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**Vol. 3**

## **CROP PRODUCTION (AGRONOMY, SOIL SCIENCE AND PLANT PHYSIOLOGY)**

**All India Coordinated  
Rice Improvement Programme  
(AICRIP)**



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## **PREFACE**

The Directorate of Rice Research (DRR), through All India Coordinated Rice Improvement Project (AICRIP), coordinates multi-disciplinary and multi-location evaluation of improved cultures, crop management practices and protection technologies across diverse ecosystems to identify situation specific technologies for enhancing and stabilizing rice production in the country. As the nodal agency, DRR has been facilitating joint planning and exchange of experimental material, conducting and monitoring the trials, data compilation, analysis and preparation of reports. Over 350 scientists from 47 funded AICRIP centres and about 60 voluntary centres representing various State Agricultural Universities, State Departments of Agriculture and ICAR Institutions participate in this collective effort.

This volume contains the results of AICRIP experiments conducted by agronomists, soil scientists and physiologists at different locations during 2013 for understanding the response of rice crop to management practices, resource conservation and climatic variations for developing efficient crop and resource management technologies that maximize the productivity and ensure higher profitability on sustainable basis. Agronomists conducted 251 trials at 56 locations on response of 55 selected advanced cultures (AVT-2) of different duration (14 groups) in various ecologies to graded levels of N application, cultural management practices for rainfed upland, evaluation of principles and long term fertility management in SRI, package of practices for aerobic rice (unpuddled), selective mechanisation and new herbicides evaluation in transplanted as well as direct seeded rice, integrated pest management (collaborative) and along with trials on impact of conservation agriculture, climate resilient management practices in different rice based cropping systems.

The Coordinated Program in Soil Science consists of 10 experiments conducted at 15 locations (total 47 trials) during 2013 covered issues related to sustaining productivity of soil and crop systems based on long term fertilizer trials, yield gap assessment and bridging the gap through site specific nutrient management, management of micronutrients in problem soils, genotypic variability for Zn and Fe content in grains and their partitioning and enrichment, nutrient and water requirement for aerobic rice cultivation, genotype response to soil acidity related problems, nutrient use efficiency and crop productivity under late planted conditions, nutrient requirement of recently released varieties and hybrids and monitoring soil and crop productivity under emerging rice production systems.

Plant Physiologists conducted 5 trials spread over 16 locations consisting of 6 funded centers 3 ICAR institutes and 7 voluntary centers. In photothermic indexing and Radiation Use Efficiency trial 20 genotypes were compared for photosensitivity and photosynthetic use efficiency at 13 centers, in second trial Influence of Silicon Solubilizers on induced stress tolerance in rice genotypes which was conducted at 14 centers and 10 genotypes were used in the study, under Screening of high temperature tolerance for terminal heat stress was studied in 9 centers in 26 genotypes, similarly Rainfed upland study was conducted in 7 centers with 17 genotypes with Anjali has national check and a new trial was conducted on Multiple abiotic stress tolerance character at 14 locations with 10 genotypes.

I compliment the cooperating scientists, technical staff and Principal Investigators of the program in the Crop Production Section for their excellent efforts in conducting the trials, monitoring, data collection and compilation, analysis and in preparation of this volume.

**B.C. VIRAKTAMATH**  
**Project Director**

# ***AGRONOMY***

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## 4. Agronomy

### SUMMARY

The Coordinated Agronomy Programme organized includes 251 experiments conducted at 56 locations during *rabi* and *kharif* seasons of 2013. Elite genotypes (55 AVT-2 cultures) belonging to 14 groups *viz.*, early hill (irrigated), medium hill (irrigated), upland hill (direct seeded), very early (direct seeded), early, mid early, medium, late, basmati, aromatic short grain, IHRT medium slender, , inland saline and coastal saline in transplanted and aerobic (direct seeded) situation were evaluated for their response to graded levels of nitrogen (NVT). In addition to these, seven trials on cultural management, three on weed management and two trials on rice based cropping systems were also conducted. Among these trials, 3 trials were conducted in collaboration with Soil Science, Entomology and Agricultural Engineering departments. Overall, the receipt of the data was 88 per cent. Results obtained from these trials are summarized here under.

#### 4.1. NITROGEN VARIETY TRIALS (NVTs)

Development of high yielding and improved varieties and hybrids is one of the major components of rice production technology. In rice growing regions, Nitrogen (N) is one of the most important yield limiting nutrients for production. Adaptation of cultivars or genotypes with high N use efficiency is a potential strategy in optimizing N requirement, lowering cost of cultivation and reducing environmental pollution. Optimization of nitrogen use not only enhances grain yield through better nutrient use efficiency but also reduces the cost of cultivation. In order to find out the production potential of promising AVT 2 cultures and their response to varying levels of nitrogen and to identify the optimum dose, these trials were organized. A total of 55 advanced cultures belonging to 14 categories were evaluated at multiple locations under three levels of nitrogen, i.e., 50,100 and 150 % of recommended dose of Nitrogen (RDN) along with standard and local checks. The doses of P and K remained constant.

Four **AVT- 2 Early hill (EH Irrigated)** cultures (IET 22269, IET 22270, IET 22272 and IET 22273) were evaluated in comparison with two standard checks (Vivekdhan 82 and RP 2421) along with the local check at seven locations. All tested entries are suitable and responded even at 150% RDN in all the locations except at Malan and Upper Shillong where in recommended doses of N did not influence grain yield. Based on grain yield over locations, IET 22273 (4.41 t/ha) was found promising. Nitrogen requirement varied from 60 to 150 kg N/ha. In most of the locations higher N response (kg grain/ kg N) was recorded with application of 100 % RDN (8.63 to 21.79 kg grain / kg N).

Three **AVT-2 Medium hill (MH Irrigated)** cultures *viz.*, IET 22281, IET 22283 and IET 22286 which were evaluated against Vivekdhan 62, HPR 2143 and local checks at seven locations *viz.*, Almora, Chatha, Khudwani, Malan, Umiam, Upper Shillong and Wangbal. The standard and local checks exhibited yield superiority over IET cultures. Most of the cultures performed well under 150% of

RDN. Among the cultures IET 22283 found promising and efficient even at 50% RDN.

Five **AVT -2 Upland hill** cultures viz., IET 22291, IET 22292, IET 22294, IET 22295 and IET 22296 were evaluated against standard checks (Vivekdhan 154 and Sukardhan 1 ) along with the local checks. Over the locations, maximum grain yield was recorded by Sukhadhan-1 (2.63 t/ha) followed by Vivekdhan -154 (2.49 t/ha) and IET 22294 (2.46 t/ha) while, nitrogen requirement was up to 120 kg N/ha and the response was maximum at 100% of RDN in most of the locations.

Three **AVT VE-DS** cultures (IET 22200, IET 22743 and IET 22744) were evaluated in comparison with standard checks (Anjali, Varalu and Vandana) and the local check at five locations (Bankura, Faizabad, Ranchi, Rewa and Tuljapur). Over the locations, maximum grain yield was recorded by IET 22743 (3.44 t/ha) followed by IET 22744 (3.40 t/ha) and 150% of RDN was found suitable. Nitrogen requirement varied from 60-120 kg N/ha at different locations.

Six **AVT-2 Early (Transplanted)** cultures viz., (IET 22752, IET 22753, IET 22763, IET 22764, IET 22767 and IET 22768) were tested against standard checks Sahbagidhan, Govind, Narendra 97 and Tulasi along with local checks of the respective locations. Based on the grain yield over the locations, maximum grain yield was recorded by IET 22752 (5.43 t/ha) followed by IET 22764 (5.15 t/ha) IET 22763 (5.11 t/ha) and IET 22753 (5.03 t/ha) and the entries were found suitable for higher N application i.e. 150% of RDN. Two cultures viz., IET 22763 and IET 22764 (E-TP), were identified as promising at 50% of RDN. Nitrogen requirement varied from 90-180 kg N/ha at different locations.

Seven **AVT-2 IME (Transplanted)** rice cultures (IET 22084, IET 22212, IET 22224, IET 22565, IET 22569, IET 22592 and IET 22598) were evaluated with five standard checks (IR 64, PA 6201, PR 113, Lalat, Sasyasree and MTU 1010) and local checks at nine locations. Over the locations, maximum grain yields were recorded at 150% of RDN and performance of IET 22212 (4.83 t/ha) and IET 22084 (4.80 t/ha) was promising .

Three **AVT-2 IM irrigated medium** cultures (IET 22379, IET 22381 and IET 22390) were evaluated against four standard checks (NDR359, KRH-2 and NDR 8002 and Akshyadhan) along with the local check at seven locations. Over the locations, standard check KRH-2 (5.24 t/ha) was found promising while, IET 22379 (5.15 t/ha) was next best entry in terms of higher grain yields. Nitrogen requirement varied from 60 to 180 kg N/ha at different locations.

One **AVT-2 Late** culture (IET 22486) was evaluated against four high yielding standard checks (Swarna, Pooja, Salivahana and Sambamahsuri) along one local check at seven locations. Over the locations, maximum grain yield was recorded by Salivahana (5.45 t/ha) followed by the local check (5.11 t/ha) of respective locations and these were found suitable at 150% of RDN at most of the locations. Nitrogen requirement varied from 120- 180 kg N/ha.

Three **AVT-1 BT (Basmati)** cultures (IET 22777, IET 22778 and IET 22787) were tested against Pusa Basmati 1, Taroari Basmati and PB 1121 (standard checks) along with local check at six locations. Maximum grain yield was recorded by IET



22787 (4.35 t/ha) followed by IET 22778 (4.30 t/ha) and IET 22747 (4.22 t/ha). Nitrogen requirement was up to 45 kg/ha at Chatha and 120 kg/ha at Nagina. Most of the IET cultures were found suitable at 100% RDN in tested locations.

Seven **AVT – ASG (Aromatic short grain)** rice cultures (IET 21261, IET 21267, IET 21835, IET 21838, IET 21840, IET 21841 and IET 21842) were evaluated along with two standard checks (Badshahbhog and Kalanamak) and a local check at six locations. Over locations, maximum grain yield was recorded by IET 21841 (3.84 t/ha) followed by IET 21261(3.71 t/ha), IET 21267 (3.67 t/ha), IET 21835 (3.60 t/ha) and IET 21838 (3.54 t/ha). At most of the locations, the test entries responded well at 100% RDN (60, 100, 120 kg N/ha at Faizabad, Nawagam and Pusa, respectively). The IET cultures were found promising and out yielded checks at most of the locations. Culture IET 22704 found promising even at 50% of RDN.

Three **IHRT medium slender** cultures viz., IET 22402, IET 22407 and IET 22410 were evaluated against Samba Mahsuri and DRRH-3 (standard checks) along with local check at six locations. Maximum mean grain yield was recorded by DRRH-3 (5.55 t/ha) followed by IET 22402 (5.49 t/ha), IET 22407 (5.44 t/ha) and IET 22410 (5.21 t/ha). All these cultures are suitable at 150% RDN in most of the locations. Nitrogen requirement varied from 150-225 kg N/ha.

Six **Aerobic cultures (direct dry seeded)** viz., IET 22699, IET 22704, IET 22716, IET 22729, IET 22731 and IET 22737 were evaluated against four standard checks (IR 36, IR 64, Rasi and MAS 946) along with the local check at five locations. Over the locations, the mean maximum grain yield was recorded by IET 22699 (4.59 t/ha) followed by IET 22704 (4.38 t/ha); IET 22729 (4.28 t/ha). Nitrogen requirement was 100% of RDN at three locations out of 5 locations(Kaul, Ludhiana and Nawagam). N requirement was up to 60 kg N/ha at Ludhiana, 100 kg N/ha at Nawagam, 120 kg N/ha at Pantnagar and Raipur and 150 kg N/ha at Kaul.

Two **AVT–AL&ISTVT** cultures viz., IET 20328 and IET 22017 were evaluated against two standard checks- CSR-23 and CSR-36 along with location specific local check at four locations (Kanpur, Karnal, Lucknow and Navsari). Over the locations, standard check CSR-36 (4.66 t/ha) followed by IET 22017 (4.52 t/ha) were found to be promising and suitable at 150% of RDN at most of the locations. Nitrogen requirement ranged from 120-180 kg N/ha across the locations.

Two **AVT-2 CSTVT** IET cultures viz., IET 21943 and IET 21944 were evaluated against two high yielding standard checks (Jaya, CSV-7-1) along with one local check at 3 locations (Lucknow, Kanpur and Navsari). Over the locations, maximum grain yield was recorded by Jaya (4.47 t/ha) followed by the local check (4.29 t/ha) and they were found suitable at 150% of RDN at Lucknow and Kanpur. Nitrogen requirement varied from 120- 180 kg N/ha, however, N response was higher at 100% RDN (120 kg N/ha) at all locations.

### **Grain Yield Efficiency Index values (GYEI)**

The GYEI helps to separate genotypes into high-yielding, stable, nutrient efficient genotypes and low yielding, unstable and nutrient inefficient genotypes. Based on the GYEI values 31 promising cultures were identified viz. **AVT- EH (Irrigated)**- IET 22269 (1.11) and IET 22273 (1.10), **AVT-1 MH (Irrigated)** - IET

22283 (1.08), **AVT-2 UH (Upland)** - IET 22294 (1.12), **AVT VE – DS** - IET 22743 (1.31) and IET 22744 (1.29), **AVT-2 E- TP** - IET 22752 (1.47), IET 22764 (1.27), IET 2275 (1.26) and IET 22763 (1.25), **AVT2 – IME (TP)** - IET 22084 (1.15), IET 22569 (1.08), IET 22592 (1.07), IET 22598 (1.07) and IET 22224 (1.03), **AVT2 – IM (TP)** - IET 22379 (1.14) and IET 22390 (1.04), **AVT2 – Late** - IET 22486 (1.03), **AVT-1BT (Basmati)** - IET 22778 (1.23), IET 22787 (1.17) and IET 22777 (1.13), **AVT ASG** - IET 21841 (1.17), IET 21261 (1.09) and IET 21842 (1.01), **NVT.1.i. IHRT MS** - IET 22402 (1.13), IET 22407 (1.07) and IET 22410 (1.02), **AVT-2 (Aerobic)** - IET 22699 (1.31), IET 22704 (1.23) and IET 22729 (1.23), **AVT-AL&ISTVT** - IET 22017 (1.01) as nutrient efficient genotypes.

Based the Grain Yield Efficiency Index values (with GYEI values higher than 1) thirty one cultures belonging to different groups were identified as promising, stable and efficient genotypes during 2013.

Further, critical analysis based on the mean percent yield reduction in 50% RDN and also cultivars recording higher grain yield over the mean of the cultures at N 50 identified four efficient genotypes viz., IET 22283 (MH-Irrigated), IET 22763 and IET 22764 (E-TP), IET 22704 (Aerobic-dry seeded) which were efficient and perform well under reduced 'N' application.

## **4.2. CULTURAL MANAGEMENT TRIALS**

### **4.2.1. Evaluation of intercropping system with different nutrient management practices in rainfed upland rice**

A trial was conducted to optimize system productivity of Rainfed rice by intercropping with legumes and nutrient management during *kharif* 2013 in split plot design with three replications. Treatments consisting of five nutrient management practices { $N_1$ : 75% recommended dose of fertilizers (RDF) of rice;  $N_2$ : 100% RDF of rice;  $N_3$ : 75% RDF of rice + 20 kg sulphur/ha;  $N_4$ : 100% RDF of rice + 20 kg sulphur/ha and  $N_5$ : 75% RDF + 5 t/ha FYM or 2 t/ha vermicompost} in main plot and five cropping systems ( $C_1$ : rice alone ;  $C_2$ : rice + soybean 3:2 replacement series;  $C_3$ : rice + urdbean 3:2 replacement series;  $C_4$ : rice + soybean 4:2 replacement series and  $C_5$ : rice + urdbean 4:2 replacement series) as sub-plot were assessed for their productivity performance in Rainfed regions at five locations viz., **Hazaribagh, Ranchi, Parbhani, Jagdhalpur, Tuljapur**. The results revealed that integration of organic manures (5 t FYM or 2 t vermicompost) with 75% RDF (Parbhani and Jagadapur) or 20 kg S to RDF (Hazaribagh) and Urdbean intercropped rice in 4:2 ratio at (Parbhani, Jagadapur and Tuljapur) or soybean intercropped rice 4:2 ratio at Ranchi have the highest rice yields.

### **4.2.2. Development of suitable agro techniques for aerobic rice**

Aerobic rice is an emerging method of rice cultivation in which crop is grown like upland rice/ wheat but with adequate inputs including water. Information is available in the country on aerobic rice production technology is very little. Hence, detailed studies have been conducted on this aspect since 2011.

#### 4.2.2. 1. Studies on suitable varieties and optimum dates of sowing for aerobic rice.

Studies were conducted during *kharif* 2013 to identify promising varieties for aerobic rice situation and their optimum sowing dates at fifteen locations. The treatments formulated by combination of three dates sowing (main plot) and eight varieties in sub-plot were tested in a three times replicated split plot design with three replications at 15 locations *viz.*, **ARI Rajendranagar, Chatha, Dharwad, Ghaghraghat, Hazaribagh, Kota, Ludhiana, Nawagam, Parbhani, Pusa, Ranchi, Rewa, Sabour, Mandya and Malan.**

Study revealed that optimum date of sowing for higher yield of aerobic rice varied with location from first fortnight of June (Rajendranagar (7 June); Chatha, Ludhiana (10 June) to second fortnight of June (Malan, (18 June), Kota (20 June), Nawagam (14-24 June), Sabour (23 June), Parbhani (24 June) and Ghaghraghat (26 June Ranchi 1 July). Among the varieties tested, MTU 1001 and MTU 1010 (Rajendranagar), DRRH 3 and PA 837 (Ghaghraghat), PA-837 (Kota, Chatha and Hazaribagh), Savanah and PA-6129 (Ludhiana), Dandi (Nawagam), Parag, Avish and Prabhava (Parbhani), PA 6444 (Pusa), Arize Tej and DRRH-3 (Ranchi), MY1001, DRRH-3 and PAC 837 (Sabour) and HPR 2143 (Malan) are promising.

#### 4. 2.2.2. Optimizing seed rate for different varieties of aerobic rice

Studies were initiated during *kharif* 2013 for identifying location specific varieties and their optimum seed rate for higher productivity of aerobic rice at thirteen locations *viz.*, **Bankura, Gaghraghat, Hathwara, Kota, Ludhiana, Sabour, Panthnagar, Parbhani, Vadgaon, Pusa, Ranchi, Varnasi and Hazaribagh .** Treatments formed by combination of four location specific varieties (six at Hazaribagh) in main plot and four seed rates (15, 25, 35 and 45 kg/ha) in sub-plot were tested in split plot design with three replications.

Data revealed that optimum seed rate for aerobic rice for higher productivity varied from 15 kg/ha (Bankura and Varanasi); 25 kg/ha (Hathwara, Sabour, Parbhani, Pusa and Ranchi) and 35 kg/ha (Gaghraghat, Kota, Vadgaon and Hazaribagh). Among the varieties tested, hybrids out yielded the varieties at all the locations. For Hathwara, Kota, Sabour, Pantnagar, Ranchi and Hazaribagh PAC 837 is promising while for Ludhiana, PR 115, at Pusa, Arize 6444, and at Vadgaon, Varanasi and Parbhani, DRRH 3 are promising.

#### 4. 2.2.3. Effect of nitrogen scheduling and dosage on aerobic rice

A trial was conducted during *kharif*- 2013 to assess the response of aerobic rice to two levels of nitrogen {120 (100%) and 150 kg/ha (125% of recommended dose)} as main plot with six schedules of N {2 splits ( $^{1/2}$  Basal +  $^{1/2}$  PI stage and  $^{1/2}$  10-12 DAE +  $^{1/2}$  PI stage), 3 splits ( $^{1/3}$  Basal +  $^{1/3}$  AT +  $^{1/3}$  PI stage, and  $^{1/3}$  10-12 DAE +  $^{1/3}$  AT +  $^{1/3}$  PI stage), 4 splits ( $^{1/4}$  Basal +  $^{1/4}$  AT stage +  $^{1/4}$  at PI stage +  $^{1/4}$  at flowering, and  $^{1/4}$  10-12 DAE +  $^{1/4}$  AT stage +  $^{1/4}$  at PI stage +  $^{1/4}$  at flowering,)} as sub-plot. The treatments that were replicated thrice were tested in split plot design at ten locations *viz.*, **Aduthurai, ARI Patna, Gangavathi, Kanpur, Kota, Mandya, Raipur, Ghaghraghat, Panthnagar and Pusa .**

The study revealed that at Gangavathi, Kanpur, Mandya and Pusa, aerobic rice responded to 125% RDN (150 kg/ha) application while at other locations (Aduthurai, Patna, Kota, Raipur, Ghagrahat, Pantnagar), RDN (120 kg/ha) was found sufficient for realizing higher aerobic rice yields. Among N schedules, 3 split application as  $\frac{1}{3}$  10-12 DAE+  $\frac{1}{3}$  AT+  $\frac{1}{3}$  PI stage at Aduthurai, Patna, and Raipur or 3 splits as  $\frac{1}{3}$  Basal+  $\frac{1}{3}$  AT+  $\frac{1}{3}$  PI at Kanpur, Pusa, and Mandya, recorded significantly higher yields and thus are promising. However, at Kota 4 split N application proved as the best N scheduling. Interaction effects (Aduthurai) revealed that when N application is low (RDN i.e. 120 kg/ha) four split application is promising while, when 125% RDN is given 3 splits was recommended.

#### ***Rabi Season:***

The trial to evaluate the effect of nitrogen scheduling and dosage on aerobic rice conducted at **Karaikal** indicated the best performance of 125% of RDF i.e 150 kg / ha N in 3 splits application (1/3 at 10-12 DAE 1/3 at AT and 1/3 at PI stage) with significantly higher grain yield (4.27 t/ha)

#### **4. 2.2.4. Integrated weed management in aerobic rice**

Experiments were conducted during *khairf* 2013 at 17 locations viz., **Bankuar, Chakdaha, Coimbatore, Dhrawad, Faizabad, Gangavathi, Hathwara, Jagdalpur, Kota, Patna, Parbhani, Pusa, Rewa, sabour, Vadgoan, Varanasi, and Adhuthurai** to assess the impact of twelve weed management practices (Pendimethalin (30EC) @1.0 kg a.i/ha (3-4) DAS + Bispyribac sodium (10%SC) @ 35 g a.i /ha (15-20DAS), Pendimethalin + 2,4 D, Na-salt (80WP) @ 0.06 kg a.i /ha (20-25 DAS), Pendimethalin (30EC) @1.0 kg a.i/ha (3-4) DAS + straw mulching @4 t/ha, Pendimethalin + (Chorimuron + Metsulfuronmethyl) (20 WP) @ 40 g. a.i/ha (25-30DAS), Butachlor (50 EC) @ 1.5 kg a.i /ha (3-4 DAS) + Bispyribac sodium @ 35 g a.i/ha (15-20 DAS), Butachlor + 2,4-D, Na-salt @ 0.06 kg a.i/ha (20-25 DAS), Butachlor + straw mulching @4 t/ha, Butachlor + (Chorimuron + Metsulfuronmethyl) @ 40 g a.i/ha (25-30 DAS), inter cropping with cow pea ( 7:1 ratio of paddy and cowpea) and incorporated at MT stage , Mechanical weeding at 20 and 45 DAS, Need based hand weeding (NBHW), Unweeded control and a location specific optional treatment) were compared in RBD with three replications.

The data revealed that in aerobic rice crop, uncontrolled weeds caused 33.9% (Sabour) to 83.2% (Faizabad) yield losses. Among the weed management options, pre- emergence application of pendimethalin or butachlor + bispyribac sodium at 15-20 DAS proved as effective as need based hand weeding (Bankura, Chakdha, Coimbatore, Dharwad, Gangavathi, Hathwara, Patna, Pusa, Sabour, and Varanasi). However, at Faizabad application of Pendimethalin + 2-4, D; at Vadgaon Pendimethalin + Chorimuron + metsulfuronmethyl and at Rewa, Pendimethalin + Ethoxysulfuron are viable best alternatives to need based hand weeding. None of the herbicide treatments exhibited crop phytotoxicity at Aduthurai, Dharwad and Vadagaon.

#### ***Rabi Season:***

Integrated weed management trial in aerobic rice with 12 treatment combination at **Puducherry** and **Pattambi** indicated the herbicide Pendimethalin @

1.5 kg a.i./ha with Chlorimuron + Metsulfuronmethyl at 40 g a.i./ha at 25-30 DAS was promising in reduction the weed problem

#### 4.2.3.1 Agronomic Studies on System of Rice Intensification (SRI)

##### Long term effects of nutrition on SRI *vis a vis* conventional flooded rice on soil fertility and sustainability in rice based cropping systems

In System of Rice Intensification (SRI), use of organics is an important component. However, their availability and costs may inhibit farmers from this practice. Hence, impacts of use of their alternatives in SRI needs to be assessed on long term basis. In order to standardize the optimum and alternate nutrition schedules for SRI in rice based cropping system, a study was initiated during *kharif* 2012 was continued during 2013 at 15 locations (**Arundhatinagar, Adhuthurai, Chatha, Coimattor, Giridhi, Khudwani, Mandya, Navsari, Nawagam, Patna, Raipur, Ranchi, Varanasi, Wangbal and DRR**). The treatments were combination of three *methods of crop establishment* {(SRI, Direct seeding using drum seeder/ dibbling of sprouted seed at 25 x 25 cm fb SRI principles (saturation method of water management, weeding with cono-weeder and fertilizer management) and normal transplanting (30-35 days old 3-4 seedlings/hill planted at 20 cm x 15 cm spacing with flooding (2-5 cm) water management) in main plot and seven nutrient management practices (F1- 100% of recommended dose of inorganic fertilizers i.e. RDF (120:60 :40 kg N:P:K/ha), F2- 50 % inorganic + 50% (equivalent of N dose) organic, F3-RDF through organic source (equivalent of N dose), F4-150% RDF, F5- without fertilizer (Control), F6- 50% inorganic + 50% through bio fertilizers and F7-location specific fertilizer management in sub-plot. The trial was conducted in split plot design with the treatments replicated thrice.

The data revealed that SRI method of establishment has resulted in significantly higher rice grain yield over direct seeded rice with SRI principles (DSRI) and transplanted rice (TPR) at all the locations. DSRI was found to have markedly higher productivity over TPR at Aduthurai, Chatha, Coimbatore, Navsari, Patna, Raipur and Wangabal while at Navasari and Giridh, TPR was promising over DSRI. Among methods of nutrition, application of 150% RDF recorded significantly higher productivity at Adhuthurai, Chatha, Mandya, Nawagam, Patna, and Raipur than all other treatments. Whereas at Ranchi, Khudwani and Navasari application of RDF (120-60-40 kg N-P-K /ha) and at Varanasi RDF as 50% fertilizers and 50% biofertilizers gave significantly better yields both in *rabi* and *kharif*. At Wangbal, RDF as 50% fertilizers + 50% organics out yielded all other treatments.

##### ***Rabi Season:***

#### 4.2.3.1(b) (R) Evaluation of principles of SRI, their contribution towards enhancement of grain yield

The study to assess the contribution of each SRI component towards productivity at **Puducherry, Arundhatinagra and Pattambi** indicated the age of seedling was the most critical component in SRI for achieving the better yields.

#### **4.2.4. Selective mechanization for enhancing production and profitability in rice.**

Farm mechanization in rice is increasingly looked at for not only reducing labour inputs, human drudgery but also at improving farm productivity. This becomes more important as labour is not only scarce but their high costs are eroding profitability in rice cultivation. Hence farm mechanization (especially transplanters) is increasingly advocated. This study during *kharif* 2013 was conducted at ten locations (**Adhuthurai, ARI- Rajendranagar, Coimbatore, Gangavathi, Giridhi, Jagdalpur, Mandya, Moncompu, Puduchery and Pattambi**) with four treatments (SMSRI: 15 day old seedling mat nursery, use of transplanter for planting and followed by SRI principles of crop management; drum seeding dibbing at 25 x 25 cm followed by SRI principles (DSRI), Normal transplanting, flood irrigation with best management practices (TP-BMP) and Normal transplanting with location specific Farmers practice (TP-FP) of the location were tested in RBD with three replications. At Jagadlpur, an additional treatment (placement of FYM) was tested in addition to the above four treatments. The results revealed that use of transplanter in SRI rice (SMSRI) have recorded the best rice yields as compared to DSRI, manual transplanted rice at Rajendranagar, Coimbatore, Mandya, Puducherry and Jagadlpur. At Aduthurai and Moncompu, transplanting with best management practices proved promising to all other methods of establishment. The reduced costs of production and higher yields under SMSRI indicate that mechanization of transplanting has enormous scope in rice cultivation.

#### ***Rabi Season:***

The studies on selective mechanization for enhancing production and profitability of rice conducted at **Moncompu** and **Poducherry** indicated the superiority of transplanting with best management at Puducherry while SMSRI at Moncompu based on the reducing the cost of cultivation.

### **4.3 WEED MANAGEMENT TRIALS**

Weed competition is one of the major constraint in achieving higher productivity particularly under direct seeding, which is being advocated due to shortage of labour, water and energy under conditions of unpredictable rainfall distribution. Therefore, it is necessary to evaluate chemical methods aimed at inhibiting the metabolic processes of weeds and considered as an important component in integrated weed management practices. The trials were conducted in more than 30 cooperating centers, located in different agro-climatic zones of India with two new herbicides and their combinations as well as direct or sequential application under different crop establishment methods to study their bio efficiency in controlling weeds.

#### **4.3.1 Evaluation of the effectiveness of new herbicides for transplanted rice**

The trial was conducted with flucetosulfuron and bispyribacsodium at 17 locations *viz.*, **Chinsurah, Coimbatore, Faizabad, Gaghraghat, Khudwani, Kota, Ludhiana, Mandya, Maruteru, Moncompu, Malan, Nawagam, Nagina, Pantnagar, Ranchi, Raipur and Varanasi in RBD design with 3 replications.** The results indicated that at all locations the herbicides, combinations and dosages could be meaningfully evaluated. The grain yield loss due to weeds ranged from 19.08 to

67.92 %. The mean grain yields were 3.06 (Ghaghraghat) to 7.10 t/ha (Mandya). At majority of the locations, Flucetosulfuron @ 25 g a.i./ha, sequential application of Flucetosulfuron followed by Bispyribacsodium (20-25 g a.i./ha) recorded grain yields comparable to need based hand weeding, mechanical weeding and weed free situation. Mechanical weeding was found to be promising and comparable with herbicidal treatments and need based hand weedings indicating the need for developing and using improved mechanical tools for weeding in future. In consideration of the grain yields and cost of weed management over the locations, with single flush of weed problem, flucetosulfuron @ 25 g a.i./ha can be effectively adopted. For locations with 2 or 3 flushes of weed problem, sequential application of flucetosulfuron followed by bispyribacsodium 20 followed by 25 g or 25 followed by 25 g a.i./ha were better depending on soil type, variety grown, intensity of weeds, stage of weeds etc. in irrigated transplanted condition.

#### ***Rabi Season:***

During rabi season flucetosulfuron @ 25 g a.i./ha and penoxulam+cyhalofopbutyl @ 120 g a.i./ha were found to be effective in reducing weeds.

#### **4.3.2 Evaluation of the effectiveness of new combination herbicide for broad-spectrum weed control in direct sown rice under puddled condition**

A trial was conducted to evaluate effectiveness of new combination herbicide (flucetosulfuron and bispyribacsodium) for broad-spectrum of weed control in direct sown rice under puddled condition at 14 locations (**ARI Rajendranagar, Coimbatore, Cuttack, Chinsurah, Moncompu, Nagina, Ludhiana, Pattambi, Puducherry, Pusa, Ragolu, Rewa, Titabar and Vadgaon**). The performance of single herbicide, flucetosulfuron at 2 doses (20 and 25 g a.i. h/a), sequential application of flucetosulfuron followed by bispyribacsodium at 2 doses (20 followed by 25 g a.i./ha and 25 followed by 25 g a.i./ha) could be meaningfully evaluated in direct sown under puddled condition. The grain yield loss due to weeds ranged from 13.06% at **Rewa** to 71.90% at **Vadgaon**. The need based hand weeding treatment recorded mean grain yield of 2.94 t/ha at **Moncompu and Pattambi** and 7.20 t/ha at **Rewa**. The non weeded control recorded minimum grain yield of 1.77 t/ha at **Vadgaon** and maximum grain yield of 6.26 t/ha at **Rewa**. Among the herbicide treatments, flucetosulfuron @ 25 g a.i./ ha was effective at 4 locations; sequential application of flucetosulfuron both 20 and 25 g a.i./ha followed by bispyribacsodium 25 g a.i./ha was effective at 6 locations. All the test herbicide treatments were effective at 6 locations. These herbicide treatments performance suggest that depending on the weed intensity, soil type, duration of variety, economics and extent of yield loss, flucetosulfuron 25 g a.i./ha or sequential application of flucetosulfuron 20 - 25 g a.i./ha followed by bispyribacsodium 25 g a.i./ha found promising for effective weed management.

#### ***Rabi Season:***

During rabi season, the herbicides flucetosulfuron @ 20/25 g a.i./ha or penoxulam + cyhalofopbutyl @ 120/135 g a.i./ha or bispyribacsodium 35 g a.i./ha were found to be effective in controlling weeds.

### 4.3.3 Integrated Pest Management – (Collaborative trial with Entomology and Pathology)

The results of the trial on Integrated Pest Management – (Collaborative trial with Entomology and Pathology) conducted at five locations (**Chinsurah, D.R.R, Jagdalpur, Ludhiana and Titabar**) indicated that the weed population and weed biomass were considerably reduced in IPM treatment plots compared to farmers practice and increased grain yields.

## 4.4 . RICE BASED CROPPING SYSTEMS

### 4.4.1. Climate Resilient Management Practices in Rice and rice based cropping systems

To address the issues of sustainability of food production on account of changing climate a combination of water and nutrient management practices were tested aimed at water and nitrogen saving. For this purpose an experiment was initiated during *kharif* 2013 at nine locations (**Patna, Coimbatore, Gangavathi, Khudwani, Karjat, Kanpur, Mandya, Puduchery and Titabar**). Eight treatments consisted {T<sub>1</sub>: split application of Nitrogen ( 50% basal+ 25% active tillering + 25% at flowering) in puddle soil; T<sub>2</sub> : Use of bio-fertilizer (*Azotobactor* and *Azolla*, to meet 50% of N requirement); T<sub>3</sub> : Crop residue retention (at least 30%) in cropping system to maintain organic carbon); T<sub>4</sub>: Non-puddled rice establishment to reduce water requirement; T<sub>5</sub>: Combination of T<sub>1</sub>+T<sub>2</sub>; T<sub>6</sub> : Combination of T<sub>1</sub>+T<sub>2</sub>+T<sub>3</sub>; T<sub>7</sub> : Combination of T<sub>2</sub>+T<sub>3</sub>+T<sub>4</sub>; and T<sub>8</sub> : Conventional method of rice cropping)} replicated four times were tested in Randomized block design.

The results revealed that non-puddled rice (NPR) as an alternative to conventional transplanted rice (TPR) at Coimbatore, Patna, Gangavathi, Khudwani, Karjat and Kanpur. However, NPR is not promising alternative to TRP at Mandya, Puducherry and Titabar. The study also proved that the yield gap between NPR and TPR got filled up by adoption of improved practices (split application of N, use of biofertilizers to substitute 50%N and crop residue retention) at Mandya and Titabar while at Puducherry; the package has made NPR to outperform TPR.

### 4.4.2. Impact of conservation agriculture on rice based cropping systems.

Rice cultivation involves intensive land preparation including puddling. Intensive tillage which leads to rapid breakdown of organic matter and its depletion. Further, the high fuel costs, difficulties in the establishment of succeeding crops including long turnover periods have given scope to reduce tillage operations. In this direction, an experiment was planned to assess the impact of conservation agriculture on rice and rice based cropping systems was initiated during *kharif* 2012. This trial also continued for 2013 at 7 locations (**Aduthurai, Coimbatore, Pantnagar, Chinsurah, Patna, Rewa and Tuljapur**). In this trial treatments included combination of three tillage systems {(Conventional tillage (CT), zero tillage (ZT) and Minimum tillage (MT)} in horizontal strips and two rice varieties (HYV and hybrid) as vertical strips were tested in strip plot design with three replications.

Irrespective of location, reduced tillage resulted in yield penalty (-3.8 to -56.5%) at all locations as compared to conventional tillage with the exception of Rewa. At Rewa, minimum tillage (MT) showed an yield advantage (12.3%) over CT. Among the rice cultivars used, hybrids have out yielded the high yielding variety



(HYV) at all the locations except at Tuljapur and Pantnagar where the differences in yield between hybrid and HYV were insignificant. At Patna and Rewa, hybrids exhibited an immense yield advantage over HYV. It is concluded that reduced tillage systems (ZT and MT) are rice productivity inhibitive and hybrids are superior in productivity to HYV.

#### **Rabi Season:**

The data of the total system ( kharif and Rabi) revealed that tillage and cultivars of preceding rice and residue retention systems had significant influence on performance of *rabi* crops at all locations. System productivity (t/ha) expressed as Rice Equivalent Yields (REY) were the highest in conventionally tilled rice-rice and rice-linseed systems with residue retention

#### **4.4.3.(R). Management of Micro Nutrients in Rice Based Cropping Systems (Agronomy and Soil Science Collaborative trial)**

The trial to evaluated micro-nutrients management in rice-wheat system at Kanpur clearly indicated superiority of micro-nutrients along with organics applied to kharif rice enhancing the total productivity of the rice-wheat system.

## 4.1 NITROGEN VARIETY TRIALS

### **Nitrogen response and N use efficiency of selected cultures from advanced variety trials.**

As a mandatory objective to identify promising cultures for nutrient use efficiency of newly developed cultures belonging to different maturity groups and ecologies were evaluated for N use efficiency for being the most important nutrient for Crop Production. In most rice growing regions, among the nutrients nitrogen (N) is one of the most yield limiting nutrients for production. Adaptation of cultivars or genotypes / identification of genotypes with higher N use efficiency is a potential strategy in optimizing 'N' requirements, lowering the cost of cultivation and reducing the environmental pollution. The main objective of these trials is to identify the AVT-2 cultures for their response to varying levels of nitrogen keeping all the other nutrients at constant optimum level. Further cultures which can perform better even at lower level of nitrogen and respond still better at higher nitrogen levels with economic rate of returns and lowering environment pollution is the key objective of this trial.

All the cultures were evaluated at three levels of N i.e. 50, 100, and 150% of recommended dose of N (RDN). These experiments were useful to study the N requirement of newly developed elite culture and their response to varying levels of 'N'. Genotypes which could perform at 50% N of RDN could be used in breeding programme to develop cultivar with high 'N' use efficiency and capable of producing high yields.

During *Kharif 2013*, 55 advanced cultures belonging to 14 categories were evaluated at multi-locations and the details of the trial and results are presented trial wise below: **Tables. 4.1 (a) to 4.1 (p).**

#### **a) AVT-2 Early hill EH (Irrigated)**

Four AVT-2 cultures (IET 22269, IET 22270, IET 22272 and IET 22273) were evaluated in comparison to two high yielding checks (Vivekdhan – 82 and RP-2421) and a local check at seven locations (**Almora, Chatha, Khudwani, Malan, Umiam, Upper Shillong and Wangbal**) under three recommended doses of N (50, 100 and 150% of RDN). The data received from seven locations are summarized and presented in **Table 4.1(a).**

Average yield of the locations ranged from 2.84 t/ha at Umiam to 5.30 t/ha at Malan. Grain yield of cultivars differed significantly at all locations. Among the cultures tested, IET 22272 (5.12 t/ha & 5.88 t/ha) at Almora and Chatha respectively, IET 22273 at Upper Shillong were found promising. The standard check, Shalimar Rice-1 at Khudwani (5.72 t/ha), IR 64 at Umiam (3.86 t/ha) and Vivekdhan 82 at Wangbal 4.14 t/ha recorded better yields than test entries. Over the locations, IET 22273 (4.41 t/ha) was found promising as compared to other test entries. Graded levels of nitrogen resulted in significantly higher grain yield at 5 locations except at Upper Shillong and Malan.

Application of 150% RDN at Almora (5.14 t/ha), Khudwani (5.68 t/ha), Chatha (5.11 t/ha) and Umiam (3.56 t/ha) recorded significantly higher grain yield than 100% RDN. Interaction effects of N level and cultures were significant only at Umiam, Chatha and Wangbal .

All tested cultivars were found suitable for 150% RDN in most of the locations except at Malan and Upper Shillong, whereas recommended doses of N did not influence grain yield. Nitrogen requirement varied from 60 to 150 kg N/ha. Among the IET cultures, IET 22273 (4.41 t/ha) was found promising over other test entries.

#### **b) AVT-2 Medium hill MH (Irrigated)**

A total of three AVT-2 medium hill irrigated cultures (IET 22281, IET 22283 and IET 22286) were evaluated in comparison to two standard checks (Vivekdhan 62 and HPR 2143) along with one local check at seven locations (**Almora, Chatha, Khudwani, Malan, Umiam, Upper Shillong and Wangbal**) under 3 levels of N. The data received from these locations are presented in **Table 4.1 (b)** and summarized below:

Grain yield differences among cultivars were significant at all locations except at Upper Shillong. At Khudwani, local check Shalimar Rice – 1 (4.86 t/ha) and Vivekdhan 62 (5.68 t/ha) at Almora; PC-15 (6.24 t/ha) at Chatha, Shasharang-1 (4.42 t/ha) at Umiam and Vivekdhan -62 (4.16 t/ha) at Wangbal; gave significantly higher grain yield than all other cultures. At Malan, the culture IET 22283 gave significantly higher grain yield as compared to other entries.

Most of the cultures performed well under 150% of RDN. Among the IET cultures, IET 22283 (4.99 t/ha) found next best cultivar after standard checks. Application of 150% of RDN gave significantly higher grain yield at Chatha (5.76 t/ha); Khudwani (4.78 t/ha); and Wangbal (3.84 t/ha) indicating better response of cultivars to higher nitrogen application. However, the differences were not significant at Upper Shillong and Malan. Interaction effects of varieties and N levels were significant at only two locations i.e. Chatha and Wangbal wherein maximum grain yield of 6.69 t/ha with PC-15 at 150% RDN at Chatha, while Vivekdhan – 62 was promising at Wangbal with 150% of RDN. Nitrogen response (kg grain / kg N) was higher at 100 % RDN as compared to 150% RDN at all the locations. At most of the locations performance of cultivars was promising at higher N dose. Performance of IET 22283 and IET 22281 was found superior at 150% of RDN as compared to rest of the entries.

#### **c) AVT -2 Upland hill**

Five upland hill cultures (IET 22291, IET 22292, IET 22294, IET 22295 and IET 22296) at six locations (**Almora, Chatha, Khudwani, Malan, Umiam and Upper Shillong**) in sandy to clay loam soils in comparison to standard checks (Vivekdhan 154 and Sukardhan 1) and the local check of locations under three graded doses of 50, 100 and 150% of RDN. The entries were tested at an elevation of 871 – 1250 MSL at different location. At Upper Shillong only one culture IET – 22294 was tested along with local checks. The details and data received from these locations are summarized and presented in **Table 4.1 (c)**.

The grain yield differences of upland hill cultures were significant at all locations with grain yield range of (1.26 t/ha to 3.35 t/ha) at Almora, Chatha and Upper Shillong. At most of the locations, performance of standard checks and local checks were promising over IET cultures. Over the locations, among the cultures Sukhardhan – 1 (2.63 t/ha) followed by Vivekdhani-154 (2.49 t/ha) and IET 22294 (2.46 t/ha) found promising over the cultures. Significant response to recommended dose of nitrogen was observed at Almora, Khudwani, Chatha and Umiam. Each successive increase of 50% RDN up to 150% RDN increased grain yield significantly only at Chatha and Khudwani. Response to N was highest with RDN at all the locations with maximum N response of 28.50 (kg grain / kg N) at Umiam. Interaction effects of varieties and N level were significant at Chatha, Umiam and Upper Shillong. Nitrogen requirement was up to 120 kg N/ha and response was maximum at 100% of RDN in most of the locations.

#### **d) AVT VE – DS**

Three rice cultures belonging to AVT VE – DS (IET 22020, IET 22743 and IET 22744) were evaluated along with Anjali, Varalu, Vandana, and one local check under three graded levels of nitrogen 50,100 and 150% of RDN at five locations **Bankura, Faizabad, Ranchi, Rewa and Tuljapur**. The local checks were Sidhanta at Bankura, PS 3 at Rewa, NDR 97 at Faizabad, BD 108 at Ranchi and TJP -48 and MAULS-11 at Tuljapur. The data received from these locations are presented in **Table 4.1(d)** and summarized below

Grain yield differences among cultivars were significant at all five locations. IET cultures recorded significantly higher grain yields (IET 22020 at Bankura, IET 22743 at Rewa and Faizabad, IET 22743 at Ranchi) over standard and local checks. However, the performance of local check – TJP-48 was significant at Tuljapur (1.73 t/ha). Mean maximum grain yield of 3.44 t/ha was recorded by IET 22743 followed by IET 22744. Incremental doses of Nitrogen influenced grain yield significantly at Bankura, Rewa, Faizabad, Ranchi except Tuljapur. Application of 150% of RDN recorded significantly higher grain yield at Bankura (3.60t/ha), Rewa (7.91t/ha) and Faizabad (3.12 t/ha) while 100% of RDN was significant at Ranchi (1.94 t/ha). The N response was higher (34.36, 18.87, 6.03 and 5.60 kg grain / kg N) at 100% RDN at Bankura, Rewa, Ranchi and Tuljapur as compared to 150% RDN. Interaction effects between N levels x cultures were significant only at Faizabad and Ranchi wherein, IET 22744 (3.65 t/ha) and IET 22743 (2.77 t/ha) respectively found promising over 100% of RDN (80:40:20 kg NPK/ha). Over locations, maximum grain yield was recorded by IET 22743 (3.44 t/ha) followed by IET 22744 (3.40 t/ha), and suitable at 150% of RDN. Nitrogen requirement varied from 60-120 kg N/ha at different locations.

#### **f) AVT-2 Early (Transplanted)**

Six AVT-2 early cultures (IET 22752, IET 22753, IET 22763, IET 22764, IET 22767 and IET 22768) were evaluated for their response to N and grain yield in comparison to Sahbagidhan, Govind, Narendra 97 and Tulasi as standard checks and local check at nine locations (**Coimbatore, Cuttack, Faizabad, Mandya, Puducherry, Karjat, Nawagam, Ranchi and Raipur**) at three graded levels of N (50,100 and 150% of RDN). Recommended N application varied from 60 – 120 kg

N/ha in test locations. The details and data received from these locations are summarized and presented in **Table 4. (f)**.

Grain yield differences among tested cultures were significant at all locations. Significantly mean maximum grain yield was recorded by IET 22764 and IET 22752 (6.56 and 6.33 t/ha) at Coimbatore, IET 27752 at Cuttack (5.80 t/ha), Faizabad (6.13 t/ha), Mandya (6.38 t/ha), Nawagam (5.62 t/ha) and Raipur (4.23 t/ha); IET 22764 (6.10 t/ha) followed by IET 22752 (6.05 t/ha) at Karjat, IET 22763 (7.37 t/ha) followed by IET 22764 (7.37 t/ha) at Puduchery over rest of the entries. Over the locations, the performance of IET 22752 (5.43 t/ha) was superior followed by IET 22764 (5.15 t/ha), IET 22763 (5.11 t/ha) and IET 22753 (5.03 t/ha) over other cultures as well as standard and local checks. Graded levels of nitrogen significantly influenced the grain yield at all locations. Grain yield increased significantly with increasing level of nitrogen up to 100 % RDN i.e. 100 kg N/ha at Coimbatore (6.14 t/ha); 60 kg N/ha at Cuttack (4.18 t/ha), 120 kg N/ha at Puduchery (5.16 t/ha) and Ranchi (5.61 t/ha) and up to 150 % RDN i.e., 180 kg N /ha at faizabad (5.15 t/ha), 150 kg N/ha at Mandya (5.98 t/ha) and Karjat (5.90 t/ha); 120 kg N/ha at Nawagam (4.22 t/ha) and Raipur (3.82 t/ha). Interaction between cultures x N levels for grain yield were significantly at Raipur, Faizabad, Karjat and Ranchi. Application of 150% of RDN recorded higher N response (kg grain / kg N) as compared to 150% of RDN at most of the locations. Based on the mean of the locations, maximum grain yield was recorded by IET 22752 (5.43 t/ha) followed by IET 22764 (5.15 t/ha) IET 22763 (5.11 t/ha) and IET 22753 (5.03 t/ha) and suitable for higher N application i.e. 150% of RDN. Nitrogen requirement ranges from 90-180 kg N/ha at different locations.

#### **g) AVT2-Irrigated mid early (TP)**

In this trial seven AVT-2 IME cultures (IET 22084, IET 22212, IET 22224, IET 22565, IET 22569, IET 22592 and IET 22598) new evaluated along with six standard checks (IR 64, PA 6201, PR113, Lalat, Sasyasree and MTU 1010) and one local check at nine locations (**Aduthurai, Chinsurah, Chiplima, Faizabad, Gangavathi, Karjat, Navsari, Pattambi and Nagina**). The data received from these locations are presented in **Table 4.1(g)** and salient findings are summarized below.

Grain yield differences among cultures were significant at seven out of eight locations. Among the cultures, IET 22084 at Faizabad (6.43 t/ha) and Chinsurah (4.72 t/ha) was found to be significantly superior to rest of the entries. While IET 22598 (4.37 t/ha) IET 22224 (4.29 t/ha) and IET 22565 (4.37 t/ha) were found to be on par and significantly superior to rest of the entries at Chiplima. The performance of standard and local checks were promising at other locations.

Incremental doses of nitrogen influenced grain yield significantly at all the locations. Application of 150% of RDN recorded significantly higher grain yield at Aduthurai (6.44 t/ha), Chiplima (5.44 t/ha), Faizabad (6.35 t/ha), Gangavathi (5.75 t/ha), Karjat (5.66 t/ha), Navsari (4.31 t/ha) and Nagina (5.04 t/ha) while at Pattambi (3.99 t/ha) and Chisurah (4.15 t/ha) application of 100% of RDN found promising. Interaction effects between N levels X IET cultures were significant only at Chinsurah (clay loam soil) and Faizabad (sandy loam) where in the cultures performed well at 100% RDF at Chinsurah and 150 % RDF at Faizabad.

Over the locations, the performance of PA 6201 (5.24 t/ha) was promising followed by IET 2212 (4.83 t/ha); IET 22084 (4.80 t /ha) and IET 22569 which are tested at all locations.

#### **h) AVT-2 IM irrigated medium (transplanted)**

Three **AVT-2 IM** cultures (IET 22379, IET 22381 and IET 22390 and) were evaluated at seven locations viz., **Chiplima** (sandy clay loam), **Chinsurah** (Clay loam), **Faizabad** (sandy loam), **Kaul** (Clay loam), **ARI-Patna** (Clay), **Pantnagar** (silt loam) and **Titabar** (Silty clay loam) along with standard checks (NDR 359, KRH-2, NDR 8002 and Akshayadhan) and one local check under three recommended doses of N (50, 100 and 150% RDN). The details and data received from these locations are summarized and presented in **Table 4.1(h)**.

The cultivars differed significantly for grain yield at all locations. The mean maximum grain yield was recorded with IET 22379 at Faizabad (7.45 t/ha), Kaul (6.75 t/ha), whereas standard checks viz., KRH – 2 at Chinsurah (5.94 t/ha), Patna (6.08 t/ha); NDR 8002 at Titabar (5.24 t/ha), Akshyadhan at Chiplima (4.38 t/ha) found promising with higher grain yield over rest of the entries.

Nitrogen application up to 100% of RDN significantly increased grain yield at Chinsurah (6.11 t/ha); Kaul (6.31 t/ha) while 150% of RDF application at Chiplima (5.64 t/ha), Faizabad (6.74 t/ha), Patna (5.42 t/ha), Pantnagar (4.13 t/ha) and Titabar (5.43 t/ha) with maximum N response ( kg grain/kg N). At most of the locations (5 out of 7) 100% RDN gave higher N response (kg grain /kg N) over 150% RDN application. Interaction effect between cultivars x N levels for grain yield were significant at Chiplima, Faizabad, Patna and cultivars showed better performance at higher 'N' level i.e. 150% of RDN.

Over the locations, standar check KRH-2 (5.24 t/ha) was found promising while culture IET 22379 (5.15 t/ha) was next best promising in terms of recording maximum yields. Nitrogen requirement varied from 60 to 180 kg N/ha at different locations.

#### **i) AVT 2 - Late**

The grain yield performance and response to nitrogen levels for one selected IET culture (IET 22486) was evaluated against four standard checks (Swarna, Pooja, Salivahana, Samba Mahsuri) along with one local check under three graded levels of nitrogen (50,100 and 150 % of recommended N) at seven locations viz., **Aduthurai, Chiplima, Chinsurah, Karjat, Mandya, Pusa and Patna**. The data received from these locations are summarized and presented in **Table 4.1 (i)**.

The cultivars differed significantly for grain yield at all locations. The mean maximum grain yield was recorded by standard check – Swarna at Adhuthrai (6.16 t/ha) followed by IET culture i.e. IET 22486 (6.12 t/ha), Pooja (6.76 t/ha) at Chinsurah, Salivahana (7.45 t/ha & 3.93 t/ha) at Mandya and Pusa, Swarna (6.35 t/ha) at Patna and IET 22480 (4.28 t/ha) at Karjat.

Nitrogen fertilizer dose significantly influenced the grain yield at all locations and the increase in grain yield with 150% of RDN found significant at all locations. Interaction effects between cultivars x N levels for grain yield were significant only

at Patna with higher yield (7.27 t/ha) obtained by Swarna under 180 kg N/ha followed by Rajendra Mahsuri at same nitrogen level indicating higher 'N' requirement for these entries

Over the locations, maximum grain yield was recorded by Salivahana (5.45 t/ha) followed by local check (5.11 t/ha) of respective location and are suitable at 150% of RDN at most of the locations. Nitrogen requirement varied from 120- 180 kg N/ha.

#### **(j) AVT-1 BT (Basmati)**

Three AVT Basmati cultures (IET 22777, IET 22778 and IET 22787) were evaluated against three standard checks (Pusa Basmati 1, Taroari Basmati and Pusa Basmati 1121 (PB 1121)) and a local check under three N levels i.e (50, 100 and 150 % RDN) at six locations. The data received from six locations (**Chatha, Kaul, Pantnagar, Nagina, New Delhi and Ludhiana**) are summarized and presented in **Table 4.1 (j)**.

Grain yield differences among varieties were significant at all the six locations. The culture IET 22778 (5.78 t/ha) at IARI-New Delhi, IET 22777 and IET 22778 (4.77 and 4.65 t/ha) at Kaul; IET 22787 and IET 22777 (4.13 and 4.01 t/ha) at Patnagar and IET 22777 (4.18 t/ha) at Nagina were found superior, while at Chatha standard check - Pusa 1121 gave significantly higher yield than all other basmati varieties. Significant influence of graded nitrogen on basmati cultivars was seen at all locations except at Ludhiana. At Chatha and Pantnagar application of 150 % of RDN gave significantly higher yield, while the response was only upto 100 % of RDN at New Delhi, Kaul and Nagina. Interaction effect of basmati cultures and nitrogen dose were significant only at Chatha and Pantnagar out of six locations for grain yield and yield attributes (panicle/m<sup>2</sup> and panicle weight). However, panicle number differed significantly due to interaction at Chatha and Panicle weight at Nagina. At all the locations, 100 % RDN gave higher N response over application of 150 % RDN. Over the locations maximum grain yield was recorded by IET 22787 (4.35 t/ha) followed by IET 22778 (4.30 t/ha) and IET 22747 (4.22 t/ha) over other test entries. Nitrogen requirement was upto 45 kg/ha at Chatha 120 kg/ha at Nagina. Most of the IET cultures are suitable for 100% RDN at different locations.

#### **k) AVT – ASG (Aromatic short grain)**

In AVT aromatic short grain trial, seven rice cultures (IET 21261, IET 21267, IET 21835, IET 21838, IET 21840, IET 21841 and IET 21842) along with Badshah bhog, Kalanamak and one local check of locations were evaluated under three graded levels of nitrogen 50,100 and 150% of RDN at six locations **Chiplima, Faizabad, Karjat, Pusa, Nawagam, Maruteru and Raipur**. The local checks, Nua Acharmati at Chiplima, NDR 6093 at Faizabad, Indrayani at Karjat, Krishnakamod at Nawagam, Rajendra Kasturi at Pusa and Dubraj at Raipur were compared with IET cultures. The data received from these locations are presented in **Table 4.1(k)**.

Grain yield differences among cultivars were significant at all six locations. IET 21261 recorded significantly higher grain yield (3.90 t/ha) at Pusa, IET 21841 followed by IET 21840, IET 21261 and IET 21267 (4.49, 4.30 4.28 and 4.26 t/ha) at Nawagam , IET 21841 and IET21835 (3.43 and 3.24 t/ha) at Raipur; IET 21835 (4.85

t/ha) at Chiplima and IET 21267 and IET 212841 (4.56 and 4.41 t/ha) at Faizabad. However, the performance of local check- Indrayani (3.96 t/ha) was significant at Karjat. Mean over the locations, maximum grain yield of 3.84 t/ha was recorded by IET21841 followed by IET 21261 (3.71 t/ha), IET 21267 (3.67 t/ha) IET 21835 (3.60 t/ha). Incremental doses of Nitrogen influenced grain yield significantly at all locations except at Nawagam. Application of 150% of RDN recorded significantly higher grain yield at Chiplima (5.61 t/ha), Karjat (3.87 t/ha) and Raipur (2.96 t/ha), while 100% of RDN was significant at Pusa (3.73 t/ha) and Faizabad (4.40 t/ha). The N response was higher (26.37, 36.06, 17.23, 18.79, 5.77 and 9.76 kg grain / kg N) at Chiplima, Faizabad, Karjat, Pusa, Nawagam and Raipur respectively with application of 100% RDN. Interaction effects between N levels x cultures were significant only at Faizabad, Karjat, Nawagam and Raipur wherein IET cultures along with 100% RDN found promising interms of higher grain yields.

Over locations, mean maximum grain yield was recorded by IET 21841 (3.84 t/ha) followed by IET 21261 (3.71 t/ha), IET 21267 (3.67 t/ha); IET 21835 (3.60 t/ha) and IET 21838 (3.54 t/ha). At most of the locations, the test entries responded well at 100% RDN (60, 100, 120 kg N/ha at Faziabad, Nawagam and Pusa respectively).

#### **1) AVT – HR Medium slender**

The grain yield performance and N response of three selected IHRT medium slender cultures (IET 22402, IET 22407 and IET 22410) were evaluated against standard checks (Samba Mahsuri and DRRH-3) along with the local check at six locations (**Mandya, Maruteru, Karjat, Raipur, Kaul and Nagina**) under three levels of nitrogen i.e. 50, 100, 150 % of RDN. The details and data recorded from these locations are summarized and presented in **Table 4.1(I)**.

Cultivars differed significantly for grain yield at all locations and mean maximum grain yield was recorded by IET 22402 at Raipur and Kaul (4.96 and 6.73 t/ha); IET 22410 (5.56 t/ha) followed by IET 22402 (5.50 t/ha) at Nagina. However, standard checks were promising at other locations.

Incremental doses of nitrogen significantly increased grain yield at all centers except Maruteru. Grain yield increased significantly up to 225 kg N/ha at Nagina (6.44 t/ha); 187.5 kg N/ha at Mandya; 180 kg N/ha at Raipur; 150 kg N/ha at Karjat (6.75 t/ha) and Kaul (6.67 t/ha); indicating higher N requirements of these entries. N response (kg grain / kg N) applied was higher with recommended dose of N as compared to 150% of RDN at all location except at Mandya (10.17 kg grain /kg N). Interaction effects between cultivar x N level on grain yield were non-significant at all locations for grain yield except at Karjat and Raipur. At Kaul increase in N beyond 100 % of RDN did not increase grain yield in all cultivars. However, at other locations each successive increase of 50 % RDN significantly increased grain yield.

In this IHRT medium slender trial, over the locations maximum grain yield was recorded by DRRH-3 (5.55 t/ha) followed by IET 22402 (5.49 t/ha), IET 22407 (5.44 t/ha) and IET 22410 (5.21 t/ha). All these cultures are suitable at 150% RDN in most of the locations. Nitrogen requirement varied from 150-225 kg N/ha.



#### **m) AVT-2 (Aerobic) – Direct Seeded**

AVT-2 Aerobic cultures evaluation trial was conducted at five locations viz., **Kaul** (clay loam), **Ludhiana** (Sandy loam), **Raipur** (clay soil), **Pantnagar** (silt loam) and **Nawagam** (Clay loam) to evaluate the performance of six selected AVT-2 culture, (IET 22699, IET 22704, IET 22716, IET 22729, IET 22731 and IET 22737) in comparison to high yielding cultivars (IR 36, IR 64, Rasi and MAS 946) and along with the local check of respective locations under three recommended doses of N (RDN) i.e. 80 kg N/ha at Raipur, 100 kg N/ha at Nawagam; 120 kg N/ha at Ludhiana, Pantnagar; and 150 kg N/ha at Kaul. The data received from these locations are summarized and presented in **Table 4.1 (m)**.

Grain yields of the test cultures differed significantly at all locations. IET 22704 culture found promising and recorded significantly higher grain yield (4.09 t/ha) at Kaul, IET 22699 (8.12 t/ha) at Ludhiana; IET 22716 (3.53 t/ha) at Raipur. However, at Pantnagar and Nawagam the grain yields recorded by local IET 22729 (3.65 & 4.16 t/ha) was significantly on par with local checks (PD -12 and Dandi) of respective locations. Significant response to graded dose of nitrogen (RDN) application was observed at all the locations except Ludhiana.

Application of 100 % of RDF was promising at Nawagam and Kaul (3.59 and 3.29 t/ha). while 150 % of RDF gave significant higher grain yield at Raipur and Pantnagar (3.74 and 4.11 t/ha). Response to N was highest with RDN at all the locations except Ludhiana. Interaction effect of aerobic cultures and nitrogen were non-significant at all locations.

The mean maximum grain yield was recorded by IET 22699 (4.59 t/ha) followed by IET 22704 (4.38 t/ha); IET 22729 (4.28 t/ha) across the locations. Nitrogen requirement was 100% of RDN at three locations (Kaul, Ludhiana and Nawagam) out of five locations. N requirement was up to 60 kg N/ha at Ludhiana, 100 kg N/ha at Nawagam, 120 kg N/ha at Pantnagar, Raipur and 150 kg N/ha at Kaul.

#### **n) AVT-AL&ISTVT**

The performance of two AVT-AL&ISTVT (IET 20328 and IET 22017) cultures and their 'N' response were evaluated against two standard checks (CSR-23 and CSR-36) along with the local check at four locations i.e. **Kanpur, Karnal, Lucknow and Navsari** under three graded levels of Nitrogen (50,100 and 150 % of recommended N). The grain yield and yield attributes data received from these locations are summarized and presented in **Table 4.1 (n)**.

The effect of cultivars as well as graded levels of Nitrogen differed significantly at all locations except Lucknow. Interaction effect of cultivars x N levels differed significantly only at Navsari. The mean maximum grain yield was recorded by IET 22017 (5.63 t/ha) at Karnal, while local checks – Dandi (5.63 t/ha) at Navsari, Usar-3 (3.96 t/ha) at Kanpur recorded higher grain yield over rest of the entries.

The increase in grain yield with 150% of RDN (180 kg N/ha) at Kanpur (4.06 t/ha); followed Karnal (5.25 t/ha) while, 100% of RDN (120 kg/ha) at Navasari was significant with better N response (kg grain /kg Nitrogen) at 100% RDN at all locations.

Over the locations, standard check CSR-36 (4.66 t/ha) followed by IET 22017 (4.52 t/ha) are found promising and suitable at 150% of RDN at most of the locations. Nitrogen requirement ranged from 120-180 kg N/ha across the locations.

**o) AVT-2 CSTVT**

The grain yield performance two selected IET cultures (IET 21943 and IET 21944) and their response to nitrogen levels was evaluated against two standard checks (CSV -7-1, Jaya) along with one local check under three graded levels of nitrogen (50,100 and 150 % of recommended N) at eight locations. **Lucknow, Kanpur and Navsari.** The data received from these locations are summarized and presented in **Table 4.1 (o).**

The cultivars differed significantly for grain yield at all locations. The mean maximum grain yield was recorded by Jaya (3.99 t/ha and 4.28 t/ha) at Lucknow and Kanpur while local check – Dhani at Navsari (5.56 t/ha recorded higher grain yield over rest of the cultures.

Nitrogen fertilizer dose significantly influenced the grain yield at all locations and the increase in grain yield with 150% of RDN at Lucknow and Kanpur (3.16 t/ha and 4.29 t/ha) except at Navasari wherein 100% of RDN (4.93 t/ha) on par with 150% of RDN. Interaction effects between cultivars x N levels for grain yield were non significant at all locations.

Mean over the locations, maximum grain yield was recorded by Jaya (4.47 t/ha) followed by local check (4.29 t/ha) and are suitable at 150% of RDN at Lucknow and Kanpur. Nitrogen requirement varied from 120- 180 kg N/ha, however, N response was higher at 100% RDN (120 kg N/ha) at all locations.

**Gain Yield Efficiency Index values (GYEI)**

Grain yield is the best measure of evaluation of given genotype in the screening experiments. Field screening results can be interpreted using the grain yield efficiency index (GYEI) for identifying efficient, stable, suitable and promising cultures.

Grain yield efficiency Index (GYEI) was computed for genotype evaluation using the following formula.

$$\text{GYEI} = \frac{(\text{Yield at low nutrient level}) (\text{Yield at high nutrient level})}{(\text{Experimental mean yield at low nutrient level}) \times (\text{Experimental mean yield at high nutrient level})}$$

Tolerant genotypes have a GYEI of 1 or higher and the susceptible ones have a GYEI in the range of 0 to 0.50 and the genotypes between these two limits are considered intermediate types. The results of these trials, if utilized meticulously not only aid to develop promising cultivars but also to reduce the cost of cultivation in rice production.

Based on the GYEI values promising cultivars in different groups is furnished below

**Table 4.1.2 (a): Nitrogen use efficient genotypes in different groups of AVT- 2.**

Groups	Nitrogen use efficient cultures	Groups	Nitrogen use efficient cultures
<b>AVT- EH (Irrigated)</b>	IET 22269 (1.11) & IET 22273 (1.10)	<b>AVT2 – Late</b>	IET 22486 (1.03)
<b>AVT-1 MH (Irrigated)</b>	IET 22283 (1.08)	<b>AVT-1BT (Basmati)</b>	IET 22778 (1.23), IET 22787 (1.17) & IET 22777 (1.13)
<b>AVT-2 UH (Upland)</b>	IET 22294 (1.12)	<b>AVT ASG</b>	IET 21841 (1.17), IET 21261 (1.09) & IET 21842 (1.01)
<b>AVT VE - DS</b>	IET 22743 (1.31) & IET 22744 (1.29)	<b>NVT.1.i. HR MS</b>	IET 22402 (1.13), IET 22407 (1.07) & IET 22410 (1.02)
<b>AVT-2 E- TP</b>	IET 22752 (1.47), IET 27753 (1.26), IET 22764 (1.27) & IET 22763 (1.25)	<b>AVT-2 (Aerobic)</b>	IET 22699 (1.31), IET 22704 (1.23) & IET 22729 (1.23)
<b>AVT2 – IME (TP)</b>	IET 22084 (1.15), IET 22569 (1.08), IET 22592 (1.07), IET 22598 (1.07) & IET 22224 (1.03)	<b>AVT- AL&amp;ISTVT</b>	IET 22017 (1.01)
<b>AVT2 – IM (TP)</b>	IET 22379 (1.14), IET 22390 (1.04)	<b>AVT- 2 CSTVT</b>	NIL

Based the GYEI values, thirty one cultures belonging to different groups were identified as promising, stable and efficient genotypes during 2013. Such N use efficient genotypes can be used effectively in breeding programme to develop agronomically suitable cultivars for different rice producing regions.

Further, critical analysis of the data based on the yield penalty at 50% of RDN over 100% RDN indicated superiority of the IET 22283 (MH-irrigated), IET 22763 and IET 22764 (Early TP) and IET 22704 (Aerobic-Direct seeded) to other cultures **4.1.2.(b)**. These culture were also found promising based on the mean higher average grain yield of cultivars at 50% of RDN (**Table 4.1.2.( c)**) over rest of the cultures tested in the group. Hence, these four cultures are identified as most promising interms of higher nutrient efficiencient and stable genotypes.

**Table-4.1(a): Summary of data on grain yield and ancillary characteres of selected AVT2- early hill (irrigated) cultures grown under tranpslanted conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.**

N-levels	Varieties	ALMORA					KHUDWANI					CHATHA				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)
N1	V1	4.43	15	280	2.39		3.47	21	280	2.04		-	-	-	-	
	V2	3.64	21	275	1.88		3.53	20	264	1.89		-	-	-	-	
	V3	4.50	12	233	2.71		4.08	17	287	2.03		5.12	5	210	2.25	
	V4	4.23	18	270	2.32		4.14	16	305	2.49		4.03	9	191	2.03	
	V5	4.54	11	192	3.89		4.04	18	303	2.32		1.87	12	100	1.50	
	V6	3.93	20	277	1.85		3.59	19	298	2.00		-	-	-	-	
	V7	4.00	19	253	2.73		4.53	15	311	2.34		4.52	8	202	2.15	
N2	V1	4.40	16	302	2.28	-0.64	4.68	14	327	2.44	20.23	-	-	-	-	-
	V2	4.27	17	277	1.87	12.64	4.72	13	307	2.25	19.78	-	-	-	-	-
	V3	5.21	5	268	2.47	14.11	5.38	8	334	2.43	21.55	5.90	2	235	2.31	15.60
	V4	4.97	7	267	2.60	14.75	5.42	7	357	3.03	21.44	4.72	7	200	2.29	13.73
	V5	4.98	6	208	3.88	8.72	5.48	6	353	2.81	23.99	2.51	11	125	1.69	12.67
	V6	4.45	14	318	2.10	10.42	4.73	12	348	2.39	18.98					
	V7	4.78	10	260	2.69	15.53	6.12	2	363	2.84	26.55	5.12	5	211	2.36	12.00
N3	V1	4.87	8	317	2.23	4.39	5.04	11	361	2.68	13.11	-	-	-	-	-
	V2	4.50	13	285	2.09	8.63	5.15	10	339	2.47	13.46	-	-	-	-	-
	V3	5.64	1	332	2.90	11.36	5.94	4	369	2.67	15.52	6.61	1	251	2.55	14.87
	V4	5.46	2	292	2.53	12.28	6.02	3	393	3.33	15.65	5.33	4	215	2.50	13.00
	V5	5.35	3	253	3.51	8.08	5.88	5	389	3.09	15.32	2.71	10	130	1.86	8.33
	V6	4.84	9	298	2.03	9.08	5.22	9	384	2.63	13.63					
	V7	5.33	4	268	2.58	13.26	6.51	1	401	3.12	16.52	5.79	3	225	2.54	12.67
C.D.(0.05) N at same V		NS		NS	NS		NS		NS	NS		0.04		1.08	NS	
V at same N		NS		NS	NS		NS		NS	NS		0.04		0.97	NS	
<b>Means of N levels:</b>																
N1		4.18		254	2.54		3.91		292	2.16		3.89		176	1.98	
N2		4.72		271	2.56	8.99	5.22		341	2.60	21.79	4.56		193	2.16	13.50
N3		5.14		292	2.55	7.99	5.68		377	2.86	14.74	5.11		205	2.36	12.22
<b>C.D.(0.05)</b>		0.28		NS	NS		0.38		11.04	0.05		0.03		0.42	0.03	
<b>C.V.(%)</b>		10.92		21.05	14.61		14.05		5.98	3.47		0.92		0.3	2.15	

Table 4.1(a) (Contd...)

N-levels	Varieties	ALMORA					KHUDWANI					CHATHA				
		Grain Yield (t/ha)	Rank	Panic le/m <sup>2</sup> (No.)	Panic le Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panic le/m <sup>2</sup> (No.)	Panic le Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panic le/m <sup>2</sup> (No.)	Panic le Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)
<b>Mean of varieties:</b>																
	V1	4.56	5	299	2.30	1.88	4.40	7	322	2.38	16.67	-	-	-	-	-
	V2	4.13	7	279	1.95	10.63	4.47	6	303	2.20	16.62	-	-	-	-	-
	V3	5.12	1	278	2.69	12.74	5.13	3	330	2.38	18.54	5.88	1	232	2.37	15.23
	V4	4.89	3	276	2.48	13.51	5.19	2	352	2.95	18.55	4.70	3	202	2.27	13.37
	V5	4.96	2	218	3.76	8.40	5.13	4	348	2.74	19.66	2.36	4	118	1.68	10.50
	V6	4.41	6	298	2.00	9.75	4.51	5	343	2.34	16.30	-	-	-	-	-
	V7	4.70	4	261	2.67	14.40	5.72	1	358	2.76		5.14	2	213	2.35	12.33
	<b>C.D.(0.05)</b>	0.37		22	0.2		0.44		17.06	0.23		0.02		0.63	0.04	
	<b>C.V.(%)</b>	8.32		8.61	8.28		9.31		5.32	9.5		0.53		0.33	2.05	
	<b>Expt. Mean</b>	<b>4.68</b>		<b>273</b>	<b>2.55</b>		<b>4.94</b>		<b>337</b>	<b>2.54</b>		<b>4.52</b>		<b>191</b>	<b>2.17</b>	
	Soil type	-										loam				
	pH	-										7.24				
	<b>N - levels (kg/ha)</b>															
	N1	50					60					50				
	N2	100					120					100				
	N3	150					180					150				
	Recommended N:P:K (kg/ha)															
	<b>Varieties</b>															
	V1	IET 22269					IET 22269					-				
	V2	IET 22270					IET 22270					-				
	V3	IET 22272					IET 22272					IET 22272				
	V4	IET 22273					IET 22273					IET 22273				
	V5	Vivekdhan 82					Vivekdhan 82					Vivekdhan 82				
	V6	RP 2421					RP 2421					RP 2421				
	V7	Local check (Vivekdhan 85)					Local check (Shalimar Rice 1)					Local check (IET 1410)				
	Available NPK in Soil (kg/ha)	-					-					178.6:12.4:112.7				

N1 = 50% of recommended N dose; N2 = 100% of recommended N dose; N3 = 150% of recommended N dose

Table 4.1(a) (Contd...)

N-levels	Varieties	MALAN					UMIAM					UPPER SHILLONG				
		Grain Yield (t/ha)	Rank	Panicl e/m <sup>2</sup> (No.)	Panic le Weigh t (g)	N res. (kg grain/kg N) (Base level 45 kg N/ha)	Grain Yield (t/ha)	Rank	Panicl e/m <sup>2</sup> (No.)	Panic le Weigh t (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicl e/m <sup>2</sup> (No.)	Panic le Weigh t (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)
N1	V1	4.85	14	203	3.14		2.41	14	176	2.60		-	-	-	-	
	V2	4.55	18	192	3.10		1.36	20	168	2.17		-	-	-	-	
	V3	4.72	17	197	3.14		1.97	19	238	1.80		3.17	5	230	-	
	V4	5.16	9	207	3.25		2.09	18	205	2.20		3.61	2	244	-	
	V5	6.13	3	225	3.52		0.69	21	182	2.27		3.33	3	233	-	
	V6	4.79	16	250	2.48		2.19	17	283	1.73		-	-	-	-	-
	V7	-	-	-	-		3.30	8	201	2.90		-	-	-	-	-
N2	V1	4.94	13	200	3.21	1.90	3.54	6	290	2.47	28.40	-	-	-	-	-
	V2	5.38	8	217	3.22	18.52	2.98	10	217	2.63	40.50	-	-	-	-	-
	V3	5.53	6	218	3.32	18.04	2.24	16	242	2.03	6.83	2.94	7	218	-	-7.41
	V4	5.62	5	217	3.40	10.21	3.19	9	275	2.23	27.42	3.33	3	231	-	-9.26
	V5	6.24	2	227	3.54	2.37	2.48	13	239	3.03	44.83	3.11	6	225	-	-7.41
	V6	4.82	15	260	2.40	0.71	2.52	12	344	2.43	8.25	-	-	-	-	-
	V7	-	-	-	-	-	3.82	5	241	3.20	13.00	-	-	-	-	-
N3	V1	4.96	12	212	3.08	1.19	4.24	2	348	3.17	22.91	-	-	-	-	-
	V2	5.11	10	210	3.15	6.17	3.91	4	269	2.37	31.79	-	-	-	-	-
	V3	4.98	11	205	3.17	2.85	2.29	15	290	2.73	4.04	2.78	8	211	-	-6.48
	V4	5.41	7	212	3.34	2.73	4.01	3	356	2.33	23.96	4.61	1	277	-	16.67
	V5	6.47	1	227	3.67	3.80	3.32	7	244	3.07	32.96	2.39	9	207	-	-15.74
	V6	5.77	4	278	2.68	10.92	2.73	11	343	2.07	6.75	-	-	-	-	-
	V7	-	-	-	-	-	4.45	1	261	3.63	14.38	-	-	-	-	-
C.D.(0.05)																
N at same V		NS		NS	NS		0.74		43.31	0.41		NS		NS	-	
V at same N		NS		NS	NS		0.7		40.71	0.41		NS		NS	-	
<b>Means of N levels:</b>																
N1		5.03		212	3.11		2.00		208	2.24		3.37		236	-	
N2		5.42		223	3.18	8.63	2.97		264	2.58	24.18	3.13		225	-	-8.02
N3		5.45		224	3.18	4.61	3.56		302	2.77	19.54	3.26		232	-	-1.85
C.D.(0.05)		NS		NS	NS		0.2		11.87	0.22		NS		NS	-	
C.V.(%)		9.91		5.48	6.15		13.12		8.4	15.7		32.73		12.51	-	

Table 4.1(a) (Contd...)

N-levels	Varieties	MALAN					UMIAM					UPPER SHILLONG				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 45 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)
<b>Mean of varieties:</b>																
	V1	4.91	6	205	3.15	1.54	3.40	2	271	2.74	25.66	-	-	-	-	-
	V2	5.01	5	206	3.16	12.35	2.75	4	218	2.39	36.15	-	-	-	-	-
	V3	5.08	4	207	3.21	10.45	2.17	6	257	2.19	5.44	2.96	2	220	-	-6.94
	V4	5.40	2	212	3.33	6.47	3.09	3	279	2.26	25.69	3.85	1	251	-	3.70
	V5	6.28	1	226	3.58	3.09	2.16	7	222	2.79	38.90	2.94	3	222	-	-11.57
	V6	5.12	3	263	2.52	5.82	2.48	5	323	2.08	7.50	-	-	-	-	-
	V7	-	-	-	-	-	3.86	1	234	3.24	13.69	-	-	-	-	-
	<b>C.D.(0.05)</b>	0.42		8.12	0.17		0.43		25	0.24		0.7		25.6		
	<b>C.V.(%)</b>	8.27		3.84	5.48		15.81		10.18	9.90		21.05		10.8		
	<b>Expt. Mean</b>	<b>5.30</b>		<b>220</b>	<b>3.16</b>		<b>2.84</b>		<b>258</b>	<b>2.53</b>		<b>3.25</b>		<b>231</b>		
	Soil type	Silty Clay Loam					Sandy clay loam					Sandy clay				
	pH	5.80					5.00					4.60				
	<b>N - levels (kg/ha)</b>															
	N1	45					40					30				
	N2	90					80					60				
	N3	135					120					90				
	Recommended N:P:K (kg/ha)															
	<b>Varieties</b>															
	V1	IET 22269					IET 22269					-				
	V2	IET 22270					IET 22270					-				
	V3	IET 22272					IET 22272					IET 22272				
	V4	IET 22273					IET 22273					IET 22273				
	V5	Vivekdhan 82					Vivekdhan 82					Vivekdhan 82				
	V6	RP 2421					RP 2421					-				
	V7	-					Local check (IR 64)					-				
	Available NPK in Soil (kg/ha)	280:28:256					275.3:9.0:258.3					-				

Table 4.1(a) (Contd...)

Nlevels	Varieties	WANGBAL					Over All Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)		
N1	V1	3.74	17	299	3.02		3.78	17
	V2	2.81	18	288	3.92		3.18	21
	V3	2.36	21	248	2.93		3.70	18
	V4	3.77	15	294	3.53		3.86	16
	V5	3.77	14	291	4.00		3.48	20
	V6	3.77	15	289	3.95		3.65	19
	V7	3.91	13	250	3.97		4.05	15
N2	V1	4.04	9	340	3.12	10.06	4.32	10
	V2	4.04	10	300	4.37	41.09	4.28	11
	V3	2.49	20	258	3.07	4.40	4.24	12
	V4	4.03	11	297	3.68	8.60	4.47	7
	V5	4.15	6	297	4.53	12.58	4.14	13
	V6	4.09	8	295	4.36	10.69	4.12	14
	V7	4.03	11	261	4.12	3.77	4.77	3
N3	V1	4.24	5	329	3.46	8.28	4.67	4
	V2	4.28	3	301	4.47	24.53	4.59	5
	V3	2.72	19	264	3.08	5.97	4.42	8
	V4	4.28	3	300	3.78	8.49	5.02	2
	V5	4.48	1	301	4.63	11.84	4.37	9
	V6	4.31	2	300	4.46	9.01	4.57	6
	V7	4.10	7	287	4.37	3.14	5.23	1
	C.D.(0.05)							
	N at same V		0.1		7.17	0.04		
	V at same N		0.1		6.9	0.04		
	<b>Means of N levels:</b>							
	N1	3.45		280	3.62			
	N2	3.84		293	3.89	13.03		
	N3	4.06		298	4.04	10.18		
	C.D.(0.05)	0.04		3.08	0.02			
	C.V.(%)	1.7		1.94	0.88			
	<b>Mean of varieties:</b>							
	V1	4.01	5	323	3.20	9.17	4.26	4
	V2	3.71	6	297	4.25	32.81	4.01	6
	V3	2.52	7	257	3.03	5.19	3.83	7
	V4	4.02	3	297	3.67	8.54	4.41	2
	V5	4.14	1	296	4.39	12.21	4.27	3
	V6	4.05	2	294	4.26	9.85	4.12	5
	V7	4.01	4	266	4.15	3.46	4.57	1
	C.D.(0.05)	0.06		4.14	0.03			
	C.V.(%)	1.67		1.5	0.69			
	<b>Expt. Mean</b>	<b>3.78</b>		<b>290</b>	<b>3.85</b>			
	Soil type	Clay loam						
	pH	5.50						
	<b>N - levels (kg/ha)</b>							
	N1	30						
	N2	60						
	N3	90						
	Recommended N:P:K (kg/ha)							
	<b>Varieties</b>							
	V1	IET 22269						
	V2	IET 22270						
	V3	IET 22272						
	V4	IET 22273						
	V5	Vivekdhari 82						
	V6	RP 2421						
	V7	Local check						
	Available NPK in Soil (kg/ha)	-						



**Table 4.1(b): Summary of data on grain yield and ancillary characters of selected AVT-2 medium hill (irrigated) cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, Kharif 2013.**

N-levels	Varieties	ALMORA					CHATHA					KHUDWANI				
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	4.36	12	218	1.97		4.59	13	173	2.26		3.71	14	293	2.21	
	V2	4.75	11	237	2.26		5.31	8	200	2.49		2.85	18	256	1.77	
	V3	2.61	18	177	1.48		4.02	16	129	2.02		3.49	17	270	1.91	
	V4	4.11	16	190	2.37		3.05	18	102	1.76		3.50	16	258	2.03	
	V5	3.83	17	215	2.48		3.11	17	111	1.81		3.52	15	279	2.06	
	V6	5.11	7	215	2.26		5.69	5	188	2.51		3.98	11	292	2.31	
N2	V1	5.15	6	257	2.28	15.86	4.97	11	204	2.40	9.33	4.82	5	370	2.78	18.48
	V2	5.33	5	278	2.20	11.64	5.61	7	219	2.70	7.33	3.78	13	323	2.23	15.38
	V3	4.30	13	235	2.27	33.93	4.63	12	150	2.35	15.17	4.57	10	340	2.39	17.99
	V4	4.96	8	213	2.78	17.06	4.06	15	134	1.95	25.17	4.60	9	326	2.55	18.22
	V5	4.28	14	217	2.37	8.97	4.25	14	140	2.00	28.67	4.62	8	351	2.59	18.43
	V6	5.92	2	287	2.53	16.13	6.36	2	223	2.74	16.83	5.13	3	369	2.90	19.11
N3	V1	5.34	4	292	2.19	9.78	5.62	6	225	2.78	12.83	5.14	2	405	3.09	11.94
	V2	5.91	3	268	2.07	11.58	6.29	3	236	2.89	12.25	3.82	12	354	2.47	8.07
	V3	4.26	15	250	1.98	16.56	5.72	4	181	2.55	21.25	4.71	6	374	2.66	10.17
	V4	4.88	9	220	2.86	7.68	5.03	10	221	2.50	24.75	4.71	7	358	2.84	10.03
	V5	4.77	10	240	2.32	9.43	5.21	9	175	2.63	26.25	4.85	4	385	2.87	11.09
	V6	5.99	1	310	1.96	8.80	6.69	1	252	2.43	12.50	5.46	1	405	3.22	12.29
C.D.(0.05) N at same V		NS		NS	NS		0.05		3.56	0.16		NS		NS	NS	
V at same N		NS		NS	NS		0.05		3.33	0.15		NS		NS	NS	
<b>Means of N levels:</b>																
N1		4.13		209	2.13		4.30		150	2.14		3.51		275	2.05	
N2		4.99		248	2.40	17.26	4.98		178	2.36	17.08	4.59		346	2.57	17.93
N3		5.19		263	2.23	10.64	5.76		215	2.63	18.31	4.78		380	2.86	10.60
<b>C.D.(0.05)</b>		0.53		22.06	NS		0.02		1.22	0.05		0.17		21.76	0.05	
<b>C.V.(%)</b>		18.65		15.53	24.56		0.57		1.13	3.46		6.54		11.01	3.09	

Table 4.1 (b) (Contd...)

N-levels	Varieties	ALMORA					CHATHA					KHUDWANI				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
<b>Mean of varieties:</b>																
	V1	4.95	3	256	2.15	12.82	5.06	3	200	2.48	11.08	4.55	2	356	2.69	15.21
	V2	5.33	2	261	2.18	11.61	5.74	2	218	2.70	9.79	3.48	6	311	2.16	11.72
	V3	3.72	6	221	1.91	25.25	4.79	4	153	2.31	18.21	4.26	5	328	2.32	14.08
	V4	4.65	4	208	2.67	12.37	4.05	6	152	2.07	24.96	4.27	4	314	2.47	14.13
	V5	4.29	5	224	2.39	9.20	4.19	5	142	2.14	27.46	4.33	3	339	2.51	14.76
	V6	5.68	1	271	2.25	12.46	6.24	1	221	2.56	14.67	4.86	1	355	2.81	15.70
	<b>C.D.(0.05)</b>	0.5		31.09	0.24		0.03		2.05	0.09		0.34		13.94	0.17	
	<b>C.V.(%)</b>	10.94		13.46	11.17		0.61		1.18	4.05		8.35		4.34	7.22	
	<b>Expt. Mean</b>	<b>4.77</b>		<b>240</b>	<b>2.26</b>		<b>5.01</b>		<b>181</b>	<b>2.38</b>		<b>4.29</b>		<b>334</b>	<b>2.49</b>	
	Soil type						loam									
	pH						7.24									
	<b>N - levels (kg/ha)</b>						40					60				
	N1	50					80					120				
	N2	100					120					180				
	N3	150														
	Recommended N:P:K (kg/ha)	100-60-40					-					-				
	<b>Varieties</b>															
	V1	IET 22281					IET 22281					IET 22281				
	V2	IET 22283					IET 22283					IET 22283				
	V3	IET 22286					IET 22286					IET 22286				
	V4	Vivekdhan 62					Vivekdhan 82					Vivekdhan 62				
	V5	HPR 2143					HPR 2143					HPR 2143				
	V6	Local check (Vivekdhan 65)					Local check (PC - 15)					Local check (Shalimar Rice-1)				
	Available NPK in Soil (kg/ha)	-					178.6;12.4;112.7					-				

Table 4.1 (b) (Contd...)

N-levels	Varieties	MALAN					UMAIM					UPPER SHILLONG				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 45 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)
N1	V1	4.55	12	242	2.29		2.98	12	213	1.87		3.61	7	247	-	
	V2	6.75	2	258	3.10		1.61	17	164	2.27		3.56	9	255	-	
	V3	4.31	14	216	2.47		2.71	13	182	1.97		-	-	-	-	
	V4	5.48	6	220	3.02		1.33	18	134	2.37		3.89	4	271	-	
	V5	4.60	11	213	2.61		2.38	15	189	2.53		-	-	-	-	
	V6	-	-	-	-		3.34	11	181	2.93		-	-	-	-	
N2	V1	4.79	10	251	2.35	5.29	3.54	8	227	2.70	14.17	3.89	5	263	-	9.26
	V2	6.90	1	256	3.24	3.53	3.37	10	268	2.43	44.00	4.11	3	271	-	18.52
	V3	4.26	15	222	2.41	-1.18	4.24	5	218	2.60	38.17	-	-	-	-	-
	V4	6.03	5	233	3.23	12.35	2.35	16	146	2.77	25.33	4.17	1	272	-	9.26
	V5	5.34	7	233	2.76	16.46	4.49	3	230	2.87	52.75	-	-	-	-	-
	V6	-	-	-	-	-	5.19	1	257	3.23	46.08	-	-	-	-	-
N3	V1	4.92	9	256	2.39	4.12	4.01	7	252	2.70	12.92	4.17	1	274	-	9.26
	V2	6.48	4	256	3.18	-2.94	4.02	6	257	2.67	30.17	3.61	7	256	-	0.93
	V3	4.44	13	218	2.63	1.47	3.44	9	239	2.60	9.13	-	-	-	-	-
	V4	6.53	3	244	3.33	11.76	2.46	14	224	3.10	14.08	3.67	6	269	-	-3.70
	V5	5.11	8	222	2.90	5.58	4.29	4	256	2.73	23.83	-	-	-	-	-
	V6	-	-	-	-	-	4.73	2	286	3.40	17.29	-	-	-	-	-
C.D.(0.05) N at same V		NS		NS	NS		NS		0.64	NS		NS		NS		
V at same N		NS		NS	NS		NS		0.59	NS		NS		NS		
<b>Means of N levels:</b>																
N1		5.14		230	2.70		2.39		177	2.32		3.69		258	-	
N2		5.47		239	2.80	7.29	3.86		224	2.77	36.75	4.06		269	-	12.35
N3		5.50		239	2.89	4.00	3.82		252	2.87	17.90	3.81		266	-	2.16
<b>C.D.(0.05)</b>		NS		NS	0.06		0.15		0.13	15.28		NS		NS		
<b>C.V.(%)</b>		6.2		5.65	3.13		6.54		6.69	11.85		29.38		13.35		

Table 4.1 (b) (Contd...)

N-levels	Varieties	MALAN					UMAIM					UPPER SHILLONG				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 45 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)
<b>Mean of varieties:</b>																
	V1	4.75	4	250	2.35	4.70	3.51	3	231	2.42	13.54	3.89	2	261	-	9.26
	V2	6.71	1	256	3.17	0.29	3.00	5	230	2.46	37.08	3.76	3	261	-	9.72
	V3	4.34	5	219	2.50	0.15	3.46	4	213	2.39	23.65	-	-	-	-	-
	V4	6.01	2	233	3.19	12.05	2.05	6	168	2.74	19.71	3.91	1	270	-	2.78
	V5	5.02	3	223	2.76	11.02	3.72	2	225	2.71	38.29	-	-	-	-	*
	V6	-	-	-	-	-	4.42	1	241	3.19	31.69	-	-	-	-	-
	<b>C.D.(0.05)</b>	0.43		20.84	0.12		0.3		0.37	29.68		NS		NS		
	<b>C.V.(%)</b>	8.29		9.08	4.25		8.35		11.84	14.15		12.04		5.38		
	<b>Expt. Mean</b>	<b>5.37</b>		<b>236</b>	<b>2.79</b>		<b>3.36</b>		<b>218</b>	<b>2.65</b>		<b>3.85</b>		<b>264</b>	-	
	Soil type	Silty clay loam					Sandy clay loam									
	pH	6.1					4.9					4.8				
	<b>N - levels (kg/ha)</b>						40									
	N1	45					80					30				
	N2	90					120					60				
	N3	135										90				
	Recommended N:P:K (kg/ha)	-					80-60-40					-				
	<b>Varieties</b>															
	V1	IET 22281					IET 22281					IET 22281				
	V2	IET 22283					IET 22283					IET 22283				
	V3	IET 22286					IET 22286					-				
	V4	Vivekdhan 62					Vivekdhan 62					Vivekdhan 62				
	V5	HPR 2143					HPR 2143					-				
	V6	-					Local check (Shasharang-1)					-				
	Available NPK in Soil (kg/ha)	308:29:265					272.6:8.8:263.2					-				

Table 4.1 (b) (Contd...)

N-levels	Varieties	WANGBAL					Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)		
N1	V1	2.47	18	213	3.97		3.94	16
	V2	3.51	15	226	3.43		4.63	10
	V3	3.64	14	329	3.85		3.61	18
	V4	3.80	7	291	4.00		3.99	15
	V5	3.80	7	315	3.95		3.77	17
	V6	3.79	10	250	4.00		4.64	9
N2	V1	2.61	17	214	4.25	4.85	4.47	13
	V2	3.72	12	227	3.98	6.96	5.07	5
	V3	3.68	13	344	4.13	1.48	4.29	14
	V4	4.17	2	297	4.53	12.65	4.77	8
	V5	3.98	5	335	4.23	6.33	4.50	12
	V6	3.83	6	255	4.13	1.48	5.31	2
N3	V1	2.82	16	220	4.32	5.90	4.77	7
	V2	3.80	7	234	4.12	4.74	5.26	3
	V3	3.79	10	350	4.19	2.53	4.59	11
	V4	4.51	1	301	4.63	11.91	5.13	4
	V5	4.12	3	341	4.33	5.48	4.81	6
	V6	4.03	4	265	4.39	4.01	5.54	1
C.D.(0.05)								
N at same V		0.12		2.55	0.03			
V at same N		0.11		2.4	0.03			
<b>Means of N levels:</b>								
N1		3.50		271	3.87			
N2		3.67		278	4.21	5.62		
N3		3.84		285	4.33	5.76		
<b>C.D.(0.05)</b>		0.02		0.96	0.02			
<b>C.V.(%)</b>		0.91		0.58	0.91			
<b>Mean of varieties:</b>								
V1		2.63	6	216	4.18	5.38	4.39	4
V2		3.67	5	229	3.84	5.85	4.99	2
V3		3.70	4	341	4.06	2.00	4.16	6
V4		4.16	1	296	4.39	12.28	4.63	3
V5		3.97	2	330	4.17	5.90	4.36	5
V6		3.88	3	257	4.17	2.74	5.17	1
<b>C.D.(0.05)</b>		0.07		1.47	0.02			
<b>C.V.(%)</b>		1.94		0.55	0.48			
<b>Expt. Mean</b>		<b>3.67</b>		<b>278</b>	<b>4.14</b>			
Soil type		Clay loam						
pH		5.5						
<b>N - levels (kg/ha)</b>		30						
N1		60						
N2		90						
N3								
Recommended N:P:K (kg/ha)		-						
<b>Varieties</b>								
V1		IET 22281						
V2		IET 22283						
V3		IET 22286						
V4		Vivekdhan 82						
V5		HPR 2143						
V6		Local check						
Available NPK in Soil (kg/ha)		-						

Table 4.1(c): Summary of data on grain yield and ancillary characters of selected AVT-2 upland hill cultures grown under direct seeded upland conditions at graded levels of recommended N fertilizer doses, Kharif 2013.

N-levels	Varieties	ALMORA					CHATHA					KHUDWANI				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
N1	V1	1.68	5	157	1.45		3.51	8	179	2.05		1.21	22	176	2.17	
	V2	1.14	17	82	2.05		2.09	17	111	1.48		1.10	24	177	2.16	
	V3	1.21	15	138	1.76		2.11	16	111	1.40		1.23	20	188	2.14	
	V4	1.21	14	190	1.57		2.71	13	156	24.83		1.18	23	185	2.18	
	V5	0.53	23	73	1.55		4.27	4	210	2.53		1.22	21	189	2.07	
	V6	1.22	13	177	1.32		1.36	18	89	1.03		2.59	9	244	2.31	
	V7	0.79	20	127	1.15		-	-	-	-		2.66	8	223	2.19	
	V8	1.10	18	113	1.40		-	-	-	-		2.74	7	263	2.33	
N2	V1	1.31	11	163	1.63	-7.46	4.15	5	226	2.52	15.83	1.67	15	215	2.35	11.43
	V2	1.34	10	175	1.82	4.05	2.55	14	130	1.69	11.67	1.51	19	217	2.33	10.29
	V3	1.85	3	180	1.85	12.94	3.11	12	159	1.75	25.00	1.69	13	229	2.32	11.52
	V4	1.66	6	163	1.85	9.09	3.69	7	175	2.00	24.67	1.62	17	231	2.36	10.86
	V5	0.61	21	155	1.72	1.70	4.61	3	220	2.87	8.33	1.67	14	230	2.24	11.23
	V6	2.30	1	203	1.63	21.67	2.19	15	115	1.56	20.83	3.42	6	299	2.50	20.76
	V7	1.16	16	163	1.30	7.58	-	-	-	-	-	3.51	5	275	2.36	21.39
	V8	2.09	2	118	1.31	19.92	-	-	-	-	-	3.53	4	321	2.52	19.79
N3	V1	1.40	8	173	1.38	-2.80	4.75	2	235	2.80	15.42	1.74	10	247	2.38	6.66
	V2	0.83	19	162	1.63	-3.16	3.34	11	164	1.87	15.67	1.57	18	249	2.37	5.91
	V3	1.78	4	183	1.58	5.75	3.49	9	178	2.00	17.25	1.73	11	264	2.35	6.29
	V4	1.29	12	145	1.76	0.83	4.05	6	206	2.50	16.83	1.65	16	261	2.39	5.87
	V5	0.35	24	143	1.67	-1.79	4.87	1	229	3.02	7.42	1.71	12	265	2.27	6.09
	V6	1.39	9	162	1.44	1.72	3.37	10	169	1.88	25.17	3.64	3	343	2.54	13.12
	V7	0.57	22	130	1.00	-2.16	-	-	-	-	-	3.73	2	312	2.40	13.44
	V8	1.45	7	160	1.47	3.50	-	-	-	-	-	3.84	1	369	2.56	13.78
C.D.(0.05) N at same V		NS		46.4	NS		0.07		2.04	NS		NS		NS		
V at same N		NS		43.61	NS		0.06		1.9	NS		NS		NS		
<b>Means of N levels:</b>																
N1		1.11		132	1.53		2.68		143	5.55		1.74		205.51	2.19	
N2		1.54		165	1.64	8.69	3.38		171	2.07	17.50	2.33		252.04	2.37	14.75
N3		1.13		157	1.49	-0.24	3.98		197	2.35	-16.25	2.45		288.75	2.41	-8.88
<b>C.D.(0.05)</b>		0.15		7.17	NS		0.03		0.62	NS		0.09		8.56	0.02	
<b>C.V.(%)</b>		23.59		9.23	21.12		1.37		0.62	284.1		8.07		6.71	2.02	

Table-4.1(c) (Contd...)

N-levels	Varieties	ALMORA					CHATHA					KHUDWANI				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
<b>Mean of varieties:</b>																
V1		1.47	4	164	1.48	-5.13	4.14	2	213	2.46	15.63	1.54	5	213	2.3	9.04
V2		1.1	6	139	1.83	0.45	2.66	5	135	1.68	13.67	1.39	8	214	2.29	8.10
V3		1.61	2	167	1.73	9.34	2.91	4	149	1.72	21.13	1.55	4	227	2.27	8.91
V4		1.39	5	166	1.72	4.96	3.48	3	179	9.78	20.75	1.49	7	226	2.31	8.36
V5		0.5	8	124	1.65	-0.04	4.58	1	220	2.8	7.88	1.54	5	228	2.19	8.66
V6		1.63	1	181	1.46	11.70	2.31	6	125	1.49	23.00	3.21	3	295	2.45	16.94
V7		0.84	7	140	1.15	2.71	-	-	-	-	-	3.3	2	270	2.32	17.42
V8		1.55	3	131	1.39	11.71	-	-	-	-	-	3.37	1	318	2.47	16.78
<b>C.D.(0.05)</b>		0.43		26.79	0.28		0.04		1.18	NS		0.31		23.23	0.12	
<b>C.V.(%)</b>		36.19		18.75	18.87		1.17		0.72	283.7		15.33		9.9	5.37	
<b>Expt. Mean</b>		<b>1.26</b>		<b>152</b>	<b>1.55</b>		<b>3.35</b>		<b>170</b>	<b>3.32</b>		<b>2.17</b>		<b>249</b>	<b>2.32</b>	
Soil type		-					loam					-				
pH		-					7.2					-				
<b>N - levels (kg/ha)</b>																
N1		50					40					40				
N2		100					80					80				
N3		150					120					120				
<b>Recommended NPK (Kg/ha)</b>																
<b>Varieties</b>																
V1		IET 22291					IET 22291					IET 22291				
V2		IET 22292					IET 22292					IET 22292				
V3		IET 22294					IET 22294					IET 22294				
V4		IET 22295					IET 22295					IET 22295				
V5		IET22296					IET22296					IET22296				
V6		Vivek Dhan 154					Vivek Dhan 154					Vivek Dhan 154				
V7		Sukardhan 1					-					Sukardhan 1				
V8		local check					-					local check				
<b>Available NPK of soil (kg/ha)</b>		-					178.6:124:112.7					-				

Table-4.1(c) (Contd...)

N-levels	Varieties	MALAN					UMIAM					Over All Mean	UPPER SHILLONG				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)		Rank	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	N res. (kg grain/kg N) (Base level 30 kg N/ha)
N1	V1	2.20	15	218	1.32		1.43	19	89	2.00		2.01	17	0.78	17	67	
	V2	2.35	14	202	1.56		1.86	16	110	2.13		1.71	24	2.04	14	257	
	V3	3.24	2	223	1.92		2.09	15	135	1.30		1.98	20	2.67	6	216	
	V4	2.41	11	172	1.91		2.09	14	116	1.87		1.92	21	2.78	2	258	
	V5	1.96	18	177	1.46		1.16	20	99	1.03		1.83	22	2.78	3	255	
	V6	1.82	21	147	1.80		-	-	-	-		1.74	23	2.74	4	266	
	V7	2.83	6	240	1.54		1.71	18	152	1.68		1.99	19	-	-	-	
	V8	-	-	-	-		2.16	13	111	2.71		2.00	18	-	-	-	
N2	V1	2.50	10	228	1.47	9.92	1.71	17	104	1.93	6.98	2.27	14	0.74	18	74	-1.23
	V2	2.41	13	212	1.53	1.98	3.21	7	171	2.47	33.80	2.21	16	2.13	13	264	3.09
	V3	3.21	3	213	2.01	-0.99	3.31	3	152	2.00	30.57	2.64	6	2.15	12	220	-17.28
	V4	2.59	8	183	1.88	5.95	2.98	10	135	2.17	22.07	2.51	9	2.22	11	257	-18.52
	V5	1.99	17	182	1.46	0.99	2.72	12	158	1.90	38.81	2.32	12	2.30	9	277	-16.05
	V6	1.96	18	155	1.83	4.96	-	-	-	-	-	2.47	10	2.70	5	278	-1.23
	V7	3.07	5	260	1.57	7.94	3.32	2	171	2.13	40.22	2.77	3	-	-	-	
	V8	-	-	-	-	-	3.28	5	119	2.91	27.93	2.97	1	-	-	-	
N3	V1	2.53	9	220	1.54	5.46	1.04	21	101	2.10	-4.88	2.29	13	0.93	16	74	6.17
	V2	2.41	11	210	1.55	0.99	2.89	11	159	2.17	12.86	2.21	15	2.41	8	265	9.26
	V3	3.57	1	242	1.95	5.46	3.21	7	151	1.93	14.07	2.76	4	1.70	15	233	-14.81
	V4	2.65	7	183	1.96	3.97	3.17	9	113	2.30	13.41	2.56	8	2.26	10	243	1.23
	V5	1.96	20	192	1.40	0.00	3.28	5	172	2.17	26.44	2.43	11	2.56	7	252	8.64
	V6	2.10	16	177	1.79	4.76	-	-	-	-	-	2.62	7	2.89	1	260	6.17
	V7	3.18	4	250	1.67	5.95	3.29	4	190	2.13	19.78	2.69	5	-	-	-	
	V8	-	-	-	-	-	3.44	1	134	2.97	15.94	2.91	2	-	-	-	
C.D.(0.05)																	
N at same V		NS		NS	NS		0.61		23.96	NS				0.38		NS	
V at same N		NS		NS	NS		0.57		23.27	NS				0.36		NS	
<b>Means of N levels:</b>																	
N1		2.40		197	1.64		1.79		116	1.82				2.30		220	
N2		2.53		205	1.68	3.25	2.93		144	2.22	28.50			2.04		228	-6.50
N3		2.63		210	1.69	-2.88	2.90		146	2.25	-13.88			2.12		221	-4.50
C.D.(0.05)		NS		NS	NS		0.15		11.41	0.11				NS		NS	
C.V.(%)		13.57		20.08	18.48		10.42		15.4	9.55				10.15		6.8	



Table-4.1(c) (Contd..)

N-levels	Varieties	MALAN					UMIAM					Over All Mean	Rank	UPPER SHILLONG				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)			Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	
<b>Mean of varieties:</b>																		
	V1	2.41	4	222	1.44	7.69	1.39	7	98	2.01	1.05	2.19	7	0.81	6	72	2.47	
	V2	2.39	5	208	1.55	1.49	2.66	5	147	2.26	23.33	2.04	8	2.19	4	262	6.17	
	V3	3.34	1	226	1.96	2.23	2.87	2	146	1.74	22.32	2.46	3	2.17	5	223	-16.05	
	V4	2.55	3	179	1.92	4.96	2.75	4	121	2.11	17.74	2.33	4	2.42	3	253	-8.64	
	V5	1.97	6	183	1.44	0.50	2.39	6	143	1.7	32.63	2.20	6	2.54	2	261	-3.70	
	V6	1.96	7	159	1.81	4.86	-	-	-	-	-	2.28	5	2.78	1	268	2.47	
	V7	3.03	2	250	1.59	6.94	2.77	3	171	1.98	30.00	2.49	2	-	-	-	-	
	V8	-	-	-	-	-	2.96	1	121	2.86	21.94	2.63	1	-	-	-	-	
	<b>C.D.(0.05)</b>	0.24		24.48	0.14		0.35		13.83	0.21				0.22		18.38		
	<b>C.V.(%)</b>	9.9		12.59	8.59		14.46		10.74	10.71				10.59		8.56		
	<b>Expt. Mean</b>	<b>2.52</b>		<b>204</b>	<b>1.67</b>		<b>2.54</b>		<b>135</b>	<b>2.09</b>				<b>2.15</b>		<b>223</b>		
	Soil type	Silty clay loam					Sandy loam							Sandy loam				
	pH	6.00					4.91							5.10				
	<b>N - levels (kg/ha)</b>																	
	N1	30					40											
	N2	60					80											
	N3	90					120											
	Recommended NPK (Kg/ha)																	
	<b>Varieties</b>																	
	V1	IET 22291					IET 22291							VL-31402				
	V2	IET 22292					IET 22292							VL-8302				
	V3	IET 22294					IET 22294							IET22294				
	V4	IET 22295					IET 22295							VL-8185				
	V5	IET22296					IET22296							VL-8304				
	V6	Vivek Dhan 154					Vivek Dhan 154							Vivek Dhan 154				
	V7	Sukardhan 1					-							-				
	V8	-					local check							-				
	Available NPK of soil (kg/ha)	300:28:250					242:6:8:0:228.3							-				

Table 4.1(d): Summary of data on grain yield and ancillary characters of selected AVT-VE (Direct Seeded) cultures grown under Direct Seeded conditions at graded levels of N fertilizer doses, *Kharif* 2013.

N-levels	Varieties	BANKURA					REWA					FAIZABAD				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
N1	V1	2.63	14	263	1.61		6.53	19	313	3.47		1.28	19	132	2.14	
	V2	2.11	16	247	1.42		6.50	20	284	3.03		1.66	14	129	2.15	
	V3	1.92	17	238	1.31		7.30	13	352	3.70		1.94	12	144	1.67	
	V4	1.73	18	218	1.36		6.57	18	287	3.30		1.09	20	121	1.74	
	V5	1.49	20	198	1.25		6.70	17	324	3.03		1.08	21	139	1.28	
	V6	1.63	19	214	1.39		6.83	16	282	3.67		1.48	16	128	1.54	
	V7	1.39	21	196	1.19		6.40	21	286	3.10		1.55	15	125	1.93	
	V8															
N2	V1	3.75	4	410	1.87	27.92	7.50	10	316	3.83	19.33	1.38	17	152	2.18	2.63
	V2	3.68	5	388	1.76	39.25	7.97	5	283	3.37	29.33	1.74	13	144	2.01	1.98
	V3	3.53	7	374	1.67	40.25	8.57	2	352	3.77	25.33	2.62	6	150	1.87	17.17
	V4	3.26	9	320	1.69	38.25	7.50	10	287	3.33	18.67	2.45	8	151	1.97	33.86
	V5	2.68	13	285	1.41	29.75	6.93	15	325	3.13	4.67	1.29	18	150	1.45	5.30
	V6	3.07	11	310	1.56	36.00	7.53	9	283	3.70	14.00	2.10	11	137	2.25	15.68
	V7	2.55	15	272	1.35	29.08	7.37	12	288	3.67	19.33	2.59	7	141	2.07	26.00
	V8															
N3	V1	4.14	1	429	2.02	18.83	7.70	8	315	3.87	11.67	3.57	2	160	2.29	28.61
	V2	4.00	2	398	1.93	23.63	7.97	5	284	3.67	14.67	3.50	3	164	2.45	23.02
	V3	3.85	3	387	1.91	24.17	8.10	3	352	3.23	8.00	3.65	1	165	2.15	21.40
	V4	3.68	6	337	1.93	24.38	7.97	5	285	3.67	14.00	3.44	4	165	2.20	29.36
	V5	3.19	10	296	1.66	21.29	8.63	1	326	3.77	19.33	2.16	10	162	1.77	13.51
	V6	3.37	8	322	1.94	21.71	8.00	4	283	4.23	11.67	2.39	9	156	1.92	11.47
	V7	2.94	12	283	1.53	19.46	7.00	14	286	3.90	6.00	3.13	5	154	2.04	19.81
	V8															
C.D.(0.05)																
N at same V		NS		NS	NS		NS		NS	0.3		0.14		NS	0.25	
V at same N		NS		NS	NS		NS		NS	0.28		0.13		NS	0.24	
<b>Means of N levels:</b>																
N1		1.84		225	1.36		6.69		304	3.33		1.44		131	1.78	
N2		3.22		337	1.62	34.36	7.62		305	3.54	18.67	2.02		147	1.97	14.66
N3		3.60		350	1.85	21.92	7.91		304	3.76	12.19	3.12		161	2.12	21.03
<b>C.D.(0.05)</b>		0.11		5.39	0.13		0.28		NS	0.06		0.03		6.78	0.08	
<b>C.V.(%)</b>		6.94		3.24	15		7.01		0.36	3.07		2.75		8.47	7.59	

Table 4.1(d) (Contd...)

N-levels	Varieties	BANKURA					REWA					FAIZABAD				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
<b>Mean of varieties:</b>																
	V1	3.51	1	367	1.83	23.38	7.24	6	315	3.72	15.50	2.07	5	148	2.20	15.62
	V2	3.27	2	344	1.71	31.44	7.48	2	284	3.36	22.00	2.30	4	146	2.20	12.50
	V3	3.10	3	333	1.63	32.21	7.99	1	352	3.57	16.67	2.74	1	153	1.90	19.28
	V4	2.89	4	292	1.66	31.31	7.34	5	286	3.43	16.33	2.33	3	145	1.97	31.61
	V5	2.45	6	260	1.44	25.52	7.42	4	325	3.31	12.00	1.51	7	151	1.50	9.41
	V6	2.69	5	282	1.63	28.85	7.46	3	283	3.87	12.83	1.99	6	140	1.90	13.57
	V7	2.29	7	250	1.35	24.27	6.92	7	286	3.56	12.67	2.42	2	140	2.01	22.91
	V8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	<b>C.D.(0.05)</b>	0.41		26.71	0.22		0.53		2.06	0.18		0.08		7.62	0.15	
	<b>C.V.(%)</b>	15.02		9.22	14.12		7.57		0.71	5.19		3.9		5.47	7.89	
	<b>Expt. Mean</b>	<b>2.89</b>		<b>304</b>	<b>1.61</b>		<b>7.41</b>		<b>304</b>	<b>3.54</b>		<b>2.19</b>		<b>146</b>	<b>1.96</b>	
	Soil type	Sandy loam					Sandy clay loam					Sandy loam				
	pH	5.80					6.50					7.60				
	<b>N-levels (kg/ha)</b>															
	N1	40					50					40				
	N2	80					100					80				
	N3	120					150					120				
	Recommended NPK (kg/ha)	80:40:40					100:60:40					80:40:40:10				
	<b>Varieties</b>															
	V1	IET 22020					IET 22020					IET 22020				
	V2	IET 22743					IET 22743					IET 22743				
	V3	IET 22744					IET 22744					IET 22744				
	V4	Anjali					Anjali					Anjali				
	V5	Varalu					Varalu					Varalu				
	V6	Vandana					Vandana					Vandana				
	V7	Local check (Siddhanta)					Local check (PS 3)					Local check (NDR 97)				
	V8	-					-					-				
	Available NPK of soil (kg/ha)	:52:166					294:337:18.0-36.0:314:611					200:24:234				

Table 4.1(d) (Contd...)

N-levels	Varieties	RANCHI					TULJAPUR					Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)		
N1	V1	1.60	15	271	2.87		0.94	20	145	2.28		2.60	17
	V2	2.73	2	303	3.37		1.27	12	146	2.12		2.85	14
	V3	1.50	16	249	2.43		1.45	9	172	1.73		2.82	15
	V4	1.97	9	263	2.30		1.02	19	172	1.96		2.47	20
	V5	0.47	21	295	1.63		1.32	11	178	1.27		2.21	21
	V6	2.10	6	262	2.57		0.89	22	168	1.76		2.59	18
	V7	1.97	8	253	2.97		1.68	2	237	1.89		2.60	16
	V8	-	-	-	-		1.14	17	189	1.80		1.14	24
N2	V1	1.50	16	216	2.30	35.56	1.05	18	154	2.34	3.74	3.04	13
	V2	2.67	3	317	3.23	-12.22	1.46	8	143	2.13	6.40	3.50	6
	V3	2.37	4	313	2.50	27.78	1.48	7	180	1.83	0.99	3.71	2
	V4	2.33	5	267	2.70	-42.22	1.26	13	215	2.06	8.08	3.36	7
	V5	0.70	19	300	1.40	48.89	0.89	23	155	1.13	-14.28	2.50	19
	V6	1.93	10	280	2.77	0.00	1.51	5	159	1.91	20.69	3.23	11
	V7	2.10	6	290	2.67	-65.56	1.82	1	237	1.91	4.43	3.28	10
	V8						1.58	4	213	1.73	14.78	1.58	22
N3	V1	1.67	14	253	2.53	2.78	0.84	24	172	1.77	-1.58	3.58	4
	V2	2.77	1	317	3.30	-21.67	1.51	5	174	2.13	3.94	3.95	1
	V3	1.77	12	268	2.67	-16.67	0.92	21	176	1.72	-8.87	3.66	3
	V4	1.43	18	270	2.63	-4.44	1.18	16	157	1.83	2.71	3.54	5
	V5	0.50	20	277	1.23	22.22	1.21	15	185	1.20	-1.72	3.14	12
	V6	1.70	13	247	2.50	-35.00	1.22	14	164	1.83	5.61	3.34	8
	V7	1.80	11	280	2.83	-32.78	1.68	2	210	2.14	0.00	3.31	9
	V8						1.44	10	229	1.69	5.02	1.44	23
	C.D.(0.05)												
	N at same V	0.29		NS	NS		NS		NS	NS			
	V at same N	0.31		NS	NS		NS		NS	NS			
	Means of N levels:												
	N1	1.76		271	2.59		1.21		176	1.85			
	N2	1.94		283	2.51	6.03	1.38		182	1.88	5.60		
	N3	1.66		273	2.53	-1.67	1.25		183	1.79	0.64		
	C.D.(0.05)	0.20		NS	NS		NS		NS	NS			
	C.V.(%)	12.93		10.29	0.27		30.86		15.71	12.04			

Table 4.1(d) (Contd...)

N-levels	Varieties	RANCHI					TULJAPUR					Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)		
<b>Mean of varieties:</b>													
	V1	1.59	6	247	2.57	19.17	0.94	8	157	2.13	1.08	3.07	4
	V2	2.72	1	312	3.30	-16.94	1.41	2	154	2.13	5.17	3.44	1
	V3	1.88	5	277	2.53	5.56	1.28	4	176	1.76	-3.94	3.40	2
	V4	1.91	3	267	2.54	-23.33	1.15	6	181	1.95	5.39	3.12	3
	V5	0.56	7	290	1.42	35.56	1.14	7	173	1.20	-8.00	2.62	7
	V6	1.91	3	263	2.61	-17.50	1.21	5	164	1.83	13.15	3.05	6
	V7	1.96	2	274	2.82		1.73	1	228	1.98	2.22	3.06	5
	V8						1.39	3	210	1.74	9.90	1.39	8
	<b>C.D.(0.05)</b>	0.17		28.64	0.29		0.33		26.13	0.26			
	<b>C.V.(%)</b>	9.83		10.87	11.74		27.31		15.36	14.72			
	<b>Expt. Mean</b>	<b>1.79</b>		<b>276</b>	<b>2.54</b>		<b>1.28</b>		<b>180</b>	<b>1.84</b>			
	Soil type	Sandy loam					Clay						
	pH	5.30					7.60						
	<b>N - levels (kg/ha)</b>												
	N1	30					30						
	N2	60					60						
	N3	90					90						
	Recommended NPK (kg/ha)	60:40:20					60:30:30						
	<b>Varieties</b>												
	V1	IET 22020					IET 22020						
	V2	IET 22743					IET 22743						
	V3	IET 22744					IET 22744						
	V4	Anjali					Anjali						
	V5	Varalu					Varalu						
	V6	Vandana					Vandana						
	V7	Local check (BVD 108)					Local check (TJP-48)						
	V8	-					Local check (MAULS-11)						
	Available NPK of soil (kg/ha)	-:40:20											

Table 4.1(f): Summary of data on grain yield and ancillary characters of selected AVT -2 early (transplanted) cultures grown under upland conditions at graded levels of recommended N fertilizer doses, *Kharif* 2013.

N-levels	Varieties	COIMBATORE					CUTTACK					FAIZABAD				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	5.80	18	254	3.42		5.76	2	208	3.64		5.67	6	230	4.15	
	V2	5.03	28	272	3.24		4.21	8	208	3.06		4.78	16	218	4.37	
	V3	5.69	20	312	2.75		4.17	9	255	2.27		4.65	17	218	2.83	
	V4	5.90	16	390	2.75		3.78	12	315	2.13		5.13	12	216	2.83	
	V5	5.45	22	324	3.42		2.97	18	249	2.64		4.87	14	217	3.36	
	V6	5.21	26	367	3.06		2.94	20	222	2.73		3.80	30	214	3.03	
	V7	5.24	25	353	2.65		2.88	21	209	2.62		4.64	18	222	3.51	
	V8	4.03	33	373	3.28		-	-	-	-		4.31	26	219	2.39	
	V9	4.51	31	392	2.14		-	-	-	-		3.44	32	218	2.25	
	V10	4.38	32	356	2.74		-	-	-	-		3.25	33	217	2.18	
	V11	5.76	19	385	2.56		-	-	-	-		4.48	20	218	2.41	
N2	V1	6.91	2	289	3.59	18.52	5.97	1	212	3.63	7.25	6.26	3	246	4.21	9.94
	V2	6.22	10	300	3.49	19.68	4.74	4	219	3.12	17.68	5.58	7	238	4.68	13.39
	V3	6.75	5	348	2.81	17.59	4.48	5	268	2.37	10.42	5.13	12	245	3.31	8.01
	V4	6.94	1	433	2.98	17.36	4.12	10	323	2.58	11.20	5.45	9	245	2.27	5.43
	V5	6.22	10	353	3.66	12.73	3.26	16	259	2.61	9.71	5.21	10	247	4.17	5.65
	V6	6.08	13	409	3.18	14.47	3.56	14	233	2.69	20.66	4.44	22	244	4.18	10.65
	V7	6.15	12	384	2.88	15.05	3.12	17	214	2.68	7.77	4.87	14	246	3.69	3.84
	V8	4.80	29	408	3.47	12.85	-	-	-	-		3.90	29	249	2.56	-6.81
	V9	5.45	22	425	2.29	15.63	-	-	-	-		4.35	24	248	1.91	15.10
	V10	5.52	21	379	2.86	19.10	-	-	-	-		3.55	31	246	1.91	4.94
	V11	6.51	7	425	2.72	12.50	-	-	-	-		4.40	23	242	4.42	-1.37
N3	V1	6.88	3	282	3.57	8.97	5.67	3	217	3.74	-1.42	6.46	2	282	4.65	6.59
	V2	6.28	9	291	3.48	10.42	4.26	7	222	2.99	0.91	5.73	5	269	3.51	7.96
	V3	6.67	6	341	2.81	8.10	4.30	6	321	2.45	2.27	5.79	4	265	4.23	9.55
	V4	6.84	4	431	2.91	7.81	3.81	11	313	2.29	0.42	6.49	1	269	3.90	11.36
	V5	6.04	14	349	3.59	4.92	3.56	13	248	2.69	9.91	5.53	8	285	4.25	5.52
	V6	5.87	17	407	3.16	5.50	3.39	15	227	2.70	7.45	4.33	25	281	3.90	4.45
	V7	6.04	14	381	2.81	6.66	2.96	19	211	2.71	1.30	5.16	11	277	3.89	4.34
	V8	4.72	30	404	3.46	5.79	-	-	-	-		4.11	27	283	3.08	-1.59
	V9	5.10	27	422	2.24	4.92	-	-	-	-		4.45	21	284	2.10	8.40
	V10	5.35	24	374	2.82	8.10	-	-	-	-		4.05	28	285	2.12	6.67
	V11	6.46	8	423	2.76	5.84	-	-	-	-		4.50	19	288	4.58	0.11
C.D.(0.05)																
Nat same V		NS		NS	NS		NS		NS	NS		0.52		7.51	0.21	
Vat same N		NS		NS	NS		NS		NS	NS		0.51		7.34	0.21	
<b>Means of N levels:</b>																
N1		5.18		343	2.91		3.82		238	2.73		4.46		219	3.03	
N2		6.14		377	3.09	15.95	4.18		247	2.81	12.10	4.83		245	3.39	6.25
N3		6.02		373	3.05	7.00	3.99		251	2.80	2.97	5.15		279	3.66	5.76
C.D.(0.05)		0.05		0.11	5.2		0.13		NS	NS		0.14		2.33	0.05	
C.V.(%)		4.38		4.38	3.26		5.85		7.15	9.39		7.04		2.22	3.33	

Table 4.1(f) (Contd..)

N-levels	Varieties	COIMBATORE					CUTTACK					FAIZABAD				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
<b>Mean of varieties:</b>																
V1		6.53	2	275	3.53	13.74	5.80	1	212	3.67	2.91	6.13	1	252	4.34	8.26
V2		5.84	6	288	3.40	15.05	4.40	2	216	3.06	9.29	5.37	3	242	4.19	10.68
V3		6.37	3	334	2.79	12.85	4.32	3	281	2.36	6.35	5.19	5	242	3.45	8.78
V4		6.56	1	418	2.88	12.59	3.90	4	317	2.34	5.81	5.69	2	243	3.00	8.40
V5		5.90	5	342	3.56	8.83	3.27	6	252	2.65	9.81	5.21	4	250	3.93	5.59
V6		5.72	8	394	3.13	9.98	3.30	5	228	2.71	14.05	4.19	8	246	3.70	7.55
V7		5.81	7	373	2.78	10.85	2.99	7	211	2.67	4.53	4.89	6	248	3.70	4.09
V8		4.52	11	395	3.40	9.32	-	-	-	-	-	4.11	9	250	2.68	-4.20
V9		5.02	10	413	2.22	10.27	-	-	-	-	-	4.08	10	250	2.09	11.75
V10		5.08	9	370	2.81	13.60	-	-	-	-	-	3.62	11	250	2.07	5.81
V11		6.24	4	411	2.68	9.17	-	-	-	-	-	4.46	7	249	3.80	-0.63
C.D.(0.05)		0.11		0.23	9.9		0.29		18.87	0.26		0.3		4.34	0.12	
C.V.(%)		4.29		4.29	2.88		7.58		8.07	9.66		6.79		1.85	3.87	
<b>Expt. Mean</b>		<b>5.78</b>		<b>365</b>	<b>3.02</b>		<b>4.00</b>		<b>245</b>	<b>2.78</b>		<b>4.81</b>		<b>248</b>	<b>3.36</b>	
Soil type		Clay loam					Sandy Clay Loam					Sandy Loam				
pH		7.50					6.80					7.60				
<b>N - levels (kg/ha)</b>																
N1		60					30					60				
N2		120					60					120				
N3		180					90					180				
Recommended N:P:K (kg/ha)		120:38:38:25					60:30:30					120:60:60:15				
<b>Varieties</b>																
V1		IET 22752					IET 22752					IET 22752				
V2		IET 22753					IET 22753					IET 22753				
V3		IET 22763					IET 22763					IET 22763				
V4		IET 22764					IET 22764					IET 22764				
V5		IET 22767					IET 22767					IET 22767				
V6		IET22768					IET22768					IET22768				
V7		Sahbhagidhan					Sahbhagidhan					Sahbhagidhan				
V8		Govind					-					Govind				
V9		Narendra 97					-					Narendra 97				
V10		Tulasi					-					Tulasi				
V11		Local (CO51)					-					Local (Sushk Samrat)				
Available N:P:K of soil (kg/ha)		252:18:540					0.051:0.0017:0.021					200:24:234				

Table 4.1(f) (Contd..)

N-levels	Varieties	MANDYA					NAWAGAM					PUDUCHERRY				
		Grain Yield (t/ha)	Ran k	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Ran k	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Ran k	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	5.75	8	328	4.30		5.16	5	446	2.98		5.22	17	450	3.30	
	V2	4.17	27	329	2.03		5.13	6	444	4.07		6.55	8	479	4.07	
	V3	5.95	4	347	2.10		3.98	19	344	3.61		7.65	2	538	4.90	
	V4	4.07	28	350	2.30		4.18	16	362	2.93		7.44	4	521	4.63	
	V5	3.77	32	366	2.60		4.31	13	373	3.34		5.83	12	476	3.93	
	V6	3.77	32	352	2.03		3.05	26	264	4.01		4.72	20	426	2.73	
	V7	4.07	28	349	2.10		2.90	28	251	3.21		4.23	23	401	2.67	
	V8	4.46	23	357	2.37		3.68	21	318	4.16		3.96	25	391	2.60	
	V9	4.07	28	340	1.93		2.84	29	246	3.59		3.55	30	375	2.47	
	V10	4.46	23	336	1.93		2.02	33	175	3.70		3.51	31	351	2.23	
	V11	4.46	23	351	2.20		4.26	14	369	3.72		5.72	14	458	3.43	
N2	V1	5.75	8	353	4.17	0.00	5.47	3	466	3.24	7.90	5.35	16	480	3.17	2.25
	V2	4.86	20	340	2.40	13.89	5.31	4	461	3.85	4.39	7.02	7	541	3.97	7.80
	V3	5.26	18	399	2.17	-13.89	4.11	18	357	3.86	3.42	8.01	1	594	4.50	6.00
	V4	4.66	21	349	2.23	11.90	4.64	9	403	3.18	11.49	7.56	3	565	4.43	1.95
	V5	4.07	28	381	3.00	5.95	4.61	10	402	3.54	7.58	6.17	9	503	3.60	5.70
	V6	4.66	21	368	2.53	17.86	3.16	24	275	4.02	2.90	5.08	18	458	3.07	6.00
	V7	5.75	8	368	2.50	33.73	3.02	27	263	3.54	2.87	4.59	21	449	2.97	6.00
	V8	4.46	23	399	2.73	0.00	4.14	17	361	4.31	11.59	4.23	23	445	2.93	4.50
	V9	5.06	19	350	2.13	19.84	2.82	30	246	3.63	-0.60	3.91	26	429	2.37	6.00
	V10	5.46	14	341	2.07	19.84	2.03	32	177	3.73	0.26	3.82	28	420	2.20	5.25
	V11	5.75	8	367	2.30	25.79	4.44	12	387	3.46	4.52	5.98	11	494	3.50	4.35
N3	V1	7.64	1	417	4.20	18.85	6.22	1	484	3.25	13.34	4.77	19	433	2.80	-3.75
	V2	5.95	4	405	2.50	17.86	5.69	2	487	3.88	7.05	6.04	10	459	3.60	-4.24
	V3	5.75	8	405	2.83	-1.98	4.22	15	361	4.15	3.10	7.28	5	519	4.17	-3.04
	V4	5.95	4	445	2.50	18.85	4.77	8	408	3.11	7.42	7.11	6	466	3.93	-2.77
	V5	6.35	2	400	3.37	25.79	4.81	7	411	3.60	6.34	5.75	13	445	3.27	-0.67
	V6	5.46	14	458	2.57	16.87	3.52	22	300	4.03	5.86	4.24	22	410	2.60	-4.01
	V7	5.46	14	455	2.57	13.89	3.32	23	283	3.47	5.16	3.87	27	398	2.43	-3.00
	V8	5.46	14	388	2.37	9.92	3.89	20	333	4.10	2.68	3.82	28	382	2.40	-1.12
	V9	5.95	4	407	2.40	18.85	3.13	25	267	3.69	3.58	3.28	32	368	2.17	-2.25
	V10	6.05	3	404	2.43	15.87	2.23	31	190	3.83	2.57	3.24	33	363	2.07	-2.25
	V11	5.75	8	401	2.50	12.90	4.60	11	393	3.53	4.27	5.38	15	440	2.97	-2.85
C.D.(0.05) Nat same V		NS		25.48	0.31		NS		NS	NS		NS		NS	NS	
Vat same N		NS		24.89	0.31		NS		NS	NS		NS		NS	NS	
<b>Means of N levels:</b>																
N1		4.46		346	2.35		3.77		327	3.58		5.31		442	3.36	
N2		5.07		365	2.57	12.27	3.98		345	3.67	5.12	5.61		489	3.34	5.07
N3		5.98		417	2.75	15.24	4.22		356	3.70	5.58	4.98		426	2.95	-2.72
C.D.(0.05)		0.28		8.88	0.16		0.20		NS	NS		0.30		NS	NS	
C.V.(%)		12.24		5.42	14.13		11.40		10.45	5.88		12.75		21.04	24.83	



Table 4.1(f) (Contd..)

N-levels	Varieties	MANDYA					NAWAGAM					PUDUCHERRY				
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
<b>Mean of varieties:</b>																
	V1	6.38	1	366	4.22	9.42	5.62	1	466	3.16	10.62	5.11	6	454	3.09	-0.75
	V2	4.99	7	358	2.31	15.87	5.38	2	464	3.93	5.72	6.54	3	493	3.88	1.78
	V3	5.65	2	384	2.37	-7.94	4.10	6	354	3.87	3.26	7.65	1	550	4.52	1.48
	V4	4.89	8	381	2.34	15.38	4.53	4	391	3.08	9.46	7.37	2	517	4.33	-0.41
	V5	4.73	10	382	2.99	15.87	4.58	3	395	3.49	6.96	5.92	4	474	3.60	2.51
	V6	4.63	11	392	2.38	17.36	3.24	8	280	4.02	4.38	4.68	7	431	2.80	0.99
	V7	5.09	5	391	2.39	23.81	3.08	9	266	3.40	4.01	4.23	8	416	2.69	1.50
	V8	4.79	9	381	2.49	4.96	3.91	7	337	4.19	7.14	4.00	9	406	2.64	1.69
	V9	5.03	6	365	2.16	19.35	2.93	10	253	3.64	1.49	3.58	10	391	2.33	1.87
	V10	5.32	3	360	2.14	17.86	2.09	11	181	3.76	1.42	3.52	11	378	2.17	1.50
	V11	5.32	3	373	2.33	19.35	4.44	5	383	3.57	4.39	5.70	5	464	3.30	0.75
	C.D.(0.05)	0.61		14.71	0.18		0.35		29.67	0.22		0.48		21.62	0.25	
	C.V.(%)	12.46		4.16	7.44		9.37		9.18	6.43		9.55		5.07	8.11	
	<b>Expt. Mean</b>	<b>5.17</b>		<b>376</b>	<b>2.56</b>		<b>3.99</b>		<b>343</b>	<b>3.65</b>		<b>5.30</b>		<b>452</b>	<b>3.21</b>	
	Soil type	Red sandy loam					Clay					Clay Loam				
	pH	6.80					7.50					7.95				
	<b>N - levels (kg/ha)</b>															
	N1	50					40					60				
	N2	100					80					120				
	N3	150					120					180				
	Recommended N:P:K (kg/ha)	100:50:50:20					80:25:0:25					120:40:40:25				
	<b>Varieties</b>															
	V1	IET 22752					IET 22752					IET 22752				
	V2	IET 22753					IET 22753					IET 22753				
	V3	IET 22763					IET 22763					IET 22763				
	V4	IET 22764					IET 22764					IET 22764				
	V5	IET 22767					IET 22767					IET 22767				
	V6	IET22768					IET22768					IET22768				
	V7	Sahbhagidhan					Sahbhagidhan					Sahbhagidhan				
	V8	Govind					Govind					Govind				
	V9	Narendra.97					Narendra.97					Narendra.97				
	V10	Tulasi					Tulasi					Tulasi				
	V11	Local (KMP 149)					Local (GR-7)					Local (PY-5)				
	Available N:P:K of soil (kg/ha)	269:28.0:191.0					0.03:47:103					168:13.67:144				

Table 4.1(f) (Contd..)

N-levels	Varieties	KARJAT					RAIPUR					RANCHI					Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
N1	V1	4.16	25	152	3.94		3.77	9	231	3.19		3.00	17	248	2.87		4.92	10
	V2	5.07	17	151	4.31		3.13	25	250	2.24		3.50	10	266	2.60		4.62	16
	V3	4.30	22	152	3.57		3.45	17	314	1.94		2.47	29	267	2.83		4.70	13
	V4	5.55	13	169	3.37		2.92	30	244	1.87		3.30	15	248	2.43		4.70	14
	V5	4.38	21	154	5.07		2.39	32	255	2.50		2.93	18	257	3.07		4.10	24
	V6	3.75	30	140	3.60		3.24	22	259	2.47		2.90	19	274	2.63		3.71	31
	V7	3.96	27	127	3.82		3.03	28	267	1.84		3.47	13	257	3.00		3.82	28
	V8	4.15	26	151	3.82		3.15	24	256	1.75		2.20	32	223	2.63		3.74	30
	V9	3.71	31	120	2.03		2.56	31	294	1.35		2.80	21	291	2.60		3.44	32
	V10	3.57	32	204	3.24		2.31	33	262	1.55		2.53	27	257	2.43		3.25	33
	V11	3.35	33	166	2.09		3.10	26	236	2.09		3.20	16	263	2.50		4.29	21
N2	V1	6.51	6	172	5.27	46.98	4.38	2	245	3.25	15.14	3.50	10	269	3.83	8.33	5.57	2
	V2	5.64	11	177	4.90	11.37	3.38	21	293	2.30	6.23	3.60	9	262	3.93	1.67	5.15	8
	V3	5.56	12	175	3.94	25.28	3.77	9	323	1.97	8.01	3.73	7	309	3.80	21.11	5.20	6
	V4	5.75	10	195	3.58	3.95	3.45	17	263	2.34	13.35	4.20	2	333	4.17	15.00	5.20	7
	V5	5.22	15	162	5.44	16.81	3.53	16	278	2.56	28.49	3.70	8	263	3.47	12.78	4.66	15
	V6	4.89	19	168	4.46	22.80	3.67	14	279	2.75	10.68	3.47	12	263	3.83	9.44	4.33	20
	V7	5.25	14	131	4.29	25.85	3.70	11	274	2.08	16.92	3.87	6	270	3.80	6.67	4.48	17
	V8	4.95	18	169	4.24	16.03	3.60	15	304	1.93	11.13	2.40	31	247	3.67	3.33	4.06	25
	V9	5.85	9	142	2.42	42.92	3.18	23	299	1.50	15.31	2.47	29	267	3.63	-5.56	4.14	23
	V10	4.22	23	228	3.94	12.96	2.98	29	271	1.65	16.56	2.70	23	317	3.93	2.78	3.78	29
	V11	3.89	29	181	2.60	10.77	3.99	6	276	2.40	22.26	2.90	19	306	2.80	-5.00	4.73	11
N3	V1	7.49	1	194	6.48	33.31	4.52	1	293	3.40	9.35	2.47	28	275	2.87	-4.44	5.79	1
	V2	6.56	4	187	5.22	14.94	3.45	17	319	2.42	4.01	3.93	3	286	3.77	3.61	5.32	5
	V3	6.54	5	188	4.16	22.40	4.27	3	365	2.07	10.24	3.90	4	364	3.73	11.94	5.42	4
	V4	6.99	2	248	3.73	14.39	3.70	11	288	2.44	9.79	4.33	1	307	4.13	8.61	5.56	3
	V5	6.43	7	174	5.84	20.57	3.81	8	293	2.68	17.81	3.90	4	280	3.63	8.06	5.13	9
	V6	6.14	8	230	5.00	23.95	3.85	7	330	2.77	7.57	2.57	26	287	3.17	-2.78	4.37	18
	V7	3.92	28	184	4.35	-0.36	4.10	4	279	2.36	13.35	3.33	14	309	3.17	-1.11	4.24	22
	V8	5.09	16	210	4.89	9.37	3.67	13	326	2.11	6.45	1.53	33	322	2.27	-5.56	4.04	26
	V9	6.83	3	172	2.86	31.25	3.45	17	308	2.27	11.13	2.67	24	321	2.67	-1.11	4.36	19
	V10	4.76	20	232	4.28	11.88	3.10	26	312	2.37	9.79	2.60	25	332	2.87	0.56	3.92	27
	V11	4.18	24	227	2.73	8.37	4.10	4	291	2.51	12.46	2.73	22	307	2.60	-3.89	4.71	12
C.D.(0.05)																		
Not same V		0.93		NS	NS		0.32		NS	NS		0.32		NS	NS			
Not same N		0.91		NS	NS		0.31		NS	NS		0.31		NS	NS			
<b>Means of N levels:</b>																		
N1		4.18		153	3.53		3.01		261	2.07		2.94		259	2.69			
N2		5.25		173	4.10	21.43	3.60		282	2.25	14.92	3.32		282	3.72	6.41		
N3		5.90		204	4.50	17.28	3.82		309	2.49	10.18	3.09		308	3.17	1.26		
C.D.(0.05)		0.34		10.60	0.14		0.11		3.21	0.10		0.11		5.34	0.10			
C.V.(%)		15.02		13.72	7.65		7.51		2.58	9.89		8.06		4.31	7.04			

Table 4.1(f) (Contd..)

N-levels	Varieties	KARJAT					RAIPUR					RANCHI					Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
<b>Mean of varieties:</b>																		
	V1	6.05	2	173	5.23	40.15	4.23	1	256	3.28	12.24	2.99	6	264	3.19	1.94	5.43	1
	V2	5.76	3	171	4.81	13.15	3.32	8	287	2.32	5.12	3.68	2	271	3.43	2.64	5.03	4
	V3	5.47	4	172	3.89	23.84	3.83	2	334	2.00	9.13	3.37	5	313	3.46	16.53	5.11	3
	V4	6.10	1	204	3.56	9.17	3.36	7	265	2.22	11.57	3.94	1	296	3.58	11.81	5.15	2
	V5	5.34	6	163	5.45	18.69	3.24	9	275	2.58	23.15	3.51	4	267	3.39	10.42	4.63	5
	V6	4.93	7	179	4.35	23.37	3.58	5	290	2.66	9.13	2.98	7	275	3.21	3.33	4.14	8
	V7	4.38	9	147	4.15	12.75	3.61	4	273	2.09	15.14	3.56	3	279	3.32	2.78	4.18	7
	V8	4.73	8	177	4.32	12.70	3.47	6	295	1.93	8.79	2.04	11	264	2.86	-1.11	3.95	10
	V9	5.46	5	145	2.44	37.08	3.07	10	300	1.71	13.22	2.64	9	293	2.97	-3.33	3.98	9
	V10	4.18	10	221	3.82	12.42	2.80	11	282	1.86	13.18	2.61	10	302	3.08	1.67	3.65	11
	V11	3.81	11	191	2.47	9.57	3.73	3	268	2.33	17.36	2.94	8	292	2.63	-4.44	4.58	6
	C.D.(0.05)	0.54		26.51	0.57		0.18		18.08	0.18		0.33		30.15	0.28			
	C.V.(%)	11.13		15.91	14.89		5.6		6.75	8.26		11.18		11.29	9.27			
	<b>Expt. Mean</b>	<b>5.11</b>		<b>177</b>	<b>4.04</b>		<b>3.48</b>		<b>284</b>	<b>2.27</b>		<b>3.12</b>		<b>283</b>	<b>3.19</b>			
	Soil type						Clay soil					Clay loam						
	pH	6.70					7.20					6.10						
	<b>N - levels (kg/ha)</b>																	
	N1	50					40					60						
	N2	100					80					120						
	N3	150					120					180						
	Recommended N:P:K (kg/ha)	100:50:50					80:60:40:25					120:60:40						
	<b>Varieties</b>																	
	V1	IET 22752					IET 22752					IET 22752						
	V2	IET 22753					IET 22753					IET 22753						
	V3	IET 22763					IET 22763					IET 22763						
	V4	IET 22764					IET 22764					IET 22764						
	V5	IET 22767					IET 22767					IET 22767						
	V6	IET22768					IET22768					IET22768						
	V7	Sahbhagidhan					Sahbhagidhan					Sahbhagidhan						
	V8	Govind					Govind					Govind						
	V9	Narendra 97					Narendra 97					Narendra 97						
	V10	Tulasi					Tulasi					Tulasi						
	V11	Local (Karjat-4)					Local (Samleshwari)					Local (IR 64)						
	Available N:P:K of soil (kg/ha)	112-199:12.58-18.42:282.24-364.48					198:24:230					212:11.5:290						

Table 4.1(g): Summary of data on grain yield and ancillary characters of selected AVT-2 IME (Transplanted) cultures grown conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.

N-levels	Varieties	ADUTHURAI					CHINSURAH					CHIJLIMA				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 35 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
N1	V1	6.35	18	384	3.60		3.86	15	309	2.95		2.99	30	277	3.55	
	V2	6.40	16	388	2.51		-	-	-	-		-	-	-	-	
	V3	6.01	23	366	3.41		3.17	31	294	2.81		3.15	27	191	3.02	
	V4	5.85	27	386	2.84		3.39	27	298	2.96		2.75	35	211	3.45	
	V5	5.65	32	285	3.21		3.39	27	299	2.84		3.44	25	174	3.62	
	V6	6.56	14	419	2.72		-	-	-	-		-	-	-	-	
	V7	5.47	34	338	2.93		3.03	33	294	2.77		3.20	26	199	2.90	
	V8	3.63	42	394	2.13		2.89	35	298	2.81		3.05	28	182	2.33	
	V9	5.76	30	376	3.05		3.75	18	305	2.91		2.93	31	193	2.37	
	V10	5.79	29	370	3.12		3.11	32	295	2.80		3.04	29	164	3.11	
	V11	5.04	38	370	2.24		3.25	30	299	2.84		2.80	32	209	2.66	
	V12	5.22	35	372	2.16		3.39	26	300	2.93		2.77	33	280	2.78	
	V13	4.75	40	365	2.40		3.36	29	299	2.93		2.77	34	219	2.50	
	V14	5.53	33	385	2.35		2.64	36	290	2.73		2.53	36	233	3.43	
N2	V1	7.13	6	394	3.74	10.39	5.06	3	336	3.23	34.13	4.00	18	204	3.44	25.33
	V2	6.89	8	403	2.81	6.52	-	-	-	-		-	-	-	-	-
	V3	6.61	12	377	3.69	7.97	4.06	13	315	3.03	25.40	4.40	13	186	5.86	31.33
	V4	6.39	17	396	2.97	7.13	4.58	4	330	3.13	34.13	4.13	14	217	2.74	34.67
	V5	6.25	19	296	3.56	7.97	3.72	20	316	2.95	9.52	4.00	18	217	5.61	14.00
	V6	7.40	3	431	3.12	11.23	-	-	-	-		-	-	-	-	-
	V7	5.80	28	346	2.90	4.35	3.72	20	313	2.96	19.84	4.11	15	211	2.77	22.67
	V8	4.97	39	403	2.30	17.87	3.75	18	315	2.97	24.60	3.87	21	233	3.24	20.40
	V9	6.41	15	388	3.30	8.70	4.53	6	328	3.12	22.22	4.05	17	223	2.74	28.00
	V10	6.87	9	381	3.33	14.37	4.06	14	322	3.01	26.98	4.11	15	204	3.54	26.67
	V11	5.75	31	382	2.52	9.54	4.31	8	324	3.09	30.16	3.57	24	259	2.75	19.33
	V12	5.85	26	382	2.48	8.45	4.17	12	324	3.04	22.22	3.84	22	201	2.49	26.67
	V13	5.14	37	376	2.71	5.31	4.31	8	318	3.04	26.98	3.68	23	228	2.52	22.80
	V14	5.91	25	398	2.65	5.19	3.56	22	311	2.93	26.19	3.95	20	211	2.54	35.33

Table 4.1(g) (Contd..)

N-levels	Varieties	ADUTHURAI					CHINSURAH					CHIPLIMA				
		Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 35 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
N3	V1	7.52	2	398	3.49	7.79	5.25	2	344	3.22	19.84	5.39	6	220	2.65	30.00
	V2	7.21	4	407	3.00	5.37	-	-	-	-	-	-	-	-	-	-
	V3	6.94	7	382	3.74	6.16	4.31	11	327	3.06	16.27	5.33	8	213	3.24	27.33
	V4	6.68	10	400	3.03	5.56	4.58	4	334	3.24	17.06	5.87	1	207	5.04	39.00
	V5	6.67	11	299	3.72	6.76	3.83	16	321	2.91	6.35	5.12	11	164	3.29	21.00
	V6	7.71	1	435	3.22	7.67	-	-	-	-	-	-	-	-	-	-
	V7	6.03	22	348	3.35	3.74	3.53	23	319	2.94	7.14	5.81	2	206	3.59	32.67
	V8	4.18	41	406	2.38	3.62	3.50	24	323	2.90	8.73	5.79	3	222	2.78	34.20
	V9	6.59	13	391	3.39	5.56	5.42	1	337	3.25	23.81	5.33	8	216	3.53	30.00
	V10	7.20	5	384	3.38	9.42	4.31	8	331	3.08	17.06	5.47	5	161	3.47	30.33
	V11	5.98	24	391	2.63	6.28	3.78	17	327	2.99	7.54	4.99	12	198	3.00	27.33
	V12	6.07	21	387	2.64	5.68	3.42	25	326	2.94	0.40	5.25	10	202	2.53	31.00
	V13	5.19	36	382	2.87	2.96	4.47	7	334	3.07	15.87	5.55	4	194	3.03	34.73
	V14	6.15	20	403	2.75	4.17	2.92	34	318	2.90	3.97	5.36	7	205	3.90	35.33
	C.D.(0.05)															
	Nat same V	NS		NS	NS		0.37		4.56	0.04		NS		30.53	0.41	
	Vat same N	0.39		NS	0.2		0.35		4.50	0.04		NS		30.47	0.4	
	Means of N levels:															
	N1	5.57		371	2.76		3.27		298	2.86		2.95		211	2.98	
	N2	6.24		382	3.01	8.93	4.15		321	3.04	25.20	3.98		216	3.35	25.60
	N3	6.44		387	3.11	5.77	4.11		328	3.04	12.00	5.44		201	3.34	31.08
	C.D.(0.05)	0.13		1.60	0.09		0.06		1.76	0.01		0.15		NS	0.13	
	C.V.(%)	3.61		0.70	5.28		3.98		1.33	1.06		8.76		15.63	9.30	
	Mean of varieties:															
	V1	7.00	2	392	3.61	9.09	4.72	1	330	3.13	26.98	4.12	7	233	3.21	27.67
	V2	6.84	3	399	2.77	5.95	-	-	-	-	-	-	-	-	-	-
	V3	6.52	5	375	3.62	7.07	3.84	5	312	2.97	20.83	4.29	2	197	4.04	29.33
	V4	6.31	6	394	2.95	6.34	4.19	3	321	3.11	25.60	4.25	3	212	3.74	36.83
	V5	6.19	8	293	3.50	7.37	3.65	9	312	2.90	7.94	4.19	6	185	4.17	17.50
	V6	7.22	1	428	3.02	9.45	-	-	-	-	-	-	-	-	-	-
	V7	5.77	10	344	3.06	-	3.43	10	309	2.89	13.49	4.37	1	206	3.09	27.67
	V8	4.26	14	401	2.27	10.75	3.38	11	312	2.89	16.67	4.23	4	212	2.79	27.30
	V9	6.26	7	385	3.25	7.13	4.56	2	323	3.09	-	4.11	8	211	2.88	29.00
	V10	6.62	4	378	3.28	11.90	3.82	6	316	2.96	22.02	4.20	5	176	3.37	28.50
	V11	5.59	12	381	2.47	7.91	3.78	7	316	2.97	18.85	3.79	12	222	2.80	23.33
	V12	5.71	11	380	2.42	7.07	3.66	8	317	2.97	-	3.96	10	228	2.60	28.83
	V13	5.03	13	374	2.66	4.14	4.05	4	317	3.01	21.43	4.00	9	214	2.68	28.77
	V14	5.86	9	395	2.58	4.68	3.04	12	306	2.85	15.08	3.95	11	217	3.29	35.33
	C.D.(0.05)	0.22		3.12	0.11		0.21		2.63	0.02		0.27		17.63	0.24	
	C.V.(%)	3.99		0.88	4.16		5.92		0.89	0.85		7.08		9.02	7.86	
	Expt. Mean	<b>6.08</b>		<b>380</b>	<b>2.96</b>		<b>3.84</b>		<b>316</b>	<b>2.98</b>		<b>4.12</b>		<b>209</b>	<b>3.22</b>	

Table 4.1(g) (Contd..)

N-levels	Varieties	ADUTHURAI					CHINSURAH					CHIPLIMA				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 35 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
Soil type		Clay					Clay loam					Sandy loam				
pH		7.20					7.30					6.55				
<b>N-levels (kg/ha)</b>																
N1		75					35					40				
N2		150					70					80				
N3		225					105					120				
Recommended N:P:K (kg/ha)		150:60:25					35:35:35:35					-				
<b>Varieties</b>																
V1		IET 22084					IET 22084					IET 22084				
V2		IET 22212					-					-				
V3		IET 22224					IET 22224					IET 22224				
V4		IET 22565					IET 22565					IET 22565				
V5		IET 22569					IET 22569					IET 22569				
V6		IET 22592					-					-				
V7		IET 22598					IET 22598					IET 22598				
V8		IR 64					IR 64					IR 64				
							PA					PA				
V9		PA 6201					6201					6201				
V10		PR 113					PR 113					PR 113				
V11		Lalat					Lalat					Lalat				
V12		Sasyasree					Sasyasree					Sasyasree				
V13		MTU 1010					MTU 1010					MTU 1010				
V14		Local (ADT 39)					Local (Sahbhagidhan)					Local (Konarka)				
Available N:P:K of soil (kg/ha)		169:54.5:210					-					153.75:30.42:135.74				

Table-4.1(g) (Contd..)

N-levels	Varieties	FAIZABAD					GANGAVATHI					KARJAT				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)
N1	V1	5.52	21	322	2.90		4.11	39	323	2.01		4.47	25	150	3.51	
	V2	-	-	-	-		3.78	40	295	2.09		-	-	-	-	
	V3	4.59	29	313	3.76		4.90	25	357	2.04		3.85	32	168	2.99	
	V4	4.34	30	318	2.09		2.95	42	357	1.72		3.79	33	163	2.56	
	V5	4.75	27	326	2.39		4.60	30	312	2.20		4.76	20	161	3.68	
	V6	-	-	-	-		4.22	38	337	2.55		-	-	-	-	
	V7	4.84	26	317	2.05		4.51	33	272	2.37		4.22	-	148	2.55	
	V8	4.20	31	308	1.66		4.27	37	359	2.49		3.61	35	159	2.60	
	V9	5.65	18	324	3.31		4.99	21	314	2.40		4.56	24	142	3.32	
	V10	4.69	28	314	4.51		4.67	29	310	2.87		3.74	34	136	4.20	
	V11	3.72	34	308	2.71		4.56	32	384	1.89		4.99	17	124	3.17	
	V12	3.74	33	306	2.11		3.74	41	312	1.72		3.91	31	146	3.36	
	V13	3.54	36	311	2.42		5.17	19	327	2.30		3.98	30	133	3.65	
	V14	3.61	35	316	3.04		4.59	31	382	2.37		4.83	18	155	2.45	
N2	V1	6.67	8	361	3.62	19.21	4.39	35	390	2.18	3.70	5.35	13	191	3.48	17.74
	V2	-	-	-	-		4.77	28	273	1.93	13.20	-	-	-	-	-
	V3	6.37	11	342	4.17	29.64	4.83	27	402	2.14	-0.90	4.44	26	170	3.24	11.81
	V4	5.98	15	338	2.51	27.28	4.48	34	389	1.99	20.47	4.58	23	202	3.01	15.83
	V5	6.33	12	348	4.12	26.35	5.63	13	333	2.15	13.68	5.21	15	181	3.18	8.85
	V6	-	-	-	-		5.75	12	360	2.55	20.42	-	-	-	-	-
	V7	6.66	9	345	2.01	30.36	5.85	10	371	2.56	17.90	4.67	-	161	2.69	9.03
	V8	5.49	22	350	1.71	21.52	5.56	15	311	2.60	17.21	4.38	28	204	2.75	15.40
	V9	6.19	13	334	3.17	8.95	6.23	4	365	2.69	16.52	5.60	9	161	3.59	20.95
	V10	6.50	10	335	4.25	30.19	4.98	22	305	2.38	4.13	4.62	22	156	4.01	17.74
	V11	5.63	19	336	2.94	31.84	5.54	16	405	2.42	13.11	5.94	6	188	3.78	18.97
	V12	5.24	23	340	2.99	25.03	4.35	36	332	2.14	8.07	4.77	19	170	3.53	17.22
	V13	4.03	32	345	3.33	8.23	6.08	8	377	2.53	12.09	4.40	27	161	4.01	8.29
	V14	5.09	24	349	4.13	24.59	4.94	24	423	1.81	4.75	5.55	11	209	2.89	14.37

Table 4.1(g) (Contd..)

N-levels	Varieties	FAIZABAD					GANGAVATHI					KARJAT				
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)
N3	V1	7.09	1	372	4.36	13.09	4.85	26	391	2.38	4.96	5.69	26	220	3.89	12.19
	V2	-	-	-	-	-	5.10	20	378	2.02	8.78	-	-	-	-	0.00
	V3	7.07	2	371	3.53	20.59	5.18	18	428	2.35	1.88	5.57	33	202	3.67	17.24
	V4	6.89	3	385	2.77	21.27	5.28	17	372	2.12	15.56	5.11	34	217	3.12	13.21
	V5	6.70	6	383	4.11	16.22	5.60	14	373	2.04	6.65	5.90	21	196	3.11	11.38
	V6	-	-	-	-	-	6.32	2	367	2.46	14.06	-	-	-	-	-
	V7	5.99	14	370	3.09	9.55	6.60	1	308	2.84	13.96	5.32	30	194	3.35	10.99
	V8	6.70	7	384	2.07	20.78	6.09	7	377	2.57	12.18	5.48	36	217	3.03	18.69
	V9	6.72	5	383	3.50	8.92	6.17	5	364	2.34	7.91	6.25	25	178	3.62	16.94
	V10	6.82	4	373	3.90	17.76	6.17	6	414	2.61	9.97	6.10	35	180	4.00	23.66
	V11	5.88	16	384	2.73	17.98	6.28	3	302	2.34	11.43	6.65	18	208	3.97	16.55
	V12	5.77	17	379	2.82	16.94	4.98	23	385	1.94	8.21	6.37	32	209	3.35	24.55
	V13	5.00	25	381	2.84	12.16	6.06	9	436	3.04	5.88	6.02	31	172	4.08	20.35
	V14	5.62	20	375	4.06	16.72	5.79	11	478	1.96	8.05	6.16	19	227	2.99	13.30
	C.D.(0.05)															
	Nat same V	0.13		11.04	0.20		NS		NS	NS		NS		NS	NS	
	Vat same N	0.13		10.74	0.20		NS		NS	NS		NS		NS	NS	
	Means of N levels:															
	N1	4.43		315	2.75		4.36		331	2.22		4.23		149	3.17	
	N2	5.85		344	3.25	23.60	5.24		360	2.29	11.74	4.96		179	3.35	14.68
	N3	6.35		378	3.32	16.00	5.75		384	2.36	9.25	5.86		202	3.51	16.34
	C.D.(0.05)	0.02		3.13	0.04		0.36		NS	NS		0.26		7.31	0.13	
	C.V.(%)	1.06		2.17	2.78		18.21		19.48	8.90		12.45		9.88	9.18	
	Mean of varieties:															
	V1	6.43	1	352	3.63	16.15	4.45	12	368	2.19	4.33	5.17	5	187	3.63	14.97
	V2	-	-	-	-	-	4.55	11	315	2.01	10.99	-	-	-	-	-
	V3	6.01	3	342	3.82	25.12	4.97	10	396	2.18	0.49	4.62	10	180	3.30	14.52
	V4	5.74	7	347	2.46	24.28	4.24	14	373	1.94	18.02	4.50	11	194	2.90	14.52
	V5	5.93	5	352	3.54	21.29	5.28	7	339	2.13	10.16	5.29	4	179	3.40	10.11
	V6	-	-	-	-	-	5.43	5	355	2.52	17.24	-	-	-	-	-
	V7	5.83	6	344	2.39	-	5.65	3	317	2.59	-	4.73	-	-	-	-
	V8	5.46	8	348	1.81	21.15	5.31	6	349	2.55	14.69	4.49	12	193	2.79	17.04
	V9	6.18	2	347	3.32	8.93	5.79	1	348	2.48	12.22	5.47	3	160	3.51	18.95
	V10	6.00	4	341	4.22	23.98	5.27	8	343	2.62	7.05	4.82	7	157	4.07	20.70
	V11	5.08	9	343	2.79	24.91	5.46	4	364	2.22	12.27	5.86	1	173	3.64	17.76
	V12	4.91	10	341	2.64	20.98	4.36	13	343	1.93	8.14	5.02	6	175	3.41	20.89
	V13	4.19	12	345	2.86	10.20	5.77	2	380	2.62	8.98	4.80	8	155	3.92	14.32
	V14	4.77	11	347	3.74	20.65	5.11	9	427	2.05	6.40	5.51	2	197	2.77	13.83
	C.D.(0.05)	0.08		6.37	0.12		0.68		51.28	0.32		0.55		24.7	0.35	
	C.V. (%)	1.47		1.98	4.06		14.33		15.33	15.05		11.64		14.98	11.31	
	Expt. Mean	5.55		346	3.10		5.12		358	2.29		5.02		177	3.34	



Table 4.1(g) (Contd..)

N-levels	Varieties	FAIZABAD					GANGAVATHI					KARJAT				
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)
Soil type		Sandy Loam					Black Clay									
pH		7.60					8.10									
<b>N - levels (kg/ha)</b>																
N1		60					75					50				
N2		120					150					100				
N3		180					225					150				
Recommended N:P:K (kg/ha)		120:60:60:25					150:75:75									
<b>Varieties</b>																
V1		IET 22084					IET 22084					IET 22084				
V2		-					IET 22212					-				
V3		IET 22224					IET 22224					IET 22224				
V4		IET 22565					IET 22565					IET 22565				
V5		IET 22569					IET 22569					IET 22569				
V6		-					IET 22592					-				
V7		IET 22598					IET 22598					IET 22598				
V8		IR 64					IR 64					IR 64				
V9		PA 6201					PA 6201					PA 6201				
V10		PR 113					PR 113					PR 113				
V11		Lalat					Lalat					Lalat				
V12		Sasyasree					Sasyasree					Sasyasree				
V13		MTU 1010					MTU 1010					MTU 1010				
V14		Local (NDR 2064)					Local (BPT-5204)					Local (Karjat)				
Available N:P:K of soil (kg/ha)		200:24:234					-					-				

Table-4.1(g) (Contd..)

N-levels	Varieties	NAVASARI					PATTAMBI					NAGINA					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 45 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
N1	V1	3.44	32	263	3.37		3.89	18	350	2.95		2.68	26	216	3.54		4.01	31
	V2	-	-	-	-		2.73	40	378	1.53		-	-	-	-		4.31	30
	V3	3.38	34	252	3.00		3.57	30	355	3.15		2.64	27	215	3.48		3.78	35
	V4	2.91	36	260	2.57		2.89	38	390	2.79		2.83	23	232	3.65		3.44	41
	V5	3.79	26	262	3.03		3.41	35	404	2.73		2.81	24	222	3.62		3.95	33
	V6	-	-	-	-		2.68	42	350	2.14		-	-	-	-		4.48	26
	V7	3.91	21	254	3.60		3.68	26	348	3.15		2.80	25	222	3.61		3.81	34
	V8	3.80	25	276	3.03		3.57	32	344	3.30		2.57	29	210	3.43		3.41	42
	V9	4.06	17	256	3.77		2.73	40	364	2.82		2.50	31	206	3.40		3.96	32
	V10	3.40	33	247	2.83		3.68	26	386	3.28		2.46	32	196	3.20		3.70	36
	V11	3.56	30	273	3.03		3.41	35	390	2.89		2.58	28	212	3.45		3.63	37
	V12	3.44	31	270	3.70		4.20	8	434	2.93		2.52	30	209	3.41		3.55	39
	V13	3.38	35	265	3.40		3.57	30	364	2.52		2.37	33	194	3.22		3.55	40
	V14	3.87	23	251	3.53		2.89	38	367	2.99		-	-	-	-		3.57	38
N2	V1	4.09	15	272.67	3.73	13.10	3.94	17	384	2.68	1.17	4.81	12	272	3.61	35.49	4.95	16
	V2	-	-	-	-		3.43	34	403	1.61	15.44	-	-	-	-		5.03	12
	V3	3.81	24	265	3.23	8.64	4.13	9	345	2.65	12.33	4.63	16	268	3.60	33.18	4.70	20
	V4	3.59	29	280	2.93	13.60	3.63	29	346	2.96	16.39	4.91	7	284	3.77	34.57	4.64	23
	V5	4.34	8	279	3.33	10.99	3.50	33	378	2.85	1.94	4.70	14	269	3.61	31.48	4.67	21
	V6	-	-	-	-		3.78	21	354	1.61	24.39	-	-	-	-		5.64	2
	V7	4.37	7	277	3.87	9.14	4.13	9	348	2.55	10.00	4.87	9	281	3.72	34.57	4.73	19
	V8	4.12	13	295	3.67	6.42	3.88	19	360	2.62	6.78	4.51	19	264	3.49	32.25	4.38	28
	V9	4.48	4	272	4.07	8.52	4.81	4	373	3.35	46.28	4.56	17	267	3.59	34.41	5.04	11
	V10	3.67	27	273	3.63	5.43	3.69	25	395	3.15	0.28	4.14	22	234	3.40	27.93	4.62	24
	V11	4.14	12	282	3.57	11.48	4.05	15	395	2.95	14.17	4.52	18	258	3.53	32.25	4.67	22
	V12	3.88	22	285	3.97	8.77	4.13	9	424	2.84	-1.67	4.40	20	265	3.48	31.33	4.42	27
	V13	3.66	28	280	3.80	5.68	4.00	16	359	2.49	9.56	4.25	21	244	3.45	31.33	4.32	29
	V14	4.20	11	266	3.83	6.54	4.75	5	367	2.95	41.39	-	-	-	-		4.54	25

Table 4.1(g) (Contd..)

N-levels	Varieties	NAVASARI					PATTAMEI					NAGINA					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 45 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
N3	V1	4.30	10	282	4.00	8.65	3.72	22	342	2.52	-1.85	5.28	3	285	3.72	21.68	5.40	5
	V2	-	-	-	-	-	3.15	37	379	1.58	4.67	-	-	-	-	-	5.29	7
	V3	4.00	18	286	3.60	6.17	4.94	2	357	2.80	15.19	5.16	5	280	3.63	20.99	5.26	8
	V4	3.96	19	281	3.57	10.49	3.72	22	370	2.50	9.24	5.45	1	291	3.77	21.84	5.31	6
	V5	4.60	3	289	3.63	8.09	4.13	9	383	2.72	7.92	5.25	4	281	3.68	20.29	5.09	10
	V6	-	-	-	-	-	3.64	28	388	1.56	10.67	-	-	-	-	-	5.89	1
	V7	4.66	2	281	4.23	7.47	4.53	6	383	2.75	9.51	5.39	2	290	3.75	21.60	5.19	9
	V8	4.42	6	306	3.87	6.23	3.80	20	356	2.54	2.56	4.81	11	266	3.51	18.60	4.90	18
	V9	4.91	1	281	4.40	8.58	4.13	9	378	2.57	15.50	4.90	8	273	3.62	19.98	5.49	3
	V10	3.95	20	277	4.43	5.56	4.94	2	392	2.68	14.03	4.75	13	260	3.50	19.06	5.42	4
	V11	4.34	8	287	3.77	7.78	4.13	9	370	2.95	7.92	4.97	6	270	3.57	19.91	5.02	14
	V12	4.10	14	302	4.37	6.60	5.10	1	418	2.83	10.00	4.65	15	255	3.50	17.75	4.97	15
	V13	4.07	16	288	4.03	6.98	3.72	22	388	2.43	1.65	4.86	10	270	3.51	20.76	5.03	13
	V14	4.45	5	283	4.20	5.78	4.53	6	370	2.92	18.26	-	-	-	-	-	4.91	17
	C.D.(0.05)																	
	Nat same V	NS		NS	NS		NS		NS	NS		NS		NS	0.02			
	Vat same N	NS		NS	NS		NS		NS	NS		NS		NS	0.02			
	Means of N levels:																	
	N1	3.58		261	3.24		3.35		373	2.79		2.62		212	3.45			
	N2	4.03		277	3.64	9.03	3.99		374	2.66	14.17	4.57		264	3.57	32.62		
	N3	4.31		287	4.01	7.37	4.15		377	2.52	8.95	5.04		275	3.61	20.22		
	C.D.(0.05)	0.09		0.65	0.09		0.46		NS	NS		0.25		6.4	0.01			
	C.V.(%)	5.19		0.56	6.11		10.39		4.83	24.46		14.07		5.85	0.77			
	Mean of varieties:																	
	V1	3.94	7	273	3.70	-	3.85	8	359	2.72	-0.34	4.25	4	258	3.62	28.59	4.80	4
	V2	-	-	-	-	-	3.10	14	387	1.57	10.06	-	-	-	-	-	4.83	3
	V3	3.73	9	268	3.28	7.41	4.21	2	352	2.87	13.76	4.14	5	254	3.57	27.08	4.59	6
	V4	3.48	12	274	3.02	12.05	3.41	12	369	2.75	12.81	4.40	1	269	3.73	28.20	4.45	10
	V5	4.24	3	277	3.33	9.54	3.68	11	388	2.77	4.93	4.26	3	257	3.63	25.89	4.59	5
	V6	-	-	-	-	-	3.36	13	364	1.77	17.53	-	-	-	-	-	5.34	1
	V7	4.31	2	270	3.90	8.30	4.11	3	360	2.81	-	4.35	2	264	3.69	28.09	4.58	7
	V8	4.11	5	292	3.52	6.33	3.75	10	353	2.82	4.67	3.96	8	247	3.48	25.42	4.23	14
	V9	4.48	1	270	4.08	8.55	3.89	6	372	2.91	30.89	3.99	7	249	3.54	27.20	4.86	2
	V10	3.67	11	266	3.63	-	4.10	4	391	3.04	-	3.78	11	230	3.37	23.50	4.58	8
	V11	4.01	6	281	3.46	9.63	3.86	7	385	2.93	11.04	4.02	6	247	3.51	26.08	4.46	9
	V12	3.81	8	286	4.01	7.69	4.48	1	425	2.86	4.17	3.85	9	243	3.46	24.54	4.31	12
	V13	3.70	10	278	3.74	-	3.76	9	370	2.48	5.60	3.83	10	236	3.39	26.04	4.29	13
	V14	4.17	4	267	3.86	6.16	4.06	5	368	2.95	29.83	-	-	-	-	-	4.35	11
	C.D.(0.05)	0.27		9.99	0.24		NS		34.85	0.53		NS		11.68	0.01			
	C.V. (%)	7.28		3.89	7.20		18.58		7.98	17.00		14.22		4.95	0.43			
	Expt. Mean	3.97		275	3.63		3.83		374	2.66		4.08		250	3.55			

Table 4.1(g) (Contd..)

N-levels	Varieties	NAVASARI					PATTAMBI					NAGINA				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
Soil type		Clay					-					Sandy loam				
pH		8.18					5.60					7.60				
<b>N - levels (kg/ha)</b>																
N1		50					45					60				
N2		100					90					120				
N3		150					135					180				
Recommended N:P:K (kg/ha)		100:30:50:20					90:45:45									
<b>Varieties</b>																
V1		IET 22084					IET 22084					IET 22084				
V2		-					IET 22212					-				
V3		IET 22224					IET 22224					IET 22224				
V4		IET 22565					IET 22565					IET 22565				
V5		IET 22569					IET 22569					IET 22569				
V6		-					IET 22592					-				
V7		IET 22598					IET 22598					IET 22598				
V8		IR 64					IR 64					IR 64				
V9		PA 6201					PA 6201					PA 6201				
V10		PR 113					PR 113					PR 113				
V11		LalaT					LalaT					LalaT				
V12		Sasyasree					Sasyasree					Sasyasree				
V13		MTU 1010					MTU 1010					MTU 1010				
V14		Local (GNR 3)					Local (Aiswarya)					Local				
Available N:P:K of soil (kg/ha)		125:60:589					216:18:92					20.4:19:207				

Table 4.1(h): Summary of data on grain yield and ancillary characters of selected AVT 2 - IM (TP)cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.

N-levels	Varieties	CHIPLIMA					CHINSURAH					FAIZABAD				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	2.93	15	228	3.03		5.07	16	309	2.46		6.55	9	317	3.50	
	V2	2.64	18	205	2.87		4.43	21	295	2.37		5.68	15	307	3.04	
	V3	2.53	21	234	3.00		5.40	14	316	1.84		4.94	22	312	3.85	
	V4	2.80	17	179	3.45		4.81	18	302	2.43		4.96	21	317	3.43	
	V5	-	-	-	-		4.76	19	300	2.40		6.44	10	320	3.06	
	V6	2.59	20	211	3.24		4.93	17	303	2.50		5.03	20	318	2.45	
	V7	2.61	19	186	3.47		4.57	20	300	2.43		3.34	24	327	3.48	
	V8	2.88	16	239	2.99		-	-	-	-		4.88	23	318	3.74	
N2	V1	3.89	12	208	3.10	24.00	6.36	4	346	2.71	32.14	7.67	2	340	3.87	18.56
	V2	3.60	14	229	3.19	24.00	5.38	15	321	2.60	23.81	6.27	11	348	3.53	9.88
	V3	4.40	9	217	2.98	46.67	6.24	6	354	2.77	20.83	6.57	8	340	3.49	27.17
	V4	3.65	13	185	2.81	21.33	6.17	7	341	2.65	33.93	5.68	15	340	3.52	12.08
	V5	-	-	-	-	-	6.45	2	348	2.79	42.26	6.83	6	346	3.54	6.59
	V6	4.29	10	223	3.38	42.67	6.10	9	344	2.70	29.17	5.83	14	339	3.44	13.34
	V7	4.80	8	196	3.21	54.67	6.05	12	342	2.74	36.90	5.68	15	342	3.47	39.09
	V8	4.16	11	242	2.92	32.00	-	-	-	-	-	5.18	19	343	3.34	4.94
N3	V1	5.26	7	221	2.48	29.07	6.40	3	353	2.69	16.67	8.16	1	367	4.11	13.39
	V2	5.81	2	224	4.57	39.67	5.50	13	327	2.59	13.39	7.00	5	363	3.49	10.98
	V3	5.41	6	230	2.01	36.00	6.26	5	350	2.68	10.71	6.82	7	367	4.26	15.65
	V4	5.68	5	216	3.51	36.00	6.05	11	349	2.63	15.48	7.26	3	350	4.52	19.21
	V5	-	-	-	-	-	6.69	1	370	3.01	24.11	7.23	4	382	3.73	6.59
	V6	5.79	3	230	2.81	40.00	6.12	8	350	2.68	14.88	6.13	12	374	3.43	9.14
	V7	5.72	4	178	2.68	38.87	6.10	9	353	2.72	19.05	5.98	13	378	3.65	22.01
	V8	5.84	1	209	2.91	37.00	-	-	-	-	-	5.36	18	373	3.55	3.98
C.D.(0.05)																
N at same V		0.48		NS	0.71		NS		6.03	NS		0.11		NS	0.24	
V at same N		0.45		NS	0.68		NS		5.98	NS		0.11		NS	0.23	
<b>Means of N levels:</b>																
N1		2.71		212	3.15		4.85		304	2.35		5.23		317	3.32	
N2		4.11		214	3.08	35.05	6.11		342	2.71	31.29	6.22		342	3.52	16.46
N3		5.64		215	3.00	36.66	6.16		350	2.72	16.33	6.74		369	3.84	12.62
<b>C.D.(0.05)</b>		0.48		NS	0.71		0.16		3.43	0.14		0.02		3.71	0.10	
<b>C.V.(%)</b>		0.45		NS	0.68		5.13		1.89	9.68		0.77		2.11	5.37	

Table-4.1(h) (Contd..)

N-levels	Varieties	CHIPLIMA					CHINSURAH					AIZABAD				
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
<b>Mean of varieties:</b>																
	V1	4.03	6	219	2.87	26.53	5.94	3	336	2.62	24.40	7.46	1	342	3.83	15.97
	V2	4.02	7	219	3.54	31.83	5.10	7	314	2.52	18.60	6.32	3	339	3.36	10.43
	V3	4.12	4	227	2.66	41.33	5.97	1	340	2.43	15.77	6.11	4	340	3.87	21.41
	V4	4.04	5	193	3.26	28.67	5.67	5	331	2.57	24.70	5.97	5	336	3.82	15.65
	V5	-	-	-	-	-	5.97	1	340	2.73	33.18	6.83	2	349	3.44	6.59
	V6	4.22	3	221	3.14	41.33	5.71	4	332	2.63	22.02	5.66	6	344	3.11	11.24
	V7	4.38	1	187	3.12	46.77	5.57	6	331	2.63	27.98	5.00	8	349	3.53	30.55
	V8	4.29	2	230	2.94	34.50						5.14	7	345	3.54	4.46
	<b>C.D.(0.05)</b>	0.14		NS	NS		0.21		3.48	NS		0.07		7.52	0.14	
	<b>C.V. (%)</b>	6.24		26.53	15.25		3.78		1.1	10.21		1.16		2.33	4.11	
	<b>Expt. Mean</b>	<b>4.16</b>		<b>214</b>	<b>3.08</b>		<b>5.71</b>		<b>332</b>	<b>2.59</b>		<b>6.06</b>		<b>343</b>	<b>3.56</b>	
	Soil type	Sandy loam					Clay loam					Sandy loam				
	pH	6.55					7.40					7.60				
	<b>N - levels (kg/ha)</b>															
	N1	40					40					60				
	N2	80					80					120				
	N3	120					120					180				
	<b>Recommended NPK (kg/ha)</b>	-					80:40:40:25					120:60:60:25				
	<b>Varieties</b>															
	V1	IET 22379					IET 22379					IET 22379				
	V2	IET 22381					IET 22381					IET 22381				
	V3	IET 22390					IET 22390					IET 22390				
	V4	NDR 359					NDR 359					NDR 359				
	V5	KRH-2					KRH-2					KRH-2				
	V6	NDR 8002					NDR 8002,					NDR 8002				
	V7	Akshayadhan					Akshayadhan					Akshayadhan				
	V8	Local (Lalat)					-					Local (Sarjoo-52)				
	<b>Available NPK of soil (kg/ha)</b>	153.75:30.42:135.744					-					200:24:234				

Table-4.1(h) (Contd..)

N-levels	Varieties	KAUL					PATNA -ARI					PANTNAGAR				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	5.82	15	253	3.14		4.31	19	258	2.03		3.63	19	182	2.56	
	V2	5.62	19	256	2.96		4.00	22	330	2.18		3.65	18	196	2.49	
	V3	5.54	20	263	2.82		4.65	13	264	2.26		3.68	15	206	2.63	
	V4	5.65	18	212	3.52		4.25	21	219	3.32		3.30	23	218	1.95	
	V5	5.67	16	264	2.87		4.33	18	283	2.10		3.42	20	212	2.15	
	V6	4.75	24	264	2.43		5.17	7	313	2.12		3.38	21	210	2.06	
	V7	5.54	20	234	3.23		4.27	20	267	2.04		3.34	22	204	2.10	
	V8	5.65	17	250	3.10		3.54	24	296	1.70		3.30	23	198	2.25	
N2	V1	7.18	2	297	3.47	18.08	4.46	17	271	2.08	2.43	4.02	7	209	2.60	6.45
	V2	6.54	6	304	2.98	12.19	4.79	11	348	2.21	13.19	4.29	3	220	2.51	10.52
	V3	6.13	14	306	2.77	7.87	5.06	8	281	2.36	6.94	4.07	6	226	2.45	6.45
	V4	6.25	11	248	3.50	7.99	4.52	15	241	3.76	4.51	3.90	9	247	2.09	9.92
	V5	6.22	13	302	2.86	7.39	4.77	12	258	2.26	7.29	3.79	12	226	2.22	6.05
	V6	5.32	23	309	2.41	7.57	6.29	2	298	2.20	18.75	3.67	16	225	2.18	4.96
	V7	6.23	12	272	3.22	9.19	4.48	16	281	2.17	3.47	3.69	14	243	2.00	5.85
	V8	6.65	5	296	3.12	13.33	3.85	23	318	1.61	5.21	3.70	13	209	2.32	6.65
N3	V1	7.24	1	300	3.35	9.43	4.81	10	287	2.13	4.17	4.21	4	217	2.61	4.86
	V2	6.77	4	313	3.04	7.63	5.29	6	365	2.34	10.76	4.75	1	241	2.58	9.13
	V3	6.40	10	304	2.88	5.71	6.00	3	300	2.43	11.28	4.57	2	236	2.49	7.39
	V4	6.47	8	254	3.54	5.50	5.40	5	257	3.83	9.55	3.66	17	265	1.88	2.98
	V5	6.40	9	309	2.88	4.86	5.44	4	375	2.34	9.20	3.95	8	242	2.16	4.37
	V6	5.40	22	307	2.41	4.32	6.77	1	319	2.25	13.37	3.84	11	235	2.31	3.87
	V7	6.48	7	282	3.22	6.25	5.00	9	300	2.19	6.08	4.18	5	251	2.27	7.04
	V8	6.78	3	302	3.15	7.54	4.65	13	300	1.95	9.20	3.89	10	213	2.35	4.86
	C.D.(0.05)	NS		NS	NS											
	Not same V	NS		NS	NS		0.25		36.07	NS		NS		NS	NS	
	V at same N	NS		NS	NS		0.24		34.68	NS		NS		NS	NS	
	<b>Means of N levels:</b>															
	N1	5.53		250	3.01		4.32		279	2.22		3.46		203	2.28	
	N2	6.31		292	3.04	10.45	4.78		287	2.33	7.73	3.89		226	2.30	7.11
	N3	6.49		296	3.06	6.40	5.42		313	2.43	9.20	4.13		238	2.33	5.56
	<b>C.D.(0.05)</b>	0.23		34.65	NS		0.06		13.04	0.06		0.15		2.96	NS	
	<b>C.V.(%)</b>	7.31		15.48	9.26		2.56		8.68	5.42		7.69		2.59	6.23	

Table-4.1(h) (Contd..)

N-levels	Varieties	KAUL					PATNA -ARI					PANTNAGAR				
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
<b>Mean of varieties:</b>																
	V1	6.75	1	283	3.32	13.75	4.53	7	272	2.08	3.30	3.95	3	203	2.59	5.65
	V2	6.31	3	291	2.99	9.91	4.69	5	348	2.25	11.98	4.23	1	219	2.53	9.82
	V3	6.02	7	291	2.82	6.79	5.24	2	282	2.35	9.11	4.10	2	223	2.52	6.92
	V4	6.12	4	238	3.52	6.74	4.72	4	239	3.64	7.03	3.62	8	243	1.97	6.45
	V5	6.09	5	292	2.87	6.13	4.85	3	305	2.23	8.25	3.72	5	227	2.18	5.21
	V6	5.16	8	294	2.42	5.95	6.08	1	310	2.19	16.06	3.63	7	223	2.18	4.41
	V7	6.08	6	263	3.22	7.72	4.58	6	283	2.13	4.77	3.74	4	233	2.13	6.45
	V8	6.36	2	283	3.13	10.44	4.01	8	305	1.75	7.20	3.63	6	206	2.31	5.75
	<b>C.D.(0.05)</b>	0.43		19.9	0.23		0.15		20.83	0.13		0.17		10.48	0.20	
	<b>C.V. (%)</b>	7.38		7.49	8.19		3.21		7.54	6.05		4.71		5.01	9.22	
	<b>Expt. Mean</b>	<b>6.11</b>		<b>279</b>	<b>3.04</b>		<b>4.84</b>		<b>293</b>	<b>2.33</b>		<b>3.83</b>		<b>222</b>	<b>2.30</b>	
	Soil type	Clay loam					Clay					Silt loam				
	pH	8.10					7.06					7.90				
	<b>N-levels (kg/ha)</b>															
	N1	75					60					60				
	N2	150					120					120				
	N3	225					180					180				
	<b>Recommended NPK (kg/ha)</b>	150:60:0:25					120:60:40:25					120:60:40:25				
	<b>Varieties</b>															
	V1	IET 22379					IET 22379					IET 22379				
	V2	IET 22381					IET 22381					IET 22381				
	V3	IET 22390					IET 22390					IET 22390				
	V4	NDR 359					NDR 359					NDR 359				
	V5	KRH-2					KRH-2					KRH-2				
	V6	NDR 8002					NDR 8002					NDR 8002,				
	V7	Akshayadhan					Akshayadhan					Akshayadhan				
	V8	Local (HKR 127)					Local (Rajendra Sweata)					Local (Pant Dhan - 12)				
	<b>Available NPK of soil (kg/ha)</b>	160:16:385					324:20:200					236:21.9:219				



Table-4.1(h) (Contd..)

N-levels	Varieties	TITABAR					Over All Mean	Rank	
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)			
N1	V1	3.87	19	243	3.28		4.40	17	
	V2	3.70	20	247	3.32		4.02	21	
	V3	-	-	-	-		4.24	19	
	V4	3.69	21	215	3.31		3.97	22	
	V5	3.87	18	277	2.76		4.57	16	
	V6	4.30	15	241	3.42		4.23	20	
	V7	4.01	17	192	3.05		3.69	24	
	V8	4.20	16	253	2.81		3.76	23	
N2	V1	5.21	6	287	3.90	44.47	5.27	11	
	V2	4.48	13	267	3.92	25.95	4.80	14	
	V3	-	-	-	-	-	5.27	10	
	V4	4.42	14	248	3.79	24.12	4.72	15	
	V5	5.05	9	318	3.41	39.35	5.38	7	
	V6	5.43	4	257	3.63	37.65	5.27	9	
	V7	4.79	11	251	3.24	25.95	4.92	13	
	V8	4.69	12	273	3.38	16.57	4.32	18	
N3	V1	5.85	2	318	4.12	32.89	5.78	2	
	V2	5.12	7	314	4.15	23.64	5.58	5	
	V3	-	-	-	-	-	5.81	1	
	V4	4.82	10	274	4.10	18.88	5.48	6	
	V5	5.60	3	347	4.05	28.69	5.78	3	
	V6	5.98	1	304	4.16	27.96	5.77	4	
	V7	5.09	8	283	3.49	17.97	5.35	8	
	V8	5.36	5	304	3.92	19.43	5.02	12	
C.D.(0.05)									
N at same V		NS		NS	0.48				
V at same N		NS		NS	NS				
<b>Means of N levels:</b>									
N1		3.95		238	3.14				
N2		4.87		272	3.61	30.58			
N3		5.40		306	4.00	24.21			
C.D.(0.05)		0.15		8.53	0.14				
C.V.(%)		5.70		5.72	7.38				
<b>Mean of varieties:</b>									
V1		4.98	2	283	3.77	38.68	5.15	2	
V2		4.43	6	276	3.79	24.79	4.80	5	
V3		-	-	-	-	-	5.11	-	
V4		4.31	7	246	3.73	21.50	4.72	6	
V5		4.84	3	314	3.41	34.02	5.24	1	
V6		5.24	1	267	3.74	32.80	5.09	4	
V7		4.63	5	242	3.26	21.96	4.65	7	
V8		4.75	4	277	3.37	18.00	4.37	8	
C.D.(0.05)		0.28		19.71	0.27				
C.V. (%)		6.19		7.58	8.01				
<b>Expt. Mean</b>		<b>4.74</b>		<b>272</b>	<b>3.58</b>				
Soil type		Silty day loam							
pH		5.10							
<b>N - levels (kg/ha)</b>									
N1		30							
N2		60							
N3		90							
<b>Recommended NPK (kg/ha)</b>		60:20:40							
<b>Varieties</b>									
V1		IET 22379							
V2		IET 22381							
V3		-							
V4		NDR 359							
V5		KRH-2							
V6		NDR 8002,							
V7		Akshayadhan							
V8		Local (Mulagabhour)							
<b>Available NPK of soil (kg/ha)</b>		460.67:10.94:210							

Table 4.1(i): Summary of data on grain yield and ancillary characters of selected AVT 2 - Late cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, *Kharif* 2013.

N-levels	Varieties	ADUTHURAI					CHIPLIPMA					CHINSURAH				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	5.80	10	411	2.11		4.43	14	121	4.63		4.60	18	307	2.40	
	V2	5.89	8	381	1.84		4.16	17	226	4.51		5.62	9	317	2.77	
	V3	5.06	18	393	1.90		4.27	16	214	3.65		6.44	5	330	2.85	
	V4	5.69	13	378	2.07		4.37	15	180	4.52		6.18	7	327	2.80	
	V5	5.23	16	370	2.09		4.00	18	247	3.56		4.93	17	310	2.49	
	V6	5.07	17	361	1.79		4.80	13	240	4.35		5.04	14	316	2.56	
N2	V1	6.20	4	428	2.20	5.43	5.65	10	154	5.42	24.53	5.04	14	326	2.89	11.11
	V2	6.21	3	399	1.97	4.35	5.23	11	240	3.57	21.33	5.98	8	333	2.97	8.89
	V3	5.61	14	401	2.02	7.25	5.87	7	237	3.51	32.00	6.51	4	347	3.20	1.67
	V4	5.98	7	388	2.20	3.86	5.76	9	167	3.24	27.73	6.42	6	350	3.29	6.11
	V5	5.88	9	384	2.24	8.70	5.01	12	192	3.45	20.27	4.98	16	324	2.80	1.11
	V6	5.38	15	378	1.89	4.11	5.81	8	191	4.37	20.27	5.22	13	329	2.91	4.33
N3	V1	6.37	1	431	2.24	3.80	6.45	4	157	4.03	20.27	5.29	11	318	2.48	8.61
	V2	6.34	2	401	2.02	3.02	7.15	1	216	3.46	29.87	6.58	2	351	3.17	11.94
	V3	5.75	11	406	2.06	4.59	6.43	5	249	3.17	21.60	7.33	1	364	3.31	11.11
	V4	6.17	5	392	2.25	3.20	6.93	2	182	4.86	25.60	6.58	2	354	3.27	5.00
	V5	6.04	6	387	2.28	5.43	6.03	6	207	3.52	20.27	5.29	11	320	2.48	4.44
	V6	5.73	12	382	1.94	4.41	6.64	3	198	5.07	18.40	5.51	10	344	3.18	5.83
C.D.(0.05)																
<i>N</i> at same <i>V</i>		0.13		NS	NS		NS		35.01	0.38		NS		5.57	NS	
<i>V</i> at same <i>N</i>		0.12		NS	NS		NS		33.71	0.35		NS		5.40	0.069	

Table-4.1(i) (Contd..)

N-levels	Varieties	ADUTHURAI					CHILIPMA					CHINSURAH				
		Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
Means of N levels:																
	N1	5.46		382	1.96		4.34		205	4.20		5.47		318	2.65	
	N2	5.88		396	2.09	5.62	5.56		197	3.93	24.36	5.69		335	3.01	5.54
	N3	6.07		400	2.13	4.08	6.60		202	4.02	22.67	6.10		342	2.98	10.43
	C.D.(0.05)	0.03		0.86	0.01		0.04		NS	0.10		0.28		2.97	0.06	
	C.V.(%)	0.73		0.37	0.5		1.10		14.77	4.29		8.3		1.51	2.49	
Mean of varieties:																
	V1	6.12	2	423	2.18	4.62	5.51	5	144	4.69	22.40	4.98	6	317	2.59	9.86
	V2	6.15	1	394	1.94	3.68	5.51	4	227	3.85	25.60	6.06	3	334	2.97	10.42
	V3	5.47	5	400	1.99	5.92	5.52	3	233	3.44	26.80	6.76	1	347	3.12	6.39
	V4	5.95	3	386	2.18	3.53	5.69	2	176	4.21	26.67	6.39	2	344	3.12	5.56
	V5	5.72	4	380	2.20	7.07	5.01	6	215	3.51	20.27	5.07	5	318	2.59	2.78
	V6	5.40	6	374	1.87	4.26	5.75	1	210	4.60	19.33	5.26	4	330	2.88	5.08
	C.D.(0.05)	0.08		3.11	0.03		0.32		20.21	0.22		0.21	3.21	3.21	0.03	
	C.V. (%)	1.40		0.82	1.34		6.02		10.44	5.65		3.8	1.01	1.01	1.12	
	<b>Expt. Mean</b>	<b>5.80</b>		<b>393</b>	<b>2.06</b>		<b>5.50</b>		<b>201</b>	<b>4.05</b>		<b>5.75</b>		<b>332</b>	<b>2.88</b>	
	Soil type	Clay					Sandy loam					Clay loam				
	pH	7.20					6.55					7.30				
N- levels (kg/ha)																
	N1	50					50					40				
	N2	100					100					80				
	N3	150					150					120				
Recommended NPK (kg/ha)		150:60:60:25										80:40:40:25				
Varieties																
	V1	IET 22486					IET 22486					IET 22486				
	V2	Swarna					Swarna					Swarna				
	V3	Pooja					Pooja					Pooja				
	V4	Salivahana					Salivahana					Salivahana				
	V5	Samba Mahsuri					Samba Mahsuri					Samba Mahsuri				
	V6	Local (ADT-46)					Local (Upahar)					Local (Swarna)				
Available NPK of Soil (kg/ha)		172:52.5:208					153.75:30.42:135.74					-				

Table-4.1(j) (Contd..)

N- levels	Varieties	KARJAT					MANDYA					PATNA (ARI)				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	3.57	8	117	4.33		5.88	15	363	2.73		3.40	16	322	2.10	
	V2	2.64	13	141	2.61		4.48	18	343	2.80		5.46	7	310	2.89	
	V3	2.00	18	147	1.93		6.51	11	413	3.17		3.54	15	300	1.22	
	V4	2.48	16	152	3.36		6.51	12	420	4.40		4.40	11	245	2.88	
	V5	2.26	17	169	2.35		5.25	17	353	2.67		3.33	18	287	1.81	
	V6	2.63	14	170	2.24		6.16	13	392	3.10		5.92	6	318	2.52	
N2	V1	4.34	3	133	4.44	15.42	7.21	6	412	3.10	26.61	3.94	13	332	2.09	9.03
	V2	2.88	12	155	2.91	4.90	5.74	16	423	2.70	25.21	6.44	3	322	3.03	16.32
	V3	2.62	15	205	2.23	12.44	6.86	8	385	3.10	7.00	3.88	14	310	1.43	5.56
	V4	3.46	9	176	3.67	19.64	7.84	3	412	4.53	26.61	5.15	8	254	3.07	12.50
	V5	3.30	10	195	2.49	20.83	6.02	14	397	2.83	15.41	3.38	17	295	1.96	0.69
	V6	3.09	11	195	2.37	9.15	6.72	9	396	3.03	11.20	6.31	4	327	2.86	6.60
N3	V1	4.94	1	168	4.68	13.67	7.98	1	426	3.20	21.01	4.27	12	344	2.11	7.29
	V2	3.69	5	208	3.26	10.54	6.93	7	434	3.00	24.51	7.27	1	332	3.37	15.10
	V3	3.57	7	223	2.21	15.77	7.35	4	422	3.03	8.40	4.69	9	322	1.73	9.55
	V4	4.57	2	243	3.91	20.93	7.98	1	426	4.57	14.71	6.08	5	268	3.42	14.06
	V5	4.04	4	244	2.49	17.76	6.65	10	423	2.60	14.01	4.65	10	309	2.14	10.94
	V6	3.63	6	210	2.60	10.02	7.28	5	426	3.00	11.20	6.46	2	339	2.95	4.51
C.D.(0.05)																
N at same V		NS		NS	NS		NS		27.18	NS		0.35		NS		0.15
V at same N		NS		NS	NS		NS		25.68	NS		0.34		NS		0.15

Table-4.1(i) (Contd..)

N-levels	Varieties	KARJAT					MANDYA					PATNA (ARI)				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
Means of N levels:																
	N1	2.60		149	2.80		5.80		380	3.14		4.34		297	2.24	
	N2	3.28		177	3.02	11.44	6.73		404	3.22	18.67	4.85		307	2.41	8.45
	N3	4.07		216	3.19	12.32	7.36		426	3.23	15.64	5.57		319	2.62	10.24
	C.D.(0.05)	0.05		16.36	0.15		0.42		11.07	NS		0.19		3.56	0.11	
	C.V.(%)	2.63		15.29	8.34		10.61		4.63	9.05		6.41		1.95	7.81	
Mean of varieties:																
	V1	4.28	1	140	4.48	14.54	7.03	2	400	3.01	23.81	3.87	5	333	2.10	8.16
	V2	3.07	5	168	2.93	7.72	5.72	6	400	2.83	24.86	6.39	1	321	3.10	15.71
	V3	2.73	6	192	2.13	14.11	6.91	3	407	3.10	7.70	4.03	4	310	1.46	7.55
	V4	3.51	2	191	3.64	20.29	7.45	1	419	4.50	20.66	5.21	3	256	3.12	13.28
	V5	3.20	3	203	2.44	19.30	5.98	5	391	2.70	14.71	3.78	6	297	1.97	5.82
	V6	3.12	4	192	2.40	9.58	6.72	4	405	3.04	11.20	6.23	2	328	2.78	5.56
	C.D.(0.05)	0.29		27.00	0.38		0.46		15.69	0.19		0.20		3.78	0.09	
	C.V. (%)	9.06		15.52	13.09		7.18		4.04	6.01		4.31		1.28	3.69	
	<b>Expt. Mean</b>	<b>3.32</b>		<b>181</b>	<b>3.00</b>		<b>6.63</b>		<b>404</b>	<b>3.20</b>		<b>4.92</b>		<b>308</b>	<b>2.42</b>	
	Soil type	-					Red sandy loam					Clay				
	pH	-					6.32					7.01				
N - levels (kg/ha)																
	N1	60					50					60				
	N2	120					100					120				
	N3	180					150					180				
Recommended NPK (kg/ha)																
		-					100:50:50:20					60:60:40:25				
Varieties																
	V1	IET 22486					IET 22486					IET 22486				
	V2	Swarna					Swarna					Swarna				
	V3	Pooja					Pooja					Pooja				
	V4	Salivahana					Salivahana					Salivahana				
	V5	Samba Mahsuri					Samba Mahsuri					Samba Mahsuri				
	V6	Local (Karjat-2)					Local (BR 2655)					Local (Rajendra Mahsuri)				
Availabale NPK of Soil (kg/ha)																
		-					286:30:188					300:20.5:190				

Table-4.1(i) (Contd..)

N-levels	Varieties	PUSA					Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
N1	V1	1.90	18	225	2.46		4.22	17
	V2	2.00	16	223	2.46		4.32	15
	V3	2.00	16	220	1.81		4.26	16
	V4	2.40	14	219	2.21		4.58	13
	V5	2.60	13	213	2.44		3.94	18
	V6	2.10	15	197	2.89		4.53	14
N2	V1	3.20	11	253	2.95	21.67	5.09	10
	V2	3.20	11	251	2.95	20.00	5.10	9
	V3	3.59	8	240	2.36	26.56	4.99	11
	V4	4.40	3	253	2.64	33.33	5.57	4
	V5	4.19	4	241	2.97	26.48	4.68	12
	V6	3.70	7	230	3.48	26.67	5.18	8
N3	V1	3.50	9	260	3.18	13.35	5.54	6
	V2	3.40	10	258	3.18	11.69	5.91	2
	V3	3.80	6	253	2.48	15.02	5.56	5
	V4	5.00	1	270	2.79	21.69	6.19	1
	V5	4.50	2	253	3.14	15.85	5.31	7
	V6	4.19	5	239	3.65	17.39	5.63	3
C.D.(0.05)								
N at same V		NS		NS	NS			
V at same N		NS		NS	NS			
Means of N levels:								
N1		2.17		216	2.38			
N2		3.71		245	2.89	25.78		
N3		4.07		256	3.07	15.83		
C.D.(0.05)		0.15		11.66	0.03			
C.V.(%)		7.5		8.24	1.63			
Mean of varieties:								
V1		2.87	5	246	2.86	17.51	4.95	4
V2		2.87	5	244	2.87	15.84	5.11	3
V3		3.13	4	238	2.22	20.79	4.94	5
V4		3.93	1	247	2.55	27.51	5.45	1
V5		3.76	2	236	2.85	21.17	4.65	6
V6		3.33	3	222	3.34	22.03	5.11	2
C.D.(0.05)		0.25		14.96	0.08			
C.V.(%)		7.95		6.51	3.07			
<b>Expt. Mean</b>		<b>3.32</b>		<b>239</b>	<b>2.78</b>			
Soil type		Silty clay						
pH		8.40						
N - levels (kg/ha)								
N1		60						
N2		120						
N3		180						
Recommended NPK (kg/ha)								
Varieties								
V1		IET 22486						
V2		Swarna						
V3		Pooja						
V4		Salivahana						
V5		Samba Mahsuri						
V6		Local (Rajendra mahsuri)						
Availabale NPK of Soil (kg/ha)		-						

Table 4.1(j): Summary of data on grain yield and ancillary characters of selected AVT-1 BT (Basmati) cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.

N-levels	Varieties	CHATHA					IARI-NEWDELHI					KAUL				
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 15 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)
N1	V1	2.11	15	130	1.51		4.06	10	384	2.45		3.92	15	156	2.75	
	V2	2.56	13	159	1.56		4.52	9	418	3.07		3.85	17	154	2.73	
	V3	-	-	-	-		3.65	15	375	2.12		3.63	18	167	2.33	
	V4	2.59	12	160	1.67		2.41	20	343	2.40		3.46	19	200	2.30	
	V5	2.61	11	163	1.67		2.08	21	333	1.63		2.93	21	198	1.62	
	V6	2.93	9	181	1.73		2.70	18	351	2.89		3.88	16	224	1.87	
	V7	-	-	-	-		3.67	13	380	2.34		3.16	20	213	1.60	
N2	V1	2.41	14	156	1.65	20.44	5.63	4	402	3.04	26.17	4.91	4	190	2.77	33.03
	V2	2.95	8	181	1.70	25.78	6.33	2	498	3.37	30.22	4.85	6	184	2.87	33.18
	V3	-	-	-	-		4.96	8	413	2.60	21.72	4.55	8	219	2.31	30.78
	V4	3.26	7	184	1.77	44.44	3.90	12	411	2.76	24.89	4.24	9	200	2.34	25.83
	V5	3.41	6	184	1.83	53.78	3.03	17	361	1.87	15.72	3.93	14	255	1.65	33.18
	V6	3.78	4	201	1.95	56.89	4.05	11	412	2.96	22.56	4.85	5	281	1.86	32.43
	V7	-	-	-	-	-	5.00	7	512	2.72	22.11	4.19	12	244	1.64	34.23
N3	V1	2.87	10	170	1.71	25.56	5.87	3	410	3.05	15.06	5.47	1	218	2.75	25.90
	V2	3.47	5	195	1.85	30.44	6.45	1	516	3.68	16.06	5.24	2	211	2.83	23.12
	V3	-	-	-	-		5.24	5	425	2.75	13.19	4.78	7	211	2.39	19.29
	V4	3.81	3	208	1.90	40.44	3.36	16	417	2.84	7.89	4.23	10	195	2.38	12.76
	V5	3.81	2	209	1.93	40.22	2.49	19	379	1.88	3.36	3.99	13	268	1.62	17.64
	V6	4.51	1	220	2.20	10.58	3.66	14	422	2.92	8.06	4.92	3	286	1.84	17.34
	V7	-	-	-	-	-	5.08	6	529	2.96	11.72	4.23	10	278	1.63	17.79
C.D.(0.05)																
Nat same V		0.06		1.82	NS		NS		NS	NS		NS		NS	NS	
Vat same N		0.05		1.75	0.01		NS		NS	NS		NS		NS	NS	

Table 4.1(j) (Contd..)

N-levels	Varieties	CHATHA					IARI-NEW DELHI					KAUL				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)
<b>Means of N levels:</b>																
N1		2.56		159	1.63		3.30		369	2.41		3.55		187	2.17	
N2		3.16		181	1.78	40.27	4.70		430	2.76	23.34	4.50		225	2.21	31.81
N3		3.70		201	1.92	37.91	4.59		443	2.87	10.76	4.69		238	2.21	19.12
<b>C.D.(0.05)</b>		0.01		0.84	0.01		0.17		8.03	0.07		0.23		6.70	NS	
<b>C.V.(%)</b>		0.34		0.46	0.45		7.32		3.54	4.48		9.95		5.64	9.48	
<b>Mean of varieties:</b>																
V1		2.46	5	152	1.62	23.00	5.19	2	399	2.85	20.61	4.77	1	188	2.76	29.47
V2		2.99	4	178	1.70	28.11	5.77	1	478	3.38	23.14	4.65	2	183	2.81	28.15
V3		-	-	-	-	-	4.62	3	404	2.49	17.46	4.32	4	199	2.34	25.04
V4		3.22	3	184	1.78	42.44	3.22	6	390	2.67	16.39	3.98	5	199	2.34	19.29
V5		3.28	2	186	1.81	47.00	2.53	7	358	1.79	9.54	3.62	7	240	1.63	25.41
V6		3.74	1	201	1.96	33.73	3.47	5	395	2.92	15.31	4.55	3	264	1.86	24.89
V7		-	-	-	-	-	4.58	4	474	2.67	16.92	3.86	6	245	1.62	26.01
<b>C.D.(0.05)</b>		0.04		1.05	0.01		0.31		24.8	0.21		0.37		25.06	0.17	
<b>C.V.(%)</b>		1.13		0.60	0.45		7.86		6.29	8.31		9.12		12.13	7.92	
<b>Expt. Mean</b>		<b>3.14</b>		<b>180</b>	<b>1.78</b>		<b>4.20</b>		<b>414</b>	<b>2.68</b>		<b>4.25</b>		<b>217</b>	<b>2.19</b>	
Soil type		loam					Sandy clay loam					Clay loam				
pH		7.24					-					8.1				
<b>N - levels (kg/ha)</b>																
N1		15					60					30				
N2		30					120					60				
N3		45					180					90				
Recommended NPK(kg/ha)		30:20:10					120:60:40					60:30:0:25				
<b>Varieties</b>																
V1		IET 22777					IET 22777					IET 22777				
V2		IET 22778					IET 22778					IET 22778				
V3		-					IET 22787					IET 22787				
V4		Pusa Bsamati 1					Pusa Bsamati 1					Pusa Bsamati 1				
V5		Taroari Basmati					Taroari Basmati					Taroari Basmati				
V6		Pusa 1121					Pusa 1121					Pusa 1121				
V7		-					Local (Pusa Sugandh - 5)					Local (CSR 30)				
Available NPK of soil (kg/ha)		178.6:12.4:112.7					170:13.0:178					160:16:385				



Table 4.1(j) (Contd..)

N-levels	Varieties	LUDHIANA					PANTNAGAR					NAGINA					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 20 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
N1	V1	4.10	15	212	2.35		3.29	18	163	1.88		2.87	13	212	2.38		3.39	15
	V2	4.23	12	222	2.31		3.33	15	170	1.86		2.64	16	204	2.36		3.52	14
	V3	4.68	3	231	3.04		3.43	14	155	2.15		2.73	14	208	2.37		3.63	13
	V4	2.87	21	242	1.67		3.48	13	192	1.72		2.48	20	191	2.23		2.88	20
	V5	3.75	18	226	2.01		2.66	21	199	1.32		1.81	21	144	1.65		2.64	21
	V6	4.31	11	279	1.85		3.03	20	190	1.58		2.50	19	193	2.27		3.22	18
	V7	4.17	14	220	2.28		3.08	19	173	1.83		2.64	16	200	2.33		3.35	16
N2	V1	4.63	7	204	3.18	26.04	3.81	10	190	1.89	10.48	4.69	3	303	2.47	30.40	4.35	7
	V2	4.82	2	243	2.95	29.38	3.95	8	186	2.04	12.26	4.40	7	290	2.45	29.32	4.55	5
	V3	4.65	5	234	2.94	-1.67	4.14	6	172	2.35	14.17	4.53	5	292	2.45	29.94	4.56	4
	V4	3.95	17	240	1.96	53.82	3.89	9	206	1.78	8.10	3.75	12	232	2.32	21.14	3.83	12
	V5	3.28	19	241	1.74	-23.40	3.32	16	214	1.56	13.10	2.59	18	207	1.68	13.12	3.26	17
	V6	4.51	10	257	2.15	9.65	3.76	11	204	1.69	14.52	4.06	10	270	2.33	26.08	4.17	10
	V7	4.19	13	228	2.21	0.97	3.59	12	179	1.95	10.12	4.31	8	256	2.45	27.93	4.26	9
N3	V1	5.33	1	248	3.18	30.66	4.92	1	202	2.27	16.37	4.98	1	310	2.49	17.59	4.91	1
	V2	4.61	8	216	2.93	9.41	4.65	3	201	2.13	13.15	4.59	4	276	2.48	16.28	4.84	3
	V3	4.68	3	246	2.85	0.00	4.82	2	201	2.22	13.87	4.83	2	306	2.48	17.52	4.87	2
	V4	3.96	16	233	2.00	27.29	4.52	4	210	2.04	10.42	4.02	11	245	2.39	12.81	3.98	11
	V5	3.06	20	275	1.48	-17.22	3.31	17	223	1.44	6.49	2.69	15	221	1.70	7.33	3.22	19
	V6	4.63	6	298	2.24	7.99	3.96	7	222	1.77	9.29	4.20	9	274	2.34	14.20	4.31	8
	V7	4.53	9	273	2.18	8.92	4.21	5	199	2.14	11.25	4.41	6	274	2.46	14.74	4.49	6
C.D.(0.05)																		
N at same V		NS		NS	NS		0.34		NS	NS		NS		NS	0.03			
V at same N		NS		NS	NS		0.34		NS	NS		NS		NS	0.03			

Table 4.1(j) (Contd...)

Nlevels	Varieties	LUDHIANA					PANTNAGAR					NAGINA					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 20 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
<b>Means of N levels:</b>																		
	N1	4.02		233	2.22		3.19		178	1.76		2.52		193	2.23			
	N2	4.29		235	2.45	13.54	3.78		193	1.90	11.82	4.05		264	2.31	25.42		
	N3	4.40		255	2.41	9.58	4.34		208	2.00	11.55	4.25		272	2.33	14.35		
	<b>C.D.(0.05)</b>	NS		NS	NS		0.21		4.28	0.09		0.24		9.81	0.01			
	<b>C.V.(%)</b>	19.32		12.04	15.99		10.2		4.05	9.13		12.32		7.36	0.46			
<b>Mean of varieties:</b>																		
	V1	4.69	1	221	2.90	28.35	4.01	2	185	2.01	13.42	4.18	1	275	2.45	24.00	4.22	3
	V2	4.56	3	227	2.73	19.39	3.98	3	186	2.01	12.71	3.88	3	257	2.43	22.80	4.30	2
	V3	4.67	2	237	2.94	-0.83	4.13	1	176	2.24	14.02	4.03	2	268	2.43	23.73	4.35	1
	V4	3.59	6	238	1.88	40.56	3.96	4	203	1.85	9.26	3.42	6	223	2.31	16.98	3.57	6
	V5	3.36	7	247	1.74	-20.31	3.10	7	212	1.44	9.79	2.36	7	191	1.67	10.22	3.04	7
	V6	4.48	4	278	2.08	8.82	3.58	6	205	1.68	11.90	3.59	5	246	2.31	20.14	3.90	5
	V7	4.30	5	240	2.22	4.95	3.63	5	183	1.97	10.68	3.79	4	243	2.41	21.33	4.03	4
	<b>C.D.(0.05)</b>	0.41		19.94	0.29		0.20		8.25	0.18		0.33		16.49	0.02			
	<b>C.V. (%)</b>	10.14		8.67	12.78		5.45		4.49	9.88		9.63		7.12	0.85			
	<b>Expt. Mean</b>	<b>4.24</b>		<b>241</b>	<b>2.36</b>		<b>3.77</b>		<b>193</b>	<b>1.89</b>		<b>3.61</b>		<b>243</b>	<b>2.29</b>			
	Soil type	Sandy loam					Silt loam					Sandy loam						
	pH						7.9					7.5						
	<b>N - levels (kg/ha)</b>																	
	N1	20					50					60						
	N2	40					100					120						
	N3	60					150					180						
	Recommended NPK(kg/ha)						100:60:40:25					120:60:40:25						
	<b>Varieties</b>																	
	V1	IET 22777					IET 22777					IET 22777						
	V2	IET 22778					IET 22778					IET 22778						
	V3	IET 22787					IET 22787					IET 22787						
	V4	Pusa Bsamati 1					Pusa Bsamati 1					Pusa Bsamati 1						
	V5	Taroari Basmati					Taroari Basmati					Taroari Basmati						
	V6	Pusa 1121					Pusa 1121					Pusa 1121						
	V7	Local (Punjab Basmati 3)					Local (Pant DRR-1)					Local (Pusa Sugandha-5)						
	Available NPK of soil (kg/ha)	-					236:21:219					21:18:33:209						

Table 4.1(k): Summary of data on grain yield and ancillary characters of selected AVT - ASG cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.

N-levels	Varieties	CHIPLIMA					FAIZABAD					KARJAT				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	2.67	26	196	2.82		3.11	24	333	2.03		2.14	21	133	1.59	
	V2	3.25	21	235	2.40		3.32	22	327	2.45		1.93	24	141	1.32	
	V3	3.63	19	203	3.18		3.54	16	310	3.27		2.03	22	147	1.54	
	V4	2.96	23	209	3.37		3.39	19	311	2.87		1.14	27	121	1.13	
	V5	2.93	24	194	2.77		3.37	20	319	1.77		1.53	26	113	1.38	
	V6	2.99	22	229	1.99		3.36	21	325	2.47		1.84	25	141	1.55	
	V7	2.67	26	266	2.38		3.41	18	308	2.64		2.03	22	155	1.85	
	V8	2.88	25	203	2.53		3.11	24	311	1.17		2.21	20	137	1.43	
	V9	-	-	-	-		-	-	-	-		-	-	-	-	
	V10	3.41	20	186	3.24		3.25	23	304	1.11		3.31	12	156	1.56	
N2	V1	4.11	18	197	3.51	28.80	4.46	11	351	2.62	45.02	3.87	6	161	2.53	28.87
	V2	4.27	15	239	3.14	20.27	5.09	2	350	2.35	58.96	2.93	14	153	1.42	16.75
	V3	4.59	11	204	4.00	19.20	4.75	9	345	2.97	40.40	2.76	17	160	1.97	12.09
	V4	4.37	13	233	2.34	28.27	4.60	10	338	3.29	40.62	2.21	19	139	1.53	17.92
	V5	4.19	16	217	2.76	25.07	4.79	8	342	2.11	47.43	2.72	18	134	1.51	19.71
	V6	4.72	10	256	2.15	34.67	5.02	3	343	1.83	55.45	3.36	10	168	1.92	25.25
	V7	4.16	17	248	2.85	29.87	3.99	13	346	2.47	19.21	2.76	16	178	1.83	12.17
	V8	4.48	12	208	3.44	32.00	3.81	15	345	1.37	23.17	2.77	15	162	1.53	9.46
	V9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V10	4.37	13	189	3.76	19.20	3.08	26	343	1.23	-5.71	4.08	4	182	1.84	12.86
N3	V1	5.25	7	211	4.00	25.87	4.46	12	370	4.15	22.40	4.98	1	198	2.96	23.74
	V2	5.49	5	262	2.43	22.40	5.27	1	361	2.88	32.50	3.51	9	178	1.85	13.24
	V3	6.35	1	219	4.01	27.20	4.87	5	362	4.25	22.23	4.21	3	170	2.01	18.15
	V4	5.49	6	252	2.43	25.33	5.02	3	361	2.44	27.28	3.28	13	154	2.45	17.88
	V5	5.17	8	215	3.01	22.40	4.83	7	368	1.71	24.26	3.60	7	163	1.95	17.21
	V6	5.89	3	273	2.11	29.07	4.84	6	367	2.25	24.70	3.90	5	199	2.04	17.16
	V7	4.88	9	269	2.90	22.13	3.85	14	372	2.43	7.41	3.33	11	188	2.13	10.77
	V8	6.24	2	218	3.59	33.60	3.05	27	364	1.45	-1.04	3.54	8	182	1.72	11.14
	V9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V10	5.73	4	192	3.18	23.20	3.43	17	372	1.79	2.91	4.48	2	187	2.70	9.77
C.D.(0.05)																
N at same V		NS		NS	0.10		0.29		7.27	0.25		0.45		NS	NS	
V at same N		NS		NS	0.09		0.28		7.75	0.25		0.45		NS	NS	

Table 4.1(k) (Contd..)

N-levels	Varieties	CHIPLIMA				FAIZABAD					KARJAT					
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
<b>Means of N levels:</b>																
	N1	3.04		213	2.74		3.32		316	2.20		2.02		138	1.48	
	N2	4.36		221	3.11	26.37	4.40		345	2.25	36.06	3.05		160	1.79	17.23
	N3	5.61		235	3.07	25.69	4.40		366	2.59	18.07	3.87		180	2.20	15.45
	<b>C.D.(0.05)</b>	0.13		NS	0.03		0.11		5.60	0.09		0.23		10.48	0.06	
	<b>C.V.(%)</b>	9.67		9.90	1.94		5.77		3.38	8.13		16.19		13.62	6.74	
<b>Mean of varieties:</b>																
	V1	4.01	8	202	3.45	27.33	4.01	6	351	2.94	33.71	3.66	2	164	2.36	26.30
	V2	4.34	5	245	2.66	21.33	4.56	1	346	2.56	45.73	2.79	6	157	1.53	14.99
	V3	4.85	1	209	3.73	23.20	4.39	3	339	3.49	31.32	3.00	4	159	1.84	15.12
	V4	4.28	6	231	2.71	26.80	4.34	4	336	2.87	33.95	2.21	9	138	1.70	17.90
	V5	4.10	7	209	2.84	23.73	4.33	5	343	1.86	35.85	2.62	8	137	1.61	18.46
	V6	4.53	2	252	2.08	31.87	4.41	2	345	2.18	40.07	3.04	3	169	1.84	21.21
	V7	3.90	9	261	2.71	26.00	3.75	7	342	2.51	13.31	2.71	7	174	1.94	11.47
	V8	4.53	2	210	3.18	32.80	3.32	8	340	1.33	11.06	2.84	5	160	1.56	10.30
	V9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	V10	4.51	4	189	3.39	21.20	3.25	9	340	1.38	-1.40	3.96	1	175	2.03	11.32
	<b>C.D.(0.05)</b>	0.17		19.50	0.06		0.17		4.19	0.15		0.26		21.71	0.28	
	<b>C.V.(%)</b>	6.68		9.27	1.99		4.41		1.3	6.63		9.17		14.46	16.42	
	<b>Expt. Mean</b>	<b>4.34</b>		<b>223</b>	<b>2.97</b>		<b>4.04</b>		<b>342</b>	<b>2.35</b>		<b>2.98</b>		<b>159</b>	<b>1.82</b>	
	Soil type	Sandy loam					Sandy loam									
	pH	6.55					7.60									
	<b>N - levels (kg/ha)</b>															
	N1	50					30					60				
	N2	100					60					120				
	N3	150					90					180				
	<b>Recommended NPK (kg/ha)</b>						60:30:30:10									
	Varieties															
	V1	IET 21261					IET 21261					IET 21261				
	V2	IET 21267					IET 21267					IET 21267				
	V3	IET 21835					IET 21835					IET 21835				
	V4	IET 21838					IET 21838					IET 21838				
	V5	IET 21840					IET 21840					IET 21840				
	V6	IET 21841					IET 21841					IET 21841				
	V7	IET 21842					IET 21842					IET 21842				
	V8	Badshabhog					Badshabhog					Badshabhog				
	V9	Kalanamak					-					-				
	V10	Local (Nua Achamati)					Local (NDR 6093)					Local (Indrayani)				
	Available NPK of soil (kg/ha)	153.75:30.42:135.74					200:24:234					-				

Table 4.1(k) (Contd..)

N-levels	Varieties	PUSA					NAWAGAM					RAIPUR					Over all Mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)		
N1	V1	3.02	19	243	2.19		4.32	10	460	3.64		2.17	26	223	2.23		2.90	22
	V2	2.39	24	239	2.08		3.45	20	367	2.88		2.35	23	262	2.01		2.78	26
	V3	2.34	25	237	2.03		3.18	21	378	2.68		2.85	12	236	2.39		2.93	21
	V4	2.73	22	242	2.13		3.95	17	428	3.35		2.60	17	238	1.98		2.79	25
	V5	2.34	26	236	2.10		3.99	16	430	3.38		1.78	30	251	2.13		2.66	27
	V6	2.53	23	246	2.05		4.33	9	457	3.55		3.06	9	243	2.29		3.02	19
	V7	2.30	27	234	2.39		4.08	15	442	3.45		2.88	11	239	2.36		2.90	23
	V8	3.06	18	238	1.70		3.11	23	337	2.63		2.67	15	210	2.24		2.84	24
	V9	-	-	-	-		-	-	-	-		1.89	29	223	1.90		1.89	30
	V10	2.75	21	244	1.87		2.86	26	298	2.31		2.28	24	217	2.46		2.98	20
N2	V1	4.46	1	296	2.61	24.00	4.34	8	474	3.70	0.42	2.39	22	229	2.37	7.12	3.94	7
	V2	3.84	5	282	2.51	24.11	4.51	3	488	3.82	21.14	2.60	17	269	2.36	8.31	3.87	9
	V3	3.36	13	255	2.59	17.07	3.46	19	375	2.93	5.60	3.21	6	239	2.61	11.87	3.69	12
	V4	3.88	4	284	2.57	19.11	4.09	14	443	3.49	2.70	2.85	12	258	2.04	8.31	3.67	14
	V5	3.30	15	252	2.56	16.00	4.50	4	487	3.81	10.28	2.07	28	253	2.22	9.50	3.59	16
	V6	3.58	10	283	2.60	17.63	4.65	2	500	3.94	6.51	3.24	4	272	2.40	5.94	4.10	6
	V7	3.52	11	266	2.61	20.33	4.18	12	452	3.53	1.94	3.21	6	242	2.43	10.68	3.64	15
	V8	3.95	3	288	2.03	14.85	3.12	22	338	2.64	0.07	2.89	10	219	2.31	7.40	3.50	17
	V9	-	-	-	-	-	-	-	-	-	-	2.53	19	229	1.97	21.4	2.53	28
	V10	3.70	7	275	2.17	15.96	3.03	24	328	2.56	3.24	2.49	20	236	2.50	7.10	3.46	18
N3	V1	4.21	2	293	2.68	9.94	4.12	13	464	3.76	-1.98	2.61	16	235	2.50	7.30	4.27	3
	V2	3.67	8	275	2.63	10.67	4.88	1	546	3.84	14.28	3.24	4	275	2.44	14.84	4.35	2
	V3	3.15	17	250	2.70	6.72	2.83	27	324	2.96	-3.51	3.67	2	245	2.73	13.65	4.18	4
	V4	3.62	9	267	2.63	7.39	4.41	6	496	3.87	4.57	3.13	8	267	2.26	8.90	4.16	5
	V5	3.01	20	243	2.59	5.59	4.40	7	494	3.84	4.14	2.49	20	258	2.70	11.87	3.92	8
	V6	3.28	16	262	2.67	6.30	4.49	5	499	3.90	1.62	3.99	1	284	2.58	15.43	4.40	1
	V7	3.31	14	255	2.64	8.44	4.22	11	477	3.71	1.40	3.31	3	264	2.69	7.12	3.82	11
	V8	3.71	6	275	2.11	5.41	3.64	18	412	3.19	5.25	2.78	14	259	2.41	1.80	3.83	10
	V9	-	-	-	-	-	-	-	-	-	-	2.26	25	235	2.19	6.20	2.26	29
	V10	3.44	12	255	2.22	5.80	2.88	25	327	2.57	0.17	2.10	27	247	2.58	-3.00	3.68	13
	C.D.(0.05)																	
	Not same V	NS		NS	NS		0.52		55	NS		0.32		NS	NS			
	V at same N	NS		NS	NS		0.50		54	NS		0.31		NS	NS			

Table 4.1(k) (Contd..)

N-levels	Varieties	PUSA					NAWAGAM					RAIPUR					Over all Mean	Rank	
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 30 kg N/ha)			
<b>Means of N levels:</b>																			
	N1	2.61		240	2.06		3.70		400	3.10		2.45		234	2.20				
	N2	3.73		276	2.47	18.79	3.99		432	3.38	5.77	2.75		245	2.32	9.76			
	N3	3.49		264	2.54	7.36	3.99		449	3.52	2.88	2.96		257	2.51	8.42			
	<b>C.D.(0.05)</b>	0.16		10.38	0.09		NS		19.19	0.16		0.10		6.31	0.11				
	<b>C.V.(%)</b>	10.13		8.27	8.03		8.96		9.3	9.79		7.85		5.61	10.21				
<b>Mean of varieties:</b>																			
	V1	3.90	1	277	2.49	16.97	4.26	4	466	3.70	-0.78	2.39	7	229	2.37	7.21	3.71	2	
	V2	3.30	4	265	2.41	17.39	4.28	3	467	3.51	17.71	2.73	6	269	2.27	11.57	3.67	3	
	V3	2.95	8	247	2.44	11.90	3.16	8	359	2.86	1.05	3.24	2	240	2.58	12.76	3.60	4	
	V4	3.41	3	264	2.44	13.25	4.15	6	455	3.57	3.63	2.86	4	254	2.10	8.61	3.54	5	
	V5	2.88	9	244	2.42	10.80	4.30	2	471	3.68	7.21	2.11	10	254	2.35	10.68	3.39	8	
	V6	3.13	6	263	2.44	11.96	4.49	1	485	3.80	4.06	3.43	1	266	2.42	10.68	3.84	1	
	V7	3.04	7	252	2.55	14.39	4.16	5	457	3.57	1.67	3.13	3	248	2.49	8.90	3.45	6	
	V8	3.57	2	267	1.95	10.13	3.29	7	362	2.82	2.66	2.78	5	230	2.32	4.57	3.39	7	
	V9	-	-	-	-	-	-	-	-	-	-	2.23	9	229	2.02	13.80	2.23	10	
	V10	3.30	5	258	2.09	10.88	2.92	9	318	2.48	1.71	2.29	8	233	2.52	2.08	3.37	9	
	<b>C.D.(0.05)</b>	0.26		11.67	0.11		0.30		32.04	0.26		0.19		15.00	0.15				
	<b>C.V.(%)</b>	8.32		4.76	4.86		8.25		7.96	8.42		7.28		6.49	6.57				
	<b>Expt. Mean</b>	<b>3.28</b>		<b>260</b>	<b>2.36</b>		<b>3.89</b>		<b>427</b>	<b>3.33</b>		<b>2.72</b>		<b>245</b>	<b>2.34</b>				
	Soil type	Silty loam					Clay loam					Clay soil							
	pH	8.20					7.60					7.20							
	<b>N - levels (kg/ha)</b>																		
	N1	60					50					30							
	N2	120					100					60							
	N3	180					150					90							
	<b>Recommended NPK (kg/ha)</b>	-					100:25:0:25					60:40:25							
	<b>Varieties</b>																		
	V1	IET 21261					IET 21261					IET 21261							
	V2	IET 21267					IET 21267					IET 21267							
	V3	IET 21835					IET 21835					IET 21835							
	V4	IET 21838					IET 21838					IET 21838							
	V5	IET 21840					IET 21840					IET 21840							
	V6	IET 21841					IET 21841					IET 21841							
	V7	IET 21842					IET 21842					IET 21842							
	V8	Badshabhog					Badshabhog					Badshabhog							
	V9	-					Kalanamak					Kalanamak							
	V10	Local (Rajendra Kasturi)					Local (Krishna Kamod)					Local (Dubraj)							
	Available NPK of soil (kg/ha)	-					0:33:206					198:24:230							

Table 4.1(l): Summary of data on grain yield and ancillary characters of selected IHRT MS cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.

N-levels	Varieties	MANDYA					KARJAT					RAIPUR				
		Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 62.5 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	5.74	14	381	3.37		4.83	14	142	4.01		4.20	11	262	3.21	
	V2	5.84	13	388	3.50		5.18	11	123	4.03		3.90	15	215	3.41	
	V3	6.28	10	392	3.87		4.69	16	135	3.63		3.97	14	230	2.91	
	V4	5.57	16	360	2.77		2.75	18	186	2.46		3.31	18	268	2.29	
	V5	6.11	12	413	4.13		5.02	12	116	5.08		4.42	9	212	3.94	
	V6	4.92	18	360	2.37		3.52	17	143	3.35		4.08	13	223	3.74	
N2	V1	6.28	10	413	3.67	8.66	5.98	6	152	4.28	23.04	5.73	2	266	3.56	25.52
	V2	6.66	7	407	2.83	12.99	6.04	5	154	4.06	17.24	4.63	5	220	3.84	12.17
	V3	7.09	3	421	4.33	12.99	5.47	10	145	4.48	15.63	4.17	12	236	3.24	3.26
	V4	5.74	14	414	4.13	2.60	4.74	15	199	2.51	39.88	3.49	17	284	3.16	2.97
	V5	6.44	9	410	3.60	5.19	5.76	8	127	5.81	14.70	4.56	7	214	5.02	2.37
	V6	5.52	17	401	2.63	9.52	4.91	13	174	3.40	27.78	4.43	8	228	4.03	5.94
N3	V1	6.71	6	426	3.10	7.79	7.33	2	185	4.50	25.03	4.95	4	272	3.07	6.23
	V2	7.09	3	427	3.37	9.96	6.88	4	165	4.13	17.06	5.38	3	264	3.50	12.32
	V3	6.76	5	445	4.17	3.90	5.79	7	169	4.08	10.97	4.31	10	254	3.30	2.82
	V4	7.31	2	427	4.00	13.85	6.98	3	234	3.53	42.29	3.67	16	290	2.67	2.97
	V5	7.68	1	457	4.70	12.55	7.88	1	153	6.40	28.60	5.88	1	240	5	12.17
	V6	6.55	8	419	2.87	12.99	5.66	9	213	3.75	21.43	4.58	6	233	3.48	4.15
	C.D.(0.05)															
	N at same V	NS		NS	0.4		0.65		NS	NS		0.61		NS	NS	
	V at same N	NS		NS	0.37		0.61		NS	NS		0.56		NS	NS	
	Means of N levels:															
	N1	5.74		382	3.33		4.33		141	3.76		3.98		235	3.25	
	N2	6.29		411	3.53	8.66	5.48		158	4.09	23.05	4.50		242	3.81	8.71
	N3	7.02		433	3.70	10.17	6.75		187	4.40	24.23	4.79		259	3.53	6.78
	C.D.(0.05)	0.33		7.29	0.14		0.25		16.64	0.23		0.13		10.94	0.13	
	C.V.(%)	8.83		3.01	6.56		7.58		17.35	9.46		4.92		7.54	6.15	

Table 4.1(I) (Contd..)

N-levels	Varieties	MANDYA					KARJAT					RAIPUR				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 62.5 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
<b>Mean of varieties:</b>																
	V1	6.24	4	407	3.38	8.23	6.05	2	160	4.27	24.03	4.96	1	267	3.28	15.88
	V2	6.53	3	407	3.23	11.47	6.03	3	147	4.07	17.15	4.64	3	233	3.58	12.24
	V3	6.71	2	419	4.12	8.44	5.31	4	150	4.06	13.30	4.15	5	240	3.15	3.04
	V4	6.20	5	400	3.63	8.23	4.82	5	206	2.83	41.09	3.49	6	281	2.71	2.97
	V5	6.75	1	427	4.14	8.87	6.22	1	132	5.76	21.65	4.95	2	222	4.72	7.27
	V6	5.66	6	393	2.62	11.26	4.70	6	177	3.50	24.60	4.36	4	228	3.75	5.05
	<b>C.D.(0.05)</b>	0.55		12.18	0.23		0.38		18.14	0.46		0.35		15.44	0.45	
	<b>C.V.(%)</b>	8.96		3.09	6.76		7.09		11.63	11.59		8.21		6.54	13.16	
	<b>Expt. Mean</b>	<b>6.35</b>		<b>409</b>	<b>3.52</b>		<b>5.52</b>		<b>162</b>	<b>4.08</b>		<b>4.42</b>		<b>245</b>	<b>3.53</b>	
	Soil type	Red Sandy Loam					-					Clay soil				
	pH	6.34					-					7.20				
	<b>N - levels (kg/ha)</b>															
	N1	62.5					50					60				
	N2	125					100					120				
	N3	187.5					150					180				
	Recommended NPK (kg/ha)	125-62.5-62.5-20					100-50-50					120-60-40-25				
	<b>Varieties</b>															
	V1	IET 22402					IET 22402					IET 22402				
	V2	IET 22407					IET 22407					IET 22407				
	V3	IET 22410					IET 22410					IET 22410				
	V4	Samba Mahsuri					Samba Mahsuri					Samba Mahsuri				
	V5	DRRH-3					DRRH-3					DRRH-3				
	V6	Local					Local (Sahyadri-4)					Local (Maheshwari)				
	Available NPK of soil (kg/ha)	285:36:190					-					198:24:230				



Table 4.1(i) (Contd..)

N-levels	Varieties	KAUL					NAGINA					MARUTERU			Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	N res. (kg grain/kg N) (Base level 45 kg N/ha)		
N1	V1	5.86	11	240	4.13		3.15	13	255	2.96		4.51	2		4.71	13
	V2	5.66	12	280	3.21		3.01	15	265	2.92		3.86	8		4.58	15
	V3	4.90	15	256	3.03		3.06	14	269	2.95		4.17	4		4.51	16
	V4	4.92	14	326	2.36		2.22	18	210	2.80		3.97	6		3.79	18
	V5	5.61	13	225	4.30		2.31	17	214	2.81		4.71	1		4.70	14
	V6	-	-	-	-		2.87	16	227	2.97		4.23	3		3.92	17
N2	V1	6.96	4	269	4.02	14.59	6.44	5	344	3.26	43.83	2.91	16	-34.22	5.72	4
	V2	7.24	2	333	3.45	21.08	6.36	7	345	3.25	44.69	2.97	15	-17.78	5.65	5
	V3	5.95	10	292	3.25	14.05	6.61	4	351	3.27	47.41	3.06	14	-11.78	5.39	10
	V4	6.31	7	327	2.69	18.44	5.07	12	305	3.20	38.02	3.64	12	-4.00	4.83	12
	V5	6.89	5	251	4.27	17.12	5.57	11	316	3.19	43.46	3.79	11	-17.11	5.50	7
	V6	-	-	-	-		6.20	8	372	3.29	44.44	3.94	7	-94.00	5.00	11
N3	V1	7.36	1	295	4.04	10.00	6.91	2	370	3.41	25.06	3.80	10	-18.11	6.18	2
	V2	7.05	3	331	3.47	9.22	6.69	3	374	3.43	24.57	2.88	17	-4.67	5.99	3
	V3	6.05	9	291	3.34	7.69	7.02	1	379	3.44	26.42	2.88	17	-3.78	5.47	8
	V4	6.11	8	360	2.71	7.90	5.66	10	321	3.37	22.90	3.44	13	1.11	5.53	6
	V5	6.85	6	252	4.28	8.26	5.92	9	346	3.39	24.01	3.83	9	-52.33	6.34	1
	V6	-	-	-	-		6.43	6	378	3.43	23.70	4.07	5	-47.00	5.46	9
C.D.(0.05)																
N at same V		NS		NS	NS		NS		20.61	0.02		NS				
V at same N		NS		NS	NS		NS		19.23	0.02		NS				
<b>Means of N levels:</b>																
N1		5.39		265	3.41		2.77		240	2.90		4.24				
N2		6.67		294	3.53	17.06	6.04		339	3.24	43.64	3.53		-15.74		
N3		6.68		306	3.57	8.61	6.44		362	3.41	24.44	3.56		-7.63		
<b>C.D.(0.05)</b>		0.34		16.84	0.06		0.20		6.78	0.01		0.34				
<b>C.V.(%)</b>		8.46		9.00	2.83		6.55		3.65	0.50		15.47				

Table 4.1(i) (Contd..)

N-levels	Varieties	KAUL					NAGINA					MARUTERU			Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	N res. (kg grain/kg N) (Base level 45 kg N/ha)		
<b>Mean of varieties:</b>																
	V1	6.73	1	268	4.06	12.30	5.50	2	323	3.21	34.44	3.45	5	-26.17	5.49	2
	V2	6.65	2	315	3.38	15.15	5.35	3	328	3.20	34.63	3.45	5	-11.22	5.44	3
	V3	5.63	5	280	3.21	10.87	5.56	1	333	3.22	36.91	3.88	4	-7.78	5.21	4
	V4	5.78	4	338	2.59	13.17	4.32	6	279	3.12	30.46	3.94	3	-1.44	4.76	6
	V5	6.45	3	243	4.28	12.69	4.60	5	292	3.13	33.73	4.33	1	-34.72	5.55	1
	V6	-	-	-	-	-	5.17	4	326	3.23	34.07	4.23	2	-70.50	4.82	5
	<b>C.D.(0.05)</b>	0.41		23.91	0.28		0.50		11.90	0.01		0.61				
	<b>C.V.(%)</b>	6.79		8.52	8.08		10.13		3.94	0.46		17.04				
	<b>Expt. Mean</b>	<b>6.25</b>		<b>289</b>	<b>3.50</b>		<b>5.08</b>		<b>313</b>	<b>3.19</b>		<b>3.88</b>				
	Soil type	Clay loam					Sandy loam					Sandy loam				
	pH	8.1					7.5					7.5				
	<b>N - levels (kg/ha)</b>															
	N1	75					75					45				
	N2	150					150					90				
	N3	225					225					135				
	Recommended NPK (kg/ha)	150-60-0-25					150-60-40-25					150-60-40-25				
	<b>Varieties</b>															
	V1	IET 22402					IET 22402					IET 22402				
	V2	IET 22407					IET 22407					IET 22407				
	V3	IET 22410					IET 22410					IET 22410				
	V4	Samba Mahsuri					Samba Mahsuri					Samba Mahsuri				
	V5	DRRH-3					DRRH-3					DRRH-3				
	V6	-					Local (NDR 359)					Local (NDR 359)				
	Available NPK of soil (kg/ha)	160:16:385					21:19.5:209					21:19.5:209				

Table 4.1(m): Summary of data on grain yield and ancillary characters of selected AVT-2 (Aerobic) cultures grown under direct seeded conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.

Nlevels	Varieties	KAUL					LUDHIANA					RAIPUR				
		Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
N1	V1	3.34	12	189	2.24		7.95	4	430	3.04	-	2.72	22	258	1.97	-
	V2	3.55	9	191	2.51		8.43	2	289	4.85	-	2.59	27	154	2.88	-
	V3	2.77	17	209	1.79		5.63	28	327	2.45	-	2.45	31	241	2.21	-
	V4	2.49	23	215	1.52		7.21	9	376	2.93	-	2.65	25	244	1.79	-
	V5	2.29	29	229	1.32		4.95	29	336	2.33	-	2.62	26	231	2.16	-
	V6	2.05	31	203	1.31		6.69	15	241	4.11		2.79	21	219	2.51	
	V7	2.05	30	214	1.28		6.45	18	424	2.21		2.03	33	264	1.89	
	V8	2.00	32	215	1.24		6.85	13	390	2.60		2.59	27	248	1.69	
	V9	1.94	33	207	1.23		5.89	23	455	1.93		2.68	24	224	1.50	
	V10	2.35	28	216	1.53		6.84	14	355	2.82		2.48	30	223	2.57	
	V11	2.69	18	205	1.66		8.23	3	365	3.57		2.59	27	220	3.15	
N2	V1	4.44	4	230	2.60	14.59	8.99	1	441	3.38	17.39	3.23	15	263	2.04	18.46
	V2	4.57	2	211	2.83	13.57	7.69	5	301	4.18	-12.31	3.46	10	182	3.72	13.94
	V3	3.96	7	247	2.11	15.86	5.67	27	319	2.53	0.67	3.15	17	268	2.31	28.57
	V4	3.35	10	241	1.80	11.47	7.11	10	435	2.52	-1.61	3.60	9	251	1.90	20.21
	V5	2.79	16	231	1.34	6.61	4.83	30	309	2.54	-2.00	3.46	10	248	2.31	33.44
	V6	2.40	27	242	1.36	4.68	5.72	25	287	2.94	-16.06	3.96	6	234	2.66	-8.36
	V7	2.57	19	248	1.31	6.91	6.28	21	368	2.45	-2.83	2.45	31	279	1.96	17.07
	V8	2.51	22	256	1.28	6.73	6.97	12	388	2.64	2.12	2.72	22	259	1.89	5.92
	V9	2.45	24	251	1.29	6.85	6.54	16	444	2.18	10.93	2.83	20	226	1.81	15.33
	V10	3.19	14	246	1.72	11.23	6.36	19	341	2.73	-8.04	3.29	14	243	2.26	24.04
	V11	3.92	8	245	2.06	16.46	7.68	6	327	3.73	-9.19	3.44	13	232	3.25	43.20
N3	V1	4.50	3	268	2.68	7.72	7.42	7	439	2.71	-4.43	4.32	4	276	2.53	14.46
	V2	4.72	1	258	2.97	7.78	7.02	11	296	3.63	-11.71	4.36	3	192	4.79	25.08
	V3	4.02	5	297	2.16	8.32	4.49	32	314	2.46	-9.50	3.87	7	278	3.29	26.13
	V4	3.35	11	297	1.80	5.71	6.45	17	325	2.96	-6.31	4.60	1	289	2.25	17.77
	V5	2.85	15	283	1.34	3.69	3.94	33	329	2.33	-8.46	4.54	2	262	3.06	6.97
	V6	2.41	26	243	1.36	2.40	5.88	24	299	2.91	-6.69	4.07	5	251	2.81	4.18
	V7	2.51	21	303	1.31	3.09	4.69	31	427	1.82	-14.69	3.18	16	285	2.16	12.72
	V8	2.52	20	307	1.28	3.45	5.92	22	405	2.17	-7.69	3.12	18	300	2.07	10.80
	V9	2.44	25	263	1.27	3.33	5.69	26	424	1.93	-1.65	3.05	19	233	2.32	14.11
	V10	3.19	13	296	1.70	5.65	6.31	20	340	2.67	-4.45	3.46	10	282	2.35	-31.01
	V11	3.96	6	301	2.09	8.50	7.35	8	403	2.75	-7.28	3.80	8	255	3.91	-32.40
C.D.(0.05)																
N at same V		NS		NS	NS		NS		NS	NS		0.29		NS	NS	
V at same N		NS		NS	NS		NS		NS	NS		0.28		NS	NS	

Table-4.1(m) (Contd...)

N-levels	Varieties	KAUL					LUDHIANA					RAIPUR				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 75 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 40 kg N/ha)
<b>Means of N levels:</b>																
	N1	2.50		208	1.60	-	6.83		363	2.98	-	2.56		230	2.21	-
	N2	3.29		241	1.79	10.45	6.71		360	2.89	-1.90	3.33		244	2.37	19.26
	N3	3.32		283	1.82	5.42	5.92		364	2.58	-7.53	3.74		264	2.87	14.76
	<b>C.D.(0.05)</b>	0.07		4.88	0.05		NS		NS	0.09		0.05		6.09	0.21	
	<b>C.V.(%)</b>	5.36		4.58	6.22		33.16		13.32	7.55		3.57		5.67	18.89	
<b>Mean of varieties:</b>																
	V1	4.09	2	229	2.51	11.16	8.12	1	436	3.04	6.48	3.35	4	265	2.18	16.46
	V2	4.28	1	220	2.77	10.68	7.72	3	295	4.22	-12.01	3.45	2	176	3.79	19.51
	V3	3.58	3	251	2.02	12.09	5.26	10	320	2.48	-4.42	3.53	1	262	2.60	27.35
	V4	3.06	5	251	1.71	8.59	6.92	4	379	2.80	-3.96	3.39	3	262	1.98	18.99
	V5	2.64	7	248	1.34	5.15	4.57	11	325	2.40	-5.23	3.25	6	247	2.51	20.21
	V6	2.28	10	229	1.34	3.54	6.10	7	276	3.32	-11.37	2.79	9	235	2.66	-2.09
	V7	2.38	8	255	1.30	5.00	5.80	9	406	2.16	-8.76	2.60	10	276	2.00	14.89
	V8	2.35	9	259	1.27	5.09	6.58	5	394	2.47	-2.78	2.96	8	269	1.88	8.36
	V9	2.28	11	240	1.26	5.09	6.04	8	441	2.01	4.64	3.26	5	228	1.88	14.72
	V10	2.91	6	253	1.65	8.44	6.50	6	346	2.74	-6.25	2.96	7	249	2.39	-3.48
	V11	3.53	4	250	1.94	12.48	7.75	2	365	3.35	-8.23	2.59	11	236	3.44	5.40
	<b>C.D.(0.05)</b>	0.26		21.22	0.16		0.67		31.6	0.37		0.17		14.84	0.35	
	<b>C.V.(%)</b>	9.08		9.22	9.67		10.98		9.26	13.94		5.48		6.40	15.10	
	<b>Expt. Mean</b>	<b>3.03</b>		<b>244</b>	<b>1.74</b>		<b>6.49</b>		<b>362</b>	<b>2.82</b>		<b>3.10</b>		<b>246</b>	<b>2.48</b>	
	Soil type	Clay loam					Sandy loam					Clay soil				
	pH	8.10										7.20				
<b>N - levels (kg/ha)</b>																
	N1	75					60					40				
	N2	150					120					80				
	N3	225					180					120				
<b>Recommended NPK (kg/ha)</b>		150:60:0-25					120:60:40					80:60:40:25				
<b>Varieties</b>																
	V1	IET 22699					IET 22699					IET 22699				
	V2	IET 22704					IET 22704					IET 22704				
	V3	IET 22716					IET 22716					IET 22716				
	V4	IET 22729					IET 22729					IET 22729				
	V5	IET22731					IET22731					IET22731				
	V6	IET22737					IET22737					IET22737				
	V7	IR 36					IR 36					IR 36				
	V8	IR 64					IR 64					IR 64				
	V9	Rasi					Rasi					Rasi				
	V10	MAS 946					MAS 946					MAS 946				
	V11	Local (H-KR 47)					Local (PR-115)					Local (Rajeshwari)				
<b>Availabe NPK of soil (kg/ha)</b>		160:16:385										198:24:230				

Table-4.1(m) (Contd...)

N-levels	Varieties	PANTNAGAR					NAWAGAM					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)		
N1	V1	3.20	25	249	1.38	-	3.18	19	243	3.17	-	4.08	10
	V2	3.08	29	174	1.74	-	2.69	28	208	4.04	-	4.07	11
	V3	3.09	28	250	1.21	-	2.35	32	179	2.90	-	3.26	30
	V4	3.52	16	225	1.30	-	4.08	4	312	2.94	-	3.99	14
	V5	2.93	31	213	1.44	-	2.74	25	209	3.11	-	3.11	33
	V6	2.51	33	161	1.86	-	2.98	23	227	3.27	-	3.40	28
	V7	2.97	30	226	1.52	-	2.67	29	204	2.80	-	3.23	31
	V8	2.79	32	248	1.22	-	3.31	16	252	3.10	-	3.51	26
	V9	3.24	21	250	1.40	-	2.29	33	175	2.57	-	3.21	32
	V10	3.22	24	238	1.35	-	2.64	30	201	3.38	-	3.51	27
	V11	3.17	27	202	1.64	-	3.55	9	271	3.00	-	4.05	12
N2	V1	3.71	11	259	1.44	8.63	3.52	12	269	3.46	6.84	4.82	4
	V2	3.56	15	186	1.89	7.94	2.71	27	207	4.09	0.49	4.34	8
	V3	3.19	26	267	1.34	1.69	2.73	26	208	3.50	7.59	3.83	18
	V4	3.70	12	253	1.48	2.98	4.35	3	331	3.08	5.34	4.39	7
	V5	3.43	18	238	1.50	8.33	3.53	11	269	3.20	15.68	3.71	21
	V6	3.24	22	183	1.81	12.10	3.10	22	236	3.90	2.24	3.38	29
	V7	3.38	19	279	1.27	6.85	3.48	13	266	2.80	16.30	3.69	22
	V8	3.23	23	282	1.22	7.44	3.30	17	252	3.11	-0.21	3.77	19
	V9	3.68	13	266	1.41	7.34	3.21	18	245	2.88	18.48	3.84	17
	V10	3.90	10	272	1.32	11.31	3.33	14	254	3.45	13.84	4.04	13
	V11	4.49	2	229	1.93	21.92	4.61	1	351	3.70	21.12	5.00	1
N3	V1	4.43	3	271	1.56	10.32	4.05	5	309	3.55	8.71	4.86	3
	V2	4.43	3	212	2.13	11.26	2.89	24	220	4.30	2.02	4.73	5
	V3	3.63	14	271	1.32	4.51	2.57	31	196	3.52	2.17	3.85	16
	V4	4.34	5	270	1.50	6.85	4.05	6	309	3.14	-0.28	4.45	6
	V5	4.25	7	263	1.66	11.01	3.82	7	291	3.25	10.77	3.61	23
	V6	3.32	20	201	1.87	6.70	3.17	20	242	3.26	1.86	3.58	25
	V7	4.13	8	290	1.45	9.62	3.61	8	275	2.87	9.41	3.60	24
	V8	3.48	17	295	1.25	5.80	3.17	21	242	3.20	-1.46	3.71	20
	V9	4.13	9	288	1.49	7.34	3.33	15	254	2.94	10.39	3.88	15
	V10	4.26	6	288	1.26	8.63	3.55	10	270	3.65	9.08	4.15	9
	V11	4.80	1	243	1.83	13.59	4.40	2	336	4.15	8.48	4.86	2
C.D.(0.05)													
N at same V		NS		NS	NS		0.43		28.68	0.32			
V at same N		NS		NS	NS		0.42		27.92	0.31			

Table-4.1(m) (Contd...)

N-levels	Varieties	PANTNAGAR					NAWAGAM					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 50 kg N/ha)		
<b>Means of N levels:</b>													
	N1	3.07		221	1.46	-	2.95		226	3.12	-		
	N2	3.59		247	1.51	8.78	3.44		262	3.38	9.79		
	N3	4.11		263	1.57	8.69	3.51		268	3.44	5.56		
	<b>C.D.(0.05)</b>	0.04		2.81	0.05		0.14		9.26	0.10			
	<b>C.V.(%)</b>	2.71		2.64	7.89		9.60		8.41	6.96			
<b>Mean of varieties:</b>													
	V1	3.78	4	260	1.46	9.47	3.59	3	273	3.40	7.78	4.59	1
	V2	3.69	5	191	1.92	9.60	2.76	10	212	4.14	1.26	4.38	3
	V3	3.30	9	263	1.29	3.10	2.55	11	194	3.31	4.88	3.65	7
	V4	3.85	2	249	1.43	4.91	4.16	2	317	3.05	2.53	4.28	4
	V5	3.54	7	238	1.53	9.67	3.36	4	256	3.19	13.22	3.47	10
	V6	3.02	11	182	1.85	9.40	3.08	8	235	3.47	2.05	3.45	11
	V7	3.49	8	265	1.41	8.23	3.25	6	248	2.82	12.86	3.51	9
	V8	3.17	10	275	1.23	6.62	3.26	5	249	3.14	-0.83	3.66	6
	V9	3.68	6	268	1.43	7.34	2.94	9	224	2.80	14.43	3.64	8
	V10	3.79	3	266	1.31	9.97	3.17	7	242	3.49	11.46	3.87	5
	V11	4.15	1	225	1.80	17.76	4.18	1	319	3.62	14.80	4.44	2
	<b>C.D.(0.05)</b>	0.27		13.58	0.13		0.25		16.56	0.18			
	<b>C.V.(%)</b>	8.03		5.91	9.33		8.01		6.97	5.90			
	<b>Expt. Mean</b>	<b>3.59</b>		<b>244</b>	<b>1.51</b>		<b>3.30</b>		<b>252</b>	<b>3.31</b>			
	Soil type	Silt loam					Clay loam						
	pH	8.00					7.7						
<b>N - levels (kg/ha)</b>													
	N1	60					50						
	N2	120					100						
	N3	180					150						
	Recommended NPK (kg/ha)	120-60-40-25					100:25:0:25						
<b>Varieties</b>													
	V1	IET 22699					IET 22699						
	V2	IET 22704					IET 22704						
	V3	IET 22716					IET 22716						
	V4	IET 22729					IET 22729						
	V5	IET22731					IET22731						
	V6	IET22737					IET22737						
	V7	IR 36					IR 36						
	V8	IR 64					IR 64						
	V9	Rasi					Rasi						
	V10	MAS 946					MAS 946						
	V11	Local (PD 12)					Local (Dandi)						
	Availabe NPK of soil (kg/ha)	236:21:219					0:03:44.8:236						

Table 4.1(n): Summary of data on grain yield and ancillary characters of selected AVT - AL&ISTVT cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.

N-levels	Varieties	KANPUR					KARNAL				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
N1	V1	3.36	12	228	2.70		4.40	12	453	-	
	V2	3.10	14	219	2.61		4.64	11	512	-	
	V3	2.94	15	239	2.52		4.05	13	434	-	
	V4	3.28	13	243	2.80		3.91	14	406	-	
	V5	-	-	-	-		3.90	15	585	-	
	V6	3.55	10	230	2.65		-	-	-	-	
N2	V1	3.88	6	235	2.82	8.51	5.67	5	490	-	21.14
	V2	3.66	9	230	2.70	9.20	5.80	3	482	-	19.33
	V3	3.39	11	248	2.62	7.47	4.87	9	507	-	13.61
	V4	3.70	8	252	2.84	6.94	4.87	10	496	-	16.02
	V5	-	-	-	-	-	4.91	8	468	-	16.83
	V6	4.00	4	240	2.72	7.47	-	-	-	-	-
N3	V1	4.15	2	241	2.86	6.51	6.38	2	507	-	16.48
	V2	3.91	5	235	2.74	6.68	6.44	1	501	-	15.00
	V3	3.71	7	251	2.64	6.42	5.65	6	529	-	13.32
	V4	4.05	3	256	2.94	6.42	5.61	7	484	-	14.18
	V5	-	-	-	-	-	5.69	4	507	-	14.97
	V6	4.32	1	244	2.81	6.42	-	-	-	-	-
	C.D.(0.05)										
	<i>N</i> at same <i>V</i>	NS		NS	NS		NS		55.49	-	
	<i>V</i> at same <i>N</i>	NS		NS	NS		NS		54.36	-	
	<b>Means of N levels:</b>										
	N1	3.25		232	2.66		4.18		478	-	
	N2	3.72		241	2.74	7.92	5.22		488	-	17.39
	N3	4.03		245	2.80	6.49	5.95		506	-	14.79
	<b>C.D.(0.05)</b>	0.08		1.91	0.03		0.03		NS	-	
	<b>C.V.(%)</b>	3.55		1.23	1.17		0.96		11.24	-	

Table 4.1(n) (Contd..)

N-levels	Varieties	KANPUR					KARNAL				
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)
<b>Mean of varieties:</b>											
	V1	3.80	2	234	2.79	7.51	5.48	2	483	-	18.81
	V2	3.56	4	228	2.68	7.94	5.63	1	498	-	17.17
	V3	3.34	5	246	2.59	6.94	4.86	3	490	-	13.47
	V4	3.68	3	250	2.86	6.68	4.79	5	462	-	15.10
	V5	-	-	-	-	-	4.83	4	520	-	15.90
	V6	3.96	1	238	2.73	6.94	-	-	-	-	-
	<b>C.D.(0.05)</b>	0.18		4.63	0.08		0.15		32.04	-	
	<b>C.V.(%)</b>	4.99		1.99	2.81		2.99		6.71	-	
	<b>Expt. Mean</b>	<b>3.67</b>		<b>239</b>	<b>2.73</b>		<b>5.12</b>		<b>491</b>	-	
	Soil type	Sandy loam					Sandy loam				
	pH	9.6					8.50				
	E.C.	0.7					1.80				
	<b>N - levels (kg/ha)</b>										
	N1	60					60				
	N2	120					120				
	N3	180					180				
	Recommended NPK (kg/ha)										
	<b>Varieties</b>										
	V1	IET 20328					IET 20328				
	V2	IET 22017					IET 22017				
	V3	CSR-23					CSR-23				
	V4	CSR-36					CSR-36				
	V5	-					Jaya				
	V6	Local (Usar-3)					-				
	Available NPK of soil (kg/ha)	152:18.12:219									



Table 4.1(n) (Contd..)

N-levels	Varieties	LUCKNOW					NAVSARI					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
N1	V1	4.06	14	328	1.88		3.47	18	286	2.80		3.83	17
	V2	4.55	9	331	1.93		3.50	17	244	3.00		3.95	16
	V3	4.03	15	254	1.87		4.22	14	306	3.20		3.81	18
	V4	4.62	8	322	2.02		4.97	9	304	3.50		4.19	14
	V5	-	-	-	-		4.23	13	264	3.8		4.07	15
	V6	4.44	12	310	2.59		4.65	10	253	4.10		4.21	13
N2	V1	4.39	13	300	2.33	5.43	3.66	16	286	2.90	3.14	4.40	12
	V2	4.93	4	380	2.13	6.33	4.40	12	260	3.20	14.97	4.70	8
	V3	4.45	10	402	2.20	7.07	5.05	8	317	3.20	13.84	4.44	11
	V4	4.67	6	322	2.28	0.96	5.31	6	297	3.60	5.66	4.64	10
	V5	-	-	-	-	-	5.59	4	242	4.00	22.58	5.25	2
	V6	4.64	7	404	3.30	3.33	6.10	2	297	4.50	24.18	4.91	6
N3	V1	4.45	11	320	2.72	3.23	3.67	15	299	2.80	1.67	4.66	9
	V2	4.76	5	346	2.40	1.73	4.51	11	304	3.40	8.41	4.90	7
	V3	5.31	2	427	2.32	10.67	5.13	7	308	3.40	7.56	4.95	5
	V4	5.59	1	409	2.59	8.12	5.38	5	295	3.70	3.42	5.16	4
	V5	-	-	-	-	-	5.65	3	299	4.10	11.75	5.67	1
	V6	5.07	3	346	3.44	5.25	6.16	1	295	4.40	12.63	5.19	3
	C.D.(0.05)												
	Nat same V	NS		58.68	NS		0.32		28.62	NS			
	Vat same N	NS		56.59	NS		0.35		29.96	NS			
	<b>Means of N levels:</b>												
	N1	4.34		309	2.06		4.17		276	3.40			
	N2	4.62		362	2.45	4.62	5.02		283	3.57	16.87		
	N3	5.04		369	2.69	5.80	5.08		300	3.63	9.09		
	<b>C.D.(0.05)</b>	NS		NS	0.10		0.29		NS	0.04			
	<b>C.V.(%)</b>	21.63		15.34	6.69		10.33		13.48	1.83			

Table 4.1(n) (Contd..)

Nlevels	Varieties	LUCKNOW					NAVSARI					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
<b>Mean of varieties:</b>													
	V1	4.30	5	316	2.31	4.33	3.60	6	290	2.83	2.40	4.30	6
	V2	4.75	2	352	2.15	4.03	4.14	5	269	3.20	11.69	4.52	4
	V3	4.60	4	361	2.13	8.87	4.80	4	310	3.27	10.70	4.40	5
	V4	4.96	1	351	2.30	4.54	5.22	2	298	3.60	4.54	4.66	3
	V5	-	-	-	-	-	5.16	3	268	3.97	17.17	5.00	1
	V6	4.72	3	353	3.11	4.29	5.63	1	282	4.33	18.40	4.77	2
	<b>C.D.(0.05)</b>	NS		NS	0.45		0.19		16.52	0.23			
	<b>C.V.(%)</b>	9.75		10.04	19.22		4.08		5.99	6.86			
	<b>Expt. Mean</b>	<b>4.67</b>		<b>347</b>	<b>2.40</b>		<b>4.76</b>		<b>286</b>	<b>3.53</b>			
	Soil type	Sodic soil					Clay						
	pH	9.2					8.66						
	E.C.	0.7					1.14						
	<b>N - levels (kg/ha)</b>												
	N1	60					60						
	N2	120					120						
	N3	180					180						
	Recommended NPK (kg/ha)						120:30:0:20						
	<b>Varieties</b>												
	V1	IET 20328					IET 20328						
	V2	IET 22017					IET 22017						
	V3	CSR-23					CSR-23						
	V4	CSR-36					CSR-36						
	V5	-					Jaya						
	V6	Local					Local (Dandi)						
	Available NPK of soil (kg/ha)						235:31.2:1320						

Table 4.1(o): Summary of data on grain yield and ancillary characters of selected AVT-2 CSTVT cultures grown under transplanted conditions at graded levels of recommended N fertilizer doses, *kharif* 2013.

N-levels	Varieties	LUCKNOW					KANPUR					NAVSARI					Over all mean	Rank
		Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)	Grain Yield (t/ha)	Rank	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	N res. (kg grain/kg N) (Base level 60 kg N/ha)		
N1	V1	1.89	9	349	2.07		3.13	12	217	2.45		3.51	12	306	3.17		2.84	15
	V2	1.32	12	298	1.70		3.39	11	225	2.55		4.13	11	253	4.27		2.94	14
	V3	-	-	-	-		-	-	-	-		3.04	15	282	3.77		3.04	13
	V4	3.58	4	303	1.89		3.68	8	238	2.87		4.60	10	255	2.77		3.95	5
	V5	3.04	6	381	2.90		3.51	10	231	2.62		4.97	7	286	3.57		3.84	7
N2	V1	2.24	8	366	2.34	5.73	3.68	8	225	2.55	9.20	4.85	9	314	3.37	22.38	3.59	9
	V2	1.49	11	376	1.91	2.87	3.91	7	232	2.69	8.68	5.21	6	275	4.47	18.06	3.54	10
	V3	-	-	-	-	-	-	-	-	-	-	3.32	14	321	4.00	4.73	3.32	12
	V4	4.10	2	302	2.33	8.61	4.34	2	245	2.92	11.11	5.45	4	279	3.17	14.15	4.63	2
	V5	3.38	5	314	2.98	5.73	4.05	5	234	2.72	9.03	5.82	2	312	3.77	14.20	4.42	4
N3	V1	2.98	7	382	2.47	9.07	3.96	6	230	2.60	6.94	4.92	8	310	3.77	11.75	3.95	6
	V2	1.76	10	388	2.06	3.66	4.22	4	240	2.75	6.94	5.25	5	288	4.47	9.36	3.74	8
	V3	-	-	-	-	-	-	-	-	-	-	3.34	13	323	4.10	2.52	3.34	11
	V4	4.30	1	326	2.47	5.98	4.67	1	249	3.01	8.25	5.53	3	290	3.17	7.79	4.83	1
	V5	3.62	3	390	3.05	4.86	4.33	3	242	2.80	6.86	5.89	1	305	4.07	7.69	4.62	3
C.D.(0.05)																		
Not same V		NS		NS	NS		NS		NS	NS		NS		NS	NS			
Not same N		NS		NS	NS		NS		NS	NS		NS		NS	NS			
<b>Means of N levels:</b>																		
N1		2.46		333	2.14		3.42		228	2.62		4.05		276	3.51			
N2		2.80		339	2.39	5.74	3.99		234	2.72	9.51	4.93		300	3.75	14.70		
N3		3.16		371	2.51	5.89	4.29		240	2.79	7.25	4.99		303	3.91	7.82		
C.D.(0.05)		0.28		NS	NS		0.14		1.96	0.05		0.32		NS	0.06			
C.V.(%)		13.91		15.3	16.69		4.88		1.16	2.49		10.6		9.71	2.62			
V1		2.37	3	366	2.29	7.40	3.59	4	224	2.53	8.07	4.42	4	310	3.43	17.07	3.46	3
V2		1.52	4	354	1.89	3.26	3.84	3	232	2.66	7.81	4.86	3	272	4.40	13.71	3.41	4
V3		-	-	-	-	-	-	-	-	-	-	3.24	5	309	3.96	3.63	3.24	5
V4		3.99	1	310	2.23	7.30	4.23	1	244	2.93	9.68	5.19	2	275	3.03	10.97	4.47	1
V5		3.35	2	362	2.98	5.29	3.97	2	236	2.71	7.94	5.56	1	301	3.80	10.94	4.29	2
C.D.(0.05)		0.42		39.45	0.27		0.20		4.63	0.10		0.37		16.49	0.34			
C.V.(%)		15.15		11.44	11.51		5.11		2.00	3.57		8.22		5.78	9.27			
<b>Expt. Mean</b>		<b>2.81</b>		<b>348</b>	<b>2.35</b>		<b>3.90</b>		<b>234</b>	<b>2.71</b>		<b>4.66</b>		<b>293</b>	<b>3.72</b>			
Soil type		-					Sandy loam					Clay						
pH		9.20					9.50					8.66						
<b>N - levels (kg/ha)</b>																		
N1		60					60					60						
N2		120					120					120						
N3		180					180					180						
Recommended NPK (kg/ha)		120:60:40:25					120:60:60:25					120:30:0:20						
<b>Varieties</b>																		
V1		IET 21943					IET 21943					IET 21943						
V2		IET 21944					IET 21944					IET 21944						
V3		-					-					CSV 7-1						
V4		Jaya					Jaya					Jaya						
V5		Local (Usar-3)					Local (Usar-3)					Local (Dandi)						
Available NPK of soil (kg/ha)		-					155:17.80:221					235:31.2:1320						

Table: 4.1.2(a): Grain Yield Efficiency Index Value (GYEI) of the cultures as influenced by dose of 'N' application (mean over the locations)

AVT-2 EH (Irrigated)			AVT-2 MH (Irrigated)			AVT-2 UH (Upland)			AVT VE - DS			AVT-2 E-TP		
N-Levels	Varieties	Mean	N-Levels	Varieties	Mean	N-Levels	Varieties	Mean	N-Level	Varieties	Mean	N-Level	Varieties	Mean
<b>N2</b>	IET 22269	1.11	<b>N2</b>	IET 22281	0.95	<b>N2</b>	IET 22291	0.95	<b>N2</b>	IET 22020	0.90	<b>N2</b>	IET 22752	1.47
	IET 22270	0.81		IET 22283	1.08		IET 22292	0.79		IET 22743	1.31		IET 22753	1.26
	IET 22272	0.99		IET 22286	0.89		IET 22294	1.12		IET 22744	1.29		IET 22763	1.25
	IET 22273	1.10		Vivekdhan 82	0.91		IET 22295	0.99		Anjali	0.99		IET 22764	1.27
	Vivekdhan 82	0.88		HPR 2143	0.94		IET22296	0.82		Varalu	0.57		IET 22767	1.00
	RP 2421	0.96		Local check	1.49		Vivek Dhan 154	1.18		Vandana	0.98		IET22768	0.85
	Local check	1.40		<b>Mean</b>	<b>1.04</b>		Sukardhan 1	1.34		Local check	1.19		Sahbhagidhan	0.92
	<b>Mean</b>	<b>1.03</b>					local check	1.69		<b>Mean</b>	<b>1.03</b>		Govind	0.80
				<b>Mean</b>	<b>1.11</b>			Narendra 97	0.73					
								Tulasi	0.64					
								Local Check	1.04					
								<b>Mean</b>	<b>1.02</b>					
<b>N3</b>	IET 22269	1.31	<b>N3</b>	IET 22281	1.14	<b>N3</b>	IET 22291	1.07	<b>N3</b>	IET 22020	1.01	<b>N3</b>	IET 22752	1.66
	IET 22270	1.19		IET 22283	1.28		IET 22292	0.99		IET 22743	1.48		IET 22753	1.40
	IET 22272	1.05		IET 22286	1.08		IET 22294	1.64		IET 22744	1.12		IET 22763	1.44
	IET 22273	1.34		Vivekdhan 82	1.11		IET 22295	1.33		Anjali	0.91		IET 22764	1.48
	Vivekdhan 82	1.04		HPR 2143	1.25		IET22296	1.06		Varalu	0.69		IET 22767	1.23
	RP 2421	1.06		Local check	1.77		Vivek Dhan 154	1.70		Vandana	0.92		IET22768	0.96
	Local check	1.56		<b>Mean</b>	<b>1.27</b>		Sukardhan 1	1.81		Local check	1.12		Sahbhagidhan	0.99
	<b>Mean</b>	<b>1.22</b>					local check	2.59		<b>Mean</b>	<b>1.04</b>		Govind	0.82
				<b>Mean</b>	<b>1.52</b>			Narendra 97	0.90					
								Tulasi	0.74					
								Local Check	1.11					
								<b>Mean</b>	<b>1.16</b>					

Table: 4.1.2(a) (Contd....)

AVT2-IME (TP)			AVT2-IM			AVT2-Late			AVT-1 BT (Basmati)		
N-Level	Varieties	Mean	N-Level	Varieties	Mean	N-Level	Varieties	Mean	N-Level	Varieties	Mean
<b>N2</b>	IET 22084	1.15	<b>N2</b>	IET 22379	1.14	<b>N2</b>	IET 22486	1.03	<b>N2</b>	IET 22777	1.13
	IET 22212	0.92		IET 22381	0.99		Swarna	1.02		IET 22778	1.23
	IET 22224	1.03		IET 22390	1.04		Pooja	0.94		IET 22787	1.17
	IET 22565	0.92		NDR 359	0.92		Salivahana	1.15		Pusa Bsamati 1	0.88
	IET 22569	1.08		KRH-2	1.07		Samba Mahsuri	0.88		Taroari Basmati	0.69
	IET 22592	1.07		NDR 8002,	1.06		Local Check	1.09		Pusa 1121	1.05
	IET 22598	1.07		Akshayadhan	0.92		<b>Mean</b>	<b>1.02</b>		Local Check	1.01
	IR 64	0.90		Local Check	0.92					<b>Mean</b>	<b>1.02</b>
	PA 6201	1.16		<b>Mean</b>	<b>1.01</b>						
	PR 113	0.99									
	LalaT	1.01									
	Sasyasree	0.93									
	MTU 1010	0.91									
	Local Check	0.95									
	<b>Mean</b>	<b>1.01</b>									
<b>N3</b>	IET 22084	1.41	<b>N3</b>	IET 22379	1.35	<b>N3</b>	IET 22486	1.23	<b>N3</b>	IET 22777	1.58
	IET 22212	1.04		IET 22381	1.24		Swarna	1.25		IET 22778	1.63
	IET 22224	<b>1.32</b>		IET 22390	1.30		Pooja	1.16		IET 22787	1.55
	IET 22565	<b>1.28</b>		NDR 359	1.12		Salivahana	1.50		Pusa Bsamati 1	1.14
	IET 22569	1.30		KRH-2	1.20		Samba Mahsuri	1.13		Taroari Basmati	0.80
	IET 22592	1.34		NDR 8002,	1.29		Local Check	1.26		Pusa 1121	1.34
	IET 22598	1.34		Akshayadhan	1.18		<b>Mean</b>	<b>1.02</b>		Local Check	1.34
	IR 64	1.16		Local Check	1.10					<b>Mean</b>	<b>1.34</b>
	PA 6201	1.48		<b>Mean</b>	<b>1.22</b>						
	PR 113	1.31									
	LalaT	1.28									
	Sasyasree	1.17									
	MTU 1010	1.15									
	Local Check	1.17									
	<b>Mean</b>	<b>1.27</b>									

Table: 4.1.2(a) (Contd....)

AVT ASG			NVT-1   IHRT MS			AVT-2 (Aerobic)			AVT-AL&ISTVT			AVT-2 CSTVT		
N-Level	Varieties	Mean	N-Level	Varieties	Mean	N-Level	Varieties	Mean	N-Level	Varieties	Mean	N-Level	Varieties	Mean
<b>N2</b>	IET 21261	1.09	<b>N2</b>	IET 22402	1.13	<b>N2</b>	IET 22699	1.31	<b>N2</b>	IET 20328	0.93	<b>N2</b>	IET 21943	0.77
	IET 21267	1.00		IET 22407	1.07		IET 22704	1.23		IET 22017	1.01		IET 21944	0.78
	IET 21835	1.04		IET 22410	1.02		IET 22716	0.89		CSR-23	0.91		CSV 7-1	0.51
	IET 21838	0.96		Samba Mahsuri	0.76		IET 22729	1.23		CSR-36	1.05		Jaya	1.52
	IET 21840	0.88		DRRH-3	1.08		IET22731	0.84		Jaya	1.00		Local Check	1.33
	IET 21841	1.17		Local Check	0.93		IET22737	0.87		Local Check	1.19		<b>Mean</b>	<b>0.98</b>
	IET 21842	1.01		<b>Mean</b>	<b>1.00</b>		IR 36	0.79		<b>Mean</b>	<b>1.01</b>			
	Badshabhog	0.97					IR 64	0.87						
	Kalanamak	0.71					Rasi	0.82						
	Local Check	1.08					MAS 946	0.96						
	<b>Mean</b>	<b>0.99</b>					Local Check	1.32						
				<b>Mean</b>	<b>1.01</b>									
<b>N3</b>	IET 21261	1.54	<b>N3</b>	IET 22402	1.45	<b>N3</b>	IET 22699	1.64	<b>N3</b>	IET 20328	0.99	<b>N3</b>	IET 21943	1.01
	IET 21267	1.46		IET 22407	1.38		IET 22704	1.50		IET 22017	1.05		IET 21944	0.94
	IET 21835	1.37		IET 22410	1.23		IET 22716	1.08		CSR-23	1.01		CSV 7-1	0.55
	IET 21838	1.32		Samba Mahsuri	1.06		IET 22729	1.44		CSR-36	1.17		Jaya	1.71
	IET 21840	1.21		DRRH-3	1.38		IET22731	1.10		Jaya	1.08		Local Check	1.49
	IET 21841	1.58		Local Check	1.24		IET22737	1.00		Local Check	1.25		<b>Mean</b>	<b>1.14</b>
	IET 21842	1.23		<b>Mean</b>	<b>1.29</b>		IR 36	0.93		<b>Mean</b>	<b>1.09</b>			
	Badshabhog	1.20					IR 64	0.91						
	Kalanamak	0.79					Rasi	0.96						
	Local Check	1.21					MAS 946	1.17						
	<b>Mean</b>	<b>1.28</b>					Local Check	1.66						
				<b>Mean</b>	<b>1.22</b>									

Table. 4.1.2 (b) Identification of cultures performing better with low level of Nitrogen application based on the % yield reduction at 50 % of RDN and 100% of RDN

Group	Group	Entry No	Mean yield over location at 50% RDN	Mean yield over location at 100% RDN	Difference of grain yield (t/ha)	(%) Reduction
EH (Irrigated)	V1	IET 22269	3.78	4.32	0.54	12.52
	V2	IET 22270	3.18	4.28	1.10	25.73
	V3	IET 22272	3.70	4.24	0.54	12.71
	V4	IET 22273	3.86	4.47	0.61	13.58
MH (Irrigated)	V1	IET 22281	3.94	4.47	0.53	11.95
	V2	IET 22283	4.63	5.07	0.44	8.59 *
	V3	IET 22286	3.61	4.29	0.68	15.77
UH (Upland)	V1	IET 22291	2.01	2.27	0.26	11.42
	V2	IET 22292	1.71	2.21	0.50	22.59
	V3	IET 22294	1.98	2.64	0.66	25.04
	V4	IET 22295	1.92	2.51	0.59	23.42
	V5	IET 22296	1.83	2.32	0.49	21.12
VE - DS	V1	IET 22020	2.60	3.04	0.44	14.50
	V2	IET 22743	2.85	3.50	0.65	18.50
	V3	IET 22744	2.82	3.71	0.89	24.03
E - TP	V1	IET 22752	4.92	5.57	0.65	11.63
	V2	IET 22753	4.62	5.15	0.53	10.29
	V3	IET 22763	4.70	5.20	0.50	9.62 *
	V4	IET 22764	4.70	5.20	0.50	9.63 *
	V5	IET 22767	4.10	4.66	0.56	12.11
	V6	IET 22768	3.71	4.33	0.63	14.43
IME (TP)	V1	IET 22084	4.01	4.95	0.94	18.99
	V2	IET 22212	4.31	5.03	0.72	14.41
	V3	IET 22224	3.78	4.70	0.92	19.64
	V4	IET 22565	3.44	4.64	1.20	25.80
	V5	IET 22569	3.95	4.67	0.72	15.48
	V6	IET 22592	4.48	5.64	1.16	20.51
	V7	IET 22598	3.81	4.73	0.92	19.47
IM (TP)	V1	IET 22379	4.40	5.27	0.87	16.54
	V2	IET 22381	4.02	4.80	0.78	16.34
	V3	IET 22390	4.24	5.27	1.03	19.49
	V4	IET 22520	3.97	4.72	0.75	15.97
Late	V1	IET 22486	4.22	5.09	0.86	16.92
BT (Basmati)	V1	IET 22777	3.39	4.35	0.96	21.99
	V2	IET 22778	3.52	4.55	1.03	22.55
	V3	IET 22787	3.63	4.56	0.94	20.58
ASG	V1	IET 21261	2.90	3.94	1.03	26.23
	V2	IET 21267	2.78	3.87	1.09	28.15
	V3	IET 21835	2.93	3.69	0.76	20.60
	V4	IET 21838	2.79	3.67	0.87	23.80
	V5	IET 21840	2.66	3.59	0.94	26.06
	V6	IET 21841	3.02	4.10	1.08	26.33
	V7	IET 21842	2.90	3.64	0.74	20.35
IHRT MS	V1	IET 22402	4.71	5.72	1.00	17.51
	V2	IET 22407	4.58	5.65	1.07	19.02
	V3	IET 22410	4.51	5.39	0.88	16.35
(Aerobic)	V1	IET 22699	4.08	4.82	0.75	15.49
	V2	IET 22704	4.07	4.34	0.27	6.17 *
	V3	IET 22716	3.26	3.83	0.57	14.90
	V4	IET 22729	3.99	4.39	0.40	9.19
	V5	IET 22731	3.11	3.71	0.60	16.17
	V6	IET 22737	3.40	3.38	-0.02	-0.64
AL&STVT	V1	IET 20328	3.83	4.40	0.57	13.03
	V2	IET 22017	3.95	4.70	0.75	15.92
CSTVT	V1	IET 21943	2.84	3.59	0.75	20.80
	V2	IET 21944	2.94	3.54	0.59	16.75

\* Promising cultivars were identified based on the yield reduction at 50% RDN (< 10%) over 100% RDN

Table. 4.1.2 (c) Identification of cultures performing better with low level of Nitrogen application based on the mean yield at 50% of RDN

Group	Group	Entry No	Mean yield over location at 50%	Group	Group	Entry No	Mean yield over location at 50%	Group	Group	Entry No	Mean yield over location at 50%		
EH (Irrigated)	V1	IET 22269	3.78	MH (Irrigated)	V1	IET 22281	3.94	UH (Upland)	V1	IET 22291	2.01		
	V2	IET 22270	3.18		V2	IET 22283	4.63 *		V2	IET 22292	1.71		
	V3	IET 22272	3.70		V3	IET 22286	3.61		V3	IET 22294	1.98		
	V4	IET 22273	3.86		Mean	4.06	V4		IET 22295	1.92			
	Mean	3.63				V5	IET 22296		1.83				
								Mean	1.89				
VE - DS	V1	IET 22020	2.60	E - TP	V1	IET 22752	4.92	IME (TP)	V1	IET 22084	4.01		
	V2	IET 22743	2.85		V2	IET 22753	4.62		V2	IET 22212	4.31		
	V3	IET 22744	2.82		V3	IET 22763	4.70 *		V3	IET 22224	3.78		
	Mean	2.76	V4		IET 22764	4.70 *	V4		IET 22565	3.44			
					V5	IET 22767	4.10		V5	IET 22569	3.95		
			V6	IET22768	3.71	V6	IET 22592	4.48					
			Mean	4.46			V7	IET 22598	3.81				
							Mean	3.97					
IM (TP)	V1	IET 22379	4.40	Late	V1	IET 22486	4.22	BT (Basmati)	V1	IET 22777	3.39		
	V2	IET 22381	4.02			V2	IET 22778		3.52	V2	IET 22778	3.52	
	V3	IET 22390	4.24				V3		IET 22787	3.63	V3	IET 22787	3.63
	V4	IET 22520	3.97				Mean		3.51	Mean	3.51		
	Mean	4.16											
ASG	V1	IET 21261	2.90	IHRT MS	V1	IET 22402	4.71	(Aerobic)	V1	IET 22699	4.08		
	V2	IET 21267	2.78		V2	IET 22407	4.58		V2	IET 22704	4.07 *		
	V3	IET 21835	2.93		V3	IET 22410	4.51		V3	IET 22716	3.26		
	V4	IET 21838	2.79		Mean	4.60	V4		IET 22729	3.99			
	V5	IET 21840	2.66				V5		IET 22731	3.11			
	V6	IET 21841	3.02				V6		IET 22737	3.40			
	V7	IET 21842	2.90				Mean		3.65				
Mean	2.85												
AL&STVT	V1	IET 20328	3.83	CSTVT	V1	IET 21943	2.84						
	V2	IET 22017	3.95		V2	IET 21944	2.94						
	Mean	3.89			Mean	2.89							

\* Nitrogen use efficient genotypes based on lower percent yield reduction (< 10%) at 50% of RDN over 100% RDN and higher mean grain yield at 50% of RDN over mean of the culture at 50% RDN.



## 4.2 CULTURAL MANAGEMENT TRIALS

### 4.2.1. Evaluation of intercropping system with different nutrient management practices in rainfed upland rice

Rainfed rice is prone to high yield fluctuations on account of moisture stress arising from insufficient and unequally distributed rainfall. For stabilizing and diversifying the farm production, intercropping of rice with legumes is advocated and practiced by farmers. The moisture stress prevailing of rainfed rice regions also brings in nutrient limitations in the soil for crop uptake. Thus developing nutrient management schedules for cropping system matching to the water supply potential besides improving the water holding capacity of soil through use of organics is an important agronomic management for boosting yields in rainfed rice ecology. With the component crop varying with location, the role of intercrop and nutrient management practices on performance of rice needs to be ascertained. Hence, studies were initiated during *kharif* 2013 to ascertain the influence of intercropping of rice and nutrient management practices for increasing productivity of Rainfed upland rice at five locations *viz.*, **Hazaribagh, Ranchi, Parbhani, Jagdhalpur and Tuljapur**. The treatments were formed by the combination of five nutrient management practices (N<sub>1</sub>: 75% recommended dose of fertilizers (RDF) of rice; N<sub>2</sub>: 100% RDF of rice; N<sub>3</sub>: 75% RDF of rice + 20 kg sulphur/ha; N<sub>4</sub>: 100% RDF of rice + 20 kg sulphur/ha and N<sub>5</sub>: 75% RDF + 5t/ha FYM or 2 t/ha vermicompost in main plot and five intercropping systems ( C1: Sole rice; C2: Rice + soybean 3:2 replacement series; C3: Rice + urdbean 3:2 replacement series; C4: Rice + soybean 4:2 replacement series C5: Rice + urdbean 4:2 replacement series) as sub-plot treatments were tested in split plot design with three replications. The data was presented in **Table 4.2.1** and the salient findings are summarized below.

The data revealed that the nutrient management practices (except at Tuljapur) and intercropping systems have marked influence on performance of base crop of rice, intercrops and the system at all the locations. However, interaction effects were found significant only at Jagadapur.

Among nutrient management treatments, integration of organic manures (5 t/ ha FYM /2 t/ha vermicompost) with 75% RDF gave significantly better yields of rice, intercrop legume and system at Parbhani and Jagadapur. At Hazaribagh application of RDF to rice + 20 kg S/ha resulted in highest inter crop (1.01 t/ha) and system productivity (3.75 t/ha). The system productivity of 100% RDF of rice, 75% RDF of rice + 5 t/ha FYM / 2 t /ha vermicompost was at par with RDF to rice + 20 kg S/ha at Hazaribagh.

Intercropping of rice with legumes (soybean and urdbean in 3:2 / 4:2 replacement series) has resulted in a significant reduction in rice yields as compared to that of its sole cropping at all locations. However, at Tuljapur, urdbean intercropped rice (4:2) has statistically similar rice yields (1.69 t/ha) as that of its sole rice (1.88 t/ha). Among the intercropping systems, soybean intercropping in 3:2 ratio has the lowest rice productivity at all the locations while urdbean intercropped with rice in 4:2 ratio at (Parbhani,

Jagadalpur and Tuljapur) and soybean intercropped rice 4:2 ratio at Ranchi have the highest rice yields.

Intercropping of legumes with rice produced 0.24-2.44 t/ha (soybean) and 0.28-2.61 t/ha (urdbean) additional seed yield. Soybean has significantly higher seed yields than urdbean at Parbhani, Hazaribagh and Ranchi. However, at Jagadalpur; urdbean out yielded soybean while at Tuljapur both legumes have similar productivities. Intercropping in 3:2 ratio resulted in markedly superior yield of legumes (Parbhani, Hazaribagh and Ranchi) while at Jagadalpur 4:2 ratio intercropping gave significantly higher productivity than other ratio intercropping.

Interaction effects at Jagadalpur revealed that best yields of sole rice crop can be obtained with 100%RDF (3.47 t/ha). Best system productivity was seen in 4:2 rice: urdbean intercropping fertilized with 75% RDF of rice + 5 t/ha FYM or 2 t/ha vermicompost (8.06 t/ha). However, in this system (4:2 rice: urdbean) similar productivity can be obtained with application of 100% RDF of rice also (7.96 t/ha).

The study indicates that rainfed upland rice productivity can be enhanced substantially by its intercropping (4:2 ratio) with soybean (Parbhani) and urdbean (Jagadalpur and Hazaribagh and Tuljapur). Application of 75% RDF of rice + 5 t/ha FYM or 2 t/ha vermicompost is desired for higher system productivity (Parbhani and Jagadalpur).

#### **4.2.2. DEVELOPMENT OF SUITABLE AGRO TECHNIQUES FOR AEROBIC RICE**

Aerobic rice is a new and emerging rice cultivation method in which crop is grown like upland rice but with adequate inputs which includes water also. Not much information is available in the country on production technology of this system with different soil and environment situations. Hence, requires in detail investigations on all aspects of its production. Studies are conducted on this aspect since 2011.

##### **4.2.2. 1. Studies on suitable varieties and optimum date of sowing under aerobic rice.**

The rice varieties evolved for upland and transplanted conditions may not be suitable for aerobic conditions. Further, there is need to generate information regarding optimum dates of sowing for such newly evolved/ identified aerobic varieties at different locations. Keeping these points in view, studies were initiated during *kharif* 2011 which were continued during 2013 also to identify promising aerobic rice varieties and their optimum sowing dates at 15 locations *viz.*, **ARI Rajendranagar, Chatha, Dharwad, Gharghraghat, Hazaribagh, Kota, Ludhiana, Nawagam, Parbhani, Pusa, Ranchi, Rewa, Sabour, Mandya and Malan.** The treatments formed by combination of three dates of sowing (main plot) and eight varieties in sub-plot were tested in a three times replicated split plot design. Sowing dates, and number of varieties tested varied with location. The data are presented in Table 4.2.2.1 and the salient findings are summarized below.

The data revealed that varieties and dates of sowing had significant influence on productivity of aerobic rice at all locations with the exception that the influence of dates of sowing at Pusa and Hazaribagh; varieties and dates of sowing at Mandya and Rewa were not significant. Further, interaction effects were found significant at four locations (Rajendranagar, Chataha, Hazaribagh and Ranchi) only.

The study revealed that optimum date of sowing for aerobic rice varied with location. Among the three dates of sowing, June month proved ideal at Rajendranagar (7 June), Chatha, Ludhiana (10 June), Malan, (18 June), Kota (20 June), Nawagam (14-24 June), Sabour (23 June), Parbhani (24 June) and Ghagharghat (26 June), whereas at Ranchi 1 July was found to be the optimum time of sowing.

Among the varieties tested, MTU 1001 and MTU 1010 at Rajendranagar (3.80 and 3.96 t/ha), DRRH 3 and PA 837 at Ghagharghat (4.57 and 4.51 t/ha), PA-837 at Kota (5.89 t/ha), Chatha (6.16 t/ha) and Hazaribagh (5.27 t/ha), Savanah and PA-6129 at Ludhiana (7.56 and 7.07 t/ha), Dandi at Nawagam (4.82 t/ha), Parag, Avish and Prabhava at Parbhani (2.70, 2.59 and 2.54 t/ha), PA 6444 at Pusa, (4.63 t/ha), Arize Tej and DRRH 3 at Ranchi (5.28 and 5.08 t/ha), MY1001, DRRH - 3 and PAC 837 at Sabour (5.20, 5.21 and 5.15 t/ha) and HPR 2143 at Malan (1.31 t/ha) proved significantly more productive and thus promising.

Interaction effects revealed that at Rajendra nagar, MTU 1010 sown on 14 June (4.83 t/ha), DRRH 3 sown on 10 June at Chatha (7.91 t/ha) and PAC 837 sown on 20 June at Hazaribagh and Ranchi (5.93 and 6.50 t/ha) recorded significantly the highest productivity. Further at Hazaribagh, PAC 837 has at par productivity as DRRH 3 (5.11 t/ha).

Study indicates that suitable dates of sowing and variety are changing with location. By manipulating these two factors higher productivity of aerobic rice can be attained.

#### **4.2.2.2. Optimizing seed rate for different varieties in aerobic rice**

Studies were initiated during *kharif* 2013 for identifying location specific varieties and their optimum seed rate for higher productivity of aerobic rice at thirteen locations *viz.*, **Bankura, Gagharghat, Hathwara, Kota, Ludhiana, Sabour, Panthnagar, Parbhani, Vadgaon, Pusa, Ranchi, Varnasi and Hazaribagh**. Treatments comprised of four location specific varieties (six at Hazaribagh) in main plot and four seed rates (15, 25, 35 and 45 kg/ha) in sub-plot were tested in split plot design with three replications. The data revealed that varieties and seed rates have marked influence on yield attributes and yield of aerobic rice at eleven out of thirteen locations. However, interaction effects were found significant at four locations only.

Aerobic rice yield increased significantly as the seed rate increased from 15 kg/ha to 25 kg/ha at Hathwara, Sabour, Parbhani, Pusa and Ranchi. However, at Gagharghat, Kota, Vadgaon and Hazaribagh yield increased significantly when seed rate increased up to 35 kg/ha. At Bankura and Varanasi, seed rates had no marked influence on rice yields.

The yield increases were ascribed to concomitant increases in panicle number and panicle weight.

Among the varieties tested, hybrids out yielded the varieties at all the locations. PAC 837 recorded markedly higher productivity at Hathwara (4.78 t/ha), Kota (5.96 t/ha), Sabour (5.02 t/ha), Pantnagar (4.43 t/ha), Ranchi (4.93 t/ha) and Hazaribag (4.98 t/ha). However, at Ludhiana, PR 115 (7.46 t/ha) at Pusa, Arize 6444 (4.45 t/ha), and at Vadgaon, Varanasi and Parbhani, DRRH 3 (6.46, 4.88 and 4.52 t/ha) proved the best. The higher grain yields of these varieties at respective locations were ascribed to higher number of panicles (Parbhani) and panicle weight (Hathwara, Kota, Varanasi) or both (Ludhiana, Sabour, Vadgaon, Ranchi, Pusa, Hazaribagh).

At Hathwara, the optimum seed rate varied with variety from the lowest of 25 (PAC 837) to 35 (Gotra Bidhan 1) and to the highest of 45 kg/ha with Sahbagidhan. However, with DRRH 3, seed rates failed alter crop yields indicating that lowest seed rate (15 kg/ha) is sufficient for this hybrid. At Ranchi, DRRH 3, PAC 837 and Lalat required 25 kg/ha seed while, Arize Tej required 35 kg/ha of seed to produce significantly superior and best yields. Further, among hybrids Arize Tej and PAC 837 gave significantly higher yield with lower seed rate (15 kg/ha) than DRRH 3. At Hazaribagh, Naveen (HYV) and Rajalakshmi hybrid recorded a significant increases in yield with increase in seed rate up to 25 and 45 kg/ha, respectively.

Thus a seed rate of 25-35 kg/ha is optimum for realizing higher yields of aerobic rice with selection of location specific hybrids.

#### 4.2.2.3. Effect of nitrogen scheduling and dosage on aerobic rice

Nitrogen is the most extensively used nutrient in many crop production activities and often applied at doses higher than the recommended / required levels owing to its cheaper costs in transplanted rice. However, the aerobic rice with altered soil physico-chemical properties, phenology and weed interference may respond differently to nutrients especially nitrogen. Hence, a study was initiated during *kharif*-2012 which was continued for 2013 at 11 locations *viz.*, **Aduthurai, ARI Patna, Gangavathi, Kanpur, Kota, Mandya, Raipur, Ghaghraghat, Panthnagar, Pusa and Arundhatinagar** also with an objective to assess the response of aerobic rice to levels of nitrogen 120 kg/ha (100%) and 150 kg/ha (125% of recommended dose) kg/ha,) as main plot with six schedules of N applications {2 splits ( $\frac{1}{2}$  Basal +  $\frac{1}{2}$  PI stage and  $\frac{1}{2}$  10-12 DAE +  $\frac{1}{2}$  PI stage), 3 splits ( $\frac{1}{3}$  Basal +  $\frac{1}{3}$  AT +  $\frac{1}{3}$  PI stage, and  $\frac{1}{3}$  10-12 DAE +  $\frac{1}{3}$  AT +  $\frac{1}{3}$  PI stage), 4 splits ( $\frac{1}{4}$  Basal +  $\frac{1}{4}$  AT stage +  $\frac{1}{4}$  at PI stage +  $\frac{1}{4}$  at flowering, and  $\frac{1}{4}$  10-12 DAE +  $\frac{1}{4}$  AT stage +  $\frac{1}{4}$  at PI stage +  $\frac{1}{4}$  at flowering,)} as sub-plots. The treatments that were replicated thrice were tested in split plot design at ten locations. The data was presented in **Table 4.2.2.3** and the findings are summarized below.

The data revealed that nitrogen doses at all locations except Patna, Kota, Raipur, Gaghraghat, Arundhatinagar and Pantnagar, it's scheduling at all locations except Gangavathi, Gaghraghat, Arundhatinagar and Pantnagar and their interactions at Aduthurai alone had significant influence on grain yield of aerobic rice.

At Gangavathi, Kanpur, Mandya and Pusa the aerobic rice crop yield responded significantly to 125% RDN (150 kg/ha) application over RDN. However, at Aduthurai and Arundhatinagr RDN was found sufficient for realizing higher yields and increase in its dose to 125% RDN resulted in drastic reduction in yield.

Among N scheduling treatments it was revealed that application of N fertilizer in 3 splits as  $\frac{1}{3}$  10-12 Days After Emergence (DAE)+  $\frac{1}{3}$  AT+  $\frac{1}{3}$  PI stage at Aduthurai, Patna, and Raipur gave significantly higher yield than other N schedules except 4 split N application ( $\frac{1}{4}$  10-12 DAE +  $\frac{1}{4}$  AT stage +  $\frac{1}{4}$  at PI stage +  $\frac{1}{4}$  at flowering). At Kanpur and Mandya, N applied in 3 splits as  $\frac{1}{3}$  Basal+  $\frac{1}{3}$  AT+  $\frac{1}{3}$  PI stage recorded significantly higher yields than its 2 split application ( $\frac{1}{2}$  10-12 DAE+  $\frac{1}{2}$  PI stage). Similarly at Pusa, 3 splits N ( $\frac{1}{3}$  Basal+  $\frac{1}{3}$  AT+  $\frac{1}{3}$  PI stage) recorded significantly higher yield than 2 split application ( $\frac{1}{2}$  basal+  $\frac{1}{2}$  PI stage) and was at par with other three and four split N application schedule except 4 split N application as  $\frac{1}{4}$  10-12 DAE +  $\frac{1}{4}$  AT stage +  $\frac{1}{4}$  at PI stage +  $\frac{1}{4}$  at flowering. At Kota both 4 split N applications recorded significantly higher yields (5.24 and 5.45 t/ha) over to all other N schedules.

Interaction effects at Aduthurai revealed that when RDN is used its application in four splits i.e.  $\frac{1}{4}$  basal +  $\frac{1}{4}$  AT stage +  $\frac{1}{4}$  at PI stage +  $\frac{1}{4}$  at flowering (4.08 t/ha) or  $\frac{1}{4}$  10-12 DAE +  $\frac{1}{4}$  AT stage +  $\frac{1}{4}$  at PI stage +  $\frac{1}{4}$  at flowering (4.29 t/ha) proved the best. When 125% RDN is used its application in 3 splits was promising to its two or 4 split application.

Thus it is concluded that at Gangavathi, Kanpur, Mandya and Pusa, 25% higher N dose than recommended (125% RDN) is desirable while at other locations RDN is sufficient. Scheduling of N in 3-4 splits is promising for aerobic rice and basal dose application at sowing or at 10 days later failed to bring marked improvements in yields.

#### **Rabi Season:**

A study was carried out during *rabi*-2012 to assess the response of aerobic rice to levels of nitrogen (120 i.e. recommended dose of nitrogen, RDN) and 150 kg/ha (125% RDN) in main plot and its scheduling {(2 splits (1/2 Basal +1/2 PI stage and 1/2 10-12 DAE+1/2 PI stage), 3 splits (1/3 Basal+ 1/3 AT+ 1/3 PI stage, and 1/3 10-12 DAE+ 1/3 AT+ 1/3 PI stage), 4 splits ( 1/4 Basal +1/4 AT stage + 1/4 at PI stage + 1/4 at flowering, and 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at flowering )}in sub-plot at **Karaikal** in split plot design with three replications. The data was presented in **Table 4.2.2.3 (R)** and the findings are summarized below.

The data revealed that nitrogen dose, its scheduling and their interactions significantly influenced the grain yield of aerobic rice yield.

Aerobic rice applied with 125% RDN (150 kg/ha) resulted in significantly higher grain yield (4.27 t/ha) than RDN (2.55 t/ha). Significant improvements in panicle number and their weights with 125% RDN have resulted in higher grain yield of aerobic rice over.

Nitrogen scheduling revealed that application on N fertilizer in 3 splits as 1/3 10-12 DAE+ 1/3 AT+ 1/3 PI stage gave significantly higher yield (4.27 t/ha) than other

schedules. The higher grain yield of above N schedules was associated with significant improvements in panicle number and their weights.

Interaction effects revealed that application of 125% RDN in 3 splits as 1/3 10-12 DAE+ 1/3 AT+ 1/3 PIs (3.50 t/ha) found best for yield.

Thus the study indicated that application of 125% recommended dose of nitrogen (150 kg/ha) and if N application in 3 splits as 1/3 10-12 DAE+ 1/3 AT+ 1/3 PI is promising for aerobic rice at Karaikal in sandy clay loam soils having medium soil available N (20 kg/ha)

#### 4.2.2.4. Integrated weed management in aerobic rice

Weeds are one of the major constraints to aerobic rice cultivation as dry tillage and alternate wetting and drying operations favour more weed growth leading to 50-91% yield losses. Therefore, developing effective weed management practices becomes imperative. Keeping this in view, trials were initiated during *khairf* 2009 which were continued during 2013 also at 17 locations *viz.*, **Bankuar, Chakdaha, Coimbatore, Dhrawad, Faizabad, Gangavathi, Hathwara, Jagdalpur, Kota, Patna, Parbhani, Pusa, Rewa, sabour, Vadgoan, Varanasi, and Adhuthurai** with 12 treatments.

**The details of treatments included in the trial are:**

1. Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)
2. Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20–25 DAS)
3. Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha
4. Pendimethelin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)
5. Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)
6. Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20–25 DAS)
7. Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha
8. Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage
9. Mechanical weeding/weeders at 20&45 DAS
10. Need based hand weeding
11. Unweeded control
12. \* Optional treatment of early pre-emergence followed by post-emergence herbicide application in locations where late flush of weeds is a problem

The treatments were compared in RBD with three replications. The data are presented in **Table 4.2.2.4** and the findings are summarized below.

The data revealed that the different weed management treatments have significant influence on yield attributes and yield of aerobic rice.

The yield data indicated the extent of yield reduction in aerobic rice crop due to weeds (Unweeded control) varied across locations from a lowest of 33.85% at Sabour to the highest of 83.2% at Faizabad as compared to need based hand weedings. Unweeded aerobic rice crop recorded the lowest yields while the need based hand weeding (NBHW) at Aduthurai, Bankura, Chakda, Coimbatore, Hathwara, Faizabad, Dharwad, Kota, Patna, Pusa, Sabour, Vadgaon and Varanasi; mechanical weeding at Parbhani, and herbicides use at Gangavathi, Rewa, and Jagadapur recorded the highest yields. Among the herbicide interventions aimed at excluding the drudgery of hand weeding, application of pendimethalin or butachlor at 3-4 DAS + bispyribac sodium at 15-20 DAS proved as effective as NBHW at Bankura, Chakda, Coimbatore, Dharwad, Gangavathi, Hathwara, Patna, Pusa, Sabour, and Varanasi. However, at Faizabad application of Pendimethalin + 2,4, D and at Vadgaon Pendimethalin + Chorimuron + metsulfuronmethyl proved as effective as NBHW. At Rewa, Pendimethalin + Straw mulch @ 4 t/ha (6.42 t/ha) proved promising over all other treatments including NBHW. At Kota, pendimethalin + bispyribac sodium (4.73 t/ha) and at Aduthurai, pendimethalin / Butachlor + Bispyribac sodium (3.06 / 3.14 t/ha) proved next best treatments to NBHW. At Parbhani, all herbicides treatments along with NBHW proved equally productive with the exception that butachlor + chorimuron + metsulfuronmethyl which recorded significantly lower yields (1.18 t/ha). Similarly at Jagadapur, all herbicides treatments equally productive with the exception that butachlor + straw mulch @ 4 t/ha recorded significantly lower yields (1.58 t/ha) than all other weed control treatments. Higher number of panicles coupled with their heavier weights produced with efficient weed control helped in realizing higher grain yields in best weed control treatment at respective locations.

Weed population and dry weights after herbicide application were the highest in unweeded crop and least in need based hand weedings treatments that were reflected in lowest and highest crop yields, respectively. Among the herbicide interventions for weed control, butachlor / pendimethalin + bispyribac-sodium were effective in reducing weed numbers and thus their dry weight. None of the herbicide treatments exhibited crop phytotoxicity at Aduthurai, Dharwad and Vadgaon. Higher weed control ratings supported the higher yields of treatments.

It is evident from the data that herbicides were promising alternatives to manual weeding. Integration of herbicide (pendimethalin @ 1 kg a.i./ha or Butachlor @ 1.5 kg a.i./ha at 3-4 DAS) with bispyribac sodium 35 g at 15 & 30 DAS or chlorimuron + metsulfuronmethyl 40 g a.i./ha at 25-30 DAS, and also mechanical weeding with weeders at 20 and 45 DAS was found effective in reducing weed menace and thus helped in realizing higher grain yields that were comparable to or nearer to need based hand weeding.

### ***Rabi Season:***

Integrated weed management in aerobic rice situation was conducted during rabi 2012 at **Puducheery** and **Pattambi**. Twelve integrated weed management practices (Pendimethalin (30EC) @ 1.0 kg a.i./ha (3-4) DAS + Bispyribac sodium (10%SC) @ 35 g a.i /ha (15-20DAS), Pendimethalin + 2,4 D, Na-salt (80WP) @ 0.06 kg a.i /ha (20-25 DAS), Pendimethalin + Ethoxysulfuron (15WSG) @ 15 g a.i/ha (25-30 DAS),

Pendimethalin + (Chlorimuron + Metsulfuronmethyl) (20 WP) @ 40 g. a.i/ha (25-30DAS), Butachlor (50 EC) @ 1.5 kg a.i /ha (3-4 DAS) + Bispyribac sodium, Butachlor + 2,4-D, Na-salt, Butachlor + Ethoxysulfuron, Butachlor + (Chlorimuron + Metsulfuronmethyl) , Mechanical weeding at 20 and 45 DAS, Need based hand weeding and Unweeded control) were compared in RBD with three replications. The data are presented in **Table 4.2.2.4 (R)** and the findings are summarized below.

The data revealed that aerobic rice crop encountered 35.3 (Puducheery)- 80.3% (Pattambi) yield reduction due to uncontrolled weeds as compared to need based hand weeding. Un weeded aerobic rice crop recorded the lowest yield while, Pendimethalin + Chlorimuron + Metsulfuronmethyl at Puducheery (6.26 t/ha) recorded significantly higher yields than need based hand weeding. However, these yields were at par with Pendimethalin / butachlor + Bispyribac sodium and Butachlor + Chlorimuron + Metsulfuronmethyl application. At Pattambi, need based hand weeding proved the best treatment. Butachlor + Chlorimuron + Metsulfuronmethyl application at Pattambi (2.17 t/ha) gave at par yields as need based hand weeding. Higher number of panicles coupled with their heavier weights resulted in realizing higher grain yields in best weed control treatment.

Weed dry weights recorded were highest in unweeded crop and least in Pendimethalin + Chlorimuron + Metsulfuronmethyl. Higher weed control ratings supported the higher yields of treatment. No crop toxicity of herbicides was recorded in the study during this season

The study identified Integration of pendimethalin @ 1 kg a.i./ha or Butachlor @ 1.5 kg a.i/ha at 3-4 DAS) with Chlorimuron + Metsulfuronmethyl 40 g a.i./ha at 25-30 DAS was found effective in reducing weed menace and thus help in realizing higher grain yields that were comparable to or nearer to need based hand weeding.

### **4.2.3. AGRONOMIC STUDIES ON SYSTEM OF RICE INTENSIFICATION (SRI)**

#### **4.2.3.1(a) Long term effects of nutrition on SRI vis a vis conventional flooded rice on soil fertility and sustainability in rice based cropping systems**

In System of Rice Intensification (SRI), use of organics is an important component. However, their availability and costs may inhibit farmers from this practice. Hence, impacts of use of other alternatives in SRI needs to be assessed on long term basis. In order to standardize the optimum and alternate nutrition schedules for SRI in rice based cropping system, a study was initiated during *kharif* 2012 and it was continued during 2013 also at 15 locations ( **Adhaturai, Chatha, Coimbatore, Giridhi, Khudwani, Mandya, Navsari, Nawagam, Patna, Raipur, Ranchi, Varanasi, Wangbal, Arundhatinagar and DRR** ) . The treatments formed by combination of three *methods of crop establishment* { (SRI, direct seeding using drum seeder/ dibbling of sprouted seed at 25 x 25 cm followed by SRI principles (saturation method of water management, weeding with cono-weeder and fertilizer management) and normal transplanting (30-35 days old 3-4 seedlings/hill planted at 20 cm x 15 cm spacing with flooding (2-5 cm)



water management) in main plot and seven nutrient management practices (100% of recommended dose of inorganic fertilizers i.e. RDF (120:60 :40 kg N:P:K/ha), 50 % inorganic + 50% (equivalent of N dose) organic, RDF through organic source (equivalent of N dose), 150% RDF, without fertilizer (Control), 50% inorganic + 50% through bio fertilizers and location specific fertilizer management in sub-plots. The study was made in split plot design with the treatments replicated thrice. The data is presented in Table 4.2.3 and salient findings are summarized below.

The data revealed that methods of establishment at all locations (except Ranchi); nutrient management practices at all locations (except at Giridhi) and their interactions at Aduthurai, Chatha, Mandya, Patna, Raipur, Ranchi, Varanasi and Wangabal have significant influence on grain yield of rice.

SRI method of crop establishment has resulted in significantly higher rice grain yield over other two methods i.e. direct seeded rice with SRI principles (DSRI) and transplanted rice (TPR) at all the locations. DSRI was found to have significantly higher rice productivity over TPR at 7 locations (Aduthurai, Chatha, Coimbatore, Navsari, Patna, Raipur and Wangabal) while at Navasari and Ghiridi, TPR recorded significantly higher productivity than DSRI. Further DSRI has recorded statistically similar productivity with that of SMSRI at Mandya and Nawgam and with that of TPR at Khudwani. At Ranchi, methods of establishment failed to exert any significant influence on rice productivity.

Among methods of nutrition management, application of 150% RDF gave significantly higher productivity at Adhuthurai (8.88 t/ha), Chatha (3.39 t/ha), Mandya (7.86 t/ha), Nawagam (5.88 t/ha), Patna (4.64 t/ha), and Raipur (5.42 t/ha) than all other treatments. Whereas at Ranchi (5.67 t/ha), Khudwani (7.03 t/ha) and Navsari (3.92 t/ha) application of RDF (120-60-40 kg N-P-K /ha) and at Varanasi RDF as 50% fertilizers and 50% biofertilizers (7.85 t/ha) and at Arundhatinagar (8.97 t/ha) application of RDF as 50% fertilizer + 50% (equalent of N dose as organic) gave significantly better yields. At Wangbal, RDF as 50% fertilizers + 50% organic (1.45 t/ha) proved significantly superior to all other treatments. While on par with 50% organic and 50% inorganic treatment at Arundhatinagar.

Interaction effects revealed that rice crop established through SRI receiving 150% RDF gave higher yields at Adhuthurai (10.26 t/ha), Chatha (3.78 t/ha), Mandya (8.79 t/ha), Raipur (6.15 t/ha), Ranchi (6.53 t/ha). At Patna and Wangabal, SRI rice receiving RDF as 50% fertilizers + 50% manures (5.64 and 1.49 t/ha) proved best combination for realizing significantly higher productivity. At Mandya rice crop established by SRI and DSRI with 150% RDF had statistically at par productivity.

From the study it was evident that SRI method of crop establishment is promising to DSRI followed by TPR. Mean percent grain yield increase with SRI was to the tune of 16 over DSR and TPR ( SRI - 5.26 t/ha, DSR- 4.59 t/ha and TPR 4.40 t/ha). Application of 150% RDF or integrated nutrition involving RDF (50% fertilizers + 50% biofertilizers/ organic manures) is promising for higher rice productivity.

**Rabi Season:**

A study was made during rabi 2012 at 5 locations (**Aduthurai, DRR, Ranchi, Arundhatinagar, Navasari, and Coimbatore**) to assess the impact of treatments formed by combination of three methods of crop establishment {(SRI, Direct seeding using drum seeder/ dibbling of sprouted seed at 25 cm x 25 cm fb SRI principles (saturation method of water management, weeding with cono-weeder and fertilizer management) and normal transplanting (30-35 days old 3-4 seedlings/hill planted at 20 cm x 15 cm spacing with flooding (2-5 cm) water management) in main plot and seven nutrient management practices (100% of recommended dose of inorganic fertilizers i.e. RDF (120:60:40 kg N:P:K/ha), 50% RDF as inorganic + 50% (equivalent of N dose) as organic, RDF through organics (equivalent of N dose), 150% RDF, No fertilizer (Control), 50% RDF as inorganic + 50% through bio fertilizers and location specific fertilizer management in sub-plot. The study was made in split plot design with the treatments replicated thrice. The data is presented in **Table 4.2.3.1(a)(R)** and salient findings are summarized below.

The data revealed that methods of establishment at Aduthurai and DRR, nutrient management practices at Aduthurai, DRR and Ranchi, all locations and their interactions at Aduthurai alone had significant influence on performance of rice.

Rice crop under SRI methods of establishment recorded significantly higher grain yield over DSRI and transplanted rice (TPR) at Aduthurai and over DSRI at DRR. Further, DSRI was also found to be superior in rice productivity over TPR at Aduthurai. Higher yields are associated with higher number of panicles with heavier panicles.

Among the nutrient management practices, application of 150% RDF gave significantly higher productivity at Aduthurai (8.48 t/ha). However, at DRR, application of RDF (6.34 t/ha) recorded significantly superior yields over rest of the nutrition treatments. Similarly at Ranchi, substitution 50% RDF through biofertilizers (2.18 t/ha) resulted in drastic reduction in yield while all other treatments remained at par.

Interaction effects revealed that rice crop established through SRI receiving 150% RDF at Arundhatinagar (9.77 t/ha) proved best combination for realizing significantly higher productivity.

Study indicated that scope lies for deviating from use exclusive organics in SRI by substituting 50% of organics with fertilizers for better yields in SRI cultivation.

**4.2.3.1(b)(R) Evaluation of principles of SRI, their contribution towards enhancement of grain yield.**

A study was made during *rabi* 2012 to assess the contributions of each component of SRI towards the productivity of rice at **Arundhatinagar, Puducherry and Pattambi**. Eight treatments {(T1: use of 8-12 day old seedlings, raised bed nursery, careful transplanting at a spacing of 25 cm x 25 cm, weed management with cono weeder (4

times), saturation of water management, and use of (75%) inorganic along with (25%) organic, T2: T1 with 3 to 4 seedlings / hill (instead of 1 seedling), T3: T1 with 30 to 35 day old seedlings (instead of 8-12 day old seedlings), T4: T1 with 20 x 10 cm spacing (instead of 25 x 25 cm spacing), T5: T1 with only inorganic fertilizers (instead of organic + inorganic), T6: T1 with herbicide + manual weeding (instead of cono-weeding), T7: T1 with 2-5 cm standing water during crop growth (instead of saturation water management), and T8: Conventional transplanting (with location specific-best management practices i.e. use of 30 day seedlings at 20 cm x 15 cm with 3-4 seedlings/hill with 2-5 cm standing water} were tested in three times replication RBD. The data presented in **Table 4.2.3.1 (R)** and salient findings are summarized below.

The data revealed that full package of SRI at Arundhatinagar (9.00 t/ha) excluding seedlings/hill at Puducherry (8.08 t/ha) and full package of SRI except spacing (5.33 t/ha) gave the highest yield at Pattambi while, conventional planting at Arundhatinagar (5.80 t/ha), Puducheery (6.21 t/ha) and SRI with aged seedlings (3.75 t/ha) gave the least yields. However, SRI excluding seedlings/hill was at par with full SRI, SRI method with in-organics and SRI with herbicides at Puducherry whereas at Pattambi, full package of SRI except spacing recorded at par yields as SRI + herbicide use treatments.

Study indicated that row spacing is not a crucial components SRI for achieving higher productivity of rice at Pattambi while age of seedlings is most important at Puducherry and Pattambi locations. However, any deviation of SRI practices drastically reduced the grain yield at Arundhatinagar. The results are similar to earlier findings.

#### **4.2.4. Selective mechanization for enhancing production and profitability in rice.**

Labour scarcity and its increase of costs are impeding rice cultivation profitably; hence farm mechanization is increasingly advocated. Farm mechanization in rice aims not only at reducing labour inputs, human drudgery but also for improving farm productivity. The government is promoting farm mechanization on a large scale through subsidies for purchase of machinery and developing custom hire services to farmers in case of high cost machines like transplanters. With this background, a trail was initiated during 2010 with the aim of reducing human drudgery involved in manual transplanting and to enhance production and profitability of rice planted through machines. This study continued during *kharif* 2013 at ten locations (**Adhaturai, ARI- Rajendranagar, Coimbatore, Gangavathi, Giridhi, Jagdalpur, Mandya, Moncompu, Puducherry and Pattambi**) . Four treatments (SMSRI: 15 day old seedling mat nursery, use of transplanter for planting and followed by SRI principles of crop management; Drum seeding Dibbing at 25 x 25 cm followed by SRI principles (DSRI), Normal transplanting, flood irrigation with best management practices (TP-BMP) and Normal transplanting with location specific Farmers practice (TP-FP) of the location were tested in RBD with four replications. At Jagadlpur, an additional treatment (placement of FYM in grooves) was tested in addition to the above four treatments. The data is presented in **Table 4.2.4** and salient findings are summarized below.

The results revealed that selective mechanization treatments had marked influence on the performance of rice crop at all the locations except at Gangavathi, Giridih and Pattambi.

At Rajendranagar (7.25 t/ha), Coimbatore (7.99 t/ha), Mandya (8.32 t/ha), Puducherry (5.63 t/ha) and Jagadapur (5.03 t/ha), SMSRI system proved significantly superior in productivity over other treatments. However, the productivity of rice under DSRI at Rajendranagar (7.24 t/ha) and Coimbatore (7.57 t/ha); TP-BMP at Mandya (8.32 t/ha) and Puducherry (5.38 t/ha) and grooves placing of FYM (5.38 t/ha) at Jagadapur have statistically similar yields to that of SMSRI. At Aduthurai, and Moncompu, TP-BMP (8.34 and 10.02 t/ha) gave significantly higher yield than all other methods of crop establishment (with the exception that at Moncompu, DSRI has at par yield). The cost of cultivation was least in DSRI across the locations and was the highest in TP-BMP at Aduthurai, ARI Rajendranagar, Mandya and Moncompu and in TP-FP at Coimbatore, Gangavathi and Puducherry.

Thus in view of reduced costs of production and higher yields, SMSRI method followed by DSRI appears remunerative to TP-BMP and TP-FP.

***Rabi Season:***

This study continued during rabi 2012 at **Moncompu** and **Puducherry**. Four treatments (SMSRI: 15 day old seedling mat nursery, use of transplanter for planting and followed by SRI principles of crop management; Drum seeding Dibbing at 25 x 25 cm followed by SRI principles (DSRI), Normal transplanting, flood irrigation with best management practices (BMP) and Farmers practice (FP) of the location were tested in RBD with three replications. The data was presented in **Table 4.2.4 (R)** and salient findings are summarized below.

The results revealed that establishment methods had significant influence on rice performance at Puducherry only where the normal transplanting with BMP has out yielded (4.65 t/ha) all other treatments with farmers practice giving the lowest yields (2.93 t/ha). At Moncompu all the treatments recorded at par yields. The cost of cultivation was least in DSRI at Puducherry and with SMSRI at Moncompu.

Thus in view of higher yields, manual transplanting with BMP was promising at Puducherry while SMSRI at Moncompu based on the cost of cultivation.

Table-4.2.1: Summary of data on grain yield and ancillary characters of rice from evaluation of intercropping system and nutrient management practices in rainfed upland rice, Kharif – 2013.

Treatments	PARBHANI				HAZARIBAGH					
	Grain Yield (t/ha)	Inter crop yield (t/ha)	REY (t/ha)	Panicle/m <sup>2</sup> (No.)	Grain Yield (t/ha)	Inter crop yield (t/ha)	REY (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	
N1	C1	3.22	-	3.22	183	2.29	-	2.29	255	1.81
	C2	2.72	1.05	4.73	174	1.36	0.53	2.37	175	1.69
	C3	2.81	0.51	4.50	166	1.29	0.49	2.91	168	1.66
	C4	2.56	0.96	4.39	174	1.52	0.89	3.21	194	1.75
	C5	2.69	0.41	4.02	160	1.46	0.60	3.42	199	1.70
N2	C1	3.44	-	3.44	190	2.54	-	2.54	282	1.83
	C2	2.87	1.14	5.05	178	1.57	0.87	3.23	177	1.67
	C3	2.96	0.58	4.85	170	1.48	0.59	3.41	176	1.66
	C4	2.93	1.07	4.97	176	1.78	1.12	3.92	197	1.82
	C5	3.09	0.47	4.65	164	1.69	0.85	4.47	193	1.74
N3	C1	3.32	-	3.32	187	2.33	-	2.33	252	1.86
	C2	2.77	1.15	4.98	181	1.40	0.95	3.20	165	1.65
	C3	2.90	0.56	4.75	172	1.36	0.68	3.58	164	1.62
	C4	2.65	1.05	4.64	179	1.60	1.19	3.86	198	1.79
	C5	2.74	0.46	4.26	169	1.41	0.70	3.70	204	1.61
N4	C1	3.53	-	3.53	200	2.49	-	2.49	286	1.89
	C2	2.92	1.28	5.37	185	1.52	1.12	3.66	179	1.79
	C3	3.06	0.60	5.04	179	1.47	0.77	4.02	173	1.82
	C4	3.04	1.18	5.30	182	1.66	1.23	4.01	197	1.83
	C5	3.35	0.47	4.89	174	1.61	0.91	4.59	205	1.81
N5	C1	3.77	-	3.77	214	2.57	-	2.57	300	1.92
	C2	3.13	1.39	5.77	192	1.55	1.00	3.46	197	1.84
	C3	3.24	0.73	5.64	189	1.43	0.68	3.67	194	1.86
	C4	3.19	1.34	5.75	190	1.69	1.10	3.80	211	1.86
	C5	3.47	0.65	5.61	188	1.65	0.82	4.33	208	1.88
<b>Mean of Nutrient Management (N)</b>										
N1	75% RDF of Rice	2.80	0.73	4.17	172	1.58	0.63	2.84	198	1.72
N2	100% RDF of Rice	3.06	0.82	4.59	176	1.81	0.86	3.51	205	1.74
N3	75% RDF of Rice + 20 kg Sulphur/ha	2.88	0.81	4.39	177	1.62	0.88	3.34	197	1.71
N4	100% RDF of Rice + 20 kg Sulphur/ha	3.18	0.88	4.83	184	1.75	1.01	3.75	208	1.83
N5	75% RDF + 5t/ha FYM or 2 t/ha vermicompost	3.36	1.03	5.31	195	1.78	0.90	3.57	222	1.87
	C.D. (0.05)	0.20	0.06	0.27	9.51	0.10	0.11	0.26	11.39	0.03
	C.V. (%)	7.76	7.88	6.97	6.25	6.83	13.31	8.96	6.56	2.15
<b>Mean of Crop system (C)</b>										
C1	Rice ( 20cm / 30 cm row spacing)	3.46	-	3.46	195	2.44	-	2.44	275	1.86
C2	Rice + Soyabean (3:2 in replacement series)	2.88	1.20	5.18	182	1.48	0.89	3.19	179	1.73
C3	Rice + Black gram/ Cluster bean (3:2 in replacement series)	3.00	0.60	4.95	175	1.41	0.64	3.52	175	1.72
C4	Rice + Soyabean (4:2 in replacement series)	2.87	1.12	5.01	180	1.65	1.11	3.76	199	1.81
C5	Rice + Blackgram (4:2 in replacement series)	3.07	0.49	4.69	171	1.56	0.77	4.10	202	1.75
	CD (0.05)	0.13	0.08	0.20	11.69	0.08	0.07	0.18	11.70	0.05
	C.V. (%)	5.65	12.17	5.83	8.77	6.67	10.31	7.28	7.70	3.73
<b>Interaction</b>										
	N and C	NS	NS	NS	NS	NS	NS	NS	NS	NS
	C and N	NS	NS	NS	NS	NS	NS	NS	NS	NS
	<b>Experimental Mean</b>	<b>3.06</b>	<b>0.85</b>	<b>4.66</b>	<b>181</b>	<b>1.71</b>	<b>0.85</b>	<b>3.40</b>	<b>206</b>	<b>1.77</b>
	Soil type	Clay				Sandy Loam				
	pH	7.50				5.20				
	Variety	Parag				Rice : Vandana, Soybean: Birsa Soybean 1, Black gram : Birsa Urud 1				

MSP (Rs/tones): Rice:1310, Soyabean:2500, Black gram:4300

Table 4.2.1.. Contd. ....

	Treatments	JAGDALPUR			TULJPUR					RANCHI				
		Grain Yield (t/ha)	Inter crop yield (t/ha)	REY (t/ha)	Grain Yield (t/ha)	Inter crop yield (t/ha)	REY (t/ha)	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Inter crop yield (t/ha)	REY (t/ha)	Panicle/ m <sup>2</sup> (No.)	Panicle Weight (g)
N1	C1	2.58	-	2.58	1.35	-	1.35	84	1.85	2.50	-	2.50	269	2.50
	C2	2.01	2.04	5.92	1.05	0.22	1.47	81	1.96	1.67	0.57	2.75	207	2.13
	C3	2.28	2.13	6.35	1.28	0.17	1.84	93	1.60	1.50	0.30	2.48	242	2.33
	C4	2.19	1.84	5.70	1.64	0.20	2.03	91	1.73	1.63	0.40	2.40	230	1.83
	C5	2.34	2.10	6.36	1.56	0.25	2.39	86	1.82	1.77	0.20	2.42	274	1.83
N2	C1	3.47	-	3.47	2.01	-	2.01	140	2.25	2.63	-	2.63	267	2.50
	C2	2.04	1.99	5.83	1.26	0.23	1.70	97	1.83	1.10	0.67	2.37	245	2.03
	C3	2.13	2.25	6.43	1.44	0.25	2.27	87	1.58	1.23	0.30	2.22	300	2.17
	C4	2.61	2.43	7.24	1.43	0.19	1.79	73	1.76	1.40	0.50	2.35	293	1.93
	C5	2.84	2.67	7.93	1.71	0.30	2.71	74	1.64	1.47	0.25	2.29	293	2.20
N3	C1	3.23	-	3.23	2.03	-	2.03	110	1.69	3.07	-	3.07	238	2.27
	C2	1.42	2.13	5.49	1.56	0.22	1.97	84	2.10	1.40	0.57	2.48	270	2.10
	C3	1.54	2.25	5.84	1.52	0.25	2.35	97	1.88	1.37	0.30	2.35	239	2.40
	C4	1.63	2.31	6.04	1.67	0.32	2.29	87	1.66	1.40	0.40	2.16	259	2.57
	C5	2.25	2.58	7.17	2.11	0.29	3.07	78	1.50	1.43	0.20	2.09	288	2.37
N4	C1	3.35	-	3.35	2.13	-	2.13	121	2.11	2.23	-	2.23	238	1.97
	C2	1.48	2.43	6.12	1.33	0.21	1.74	112	2.20	1.30	0.67	2.57	313	1.63
	C3	1.60	2.43	6.24	1.41	0.34	2.52	76	2.10	1.83	0.30	2.82	242	1.87
	C4	1.66	2.90	7.20	1.42	0.24	1.88	82	1.68	1.67	0.50	2.62	247	2.03
	C5	2.01	2.79	7.33	1.50	0.26	2.36	102	1.71	1.43	0.23	2.20	215	1.90
N5	C1	3.23	-	3.23	1.89	-	1.89	180	1.77	2.93	-	2.93	280	2.17
	C2	2.19	2.43	6.83	1.34	0.31	1.93	74	1.79	1.47	0.40	2.23	237	1.87
	C3	2.28	2.46	6.97	1.65	0.39	2.93	91	1.73	1.50	0.20	2.16	237	1.80
	C4	2.34	2.70	7.49	1.55	0.29	2.10	87	1.74	1.80	0.57	2.88	210	2.03
	C5	2.46	2.93	8.06	1.55	0.32	2.58	91	1.41	1.53	0.30	2.52	212	2.03
	<b>Mean of Nutrient Management (N)</b>													
N1	75% RDF of Rice	2.28	2.03	5.38	1.38	0.21	1.81	87	1.79	1.81	0.37	2.51	244	2.13
N2	100% RDF of Rice	2.62	2.33	6.18	1.57	0.24	2.10	94	1.81	1.57	0.43	2.37	280	2.17
N3	75% RDF of Rice + 20 kg Sulphur/ha	2.01	2.32	5.55	1.78	0.27	2.32	91	1.77	1.73	0.37	2.43	259	2.34
N4	100% RDF of Rice + 20 kg Sulphur/ha	2.02	2.64	6.05	1.56	0.26	2.20	99	1.96	1.69	0.43	2.49	251	1.88
N5	75% RDF + 5t/ha FYM or 2 t/ha vermicompost	2.50	2.63	6.52	1.60	0.33	2.58	105	1.69	1.85	0.37	2.54	235	1.98
	C.D. (0.05)	0.14	0.14	0.23	NS	0.06	NS	10	NS	NS	NS	NS	NS	NS
	C.V. (%)	7.21	6.23	4.68	32.60	24.77	28.08	12	13.37	17.51	21.57	15.38	13.92	20.02
	<b>Mean of Crop system (C)</b>													
C1	Rice ( 20cm/ 30 cm row spacing)	3.17	-	3.17	1.88	-	1.88	127	1.93	2.67	-	2.67	258	2.28
C2	Rice + Soyabean (3:2 in replacement series)	1.83	2.20	6.04	1.31	0.24	1.76	90	1.98	1.39	0.57	2.48	254	1.95
C3	Rice + Black gram/ Cluster bean (3:2 in replacement series)	1.97	2.31	6.37	1.46	0.28	2.38	89	1.78	1.49	0.28	2.41	252	2.11
C4	Rice + Soyabean (4:2 in replacement series)	2.09	2.44	6.73	1.54	0.25	2.02	84	1.71	1.58	0.47	2.48	248	2.08
C5	Rice + Blackgram (4:2 in replacement series)	2.38	2.61	7.37	1.69	0.28	2.62	86	1.62	1.53	0.24	2.30	256	2.07
	CD (0.05)	0.16	0.11	0.24	0.32	NS	0.33	10.16	0.20	0.18	0.10	NS	NS	NS
	C.V. (%)	9.66	6.19	5.46	27.64	21.28	21.17	14.47	15.33	14.31	33.18	14.74	11.28	15.63
	<b>Interaction</b>													
	N and C	0.36	0.25	0.53	NS	NS	NS	22.72	NS	NS	NS	NS	47.25	NS
	C and N	0.34	0.24	0.51	NS	NS	NS	21.66	NS	NS	NS	NS	47.9	NS
	<b>Experimental Mean</b>	<b>2.29</b>	<b>2.39</b>	<b>5.94</b>	<b>1.58</b>	<b>0.26</b>	<b>2.13</b>	<b>95.15</b>	<b>1.80</b>	<b>1.73</b>	<b>0.39</b>	<b>2.47</b>	<b>254</b>	<b>2.10</b>
	Soil type	-	-	-	Clay	-	-	-	-	Sandy loam	-	-	-	-
	pH	-	-	-	7.60	-	-	-	-	5.20	-	-	-	-
	Variety	Rice: Vandana, Soybean : RSC-10-02 & RSC -10-05			TJP-48					Rice: BVD 102, Blackgram: Pant U19, Soyabean : Birsaa Soybean 1				

**Trial-4.2.2.1: Summary of data on grain yield and ancillary characters of rice from studies on suitable varieties and optimum date of sowing under aerobic rice, Kharif - 2013**

Date of sowing	Varieties	ARI-RJNR			CHATHA			DHARWAD			GHAGHARGHAT		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
D1	V1	4.25	450	2.73	5.29	223	2.45	-	-	-	2.56	218	2.14
	V2	3.17	453	2.05	4.72	215	2.40	-	-	-	2.73	229	2.19
	V3	4.03	495	3.59	7.59	250	3.19	-	-	-	4.26	512	2.28
	V4	3.81	525	3.14	7.91	255	3.20	-	-	-	3.16	393	2.20
	V5	4.83	465	2.55	4.71	216	2.35	-	-	-	4.58	268	2.25
	V6	4.22	445	2.31	-	-	-	-	-	-	4.39	281	2.27
	V7	-	-	-	-	-	-	-	-	-	-	-	-
	V8	-	-	-	-	-	-	-	-	-	-	-	-
D2	V1	3.85	396	2.46	4.79	215	2.37	-	-	-	2.79	227	2.03
	V2	3.02	407	2.00	4.59	207	2.30	-	-	-	2.98	242	2.07
	V3	3.77	427	3.16	7.15	242	3.10	-	-	-	4.47	263	2.24
	V4	3.96	430	2.93	7.29	243	3.15	-	-	-	3.76	262	2.15
	V5	3.99	421	2.53	4.18	201	2.20	-	-	-	4.72	278	2.27
	V6	3.38	407	1.95	-	-	-	-	-	-	4.90	271	2.23
	V7	-	-	-	-	-	-	-	-	-	-	-	-
	V8	-	-	-	-	-	-	-	-	-	-	-	-
D3	V1	3.30	298	2.27	2.33	111	2.10	4.19	341	2.14	2.50	218	2.12
	V2	2.60	217	1.98	2.16	110	2.09	5.72	396	2.28	2.85	235	2.14
	V3	3.28	239	3.10	3.16	129	2.59	4.68	325	3.17	3.44	272	2.21
	V4	3.29	307	2.92	3.27	133	2.65	6.07	330	3.04	2.94	254	2.13
	V5	3.06	317	2.17	2.05	100	2.05	5.07	340	2.65	4.41	270	2.23
	V6	2.82	283	2.05	-	-	-	3.16	238	3.19	4.23	266	2.17
	V7	-	-	-	-	-	-	-	-	-	-	-	-
	V8	-	-	-	-	-	-	-	-	-	-	-	-
C.D.(0.05)													
D at same V		0.31	NS	0.17	0.15	2.68	NS	-	-	-	NS	NS	NS
V at same D		0.29	NS	0.16	0.13	2.54	0.01	-	-	-	NS	NS	NS
Date of sowing													
D1		4.05	472	2.73	6.04	232	2.72	-	-	-	3.61	317	2.22
D2		3.66	415	2.51	5.60	222	2.62	-	-	-	3.94	257	2.16
D3		3.06	277	2.41	2.59	117	2.30	4.82	328	2.74	3.40	253	2.17
C.D. (0.05)		0.12	9.96	0.04	0.06	1.38	0.01	-	-	-	0.17	NS	NS
C.V. (%)		5.84	4.34	2.6	1.79	1.12	0.17	-	-	-	7.92	33.17	2.47
Varieties	V1	3.80	381	2.49	4.14	183	2.31	4.19	341	2.14	2.61	221	2.10
	V2	2.93	359	2.01	3.82	177	2.26	5.72	396	2.28	2.85	235	2.13
	V3	3.69	387	3.28	5.97	207	2.96	4.68	325	3.17	4.06	349	2.24
	V4	3.69	421	3.00	6.16	210	3.00	6.07	330	3.04	3.29	303	2.16
	V5	3.96	401	2.42	3.65	172	2.20	5.07	340	2.65	4.57	272	2.25
	V6	3.47	378	2.10	-	-	-	3.16	238	3.19	4.51	273	2.22
	V7	-	-	-	-	-	-	-	-	-	-	-	-
	V8	-	-	-	-	-	-	-	-	-	-	-	-
C.D. (0.05)		0.18	28.54	0.1	0.08	1.55	0.01	0.61	27.51	0.26	0.4	NS	0.10
C.V. (%)		5.17	7.64	4.09	1.82	0.84	0.32	6.93	4.61	5.14	11.49	41.48	4.91
Expt. Mean		3.59	388	2.55	4.75	190	2.55	4.82	328	2.74	3.65	276	2.18
Soil type		-			-			Silty Clay loam			Sandy loam		
pH		8.45			-			6.4			8.06		
EC		0.47			-			-			-		
Date of sowing													
D1		14.06.2013			10.06.2013			-			16.06.2013		
D2		25.06.2013			20.06.2013			-			26.06.2013		
D3		04.07.2013			01.07.2013			02.07.2013			06.07.2013		
Varieties													
V1		MTU 1001			SJR-5			MAS 945-1			NDR-97		
V2		RNR 2458			PC-19			MAS-26			Shushk		
V3		DRRH 3			DRRH-3			DRRH-3			Samrat		
V4		KRH 2			PAC-837			PAC-837			NDR - 1149		
V5		MTU 1010			JAYA			MGD-101			DRRH-3		
V6		RNR 1446			-			Doddiga			PAC-837		
V7		-			-			-			-		
V8		-			-			-			-		

Table-4.2.2.1(Contd...)

Date of sowing	Varieties	HAZARIBAGH			KOTA			LUDHIANA			NAWAGAM		
		Grain Yield (t/ha)	Panicle /m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
D1	V1	3.35	210	2.05	4.46	255	3.76	7.99	345	4.54	3.63	326	3.96
	V2	4.46	261	2.12	5.33	283	4.13	7.74	438	3.34	3.31	315	3.17
	V3	5.11	249	2.32	4.12	234	5.18	8.70	430	3.73	4.00	288	3.15
	V4	5.93	281	2.26	6.24	296	5.40	7.96	356	4.24	5.00	396	3.52
	V5	4.10	267	1.82	4.84	341	3.30	7.73	376	3.75	3.27	275	3.11
	V6	4.37	319	1.92	4.25	253	3.69	5.83	321	3.33	4.86	418	3.62
	V7	-	-	-	-	-	-	-	-	-	4.29	360	4.06
	V8	-	-	-	-	-	-	-	-	-	4.02	325	2.96
D2	V1	4.46	187	2.10	4.28	248	3.68	6.18	332	3.31	3.84	379	4.17
	V2	3.97	272	2.08	5.07	274	3.97	7.34	325	4.14	3.71	289	3.23
	V3	4.51	245	2.35	3.93	227	5.14	7.55	337	4.10	3.95	387	3.31
	V4	5.07	274	2.22	6.10	292	5.32	6.69	348	3.57	4.67	427	3.9
	V5	4.54	265	2.13	4.55	334	3.21	6.64	277	4.35	3.24	291	3.46
	V6	3.89	260	2.06	4.04	244	3.60	5.11	289	4.34	4.93	413	3.85
	V7	-	-	-	-	-	-	-	-	-	4.37	363	4.01
	V8	-	-	-	-	-	-	-	-	-	4.12	329	3.34
D3	V1	4.09	238	2.24	3.68	226	3.18	5.55	325	3.06	3.55	304	3.84
	V2	3.96	280	2.08	4.23	235	3.56	5.76	347	2.98	3.07	267	2.83
	V3	4.38	234	2.52	3.31	194	4.45	6.42	301	3.76	2.79	240	2.88
	V4	4.80	268	2.36	5.34	267	4.90	6.21	265	4.20	3.4	291	3.55
	V5	5.37	262	2.42	3.95	285	2.92	6.84	335	3.78	2.96	258	3
	V6	4.79	339	1.90	3.56	223	3.14	5.18	311	2.89	4.68	397	3.78
	V7	-	-	-	-	-	-	-	-	-	4.06	339	3.73
	V8	-	-	-	-	-	-	-	-	-	3.8	321	3.29
C.D.(0.05)													
D at same V		0.88	NS	NS	NS	NS	NS	NS	NS	NS	NS	43.03	NS
V at same D		0.86	NS	NS	NS	NS	NS	NS	NS	NS	NS	40.76	NS
Date of sowing													
D1		4.55	265	2.08	4.87	277	4.24	7.66	378	3.82	4.05	338	3.44
D2		4.41	250	2.16	4.66	270	4.15	6.59	318	3.97	4.1	360	3.66
D3		4.56	270	2.25	4.01	238	3.69	5.99	314	3.45	3.54	302	3.36
C.D. (0.05)		NS	NS	NS	0.21	11.29	0.17	0.24	13.57	NS	0.16	10.62	0.13
C.V. (%)		17.87	13.34	10.4	8.02	7.29	7.21	5.98	6.81	11.63	8.24	6.21	7.49
Varieties													
V1		3.97	212	2.13	4.14	243	3.54	6.58	334	3.63	3.67	336	3.99
V2		4.13	271	2.09	4.88	264	3.89	6.95	370	3.49	3.36	291	3.08
V3		4.67	243	2.40	3.78	218	4.92	7.56	356	3.86	3.58	305	3.12
V4		5.27	274	2.28	5.89	285	5.21	6.95	323	4.00	4.35	372	3.66
V5		4.67	264	2.12	4.45	320	3.14	7.07	329	3.96	3.16	275	3.19
V6		4.35	306	1.96	3.95	240	3.48	5.38	307	3.52	4.82	410	3.75
V7		-	-	-	-	-	-	-	-	-	4.24	354	3.93
V8		-	-	-	-	-	-	-	-	-	3.98	325	3.19
C.D. (0.05)		0.51	35.2	0.22	0.38	17.88	0.24	0.56	39.92	NS	0.33	24.84	0.23
C.V. (%)		11.72	13.98	10.4	8.83	7.10	6.17	8.59	12.32	17.3	8.88	7.90	7.04
Expt. Mean		4.51	262	2.16	4.52	262	4.03	6.75	337	3.75	3.90	333	3.49
Soil type		Clay loam			Clay loam			Sandy loam			Clay loam		
pH		7.15			7.55			7.2			7.7		
EC		-			0.29			-			0.48		
Date of sowing													
D1		20.06.2013			20.06.2013			10.06.2013			14.06.2013		
D2		30.06.2013			30.06.2013			20.06.2013			24.06.2013		
D3		10.07.2013			10.07.2013			30.06.2013			05.07.2013		
Varieties													
V1		Sahbhagi			Vikash			PR 115			Gurjari		
V2		Abhishek			Sasyasree			PR 121			GR-7		
V3		DRRH-3			DRRH-3			Savanah			GR-12		
V4		PAC837			PAC 837			Swift (Hy)			GAR-13		
V5		PHB 71			IR 64 (c)			PA - 6129			GAR-1		
V6		PAC 801			PR 113 (C)			Tej			Dandi		
V7		-			-			-			DRRH-3		
V8		-			-			-			PAC-837		



Table-4.2.2.1(Contd...)

Date of sowing	Varieties	PARBHANI		PUSA			RANCHI			REWA			
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	
D1	V1	2.94	269	3.39	259	2.52	4.87	287	3.73	7.10	318	2.60	
	V2	3.08	288	3.21	255	2.19	4.00	260	3.37	7.10	330	2.13	
	V3	2.92	276	4.19	272	2.96	5.70	303	4.17	7.17	338	2.83	
	V4	2.11	158	4.75	297	2.90	4.33	259	3.97	7.00	320	2.73	
	V5	2.75	268	3.22	233	2.91	3.93	305	3.77	7.23	323	2.80	
	V6	1.69	129	4.37	280	2.83	3.07	338	3.23	7.20	323	2.83	
	V7	-	-	-	-	-	-	-	-	-	-	-	
	V8	-	-	-	-	-	-	-	-	-	-	-	
D2	V1	2.61	267	3.39	257	2.50	5.87	339	3.90	7.27	328	2.83	
	V2	2.75	275	3.12	243	2.21	4.67	290	3.53	7.37	330	3.27	
	V3	2.58	236	4.17	267	2.95	5.27	294	3.77	7.07	335	2.63	
	V4	1.31	97	4.74	293	2.92	6.50	397	4.13	6.97	328	2.83	
	V5	2.44	255	3.10	224	2.94	4.93	290	3.50	7.10	330	2.83	
	V6	1.03	120	4.35	277	2.84	3.83	267	3.17	7.37	335	2.73	
	V7	-	-	-	-	-	-	-	-	-	-	-	
	V8	-	-	-	-	-	-	-	-	-	-	-	
D3	V1	2.22	232	3.22	251	2.50	4.50	300	3.23	7.00	317	2.80	
	V2	2.33	253	2.91	237	2.21	3.60	267	3.43	7.23	311	2.80	
	V3	2.11	216	4.07	262	2.93	4.87	297	3.63	6.97	326	3.27	
	V4	0.53	87	4.41	279	2.92	4.13	261	2.83	7.10	315	2.43	
	V5	1.97	239	2.84	219	2.94	3.07	275	2.47	7.20	321	1.97	
	V6	1.47	0	4.05	263	2.84	2.93	297	2.90	7.27	330	2.63	
	V7	-	-	-	-	-	-	-	-	-	-	-	
	V8	-	-	-	-	-	-	-	-	-	-	-	
C.D.(0.05)													
D at same V		NS	38.06	NS	NS	NS	0.43	63.43	NS	NS	7.85	0.24	
V at same D		NS	37.43	NS	NS	NS	0.40	58.16	NS	NS	7.67	0.24	
Date of sowing	D1	2.58	231	3.86	266	2.72	4.32	292	3.71	7.13	325	2.66	
	D2	2.12	208	3.81	260	2.73	5.18	313	3.67	7.19	331	2.86	
	D3	1.77	171	3.58	252	2.72	3.85	283	3.08	7.13	320	2.65	
C.D. (0.05)		0.08	22.44	NS	NS	NS	0.07	9.55	0.11	NS	4.42	NS	
C.V. (%)		6.58	18.61	7.76	5.57	5.49	2.56	5.46	5.23	1.36	2.29	8.48	
Varieties	V1	2.59	256	3.34	256	2.51	5.08	309	3.62	7.12	321	2.74	
	V2	2.72	272	3.08	245	2.20	4.09	272	3.44	7.23	324	2.73	
	V3	2.54	243	4.14	267	2.95	5.28	298	3.86	7.07	333	2.91	
	V4	1.31	114	4.63	290	2.91	4.99	306	3.64	7.02	321	2.67	
	V5	2.39	254	3.05	225	2.93	3.98	290	3.24	7.18	325	2.53	
	V6	1.40	83	4.26	273	2.84	3.28	300	3.10	7.28	329	2.73	
	V7	-	-	-	-	-	-	-	-	-	-	-	
	V8	-	-	-	-	-	-	-	-	-	-	-	
C.D. (0.05)		0.30	21.97	0.16	12.9	0.12	0.25	NS	0.40	NS	4.53	0.14	
C.V. (%)		14.32	11.21	4.45	5.17	4.48	5.81	12.86	11.98	3.33	1.45	5.36	
Expt. Mean		2.16	204	3.75	259	2.72	4.45	296	3.49	7.15	325	2.72	
Soil type		-			Silty loam			Clay loam			Sandy Clay loam		
pH		-			8.3			5.5			6.7		
EC		-			-			-			0.43		
Date of sowing													
D1		25.06.2013		15.06.2013			21.06.2013			15.06.2013			
D2		04.07.2013		25.06.2013			01.07.2013			25.06.2013			
D3		14.07.2013		05.07.2013			11.07.2013			05.07.2013			
Varieties													
V1		Avish		Sahbhagidhan			Arize Tez			DRRH-3			
V2		Parag		Suwasani			DRRH-2			PA - 837			
V3		Prabhava		PHB-71			DRRH-3			PAC - 807			
V4		BSMT 370		PA 6444			PAC837			PHB - 71			
V5		TJP 48		DRRH-3			Lalat			IR - 36			
V6		Sahyadri		PAC-837			Naveen			PS - 3			
V7		-		-			-			-			
V8		-		-			-			-			

Table-4.2.2.1(Contd..)

Date of sowing	Varieties	SABOUR			MANDYA			MALAN			ARUNDHATINAGAR		
		Grain Yield (t/ha)	Panicle /m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle e/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle e/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
D1	V1	3.62	215	2.75	6.45	354	4.70	1.67	208	2.07	5.17	262	2.26
	V2	3.63	221	2.83	6.08	350	3.57	1.13	235	1.62	4.49	283	2.10
	V3	4.79	289	3.69	4.91	319	4.27	1.27	210	2.09	5.09	251	2.51
	V4	4.97	295	3.76	4.43	343	2.80	1.47	185	2.35	4.99	246	3.32
	V5	5.07	303	3.87	4.59	331	4.17	1.33	185	1.90	4.87	202	2.96
	V6	4.94	297	3.80	4.59	337	4.07	1.33	190	1.91	4.92	255	2.66
	V7	-	-	-	5.81	340	4.43	-	-	-	-	-	-
	V8	-	-	-	5.07	312	2.83	-	-	-	-	-	-
D2	V1	3.77	222	2.84	5.65	358	4.10	1.30	165	1.91	4.82	192	2.40
	V2	3.88	234	2.99	6.51	362	5.13	0.73	150	1.28	5.22	242	2.29
	V3	5.16	312	3.99	4.11	313	3.30	1.00	175	1.75	5.29	247	2.18
	V4	5.35	317	4.04	4.43	325	3.53	0.97	180	2.11	7.81	207	3.25
	V5	5.40	326	4.17	4.11	310	2.70	0.97	165	1.42	6.44	178	2.39
	V6	5.26	319	4.08	4.80	344	4.07	1.03	175	1.57	6.61	272	3.09
	V7	-	-	-	5.01	338	4.07	-	-	-	-	-	-
	V8	-	-	-	5.55	351	4.50	-	-	-	-	-	-
D3	V1	3.67	218	2.78	-	-	-	0.97	150	1.83	5.02	232	2.94
	V2	3.65	222	2.83	-	-	-	0.67	125	1.27	4.93	217	2.40
	V3	4.92	297	3.79	-	-	-	0.70	155	1.68	5.65	237	2.68
	V4	5.28	312	3.99	-	-	-	0.55	130	1.90	7.67	237	2.95
	V5	5.15	316	4.04	-	-	-	0.50	125	1.26	6.21	194	2.75
	V6	5.26	312	3.98	-	-	-	0.00	0	0.00	6.48	237	2.93
	V7	-	-	-	-	-	-	-	-	-	-	-	-
	V8	-	-	-	-	-	-	-	-	-	-	-	-
C.D.(0.05)													
D at same V		NS	NS	0.27	NS	NS	0.29	NS	43.11	0.31	NS	NS	NS
V at same D		NS	NS	NS	NS	NS	0.29	NS	40.65	0.29	1.13	NS	NS
Date of sowing													
D1		4.50	270	3.45	5.24	336	3.85	1.37	202	1.99	4.92	250	2.64
D2		4.80	289	3.68	5.02	338	3.93	1.00	168	1.67	6.03	223	2.60
D3		4.65	279	3.57	-	-	-	0.56	114	1.32	6.00	226	2.77
<b>C.D. (0.05)</b>		0.07	3.92	0.08	NS	NS	NS	0.19	17.12	0.11	0.62	21.07	NS
<b>C.V. (%)</b>		2.37	2.37	2.40	128.67	4.8	2.6	32.08	17.89	11.01	11.88	9.78	13.46
Varieties	V1	3.68	219	2.79	6.05	356	4.40	1.31	174	1.94	5.00	229	2.53
	V2	3.72	226	2.88	6.29	356	4.35	0.84	170	1.39	4.88	247	2.26
	V3	4.96	299	3.82	4.51	316	3.78	0.99	180	1.84	5.34	245	2.46
	V4	5.20	308	3.93	4.43	334	3.17	1.00	165	2.12	6.82	230	3.17
	V5	5.21	315	4.02	4.35	321	3.43	0.93	158	1.53	5.84	191	2.70
	V6	5.15	309	3.95	4.69	340	4.07	0.79	122	1.16	6.00	254	2.89
	V7	-	-	-	5.41	339	4.25	-	-	-	-	-	-
	V8	-	-	-	5.31	331	3.67	-	-	-	-	-	-
<b>C.D. (0.05)</b>		0.16	12.21	0.16	NS	16.19	0.21	0.24	24.89	0.18	0.65	31.24	0.37
<b>C.V. (%)</b>		3.60	4.54	4.61	127.32	4.07	4.51	25.1	16	11.11	21.05	13.95	14.68
Expt. Mean		4.65	279	3.57	5.13	337	3.89	0.98	162	1.66	5.65	233	2.67
Soil type		Loamy			Red sandy loam			Silty day loam			Silty day loam		
pH		7.2			6.74			6			6		
EC		0.34			0.408			-			-		
Date of sowing													
D1		16.06.2013			27.07.2013			18.06.2013			21.06.2013		
D2		23.06.2013			05.08.2013			25.06.2013			02.07.2013		
D3		30.06.2013			-			02.07.2013			13.07.2013		
Varieties													
V1		Prabhat			KRH-4			HPR-2143			DRRH-3		
V2		Sushk Samrat			KRH-2			HPR-1156			PAC-837		
V3		MTU 1010			MAS-946-1			PAC 807			PAC 807		
V4		MY 1001			MAS-26			ARIZE 6129			PAC-801		
V5		DRRH-3			BI-33			PAC 837			MTU-7029		
V6		PAC 837			KMP-175			DRRH-3			Shabgadhian		
V7		-			DRRH-3			-			-		
V8		-			PAC-837			-			-		

**Trial-4.2.2.2: Summary of data on grain yield and ancillary characters of rice from optimizing seed rate and selecting varieties in aerobic rice situation during Kharif - 2013.**

Variety	Seed Rate (kg/ha)	BANKURA			GAGHRAGHAT			HATHWARA			KOTA		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
V1	S1	3.32	329	2.03	3.09	194	2.27	2.25	189	2.43	3.65	265	3.22
	S2	4.02	408	1.85	3.74	243	2.23	2.58	216	2.17	4.50	322	3.18
	S3	3.83	395	1.79	4.01	268	2.12	2.86	224	2.11	4.87	348	3.25
	S4	3.53	377	1.66	3.96	273	2.10	3.43	211	2.34	4.95	354	3.14
V2	S1	3.25	315	1.92	3.16	207	2.41	3.24	228	2.32	4.08	226	3.70
	S2	3.83	392	1.77	3.56	248	2.34	3.29	234	2.42	4.60	255	3.67
	S3	3.62	370	1.72	4.23	279	2.25	3.87	239	2.53	5.29	284	3.78
	S4	3.42	350	1.60	4.37	285	2.18	3.53	227	2.36	5.38	292	3.60
V3	S1	3.82	374	2.44	3.17	212	2.20	4.15	229	2.56	3.33	188	4.82
	S2	4.55	466	2.32	4.05	258	2.15	4.40	230	2.91	3.81	223	4.87
	S3	4.32	451	2.12	3.87	280	1.93	4.35	228	2.92	4.43	247	4.76
	S4	4.08	425	1.97	4.15	272	1.86	4.19	222	2.84	4.59	251	4.73
V4	S1	3.61	341	2.36	3.34	201	1.98	3.94	213	2.38	5.33	247	5.05
	S2	4.21	433	2.19	3.76	248	2.02	5.10	214	2.84	5.83	276	5.11
	S3	4.01	411	1.99	3.89	262	1.84	5.14	226	3.05	6.29	300	4.80
	S4	3.92	386	1.85	3.75	267	1.80	4.87	246	2.97	6.40	305	4.92
C.D.(0.05)													
V at same S		1.38	43	0.58	NS	NS	NS	0.45	NS	NS	NS	NS	NS
S at same V		1.25	40	0.52	NS	NS	NS	0.50	NS	NS	NS	NS	NS
Varieties	V1	3.68	377	1.83	3.70	245	2.18	2.78	210	2.26	4.49	322	3.20
	V2	3.53	357	1.75	3.83	255	2.30	3.48	232	2.41	4.84	264	3.69
	V3	4.19	429	2.21	3.81	255	2.04	4.27	227	2.81	4.04	227	4.80
	V4	3.94	393	2.10	3.68	244	1.91	4.76	225	2.81	5.96	282	4.97
C.D. (0.05)		NS	NS	NS	NS	NS	0.14	0.4	NS	0.26	0.20	21	0.16
C.V. (%)		9.84	5.41	10.48	7.89	6.98	6.52	10.43	8.50	10.16	4.21	7.73	3.80
Seed rate (kg/ha)	S1	3.50	339	2.19	3.19	203	2.22	3.39	215	2.42	4.09	232	4.20
	S2	4.15	425	2.03	3.78	249	2.19	3.84	224	2.59	4.69	269	4.21
	S3	3.94	407	1.91	4.00	272	2.04	4.05	229	2.65	5.22	295	4.15
	S4	3.74	385	1.77	4.06	274	1.99	4.01	227	2.63	5.33	301	4.10
C.D. (0.05)		NS	NS	NS	0.18	16.07	0.16	0.23	NS	NS	0.36	17.32	NS
C.V. (%)		21.47	6.66	17.38	5.72	7.64	8.94	7.04	6.66	11.83	8.82	7.50	3.41
<b>Expt. Mean</b>		<b>3.83</b>	<b>389</b>	<b>1.97</b>	<b>3.75</b>	<b>250</b>	<b>2.11</b>	<b>3.82</b>	<b>224</b>	<b>2.57</b>	<b>4.83</b>	<b>274</b>	<b>4.16</b>
Soil type		Sandy loam			Sandy loam			Sandy clay			Clay loam		
pH		5.6			8.06			6.0			7.55		
Varieties	V1	Puspa (IET 17509)			Sarju-52			Sahbhagidhan			IR-64		
	V2	Vandana			NDR-359			Gotra Bidhan - 1 (GH-1)			Vikash		
	V3	DRRH-3			Shiva 786			DRRH-3			DRRH-3		
	V4	PAC-837			HR-664			PAC-837			PAC-837		
Seed rate (kg/ha)	S1	15			15			15			15		
	S2	25			25			25			25		
	S3	35			35			35			35		
	S4	45			45			45			45		

Table-4 .2.2.2 (Contd...)

Variety	Seed Rate (kg/ha)	LUDHIANA			SABOUR			PANTNAGAR			PARBHANI	
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)
V1	S1	8.11	369	3.91	3.25	195	2.49	3.93	224	1.86	2.22	226
	S2	7.73	325	4.31	3.72	223	2.85	4.28	250	1.80	3.39	237
	S3	7.33	363	3.69	3.89	235	3.00	4.48	295	1.61	3.53	252
	S4	6.69	338	3.83	3.57	214	2.74	4.29	306	1.52	2.67	254
V2	S1	6.80	360	3.66	3.24	190	2.43	4.16	241	1.88	1.81	219
	S2	6.85	339	3.93	3.69	218	2.79	4.32	255	1.85	3.00	231
	S3	7.38	343	3.93	3.71	222	2.84	4.66	297	1.74	3.22	240
	S4	6.45	333	3.86	3.48	211	2.70	4.49	310	1.61	2.69	251
V3	S1	4.62	343	3.53	4.77	285	3.64	4.23	249	1.86	2.40	211
	S2	4.76	337	3.79	5.08	312	3.99	4.40	266	1.81	3.25	217
	S3	3.99	341	3.29	5.31	322	4.12	4.82	304	1.74	3.11	229
	S4	3.07	320	3.26	5.12	305	3.90	4.61	318	1.56	2.78	232
V4	S1	4.70	325	3.79	4.74	281	3.59	4.10	249	1.83	1.92	209
	S2	4.22	324	3.59	5.22	308	3.93	4.36	259	1.87	2.11	210
	S3	4.05	328	3.51	5.23	319	4.08	4.76	300	1.78	2.35	221
	S4	3.46	307	3.46	4.90	295	3.76	4.51	310	1.61	2.47	222
C.D.(0.05)												
V at same S		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
S at same V		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Varieties	V1	7.46	349	3.94	3.61	217	2.77	4.25	269	1.70	2.95	242
	V2	6.87	344	3.85	3.53	211	2.69	4.41	276	1.77	2.68	235
	V3	4.11	335	3.47	5.07	306	3.91	4.52	284	1.74	2.89	222
	V4	4.11	321	3.59	5.02	301	3.84	4.43	279	1.77	2.21	216
<b>C.D. (0.05)</b>		1.05	NS	0.28	0.2	8.48	0.21	0.14	5.13	NS	0.18	15.52
<b>C.V. (%)</b>		18.61	8.81	7.45	4.63	3.28	3.72	3.11	1.85	4.70	6.56	6.79
Seed rate (kg/ha)	S1	6.06	349	3.72	4.00	238	3.04	4.11	241	1.86	2.09	216
	S2	5.89	331	3.91	4.43	265	3.39	4.34	258	1.83	2.94	224
	S3	5.69	344	3.61	4.53	275	3.51	4.68	299	1.72	3.05	235
	S4	4.92	324	3.60	4.27	256	3.27	4.48	311	1.57	2.65	240
<b>C.D. (0.05)</b>		0.42	NS	NS	0.12	10.62	0.14	0.12	8.63	0.07	0.22	11.89
<b>C.V. (%)</b>		8.74	12.36	11.47	3.31	4.87	4.88	3.15	3.69	4.74	9.88	6.17
<b>Expt. Mean</b>		<b>5.64</b>	<b>337</b>	<b>3.71</b>	<b>4.31</b>	<b>259</b>	<b>3.30</b>	<b>4.40</b>	<b>277</b>	<b>1.75</b>	<b>2.68</b>	<b>229</b>
Soil type		Sandy loam			Loamy			Silt loam			-	
pH		7.2			7.2			7.8			-	
Varieties	V1	PR-115			Sushk Samrat			PD-16			Parag	
	V2	PR-121			Sahabgajidhan			PD-18			PBNR 03 2	
	V3	Prima			DRRH3			DRRH-3			DRRH-3	
	V4	DRRH-3			PAC 837			PAC-837			PAC 837	
Seed rate (kg/ha)	S1	15			15			15			15	
	S2	25			25			25			25	
	S3	35			35			35			35	
	S4	45			45			45			45	

Table-4 .2.2.2 (Contd...)

Variety	Seed Rate (kg/ha)	VADGOAN			PUSA			RANCHI			VARANASI		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
V1	S1	3.74	359	2.48	2.47	214	2.52	3.27	230	3.64	3.67	267	2.92
	S2	5.60	538	3.71	2.98	232	2.43	4.90	274	3.65	3.98	255	2.61
	S3	5.84	561	3.87	3.05	237	2.41	4.77	279	3.33	3.90	288	2.63
	S4	5.37	516	3.56	2.97	230	2.43	3.73	367	2.67	3.88	339	2.75
V2	S1	4.16	400	2.76	4.26	274	3.01	4.07	238	2.73	3.92	225	3.15
	S2	5.82	559	3.85	4.56	289	2.94	5.27	293	4.09	3.96	255	3.67
	S3	6.01	577	3.98	4.58	289	2.97	5.20	327	2.74	4.31	269	3.22
	S4	5.72	550	3.79	4.41	284	2.92	5.20	360	2.62	4.17	275	3.03
V3	S1	5.47	526	3.62	2.34	198	2.99	4.10	349	2.09	4.17	203	4.59
	S2	6.83	656	4.52	2.56	210	2.88	3.93	320	2.88	4.67	235	4.44
	S3	7.01	673	4.64	2.67	211	2.89	4.90	294	2.34	5.08	237	4.67
	S4	6.54	629	4.33	2.62	207	2.86	4.63	327	2.42	5.58	257	4.26
V4	S1	5.33	512	3.53	3.55	240	2.89	2.80	363	2.40	3.92	219	3.86
	S2	6.73	646	4.46	3.92	256	2.83	3.90	307	2.09	4.21	227	4.06
	S3	6.81	654	4.51	3.97	258	2.81	3.30	310	2.74	4.63	270	3.57
	S4	6.34	609	4.20	3.76	251	2.81	3.90	283	2.64	4.42	259	3.44
C.D.(0.05)													
V at same S		NS	NS	NS	NS	NS	NS	0.31	58	0.5	NS	15.97	NS
S at same V		NS	NS	NS	NS	NS	NS	0.37	53	0.57	NS	15.44	NS
Varieties	V1	5.14	494	3.40	2.87	228	2.45	4.17	288	3.32	3.85	287	2.73
	V2	5.43	522	3.60	4.45	284	2.96	4.93	305	3.04	4.09	256	3.27
	V3	6.46	621	4.28	2.55	207	2.91	4.39	322	2.43	4.88	233	4.49
	V4	6.30	605	4.17	3.80	251	2.84	3.48	316	2.47	4.29	244	3.73
C.D. (0.05)		0.15	13.74	0.10	0.15	10.31	0.09	0.34	22.83	0.49	0.61	8.91	0.58
C.V. (%)		2.51	2.46	2.53	4.52	4.26	3.28	7.99	7.43	17.57	14.31	3.5	16.46
Seed rate (kg/ha)	S1	4.68	449	3.10	3.16	231	2.85	3.56	295	2.72	3.92	229	3.63
	S2	6.24	600	4.14	3.51	247	2.77	4.50	299	3.18	4.20	243	3.70
	S3	6.42	616	4.25	3.57	249	2.77	4.54	303	2.79	4.48	266	3.52
	S4	5.99	576	3.97	3.44	243	2.76	4.37	334	2.59	4.51	282	3.37
C.D. (0.05)		0.15	14.18	0.10	0.12	4.53	NS	0.15	28.82	0.25	NS	7.98	NS
C.V. (%)		3.02	3.00	3.02	4.26	2.22	3.88	4.3	11.12	10.57	15.96	3.72	10.36
Expt. Mean		5.83	560	3.86	3.42	243	2.79	4.24	308	2.82	4.28	255	3.55
Soil type		Medium			Silty loam			-			Sandy loam		
pH		7.9			8.3			5.6			7.2		
Varieties	V1	Indrayani-VDN-3-51-18			Sahbhagidhan			DRRH-3			HUR-3022		
	V2	Phule Samruddhi-VDN-99-29			Arize 6444			PAC-837			Sarjoo-52		
	V3	DRRH-3			DRRH3			Arize Tej			DRRH-3		
	V4	PAC 837			PAC 837			Lalat			PAC-837		
Seed rate (kg/ha)	S1	15			15			15			15		
	S2	25			25			25			25		
	S3	35			35			35			35		
	S4	45			45			45			45		

**Table-4 .2.2.2 (Contd...)**

Variety	Seed Rate (kg/ha)	HAZARIBAGH		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
V1	S1	3.30	244	2.44
	S2	3.55	242	2.86
	S3	4.11	292	2.31
	S4	4.37	369	2.34
V2	S1	4.59	264	2.77
	S2	4.24	285	2.52
	S3	4.95	311	2.53
	S4	4.21	356	2.44
V3	S1	5.10	269	2.32
	S2	4.30	293	2.93
	S3	4.23	321	2.60
	S4	3.17	377	2.24
V4	S1	4.49	254	2.90
	S2	5.10	314	2.73
	S3	5.08	329	2.51
	S4	5.24	365	2.38
V5	S1	2.69	237	1.97
	S2	4.56	276	1.77
	S3	4.71	339	1.77
	S4	3.71	374	1.62
V6	S1	3.97	262	2.01
	S2	4.29	296	2.22
	S3	4.07	363	2.01
	S4	3.85	369	2.20
	C.D.(0.05)			
	Mat same S	0.83	NS	0.25
	S at same M	0.77	NS	0.24
Seed Rate	V1	3.83	287	2.49
	V2	4.50	304	2.56
	V3	4.20	315	2.52
	V4	4.98	316	2.63
	V5	3.92	306	1.78
	V6	4.04	322	2.11
		<b>C.D. (0.05)</b>	0.38	NS
	<b>C.V. (%)</b>	9.75	8.42	6.46
Row Spacing	S1	4.02	255	2.40
	S2	4.34	284	2.51
	S3	4.53	326	2.29
	S4	4.09	368	2.20
		<b>C.D. (0.05)</b>	0.34	20.26
	<b>C.V. (%)</b>	11.81	9.75	6.42
	<b>Expt. Mean</b>	<b>4.25</b>	<b>308</b>	<b>2.35</b>
Row spacing (cm)	Soil type	Clay loam		
	PH	7.05		
	Varieties			
	V1	Rajlaxmi		
	V2	Ajay		
	V3	DRRH-3		
	V4	PAC 837		
V5	Naveen			
V6	Abhishek			
Seed rate (kg/ha)	S1	15		
	S2	25		
	S3	35		
	S4	45		

Table-4.2.2.3: Summary of data on grain yield and ancillary characters of trial on effect of dosage and nitrogen scheduling on aerobic rice during Kharif - 2013.

Nitrogen dose	Nitrogen Scheduling	ADUTHURAI			ARI-PATNA			GANGAVATHI		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle /m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle /m <sup>2</sup> (No.)	Panicle Wt. (g)
100% of RDF (M1)	F1	3.09	259	2.59	4.59	351	2.77	2.73	343	1.80
	F2	3.20	265	2.63	5.25	341	2.73	3.05	398	2.23
	F3	3.55	297	2.77	5.96	353	2.90	3.64	394	2.36
	F4	3.72	309	2.77	7.35	342	3.10	3.21	390	1.85
	F5	4.08	326	2.80	5.63	321	2.83	3.22	336	2.18
	F6	4.29	335	2.94	6.43	316	3.03	3.13	361	2.41
125% RDF (M2)	F1	3.03	272	2.67	4.13	335	2.70	3.83	402	2.23
	F2	3.17	279	2.64	5.16	331	2.67	3.81	446	1.82
	F3	3.49	304	2.74	5.83	325	2.87	4.02	475	2.48
	F4	3.68	336	2.93	6.13	322	3.00	3.33	398	1.85
	F5	2.80	358	2.97	5.60	220	2.77	3.51	387	2.22
	F6	3.01	375	3.01	6.10	296	2.83	3.57	368	2.40
C.D.(0.05)										
M at same F		0.26	11.09	NS	NS	NS	NS	NS	NS	NS
F at same M		0.28	18.68	NS	NS	NS	NS	NS	NS	NS
Mean of Nitrogen dose										
M1		3.66	298	2.75	5.87	337	2.89	3.16	370	2.14
M2		3.20	320	2.83	5.49	305	2.81	3.68	413	2.16
C.D.(0.05)		0.20	20.38	NS	NS	NS	0.06	0.25	NS	NS
C.V.(%)		4.03	4.59	4.76	5.07	17.26	1.55	5.05	7.88	29.95
Mean of nitrogen schedules	F1	3.06	265	2.63	4.36	343	2.73	3.28	373	2.02
	F2	3.19	272	2.64	5.20	336	2.70	3.43	422	2.02
	F3	3.52	300	2.76	5.89	339	2.88	3.83	435	2.42
	F4	3.70	322	2.85	6.74	332	3.05	3.27	394	1.85
	F5	3.44	342	2.89	5.62	270	2.80	3.37	362	2.20
	F6	3.65	355	2.97	6.26	306	2.93	3.35	365	2.40
C.D.(0.05)		0.18	7.84	0.08	1.00	NS	0.13	NS	54.11	NS
C.V.(%)		4.38	2.10	2.33	14.59	16.4	3.74	9.92	11.47	18.77
Experimental Mean		<b>3.43</b>	<b>309</b>	<b>2.79</b>	<b>5.68</b>	<b>321</b>	<b>2.85</b>	<b>3.42</b>	<b>392</b>	<b>2.15</b>
Soil type		Clay			Clay loam			Black clay		
pH		7.2			7.1			8.1		
Variety		ADT 45			BRR 0007			GGV-05-01		
Nitrogen dose (kg/ha)	M1	120 60 50 N P K kg/ha (100% of RDF)			120 60 50 N P K kg/ha (100% of RDF)			120 60 50 N P K kg/ha (100% of RDF)		
	M2	150 60 50 N P K kg/ha (125% of RDF)			150 60 50 N P K kg/ha (125% of RDF)			150 60 50 N P K kg/ha (125% of RDF)		
Nitrogen schedule	F1	N-2 splits ( ½ Basal + ½ PI stage)			N-2 splits ( ½ Basal + ½ PI stage)			N-2 splits ( ½ Basal + ½ PI stage)		
	F2	N-2 splits (½ 10-12 DAE + ½ PI stage)			N-2 splits (½ 10-12 DAE + ½ PI stage)			N-2 splits (½ 10-12 DAE + ½ PI stage)		
	F3	N-3 splits ( Basal + AT + PI stage)			N-3 splits ( Basal + AT + PI stage)			N-3 splits ( Basal + AT + PI stage)		
	F4	N-3 splits ( 10-12 DAE + AT + PI stage)			N-3 splits ( 10-12 DAE + AT + PI stage)			N-3 splits ( 10-12 DAE + AT + PI stage)		
	F5	N-4 splits ( ¼ Basal + ¼ AT stage + ¼ at PI stage + ¼ at Flowering)			N-4 splits ( ¼ Basal + ¼ AT stage + ¼ at PI stage + ¼ at Flowering)			N-4 splits ( ¼ Basal + ¼ AT stage + ¼ at PI stage + ¼ at Flowering)		
	F6	N-4 splits ( ¼ 10-12 DAE + ¼ AT stage + ¼ at PI stage + ¼ at Flowering)			N-4 splits ( ¼ 10-12 DAE + ¼ AT stage + ¼ at PI stage + ¼ at Flowering)			N-4 splits ( ¼ 10-12 DAE + ¼ AT stage + ¼ at PI stage + ¼ at Flowering)		

Table-4.2.2.3 (Contd...)

Nitrogen dose	Nitrogen Scheduling	KANPUR			KOTA			MANDYA			RAIPUR		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
100% of RDF (M1)	F1	3.03	252	2.30	4.05	254	2.50	5.23	339	4.07	2.95	221	3.54
	F2	2.90	247	2.24	4.18	259	2.54	5.01	323	3.63	3.50	248	3.64
	F3	3.17	248	2.51	4.59	283	3.30	5.65	371	4.50	4.22	255	4.16
	F4	3.08	264	2.43	4.72	288	3.36	5.23	328	3.53	4.96	270	4.69
	F5	3.15	273	2.48	5.22	316	3.58	6.03	362	4.03	3.99	273	4.08
	F6	3.09	262	2.40	5.40	320	3.63	5.65	332	3.60	4.49	278	4.40
125% RDF (M2)	F1	3.47	274	2.68	4.13	259	2.55	6.03	347	4.27	3.17	231	3.59
	F2	3.26	272	2.61	4.25	264	2.60	5.23	334	4.10	3.92	259	3.86
	F3	3.57	303	2.82	4.78	291	3.36	6.29	380	4.70	4.57	268	4.37
	F4	3.47	290	2.75	4.87	296	3.43	5.49	335	3.87	5.09	273	4.79
	F5	3.54	297	2.74	5.27	323	3.64	6.77	366	4.33	4.46	284	4.32
	F6	3.49	292	2.69	5.49	327	3.70	6.40	341	4.00	4.80	292	4.65
C.D.(0.05) Mat same F F at same M		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Mean of Nitrogen dose	M1	3.07	258	2.39	4.69	287	3.15	5.47	343	3.89	4.02	257	4.09
	M2	3.47	288	2.71	4.80	293	3.21	6.04	350	4.21	4.34	268	4.26
C.D.(0.05) C.V.(%)		0.03	14.56	0.03	NS	NS	NS	0.21	3.39	0.04	0.23	NS	NS
		0.73	3.72	0.95	6.46	4.63	5.04	2.58	0.68	0.71	3.91	4.37	5.73
Mean of nitrogen schedules	F1	3.25	263	2.49	4.09	257	2.53	5.63	343	4.17	3.06	226	3.56
	F2	3.08	259	2.43	4.22	262	2.57	5.12	328	3.87	3.71	253	3.75
	F3	3.37	276	2.67	4.68	287	3.33	5.97	375	4.60	4.40	262	4.26
	F4	3.28	277	2.59	4.79	292	3.40	5.36	332	3.70	5.03	272	4.74
	F5	3.35	285	2.61	5.24	319	3.61	6.40	364	4.18	4.22	279	4.20
	F6	3.29	277	2.55	5.45	324	3.67	6.03	337	3.80	4.65	285	4.52
			0.17	15.38	0.10	0.31	28.41	0.30	0.68	9.29	0.40	0.18	18.10
C.D.(0.05) C.V.(%)		4.42	4.68	3.14	5.39	8.13	7.73	9.83	2.23	8.19	3.58	5.72	7.68
	Experimental Mean	3.27	273	2.55	4.75	290	3.18	5.75	347	4.05	4.18	263	4.17
Soil type		Sandy loam			Clay laom			Red Sandy loam			Clay soil		
	pH	7.4			7.55			6.67			7.2		
Variety		Sahbhagidhan			Vikash			KRH- 4			Rajeshwari		
	Nitrogen dose (kg/ha)	M1 120 60 50 N P K kg/ha (100% of RDF)			120 60 50 N P K kg/ha (100% of RDF)			120 60 50 N P K kg/ha (100% of RDF)			120 60 50 N P K kg/ha (100% of RDF)		
Nitrogen schedule	M2	150 60 50 N P K kg/ha (125% of RDF)			150 60 50 N P K kg/ha (125% of RDF)			150 60 50 N P K kg/ha (125% of RDF)			150 60 50 N P K kg/ha (125% of RDF)		
	F1	N-2 splits ( 1/2 Basal + 1/2 PI stage)			N-2 splits ( 1/2 Basal + 1/2 PI stage)			N-2 splits ( 1/2 Basal + 1/2 PI stage)			N-2 splits ( 1/2 Basal + 1/2 PI stage)		
	F2	N-2 splits ( 1/2 10-12 DAE + 1/2 PI stage)			N-2 splits ( 1/2 10-12 DAE + 1/2 PI stage)			N-2 splits ( 1/2 10-12 DAE + 1/2 PI stage)			N-2 splits ( 1/2 10-12 DAE + 1/2 PI stage)		
	F3	N-3 splits ( Basal + AT + PI stage)			N-3 splits ( Basal + AT + PI stage)			N-3 splits ( Basal + AT + PI stage)			N-3 splits ( Basal + AT + PI stage)		
	F4	N-3 splits ( 10-12 DAE + AT + PI stage)			N-3 splits ( 10-12 DAE + AT + PI stage)			N-3 splits ( 10-12 DAE + AT + PI stage)			N-3 splits ( 10-12 DAE + AT + PI stage)		
	F5	N-4 splits ( 1/4 Basal + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 Basal + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 Basal + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 Basal + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)		
F6	N-4 splits ( 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			



Table-4.2.2.3 (Contd...)

Nitrogen dose	Nitrogen Scheduling	GHAGHRAGHAT			PANTHAGAR			PUSA			ARUNDHATINAGAR		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle/Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle/Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle/Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle/Wt. (g)
100% of RDF (M1)	F1	2.92	173	1.80	4.39	258	1.98	2.71	221	2.40	6.04	188	1.93
	F2	2.72	169	1.72	4.40	261	1.97	3.03	237	2.41	5.47	189	2.33
	F3	3.08	216	2.00	4.41	241	1.97	3.15	244	2.45	6.30	211	2.51
	F4	2.86	200	1.83	4.49	255	1.95	3.36	254	2.48	5.56	218	2.79
	F5	3.17	220	1.98	4.93	232	2.30	3.32	252	2.50	7.29	223	2.12
	F6	2.98	214	1.89	4.54	255	1.97	3.48	259	2.51	6.64	200	2.26
125% RDF (M2)	F1	3.12	203	1.91	4.47	291	1.66	3.06	239	2.49	5.24	191	2.63
	F2	3.06	198	1.82	4.57	236	2.14	3.29	249	2.51	5.60	195	2.71
	F3	3.27	227	2.10	4.45	260	1.93	3.35	255	2.52	5.72	191	2.86
	F4	3.16	218	2.10	4.59	262	1.92	3.50	261	2.54	6.19	197	2.72
	F5	3.23	223	2.01	4.99	229	2.35	3.62	266	2.54	5.02	182	2.49
	F6	3.17	220	1.95	4.79	246	2.14	3.71	270	2.57	6.00	199	2.59
C.D.(0.05)													
M at same F		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
F at same M		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Mean of Nitrogen dose													
M1		2.96	199	1.87	4.53	250	2.02	3.17	245	2.46	6.21	205	2.33
M2		3.17	215	1.98	4.64	254	2.02	3.42	257	2.53	5.63	192	2.67
C.D.(0.05)		NS	8.10	NS	NS	NS	NS	0.22	NS	0.06	NS	NS	NS
C.V.(%)		11.58	2.73	7.27	4.7	5.78	18.52	4.66	4.34	1.59	31.06	18.99	10.02
Mean of nitrogen schedules	F1	3.02	188	1.86	4.43	274	1.82	2.89	230	2.44	5.64	190	2.28
	F2	2.89	184	1.77	4.49	249	2.06	3.16	243	2.46	5.53	192	2.52
	F3	3.18	222	2.05	4.43	250	1.95	3.25	250	2.49	6.01	201	2.69
	F4	3.01	209	1.97	4.54	259	1.94	3.43	258	2.51	5.87	208	2.76
	F5	3.20	222	2.00	4.96	230	2.32	3.47	259	2.52	6.16	203	2.31
	F6	3.08	217	1.92	4.66	250	2.06	3.60	265	2.54	6.32	200	2.43
C.D.(0.05)		NS	19.87	0.14	NS	NS	0.26	0.32	16.55	NS	NS	NS	NS
C.V.(%)		7.86	7.98	6.13	6.61	8.69	10.58	8.18	5.48	3.52	17.25	13.38	14.58
Experimental Mean		3.06	207	1.93	4.58	252	2.02	3.30	251	2.49	5.92	199	2.50
Soil type		Sandy loam			Silt loam			Silty clay			Silty clay		
pH		8.06			7.9			8.4			8.4		
Variety		NDR-359			PD 16, PD 18, DRRH 3 & PAC 837			Sahbhagidhan			Sahbhagidhan		
Nitrogen dose (kg/ha)	M1	120 60 50 N P K kg/ha (100% of RDF)			120 60 50 N P K kg/ha (100% of RDF)			120 60 50 N P K kg/ha (100% of RDF)			120 60 50 N P K kg/ha (100% of RDF)		
	M2	150 60 50 N P K kg/ha (125% of RDF)			150 60 50 N P K kg/ha (125% of RDF)			150 60 50 N P K kg/ha (125% of RDF)			150 60 50 N P K kg/ha (125% of RDF)		
Nitrogen schedule	F1	N-2 splits ( 1/2 Basal + 1/2 PI stage)			N-2 splits ( 1/2 Basal + 1/2 PI stage)			N-2 splits ( 1/2 Basal + 1/2 PI stage)			N-2 splits ( 1/2 Basal + 1/2 PI stage)		
	F2	N-2 splits ( 1/2 10-12 DAE + 1/2 PI stage)			N-2 splits ( 1/2 10-12 DAE + 1/2 PI stage)			N-2 splits ( 1/2 10-12 DAE + 1/2 PI stage)			N-2 splits ( 1/2 10-12 DAE + 1/2 PI stage)		
	F3	N-3 splits ( Basal + AT + PI stage)			N-3 splits ( Basal + AT + PI stage)			N-3 splits ( Basal + AT + PI stage)			N-3 splits ( Basal + AT + PI stage)		
	F4	N-3 splits ( 10-12 DAE + AT + PI stage)			N-3 splits ( 10-12 DAE + AT + PI stage)			N-3 splits ( 10-12 DAE + AT + PI stage)			N-3 splits ( 10-12 DAE + AT + PI stage)		
	F5	N-4 splits ( 1/4 Basal + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 Basal + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 Basal + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 Basal + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)		
	F6	N-4 splits ( 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)			N-4 splits ( 1/4 10-12 DAE + 1/4 AT stage + 1/4 at PI stage + 1/4 at Flowering)		

Table-4.2.2.3.(R): Summary of data on grain yield and ancillary characteres of trial on effect of nitrogen scheduling and dosage on aerobic rice during Rabi - 2012-13.

Nitrogen dose	Nitrogen Scheduling	KARAIKAL		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
100% RDN (M1)	F1	1.95	153	1.35
	F2	2.12	143	1.57
	F3	2.27	133	1.81
	F4	3.25	160	2.14
	F5	2.71	151	1.90
	F6	3.03	163	1.96
125% RDN (M2)	F1	3.25	152	2.25
	F2	3.35	144	2.46
	F3	3.79	156	2.66
	F4	5.30	153	3.67
	F5	4.76	185	2.70
	F6	5.19	179	3.07
C.D.(0.05)				
M at same F		0.26	12.27	0.08
F at same M		0.24	12.08	0.13
Mean of Nitrogen dose				
M1		2.55	150	1.79
M2		4.27	162	2.80
C.D.(0.05)		0.04	5.74	0.14
C.V.(%)		0.90	2.57	4.33
Mean of nitrogen schedules	F1	2.60	153	1.80
	F2	2.74	144	2.02
	F3	3.03	145	2.23
	F4	4.27	156	2.91
	F5	3.73	168	2.30
	F6	4.11	171	2.51
C.D.(0.05)		0.18	8.68	0.06
C.V.(%)		4.49	4.62	2.17
Experimental Mean		3.41	156	2.30
Soil type		Sandy Clay Loam		
pH		7.36		
Variety		ADT (R)45		
Nitrogen dose (kg/ha)		M1	100 % RDN: 120 kg N	
		M2	125 % RDN: 150 kg N	
Nitrogen schedule		F1	N-2 splits ( ½ Basal + ½ PI stage)	
		F2	N-2 splits (½ 10-12 DAE + ½ PI stage)	
		F3	N-3 splits ( Basal + AT + PI stage)	
		F4	N-3 splits ( 10-12 DAE + AT + PI stage)	
		F5	N-4 splits ( ¼ Basal + ¼ AT stage + ¼ at PI stage + ¼ at Flowering)	
		F6	N-4 splits ( ¼ 10-12 DAE + ¼ AT stage + ¼ at PI stage + ¼ at Flowering)	

Table 4.2.2.4: Summary of data on grain yield and ancillary characters of trial on Integrated weed management in aerobic rice Kharif 2013

T.No.	Treatment	BANKURA			CHAKDHA			COIMBATORE			DHARWAD		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	3.86	396	1.67	5.78	345	2.79	3.52	291	2.15	6.22	367	4.03
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	3.58	374	1.45	4.90	310	2.6	3.52	274	2.03	5.15	290	3.57
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	3.03	337	1.39	4.52	298	2.53	2.55	260	1.95	2.83	138	3.17
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	3.47	363	1.47	4.58	292	2.42	3.35	287	2.06	4.05	255	3.26
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	4.11	411	1.75	5.68	322	2.68	3.42	295	2.12	5.92	342	3.75
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	3.72	384	1.55	4.85	306	2.58	3.43	254	2.02	3.44	235	3.20
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	3.12	347	1.38	4.32	290	2.48	2.67	254	1.92	2.13	111	2.81
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	2.57	306	1.43	3.29	267	2.38	3.13	252	1.92	1.42	86	2.79
9	Mechanical weeding/weeders at 20&45 DAS	2.82	322	1.38	5.73	338	2.7	3.38	260	1.72	6.15	353	3.72
10	Need based hand weeding	4.23	427	1.82	5.99	368	2.9	3.73	302	2.25	6.23	376	4.36
11	Unweeded control	1.32	165	0.66	3.24	252	2.29	1.73	163	1.50	-	-	-
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	1.50	41.47	0.53	0.2	11.33	0.11	0.42	23.16	0.15	0.64	29.87	0.35
	C.V	27.06	6.99	21.25	2.48	2.16	2.45	7.92	5.18	4.43	8.56	6.82	5.92
	<b>Expt. Mean</b>	<b>3.26</b>	<b>348</b>	<b>1.45</b>	<b>4.81</b>	<b>308</b>	<b>2.58</b>	<b>3.13</b>	<b>263</b>	<b>1.97</b>	<b>4.35</b>	<b>255</b>	<b>3.47</b>
	Soil type	Sandy loam			Clay loam			Clay loam			Silty Clay loam		
	pH	5.5			7.5			7.0			6.4		
	Variety	Puspa (IET 17509)			Satabdi (IET 4786)			CORH 3			MGD-101		

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

Table-4.2.24 (Contd..)

T.No.	Treatment	FAIZABAD			GANGAVATHI			HATHWARA			JAGDALPUR		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	2.98	99	1.10	3.45	273	2.42	4.38	218	2.35	3.62	212	3.1
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	3.78	83	1.27	3.01	281	2.24	3.88	209	2.24	3.16	178	2.73
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	2.59	49	1.13	1.28	139	2.15	3.38	199	2.30	3.51	210	3.03
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	2.87	21	1.09	3.25	297	2.40	3.43	191	2.18	2.83	155	2.63
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	2.59	37	1.08	3.82	305	2.57	4.13	206	2.31	3.32	196	3.03
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) +2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	2.68	44	1.16	2.49	252	2.38	3.80	200	2.31	2.75	149	2.53
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	2.76	21	1.07	1.90	214	1.89	3.22	195	2.20	1.58	95	2.07
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	1.59	23	1.08	0.84	109	1.81	3.16	196	2.20	-	-	-
9	Mechanical weeding/weeders at 20&45 DAS	3.68	45	1.04	2.13	246	2.39	3.67	196	2.16	-	-	-
10	Need based hand weeding	3.99	52	1.12	3.39	281	2.17	4.52	205	2.27	-	-	-
11	Unweeded control	0.67	20	1.09	0.84	145	1.87	1.25	111	2.10	-	-	-
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	2.87	46	0.89	-	-	-	-	-	-	-	-	-
	<i>C.D. (0.05)</i>	0.68	5.99	0.12	0.87	61.85	0.78	0.39	11.65	0.09	0.88	16.83	0.41
	<i>C.V</i>	14.67	7.86	6.43	21.33	15.72	20.63	6.55	3.54	2.44	16.64	5.54	8.33
	<b>Expt. Mean</b>	<b>2.75</b>	<b>45</b>	<b>1.09</b>	<b>2.40</b>	<b>231</b>	<b>2.21</b>	<b>3.53</b>	<b>193</b>	<b>2.24</b>	<b>2.97</b>	<b>171</b>	<b>2.73</b>
	Soil type	Sandy loam			Black Clay			Sandy clay			-		
	pH	7.6			8.3			5.6			-		
	Variety	NDR 97			GGB - 05-01			Sahbhagidhan			-		

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

Table-4.2.24 (Contd..)

T.No.	Treatment	KOTA			PATNA-ARI			PARBHANI			PUSA		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispiribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	4.73	364	3.62	5.25	215	2.67	1.78	275	-	4.17	269	2.90
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	3.85	311	3.23	3.58	170	2.43	1.74	233	-	4.11	265	2.90
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	2.87	277	2.94	2.97	159	2.63	1.83	254	-	3.91	255	2.91
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	3.74	318	3.15	4.03	195	2.33	1.76	245	-	3.76	248	2.88
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispiribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	4.42	342	3.41	4.03	200	2.60	1.91	278	-	3.93	258	2.89
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	3.78	305	3.19	3.72	136	2.63	1.65	239	-	3.68	239	2.92
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	2.73	269	2.90	2.69	137	2.40	1.90	260	-	3.72	245	2.90
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	2.49	234	2.68	3.14	164	2.60	1.18	163	-	-	-	-
9	Mechanical weeding/weeders at 20&45 DAS	4.87	364	3.66	3.72	178	2.43	2.03	283	-	4.12	267	2.89
10	Need based hand weeding	5.23	390	3.89	5.83	248	2.77	1.89	287	-	4.35	274	2.92
11	Unweeded control	1.75	169	2.47	1.06	76	2.33	0.56	157	-	1.81	201	2.41
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	0.38	31.66	0.32	0.85	39.15	0.33	0.27	22.56		0.49	26.79	0.28
	C.V	6.03	6.12	5.87	13.73	13.45	7.72	9.53	5.44		7.66	6.19	5.62
	<b>Expt. Mean</b>	<b>3.68</b>	<b>303.91</b>	<b>3.19</b>	<b>3.64</b>	<b>171</b>	<b>2.53</b>	<b>1.66</b>	<b>243</b>		<b>3.75</b>	<b>252</b>	<b>2.85</b>
	Soil type	Clay loam			Clay loam			-			Silty loam		
	pH	7.55			7.00			-			8.30		
	Variety	IR 64			BRR 0006			PBNR-032			Arize 6444		

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

Table-4.2.24 (Contd..)

T.No.	Treatment	REWA			SABOUR			VADGOAN			Over all Mean	Rank
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)		
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%/SC)@35 g.a.i./ha (15-20 DAS)	4.31	336	2.30	5.07	203	2.43	4.91	426	3.63	4.27	2
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	4.31	318	2.27	4.83	193	2.32	4.50	391	3.33	3.86	5
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	6.42	340	1.53	4.38	175	2.10	4.02	349	2.98	3.34	8
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	4.72	387	1.90	5.08	203	2.44	5.31	461	3.93	3.75	6
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%/SC)@35 g.a.i./ha (15-20DAS)	5.33	341	2.43	4.95	198	2.38	4.58	397	3.39	4.14	3
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	4.53	317	2.63	4.82	193	2.31	4.42	384	3.28	3.58	7
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	5.42	341	2.47	4.27	171	2.05	4.26	369	3.15	3.11	9
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	4.33	302	2.20	4.57	183	2.19	3.73	324	2.76	2.73	10
9	Mechanical weeding/weeders at 20&45 DAS	5.36	383	1.50	4.77	191	2.29	4.40	381	3.26	4.06	4
10	Need based hand weeding	4.64	341	2.43	5.17	207	2.48	5.58	484	4.13	4.63	1
11	Unweeded control	5.36	240	2.07	3.42	155	2.02	1.60	206	2.19	1.89	11
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	0.49	8.72	0.37	0.35	14.15	0.17	0.57	49.8	0.43		
	C.V	5.75	1.54	9.93	4.4	4.41	4.47	7.84	7.70	7.62		
	<b>Expt. Mean</b>	<b>4.97</b>	<b>331</b>	<b>2.16</b>	<b>4.66</b>	<b>188</b>	<b>2.27</b>	<b>4.30</b>	<b>379</b>	<b>3.28</b>		
	Soil type	Sandy Clay laom			Loamy			Medium				
	pH	6.9			7.1			7.8				
	Variety	PS 3			-			Phule Samruddhi (VDN - 29)				

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

Table 4.2.24 (Contd..)

T.No.	Treatment	VARANASI			Rank	T.No.	Treatment	ADUTHURAI			Rank
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)				Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	
1	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + Bispyribac sodium (10%SC) @ 35 g a.i./ha (15-20 DAS)	4.73	336	2.62	3	1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	3.06	292	2.63	4
2	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + 2,4-D Na salt (80 WP) @ 0.06 kg a.i./ha (20-25 DAS)	4.00	189	2.35	8	2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	2.78	278	2.44	8
3	Pendimethalin (38.7EC) @1.0 kg a.i./ha (3-4 DAS) + Straw mulching @ 4.0 t/ha	3.06	165	2.38	10	3	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	2.79	272	2.37	7
4	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuron methyl) 20 WP @ 40 g a.i./ha	4.33	277	2.60	6	4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	2.76	276	2.40	10
5	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + Bispyribac sodium (10%SC) @ 35 g a.i./ha (15-20 DAS)	4.56	308	2.57	4	5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	3.14	294	2.68	3
6	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + 2,4-D Na salt (80 WP) @ 0.06 kg a.i./ha (20-25 DAS)	3.89	194	2.10	9	6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	2.77	274	2.42	9
7	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + Straw mulching @ 4.0 t/ha	3.00	210	1.80	11	7	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	2.94	278	2.42	6
8	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuron methyl) 20 WP @ 40 g a.i./ha	4.23	208	2.36	7	8	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	2.96	274	2.48	5
9	Intercropping with Daicha (1:1 ratio of paddy and daicha) and incorporation at MT stage	4.39	295	2.45	5	9	Mechanical weeding/weeders at 20&45 DAS	3.43	334	2.95	2
10	Mechanical weeding/weeders at 20 & 45 DAS	4.78	348	2.54	2	10	Need based hand weeding	4.10	371	3.00	1
11	Need based hand weeding	4.79	351	2.58	1	11	Unweeded control	0.79	67	2.15	11
12	Unweeded control	1.46	85	1.66	12	12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	
	C.D. (0.05)	0.17	13.85	0.08			C.D. (0.05)	0.22	20.35	0.18	
	C.V	2.61	3.31	1.92			C.V	4.55	4.37	4.22	
	<b>Expt. Mean</b>	<b>3.93</b>	<b>247</b>	<b>2.33</b>			<b>Expt. Mean</b>	<b>2.86</b>	<b>274</b>	<b>2.54</b>	
	Soil type	Sandy loam					Soil type	Clay			
	pH	7.2					pH	7.2			
	Variety	HUR 3022					Variety	ADT 45			

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

Table-4.224 (Contd..)

T.No.	Treatment	Weed dry weight (g/m <sup>2</sup> )								
		BNK	CKD	CBT	FZB	GNG	HTW	PNT (ARI)	RWA	VDG
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	20.92	33.83	14.78	65.83	21.70	28.67	135	30.27	34.34
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	22.81	36.90	21.68	71.27	30.43	49.00	131	27.00	49.09
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	-	30.73	25.15	70.2	62.53	52.67	139	24.07	64.39
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	23.09	37.53	24.23	81.27	28.80	39.67	123	30.23	26.55
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	18.78	29.23	16.01	80.23	19.40	35.00	124	31.30	45.77
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	22.22	34.27	22.16	80.34	38.30	35.33	137	24.53	53.05
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	-	33.83	26.38	82.13	56.13	46.33	139	24.53	59.61
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	-	34.30	39.39	98.17	68.30	67.67	133	30.93	70.89
9	Mechanical weeding/weeders at 20&45 DAS	-	34.77	16.12	44.9	11.86	33.00	133	23.87	52.76
10	Need based hand weeding	-	33.00	13.62	40.53	2.23	20.33	133	31.00	22.31
11	Unweeded control	-	33.47	55.63	190.37	78.27	118.00	130	24.87	127.69
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	90.4	-	-	-	-	-
	<i>C.D. (0.05)</i>	0.79	0.99	0.31	0.07	3.77	14.03	18.29	0.16	0.53
	<i>C.V</i>	8.99	9.96	3.64	0.49	39.9	17.23	8.1	1.81	4.31
	<b>Expt. Mean</b>	<b>4.68</b>	<b>5.82</b>	<b>4.93</b>	<b>8.96</b>	<b>5.55</b>	<b>47.79</b>	<b>132.61</b>	<b>5.28</b>	<b>7.26</b>

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate



Table-4.2.24 (Contd..)

T. No	Treatment	KOTA		DHARWAD	SABOUR	T.N o.	Treatment	VAR	T. No	Treatment	ADT
		Dry Weight of weeds /m2 at heading stage(60 DAS)	Total no. of weeds/m2 at heading stage(60 DAS)	*Weed Dry Weight (10 days after Herbicide application)	Total Weed Dry weight (g)						
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	24.25	11.00	3.43	17.53	1	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + Bispyribac sodium (10%SC) @ 35 g.a.i./ha (15-20 DAS)	30.95	1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	4.79
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4-D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	45.88	29.00	6.61	17.96	2	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + 2,4-D Na salt (80 WP) @ 0.06 kg a.i./ha (20-25 DAS)	69.21	2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4-D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	5.24
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	84.47	53.00	6.75	18.28	3	Pendimethalin (38.7EC) @1.0 kg a.i./ha (3-4 DAS) + Straw mulching @ 4.0 t/ha	93.32	3	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	5.67
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	44.30	24.00	7.89	23.17	4	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuron methyl) 20 WP @ 40 g a.i./ha	58.39	4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	6.04
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	30.18	16.00	4.04	22	5	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + Bispyribac sodium (10%SC) @ 35 g.a.i./ha (15-20 DAS)	36.32	5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	5.24
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	48.86	35.00	7.15	21.83	6	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + 2,4-D Na salt (80 WP) @ 0.06 kg a.i./ha (20-25 DAS)	76.95	6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	6.35
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	92.80	62.67	10.64	21.97	7	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + Straw mulching @ 4.0 t/ha	119.1	7	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	5.69
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	121.60	76.00	21.98	22.21	8	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuron methyl) 20 WP @ 40 g a.i./ha	65.27	8	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	5.04
9	Mechanical weeding/weeders at 20&45 DAS	21.73	9.00	1.97	16.35	9	Intercropping with Daicha (1:1 ratio of paddy and daicha) and incorporation at MT stage	51.46	9	Mechanical weeding/weeders at 20&45 DAS	4.13
10	Need based hand weeding	12.57	5.33	0.79	49.39	10	Mechanical weeding/weeders at 20 & 45 DAS	29.68	10	Need based hand weeding	1.19
11	Unweeded control	236.75	127.00	29.15	49.39	11	Need based hand weeding	27.98	11	Unweeded control	32.04
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	12	Unweeded control	167.5	12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-
	C.D. (0.05)	9.44	7.78	2.78	2.81		C.D. (0.05)	13.63		C.D. (0.05)	0.18
	C.V	7.99	11.22	17.9	6.47		C.V	11.69		C.V	3.97
	<b>Expt. Mean</b>	<b>69.4</b>	<b>40.73</b>	<b>9.13</b>	<b>25.46</b>		<b>Expt. Mean</b>	<b>68.84</b>		<b>Expt. Mean</b>	<b>2.61</b>

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

Table-4.224 (Contd..)

T.No.	Treatment	Before 5 days of herbicide application (Weed population No./m <sup>2</sup> )								
		BANKURA			CHAKDHA			DHARWAD		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	299.00(17.27)	341.67(18.35)	181.33(13.47)	5.00(2.34)	5.67(2.47)	4.00(2.11)	22.00(4.74)	1.33(1.34)	46.33(6.84)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20–25 DAS)	297.00(17.12)	391.33(19.74)	170.67(13.01)	3.33(1.95)	5.00(2.27)	4.00(2.09)	40.67(6.41)	1.33(1.34)	91.67(9.59)
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	322.00(17.93)	299.00(17.20)	169.67(12.92)	4.00(2.09)	2.33(1.64)	4.00(2.11)	20.00(4.50)	7.00(2.73)	111.67(10.59)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	288.67(16.92)	335.33(18.26)	265.33(16.22)	4.67(2.26)	5.00(2.34)	6.00(2.54)	45.00(6.73)	4.33(2.20)	111.33(10.56)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	311.67(17.56)	331.33(18.11)	193.67(13.76)	4.00(2.08)	6.33(2.61)	7.00(2.71)	25.33(5.07)	2.67(1.77)	54.67(7.43)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20–25 DAS)	-	-	-	5.67(2.47)	3.67(2.02)	4.67(2.26)	42.33(6.52)	1.67(1.46)	100.33(10.02)
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	-	-	-	3.00(1.86)	2.67(1.74)	4.33(2.16)	48.00(6.95)	3.67(2.04)	163.67(12.81)
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	-	-	-	2.67(1.74)	6.00(2.54)	4.33(2.18)	132.00(11.51)	9.00(3.06)	305.67(17.49)
9	Mechanical weeding/weeders at 20&45 DAS	-	-	-	4.00(2.08)	5.67(2.45)	6.33(2.60)	11.67(3.48)	3.67(2.02)	25.67(5.11)
10	Need based hand weeding	-	-	-	6.00(2.54)	4.67(2.21)	4.33(2.16)	4.33(2.16)	1.00(1.22)	11.00(3.36)
11	Unweeded control	-	-	-	5.67(2.47)	5.33(2.40)	5.33(2.40)	185.67(13.55)	13.33(3.72)	393.67(19.83)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	4.13	4.64	3.62	0.55	0.77	0.59	1.28	0.40	0.96
	C.V	12.64	13.43	13.84	14.95	20.21	15.00	11.52	11.29	5.45
	<b>Expt. Mean</b>	<b>17.36</b>	<b>18.33</b>	<b>13.88</b>	<b>2.17</b>	<b>2.24</b>	<b>2.30</b>	<b>6.51</b>	<b>2.08</b>	<b>10.33</b>

DAS = (Days after sowing) LSC = Liquid Soluble concentrate (Figures in parantheses are the transformed means)

Table-4.224 (Contd..)

T.No.	Treatment	Before 5 days of herbicide application (Weed population No./m <sup>2</sup> )								
		GANGAVATHI			HATHWARA			PANTNAGAR		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	8.67(2.83)	10.33(3.22)	35.67(5.83)	31.00(5.60)	5.67(2.28)	22.67(4.79)	136.33(11.69)	5.00(2.28)	5.00(2.32)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	3.33(1.93)	5.67(2.44)	22.67(4.68)	36.67(6.07)	16.67(4.08)	36.67(5.77)	137.00(11.72)	7.33(2.66)	5.00(2.28)
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	3.67(2.03)	10.33(3.15)	15.00(3.80)	21.67(4.66)	25.67(5.09)	11.33(3.44)	128.67(11.35)	7.67(2.81)	3.00(1.79)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	2.33(1.57)	8.00(2.89)	31.67(5.43)	25.67(5.07)	26.00(5.10)	25.33(5.00)	133.67(11.57)	8.67(2.98)	3.67(2.02)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	9.33(3.12)	8.00(2.68)	43.67(6.59)	24.33(4.95)	2.00(1.32)	41.67(6.00)	142.33(11.92)	7.67(2.73)	4.00(2.06)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	3.33(1.55)	4.00(2.08)	19.00(4.27)	34.67(5.80)	0.33(0.88)	40.67(6.33)	133.67(11.54)	11.00(3.37)	4.00(2.08)
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	3.33(1.93)	24.33(4.70)	19.33(4.42)	21.67(4.64)	17.67(4.22)	14.33(3.60)	139.33(11.80)	5.67(2.40)	3.33(1.90)
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	16.00(4.03)	27.67(5.11)	25.67(5.05)	46.33(6.83)	23.67(4.88)	12.00(3.37)	141.33(11.91)	4.00(2.00)	3.00(1.79)
9	Mechanical weeding/weeders at 20&45 DAS	14.33(3.83)	20.67(4.40)	53.33(6.70)	55.00(7.39)	12.33(3.10)	16.67(4.03)	126.67(11.25)	4.00(2.09)	3.33(1.90)
10	Need based hand weeding	26.67(4.97)	25.33(5.07)	35.67(5.57)	88.33(9.38)	48.00(6.92)	17.67(4.24)	130.67(11.44)	5.67(2.46)	2.67(1.72)
11	Unweeded control	40.67(6.19)	-	44.67(6.65)	-	-	-	139.33(11.80)	6.00(2.47)	2.67(1.74)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	1.84	1.92	2.97	1.66	1.81	2.59	1.40	1.30	0.99
	C.V	34.96	31.27	32.54	16.01	27.89	32.47	7.08	29.65	29.61
	<b>Expt. Mean</b>	<b>3.09</b>	<b>3.57</b>	<b>5.36</b>	<b>6.04</b>	<b>3.79</b>	<b>4.66</b>	<b>11.63</b>	<b>2.57</b>	<b>1.96</b>

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.24 (Contd..)

T.No.	Treatment	Before 5 days of herbicide application (Weed population No./m <sup>2</sup> )								
		REWA			SABOUR			VADGAON		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	33.33(5.82)	18.67(4.37)	27.67(5.30)	4.25(2.15)	6.68(2.67)	6.01(2.55)	1.00(1.22)	1.00(1.22)	1.33(1.34)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	27.00(5.24)	13.33(3.72)	21.67(4.66)	4.96(2.32)	7.10(2.75)	6.40(2.62)	1.33(1.34)	1.33(1.34)	2.00(1.58)
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	35.00(5.88)	14.00(3.80)	24.00(4.95)	5.03(2.35)	7.28(2.79)	6.59(2.66)	2.00(1.58)	1.67(1.46)	2.33(1.68)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	32.33(5.73)	13.00(3.67)	27.00(5.24)	4.81(2.30)	8.56(3.01)	5.87(2.52)	1.00(1.22)	0.67(1.05)	1.00(1.22)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	30.33(5.55)	16.67(4.13)	16.33(4.10)	7.04(2.75)	10.71(3.34)	6.65(2.67)	1.00(1.22)	1.00(1.22)	1.33(1.34)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	34.67(5.93)	18.00(4.29)	27.00(5.24)	5.99(2.55)	10.48(3.31)	6.69(2.68)	1.33(1.34)	1.33(1.34)	2.00(1.58)
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	35.67(5.96)	13.33(3.72)	29.00(5.43)	5.97(2.54)	10.45(3.31)	6.56(2.66)	1.33(1.34)	1.33(1.34)	2.33(1.68)
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	32.33(5.73)	12.67(3.63)	17.67(4.26)	6.01(2.55)	10.54(3.32)	6.58(2.66)	2.00(1.58)	1.67(1.46)	2.33(1.68)
9	Mechanical weeding/weeders at 20&45 DAS	35.00(5.95)	18.33(4.34)	34.00(5.86)	6.47(2.63)	10.17(3.26)	6.74(2.69)	1.33(1.34)	1.33(1.34)	2.00(1.58)
10	Need based hand weeding	30.33(5.55)	16.33(4.10)	23.67(4.91)	3.99(2.12)	6.81(2.70)	6.40(2.62)	1.00(1.22)	0.67(1.05)	1.00(1.22)
11	Unweeded control	27.67(5.30)	14.67(3.89)	17.33(4.22)	11.17(3.40)	20.50(4.58)	20.32(4.56)	3.33(1.95)	3.00(1.86)	4.67(2.26)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	0.85	0.36	0.53	0.40	0.36	0.29	0.17	0.24	0.18
	C.V	8.79	5.31	6.27	9.39	6.73	5.98	7.33	10.34	6.63
	<b>Expt. Mean</b>	<b>5.69</b>	<b>3.97</b>	<b>4.93</b>	<b>2.51</b>	<b>3.18</b>	<b>2.81</b>	<b>1.40</b>	<b>1.34</b>	<b>1.56</b>

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.2.4 (Contd...)

T.No.	Treatment	Before 5 days of herbicide application (Weed population No./m <sup>2</sup> )		
		ADUTHURAI		
		Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	10.67(3.34)	8.22(2.95)	3.22(1.91)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	10.67(3.34)	7.00(2.74)	3.78(2.03)
3	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	11.00(3.39)	7.33(2.79)	4.22(2.16)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	10.33(3.28)	7.11(2.75)	4.33(2.19)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	9.89(3.21)	7.22(2.77)	2.22(1.65)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	10.67(3.34)	7.78(2.87)	3.89(2.08)
7	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	11.44(3.45)	6.89(2.71)	2.78(1.79)
8	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	11.78(3.50)	8.22(2.94)	3.67(2.04)
9	Mechanical weeding/weeders at 20&45 DAS	18.55(4.36)	9.56(3.16)	7.56(2.84)
10	Need based hand weeding	4.67(2.27)	04.11(2.11)	5.00(2.34)
11	Unweeded control	26.33(5.18)	12.00(3.53)	33.89(5.86)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-
	C.D. (0.05)	0.41	0.47	0.47
	C.V	6.89	9.59	11.17
	Expt. Mean	3.51	2.85	2.44

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.2.4 (Contd...)

T.No.	Treatment	After 10 days of herbicide application (Weed population-No/m <sup>2</sup> )								
		DHARWAD			BANKURA			CHAKDHA		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	53.67(7.36)	3.00(1.86)	60.33(7.78)	71.33(8.45)	58.67(7.61)	57.33(7.50)	2.33(1.68)	2.00(1.56)	2.00(1.56)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	46.67(6.87)	1.67(1.44)	63.33(7.98)	241.67(15.45)	271.67(16.44)	33.33(5.76)	1.33(1.34)	1.33(1.34)	1.67(1.46)
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	7.33(2.78)	2.67(1.77)	79.33(8.93)	61.67(7.87)	32.33(5.70)	30.00(5.50)	1.33(1.27)	2.33(1.68)	1.67(1.44)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	50.00(7.09)	4.67(2.26)	70.00(8.38)	94.67(9.75)	116.00(10.77)	126.00(11.24)	1.33(1.34)	2.33(1.66)	1.67(1.46)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	55.00(7.43)	5.33(2.41)	52.67(7.19)	73.33(8.57)	55.33(7.46)	72.33(8.43)	2.00(1.56)	2.00(1.58)	1.67(1.46)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	51.67(7.20)	2.00(1.56)	68.33(8.29)	169.67(12.98)	218.00(14.71)	27.00(5.21)	1.33(1.29)	1.00(1.17)	2.33(1.68)
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	58.33(7.66)	4.67(2.27)	65.00(7.97)	24.67(4.95)	29.00(5.42)	23.67(4.88)	1.67(1.46)	1.00(1.17)	2.00(1.56)
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	91.00(9.56)	6.00(2.53)	111.33(10.57)				1.33(1.34)	2.67(1.74)	1.67(1.46)
9	Mechanical weeding/weeders at 20&45 DAS	11.00(3.38)	3.67(2.02)	10.33(3.26)				1.33(1.34)	2.67(1.74)	1.67(1.46)
10	Need based hand weeding	4.00(2.06)	1.00(1.22)	5.67(2.43)				0.67(1.05)	1.33(1.27)	1.33(1.34)
11	Unweeded control	125.00(11.13)	9.00(3.08)	121.00(11.02)				7.00(2.73)	5.00(2.34)	2.33(1.68)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	1.15	0.39	1.42	2.19	2.10	1.66	0.54	0.65	0.44
	C.V	10.22	11.18	10.97	12.64	12.12	13.49	21.12	24.31	16.96
	Expt. Mean	6.59	2.04	7.62	9.72	9.73	6.93	1.49	1.57	1.51

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.24 (Contd..)

T.No.	Treatment	After 10 days of herbicide application (Weed population-No/m <sup>2</sup> )								
		PANTNAGAR			GANGAVATHI			HATHWARA		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	59.00(7.70)	1.67(1.39)	0.67(1.00)	10.33(3.08)	18.33(3.65)	13.33(3.24)	1.67(1.39)	1.67(1.39)	2.67(1.64)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	66.33(8.17)	5.00(2.28)	2.67(1.76)	6.67(2.64)	28.00(4.51)	10.67(3.08)	2.33(1.64)	1.00(1.17)	2.33(1.57)
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	85.00(9.23)	6.00(2.53)	1.33(1.29)	2.67(1.77)	11.67(3.19)	31.00(5.22)	18.00(4.28)	24.33(4.91)	3.33(1.79)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	72.33(8.52)	8.67(2.98)	3.67(2.02)	2.67(1.72)	23.33(4.18)	2.33(1.68)	8.33(2.95)	15.33(3.73)	4.67(2.04)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	68.00(8.25)	1.33(1.29)	1.67(1.46)	3.00(1.62)	35.33(5.92)	12.67(3.57)	15.33(3.85)	0.33(0.88)	3.00(1.62)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	54.00(7.37)	3.00(1.86)	0.67(1.05)	9.33(3.13)	39.33(6.10)	20.33(4.40)	39.00(6.28)	1.33(1.27)	2.00(1.43)
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	58.33(7.66)	4.67(2.16)	2.67(1.74)	10.00(2.99)	28.33(5.13)	34.33(5.62)	28.00(5.28)	18.33(4.13)	15.33(3.77)
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	102.00(10.11)	4.67(2.18)	4.00(2.06)	9.33(3.13)	30.33(5.09)	66.33(7.70)	68.00(8.14)	23.00(4.83)	26.33(4.52)
9	Mechanical weeding/weeders at 20&45 DAS	98.33(9.93)	1.67(1.46)	1.67(1.44)	3.67(2.00)	10.67(3.16)	28.33(4.98)	20.33(4.56)	16.00(3.94)	8.67(3.00)
10	Need based hand weeding	55.33(7.46)	2.00(1.56)	0.67(1.00)	2.00(1.58)	19.67(4.45)	27.67(5.05)	17.67(4.18)	9.00(3.07)	11.00(3.39)
11	Unweeded control	163.67(12.78)	12.33(3.57)	5.67(2.48)	9.67(3.13)	17.67(3.49)	17.00(4.15)	190.33(13.80)	108.00(10.23)	33.67(5.83)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	1.08	0.98	0.73	1.33	3.75	2.73	1.47	2.07	2.09
	C.V	7.19	27.32	27.11	32.17	49.61	36.23	16.83	33.81	44.13
	Expt. Mean	8.84	2.11	1.57	2.44	4.44	4.43	5.12	3.60	2.78

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.24 (Contd..)

T.No.	Treatment	After 10 days of herbicide application (Weed population-No/m <sup>2</sup> )					
		REWA			SABOUR		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	7.67(2.85)	3.00(1.86)	4.67(2.26)	2.28(1.66)	2.59(1.75)	1.87(1.54)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	12.00(3.53)	7.00(2.63)	3.00(1.86)	2.36(1.69)	4.00(2.11)	1.50(1.41)
3	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	4.00(2.09)	3.00(1.86)	4.33(2.19)	2.32(1.68)	3.48(1.99)	2.85(1.83)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	7.67(2.85)	6.33(2.61)	6.67(2.67)	2.28(1.66)	2.69(1.78)	1.72(1.49)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	4.33(2.16)	3.33(1.95)	4.00(2.11)	2.70(1.79)	2.53(1.73)	1.86(1.53)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	8.00(2.90)	6.00(2.54)	6.67(2.67)	2.62(1.76)	3.68(2.04)	1.78(1.51)
7	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	6.00(2.53)	7.67(2.85)	5.33(2.35)	2.71(1.79)	3.59(2.02)	2.98(1.86)
8	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	4.67(2.22)	3.00(1.86)	4.33(2.19)	2.80(1.82)	3.10(1.90)	2.68(1.78)
9	Mechanical weeding/weeders at 20&45 DAS	12.67(3.62)	7.67(2.81)	3.00(1.86)	2.26(1.66)	2.47(1.71)	1.85(1.53)
10	Need based hand weeding	8.00(2.90)	6.00(2.54)	6.00(2.54)	1.83(1.52)	2.16(1.62)	1.67(1.47)
11	Un weeded	74.00(8.63)	22.33(4.77)	50.33(7.12)	10.68(3.34)	19.37(4.46)	20.06(4.53)
12	Local check	-	-	-	-	-	-
	C.D. (0.05)	0.67	0.63	0.51	0.25	0.27	0.19
	C.V	11.87	14.44	10.98	7.78	7.52	6.12
	Expt. Mean	<b>3.30</b>	<b>2.57</b>	<b>2.71</b>	<b>1.85</b>	<b>2.10</b>	<b>1.86</b>

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)



Table-4.2.2.4 (Contd...)

T.No.	Treatment	After 10 days of herbicide application (Weed population-No/m <sup>2</sup> )			No. of weeds/m <sup>2</sup> at heading stage (60 DAS)		
		VADGAON			KOTA		
		Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	3.33(1.95)	3.00(1.86)	4.67(2.26)	3.00(1.86)	4.00(2.11)	4.00(2.11)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	4.67(2.26)	4.33(2.18)	7.00(2.73)	10.00(3.23)	12.00(3.52)	7.33(2.78)
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	6.67(2.67)	6.00(2.53)	9.00(3.07)	15.00(3.93)	23.00(4.83)	15.00(3.92)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	2.33(1.68)	2.33(1.68)	3.67(2.03)	6.00(2.53)	8.00(2.90)	10.00(3.23)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	4.33(2.20)	4.00(2.11)	6.00(2.54)	4.00(2.11)	7.00(2.72)	5.00(2.32)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	5.33(2.41)	4.67(2.26)	7.00(2.73)	14.00(3.80)	15.00(3.93)	6.00(2.53)
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	5.67(2.48)	5.33(2.40)	8.33(2.96)	18.00(4.29)	24.00(4.95)	20.00(4.52)
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	6.67(2.67)	6.00(2.53)	9.67(3.17)	20.00(4.52)	32.00(5.69)	24.00(4.93)
9	Mechanical weeding/weeders at 20&45 DAS	5.33(2.41)	4.67(2.26)	7.00(2.73)	2.00(1.56)	5.33(2.41)	3.00(1.86)
10	Need based hand weeding	2.33(1.68)	2.00(1.56)	3.33(1.95)	1.00(1.17)	2.00(1.56)	1.00(1.22)
11	Unweeded control	12.33(3.57)	11.33(3.41)	17.67(4.24)	32.00(5.69)	55.00(7.45)	40.00(6.36)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-
	C.D. (0.05)	0.11	0.18	0.17	0.54	0.58	0.63
	C.V	2.62	4.75	3.62	10.05	8.94	11.32
	<b>Expt. Mean</b>	<b>2.36</b>	<b>2.25</b>	<b>2.76</b>	<b>3.15</b>	<b>3.82</b>	<b>3.25</b>

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.2.4 (Contd...)

T.No.	Treatment	After 10 days of herbicide application (Weed population-No/m <sup>2</sup> )			T.No.	Treatment	After 10 days of herbicide application (Weed population-No/m <sup>2</sup> )		
		ADUTHURAI					VARANASI		
		Grasses	Sedges	BLW			Grasses	Sedges	BLW
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	4.33(2.19)	7.22(2.77)	3.22(1.91)	1	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + Bispyribac sodium (10%SC) @ 35 g a.i./ha (15-20 DAS)	3.33(1.93)	5.33(2.39)	6.00(2.53)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	6.33(2.61)	7.11(2.75)	3.78(2.03)	2	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + 2,4-D Na salt (80 WP) @ 0.06 kg a.i./ha (20-25 DAS)	5.33(2.39)	9.33(3.13)	5.33(2.40)
3	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	6.56(2.65)	9.11(3.10)	4.22(2.16)	3	Pendimethalin (38.7EC) @1.0 kg a.i./ha (3-4 DAS) + Straw mulching @ 4.0 t/ha	5.67(2.47)	11.33(3.41)	6.67(2.67)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	5.22(2.38)	9.11(3.10)	4.33(2.19)	4	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuron methyl) 20 WP @ 40 g a.i./ha	4.33(2.16)	6.67(2.62)	4.67(2.26)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	4.56(2.24)	6.56(2.65)	2.22(1.65)	5	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + Bispyribac sodium (10%SC) @ 35 g a.i./ha (15-20 DAS)	6.33(2.56)	8.33(2.93)	8.33(2.95)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	7.00(2.74)	7.44(2.82)	3.89(2.08)	6	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + 2,4-D Na salt (80 WP) @ 0.06 kg a.i./ha (20-25 DAS)	9.33(3.11)	14.67(3.87)	5.00(2.29)
7	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	6.56(2.65)	6.00(2.53)	2.78(1.79)	7	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + Straw mulching @ 4.0 t/ha	10.67(3.33)	10.67(3.31)	9.67(3.17)
8	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	7.11(2.75)	8.78(3.04)	3.67(2.04)	8	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuron methyl) 20 WP @ 40 g a.i./ha	7.67(2.81)	7.33(2.73)	4.33(2.16)
9	Mechanical weeding/weeders at 20&45 DAS	7.11(2.75)	9.44(3.15)	7.56(2.84)	9	Intercropping with Daicha (1:1 ratio of paddy and daicha) and incorporation at MT stage	7.33(2.78)	9.67(3.18)	10.33(3.28)
10	Need based hand weeding	1.22(1.28)	3.78(2.04)	5.00(2.34)	10	Mechanical weeding/weeders at 20 & 45 DAS	3.67(2.02)	6.33(2.59)	4.67(2.23)
11	Unweeded control	38.33(6.23)	20.89(4.62)	33.89(5.86)	11	Need based hand weeding	2.67(1.77)	4.67(2.26)	6.33(2.58)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	12	Unweeded control	20.67(4.60)	38.33(6.23)	76.00(8.75)
	C.D. (0.05)	0.36	0.43	0.47		C.D. (0.05)	0.76	0.85	0.74
	C.V	7.62	8.44	11.17		C.V	16.84	15.65	14.10
	Expt. Mean	2.77	2.96	2.44		Expt. Mean	2.66	3.22	3.11

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.2.4 (Contd...)

T.No.	Treatment	Weed Control Rating						Crop Toxicity Rating	
		CBT	DWD	HTW	PNT	RWA	VDG	DWD	VDG
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	8.33(2.97)	8.00(2.92)	8.33(2.97)	7.33(2.80)	83.87(9.18)	7.33(2.80)	1.00(1.22)	1.00(1.22)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	6.67(2.68)	6.00(2.55)	8.00(2.91)	5.00(2.35)	69.87(8.39)	6.33(2.61)	1.00(1.22)	1.00(1.22)
3	Pendimethalin (38.7 EC) @ 1.00 kg a.i./ha (3-4 DAS) + Straw mulching @ 4 t/ha	7.00(2.74)	4.00(2.12)	6.67(2.68)	4.67(2.27)	76.03(8.64)	5.00(2.35)	1.00(1.22)	1.00(1.22)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 4 g.a.i./ha (25-30 DAS)	7.00(2.74)	5.00(2.35)	7.67(2.86)	6.00(2.55)	91.07(9.57)	8.00(2.92)	1.00(1.22)	1.00(1.22)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	8.33(2.97)	8.00(2.92)	8.67(3.03)	6.67(2.68)	83.93(9.19)	6.67(2.68)	1.00(1.22)	1.00(1.22)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	6.67(2.68)	5.00(2.35)	8.33(2.97)	4.67(2.27)	83.87(9.18)	6.00(2.55)	1.00(1.22)	1.00(1.22)
7	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Straw mulching @ 4 t/ha	7.33(2.80)	4.00(2.12)	7.33(2.80)	4.33(2.20)	85.20(9.26)	5.00(2.35)	1.00(1.22)	1.00(1.22)
8	Intercropping with Cow pea (7:1 ratio of paddy and cow pea) and incorporation at MT stage	-	3.00(1.87)	5.67(2.48)	3.67(2.04)	84.93(9.24)	4.67(2.26)	-	-
9	Mechanical weeding/weeders at 20&45 DAS	-	8.00(2.92)	7.33(2.80)	5.67(2.48)	90.43(9.54)	6.00(2.55)	-	-
10	Need based hand weeding	-	9.00(3.08)	9.67(3.19)	7.67(2.86)	81.93(9.08)	8.00(2.92)	-	-
11	Unweeded control	-	-	0.00(0.71)	1.00(1.22)	-	1.00(1.22)	-	-
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	-	-	-	-	-	-
		0.17	0.00	0.19	0.15	1.00	0.19		
	C.D. (0.05)	3.33	0.00	4.10	3.65	6.41	4.57	0.00	0.00
	C.V	2.80	0.00	2.67	2.34	9.13	2.47	0.00	0.00
	Expt. Mean							<b>0.00</b>	<b>0.00</b>

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.2.4 (Contd...)

T.No.	Treatment	ADT		T.No.	Treatment	VAR
		Weed Control Rating	Crop Toxicity Rating			Weed Control Rating
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	7.00(2.73)	2.33(1.68)	1	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + Bispyribac sodium (10%SC) @ 35 g a.i./ha (15-20 DAS)	9.33(3.14)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	6.33(2.61)	2.00(1.58)	2	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + 2,4-D Na salt (80 WP) @ 0.06 kg a.i./ha (20-25 DAS)	6.50(2.65)
3	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	6.33(2.61)	3.00(1.87)	3	Pendimethalin (38.7EC) @1.0 kg a.i./ha (3-4 DAS) + Straw mulching @ 4.0 t/ha	5.50(2.45)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	6.33(2.61)	3.33(1.95)	4	Pendimethalin (30EC) @1.0 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuron methyl) 20 WP @ 40 g a.i./ha	8.00(2.91)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	7.33(2.79)	2.33(1.68)	5	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + Bispyribac sodium (10%SC) @ 35 g a.i./ha (15-20 DAS)	9.00(3.08)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	6.00(2.55)	1.67(1.46)	6	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + 2,4-D Na salt (80 WP) @ 0.06 kg a.i./ha (20-25 DAS)	6.00(2.55)
7	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	6.33(2.61)	2.67(1.77)	7	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + Straw mulching @ 4.0 t/ha	5.00(2.34)
8	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	6.00(2.55)	3.33(1.95)	8	Butachlor 50 EC @ 1.5 kg a.i./ha (3-4 DAS) + (Chlorimuron + Metsulfuron methyl) 20 WP @ 40 g a.i./ha	7.50(2.83)
9	Mechanical weeding/weeders at 20&45 DAS	-	-	9	Intercropping with Daicha (1:1 ratio of paddy and daicha) and incorporation at MT stage	8.50(3.00)
10	Need based hand weeding	-	-	10	Mechanical weeding/weeders at 20 & 45 DAS	9.33(3.13)
11	Unweeded control	-	-	11	Need based hand weeding	9.66(3.19)
12	Optional treatment of early pre-emergence followed by post-emergence herbicide application	-	-	12	Unweeded control	1.00(1.22)
	<i>C.D. (0.05)</i>	0.19	0.25		<i>C.D. (0.05)</i>	0.10
	<i>C.V</i>	4.08	8.20		<i>C.V</i>	2.22
	<b>Expt. Mean</b>	<b>2.63</b>	<b>1.74</b>		<b>Expt. Mean</b>	<b>2.71</b>

DAS = (Days after sowing)

LSC = Liquid Soluble concentrate

(Figures in parantheses are the transformed means)

Table-4.2.2.4.(R): Summary of data on grain yield and ancillary characters of trial on Integrated weed management in aerobic rice Rabi 2012-13.

T.No.	Treatment	PUDUCHERRY											
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Weed dry weight (g)	5 days before Herbicide application weed population (No./m <sup>2</sup> )			10 days after Herbicide application weed population (No./m <sup>2</sup> )			Weed control rating	Crop toxicity
						Grasses	Sedges	BLW	Grasses	Sedges	BLW		
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	6.06	472	2.92	6.99	9.78 (3.20)	10.86 (3.37)	5.26 (2.40)	5.67 (2.48)	4.66 (2.27)	3.02 (1.87)	7.20 (2.77)	1.00 (1.22)
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2.4 D.Na salt (80WP) @0.06 kg.a.i./ha (20-25 DAS)	5.21	308	2.33	9.68	12.53 (3.61)	14.24 (3.84)	5.60 (2.46)	8.18 (2.94)	7.92 (2.90)	3.24 (1.93)	5.60 (2.47)	1.00 (1.22)
3	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15VSG) @ 15 g.a.i./ha (25-30 DAS)	5.66	392	2.60	7.55	10.56 (3.33)	12.81 (3.65)	5.08 (2.36)	7.86 (2.89)	6.46 (2.64)	2.73 (1.79)	6.40 (2.63)	1.00 (1.22)
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	6.26	499	3.13	6.17	9.96 (3.23)	10.89 (3.37)	4.92 (2.33)	4.34 (2.20)	3.80 (2.07)	2.46 (1.71)	8.87 (3.06)	1.00 (1.22)
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	5.90	438	2.67	7.40	9.98 (3.24)	12.51 (3.60)	6.02 (2.55)	7.42 (2.81)	5.97 (2.54)	3.75 (2.06)	7.13 (2.76)	1.00(1.22)
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2.4-D.Na salt (80WP) @ 0.06 kg.a.i./ha (20-25 DAS)	5.08	283	2.23	9.95	11.68(3.49)	15.49(4.00)	6.50(2.64)	8.56(3.01)	8.38(2.98)	4.63 (2.26)	5.10 (2.36)	1.00(1.22)
7	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15VSG) @ 15 g.a.i./ha (25-30 DAS)	5.28	356	2.43	8.25	10.91 (3.38)	13.52 (3.74)	5.60 (2.47)	8.19 (2.95)	6.95 (2.73)	3.07 (1.88)	5.93 (2.54)	1.00 (1.22)
8	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	6.12	477	2.92	6.96	8.98 (3.08)	10.73 (3.35)	4.87 (2.32)	6.00 (2.54)	4.48 (2.22)	2.91 (1.84)	8.50 (3.00)	1.00 (1.22)
9	Mechanical weeding/weeders at 20&45 DAS	4.99	262	2.00	9.94	13.62 (3.76)	14.58 (3.88)	6.25 (2.59)	8.93 (3.07)	8.49 (3.00)	4.15 (2.16)	4.37 (2.21)	1.00 (1.22)
10	Need based hand weeding	5.67	436	2.19	9.99	12.02 (3.54)	14.31 (3.85)	6.64 (2.66)	9.40 (3.15)	8.78 (3.05)	4.43 (2.22)	6.60 (2.66)	1.00 (1.22)
11	Uh weeded	3.67	237	1.97	12.45	13.04 (3.68)	14.39 (3.86)	6.41 (2.62)	17.11 (4.20)	19.36 (4.46)	8.57 (3.01)	1.00 (1.22)	1.00 (1.22)
12	Local check	-	-	-	-	-	-	-	-	-	-	-	-
	C.D. (0.05)	0.49	20	0.37	0.75	0.19	0.26	0.31	0.24	0.2	0.26	0.14	0
	C.V	5.25	3.17	8.76	5.05	3.32	4.11	7.23	4.86	4.26	7.34	3.21	0.02
	Expt. Mean	5.45	378	2.49	8.66	3.41	3.68	2.49	2.93	2.8	2.07	2.52	1.22
	Yield loss (%)	35.27											
	Soil type	Clayey Loam											
	pH	6.49											
	Variety	ADT 43											

DAS = (Days after sowing) EC = Emulsifiable Concentrate LSC = Liquid Soluble concentrate (Figures in paranthess are the transformed means)

Table-4.2.2.4.(R). (contd...)

T.No.	Treatment	PATTAMBI			
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Weed dry weight (g)
1	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4 DAS) + Bispyribac- sodium (10%SC)@35 g.a.i./ha (15-20 DAS)	1.84	264	1.30	11.33
2	Pendimethalin (30EC)@1.00 kg a.i./ha(3-4DAS) +2,4 D,Na salt (80WP) @0.06 kg.a.i /ha (20-25 DAS)	1.81	271	1.35	9.24
3	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	1.82	266	1.37	13.26
4	Pendimethalin (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	2.17	248	1.61	6.34
5	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + Bispyribac-sodium (10%SC)@35 g.a.i./ha (15-20DAS)	1.51	267	1.28	17.02
6	Butachlor (50EC)@1.5 kg/a.i./ha (3-4DAS) + 2,4-D,Na salt (80WP) @ 0.06 kg.a.i /ha (20-25 DAS)	1.84	252	1.44	21.41
7	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + Ethoxysulfuron (15WSG) @ 15 g.a.i./ha (25-30 DAS)	1.61	272	1.35	15.28
8	Butachlor (30EC) @ 1.00 kg a.i./ha (3-4 DAS) + (Chorimuron + Metsulfuronmethyl) 20WP @ 40 g.a.i./ha (25-30 DAS)	2.01	274	1.39	6.96
9	Mechanical weeding/weeders at 20&45 DAS	1.72	273	1.22	22.80
10	Need based hand weeding	2.24	305	1.42	3.30
11	Un weeded	0.44	109	1.07	56.36
12	Local check	-	-	-	-
	C.D. (0.05)	0.17	34.58	0.18	8.58
	C.V	5.65	7.98	7.78	30.22
	Expt. Mean	1.73	255	1.34	16.66
	Yield loss (%)	-	-	-	-
	Soil type	-	-	-	-
	pH	5.5	-	-	-
	Variety	Aiswarya	-	-	-

DAS = (Days after sowing) EC = Emulsifiable Concentrate LSC = Liquid Soluble concentrate

Table-4.2.3.1.a: Summary of data on grain yield and ancillary characters of rice from evaluation of long term effects of nutrition on SRI vis a vis Conventional flooded system rice on soil fertility and in RECS, Kharif - 2013

Treatment		ADHUTURAI				CHATHA			COIMBATORE				
Methods of crop establishment	Method of Nutrition	Grain yield (t/ha)	Panicle /m <sup>2</sup> (No.)	Panicle weight (g)	Weed dry weight (g)	Grain yield (t/ha)	Panicle/ m <sup>2</sup> (No.)	Panicle weight (g)	Grain yield (t/ha)	Panicle/ m <sup>2</sup> (No.)	Panicle weight (g)	Weed dry weight (g)	
M1 (SRI)	S1	8.52	455	2.74	3.80	3.53	180	1.83	7.89	466	2.63	8.23	
	S2	6.10	437	2.55	3.43	3.12	171	1.64	7.72	458	2.50	8.25	
	S3	5.77	427	2.44	2.53	2.62	156	1.50	6.90	449	2.48	8.17	
	S4	10.26	475	3.04	3.97	3.78	200	1.99	7.90	463	2.60	8.31	
	S5	3.19	296	2.13	1.53	2.12	159	1.41	4.32	392	2.30	8.04	
	S6	-	-	-	-	-	-	-	-	-	-	-	-
	S7	-	-	-	-	-	-	-	-	-	-	-	-
M2 (DS fb SRI)	S1	8.04	450	2.76	15.20	2.84	165	1.60	7.57	460	2.43	8.25	
	S2	5.86	426	2.44	12.30	3.01	162	1.56	7.47	448	2.33	8.26	
	S3	5.29	420	2.37	10.33	2.24	150	1.40	6.83	439	2.28	8.16	
	S4	8.80	462	2.83	17.27	3.38	180	1.81	7.56	457	2.41	8.29	
	S5	2.95	285	2.09	11.37	1.62	150	1.35	4.22	384	2.25	8.01	
	S6	-	-	-	-	-	-	-	-	-	-	-	-
	S7	-	-	-	-	-	-	-	-	-	-	-	-
M3 (TPR)	S1	7.59	340	2.64	9.10	2.73	161	1.60	7.17	423	2.38	8.84	
	S2	5.53	332	2.41	8.40	2.63	156	1.53	6.99	409	2.31	8.72	
	S3	4.89	323	2.35	6.33	2.08	150	1.40	6.69	400	2.20	8.65	
	S4	7.59	348	2.74	10.23	3.01	170	1.61	7.12	418	2.32	8.92	
	S5	2.46	276	2.03	4.30	1.41	150	1.35	3.68	373	2.09	8.09	
	S6	-	-	-	-	-	-	-	-	-	-	-	-
	S7	-	-	-	-	-	-	-	-	-	-	-	-
<b>C.D.(0.05)</b>													
Mand S		0.43	3.56	0.01	0.25	0.06	1.11	NS	NS	NS	NS	NS	
Sand M		0.39	3.25	0.01	0.26	0.06	1.05	0.22	NS	NS	NS	NS	
<b>Method of crop establishments</b>	M1	6.77	418	2.58	3.05	3.03	173	1.67	6.95	445	2.50	8.20	
	M2	6.19	409	2.50	13.29	2.62	162	1.55	6.73	438	2.34	8.19	
	M3	5.61	324	2.43	7.67	2.37	158	1.50	6.33	405	2.26	8.64	
<b>C.D. (0.05)</b>		0.11	1.1	0.01	0.2	0.03	0.56	0.014	0.19	6.79	0.05	0.13	
<b>C.V. (%)</b>		2.85	0.44	0.38	3.76	1.92	0.53	0.90	4.45	2.44	3.08	2.40	
<b>Method of Nutrition</b>	S1	8.05	415	2.71	9.37	3.03	169	1.68	7.54	450	2.48	8.44	
	S2	5.83	398	2.46	8.04	2.92	163	1.58	7.40	438	2.38	8.41	
	S3	5.32	390	2.39	6.4	2.31	152	1.43	6.81	429	2.32	8.33	
	S4	8.88	428	2.87	10.49	3.39	184	1.80	7.53	446	2.44	8.51	
	S5	2.87	285	2.08	5.73	1.71	153	1.37	4.07	383	2.21	8.05	
	S6	-	-	-	-	-	-	-	-	-	-	-	-
	S7	-	-	-	-	-	-	-	-	-	-	-	-
<b>CD (0.05)</b>		0.25	2.06	0.01	0.14	0.04	0.64	0.013	0.15	12.26	0.11	0.16	
<b>C.V. (%)</b>		4.15	0.55	0.31	1.85	1.42	0.40	0.82	2.33	2.94	4.67	2.00	
<b>Experimental Mean</b>		<b>6.19</b>	<b>383</b>	<b>2.50</b>	<b>8.01</b>	<b>2.67</b>	<b>164</b>	<b>1.57</b>	<b>6.67</b>	<b>429</b>	<b>2.37</b>	<b>8.35</b>	
Soil type		Clay				-			Clay Loam				
pH		7.20				-			7.50				
Variety		ADT 43				Basmati - 370			CO 51				

- M1 SRI Method  
M2 Direct Seeding  
M3 Normal Transplanting
- S1 100% of recommended inorganic fertilizers (120:60 :40 kg N K/ha)  
S2 50 % inorganic + 50%(equivalent of N dose) organic  
S3 100% of recommended dose through organic source (equivalent of N dose)  
S4 150 % recommended fertilizer dose  
S5 No fertilizer (Control)  
S6 50% inorganic + 50% through Bio fertilizers  
S7 Location specific fertilizer management

Table-4.2.3.1.a. Contd.....

Treatment		GRIDIH			KHUDWANI			MANDYA			
Methods of crop establishment	Method of Nutrition	Grain yield (t/ha)	Panicle/ m2 (No.)	Panicle weight (g)	Grain yield (t/ha)	Panicle/ m2 (No.)	Panicle weight (g)	Grain yield (t/ha)	Panicle e/m2 (No.)	Panicle weight (g)	Weed dry weight (g)
M1 (SRI)	S1	1.11	313	19.53	7.31	461	3.15	7.85	303	4.67	5.70
	S2	0.98	267	16.40	7.19	424	2.80	7.32	327	5.37	5.70
	S3	0.85	257	16.20	6.26	355	2.54	6.33	336	4.13	5.27
	S4	1.08	271	17.07	7.62	469	3.47	8.79	332	5.17	6.57
	S5	0.86	255	13.60	6.02	296	2.35	4.03	346	2.93	4.57
	S6	-	-	-	6.71	403	2.57	5.82	240	3.83	4.60
	S7	-	-	-	-	-	-	-	-	-	-
M2 (DS fb SRI)	S1	0.57	154	17.87	6.78	401	2.85	5.93	298	4.57	5.53
	S2	0.58	190	20.53	6.54	369	2.57	5.97	273	4.10	5.33
	S3	0.66	161	18.20	5.93	306	2.51	6.07	318	3.80	3.80
	S4	0.61	174	18.53	7.11	410	2.99	8.43	331	4.97	5.40
	S5	0.54	153	19.53	5.47	256	2.38	4.58	296	2.93	3.57
	S6	-	-	-	6.28	352	2.75	6.77	340	4.03	4.13
	S7	-	-	-	-	-	-	-	-	-	-
M3 (TPR)	S1	0.94	187	30.47	7.01	421	3.03	7.11	408	4.20	6.00
	S2	0.87	191	29.80	6.84	385	2.66	4.99	395	4.40	5.37
	S3	1.09	197	41.00	5.96	323	2.51	5.04	412	4.13	4.77
	S4	0.97	199	34.00	7.14	429	3.39	6.37	414	5.13	5.57
	S5	0.70	166	29.33	5.63	268	2.38	3.94	368	2.83	3.40
	S6	-	-	-	6.43	367	2.52	6.21	398	4.07	3.57
	S7	-	-	-	-	-	-	-	-	-	-
<b>C.D.(0.05)</b>											
<i>MandS</i>		NS	NS	NS	NS	NS	NS	0.65	34.98	0.35	NS
<i>SandM</i>		NS	NS	NS	NS	NS	NS	0.74	32.94	0.33	NS
<b>Method of crop establishments</b>	M1	0.98	273	16.56	6.85	401	2.81	6.69	314	4.35	5.40
	M2	0.59	166	18.93	6.35	349	2.67	6.29	309	4.07	4.63
	M3	0.91	188	32.92	6.50	366	2.75	5.61	399	4.13	4.78
<i>C.D. (0.05)</i>		0.08	11.98	NS	0.20	13.11	NS	0.60	13.58	NS	0.35
<i>C.V. (%)</i>		14.56	8.84	47.97	5.05	5.95	6.45	10.61	6.73	6.17	12.09
<b>Method of Nutrition</b>	S1	0.87	218	22.62	7.03	428	3.01	6.96	337	4.48	5.74
	S2	0.81	216	22.24	6.86	393	2.68	6.09	331	4.62	5.47
	S3	0.87	205	25.13	6.05	328	2.52	5.81	355	4.02	4.61
	S4	0.88	215	23.20	7.29	436	3.29	7.86	359	5.09	5.84
	S5	0.70	191	20.82	5.71	273	2.37	4.18	337	2.90	3.84
	S6	-	-	-	6.47	374	2.61	6.27	326	3.98	4.10
	S7	-	-	-	-	-	-	-	-	-	-
<i>CD (0.05)</i>		NS	NS	5.49	0.37	15.11	0.16	0.38	20.20	0.20	0.61
<i>C.V. (%)</i>		19.34	11.45	24.74	5.9	4.22	6.04	6.29	6.16	4.96	12.84
<b>Experimental Mean</b>		<b>0.83</b>	<b>209</b>	<b>22.80</b>	<b>6.57</b>	<b>372</b>	<b>2.75</b>	<b>6.20</b>	<b>341</b>	<b>4.18</b>	<b>4.94</b>
Soil type		lateritic soil			Silty Clay Loam			Red Sandy Loam			
pH		-			6.90			6.34			
Variety		-			Shalimar Rice-1			KRH4			

- M1 SRI Method  
M2 Direct Seeding  
M3 Normal Transplanting
- S1 100% of recommended inorganic fertilizers (120:60 :40 kg N K/ha)  
S2 50 % inorganic + 50% (equivalent of N dose) organic  
S3 100% of recommended dose through organic source (equivalent of N dose)  
S4 150 % recommended fertilizer dose  
S5 No fertilizer (Control)  
S6 50% inorganic + 50% through Bio fertilizers  
S7 Location specific fertilizer management



Table-4.2.3.1.a. Contd.....

Treatment		NAVSARI			NAWAGAM				PATNA (ARI)			
Methods of crop establishment	Method of Nutrition	Grain yield (t/ha)	Panicle /m2 (No.)	Panicle weight (g)	Grain yield (t/ha)	Panicle /m2 (No.)	Panicle weight (g)	Weed dry weight (g)	Grain yield (t/ha)	Panicle/m2 (No.)	Panicle weight (g)	Weed dry weight (g)
M1 (SRI)	S1	4.02	317	4.73	5.99	439	3.85	17.92	5.52	383	2.92	0.43
	S2	3.27	257	4.07	5.67	431	3.57	19.09	5.64	367	2.10	0.53
	S3	2.98	223	3.73	5.50	408	3.47	21.92	5.32	356	2.15	0.73
	S4	4.15	321	4.83	6.61	499	4.21	20.45	5.80	398	2.43	1.00
	S5	2.65	187	3.60	3.62	257	2.35	22.18	3.14	212	1.85	0.5
	S6	-	-	-	6.06	441	3.82	21.27	-	-	-	-
	S7	3.98	299	4.63	6.34	462	4.00	21.93	-	-	-	-
M2 (DS fb SRI)	S1	3.56	285	4.23	5.81	412	3.66	22.26	4.11	340	2.51	2.83
	S2	3.08	232	3.80	5.66	412	3.57	19.99	4.23	322	1.74	2.77
	S3	2.90	208	3.20	5.78	421	3.65	22.24	3.90	315	1.85	2.8
	S4	3.65	296	4.40	6.42	477	4.09	21.97	4.33	348	1.71	2.67
	S5	2.26	154	2.87	3.53	257	2.21	22.46	2.63	202	1.19	2.37
	S6	-	-	-	5.89	429	3.57	23.18	-	-	-	-
	S7	3.56	283	4.17	5.99	436	3.62	22.71	-	-	-	-
M3 (TPR)	S1	3.86	310	4.60	4.80	346	3.13	22.62	3.58	342	2.40	2.8
	S2	3.02	241	3.87	4.71	343	2.97	20.84	3.70	343	1.95	3.13
	S3	2.90	215	3.50	4.72	344	2.97	22.84	3.32	314	1.73	3.5
	S4	3.97	306	4.77	4.63	373	2.8	21.74	3.80	343	2.18	2.8
	S5	2.54	160	3.30	3.06	223	2.22	21.15	2.27	188	1.43	3.33
	S6	-	-	-	4.70	336	3.16	18.72	-	-	-	-
	S7	3.82	288	4.30	4.52	328	3.07	24.96	-	-	-	-
<b>C.D.(0.05)</b>												
<i>Mand S</i>		NS	NS	NS	NS	31.11	0.28	NS	0.22	10.49	NS	0.34
<i>S and M</i>		NS	NS	NS	0.55	29.37	0.27	NS	0.21	9.58	NS	0.32
<b>Method of crop establishments</b>	M1	3.51	267	4.27	5.68	420	3.61	20.68	5.09	343	2.29	0.64
	M2	3.17	243	3.78	5.58	406	3.48	22.12	3.84	306	1.80	2.69
	M3	3.35	253	4.06	4.45	328	2.90	21.84	3.33	306	1.94	3.11
<i>C.D. (0.05)</i>		0.14	8.50	0.11	0.34	9.61	0.12	NS	0.10	3.34	0.11	0.15
<i>C.V. (%)</i>		4.53	3.61	2.84	7.55	4.56	6.64	14.95	3.95	1.62	8.57	10.86
<b>Method of Nutrition</b>	S1	3.81	304	4.52	5.53	399	3.55	20.93	4.40	355	2.61	2.02
	S2	3.12	243	3.91	5.35	395	3.37	19.97	4.52	344	1.93	2.14
	S3	2.93	216	3.48	5.33	391	3.36	22.33	4.18	328	1.91	2.34
	S4	3.92	308	4.67	5.88	450	3.7	21.39	4.64	363	2.11	2.16
	S5	2.48	167	3.26	3.40	245	2.26	21.93	2.68	200	1.49	2.07
	S6	-	-	-	5.55	402	3.52	21.06	-	-	-	-
	S7	3.79	290	4.37	5.62	408	3.56	23.20	-	-	-	-
<i>CD (0.05)</i>		0.28	19.76	0.49	0.31	17.96	0.16	NS	0.13	6.06	0.19	0.2
<i>C.V. (%)</i>		8.95	8.06	12.62	6.19	4.91	5.17	10.75	3.21	1.96	9.73	9.42
<b>Experimental Mean</b>		<b>3.34</b>	<b>255</b>	<b>4.03</b>	<b>5.23</b>	<b>384</b>	<b>3.33</b>	<b>21.54</b>	<b>4.09</b>	<b>318</b>	<b>2.01</b>	<b>2.15</b>
Soil type		Clay			Clay loam				Clay			
pH		8.40			7.60				7.10			
Variety		NAUR-1			GAR - 1				Rajendra Sweta			

- M1 SRI Method** S1 100% of recommended inorganic fertilizers (120:60 :40 kg N K/ha)  
**M2 Direct Seeding** S2 50 % inorganic + 50% (equivalent of N dose) organic  
**M3 Normal Transplanting** S3 100% of recommended dose through organic source (equivalent of N dose)  
S4 150 % recommended fertilizer dose  
S5 No fertilizer (Control)  
S6 50% inorganic + 50% through Bio fertilizers  
S7 Location specific fertilizer management

Table-4.2.3.1.a. Contd.....

Treatment		RAIPUR			RANCHI			VARANASI		
Methods of crop establishment	Method of Nutrition	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle weight (g)	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle weight (g)	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle weight (g)
M1 (SRI)	S1	5.20	141	5.34	6.20	272	4.04	7.56	255	5.34
	S2	4.83	139	5.18	5.47	256	4.07	7.67	248	5.38
	S3	4.24	129	4.92	3.33	207	2.79	6.95	245	4.65
	S4	6.15	156	5.63	6.53	297	4.44	8.10	266	5.43
	S5	3.00	109	4.67	1.40	158	1.95	5.06	237	4.45
	S6	-	-	-	-	-	-	8.14	272	5.55
	S7	-	-	-	-	-	-	8.03	256	5.79
M2 (DS fb SRI)	S1	5.12	138	5.3	5.73	262	3.76	-	-	-
	S2	4.82	135.67	5	5.93	309	4.19	-	-	-
	S3	4.21	123.67	4.68	3.93	210	3.43	-	-	-
	S4	5.54	152.33	5.47	4.93	265	4.14	-	-	-
	S5	2.97	105.67	3.92	1.33	196	2.27	-	-	-
	S6	-	-	-	-	-	-	-	-	-
	S7	-	-	-	-	-	-	-	-	-
M3 (TPR)	S1	4.49	244.33	3.97	5.33	197	3.52	6.77	252	5.30
	S2	4.33	215.67	3.56	5.60	301	3.60	7.15	242	5.20
	S3	3.72	211	3.2	3.47	215	3.31	6.53	241	5.09
	S4	4.57	271.67	4.01	5.40	299	3.76	7.39	257	5.57
	S5	2.75	171.33	3.23	1.63	206	2.05	5.27	215	4.40
	S6	-	-	-	-	-	-	7.55	261	5.53
	S7	-	-	-	-	-	-	7.01	254	5.31
<b>C.D.(0.05)</b>										
<i>Mand S</i>		0.26	12.2	NS	0.45	34.24	NS	0.09	NS	NS
<i>Sand M</i>		0.24	11.04	NS	0.42	32.11	NS	0.09	NS	NS
<b>Method of crop establishments</b>										
M1		4.68	135	5.15	4.59	238	3.46	7.36	254	5.23
M2		4.53	131	4.87	4.37	248	3.56	-	-	-
M3		3.97	223	3.59	4.29	244	3.25	6.81	246	5.20
<i>C.D. (0.05)</i>		0.06	2.90	0.22	NS	NS	0.12	0.04	5.98	NS
<i>C.V. (%)</i>		2.21	2.75	7.31	8.09	10.25	5.27	0.38	1.8	6.19
<b>Method of Nutrition</b>										
S1		4.94	175	4.87	5.76	244	3.77	7.17	254	5.32
S2		4.66	163	4.58	5.67	288	3.95	7.41	245	5.29
S3		4.05	155	4.27	3.58	211	3.18	6.74	243	4.87
S4		5.42	193	5.04	5.62	287	4.11	7.75	261	5.50
S5		2.91	129	3.94	1.46	186	2.09	5.16	226	4.43
S6		-	-	-	-	-	-	7.85	266	5.54
S7		-	-	-	-	-	-	7.52	255	5.55
<i>CD (0.05)</i>		0.15	7.04	0.41	0.26	19.77	0.35	0.07	11.3	0.37
<i>C.V. (%)</i>		3.53	4.44	9.22	6.02	8.35	10.57	0.77	3.79	5.93
<b>Experimental Mean</b>		4.40	163	4.54	4.42	243	3.42	7.08	250	5.21
Soil type		Clay soil			-			Sandy Loam		
pH		7.20			-			7.20		
Variety		Maheshwari			-			Hybrid - PHB 71		

- M1** SRI Method  
**M2** Direct Seeding  
**M3** Normal Transplanting
- S1** 100% of recommended inorganic fertilizers (120:60 :40 kg N K/ha)  
**S2** 50 % inorganic + 50% (equivalent of N dose) organic  
**S3** 100% of recommended dose through organic source (equivalent of N dose)  
**S4** 150 % recommended fertilizer dose  
**S5** No fertilizer (Control)  
**S6** 50% inorganic + 50% through Bio fertilizers  
**S7** Location specific fertilizer management

Table-4.2.3.1.a. Contd.....

Treatment		WANGBAL				DRR			ARUNDHATINAGAR			Over all Mean	Ran k
Methods of crop establishment	Method of Nutrition	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle weight (g)	Weed dry weight (g)	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle weight (g)	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle weight (g)		
M1 (SRI)	S1	1.41	348	5.10	48.67	6.85	313	6.31	6.95	221	4.20	5.73	7
	S2	1.49	397	5.72	47.67	6.24	286	6.02	12.07	216	4.48	5.65	8
	S3	1.46	377	5.61	51.00	6.68	292	6.39	9.07	201	3.90	4.95	14
	S4	1.49	382	5.44	49.00	-	-	-	9.76	221	4.36	6.29	4
	S5	0.61	242	3.05	46.33	4.07	275	5.29	7.21	210	2.46	3.42	19
	S6	-	-	-	-	-	-	-	11.11	221	4.02	7.57	1
	S7	-	-	-	-	-	-	-	10.20	228	3.71	7.14	2
M2 (DS fb SRI)	S1	1.39	355	5.07	50.00	-	-	-	8.46	201	3.13	5.07	11
	S2	1.47	378	5.70	49.33	-	-	-	8.85	193	3.76	4.88	15
	S3	1.44	372	5.74	46.00	-	-	-	8.51	195	2.98	4.44	17
	S4	1.45	380	5.73	45.00	-	-	-	7.31	189	3.50	5.35	9
	S5	0.59	250	3.15	46.67	-	-	-	6.33	189	2.40	3.00	20
	S6	-	-	-	-	-	-	-	8.52	188	2.47	6.86	3
	S7	-	-	-	-	-	-	-	8.80	197	2.25	6.11	6
M3 (TPR)	S1	1.35	380	5.01	49.00	5.58	257	6.26	6.87	184	3.21	5.01	13
	S2	1.39	390	5.17	49.67	5.53	238	6.19	6.00	201	3.39	4.62	16
	S3	1.36	392	5.11	48.67	5.45	263	6.02	5.77	185	3.43	4.20	18
	S4	1.36	382	5.05	46.00	-	-	-	7.39	185	3.38	5.05	12
	S5	0.59	251	3.45	47.67	4.03	247	5.45	4.91	193	2.26	2.99	21
	S6	-	-	-	-	-	-	-	6.00	181	3.69	6.18	5
	S7	-	-	-	-	-	-	-	5.83	188	3.29	5.30	10
<b>C.D.(0.05)</b>													
<i>Mand S</i>		0.02	5.14	0.05	2.16	NS	NS	NS	NS	NS	NS		
<i>Sand M</i>		0.02	4.82	0.05	1.95	NS	NS	NS	31.00	NS	0.54		
<b>Method of crop establishments</b>													
M1		1.29	349	4.98	48.53	5.96	291	6.00	9.48	217	3.88	5.26	1
M2		1.27	347	5.08	47.40	-	-	-	8.11	193	2.93	4.59	2
M3		1.21	359	4.76	48.20	5.15	251	5.98	6.11	188	3.23	4.40	3
<i>C.D. (0.05)</i>		0.01	2.41	0.03	0.47	NS	NS	NS	0.35	NS	0.38		
<i>C.V. (%)</i>		0.33	1.06	0.97	1.50	10.37	20.25	16.19	5.21	32.04	13.18		
<b>Method of Nutrition</b>													
S1		1.38	361	5.06	49.22	6.22	285	6.29	7.43	202	3.51	5.34	4
S2		1.45	388	5.53	48.89	5.89	262	6.11	8.97	204	3.88	5.13	5
S3		1.42	381	5.48	48.56	6.07	277	6.21	7.78	194	3.44	4.62	6
S4		1.43	381	5.41	46.67	-	-	-	8.15	198	3.75	5.62	3
S5		0.60	248	3.22	46.89	4.05	261	5.37	6.15	198	2.37	3.21	7
S6		-	-	-	-	-	-	-	8.55	196	3.39	6.94	1
S7		-	-	-	-	-	-	-	8.27	204	3.08	6.30	2
<i>CD (0.05)</i>		0.01	2.97	0.03	1.25	0.45	NS	0.60	0.53	NS	0.28		
<i>C.V. (%)</i>		0.99	0.87	0.65	2.67	6.43	15.21	7.94	7.04	5.52	8.96		
<b>Experimental Mean</b>		1.26	352	4.94	48.04	5.55	271	5.99	7.90	199	3.35		
Soil type		Clay Loam				Clay soil			Clay soil				
pH		6.50				7.93			7.93				
Variety		Limaphone				Varadhan			Varadhan				

- M1 SRI Method  
M2 Direct Seeding  
M3 Normal Transplanting
- S1 100% of recommended inorganic fertilizers (120:60 :40 kg N K/ha)  
S2 50 % inorganic + 50% (equivalent of N dose) organic  
S3 100% of recommended dose through organic source (equivalent of N dose)  
S4 150 % recommended fertilizer dose  
S5 No fertilizer (Control)  
S6 50% inorganic + 50% through Bio fertilizers  
S7 Location specific fertilizer management

Table-4.2.3.1.a.(R): Summary of data on grain yield and ancillary characters of rice from evaluation of long term effects of nutrition on SRI vis a vis Conventional flooded system rice on soil fertility and in RBCS, Rabi-2012-13.

Treatment		ADHUTURAI					DRR			Ranchi	
Methods of crop establishment	Method of Nutrition	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle weight (g)	Weed dry weight (g)	Cost of cultivation (Rs/ha)	Grain yield (t/ha)	Panicle /m <sup>2</sup> (No.)	Panicle weight (g)	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)
M1 (SRI)	S1	8.18	445	2.65	2.8	39838	7.45	507	3.71	4.71	274
	S2	5.9	298	2.43	2.43	28782	5.69	427	3.56	4.95	308
	S3	5.65	416	2.33	1.37	42328	6.83	411	2.90	4.85	290
	S4	9.77	467	3.05	3.3	41707	-	-	-	4.73	283
	S5	2.88	282	2.13	1.13	32360	5.27	336	2.84	4.32	286
	S6	-	-	-	-	-	-	-	-	1.31	163
	S7	-	-	-	-	-	-	-	-	-	-
M2 (DS fb SRI)	S1	7.6	443	2.65	14.2	32367	-	-	-	4.82	270
	S2	5.5	419	2.35	11.37	33620	-	-	-	4.99	312
	S3	4.91	412	2.28	10.37	34858	-	-	-	4.98	343
	S4	8.32	457	2.78	16.33	34238	-	-	-	4.79	275
	S5	2.42	274	2.04	10.57	24905	-	-	-	4.39	316
	S6	-	-	-	-	-	-	-	-	4.00	153
	S7	-	-	-	-	-	-	-	-	-	-
M3 (TPR)	S1	7.18	335	2.54	7.9	37352	5.24	430	3.58	4.88	334
	S2	5.14	328	2.39	7.23	38590	4.28	359	3.52	4.92	317
	S3	4.49	318	2.27	5.4	39837	4.49	391	2.94	5.03	302
	S4	7.35	339	2.64	9.33	39221	-	-	-	4.69	280
	S5	2.17	267	2.01	3.53	29877	2.55	324	2.75	4.60	354
	S6	-	-	-	-	-	-	-	-	1.24	160
	S7	-	-	-	-	-	-	-	-	-	-
<b>C.D.(0.05)</b>											
M and S		0.09	NS	0.03	0.34	NS	NS	NS	NS	NS	NS
S and M		0.09	NS	0.03	0.3	NS	0.42	NS	NS	NS	NS
<i>Method of crop establishments</i>											
M1		6.48	381	2.52	2.21	37003	6.31	420	3.25	4.14	267
M2		5.75	401	2.42	12.57	31998	-	-	-	4.66	278
M3		5.26	318	2.37	6.68	36975	4.14	376	3.20	4.23	291
C.D. (0.05)		0.05	37.37	0.01	0.09	NS	0.23	NS	NS	NS	NS
C.V. (%)		1.42	15.72	0.3	1.92	15.64	2.52	14.12	2.40	26.98	8.31
<b>Method of Nutrition</b>											
S1		7.65	408	2.62	8.3	36519	6.34	468	3.64	4.80	293
S2		5.51	348	2.39	7.01	33664	4.99	393	3.54	4.95	313
S3		5.02	382	2.29	5.71	39008	5.66	401	2.92	4.95	312
S4		8.48	421	2.82	9.66	38388	-	-	-	4.74	279
S5		2.49	274	2.06	5.08	29047	3.91	330	2.80	4.44	319
S6		-	-	-	-	-	-	-	-	2.18	159
S7		-	-	-	-	-	-	-	-	-	-
CD(0.05)		0.05	55.27	0.02	0.19	5369	0.32	39.27	0.18	1.20	31.4
C.V. (%)		0.94	15.5	0.73	2.79	15.62	4.97	7.84	4.31	28.70	11.70
<b>Experimental Mean</b>		5.83	367	2.44	7.15	35325	5.22	398	3.22	4.34	279
Soil type		Clay					Clay soil				
pH		7.20					-				
Variety		-					Varadhan				

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Table-4.2.3.1.a.R) (contd).....

Treatment			NAVSARI			COIMBATORE			
Methods of crop establishment	Method of Nutrition	Residual effect	Grain yield (t/ha)	No. of Pods/plant	No. of grains/ pod	Grain yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle weight (g)	
M1 (SRI)	S1	F0	0.74	20.18	9.65	2.98	316	2.30	
		F1	1.15	29.91	11.99	4.82	352	2.77	
	S2	F0	0.81	20.29	10.39	2.85	314	2.30	
		F1	1.26	31.81	13.29	4.23	336	2.61	
	S3	F0	0.81	21.40	10.71	3.07	318	2.34	
		F1	1.20	31.91	13.48	4.67	327	2.50	
	S4	F0	0.76	20.21	9.69	2.97	315	2.28	
		F1	1.17	29.55	12.73	4.75	341	2.74	
	S5	F0	0.72	18.56	9.40	2.48	293	2.12	
		F1	0.74	18.06	9.67	2.76	308	2.37	
	S6	F0	-	-	-	-	-	-	-
		F1	-	-	-	-	-	-	-
	S7	F0	0.83	21.98	10.84	-	-	-	-
		F1	1.22	32.13	13.61	-	-	-	-
M2 (DS fb SRI)	S1	F0	0.73	19.19	9.46	2.95	306	2.18	
		F1	1.16	27.93	10.54	4.61	341	2.67	
	S2	F0	0.79	20.17	10.33	2.96	310	2.27	
		F1	1.17	29.28	11.63	4.10	335	2.42	
	S3	F0	0.80	20.68	10.47	3.08	312	2.34	
		F1	1.18	30.40	12.34	4.52	324	2.39	
	S4	F0	0.75	19.97	9.75	3.02	304	2.13	
		F1	1.16	28.95	11.99	4.63	339	2.60	
	S5	F0	0.71	17.45	8.99	2.41	274	2.12	
		F1	0.73	17.24	9.29	2.61	303	2.32	
	S6	F0	-	-	-	-	-	-	-
		F1	-	-	-	-	-	-	-
	S7	F0	0.82	21.18	10.63	-	-	-	-
		F1	1.20	31.39	12.74	-	-	-	-
M3 (TPR)	S1	F0	0.73	18.57	9.56	2.45	233	2.19	
		F1	1.16	29.28	11.61	4.08	274	2.62	
	S2	F0	0.80	21.10	10.38	2.37	223	2.22	
		F1	1.18	31.10	12.30	3.29	268	2.39	
	S3	F0	0.81	21.48	10.63	2.50	237	2.23	
		F1	1.18	31.38	12.72	3.95	272	2.37	
	S4	F0	0.74	19.09	9.76	2.46	234	2.12	
		F1	1.17	29.59	11.89	3.98	273	2.54	
	S5	F0	0.72	17.65	9.34	2.32	232	2.06	
		F1	0.73	17.75	9.60	2.36	251	2.26	
	S6	F0	-	-	-	-	-	-	-
		F1	-	-	-	-	-	-	-
	S7	F0	0.83	21.70	10.73	-	-	-	-
		F1	1.21	31.93	12.95	-	-	-	-
Method of crop establishments	M1		0.95	24.67	11.29	3.56	322	2.43	
	M2		0.93	23.65	10.68	3.49	315	2.35	
	M3		0.94	24.22	10.96	2.97	250	2.30	
	C.D. (0.05)		NS	NS	NS	NS	NS	NS	
	C.V. (%)		7.63	4.97	7.45	5.16	3.35	1.48	
Method of Nutrition	S1		0.95	24.18	10.47	3.65	304	2.46	
	S2		1.00	25.62	11.39	3.30	298	2.37	
	S3		1.00	26.21	11.73	3.63	298	2.36	
	S4		0.96	24.56	10.97	3.63	301	2.40	
	S5		0.72	17.79	9.38	2.49	277	2.21	
	S6		-	-	-	-	-	-	-
	S7		1.02	26.72	11.92	-	-	-	-
		CD (0.05)		NS	NS	NS	NS	NS	NS
	C.V. (%)		9.27	12.78	17.46	5.8	2.00	4.68	
Sub-Sub Residual effect									
	F0		0.77	20.05	10.04	2.72	281	2.21	
	F1		1.11	28.31	11.91	3.96	309	2.51	
	CD (0.05)		NS	NS	NS	NS	NS	NS	
	C.V. (%)		7.85	11.60	12.14	5.21	2.58	4.92	
Interaction									
	SUB at the same or diff. level of MAIN		NS	NS	NS	NS	NS	NS	
	MAIN at the same or diff. level of SUB		NS	NS	NS	NS	NS	NS	
	MAIN at the same or diff. level of SUB		NS	NS	NS	NS	NS	NS	
	SUB at the same or diff. level of SUB-SUB		NS	NS	NS	NS	NS	NS	
	SUB-SUB at the same level of MAIN		NS	NS	NS	NS	NS	NS	
	SUB-SUB at the same level of SUB		NS	NS	NS	NS	NS	NS	
	SUB-SUB at the same combination of MAIN and SUB		NS	NS	NS	NS	NS	NS	
Experimental Mean			0.94	24.18	10.98	3.34	295	2.36	
	Soil type		Clay			Clay loam			
	pH		8.40			7.50			
	Crop		Greengram						
	Variety		Co-4			CO 47			

**Table-4.2.3.1.b.(R): Summary of data on grain yield and ancillary characters of trial on evaluation of principles of SRI their contribution towards enhancement of grain yield, Rabi- 2012-13.**

T. No.	Treatments	ARUNDHATINAGAR			PUDUCHERRY					PATTAMBI			
		Grain Yield (t/ha)	Panicle m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle m <sup>2</sup> (No.)	Panicle Weight (g)	Weed dry weight (g)	Weed Population No./m <sup>2</sup>	Grain Yield (t/ha)	Panicle m <sup>2</sup> (No.)	Panicle Weight (g)	Weed dry weight (g)
1	SRI (use of 8-12 day old seedlings, raised bed nursery, careful transplanting at a spacing of 25 cm x 25 cm, weed management with cono weeder (4 times), saturation of water management, and use of (75%) inorganic along with (25%) organic.	9.00	401	2.75	7.85	372	3.23	21.00	20.00 (4.50)	4.67	267	2.84	4.08
2	T1 with 3-4 seedlings per hill (instead of 1 seedling per hill)	5.98	295	2.25	8.08	452	3.30	17.00	13.33 (3.70)	4.08	247	2.62	4.64
3	T1 with 30 to 35 day old seedlings (instead of 8-12 day old seedlings)	6.55	347	1.97	6.77	305	2.43	34.67	34.00 (5.86)	3.75	227	2.94	5.32
4	T1 with 20 x 10 cm spacing (instead of 25 x 25 cm spacing)	7.20	331	2.10	6.85	323	2.50	28.33	33.67 (5.84)	5.33	275	3.06	3.20
5	T1 with only inorganic (RDF) (instead of organic + inorganic)	6.83	345	2.17	7.89	402	3.20	21.00	19.33 (4.45)	4.17	224	2.97	5.14
6	T1 with herbicide + manual weeding (instead of Cono-weeding)	6.78	308	2.08	7.47	352	2.97	26.67	24.67 (5.00)	5.27	233	2.91	0.99
7	T1 with 2+ 5 standing water during crop growth (instead of Saturation / alternate wetting and drying of water management)	6.67	208	1.92	7.13	335	2.60	28.00	26.00 (5.14)	4.50	251	2.87	1.92
8	Conventional transplanting (location specific-best management practices with 30 day old nursery, planted at a spacing of 20 x 15 cm spacing , 3-4 seedlings per hill and 2+ 5 standing water during crop growth)	5.80	205	2.08	6.21	301	2.40	42.67	47.67 (6.93)	4.53	289	2.93	5.56
	<i>C.D. (0.05)</i>	0.71	27.69	0.19	0.68	31.97	0.49	6.42	0.72	0.69	39.84	0.19	1.91
	<i>C.V.(%)</i>	5.89	5.19	5.08	5.40	5.14	9.98	13.38	7.93	8.65	9.04	3.70	28.23
	<b>Expt. Mean</b>	<b>6.85</b>	<b>305</b>	<b>2.17</b>	<b>7.28</b>	<b>355</b>	<b>2.83</b>	<b>27.42</b>	<b>5.18</b>	<b>4.54</b>	<b>252</b>	<b>2.89</b>	<b>3.86</b>

(Figures in parantheses are the transformed means)

**Table-4.2.4:- Summary of data on grain yield and ancillary characters of trial selective mechanisation for enhancing productivity practices for highest realizable and profitability of rice cultivation transplanted rice kharif 2013.**

Treatment	ADUTHURAI				ARI-RJNR				COIMBATORE			
	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)	Grain Yield (t/ha)	Panicle /m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)
T1 : SMSRI - (15 day old seedling mat nursery, use of transplanter for planting and followed by SRI principles of crop management)	6.57	349	2.53	38156	7.25	414	3.97	51323	7.99	453	2.53	32173
T2: Drum seeding Dibbing at 25 x 25 cm followed by SRI principles	6.49	342	2.51	36279	7.24	390	3.69	43931	7.57	431	2.50	32607
T3 : Normal transplanting - Best management practices (Flooded rice system)	8.34	456	2.78	40320	6.27	386	3.58	50381	6.79	402	2.41	34783
T4 :Farmers practice of the location	5.01	354	2.45	38671	5.94	365	3.29	48555	5.57	370	2.24	36033
T5: Grooves placing of FYM	-	-	-	-	-	-	-	-	-	-	-	-
C.D. (0.05)	0.10	8.76	0.04	-	0.73	35.73	0.61	-	0.45	12.58	0.17	-
C.V. (%)	0.78	1.17	0.86	-	5.45	4.60	8.41	-	3.26	1.52	3.47	-
<b>Expt. Mean</b>	<b>6.60</b>	<b>375</b>	<b>2.57</b>	<b>38357</b>	<b>6.68</b>	<b>389</b>	<b>3.63</b>	<b>48548</b>	<b>6.98</b>	<b>414</b>	<b>2.42</b>	<b>33899</b>
Soil type	Clay				Loamy Sand				Clay loam			
pH	7.20				8.62				7.5			
Variety	-				RNR-2465				CO-51			
Recommended N:P:K (kg/ha)	150:60:60:25				120:60:40:0				120:38:38:25			
Available NPK in Soil (kg/ha)	178.5:52.5:232				176:109:960				252:18:540			

Table. 4.2.4 (Contd...)

Treatment	GANGAVATHI				GRIDHI			JAGDALPUR		
	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)
T1 : SMSRI - (15 day old seedling mat nursery, use of transplanter for planting and followed by SRI principles of crop management)	6.13	381	2.98	35325	4.02	173	25.90	5.03	305	4.31
T2: Drum seeding Dibbing at 25 x 25 cm followed by SRI principles	6.02	334	2.61	29269	3.66	191	28.30	3.73	216	3.18
T3 : Normal transplanting - Best management practices (Flooded rice system)	5.76	396	2.51	34405	4.80	203	24.45	4.11	265	3.99
T4 :Farmers practice of the location	5.45	387	2.600	35012	4.46	189	18.30	3.21	166	2.63
T5.Grooves placing of FYM	-	-	-	-	-	-	-	5.38	289	4.76
C.D. (0.05)	NS	47.04	0.62	-	NS	20.54	8.40	0.57	41.9	0.48
C.V. (%)	8.13	6.28	11.56	-	18.23	6.80	21.67	8.64	10.96	8.19
<b>Expt. Mean</b>	<b>5.84</b>	<b>375</b>	<b>2.67</b>	<b>33503</b>	<b>4.23</b>	<b>189</b>	<b>24.24</b>	<b>4.29</b>	<b>248</b>	<b>3.77</b>
Soil type	Black clay				-			-		
pH	8.1				-			-		
Variety	CGV-0501				MTU 1010			-		
Recommended N:P:K (kg/ha)	100:50:50				120:60:40			-		
Available NPK in Soil (kg/ha)	-				-			-		



Table. 4.2.4 (Contd...)

Treatment	MANDYA				MONCOMPU				PUDUCHERRY				PATTAMBI			
	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)
T1 : SMSRI - (15 day old seedling mat nursery, use of transplanter for planting and followed by SRI principles of crop management)	8.27	415	4.05	36800	6.08	255	3.72	33481	5.63	465	3.11	27560	3.79	406	2.71	41425
T2: Drum seeding Dibbing at 25 x 25 cm followed by SRI principles	7.30	386	3.03	35500	8.92	380	4.14	32429	4.85	385	2.60	25185	3.03	379	2.25	41425
T3 : Normal transplanting - Best management practices (Flooded rice system)	8.32	399	3.68	38500	10.02	301	4.56	39707	5.38	430	2.93	30898	2.85	373	2.27	41425
T4 : Farmers practice of the location	5.64	317	2.88	38000	4.35	339	3.26	36581	4.41	364	2.50	32770	2.61	384	1.81	41425
C.D. (0.05)	0.35	14.29	0.32	-	1.50	97.98	0.65	-	0.49	35.59	0.41	-	NS	NS	0.55	-
C.V. (%)	2.97	2.36	5.96	-	10.20	15.39	8.30	-	4.87	4.33	7.36	-	28.98	7.37	12.17	-
<b>Expt. Mean</b>	<b>7.38</b>	<b>379</b>	<b>3.41</b>	<b>37200</b>	<b>7.34</b>	<b>319</b>	<b>3.92</b>	<b>35550</b>	<b>5.07</b>	<b>411</b>	<b>2.79</b>	<b>29103</b>	<b>3.07</b>	<b>385</b>	<b>2.26</b>	<b>41425</b>
Soil type	Red sandy loam				Silty clay				Clay loam				-			
pH	6.47				6.2				6.2				5.6			
Variety	-				-				ADT-49				Aiswarya			
Recommended N:P:K (kg/ha)	100:50:50				90:45:45				150:40:40:25				90:45:45			
Available NPK in Soil (kg/ha)	286:32:185				240:65:200				134.4:15.21:129				-			
Treatment details					T4 : Broad casting											

Table-4.2.4.(R)-: Summary of data on grain yield and ancillary characters of trial selective mechanization for enhancing productivity and profitability of rice cultivation transplanted rice Rabi-2012-13.

Treatment	MONCOMPU				PUDUCHERRY			
	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Cost of Cultivation (Rs/ha)
SMSRI - (15 day old seedling mat nursery, use of transplanter for planting and followed by SRI principles of crop management)	5.23	353	3.27	28582	4.15	430	2.27	27080
Drum seeding Dibbing at 25 x 25 cm followed by SRI principles	4.98	321	2.40	28885	3.48	379	2.23	24705
Normal transplanting - Best management practices (Flooded rice system)	4.75	337	3.19	33612	4.65	474	2.50	27605
Farmers practice of the location	4.35	263	1.98	32196	2.93	305	2.20	31478
C.D. (0.05)	0.96	59	0.42	-	0.46	21	0.22	-
C.V. (%)	9.97	9.25	7.69	-	6.00	2.59	4.81	-
<b>Expt. Mean</b>	<b>4.83</b>	<b>319</b>	<b>2.71</b>	<b>30819</b>	<b>3.80</b>	<b>397</b>	<b>2.30</b>	<b>27717</b>
Soil type	Silty Clay				Clay Loam			
pH	5.81				6.57			
Variety	Uma				ADT - 43			
Recommended N:P:K (kg/ha)	90:45:45				120:40:40:25			
Available NPK in Soil (kg/ha)	202:22.5:225				212.8:34.02:155			

### 4.3 WEED MANAGEMENT TRIALS

The rapid increase in population growth, in Indian sub-continent demands phenomenal increase in crop productivity. Weed competition is going to be the major constraint in achieving higher productivity. Most of the farmers in the intensive cropping areas are shifting from transplanting to direct seeding practices, due to shortage of labour, scarcity of water and energy, etc. Additionally, the late onset of monsoon and unpredictable rainfall patterns due to global warming, during recent years, are also prompting farmers to go in for dry or wet seeding under puddled conditions. In drill seeded or direct seeded rice under puddled conditions, the weeds grow vigorously; and the level of infestation and competitiveness are going to be the major challenges to farmers and researchers, alike; and the grain yield losses in these rice ecosystems are expected to be higher than transplanted rice. Therefore, it is necessary to incorporate the chemical methods of weed management aimed at inhibiting the metabolic processes, in integrated weed management practices. In this context, at DRR under the aegis of AICRIP at more than 30 cooperating centers, located in different agro-climatic zones of India, several herbicides have been tested in different crop establishment methods. A new collaborative trial (Entomology and Pathology) of integrated pest management was also initiated during kharif 2013.

#### 4.3.1 Evaluation of the effectiveness of new herbicides for transplanted rice

During *Kharif* 2013, new herbicide molecule flucetosulfuron 10 % WG (2 doses - 20 and 25 g a.i./ha) was tested for second season along with sequential application of flucetosulfuron and bispyribacsodium against butachlor 50 EC @ 1.5 kg a.i./ha and bispyribacsodium 10% SC @ 25 g a. i/ha for bioefficacy in transplanted rice. These chemical treatments were compared against weed free, mechanical weeding and need based hand weeding and non-weeded control. The herbicide flucetosulfuron was applied at 2 – 3 DAT, butachlor at 5-7 DAT and bispyribacsodium @ 2-5 leaf stage of weeds. The trial was conducted at 18 locations *viz.*, **Aundhatinagar, Chinsurah, Coimbatore, Faizabad, Gaghraghat, Khudwani, Kota, Ludhiana, Mandya, Maruteru, Moncompu, Malan, Nawagam, Nagina, Pantnagar, Ranchi, Raipur and Varanasi.** The treatment details and data are presented in **Table 4.3.1. (a-e).**

Among the test locations, **Mandya, Malan, Khudwani, Coimbatore and Nawagam** reported very good crop growth and higher mean grain yields of 6.02 t/ha to 7.10 t/ha, while in weed free situation the average grain yield over the locations ranged from 3.44 t/ha to 7.77 t/ha. The grain yield loss due to weeds was ranging from a low 19.61% in **Malan** to a high 74.22% in **Arundhatinagar**. At majority of the locations (12 locations) the weed problem was high and yield losses were > 30%. At **Ludhiana, Nagina, Ranchi and Varanasi**, the crop growth was good with mean grain yield of 5.11 to 5.81 t/ha. At **Chinsurah, Faizabad, Gagharaghat, Kota, Moncompu, Patnagar and Raipur** the reported grain yields were < 5 t/ha and the grain yield losses were up to 51.45% (**Table. 4.3.1.a - e**).

The effectiveness of herbicide treatments in terms of grain yield (**Table 4.3.1.a**) were significant at all the locations. At **Gaghraghat, Khudwani, Ludhiana and Pantnagar**, all the herbicide treatments were equally effective with mean grain yields of

3.06 to 6.94 t/ha. The test herbicide flucetosulfuron (10%) WG at 20 and 25 g ai./ha was equally effective at 13 locations *viz.*, **Coimbatore, Chisurah, Gagharaghat, Khudwani, Kota, Ludhiana, Mandya, Malan, Nagina, Pantnagar, Raipur, Ranchi and Varanasi**. At **Moncompu, Nawagam** flucetosulfuron at higher dose significantly reduced the weed menace and increased grain yields. Sequential application of higher dose of flucetosulfuron @ 25 a.i./ha followed by bispyribacsodium (25 g a.i./ha) was effective at 5 locations *viz.*, **Coimbatore, Chinsurah, Moncompu, Arundhatinagar and Raipur**; sequential application of flucetosulfuron both doses followed by bispyribacsodium were effective at 5 locations *viz.*, **Kota, Malan, Nagina, Ranchi and Varanasi**. The mechanical weeding treatment showed promising influence on weeds at 8 locations and was on par with weed-free situation, indicating the scope and prospects of using mechanical weeding devices in weed management.

The data on ancillary characters (panicle number per square meter and panicle weight) showed similar trend as that of grain yield at different test locations with mean panicle number ranging from **216 at Moncompu to 444 at Nawagam**; mean panicle weight ranging from 2.31 of **Nawagam** of at **Ludhiana**. The herbicide treatments of higher dose of flucetosulfuron, sequential application of flucetosulfuron both doses followed by bispyribacsodium and mechanical weeding were comparable with weed free and need based hand weeding treatments (**Table 4.3.1.a**).

The data on weed biomass **Table (4.3.1.b)** indicated that the mean weed biomass was low at Ranchi 5.96 g/m<sup>2</sup> and high at Ludhiana 53.87 g/m<sup>2</sup>. Weed biomass in non weeded control plots at **Coimbatore, Ludhiana and Nawagam** was > 100 g/m<sup>2</sup> i.e. > 1 t/ha indicating the intensity of weed problem. At **Mandya, Ranchi and Nagina** the weed biomass was < 35 gm/m<sup>2</sup> with less weed problem. Among the herbicide treatments, flucetosulfuron higher doses 25 gm a.i./ha recorded low weed biomass 10 locations *viz.*, **Faizabad, Gagharaghat, Mandya, Nawagam, Coimbatore, Chinsurah, Kota, Ludhiana, Malan and Varanasi**. Flucetosulfuron followed by bispyribacsodium recorded lower weed biomass at 8 locations *viz.*, **Coimbatore, Chinsurah, Kota, Ludhiana, Nagina, Ranchi, Pantnagar and Varanasi**. All the herbicides treatments recorded considerable reduction in weed biomass at **Mandya, Malan, Nagina**. The mechanical weeding treatment reduced weed biomass and superior over herbicidal treatments at 4 locaitons *viz.*, **Coimbatore, Kota, Nawagam and Pantnagar**. It also showed performance on par with herbicides at **Gagharaghat, Nagina and Varanasi**.

The major weed flora (Grasses, Sedges and Broad Leaf weeds) reported by different locations are presented in **Table (4.3.1.c)**. The data on weed population (**Table 4.3.1.d**) at 5 days before herbicide application indicated that at **Coimbatore, Nawagam and Nagina** grasses predominate the weed flora followed by sedges and BLW, whereas at **Moncompu and Malan**, broad leaf weeds predominate, grassy and sedge weeds were not found at these locations. At 10 days after herbicide application, flucetosulfuron @ 25 g a.i. / ha recorded lower weed population at 6 locations *viz.*, **Khudwani, Mandya, Pantnagar, Nawagam, Nagina and Kota** when compared to other herbicide treatments where the first flush of weeds is major cause of yield loss. At 5 locations *viz.*, **Coimbatore, Moncompu, Malan, Varanasi and Ranchi** where 2 or 3 flushes of weeds

is common, sequential application of flucetosulfuron followed by bispyribacsodium recorded lower weed population.

The data on crop toxicity ratings were reported by 8 locations (**Table 4.3.1.e**). At 6 locations no herbicide treatments showed crop toxicity. Only at 2 locations higher dose of flucetosulfuron, bispyribacsodium and flucetosulfuron followed by bispyribacsodium showed slight toxicity, but recovered within one week of herbicide application. The data on weed control ratings (**Table 4.3.1.e**) reported by 9 locations indicated that at 6 locations, the herbicides flucetosulfuron @ 25 g a.i./ ha and flucetosulfuron followed by bispyribacsodium (both doses) were effective and recorded higher weed control ratings. At 3 locations, sequential application of flucetosulfuron followed by bispyribacsodium recorded superior performance and higher weed control ratings.

The summary of the results clearly indicated that the loss due to weeds ranged from 19.08 to 74.22 % with mean grain yields were 3.06 to 7.10 t/ha at different locations. At majority of the locations flucetosulfuron @ 25 g a.i./ha, sequential application of flucetosulfuron followed by bispyribacsodium (both doses) recorded grain yields comparable to need based hand weeding, mechanical weeding and weed free situation. Mechanical weeding was found to be promising and comparable with herbicidal treatments and need based hand weedings indicating the enormous scope for developing and using improved mechanical tools for weeding in future. In consideration of the grain yields and cost of weed management over the locations, with single flush of weed problem, flucetosulfuron @ 25 g a.i./ ha can be effectively adopted. For locations with 2 or 3 flushes of weed problem, sequential application of flucetosulfuron followed by bispyribacsodium 20 followed by 25 or 25 g a.i./ha followed by 25 g a.i./ha can be adopted depending on soil type, variety grown, intensity of weeds, stage of weeds etc. in irrigated transplanted condition.

#### ***Rabi Season:***

The trial was conducted by two locations viz., **Moncompu** and **Pattambi**. The yield loss due to weeds was 71.92 % and 35.56% respectively. The data from **Moncompu** indicated that all the herbicide treatments under testing were on par with each other and need based hand weeding in terms of grain yield, panicle number, panicle weight, weed dry weight and weed control rating. The data on weed population indicated that grassy weeds were not present and sedges were predominant followed by BLW. No phytotoxicity was noticed in any of the herbicide treatments.

At Pattambi, except bispyribacsodium other herbicides recorded grain yield on par with need based hand weeding and the same trend was reflected in weed biomass also. The weed population was significantly low in flucetosulfuron applied plots when compared to penoxsulam+cyhalofop herbicides. Based on the results it was concluded that, flucetosulfuron 20/25 a.i./ha or penoxsulam+cyhalofopbutyl@ 120/135 g a.i./ha or bispyribacsodium @ 35 g a.i./ha were found to be effective. (**Table 4.3.1(R)**)

#### 4.3.2 Evaluation of the effectiveness of new combination herbicide for broad-spectrum weed control in direct sown rice under puddled condition

With the objective of evaluating new herbicide molecule flucetosulfuron @ 20 and 25 g a.i./ha (second season) and sequential application of flucetosulfuron 2 doses followed by bispyribacsodium (first season) for bioefficacy in weed control of direct sown puddled rice, the trial was conducted at 14 locations viz., **ARI Rajendranagar, Coimbatore, Cuttack, Chinsurah, Moncompu, Nagina, Ludhiana, Pattambi, Puducherry, Pusa, Ragolu, Rewa, Titabar and Vadagaon** during *kharif* 2013. The herbicide flucetosulfuron was applied 2 - 3 days after sowing (DAS) and sequential application of bispyribacsodium at 15 - 20 DAS. These herbicide treatments were tested along with weed free situation, mechanical weeding and need based hand weeding against non weeded control. The treatment details and data are presented in **Table – 4.3.2. (a - e)**

The evaluation results showed significant differences due to treatments at all the locations tested. The grain yield loss due to weeds ranged from 13.06 to 71.90 %; The yield loss was low (< 20%) at one location **Rewa**, medium (20 - 40%) at 4 locations viz., **Coimbatore, Pattambi, Puducherry, Pusa**; very high (> 40%) at 9 locations viz., **ARI Rajendranagar, Cuttack, Chinsurah, Ludhiana, Moncompu, Nagina, Ragolu, Titabar and Vadagaon**.

At **Coimbatore, Moncompu and Rewa** the crop growth was very good with mean grain yields of > 5 t/ha. At other locations, the crop growth was good with mean grain yields of > 3 t/ha except at **Ragolu**.

The data on grain yield (t/ha) showed significant differences among herbicide treatments at all the locations. The test herbicide flucetosulfuron at both doses was effective and on par with need based hand weeding at 9 locations viz., **ARI Rajendranagar, Coimbatore, Chinsurah, Ludhiana, Pattambi, Puducherry, Pusa, Titabar and Vadagaon**; flucetosulfuron higher dose at 4 locations viz., **Cuttack, Moncompu, Nagina and Rewa**; flucetosulfuron @ 25 g a.i./ha and sequential application of flucetosulfuron followed by bispyribacsodium at 6 locations viz., **Coimbatore, Cuttack, Moncompu, Nagina, Pattambi and Rewa**; only sequential application of flucetosulfuron followed by bispyribacsodium at 3 locations viz., **Chinsurah, Ludhiana and Puducherry**; All the herbicide treatments at 6 locations viz., **ARI Rajendranagar, Moncompu, Pusa, Ragolu, Titabar and Vadagaon**. However, at 7 locations viz., **ARI Rajendranagar, Ludhiana, Moncompu, Pattambi, Pusa, Ragolu and Titabar**, mechanical weeding treatment showed better control on weeds and on par with weed free, need based hand weeding and herbicide treatments indicating the scope of usage of mechanical devices in weed control and need for developing improved tools for easy weeding in future.

The data on ancillary characters (panicle number/m<sup>2</sup> and panicle weight) showed supporting trend to the grain yield data (**Table 4.3.2.a**). The mean panicle number ranged from 201 m<sup>2</sup> at Ragolu to 401 m<sup>2</sup> at Coimbatore. The mean panicle weight ranged from 2.41 g at Coimbatore to 4.88 g at ARI, Rajendranagar. The herbicide flucetosulfuron @ 25 g a.i./ha, sequential application of flucetosulfuron and

bispyribacsodium recorded higher no. of panicles and panicle weight at locations with 2 or 3 flushes of weeds in high intensity and both doses of flucetosulfuron was effective at majority of the locations with single flush of high weed intensity.

The data on weed biomass (**Table 4.3.2.b**) recorded at 11 locations indicted significant reduction in weed biomass by using higher dose of flucetosulfuron and sequential application of flucetosulfuron followed by bispyribacsodium both doses. Flucetosulfuron @ 25 g a.i./ ha and sequential application of flucetosulfuron @ 20 or 25 a.i/ha followed by bispyribacsodium were effective in reducing the weed biomass considerably at 4 locations *viz.*, **ARI Rajendranagar, Coimbatore, Moncompu and Ragolu**. Sequential application of two herbicides was required at 4 locations *viz.*, **Chisurah, Ludhiana, Puducherry and Vadgaon** to reduce weed biomass significantly. At 3 locations *viz.*, **Nagina, Pattambi and Titabar**, all the herbicide treatments were equally effective in reducing weed biomass considerably.

The major weed flora (Grasses, Sedges and Broad Leaf weeds) reported by different locations are presented in **Table (4.3.1.c)**. The data on weed population (**Table 4.3.1.d**) reported by 10 locations, at 5 days before herbicide application indicated that at 6 locations, the grasses predominate the weed flora followed by sedges and broad leaf weeds. At 3 locations *viz.*, **Moncompu, Ragolu and Vadgaon** the broad leaf weeds is the major menace followed by grasses and sedges at 2 locations and sedges and grasses at one location respectively. The data on weed population at 10 days after herbicide application, indicated that grasses were higher than sedges and BLW's at 6 locations; sedges at 2 locations *viz.*, **Titabar and Vadgaon**; BLW at 2 locations *viz.*, **Moncompu and Ragolu**. The weed populations were lower with higher dose of flucetosulfuron and showed significant influence on corresponding weed biomass also.

The data on crop toxicity rating (**Table 4.3.1.e**) reported by 8 locations indicated that all the herbicide treatments were safe to paddy at 6 locations and at 2 locations *viz.*, **Nagina and Titabar** higher dose of flucetosulfuron caused slight toxicity, but recovered within 10 days of herbicide application. The data on weed control rating reported by (10 locations) indicated that, the weed control rating was higher with application of flucetosulfuron @ 25 g a.i./ ha at **Rewa, Titabar, Moncompu (Table 4.3.1.e)** The sequential application of flucetosulfuron followed by bispyribacsodium recorded higher weed control rating at majority of the locations indicating the longer period of control by sequential application.

Summarized over the locations, the results of 14 locations clearly indicated that the herbicide treatments, flucetosulfuron @ 25 g a.i./ ha was effective at 4 locations; sequential application of flucetosulfuron both 20 and 25 g a.i./ha followed by bispyribacsodium was effective at 6 locations. All the test herbicide treatments were effective at 6 locations. These herbicide treatments performance suggest that depending on the weed intensity, soil type, duration of variety, economics and extent of yield loss, flucetosulfuron 25 g a.i./ha or sequential application of flucetosulfuron 20 - 25 g a.i./ha followed by bispyribacsodium can be recommended.

### **Rabi Season:**

The trial was conducted by only one location i.e. Moncompu with variety Uma. The yield loss due to weeds was very high. Among the test herbicides and combinations, flucetosulfuron @ 25 g a.i./ ha and penaxsulam+cyhalofopbutyl@ 120 g a.i./ha recorded significantly higher grain yield and comparable with need based hand weeding. The yield attributing characters supported the yield trend. Grassy weed population was predominant followed by broad leaf weeds and sedges. Data on weed population at 10 days after herbicide application indicated excellent control of grasses by herbicides and, BLW and sedges to certain extent. The lowest weed biomass was recorded by flucetosulfuron @ 25 g a.i./ha and penaxsulam+cyhalofopbutyl@ 120 g a.i./ha and significantly superior over need based hand weeding and other herbicide treatments. No phytotoxicity was reported by the test herbicides / dosages. Weed control rating was also higher with flucetosulfuron @ 25 g a.i./ha and penaxsulam+cyhalofopbutyl@ 120 g a.i./ha. Based on the results it was concluded that flucetosulfuron @25 g a.i./ha or penaxsulam+cyhalofopbutyl@ 120 g a.i./ha were found to be effective in weed management. (Table . 4.3.2(R))

### **4.3.3 Integrated Pest Management – (Collaborative trial with Entomology and Pathology)**

The collaboration trial was conducted during Rabi 2012-13 and *Kharif* 2013 with the objective of evaluating the effectiveness of different components of integrated pest management in rice under transplanted condition with special emphasis on integrated weed management during critical period of crop weed competition.

During *Kharif* 2013 the trial was conducted at five locations viz., **Chinsurah, D.R.R, Jagdalpur, Ludhiana and Titabar**. The data on weed population and weed biomass are presented in (Table 4.3.3.). The weed population at 30 days after planting (DAT) indicated that, at all the locations except **Ludhiana**, farmers practice showed higher weed population and Integrated pest management (IPM) practice recorded significantly lower weed population. The weed population at 60 DAT also showed similar trend indicating the effectiveness of IPM practice (weed control in time using herbicide) in reducing weed population. The data on weed biomass also showed that the IPM practice recorded significantly low weed biomass both at 30 and 60 DAT and the extended period of weed control has increased the resource use efficiency, and reflected in higher grain yields.

During rabi 2012-13, the trail was conducted at Pattambi and the IPM implemented plots exhibited better weed control with lower no. of grasses and broad leaf weeds (50% less) than farmers practice resulted in higher weed co troll efficiency.

The results indicated that the weed population and weed biomass were considerably reduced in IPM treatment plots as compared to farmers practice and increased grain yields. (For more details see Volume.2 Entomology report of *Kharif* 2013).



Table-4.3.1.(a): Summary of data on grain yield and ancillary characters from trial on evaluation the effectiveness of new herbicide for transplanted rice, kharif 2013

T.N o.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Grain Yield (t/ha)																
				ARD	CBT	CHN	FZB	GGT	KHU	KTA	LUD	MND	MNC	MLN	NWG	NGN	PNT	RNC	RPR	VAR
1	Butachlor (50 EC)	1500	5-7	5.27	6.83	3.88	4.28	2.93	7.11	4.22	5.79	6.63	3.76	6.85	5.64	5.88	4.94	5.46	3.87	4.56
2	Flucetosulfuron 10% WG	20	2-3	6.80	6.19	3.91	4.92	2.99	7.49	4.14	5.86	7.50	3.16	6.89	5.62	6.13	4.75	5.20	3.98	4.78
3	Flucetosulfuron 10% WG	25	2-3	5.91	6.33	4.10	4.43	3.03	7.27	4.54	6.12	7.53	4.83	7.12	6.52	6.21	4.52	5.45	4.20	5.00
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	5.26	6.44	4.71	4.50	3.06	7.40	4.83	6.12	7.24	4.32	7.35	6.55	6.55	4.93	5.87	3.94	5.69
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	7.57	6.93	5.00	4.43	3.09	6.98	5.12	6.21	7.96	5.34	7.23	6.63	6.90	5.11	5.69	4.54	5.77
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	5.79	6.56	3.84	4.35	2.83	6.84	4.17	5.84	7.21	3.69	7.16	6.50	5.72	4.59	4.79	3.79	5.33
7	Weed free	-	20 & 40 DAT	8.66	7.07	5.01	5.34	3.45	7.77	5.58	5.71	7.61	3.88	7.11	6.66	6.95	5.52	5.99	4.74	5.78
8	Mechanical weeding	-		4.47	6.73	4.64	4.33	3.13	6.84	5.44	5.60	6.31	4.29	6.93	6.43	5.64	5.26	5.27	4.17	5.39
9	Need based hand weeding	-		6.51	6.99	4.78	4.98	3.29	7.23	5.53	5.51	7.15	1.90	7.06	5.77	5.93	5.25	5.43	4.33	5.72
10	Non-weeded control	-		2.23	4.24	3.22	3.26	2.79	4.53	3.41	3.89	5.91	1.88	5.71	3.91	2.23	2.68	3.72	3.46	3.11
	C.D. (0.05)			0.85	0.24	0.25	0.07	0.32	0.89	0.44	0.92	0.37	0.72	0.31	0.60	0.44	0.53	0.53	0.30	0.30
	C.V.(%)			10.00	2.14	3.41	1.07	7.29	7.49	6.40	9.50	3.03	11.34	3.10	6.82	4.41	6.45	5.81	5.03	3.45
	<b>Expt. Mean</b>			<b>5.85</b>	<b>6.43</b>	<b>4.31</b>	<b>4.48</b>	<b>3.06</b>	<b>6.94</b>	<b>4.70</b>	<b>5.67</b>	<b>7.10</b>	<b>3.71</b>	<b>6.94</b>	<b>6.02</b>	<b>5.81</b>	<b>4.76</b>	<b>5.29</b>	<b>4.10</b>	<b>5.11</b>
	Yield loss (%)			74.22	40.03	35.84	38.95	19.08	41.71	38.86	31.92	22.35	51.50	19.69	41.29	67.92	51.45	37.90	27.00	46.19
	Soil type			-	Clay loam	Clay loam	Sandy loam	Sandy loam	Silty clay loam	Clay loam	- Pusa Basmati	Sandy loam	Silty clay UMA, MO-	Silty clay loam	Clay loam	Sandy loam	Silt loam Pant Dhan	Clay loam	Clay Soil Durg eshw ari	Sandy loam
	Variety			MTU- 7029	CO 51	Trigu na	Sarjoo -52	NDR- 359	Jehlu m	P- 1121	Pusa Basmati 1121	BR- 2655	MO- 16	HPR 1068	GAR- 13	NDR- 359	Pant Dhan -18	PHB 71	Clay Soil Durg eshw ari	HUR- 4-3

T.A. = Time of Application SC =Soluble concentrate a.i. = active ingredient  
 DAT = Days after transplanting EC = Emulsifiable Concentrate WG: Watersoluable Granules

Table-4.3.1.(a): contd.....

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Panicle No./m <sup>2</sup>																
				ARD	CBT	CHN	FZB	GGT	KHU	KTA	LUD	MND	MNC	MLN	NWG	NGN	PNT	RNC	RPR	VAR
1	Butachlor (50 EC)	1500	5-7	231	432	312	362	245	378	315	323	347	241	258	422	308	195	261	242	276
2	Flucetosulfuron 10% WG	20	2-3	256	417	312	388	253	399	309	321	396	209	264	416	317	215	225	246	280
3	Flucetosulfuron 10% WG	25	2-3	237	437	317	340	250	393	337	372	404	209	270	482	330	213	248	253	286
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	265	433	325	342	238	404	357	350	402	265	260	488	331	205	326	243	308
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	232	444	332	349	235	401	380	363	425	262	263	482	339	207	293	262	311
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	241	440	309	346	229	397	312	343	395	222	264	481	306	210	195	241	291
7	Weed free	-		268	459	339	351	284	415	398	340	391	207	264	485	340	219	334	265	290
8	Mechanical weeding	-	20 & 40 DAT	223	427	319	339	262	391	390	332	395	222	269	471	308	221	202	249	291
9	Need based hand weeding	-		263	454	328	362	271	397	394	335	400	143	258	427	312	212	207	259	270
10	Non-weeded control	-		89	334	275	331	212	268	283	309	373	184	239	290	208	165	164	235	243
	C.D. (0.05)			23	16	7	10	21	31	27	NS	28	32	17	39	20	32	56	12	16
	C.V.(%)			6.85	2.13	1.23	1.94	5.91	4.71	5.33	12.14	4.13	8.52	4.55	6.06	3.73	9.12	13.18	3.29	3.24
	Expt. Mean			230	428	317	351	248	384	347	339	393	216	261	444	310	206	245	249	285

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Panicle weight (g)															
				ARD	CBT	CHN	GGT	KHU	KTA	LUD	MND	MNC	MLN	NWG	NGN	PNT	RNC	RPR	VAR
1	Butachlor (50 EC)	1500	5-7	3.68	2.60	2.75	2.28	2.93	2.85	2.45	3.17	3.31	3.51	3.54	3.78	2.74	3.3	3.25	2.30
2	Flucetosulfuron 10% WG	20	2-3	4.28	2.44	2.77	2.10	2.93	2.79	2.48	3.73	3.43	3.45	3.64	3.78	2.33	3.16	3.32	2.61
3	Flucetosulfuron 10% WG	25	2-3	3.54	2.57	2.75	2.38	2.94	3.06	2.22	3.93	4.14	3.50	4.13	3.79	2.26	3.46	3.36	2.71
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	3.62	2.73	2.89	2.38	2.85	3.30	2.32	3.90	3.73	3.74	4.09	3.79	2.67	4.08	3.27	2.82
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	3.55	2.81	2.94	2.29	2.91	3.51	2.47	4.07	4.21	3.65	4.16	3.80	2.7	3.48	3.54	2.84
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	2.93	2.79	2.73	2.27	2.91	2.82	2.32	3.60	3.32	3.60	4.05	3.79	2.35	3.46	3.2	2.77
7	Weed free	-		3.59	2.88	2.98	2.41	3.15	3.80	2.29	3.50	3.83	3.49	4.14	3.80	2.68	3.87	3.59	3.07
8	Mechanical weeding	-	20 & 40 DAT	3.44	2.79	2.88	2.36	2.75	3.73	2.27	3.70	3.26	3.45	3.99	3.79	2.58	3.04	3.35	2.80
9	Need based hand weeding	-		3.08	2.85	2.93	2.34	2.96	3.76	2.18	3.83	1.49	3.63	3.7	3.78	2.7	2.63	3.5	3.21
10	Non-weeded control	-		1.50	2.43	2.47	2.19	2.34	2.34	2.13	3.23	1.49	3.07	3.17	3.57	1.82	1.83	3.04	2.00
	C.D. (0.05)			0.40	0.25	0.04	0.28	0.38	0.38	0.27	0.29	0.59	0.26	0.4	0.02	0.36	0.56	0.2	0.11
	C.V.(%)			8.29	5.46	0.82	8.58	7.78	8.12	6.89	4.59	10.7	5.1	7.05	0.3	8.5	10.15	4.2	2.36
	Expt. Mean			3.32	2.69	2.81	2.29	2.87	3.20	2.31	3.67	3.22	3.51	3.86	3.77	2.48	3.23	3.34	2.71

T.A. = Time of Application      SC =Soluble concentrate      a.i. = active ingredient  
 DAT = Days after transplanting      EC = Emulsifiable Concentrate      WG: Watersoluble Granules

Table-4.3.1.(b): Summary of data on weed biomass from trial to evaluate the effectiveness of new herbicides for transplanted rice, kharif 2013

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Weed dry weight (g/m <sup>2</sup> )														
				10 DAHA							10 DAT	Heading Stage						Harvest
				VAR	LUD	MND	MLN	NGN	RNC	MNC	VAR	CBT	FZB	GGT	KTA	MWG	PNT	CHN
1	Butachlor (50 EC)	1500	5-7	26.80	41.30	9.80	18.73	9.52	7.80	0.86	43.50	31.40	25.50	37.69	27.37	39.53	178.33	188.67
2	Flucetosulfuron 10% WG	20	2-3	19.70	38.43	6.03	18.48	9.45	3.20	0.40	27.30	34.50	13.25	18.43	30.30	57.32	201.33	176.67
3	Flucetosulfuron 10% WG	25	2-3	16.80	17.83	9.33	13.85	8.41	3.35	0.81	23.80	31.70	24.25	20.25	21.38	34.23	214.33	160.00
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15- 20	8.30	33.43	8.07	12.08	7.91	2.15	0.00	11.97	23.90	39.75	26.56	14.76	62.19	56.00	76.33
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15- 20	3.60	11.93	7.17	17.20	7.04	2.11	0.00	8.70	20.70	47.50	29.38	9.47	48.98	47.67	29.00
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	11.27	40.33	11.40	14.48	8.29	3.97	1.72	18.96	25.50	50.50	13.27	28.97	57.49	167.00	211.33
7	Weed free	-		2.90	57.18	-	0.00	0.00	1.71	17.57	8.14	0.60	8.75	8.92	0.00	13.05	0.00	0.00
8	Mechanical weeding	-	20 & 40 DAT	7.86	66.47	-	19.53	8.97	5.03	5.11	14.98	16.40	47.75	22.38	4.29	23.04	11.67	135.67
9	Need based hand weeding	-		7.20	80.37	4.97	6.88	3.72	6.63	9.60	9.60	12.70	19.50	12.38	3.30	23.24	7.67	47.67
10	Non-weeded control	-		56.44	151.43	18.83	66.43	33.72	23.65	4.61	89.45	102.80	63.75	54.81	87.38	110.33	396.67	323.33
	C.D. (0.05)			6.30	16.84	2.38	8.83	6.25	1.02	6.08	6.41	1.43	5.48	4.97	8.24	8.74	30.84	51.00
	C.V.(%)			31.66	18.22	14.40	32.44	37.53	9.93	87.00	23.23	2.78	11.10	14.03	24.65	12.83	14.03	22.03
	<b>Expt. Mean</b>			<b>16.09</b>	<b>53.87</b>	<b>9.45</b>	<b>18.76</b>	<b>9.70</b>	<b>5.96</b>	<b>4.07</b>	<b>25.64</b>	<b>30.02</b>	<b>34.05</b>	<b>24.41</b>	<b>22.72</b>	<b>46.94</b>	<b>128.07</b>	<b>134.87</b>

T.A. = Time of Application  
DAT = Days after transplanting

SC =Soluble concentrate  
EC = Emulsifiable Concentrate

a.i. = active ingredient  
WG: Watersoluable Granules

Table-4.3.1.(c): Common weeds of transplanted rice reported by AICRIP locations

Weed Groups	Scientific Name	CB T	KH U	KT A	MN D	MN C	ML N	NG N	PN T	WN G	TB T
Grasses	<i>Cynodon dactylone</i>										
	<i>Digitaria eiliaris</i>										
	<i>Digitaria sanguinalis</i>										
	<i>Echinochloa stagnina</i>										
	<i>Echinochloa colonum</i>										
	<i>Echinochloa crusgalli</i>										
	<i>Echinochloa glabrescens</i>										
	<i>Eleusine indica</i>										
	<i>Isachne miliacea</i>										
	<i>Ischaemum rugosum</i>										
	<i>Leptochloa chinensis</i>										
	<i>Oryza rufipogon</i>										
	<i>Panicum dichotomiflorum</i>										
	<i>Panicum repens</i>										
<i>Setaria glauca</i>											
Sedges	<i>Cyperus difformis</i>										
	<i>Cyperus esculentus</i>										
	<i>Cyperus iria</i>										
	<i>Cyperus rotundus</i>										
	<i>Fimbristylis aestivales</i>										
	<i>Fimbristylis littoralis</i>										
	<i>Fimbristylis miliacea</i>										
	<i>Scirpus juncooides</i>										
BLW	<i>Alternanthera phillozemaides</i>										
	<i>Alternanthera sessilis</i>										
	<i>Ammania bacifera</i>										
	<i>Caesulia axilaris</i>										
	<i>Commelina benghalensis</i>										
	<i>Eclipta alba</i>										
	<i>Gallinsoga parviflora</i>										
	<i>Ludwigia perennis</i>										
	<i>Marselia quadrifoliata</i>										
	<i>Monochoria hastefolia</i>										
	<i>Monochoria vaginalis</i>										
	<i>Nelumbo spp</i>										
	<i>Phyllanthus niruri</i>										
<i>Potamogeton distinctus</i>											
<i>Schoenoplectus lateriflorus</i>											

Table-4.3.1.(d): Summary of data on weed population from trial on evaluation the effectiveness of new herbicide for transplanted rice, kharif 2013

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Before 5 days of herbicide application Weed Population (No/m <sup>2</sup> )								
				COIMBATORE			NAWAGAM			MONCOMPU		
				Grasses	Sedgess	BLW	Grasses	Sedgess	BLW	Grasses	Sedgess	BLW
1	Butachlor (50 EC)	1500	5-7	0.00(0.71)	0.00(0.71)	0.00(0.71)	1.09(1.26)	1.01(1.23)	0.00(0.71)	0.00(0.71)	0.00(0.71)	5.33(2.39)
2	Flucetosulfuron 10% WG	20	2-3	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
3	Flucetosulfuron 10% WG	25	2-3	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	2.67(1.44)
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	0.00(0.71)	0.00(0.71)	0.00(0.71)	4.00(2.12)	3.51(2.00)	0.00(0.71)	0.00(0.71)	0.00(0.71)	2.67(1.44)
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	0.00(0.71)	0.00(0.71)	0.00(0.71)	4.03(2.13)	3.82(2.08)	0.00(0.71)	0.00(0.71)	0.00(0.71)	2.67(1.65)
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	27.67(5.30)	5.00(2.34)	3.00(1.86)	3.94(2.10)	3.54(2.01)	0.00(0.71)	0.00(0.71)	0.00(0.71)	5.33(2.39)
7	Weed free	-		0.00(0.71)	0.33(0.88)	0.33(0.88)	2.93(1.85)	2.64(1.77)	0.00(0.71)	0.00(0.71)	1.33(1.18)	12.00(3.50)
8	Mechanical weeding	-	20 & 40 DAT	28.67(5.39)	5.33(2.41)	3.67(2.02)	3.21(1.92)	2.83(1.82)	0.00(0.71)	0.00(0.71)	1.33(1.18)	8.00(2.86)
9	Need based hand weeding	-		26.67(5.21)	6.33(2.60)	3.33(1.93)	2.85(1.83)	2.86(1.83)	0.00(0.71)	0.00(0.71)	0.00(0.71)	2.67(1.65)
10	Non-weeded control	-		30.33(5.55)	7.00(2.73)	4.67(2.27)	3.14(1.91)	2.80(1.82)	0.00(0.71)	0.00(0.71)	0.00(0.71)	5.33(2.39)
	C.D. (0.05)			0.27	0.25	0.39	0.15	0.15	0	0.00	0.64	1.33
	C.V.(%)			6.10	9.93	18.37	6.3	6.29	0.02	0.00	46.81	38.04
	<b>Expt. Mean</b>			<b>2.57</b>	<b>1.45</b>	<b>1.25</b>	<b>1.65</b>	<b>1.6</b>	<b>0.71</b>	<b>0.71</b>	<b>0.8</b>	<b>2.04</b>

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Before 5 days of herbicide application Weed Population (No/m <sup>2</sup> )					
				MALAN			NAGINA		
				Grasses	Sedgess	BLW	Grasses	Sedgess	BLW
1	Butachlor (50 EC)	1500	5-7	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
2	Flucetosulfuron 10% WG	20	2-3	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
3	Flucetosulfuron 10% WG	25	2-3	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	1.00(1.06)	0.00(0.71)	2.00(1.41)	7.35(2.80)	2.31(1.67)	3.10(1.90)
7	Weed free	-		0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
8	Mechanical weeding	-	20 & 40 DAT	0.00(0.71)	0.00(0.71)	0.00(0.71)	6.40(2.62)	2.30(1.67)	3.13(1.90)
9	Need based hand weeding	-		0.00(0.71)	0.00(0.71)	0.00(0.71)	6.48(2.64)	2.31(1.68)	2.65(1.77)
10	Non-weeded control	-		0.00(0.71)	0.00(0.71)	3.00(1.77)	7.17(2.76)	2.35(1.69)	3.12(1.90)
	C.D. (0.05)			0.32	NS	0.48	0.23	0.06	0.11
	C.V.(%)			30.12	0.00	37.4	8.9	3.32	5.41
	<b>Expt. Mean</b>			<b>0.74</b>	<b>0.71</b>	<b>0.88</b>	<b>1.51</b>	<b>1.10</b>	<b>1.17</b>

T.A. = Time of Application SC=Soluble concentrate a.i. = active ingredient DAT = Days after transplanting EC = Emulsifiable Concentrate WG: Watersoluble Granules (Figures in parantheses are the transformed means)

Table-4.3.1.(d)::contd...

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	After 10 days of herbicide application Weed Population (No./m <sup>2</sup> )								
				COIMBATORE			KHUDWANI			MANDYA		
				Grasses	Sedgess	BLW	Grasses	Sedgess	BLW	Grasses	Sedgess	BLW
1	Butachlor (50 EC)	1500	5-7	3.00(1.86)	1.33(1.34)	2.00(1.56)	2.67(1.76)	3.00(1.86)	8.67(3.00)	5.33(2.41)	6.33(2.60)	7.33(2.79)
2	Flucetosulfuron 10% WG	20	2-3	6.00(2.54)	1.67(1.44)	3.00(1.86)	1.00(1.17)	0.67(1.05)	1.00(1.17)	3.00(1.81)	2.67(1.77)	3.67(2.02)
3	Flucetosulfuron 10% WG	25	2-3	4.33(2.20)	1.33(1.34)	1.33(1.34)	0.67(1.05)	0.67(1.00)	0.33(0.88)	2.33(1.68)	1.67(1.46)	2.33(1.68)
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	2.33(1.68)	1.00(1.22)	0.67(1.05)	0.33(0.88)	1.00(1.17)	0.67(1.00)	2.67(1.76)	5.00(2.34)	3.67(2.04)
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	2.00(1.56)	0.67(1.05)	0.67(1.05)	1.00(1.17)	1.33(1.34)	0.67(1.05)	3.33(1.94)	3.00(1.86)	3.67(2.04)
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	7.00(2.73)	1.67(1.46)	1.33(1.34)	1.67(1.46)	2.00(1.56)	5.67(2.47)	2.67(1.77)	3.00(1.86)	4.33(2.20)
7	Weed free	-		0.33(0.88)	0.33(0.88)	0.33(0.88)	0.00(0.71)	0.00(0.71)	0.00(0.71)	-	-	-
8	Mechanical weeding	-	20 & 40 DAT	5.00(2.34)	1.33(1.34)	1.33(1.34)	3.00(1.86)	2.33(1.68)	5.33(2.38)	-	-	-
9	Need based hand weeding	-		3.67(2.04)	0.33(0.88)	0.67(1.05)	3.00(1.86)	2.67(1.77)	4.00(2.11)	-	-	-
10	Non-weeded control	-		36.67(6.09)	8.00(2.91)	7.33(2.79)	6.67(2.66)	3.00(1.86)	13.33(3.70)	-	-	-
	C.D. (0.05)			0.36	0.44	0.49	0.56	0.5	0.67	0.61	0.41	0.45
	C.V.(%)			8.65	18.3	19.87	22.32	20.9	21.13	17.8	11.43	11.7
	<b>Expt. Mean</b>			<b>2.39</b>	<b>1.39</b>	<b>1.43</b>	<b>1.46</b>	<b>1.40</b>	<b>1.85</b>	<b>1.90</b>	<b>1.98</b>	<b>2.13</b>

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	After 10 days of herbicide application Weed Population (No./m <sup>2</sup> )								
				MONCOMPU			MALAN			VARANASI		
				Grasses	Sedgess	BLW	Grasses	Sedgess	BLW	Grasses	Sedgess	BLW
1	Butachlor (50 EC)	1500	5-7	1.33 (1.18)	0.00 (0.71)	26.67 (3.86)	5.00 (2.16)	0.00 (0.71)	5.00 (2.16)	15.33 (3.96)	18.33 (4.33)	11.6 (7.348)
2	Flucetosulfuron 10% WG	20	2-3	0.00 (0.71)	2.67 (1.44)	29.33 (3.61)	4.00 (1.97)	0.00 (0.71)	3.00 (1.61)	11.00 (3.36)	9.00 (3.06)	8.67 (3.01)
3	Flucetosulfuron 10% WG	25	2-3	9.33 (2.25)	0.00 (0.71)	0.00 (0.71)	6.00 (2.32)	0.00 (0.71)	3.00 (1.61)	9.33 (3.12)	7.33 (2.79)	8.33 (2.96)
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	3.00 (1.61)	0.00 (0.71)	2.00 (1.26)	3.33 (1.93)	1.67 (1.46)	3.67 (2.04)
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	3.00 (1.61)	0.00 (0.71)	4.00 (1.81)	2.33 (1.68)	1.00 (1.22)	2.00 (1.56)
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	0.00 (0.71)	40.00 (4.13)	30.67 (3.68)	4.00 (1.77)	0.00 (0.71)	5.00 (2.12)	6.00 (2.53)	5.33 (2.39)	6.67 (2.67)
7	Weed free	-		13.33 (3.11)	390.67 (19.14)	262.67 (15.27)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	1.33 (1.34)	1.33 (1.34)	1.67 (1.46)
8	Mechanical weeding	-	20 & 40 DAT	0.00 (0.71)	129.33 (10.29)	61.33 (7.24)	4.00 (1.81)	0.00 (0.71)	7.00 (2.52)	2.00 (1.56)	3.33 (1.95)	5.33 (2.40)
9	Need based hand weeding	-		6.67 (2.39)	290.67 (16.69)	37.33 (5.84)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	2.67 (1.77)	2.33 (1.68)	2.33 (1.68)
10	Non-weeded control	-		4.00 (1.91)	148.00 (11.47)	50.67 (7.10)	23.00 (4.83)	0.00 (0.71)	123.00 (11.06)	19.00 (4.41)	33.6 (7.584)	23.6 (4.91)
	C.D. (0.05)			5.65	5.65	5.63	1.28	NS	1.38	0.63	0.50	0.44
	C.V.(%)			49.91	49.91	67.39	45.39	0.00	37.14	14.28	11.25	9.8
	<b>Expt. Mean</b>			<b>6.60</b>	<b>6.60</b>	<b>4.87</b>	<b>1.95</b>	<b>0.71</b>	<b>2.56</b>	<b>2.57</b>	<b>2.61</b>	<b>2.62</b>

T.A. = Time of Application SC = Soluble concentrate a.i. = active ingredient DAT = Days after transplanting  
 EC = Emulsifiable Concentrate WG: Watersoluble Granules (Figures in parantheses are the transformed means)

Table-4.3.1.(d)::contd...

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	After 10 days of herbicide application Weed Population (No./m <sup>2</sup> )								
				NAGINA			PANTNAGAR			RANCHI		
				Grasses	Sedgess	BLW	Grasses	Sedgess	BLW	Grasses	Sedgess	BLW
1	Butachlor (50 EC)	1500	5-7	4.24 (2.17)	3.76 (2.06)	4.41 (2.21)	8.00 (2.88)	21.00 (4.63)	23.67 (4.87)	9.33 (3.13)	17.33 (4.22)	17.33 (4.21)
2	Flucetosulfuron 10% WG	20	2-3	2.88 (1.84)	2.68 (1.78)	3.71 (2.05)	21.67 (4.70)	17.67 (4.19)	19.00 (4.39)	14.00 (3.80)	13.67 (3.76)	17.00 (4.17)
3	Flucetosulfuron 10% WG	25	2-3	2.44 (1.71)	2.29 (1.67)	3.41 (1.98)	15.00 (3.90)	21.33 (4.64)	21.67 (4.69)	14.67 (3.87)	9.33 (3.13)	16.33 (4.05)
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	2.08 (1.61)	2.44 (1.71)	2.64 (1.77)	26.67 (5.14)	22.33 (4.67)	21.33 (4.66)	9.33 (3.13)	4.00 (1.91)	15.00 (3.91)
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	2.05 (1.60)	2.07 (1.60)	2.32 (1.68)	24.00 (4.92)	22.33 (4.74)	26.67 (5.19)	8.33 (2.95)	11.00 (3.36)	11.67 (3.48)
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	4.68 (2.27)	2.11 (1.61)	2.45 (1.72)	16.00 (4.02)	17.67 (4.21)	30.33 (5.54)	11.33 (3.41)	9.33 (3.13)	15.33 (3.97)
7	Weed free	-	-	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.67 (1.00)
8	Mechanical weeding	-	20 & 40 DAT	2.25 (1.66)	2.10 (1.61)	2.49 (1.73)	85.00 (9.23)	41.00 (6.35)	81.67 (9.06)	19.67 (4.48)	18.33 (4.32)	13.33 (3.71)
9	Need based hand weeding	-	-	2.74 (1.80)	1.93 (1.56)	1.75 (1.50)	80.33 (8.99)	47.33 (6.88)	77.67 (8.80)	14.00 (3.80)	11.33 (3.42)	11.00 (3.22)
10	Non-weeded control	-	-	21.03 (4.63)	19.59 (4.48)	15.52 (3.97)	93.67 (9.70)	46.00 (6.77)	87.67 (9.37)	18.00 (4.30)	47.00 (6.88)	114.67 (10.73)
	C.D. (0.05)			0.26	0.15	0.38	1.04	1.51	1.04	0.64	0.88	1.08
	C.V.(%)			7.69	4.57	11.52	11.15	18.36	10.54	11.18	14.74	14.75
	Expt. Mean			2.00	1.88	1.93	5.42	4.78	5.73	3.36	3.48	4.25

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	After 10 days of herbicide application Weed Population (No./m <sup>2</sup> )			Weeds/m <sup>2</sup> at heading stage (60 DAT)		
				NAWAGAM			KOTA		
				Grasses	Sedgess	BLW	Grasses	Sedgess	BLW
1	Butachlor (50 EC)	1500	5-7	0.73 (1.10)	0.64 (1.06)	0.47 (0.98)	3.75 (2.03)	8.00 (2.91)	6.25 (2.58)
2	Flucetosulfuron 10% WG	20	2-3	0.72 (1.10)	0.59 (1.04)	0.43 (0.96)	6.00 (2.55)	10.00 (3.22)	5.00 (2.32)
3	Flucetosulfuron 10% WG	25	2-3	0.96 (1.21)	0.74 (1.12)	0.53 (1.01)	3.00 (1.86)	5.00 (2.33)	6.00 (2.53)
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	3.32 (1.95)	2.57 (1.75)	1.81 (1.52)	2.25 (1.64)	4.00 (2.11)	4.00 (2.11)
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	3.35 (1.96)	2.54 (1.74)	1.81 (1.51)	1.00 (1.18)	2.00 (1.56)	1.25 (1.27)
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	3.27 (1.94)	2.56 (1.75)	1.92 (1.55)	6.50 (2.62)	7.00 (2.73)	6.75 (2.68)
7	Weed free	-	-	6.12 (2.57)	4.78 (2.29)	3.54 (2.01)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
8	Mechanical weeding	-	20 & 40 DAT	6.37 (2.62)	5.07 (2.36)	3.65 (2.03)	1.25 (1.27)	1.00 (1.22)	0.00 (0.71)
9	Need based hand weeding	-	-	6.33 (2.61)	4.91 (2.33)	3.68 (2.05)	1.00 (1.22)	0.00 (0.71)	1.25 (1.27)
10	Non-weeded control	-	-	6.27 (2.60)	4.86 (2.31)	3.64 (2.03)	16.25 (4.09)	26.00 (5.14)	20.00 (4.53)
	C.D. (0.05)			0.16	0.15	0.13	0.41	0.41	0.48
	C.V.(%)			5.43	5.85	5.79	13.77	10.5	13.66
	Expt. Mean			1.97	1.78	1.57	2.01	2.65	2.41

T.A. = Time of Application SC =Soluble concentrate a.i. = active ingredient DAT = Days after transplanting EC = Emulsifiable Concentrate WG: Watersoluable Granules (Figures in parantheses are the transformed means)

Table-4.3.1.(e): Summary of data on weed control rating & crop toxicity rating from trial to evaluate the effectiveness of new herbicides for transplanted rice, kharif 2013

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Crop toxicity rating								
				CBT	CHN	KTA	NWG	MNC	MLN	NGN	PNT	
1	Butachlor (50 EC)	1500	5-7	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	0.97(1.21)
2	Flucetosulfuron 10% WG	20	2-3	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.67(1.46)	0.90(1.18)
3	Flucetosulfuron 10% WG	25	2-3	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	0.83(1.15)
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.67(1.46)	0.73(1.11)
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	0.73(1.11)
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.27(1.33)
7	Weed free	-		-	1.00(1.22)	1.00(1.22)	-	-	1.00(1.22)	1.00(1.22)	1.00(1.22)	0.00(0.71)
8	Mechanical weeding	-	20 & 40 DAT	-	1.00(1.22)	1.00(1.22)	-	-	1.00(1.22)	1.00(1.22)	1.00(1.22)	0.00(0.71)
9	Need based hand weeding	-		-	1.00(1.22)	1.00(1.22)	-	-	1.00(1.22)	1.00(1.22)	1.00(1.22)	0.00(0.71)
10	Non-weeded control	-		-	1.00(1.22)	1.00(1.22)	-	-	1.00(1.22)	1.00(1.22)	1.00(1.22)	0.00(0.71)
	C.D. (0.05)			NS	NS	NS	NS	NS	NS	NS	0.16	0.08
	C.V.(%)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	7.43	4.96
	<b>Expt. Mean</b>			<b>1.22</b>	<b>1.22</b>	<b>1.22</b>	<b>1.22</b>	<b>1.22</b>	<b>1.22</b>	<b>1.22</b>	<b>1.27</b>	<b>0.99</b>

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Weed control rating								
				CBT	CHN	KTA	NWG	MNC	MLN	NGN	PNT	VAR
1	Butachlor (50 EC)	1500	5-7	7.67 (2.86)	5.00 (2.35)	7.50 (2.83)	2.95 (1.86)	6.67 (2.67)	8.25 (2.96)	4.67 (2.27)	7.50 (2.83)	6.50 (2.65)
2	Flucetosulfuron 10% WG	20	2-3	6.67 (2.68)	5.67 (2.48)	7.00 (2.74)	2.90 (1.84)	7.67 (2.86)	8.50 (3.00)	5.33 (2.41)	7.13 (2.76)	7.50 (2.83)
3	Flucetosulfuron 10% WG	25	2-3	7.33 (2.80)	7.00 (2.74)	7.75 (2.87)	3.05 (1.88)	7.67 (2.86)	9.00 (3.08)	6.00 (2.55)	6.60 (2.66)	8.00 (2.92)
4	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	8.33 (2.97)	5.00 (2.33)	8.00 (2.91)	3.10 (1.90)	8.00 (2.92)	9.50 (3.16)	7.00 (2.74)	8.33 (2.97)	9.65 (3.19)
5	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	9.00 (3.08)	9.67 (3.19)	8.50 (3.00)	3.10 (1.90)	9.00 (3.08)	9.25 (3.12)	7.67 (2.86)	8.50 (3.00)	9.75 (3.20)
6	Bispyribacsodium 10% SC	25	4-6 leaf stage of weeds (15-20)	7.67 (2.86)	3.67 (2.04)	7.25 (2.78)	3.18 (1.92)	7.00 (2.73)	9.00 (3.08)	5.67 (2.48)	7.10 (2.76)	9.50 (3.16)
7	Weed free	-		-	10.00 (3.24)	10.00 (3.24)	-	1.67 (1.46)	10.00 (3.24)	9.00 (3.08)	0.00 (0.71)	9.75 (3.20)
8	Mechanical weeding	-	20 & 40 DAT	-	7.00 (2.74)	9.00 (3.08)	-	4.67 (2.26)	9.00 (3.08)	6.33 (2.61)	0.00 (0.71)	9.60 (3.18)
9	Need based hand weeding	-		-	8.67 (3.03)	9.00 (3.08)	-	4.33 (2.20)	9.25 (3.12)	6.67 (2.68)	0.00 (0.71)	9.70 (3.19)
10	Non-weeded control	-		-	2.00 (1.56)	1.00 (1.22)	-	4.33 (2.18)	1.00 (1.22)	0.00 (0.71)	0.00 (0.71)	1.00 (1.22)
	C.D. (0.05)			0.17	0.28	0.13	0.04	0.36	0.11	0.15	0.09	0.09
	C.V.(%)			3.33	6.45	3.25	1.24	8.33	2.58	3.64	2.79	1.73
	<b>Expt. Mean</b>			<b>2.87</b>	<b>2.57</b>	<b>2.78</b>	<b>1.88</b>	<b>2.52</b>	<b>2.91</b>	<b>2.44</b>	<b>1.98</b>	<b>2.87</b>

T.A. = Time of Application    SC =Soluble concentrate    a.i. = active ingredient    DAT = Days after transplanting  
 EC = Emulsifiable Concentrate    WG: Watersoluble Granules    (Figures in parantheses are the transformed means)



Table-4.3.1.(R): Summary of data on grain yield and ancillary characters from trial to evaluate the effectiveness of new herbicides for transplanted rice, Rabi 2012-13.

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	MONCOMPU											
				Grain Yield (t/ha)	Panicle No./m <sup>2</sup>	Panicle Weight (g)	Weed dry weight (g/m <sup>2</sup> )	Before 5 days of herbicide application Weed Population (No./m <sup>2</sup> )			After 10 days of herbicide application Weed Population (No./m <sup>2</sup> )			Crop toxicity rating	Weed control rating
								Grasses	Sedges	BLW	Grasses	Sedges	BLW		
1	Butachlor (50 EC)	1500	5-7	5.30	270	2.53	26.15	0.00 (0.71)	8.00 (2.12)	12.00 (2.49)	0.00 (0.71)	30.67 (5.21)	22.67 (3.80)	1.00 (1.22)	7.33 (2.80)
2	Flucetosulfuron 10% WG	20	2-3	5.56	280	2.70	6.88	14.67 (3.06)	290.67 (16.84)	1.33 (1.18)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	1.00 (1.22)	8.67 (3.03)
3	Flucetosulfuron 10% WG	25	2-3	5.79	333	2.85	0.83	12.00 (2.49)	294.67 (16.56)	9.33 (2.72)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	1.00 (1.22)	9.00 (3.08)
4	Penoxsulam 1.02%(w/v) + Cyhalofop-butyl 5.1%(w/w) (5.0w/v)	120	15-20	5.78	290	2.75	0.61	2.67 (1.44)	146.67 (7.47)	24.00 (4.76)	0.00 (0.71)	5.33 (1.83)	13.33 (3.25)	1.00 (1.22)	9.00 (3.08)
5	Penoxsulam 1.02%(w/v) + Cyhalofop-butyl 5.1%(w/w) (5.0w/v)	135	15-20	5.30	283	2.72	5.69	5.33 (2.18)	237.33 (12.78)	8.00 (2.56)	0.00 (0.71)	17.33 (4.11)	32.00 (5.65)	1.00 (1.22)	8.00 (2.92)
6	Bispyribacsodium 10% SC	35	4-6 leaf stage of weeds (15-20)	5.47	260	2.60	2.63	18.67 (3.64)	490.67 (22.08)	102.67 (10.04)	0.00 (0.71)	2.67 (1.44)	0.00 (0.71)	1.00 (1.22)	9.00 (3.08)
7	Need based hand weeding			6.33	333	2.72	16.37	-	-	-	2.67 (1.44)	24.00 (4.21)	16.00 (2.79)	1.00 (1.22)	8.67 (3.03)
8	Non weeded control			1.96	193	1.80	58.07	-	-	-	14.67 (2.70)	96.00 (9.70)	77.33 (8.17)	1.00 (1.22)	1.00 (1.22)
	C.D. (0.05)			0.67	68	0.58	12.86	4.25	13.13	3.55	2.33	3.36	3.93	-	0.11
	C.V.(%)			7.40	14	12.89	50.11	103.62	55.62	49.33	126.76	55.08	69.54	-	2.27
	Expt. Mean			5.18	280	2.58	14.65	2.25	12.98	3.96	1.05	3.49	3.22	-	2.78
	Yield loss (%)			69.07											
	Soil type			<b>Silty Clay</b>											
	Variety			<b>Uma</b>											

T.A. = Time of Application EC = Emulsifiable Concentrate DAT = Days after transplanting  
 SC =Soluble concentrate WG: Watersoluable Granules (Figures in parantheses are the transformed means)

Table-4.3.2(a): Summary of data on grain yield and ancillary characters from trial on evaluation of new combination herbicide for direct sown rice under puddled irrigated condition, kharif 2013

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Grain Yield (t/ha)													
				ARI- RJNR	CBT	CTC	CHN	LDH	MNC	NGN	PTB	PDU	PSA	RGL	REW	TTB	VDG
1	Flucetosulfuron 10% WG	20	2-3	4.73	5.77	3.68	4.13	3.93	5.55	4.83	3.53	4.55	3.18	1.89	6.26	3.07	3.65
2	Flucetosulfuron 10% WG	25	2-3	4.78	5.91	4.01	4.33	4.37	6.84	5.02	3.78	4.36	3.23	1.96	7.57	3.35	3.84
3	Flucetosulfuron 10% WG +Bispyribacsodium 10% SC	20+25	2-3 fb 15- 20	4.82	6.02	4.16	4.66	5.03	6.10	5.43	3.90	5.61	3.56	2.38	7.24	3.43	5.46
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15- 20	5.05	6.51	4.26	4.78	5.16	6.29	5.69	3.96	5.47	3.62	2.53	5.93	3.34	6.04
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	4.82	6.14	3.59	3.69	4.89	5.77	4.70	3.00	4.68	3.45	2.33	7.75	3.23	4.38
6	Weed free	-	-	5.36	6.65	4.48	5.39	5.15	7.38	6.04	3.25	5.02	3.78	2.93	7.20	3.50	6.32
7	Mechanical weeding	-	20 & 40 DAS	5.09	6.31	3.84	4.67	4.99	7.24	4.45	3.50	4.06	3.54	2.33	5.74	2.79	4.76
8	Need based hand weeding			5.30	6.57	4.03	5.24	4.70	2.94	5.20	2.94	4.76	3.42	2.75	7.20	3.15	5.51
9	Non-weeded control			2.55	4.16	2.51	2.31	2.35	3.13	1.96	2.10	3.78	2.62	0.98	6.26	1.95	1.77
	C.D. (0.05)			0.77	0.25	0.15	0.18	0.65	1.54	0.50	0.38	0.43	0.47	0.71	0.83	0.53	0.61
	C.V.(%)			9.42	2.40	2.61	2.39	8.36	15.65	5.98	7.89	6.32	7.98	21.83	7.10	11.76	7.59
	<b>Expt. Mean</b>			<b>4.72</b>	<b>6.00</b>	<b>3.84</b>	<b>4.36</b>	<b>4.51</b>	<b>5.69</b>	<b>4.81</b>	<b>3.33</b>	<b>4.70</b>	<b>3.38</b>	<b>2.23</b>	<b>6.79</b>	<b>3.09</b>	<b>4.64</b>
	Yield loss (%)			<b>52.43</b>	<b>37.44</b>	<b>43.97</b>	<b>57.14</b>	<b>54.37</b>	<b>57.59</b>	<b>67.55</b>	<b>35.38</b>	<b>24.70</b>	<b>30.69</b>	<b>66.43</b>	<b>13.06</b>	<b>44.29</b>	<b>71.99</b>
	Soil type			Sandy loam	Clay loam	-	Clay loam	Sandy loam	Silty clay	Sandy loam	-	Clayey loam	Silty loam	Sandy clay loam	Sandy Clay loam	Clay Loam	Medium
	Variety			RNR 15048	CO 51	Naveen	IR 64	Punja b Mehk 1	Uma- MO 16	NDR 359	-	ADT 49	Sahbhag idhan	Sandy clay loam Vijetha (MTU 1001)	Sandy Clay loam PS-3	Luit	Phule Samruddhi (VDN- 99- 29)

DAS = Days After Sowing    SC = Soluble concentrate WG: Watersoluble Granules

Table-4.3.2.(a) (contd....)

T.No	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Panicles/m <sup>2</sup> (No.)													
				ARI- RJNR	CBT	CTC	CHN	LDH	MNC	NGN	PTB	PDU	PSA	RGL	REW	TTB	VDG
1	Flucetosulfuron 10% WG	20	2-3	193	387	199	292	216	329	293	366	290	244	207	369	347	309
2	Flucetosulfuron 10% WG	25	2-3	207	399	219	299	241	366	300	356	289	248	207	334	376	325
3	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	247	410	230	312	276	333	309	354	423	270	211	387	375	462
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	257	423	231	321	257	393	314	369	415	275	214	383	376	511
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	257	411	193	288	244	309	293	361	319	264	206	395	330	371
6	Weed free	-	-	275	426	250	331	271	403	319	376	372	287	224	385	396	535
7	Mechanical weeding	-	20 & 40 DAS	270	413	208	318	243	381	279	382	287	258	201	383	367	403
8	Need based hand weeding	-		273	425	219	327	247	203	283	340	335	261	217	391	330	466
9	Non-weeded control	-		174	316	156	246	187	195	198	251	260	223	121	391	260	206
	C.D. (0.05)			28	13	11	6	39	72	17	41	43	23	55	41	27	52
	C.V.(%)			6.73	1.86	3.57	1.08	9.39	12.78	3.39	8.06	8.86	5.20	18.78	6.21	5.27	7.47
	<b>Expt. Mean</b>			<b>239</b>	<b>401</b>	<b>212</b>	<b>304</b>	<b>242</b>	<b>323</b>	<b>287</b>	<b>350</b>	<b>332</b>	<b>259</b>	<b>201</b>	<b>380</b>	<b>351</b>	<b>399</b>

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Panicle weight (g)													
				ARI- RJNR	CBT	CTC	CHN	LDH	MNC	NGN	PTB	PDU	PSA	RGL	REW	TTB	VDG
1	Flucetosulfuron 10% WG	20	2-3	4.44	2.33	2.75	2.49	3.03	2.29	3.64	2.36	2.62	2.48	2.90	2.27	3.03	3.16
2	Flucetosulfuron 10% WG	25	2-3	4.65	2.41	2.78	2.60	2.79	2.41	3.64	2.85	2.53	2.50	2.91	3.30	3.00	3.33
3	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	4.81	2.48	2.80	2.74	2.97	2.67	3.65	2.66	4.15	2.53	3.21	3.67	3.74	4.70
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	4.88	2.51	2.82	2.83	3.80	2.96	3.66	2.68	3.98	2.53	3.46	3.00	3.57	5.23
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15- 20)	4.98	2.45	2.66	2.37	3.23	2.10	3.65	2.65	2.95	2.51	3.06	3.30	3.50	3.79
6	Weed free	-	-	5.41	2.57	2.86	2.88	3.32	2.75	3.67	2.65	3.69	2.58	3.66	3.67	3.77	5.46
7	Mechanical weeding	-	20 & 40 DAS	4.99	2.38	2.79	2.75	3.36	2.52	3.63	2.59	2.47	2.51	2.91	2.23	3.36	4.10
8	Need based hand weeding	-		5.38	2.54	2.81	2.83	3.09	2.15	3.64	2.65	3.43	2.49	3.31	2.50	3.27	4.75
9	Non-weeded control	-		4.38	2.01	2.51	2.22	2.33	1.91	3.57	1.79	2.23	2.42	2.40	2.23	2.21	2.25
	C.D. (0.05)			0.60	0.20	0.03	0.07	0.57	0.65	0.02	0.62	0.31	0.27	0.64	0.58	0.72	0.51
	C.V.(%)			7.15	4.73	0.80	1.51	10.59	15.59	0.27	16.79	6.80	6.23	14.2	11.4	15.03	7.20
	<b>Expt. Mean</b>			<b>4.88</b>	<b>2.41</b>	<b>2.75</b>	<b>2.63</b>	<b>3.10</b>	<b>2.42</b>	<b>3.64</b>	<b>2.54</b>	<b>3.11</b>	<b>2.51</b>	<b>3.09</b>	<b>2.91</b>	<b>3.27</b>	<b>4.09</b>

DAS = Days After Sowing    SC = Soluble concentrate    WG: Watersoluble Granules

Table-4.3.2.(b): Summary of data on weed biomass from trial on evaluation new combination herbicide for direct sown rice under puddled irrigated condition kharif 2013

T.No.	Treatments	Dosage (g a.i./ha)	T.A. (DAT)	Weed Dry Weight (g/m <sup>2</sup> )										
				10 DAHA				Heading stage						Harvest
				NGN	PTB	PDU	RGL	ARI- RJNR	CBT	LDH	MNC	TTB	VDG	CHN
1	Flucetosulfuron 10% WG	20	2-3	10.88	19.41	22.09	15.50	54.53	43.80	120.00	13.65	51.36	32.78	239.00
2	Flucetosulfuron 10% WG	25	2-3	9.94	11.74	22.94	15.42	51.03	39.40	92.00	1.84	42.83	30.88	217.33
3	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	10.03	5.51	17.17	9.73	54.93	36.70	40.00	1.87	40.66	17.28	169.67
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	9.43	6.37	19.23	8.16	45.50	32.80	29.33	4.07	39.15	10.77	94.67
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15- 20)	12.18	6.24	21.11	11.21	53.33	38.80	64.33	7.71	32.07	30.53	271.67
6	Weed free	-	-	0.00	0.00	15.93	0.00	0.00	0.20	39.67	3.08	8.94	0.00	0.00
7	Mechanical weeding	-	20 & 40 DAS	8.88	6.82	24.22	13.86	4.10	30.20	41.00	17.44	36.07	25.67	135.67
8	Need based hand weeding	-		5.88	6.74	18.34	8.29	3.00	21.90	73.67	85.76	39.09	16.33	36.00
9	Non-weeded control	-		53.74	111.22	46.58	27.02	267.70	119.70	300.00	217.46	79.03	117.58	404.33
	C.D. (0.05)			7.40	19.50	2.65	7.44	7.92	8.11	29.29	4.46	11.46	9.06	62.83
	C.V.(%)			31.79	69.10	7.87	42.00	7.71	11.60	19.03	59.17	19.14	16.71	20.83
	Expt. Mean			13.44	19.34	23.07	12.13	59.35	40.39	88.89	4.35	41.02	31.31	174.26

DAS = Days After Sowing    SC = Soluble concentrate    WG: Watersoluble Granules

Table-4.3.2(c): Common weeds of Direct seeded rice reported by AICRIP locations

Weed Groups	Scientific Name	ARI-RJNR	CBT	MNC	NGN	PDU	RGL	RWA
Grasses	<i>Cynodon dactylon</i>							
	<i>Dactyloctenium aegyptium</i>							
	<i>Dinebra retroflexa</i>							
	<i>Echinochloa Colonan</i>							
	<i>Echinochloa Crusgalli</i>							
	<i>Echinochloa glabrescens</i>							
	<i>Echinochloa stagnina</i>							
	<i>Heteropogon contortus</i>							
	<i>Isachne miliacea</i>							
	<i>Jussiaea- suffruticosa</i>							
	<i>Leptochloa chinensis</i>							
	<i>Oryza rufipogon</i>							
	<i>Paspalum spp.</i>							
Sedgess	<i>Cyperus difformis</i>							
	<i>Cyperus rotundus</i>							
	<i>Cyprus halpan</i>							
	<i>Cyprus iria</i>							
	<i>Elapta- elava</i>							
	<i>Fimistylis miliacea</i>							
BLW	<i>Alternanthera sessilis</i>							
	<i>Ammania baccifera</i>							
	<i>Cleome viscosa</i>							
	<i>Commelina benghalensis</i>							
	<i>Communilla diflura</i>							
	<i>Cyanotis cucullata</i>							
	<i>Eclipta alba</i>							
	<i>Eclipta prostrata</i>							
	<i>Euphorbia geniculata</i>							
	<i>Euphorbia hirta</i>							
	<i>Ludwigia hyssopifolia</i>							
	<i>Ludwigia perennis</i>							
	<i>Marselia quadrifoliata</i>							
	<i>Monochoria vaginalis</i>							
	<i>Marsilia minuta</i>							
	<i>Mollugo-peataphylla</i>							
	<i>Phyllanthus niruri</i>							
	<i>Physalis-minima</i>							
	<i>Rotala indica</i>							
	<i>Schoenoplectus lateriflorus</i>							
<i>Sida acuta</i>								
<i>Sphenoclea zeylanica</i>								
<i>Trianthema portulacastrum</i>								
<i>Tridax-procumbence</i>								

Table-4.3.2(d): Summary of data on Weed population from trial on evaluation new combination herbicide for direct sown rice under puddled irrigated condition, kharif 2013

Tr. No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAT)	Before 5 days of herbicide application (Weed population No/m <sup>2</sup> )											
				ARI-RJNR			COIMBATORE			MONCOMPU			NAGINA		
				Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Flucetosulfuron 10% WG	20	2-3	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	1.33 (1.18)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
2	Flucetosulfuron 10% WG	25	2-3	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
3	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	6.67 (2.67)	3.00 (1.86)	1.33 (1.34)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	5.67 (2.48)	2.00 (1.56)	1.67 (1.46)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	22.67 (4.80)	14.67 (3.88)	7.67 (2.85)	28.67 (5.40)	4.00 (2.11)	6.00 (2.54)	0.00 (0.71)	26.67 (3.46)	12.00 (3.50)	12.19 (3.56)	17.24 (4.21)	9.60 (3.18)
6	Weed free	-	-	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.33 (0.88)	0.33 (0.88)	0.33 (0.88)	0.00 (0.71)	0.00 (0.71)	13.33 (3.66)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
7	Mechanical weeding	-	20 & 40 DAS	24.00 (4.93)	11.33 (3.41)	6.67 (2.67)	27.67 (5.31)	4.67 (2.26)	6.67 (2.67)	0.00 (0.71)	0.00 (0.71)	17.33 (4.14)	8.53 (3.00)	12.94 (3.67)	8.08 (2.93)
8	Need based hand weeding	-	-	2.00 (1.56)	2.00 (1.56)	1.00 (1.17)	33.67 (5.84)	5.00 (2.34)	7.00 (2.73)	0.00 (0.71)	26.67 (3.46)	17.33 (4.14)	7.66 (2.85)	10.17 (3.26)	6.73 (2.69)
9	Non-weeded control	-	-	21.67 (4.70)	15.33 (3.96)	9.33 (3.13)	35.00 (5.95)	6.00 (2.54)	6.33 (2.60)	1.33 (1.18)	13.33 (2.59)	16.00 (3.84)	17.89 (4.27)	13.95 (3.77)	9.60 (3.17)
	C.D. (0.05)			4.09	0.58	0.41	0.3	0.31	0.35	0.47	4.36	1.37	0.3	0.4	0.16
	C.V.(%)			25.75	16.35	14.29	6.04	12.41	12.75	35.84	164.76	31.63	9.05	11.18	5.49
	Expt. Mean			9.19	2.04	1.64	2.91	1.44	1.58	0.76	1.53	2.51	1.91	2.05	1.72

Tr. No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAT)	Before 5 days of herbicide application (Weed population No/m <sup>2</sup> )								
				PATTAMBI			PUDUCHERRY			RAGOLU		
				Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Flucetosulfuron 10% WG	20	2-3	1.25 (1.27)	0.75 (1.06)	1.00 (1.14)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	4.00 (1.97)	101.00 (9.93)	33.00 (5.15)
2	Flucetosulfuron 10% WG	25	2-3	0.50 (0.93)	1.00 (1.14)	1.75 (1.44)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	84.00 (8.91)	28.00 (5.27)
3	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	1.50 (1.32)	0.75 (1.06)	1.25 (1.27)	10.25 (3.28)	7.25 (2.78)	6.00 (2.55)	5.00 (1.90)	70.00 (8.30)	22.00 (3.69)
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	1.25 (1.27)	0.75 (1.06)	1.00 (1.14)	10.75 (3.35)	8.25 (2.95)	6.75 (2.69)	0.00 (0.71)	78.00 (8.60)	15.00 (3.04)
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	10.00 (3.23)	5.50 (2.43)	1.00 (1.22)	16.25 (4.09)	10.00 (3.24)	7.75 (2.87)	0.00 (0.71)	74.00 (8.56)	36.00 (6.04)
6	Weed free	-	-	12.00 (3.53)	10.25 (3.27)	7.75 (2.87)	14.50 (3.87)	10.75 (3.35)	7.50 (2.83)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
7	Mechanical weeding	-	20 & 40 DAS	10.50 (3.31)	9.00 (3.06)	6.50 (2.62)	21.75 (4.71)	10.00 (3.24)	7.50 (2.83)	0.00 (0.71)	70.00 (8.23)	56.00 (7.46)
8	Need based hand weeding	-	-	11.00 (3.33)	11.50 (3.45)	11.50 (3.45)	18.50 (4.36)	10.25 (3.28)	7.50 (2.83)	4.00 (1.55)	18.00 (3.88)	7.00 (2.25)
9	Non-weeded control	-	-	11.50 (3.45)	10.50 (3.29)	9.00 (3.06)	26.00 (5.15)	10.00 (3.24)	8.25 (2.96)	44.00 (6.66)	142.00 (11.55)	90.00 (9.32)
	C.D. (0.05)			0.63	0.68	0.63	0.19	0.19	0.17	1.25	2.76	2.87
	C.V.(%)			21.28	19.24	19.55	3.93	4.94	4.96	49.38	24.81	41.19
	Expt. Mean			2.02	2.4	2.2	3.36	2.61	2.33	1.73	7.63	4.77

DAS= Days After Sowing SC= Soluble concentrate WG: Watersoluble Granules (Figures in parantheses are the transformed means)

Table-4.3.2(d) (Contd..)

Tr. No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAT)	Before 5 days of herbicide application (Weed population No/m <sup>2</sup> )								
				REWA			VADGOAN			TITABAR		
				Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Flucetosulfuron 10% WG	20	2-3	-	-	-	1.00 (1.22)	1.00 (1.22)	3.67 (2.04)	28.00 (5.29)	75.75 (8.72)	28.50 (5.36)
2	Flucetosulfuron 10% WG	25	2-3	-	-	-	1.00 (1.22)	1.00 (1.22)	3.00 (1.86)	24.25 (4.93)	67.00 (8.20)	25.75 (5.07)
3	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	25.00 (5.03)	2.67 (1.77)	10.33 (3.29)	1.00 (1.22)	1.00 (1.22)	1.67 (1.46)	22.50 (4.75)	43.50 (6.61)	20.50 (4.57)
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	24.33 (4.97)	2.33 (1.68)	6.67 (2.68)	0.67 (1.05)	0.33 (0.88)	1.00 (1.22)	16.75 (4.08)	35.00 (5.95)	18.25 (4.30)
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	27.33 (5.27)	3.00 (1.86)	12.00 (3.53)	1.67 (1.46)	1.33 (1.34)	2.67 (1.77)	49.50 (7.06)	52.25 (7.21)	23.00 (4.84)
6	Weed free	-	-	27.00 (5.24)	2.33 (1.68)	7.00 (2.73)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	4.00 (2.03)	3.50 (1.98)	-
7	Mechanical weeding	-	20 & 40 DAS	43.00 (6.59)	12.33 (3.57)	35.33 (5.98)	1.00 (1.22)	1.00 (1.22)	1.67 (1.46)	30.50 (5.54)	34.25 (5.89)	31.75 (5.66)
8	Need based hand weeding	-	-	26.00 (5.15)	3.00 (1.86)	10.67 (3.34)	0.00 (0.71)	0.00 (0.71)	0.67 (1.05)	12.25 (3.54)	27.75 (5.30)	26.00 (5.14)
9	Non-weeded control	-	-	46.67 (6.85)	13.33 (3.71)	37.33 (6.14)	3.00 (1.86)	2.33 (1.68)	5.00 (2.34)	65.25 (8.09)	153.75 (12.38)	38.00 (6.18)
	C.D. (0.05)			0.62	0.29	0.53	0.23	0.2	0.2	0.87	0.93	0.79
	C.V.(%)			6.28	7.11	7.55	11.2	10.31	7.32	11.8	9.24	10.45
	Expt. Mean			5.59	2.30	3.95	1.19	1.13	1.55	5.04	6.92	5.14

Tr. No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAT)	After 10 days of herbicide application (Weed population No/m <sup>2</sup> )								
				ARI-RJNR			COIMBATORE			MONCOMPU		
				Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Flucetosulfuron 10% WG	20	2-3	10.67 (3.34)	11.67 (3.48)	6.00 (2.53)	6.00 (2.54)	2.00 (1.56)	4.00 (2.11)	2.67 (1.65)	6.67 (1.98)	18.67 (2.98)
2	Flucetosulfuron 10% WG	25	2-3	9.00 (3.08)	8.67 (2.99)	4.33 (2.15)	4.67 (2.26)	1.67 (1.44)	5.00 (2.34)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
3	Flucetosulfuron 10% WG + Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	4.00 (2.08)	1.67 (1.46)	0.67 (1.05)	4.33 (2.20)	1.00 (1.22)	1.00 (1.22)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	3.33 (1.93)	1.00 (1.17)	1.00 (1.17)	2.00 (1.56)	1.00 (1.22)	1.33 (1.34)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	8.00 (2.86)	6.00 (2.53)	3.00 (1.86)	5.67 (2.47)	1.33 (1.34)	1.33 (1.34)	0.00 (0.71)	5.33 (1.83)	5.33 (1.83)
6	Weed free	-	-	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.67 (1.05)	0.33 (0.88)	0.33 (0.88)	1.33 (1.18)	57.33 (7.46)	50.67 (7.08)
7	Mechanical weeding	-	20 & 40 DAS	7.33 (2.79)	3.00 (1.86)	3.00 (1.86)	3.33 (1.93)	1.00 (1.22)	1.00 (1.22)	25.33 (4.73)	216.00 (14.40)	176.00 (13.09)
8	Need based hand weeding	-	-	1.00 (1.17)	1.00 (1.17)	0.67 (1.05)	3.00 (1.86)	1.00 (1.22)	1.00 (1.22)	1.33 (1.18)	286.67 (16.70)	120.00 (10.95)
9	Non-weeded control	-	-	26.33 (5.17)	17.67 (4.25)	11.00 (3.39)	41.67 (6.49)	9.00 (3.07)	15.00 (3.94)	8.00 (2.86)	108.00 (10.38)	152.00 (12.35)
	C.D. (0.05)			0.71	0.64	0.58	0.53	0.42	0.31	1.65	3.6	3.21
	C.V.(%)			15.99	17.08	19.2	12.23	16.69	10.18	59.33	34.13	33.15
	Expt. Mean			2.57	2.18	1.75	2.48	1.47	1.74	1.60	6.10	5.60

DAS= Days After Sowing SC= Soluble concentrate WG: Watersoluble Granules (Figures in parantheses are the transformed means)

Table-4.3.2(d) (Contd..)

Tr. No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAT)	After 10 days of herbicide application (Weed population No/m <sup>2</sup> )								
				NAGINA			PATTAMBI			PUDUCHERRY		
				Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Flucetosulfuron 10% WG	20	2-3	4.98 (2.34)	8.61 (3.02)	5.28 (2.40)	1.25 (1.27)	0.75 (1.06)	1.00 (1.14)	12.50 (3.60)	7.25 (2.78)	4.25 (2.18)
2	Flucetosulfuron 10% WG	25	2-3	4.62 (2.26)	7.36 (2.80)	4.81 (2.30)	0.75 (1.06)	1.00 (1.14)	1.75 (1.44)	13.00 (3.67)	7.75 (2.87)	4.25 (2.18)
3	Flucetosulfuron 10% WG	20+25	2-3 fb 15-20	3.69 (2.05)	4.59 (2.23)	4.68 (2.27)	1.50 (1.32)	0.75 (1.06)	1.25 (1.27)	5.75 (2.49)	3.50 (2.00)	2.75 (1.80)
4	+Bispyribacsodium 10% SC Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	3.16 (1.91)	3.97 (2.10)	4.08 (2.14)	1.25 (1.27)	0.75 (1.06)	1.00 (1.14)	6.25 (2.59)	4.25 (2.17)	3.25 (1.93)
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	8.09 (2.93)	9.12 (3.10)	5.71 (2.49)	1.75 (1.44)	3.50 (1.96)	0.25 (0.84)	12.00 (3.53)	5.75 (2.49)	3.50 (2.00)
6	Weed free	-	-	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	8.00 (2.91)	4.50 (2.23)	3.25 (1.93)
7	Mechanical weeding	-	20 & 40 DAS	4.43 (2.22)	4.25 (2.17)	4.11 (2.14)	1.00 (1.14)	1.75 (1.41)	0.75 (1.06)	15.25 (3.97)	8.25 (2.96)	5.00 (2.34)
8	Need based hand weeding	-	-	2.04 (1.59)	3.32 (1.94)	2.89 (1.82)	2.00 (1.56)	1.00 (1.18)	0.75 (1.06)	11.25 (3.42)	4.75 (2.29)	3.50 (2.00)
9	Non-weeded control	-	-	32.47 (5.73)	29.08 (5.41)	15.79 (4.03)	11.50 (3.45)	10.50 (3.29)	9.00 (3.06)	35.75 (6.01)	14.50 (3.87)	10.00 (3.24)
	C.D. (0.05)			0.31	0.55	0.31	0.61	0.66	0.62	0.31	0.24	0.20
	C.V.(%)			7.32	12.27	7.81	28.59	31.48	32.91	5.96	6.3	6.37
	Expt. Mean			2.41	2.61	2.26	1.47	1.43	1.30	3.58	2.63	2.18

Tr. No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAT)	After 10 days of herbicide application (Weed population No/m <sup>2</sup> )								
				RAGOLU			REWA			VADGOAN		
				Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
1	Flucetosulfuron 10% WG	20	2-3	26.00 (4.51)	115.00 (9.94)	238.00 (13.08)	2.67 (1.77)	1.33 (1.34)	1.67 (1.46)	4.67 (2.27)	3.00 (1.86)	8.33 (2.96)
2	Flucetosulfuron 10% WG	25	2-3	18.00 (2.95)	121.00 (10.76)	197.00 (11.09)	1.67 (1.46)	1.33 (1.34)	1.33 (1.34)	4.67 (2.27)	3.00 (1.86)	7.00 (2.73)
3	Flucetosulfuron 10% WG	20+25	2-3 fb 15-20	12.00 (2.67)	82.00 (8.94)	110.00 (6.92)	2.33 (1.68)	2.00 (1.56)	2.00 (1.56)	5.00 (2.35)	3.00 (1.86)	3.67 (2.04)
4	+Bispyribacsodium 10% SC Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	8.00 (1.96)	82.00 (8.76)	78.00 (7.94)	1.33 (1.34)	1.67 (1.46)	1.00 (1.22)	2.67 (1.77)	2.00 (1.58)	2.33 (1.68)
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	14.00 (3.26)	93.00 (9.65)	212.00 (11.77)	2.33 (1.68)	1.00 (1.17)	1.67 (1.46)	7.67 (2.86)	5.33 (2.41)	6.00 (2.54)
6	Weed free	-	-	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	1.33 (1.34)	1.67 (1.46)	1.00 (1.22)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)
7	Mechanical weeding	-	20 & 40 DAS	17.00 (3.28)	95.00 (9.70)	303.00 (16.75)	47.33 (6.91)	13.00 (3.66)	40.33 (6.38)	4.67 (2.27)	3.00 (1.86)	3.67 (2.04)
8	Need based hand weeding	-	-	6.25 (2.56)	6.50 (2.51)	0.75 (1.06)	2.33 (1.68)	1.00 (1.17)	1.67 (1.46)	1.67 (1.46)	1.00 (1.22)	1.00 (1.22)
9	Non-weeded control	-	-	51.00 (7.07)	146.00 (11.96)	578.00 (20.89)	49.00 (7.03)	12.33 (3.58)	38.33 (6.22)	14.33 (3.84)	10.33 (3.28)	12.00 (3.53)
	C.D. (0.05)			3.27	3.35	10.59	0.40	0.53	0.45	0.15	0.25	1.21
	C.V.(%)			69.62	28.36	72.39	8.38	16.32	10.37	4.07	7.77	14.26
	Expt. Mean			3.22	8.10	10.02	2.77	1.86	2.48	2.20	1.85	4.89

DAS = Days After Sowing SC = Soluble concentrate WG: Watersoluble Granules (Figures in parantheses are the transformed means)



Table-4.3.2(d) (Contd..)

Tr. No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAT)	After 10 days of herbicide application (Weed population No./m <sup>2</sup> )			Weed Population at Harvest
				TITABAR			CHINSURAH
				Grasses	Sedges	BLW	
1	Flucetosulfuron 10% WG	20	2-3	25.00(5.00)	45.00(6.74)	28.75(5.39)	139.67(11.84)
2	Flucetosulfuron 10% WG	25	2-3	17.50(4.20)	35.00(5.93)	16.75(4.13)	124.00(11.15)
3	Flucetosulfuron 10% WG	20+25	2-3 fb	22.75(4.81)	29.25(5.43)	14.25(3.79)	88.67(9.44)
	+Bispyribacsodium 10% SC		15-20				
4	Flucetosulfuron 10% WG fb	25+25	2-3 fb	18.25(4.31)	24.50(4.99)	12.75(3.60)	66.00(8.14)
	Bispyribacsodium 10% SC		15-20				
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	26.75(5.20)	40.50(6.40)	18.50(4.33)	171.67(13.12)
6	Weed free	-	-	3.25(1.90)	3.50(1.96)	-	0.00(0.71)
7	Mechanical weeding	-	20 & 40 DAS	22.75(4.81)	28.00(5.33)	23.75(4.92)	84.67(9.23)
8	Need based hand weeding	-	-	10.75(3.30)	16.25(4.07)	14.50(3.78)	22.33(4.77)
9	Non-weeded control	-	-	81.50(9.03)	170.75(13.06)	52.00(7.22)	212.67(14.59)
	C.D. (0.05)			0.94	0.74	0.99	0.67
	C.V.(%)			13.59	8.41	14.53	4.19
	<b>Expt. Mean</b>			<b>4.73</b>	<b>5.99</b>	<b>4.65</b>	<b>9.22</b>

DAS = Days After Sowing SC = Soluble concentrate WG: Watersoluble Granules (Figures in parantheses are the transformed means)

Table-4.3.2(e): Summary of data on crop toxicity rating & weed control rating from trial to evaluate new combination herbicides for direct sown rice under puddled irrigation conditions, kharif 2013

T.No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAS)	Crop Toxicity Rating (1-10 scale)								
				CBT	CHN	MNC	PTB	PDC	NGN	TTB	VDG	
1	Flucetosulfuron 10% WG	20	2-3	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	3.00(1.87)	1.00(1.22)
2	Flucetosulfuron 10% WG	25	2-3	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.67(1.46)	4.00(2.12)	1.00(1.22)
3	Flucetosulfuron 10% WG+ Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	2.50(1.73)	1.00(1.22)
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	1.00(1.22)	1.33(1.34)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.67(1.46)	3.25(1.93)	1.00(1.22)
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	2.50(1.73)	1.00(1.22)
6	Weed free	-	-	-	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	-
7	Mechanical weeding	-	20 & 40 DAS	-	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	-
8	Need based hand weeding	-	-	-	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	-
9	Non-weeded control	-	-	-	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	1.00(1.22)	-
C.D. (0.05)				NS	NS	NS	NS	NS	NS	0.17	0.12	NS

T.No.	Treatments	Dosage (kg a.i./ha)	T.A. (DAS)	Weed Control Rating (1-10 scale)									
				CBT	CHN	MNC	PTB	PDC	RGL	RWA (%)	NGN	TTB	VDG
1	Flucetosulfuron 10% WG	20	2-3	6.67 (2.68)	5.00 (2.35)	6.67 (2.67)	7.25 (2.78)	6.35 (2.62)	6.50 (2.62)	93.67 (9.70)	5.00 (2.35)	3.75 (2.05)	7.00 (2.74)
2	Flucetosulfuron 10% WG	25	2-3	7.67 (2.86)	5.33 (2.41)	8.00 (2.92)	6.75 (2.69)	5.90 (2.53)	6.00 (2.52)	94.33 (9.74)	5.67 (2.48)	5.50 (2.45)	7.33 (2.80)
3	Flucetosulfuron 10% WG+ Bispyribacsodium 10% SC	20+25	2-3 fb 15-20	8.67 (3.03)	7.00 (2.74)	8.00 (2.92)	7.50 (2.83)	8.93 (3.07)	5.25 (2.37)	91.87 (9.61)	6.33 (2.61)	4.25 (2.17)	8.67 (3.03)
4	Flucetosulfuron 10% WG fb Bispyribacsodium 10% SC	25+25	2-3 fb 15-20	9.00 (3.08)	7.67 (2.86)	8.33 (2.97)	8.50 (3.00)	8.35 (2.97)	3.75 (2.01)	93.27 (9.68)	7.33 (2.80)	5.25 (2.40)	9.00 (3.08)
5	Bispyribacsodium 10% SC	25	4-6 leaf stage weeds (15-20)	7.67 (2.86)	3.67 (2.04)	7.33 (2.79)	6.75 (2.69)	7.33 (2.80)	4.50 (2.19)	95.00 (9.77)	4.67 (2.27)	4.25 (2.18)	7.67 (2.86)
6	Weed free	-	-	-	10.00 (3.24)	7.67 (2.86)	10.00 (3.24)	8.73 (3.04)	1.00 (1.22)	94.33 (9.74)	9.00 (3.08)	8.75 (3.04)	10.00 (3.24)
7	Mechanical weeding	-	20 & 40 DAS	-	7.00 (2.74)	7.33 (2.80)	8.50 (3.00)	5.55 (2.46)	5.75 (2.48)	-	5.33 (2.41)	5.25 (2.40)	7.67 (2.85)
8	Need based hand weeding	-	-	-	9.67 (3.19)	3.67 (1.97)	8.25 (2.96)	7.53 (2.83)	3.50 (1.98)	-	5.67 (2.48)	6.00 (2.55)	8.67 (3.03)
9	Non-weeded control	-	-	-	2.00 (1.56)	1.00 (1.22)	1.00 (1.22)	1.00 (1.22)	8.75 (3.04)	-	0.00 (0.71)	1.00 (1.22)	1.00 (1.22)
C.D. (0.05)				0.15	0.24	0.50	0.13	0.09	0.61	0.19	0.16	0.20	0.17

DAS = Days After Sowing SC = Soluble concentrate WG: Watersoluble Granules (Figures in parantheses are the transformed means)

Table-4.3.2 (R).: Summary of data on grain yield and ancillary characters from trial to evaluate new combination herbicide for direct sown rice under puddled condition, Rabi 2012-13.

T.No.	Treatments	Dosage (g a.i./ha)	(Formulation ml/ha)	T.A. (DAT)	MONCOMPU								Crop Toxicity Rating (1-10 scale)	Weed Control Rating (1-10 scale)	
					Grain Yield (t/ha)	Panicles /m <sup>2</sup> (No.)	Panicle weight (g)	Weed Dry Weight (g/m <sup>2</sup> )	Before 5 days of herbicide application (Weed population No./m <sup>2</sup> )			After 10 days of herbicide application (Weed population-No/m <sup>2</sup> )			
									Grasses	Sedges	BLW	Sedges			BLW
1	Flucetosulfuron 10% WG	20	200	2-3	3.19	277	2.44	16.28	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	4.00 (1.65)	1.33 (1.18)	1.00 (1.22)	7.33 (2.80)
2	Flucetosulfuron 10% WG	25	250	2-3	3.60	263	2.70	9.11	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	0.00 (0.71)	4.00 (1.91)	1.00 (1.22)	8.67 (3.03)
3	Penoxsulam 1.02%w/v + Cyhalofop-butyl 5.1%w/w (5.0w/v)	120	2000	15-20	3.58	233	2.73	17.84	0.00 (0.71)	9.33 (2.77)	29.33 (5.44)	0.00 (0.71)	2.67 (1.44)	1.00 (1.22)	8.33 (2.97)
4	Penoxsulam 1.02%w/v + Cyhalofop-butyl 5.1%w/w (5.0w/v)	135	2250	15-20	3.42	300	2.29	13.19	1.33 (1.18)	16.00 (3.69)	66.67 (7.75)	1.33 (1.18)	8.00 (2.59)	1.00 (1.22)	8.33 (2.97)
5	Bispyribacsodium 10% SC	35	350	15-20 (4-6 leaf stage of weeds)	3.48	247	2.15	2.47	0.00 (0.71)	45.33 (5.19)	28.00 (5.33)	0.00 (0.71)	0.00 (0.71)	1.00 (1.22)	9.00 (3.08)
6	Need based hand weeding	-	-	-	3.68	287	3.02	6.60	0.00 (0.71)	38.67 (5.20)	14.67 (3.84)	24.00 (4.21)	10.67 (2.86)	1.00 (1.22)	9.00 (3.08)
7	Non-weeded control	-	-	-	1.03	137	1.85	147.73	0.00 (0.71)	14.67 (3.73)	34.67 (5.88)	158.67 (9.10)	80.00 (8.83)	1.00 (1.22)	1.00 (1.22)
	C.D. (0.05)				0.54	97	0.60	67.82	0.55	4.96	2.46	7.55	2.32		0.14
	C.V.(%)				9.72	21.88	13.70	125.16	39.85	88.78	32.61	162.73	46.84		2.86
	Expt. Mean				3.14	249	2.45	30.46	0.77	3.14	4.24	2.61	2.79		2.74
	Yield loss (%)				71.92										
	Soil type				Silty clay										
	Variety				UMA										

T.A. = Time of Application WG : Watersoluble Granules DAT = Days after transplanting a.i. : active ingredient (Figures in paranthess are the transformed means)

Table-4.3.2 (R). (contd...)

T.No.	Treatments	Dosage (g a.i./ha)	(Formulation ml/ha)	T.A. (DAT)	PATTAMBI				
					Grain Yield (t/ha)	Panicles/m <sup>2</sup> (No.)	Panicle weight (g)	Weed Dry Weight (g/m <sup>2</sup> )	Weed number / m <sup>2</sup>
1	Flucetosulfuron 10% WG	20	200	2-3	4.38	344	2.56	3.49	10.00(3.03)
2	Flucetosulfuron 10% WG	25	250	2-3	4.78	352	2.92	1.54	4.00(1.97)
3	Penoxsulam 1.02% $\omega$ /v) + Cyhalofop-butyl 5.1% $\omega$ /w (5.0 $\omega$ /v)	120	2000	15-20	4.13	338	2.47	3.44	16.00(3.99)
4	Penoxsulam 1.02% $\omega$ /v) + Cyhalofop-butyl 5.1% $\omega$ /w (5.0 $\omega$ /v)	135	2250	15-20	4.33	365	2.59	1.67	19.00(4.37)
5	Bispyribacsodium 10% SC	35	350	15-20 (4-6 leaf stage of weeds)	3.93	350	2.38	8.75	44.00(6.60)
6	Need based hand weeding	-	-	-	4.5	351	2.87	4.57	19.00(4.39)
7	Non-weeded control	-	-	-	2.9	300	2.1	30.95	164.00(12.73)
	C.D. (0.05)				0.39	37.34	0.24	3.12	1.82
	C.V.(%)				6.31	7.33	6.27	26.97	23.11
	Expt. Mean				4.13	343	2.55	7.77	5.29
	Yield loss (%)				35.56				
	Soil type				<b>Sandy loam</b>				
	Variety				-				

T.A. = Time of Application WG : Watersoluble Granules DAT = Days after transplanting a.i. : active ingredient (Figures in paranthesis are the transformed means)

Table-4.3.3.: Summary of data on weed population and weed biomass from the trial on farm management of insects, diseases and weeds IPM during *kharif* 2013 and *Rabi* 2012-13.

Treatments	CHINSURAH				DRR		JAGDALPUR						LUDHIANA				TITABAR		PATTAMBI (Rabi 2012-13)	
	Weed Population no./sqm		Weed biomass g/sqm		Weed Population no./sqm		Weed Population no./sqm			Weed biomass g/sqm			Weed Population no./sqm		Weed biomass g/sqm		Weed Population no./sqm	Weed biomass g/sqm	Weed Population no./sqm	
	(30 DAT)	(60 DAT)	(30 DAT)	(60 DAT)	(30 DAT)	(60 DAT)	Grass es	Sedge ss	BLW	Grass es	Sedg ess	BLW	(30 DAT)	(60 DAT)	(30 DAT)	(60 DAT)			Grass es	BLW
IPM	66.4 (8.11)	138.2 (11.71)	10.50	19.64	0.60 (0.98)	3.60 (1.87)	3.94 (2.48)	3.40 (2.34)	3.14 (2.27)	0.37	1.47	0.70	1.00 (1.19)	0.60 (0.98)	23.25	26.00	119.2 (10.90)	16.70	9.50 (3.05)	10.00 (3.16)
Farmers Practices (FP)	114.6 (10.69)	227 (15.05)	16.66	30.36	11.6 (3.47)	22.2 (4.69)	19.26 (4.89)	17.93 (4.73)	16.40 (4.55)	5.21	2.46	6.53	1.60 (1.39)	1.40 (1.28)	42.00	49.00	178.4 (13.34)	60.83	22.50 (4.63)	17.50 (4.17)
<i>C.D</i> (0.05)	1.10	1.36	2.97	4.92	0.47	0.54	1.18	1.47	0.88	0.41	0.83	0.43	NS	NS	NS	NS	1.04	12.25	NA	
<i>C.D</i> (%)	8.07	7.01	14.99	13.51	14.61	11.33	22.13	29.10	8.00	22.50	26.84	16.56	29.80	42.05	71.27	114.45	5.88	21.67		

#### 4.4. RICE BASED CROPPING SYSTEMS

##### 4.4.1. Climate Resilient Management Practices in Rice and rice based cropping systems

To address the issues of sustainability of food production on account of changing climate, a combination of water and nutrient management practices were tested aimed at water and nitrogen saving. For this purpose an experiment was initiated during 2013 at locations. Eight treatments consisted {T<sub>1</sub>: split application of Nitrogen (50% basal+ 25% active tillering + 25% at flowering) in puddle soil; T<sub>2</sub>: Use of bio-fertilizer (*Azotobacter* and *Azolla*, to meet 50% of N requirement); T<sub>3</sub>: Crop residue retention (at least 30%) in cropping system to maintain organic carbon); T<sub>4</sub>: Non-puddled rice establishment to reduce water requirement; T<sub>5</sub>: Combination of T<sub>1</sub>+T<sub>2</sub>; T<sub>6</sub>: Combination of T<sub>1</sub>+T<sub>2</sub>+T<sub>3</sub>; T<sub>7</sub>: Combination of T<sub>1</sub>+T<sub>2</sub>+T<sub>3</sub>+T<sub>4</sub>; and T<sub>8</sub>: Conventional method of rice cropping)} replicated four times were tested in Randomized block design. The data is presented in Table 4.4.1. and salient findings are summarized below.

The results revealed that non-puddled rice (NPR) as an alternative to culture conventional transplanted rice (TPR) was promising at Coimbatore as NPR (6.91 t/ha) out yielded TPR (6.02 t/ha). At Patna (4.03 t/ha), Gangavathi (3.99 t/ha), Khudwani (5.82 t/ha), Karjat (3.34 t/ha) and Kanpur (4.12 t/ha) NPR was statistically as productive as TPR. However, NPR is not promising alternative to TRP at Mandya, Puducherry and Titabar as there was severe yield penalty as compared to TPR. This wide yield gap between NPR and TPR got filled up by adoption of improved practices (split application of N, use of biofertilizers to substitute 50%N and crop residue retention) at Mandya and Titabar while at Puducherry; the package has made NPR to outperform TPR. Use of biofertilizers at Mandya and Coimbatore and crop residues alone in TPR at Puducherry resulted in significant reduction in rice yields.

The study clearly indicated that non-puddled rice crop establishment is promising at Coimbatore and at other locations and it can be made as productive as transplanted rice with resorting to split application of N, use of biofertilizers to substitute 50%N and crop residue retention.

##### 4.4.2. Impacts of conservation agriculture on rice based cropping systems.

Rice cultivation involves intensive land preparation including puddling. Intensive tillage leads to rapid breakdown of organic matter and its depletion. Further, the high fuel costs, difficulties in the establishment of succeeding crops including long turnover periods have given scope for reduced tillage systems. In this direction, an experiment was planned to assess the impact of conservation agriculture on rice and rice based cropping systems was initiated during *kharif* 2012 and it was continued for 2013 at 7 locations (**Aduthurai, Coimbatore, Pantnagar, Chinsurah, Patna, Rewa and Tuljapur**). In this trial treatments formed by combination of three tillage systems {(Conventional tillage (CT), zero tillage (ZT) and rotatory tillage (RT)} in horizontal strips and two rice varieties (HYV and hybrid) as vertical strips were tested in strip plot design with

three replications. Seed rate was similar for both hybrids and HYVs. The data are presented in Table 4.4.2. and salient findings are summarized below.

The data revealed that tillage system at Coimbatore, Chinsurah, Rewa and rice varieties at 6 out of seven locations (excluding Tuljapur) had significant influence on performance of rice.

Irrespective of location, conventional tillage has recorded the highest yields with the exception that at Rewa, where minimum tillage recorded the highest rice has yields. At Coimbatore, ZT recorded significantly lower productivity (3.10 t/ha) than MT (3.96 t/ha) and CT (7.13 t/ha). However, at Chinsurah ZT (4.30 t/ha) remained on par with MT (4.39 t/ha) and recorded significantly lower rice yields than CT (4.91 t/ha). At Rewa, MT (7.13 t/ha) recorded significantly higher rice yields than CT (6.35 t/ha) which was at par with ZT (6.11 t/ha). The extent of yield reduction due to adoption of ZT and MT over CT varied with the location from -56.5% and -44.4% at Coimbatore to -12.4% and -10.6% at Chinsurah. However at Rewa, there is yield advantage of 12.3% with adoption of MT as compared to CT while ZT has encountered a little yield penalty (-3.8%).

Among the rice cultivars used, hybrids have out yielded the high yielding variety (HYV) of location at all the locations except at Tuljapur and Pantnagar where the differences in yield between hybrid and HYV are insignificant. At Patna and Rewa, hybrids have 1.93 and 1.45 t/ha higher yield than HYV.

It is concluded that reduced tillage systems (ZT and MT) are rice productivity inhibitive and hybrids are superior in productivity to HYV.

#### ***Rabi Season:***

The impact of conservation agriculture on rice based cropping systems was initiated during *kharif* 2012 continued at four (**Adhuturai** and **Coimbatore** with *rabi* rice, and at **Kanpur**, and **Rewa** with *rabi* linseed) locations. In this trial treatments composed of combination of three tillage systems {(Conventional tillage (CT), zero tillage (ZT) and minimum tillage (MT)} and two rice varieties (HYV and hybrid) horizontal strips and residue management (retention and no retention) as vertical strips were tested in strip plot design with three replications. The data is presented in **Table 4.4.2 (R)** and salient findings are summarized below.

The data revealed that tillage and cultivars of preceding rice and residue retention systems had significant influence on performance of *rabi* crops at all locations. The interaction effects were found non significant at all locations.

CT with hybrids in rice-rice system resulted in significantly superior performance of *rabi* rice at Adhuturai (4.17 t/ha) and Coimbatore (6.50 t/ha) than all other tillage and variety combinations. CT in rice followed by CT linseed system resulted in significantly superior performance of linseed at Kanpur (1.19-1.20 t/ha) and Rewa (1.45-1.55 t/ha).

Kharif rice residue retention in *rabi* rice at Adhaturai and Coimbatore and in linseed at Kanpur had registered significantly higher yields of *rabi* crops over no residue retention. However, at Rewa no residue retention linseed fared significantly better than residue retained linseed.

System productivity (t/ha) expressed as Rice Equivalent Yields (REY) were the highest in conventionally tilled rice-rice and rice-linseed systems with residue retention.

#### **4.4.3.(R). Management of Micro Nutrients in Rice Based Cropping Systems (Agronomy and Soil Science Collaborative trial)**

A collaborative trial (Agronomy and Soil Science) on the effect of micro nutrient application on nutrition and productivity of rice-wheat cropping system was conducted at Kanpur during *rabi* 2012. The treatments include inorganic NPK alone and additionally the combinations of Zn, Fe, Mn and B as soil application and also as foliar spray. The treatment details and data are presented in **Tables 4.4.3 (R)**.

Fourteen treatments that include the recommended doses of inorganic NPK fertilizers alone or applied in conjunction with Zinc, Iron and Manganese as well as combination of organic matter and micro nutrients. The micro-nutrients Zn, Fe and Mn were applied soil and also as foliar spray (0.5%) independently. The treatments details and data received are presented in **Table 4.4.3 (R)**.

At Kanpur rice-wheat cropping system was adopted and among treatments, NPK Zn + Fe + Mn (either soil or spray application) recorded higher grain yield of Wheat (4.48 – 4.65 t/ha) compared to NPK only (4.28 t/ha). However, organic matter in conjunction with NPK Zn + Fe + Mn applied during previous *kharif* season followed by NPK alone during *rabi* season recorded higher grain yield of 4.65 t/ha which was higher than to NPK Zn + Fe + Mn applied during *rabi* either as soil application or as spray formulation. (4.15 - 4.53 t/ha).

The system productivity was also higher in treatments applied with organic manure+NPK+Zn+Fe+Mn for rice followed by NPK+Zn+Mn in rice- wheat system (10.05 to 10.08 t/ha) indicating importance of organics for rice – wheat system.

The data revealed that addition of micronutrients substantially improved rice grain yields in sandy loam soil of Kanpur (Rice-Wheat) and addition of organic matter during previous *kharif* season had positive residual effect in succeeding wheat crop productivity and recorded additional higher grain yield either with soil or spray application of micro nutrients. It is clear that the system productivity of rice-wheat, indicate the need for judicious application of organic manure (in conjunction with NPK and micro-nutrients), is essential for enhancing the productivity of the system.



**Table-4.4.1: Summary of data on grain yield and ancillary characters of rice from the trial of Climate Resilient Management Practices in Rice and rice based cropping systems, kharif - 2013.**

Treatments		ARI-PATNA			COIMBATORE			GANGAVATHI			KHUDWANI		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
T1	Split application of Nitrogen ( 50%Basal+ 25% Active tillering + 25% at Flowering) in puddle soil	4.08	360	2.89	6.84	383	3.28	4.71	318	2.00	6.87	405	2.73
T2	Use of bio-fertilizer (use any or more no. of biofertilizer like Azotobactor and Azolla, as per suitability/availability for rice equivalent to 50% of N requirement)	3.92	308	1.68	5.29	293	3.22	4.32	309	2.07	5.96	343	2.58
T3	Crop residue retention (At least 30% crop residue retention) in cropping system (both crops) to maintain organic carbon)	4.13	326	2.48	5.60	355	3.10	4.77	263	1.58	5.58	367	2.45
T4	Non-puddled rice establishment through any method (Direct seeding of rice, Unpuddled manual transplanting or mechanical transplanting) to reduce water requirement	4.03	319	2.08	6.91	363	3.51	3.99	286	1.77	5.82	386	2.46
T5	Combination of T1+T2	4.18	352	2.72	6.93	373	3.57	3.63	348	2.07	7.31	407	2.88
T6	Combination of T1+T2+T3	4.15	329	2.58	7.38	371	3.29	4.25	341	2.26	7.50	421	2.83
T7	Combination of T2+T3+T4	4.08	323	2.33	7.51	423	3.59	4.89	321	2.23	7.42	416	2.91
T8	Conventional method of rice cropping in as per the recommendation of respective area followed by next crop	3.89	277	1.30	6.02	357	3.31	4.71	294	2.81	6.51	357	2.67
	C.D.(0.05)	0.20	10.90	0.16	0.52	22.80	0.17	1.05	68.54	0.57	1.14	31.05	0.19
	C.V. (%)	3.42	2.29	4.75	4.55	3.57	2.95	13.56	12.63	15.48	9.80	4.57	4.03
	<b>Expt. Mean</b>	<b>4.06</b>	<b>324</b>	<b>2.26</b>	<b>6.56</b>	<b>365</b>	<b>3.36</b>	<b>4.41</b>	<b>310</b>	<b>2.10</b>	<b>6.62</b>	<b>388</b>	<b>2.69</b>
	Fert.dose NPK (kg/ha)	120-60-40			150-50-50-25			200-100-100			120-60-30		
	Variety	-			CO (R) 50			GGV-05-01			Shalimar Rice-1		
	Soil type	Clay			Clay loam			Black clay			Silty clay loam		
	pH	7.1			7.5			8.2			6.78		
	Avaliable NPK	305.21.210			252-18-540			-			230-21-123		

Table-4.4.1 (Contd..)

Treatments		KARJAT			KANPUR			MANDYA			PUDUCHERRY			TITABAR		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
T1	Split application of Nitrogen ( 50% Basal+ 25% Active tillering + 25% at Flowering) in puddle soil	3.47	184	2.09	4.92	286	2.67	7.28	341	4.40	5.15	406	3.69	4.84	201	4.01
T2	Use of bio-fertilizer (use any or more no. of biofertilizer like Azotobactor and Azolla, as per suitability/availability for rice equivalent to 50% of N requirement)	3.33	141	2.20	4.08	255	2.46	6.39	308	4.17	5.03	384	3.62	4.93	206	4.23
T3	Crop residue retention (At least 30% crop residue retention) in cropping system (both crops) to maintain organic carbon)	3.42	191	2.12	3.49	225	2.35	6.60	340	4.17	4.69	354	3.46	4.48	206	3.90
T4	Non-puddled rice establishment through any method (Direct seeding of rice, Unpuddled manual transplanting or mechanical transplanting) to reduce water requirement	3.34	154	2.11	4.12	266	2.61	7.36	303	3.90	4.59	338	3.43	4.06	338	3.79
T5	Combination of T1+T2	3.60	183	2.17	5.28	301	3.11	8.12	344	4.70	5.89	436	4.10	5.11	244	4.41
T6	Combination of T1+T2+T3	3.49	165	2.21	3.61	313	3.17	8.33	350	4.87	6.05	447	4.34	4.90	223	4.39
T7	Combination of T2+T3+T4	3.38	164	2.16	5.09	271	2.63	8.59	366	5.17	5.72	409	3.93	4.33	367	4.34
T8	Conventional method of rice cropping in as per the recommendation of respective area followed by next crop	3.51	178	2.14	5.17	305	3.14	8.16	323	4.57	5.07	406	3.70	4.66	211	4.29
	C.D.(0.05)	0.14	54.77	0.52	1.97	7.97	0.07	0.61	21.86	0.22	0.26	17.82	0.17	0.54	28.76	0.47
	C.V. (%)	2.40	18.40	13.91	25.10	1.64	1.36	4.61	3.73	2.77	2.78	2.56	2.6	7.96	7.84	7.68
	<b>Expt. Mean</b>	<b>3.44</b>	<b>170</b>	<b>2.15</b>	<b>4.47</b>	<b>278</b>	<b>2.77</b>	<b>7.6</b>	<b>334</b>	<b>4.49</b>	<b>5.27</b>	<b>398</b>	<b>3.78</b>	<b>4.66</b>	<b>249</b>	<b>4.17</b>
	Fert.dose NPK (kg/ha)	-			120-60-60-25			100-50-50-20			150-40-40-25			60-20-40		
	Variety	-			NDR-359			-			ADT-49			TTB-404		
	Soil type	-			Sandy loam			Red sandy loam			Clay loam			Clay loam		
	pH	-			7.5			6.64			7.07			-		
	Availble NPK	-			206-17.81-211			298-32-197			481.6-50.22-154			444.67-8.54-231.3		

Table-4.4.2: Summary of data on grain yield and ancillary characters of trial on Impacts of Conservation Agriculture on Rice Based Cropping systems during kharif - 2013.

Treatments	ADUTHURAI			COIMBATORE			CHINSURAH			GANGAVATHI			
	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	
T1	V1	1.30	317	2.80	7.30	417	3.28	4.62	346	2.84	4.40	384	3.04
	V2	1.22	308	2.65	6.96	412	2.97	5.21	360	3.00	3.41	304	3.48
T2	V1	1.26	300	2.73	3.32	297	2.63	3.95	332	2.69	4.09	336	2.47
	V2	1.23	274	2.65	2.88	281	2.54	4.66	341	2.93	3.44	306	2.78
T3	V1	1.27	308	2.75	4.09	346	2.88	3.88	328	2.64	3.78	371	2.46
	V2	1.23	297	2.65	3.83	339	2.75	4.91	352	2.78	3.26	324	3.28
C.D.(0.05)													
T at same V		NS	3.62	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
V at same T		NS	2.71	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Mean of resource conservation system (RCS)</b>													
	T1	1.26	313	2.72	7.13	415	3.13	4.91	353	2.92	3.91	344	3.26
	T2	1.25	287	2.69	3.10	289	2.59	4.30	337	2.81	3.77	321	2.62
	T3	1.25	303	2.70	3.96	343	2.81	4.39	340	2.71	3.52	348	2.87
C.D.(0.05)		NS	1.89	NS	0.38	13.81	0.13	0.14	3.43	0.03	NS	NS	NS
C.V.(%)		1.17	0.61	1.17	7.84	3.86	4.61	2.91	0.98	0.90	8.53	4.29	20.00
<b>Mean of varieties</b>													
	V1	1.28	308	2.76	4.90	354	2.93	4.15	335	2.73	4.09	364	2.66
	V2	1.23	293	2.65	4.56	344	2.75	4.93	351	2.90	3.37	311	3.18
C.D.(0.05)		0.01	2.09	0.03	0.23	8.05	0.14	0.17	5.4	0.04	0.11	33.79	0.48
C.V.(%)		0.91	0.6	0.91	4.21	2	4.30	3.32	1.37	1.11	2.66	8.68	14.14
<b>Experimental Mean</b>		<b>1.26</b>	<b>301</b>	<b>2.71</b>	<b>4.73</b>	<b>349</b>	<b>2.84</b>	<b>4.54</b>	<b>343</b>	<b>2.82</b>	<b>3.73</b>	<b>338</b>	<b>2.92</b>
Soil type		Clay			Clay loam			Clay loam			Black clay		
pH		7.20			7.5			7.2			8.2		
RDF (NPK kg/ha) + Zn		150-60-60-25			120-38-38-25			80-40-40-25			150-60-50-20		
<b>System of RCT</b>													
	T1	Conventional tillage			Conventional tillage			Conventional tillage			Conventional tillage		
	T2	Zero tillage			Zero tillage			Zero tillage			Zero tillage		
	T3	Minimum tillage			Minimum tillage			Minimum tillage			Minimum tillage		
<b>Varieties</b>													
	V1	Hybrid (CoRH 3)			Hybrid (CO 51)			Hybrid (Ganga RH-122)			Hybrid (GGV-05-01)		
	V2	Variety (ADT 43)			High yielding variety (HYV) (CORH 3)			High yielding variety (HYV) (Satya Krishna)			High yielding variety (HYV) (KRH-4)		

Table-4.4.2 (Contd..)

Treatments		KARJAT			KANPUR			PATNA-ARI		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (cm)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
T1	V1	3.05	310	3.16	4.38	310	3.20	5.05	443	2.31
	V2	2.75	267	3.00	3.58	250	2.94	3.55	359	1.65
T2	V1	2.36	300	2.55	3.54	264	2.60	6.31	483	2.62
	V2	2.21	286	2.43	2.82	227	2.44	3.94	444	1.82
T3	V1	2.67	311	2.77	3.90	249	2.82	5.49	459	2.20
	V2	2.48	271	3.44	3.20	248	2.64	3.58	413	1.27
C.D.(0.05)										
T at same V		NS	NS	NS	NS	NS	NS	NS	NS	NS
V at same T		NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Mean of resource conservation system (RCS)</b>										
T1		2.90	288	3.08	3.98	280	3.07	4.30	401	1.98
T2		2.29	293	2.49	3.18	246	2.52	5.13	464	2.22
T3		2.57	291	3.11	3.55	249	2.73	4.53	436	1.74
C.D.(0.05)		0.06	NS	NS	0.14	NS	0.07	NS	24.02	0.10
C.V.(%)		2.15	26.56	17.57	3.74	10.82	2.55	9.85	5.41	4.76
<b>Mean of varieties</b>										
V1		2.70	307	2.83	3.94	274	2.87	5.62	462	2.38
V2		2.48	275	2.96	3.20	242	2.68	3.69	405	1.58
C.D.(0.05)		0.07	NS	NS	0.29	28.51	0.09	0.43	21.32	0.15
C.V.(%)		2.40	11.06	16.49	6.93	9.58	2.82	7.98	4.26	6.41
<b>Experimental Mean</b>		<b>2.59</b>	<b>291</b>	<b>2.90</b>	<b>3.57</b>	<b>258</b>	<b>2.78</b>	<b>4.66</b>	<b>433</b>	<b>1.98</b>
Soil type		-			Sandy loam			Clay		
pH		-			7.1			7.1		
RDF (NPK kg/ha) + Zn		-			120-60-60-25			120-60-40		
<b>System of RCT</b>										
T1		Conventional tillage			Conventional tillage			Conventional tillage		
T2		Zero tillage			Zero tillage			Zero tillage		
T3		Minimum tillage			Minimum tillage			Minimum tillage		
<b>Varieties</b>										
V1		Hybrid (Karjat-3)			Hybrid (PHB-71)			Hybrid (PAC 835)		
V2		High yielding variety (HYV) (Sahyadri-4)			High yielding variety (HYV) (NDR-359)			High yielding variety (HYV) (Rajendra Sweta)		

Table-4.4.2 (Contd..)

Treatments		REWA			TULJAPUR			PANTNAGAR		
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Wt. (g)
T1	V1	7.50	264	2.17	0.89	125	2.02	4.70	266	2.27
	V2	5.20	247	1.70	1.01	143	2.17	4.57	271	2.32
T2	V1	6.47	266	2.48	0.53	103	1.30	4.70	258	2.11
	V2	5.76	253	2.23	0.58	115	1.35	4.57	270	2.06
T3	V1	7.80	259	2.57	0.75	107	1.77	5.49	266	2.28
	V2	6.46	260	2.45	0.85	114	1.92	5.31	259	2.37
C.D.(0.05)										
T at same V		NS	NS	NS	NS	NS	NS	NS	NS	NS
V at same T		NS	NS	NS	NS	NS	NS	NS	NS	NS
<b>Mean of resource conservation system (RCS)</b>										
T1		6.35	256	1.93	0.95	134	2.10	4.63	268	2.30
T2		6.11	259	2.36	0.56	109	1.32	4.63	264	2.08
T3		7.13	259	2.51	0.80	110	1.84	5.40	263	2.32
C.D.(0.05)		0.49	NS	NS	NS	NS	0.14	NS	NS	NS
C.V.(%)		7.25	3.48	16.33	24.19	11.79	7.54	20.2	4.36	9.02
<b>Mean of varieties</b>										
V1		7.26	263	2.41	0.72	112	1.70	4.96	263	2.22
V2		5.81	253	2.13	0.82	124	1.81	4.81	267	2.25
C.D.(0.05)		0.64	NS	NS	NS	8.67	NS	NS	NS	NS
C.V.(%)		8.46	3.55	13.50	11.78	6.38	12.55	3.53	7.58	6.83
<b>Experimental Mean</b>		<b>6.54</b>	<b>258</b>	<b>2.27</b>	<b>0.77</b>	<b>118</b>	<b>1.76</b>	<b>4.89</b>	<b>265</b>	<b>2.23</b>
Soil type		Sandy clay loam			Clay			Silty loam		
pH		6.5			7.6			7.9		
RDF (NPK kg/ha) + Zn		100-60-40-20			60-30-30			120-60-40		
<b>System of RCT</b>										
T1		Conventional tillage			Conventional tillage			Conventional tillage		
T2		Zero tillage			Zero tillage			Zero tillage		
T3		Minimum tillage			Minimum tillage			Minimum tillage		
<b>Varieties</b>										
V1		Hybrid (PS-3)			Hybrid (Terana)			Hybrid (Pant Sanker Dhan-3)		
V2		High yielding variety (HYV)			High yielding variety (HYV) (TJP-48)			High yielding variety (HYV) (Pant Dhan-16)		

Table-4.4.2(R): Summary of data on grain yield and ancillary characters of trial on impact of conservation agriculture in rice based cropping system during Rabi- 2012-13.

Treatments		ADUTHURAI							COIMBATORE						
		Kharif (Rice)			Rabi (Rice)			REY	Kharif (Rice)			Rabi (Rice)			REY
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	
M1	S1	8.08	501	2.88	3.87	304	2.72	11.95	7.44	332	4.04	6.34	375	2.43	13.78
	S2	-	-	-	4.47	312	2.82	12.55	-	-	-	6.87	388	2.69	14.31
M2	S1	7.66	474	2.85	3.96	286	2.43	11.62	7.11	315	4.27	5.97	366	2.29	13.08
	S2	-	-	-	4.15	304	2.56	11.81	-	-	-	6.53	383	2.45	13.64
M3	S1	7.59	469	2.83	3.53	275	2.46	11.12	3.45	248	2.33	3.05	279	2.27	6.50
	S2	-	-	-	3.89	293	2.65	11.48	-	-	-	3.23	280	2.36	6.68
M4	S1	7.20	446	2.80	3.21	250	2.45	10.41	2.98	211	3.11	2.68	250	2.09	5.66
	S2	-	-	-	3.53	265	2.57	10.73	-	-	-	2.98	275	2.17	5.96
M5	S1	7.83	484	2.86	3.44	289	2.52	11.27	4.33	274	2.87	4.11	311	2.41	8.44
	S2	-	-	-	4.01	301	2.65	11.84	-	-	-	4.39	327	2.5	8.72
M6	S1	7.39	457	2.84	3.75	182	2.47	11.14	3.85	239	3.56	3.61	299	2.29	7.46
	S2	-	-	-	4.16	287	2.56	11.55	-	-	-	3.98	313	2.39	7.83
C.D.(0.05)															
Mat same V		NS	NS	NS	NS	NS	NS		NS	7.85	NS	NS	NS	NS	
Vat same M		NS	NS	NS	NS	NS	NS		NS	10.41	NS	NS	NS	NS	
<b>Mean of resource conservation system (RCS)</b>															
	M1	8.08	501	2.88	4.17	308	2.77	12.25	7.44	332	4.04	6.60	381	2.56	14.05
	M2	7.66	474	2.85	4.05	295	2.50	11.72	7.11	315	4.27	6.25	374	2.37	13.36
	M3	7.59	469	2.83	3.71	284	2.55	11.30	3.45	248	2.33	3.14	280	2.31	6.59
	M4	7.20	446	2.80	3.37	258	2.51	10.57	2.98	211	3.11	2.83	262	2.13	5.81
	M5	7.83	484	2.86	3.72	295	2.59	11.56	4.33	274	2.87	4.25	319	2.45	8.58
	M6	7.39	457	2.84	3.95	235	2.51	11.35	3.85	239	3.56	3.80	306	2.34	7.65
C.D.(0.05)		0.12	7.55	0.01	0.11	NS	0.05		0.31	13.07	0.11	0.25	9.25	0.12	
C.V.(%)		1.57	1.56	0.28	2.18	16.58	1.38		6.23	4.72	3.22	4.26	2.24	4.06	
<b>Mean of varieties</b>															
	S1	7.63	472	2.84	3.63	265	2.51	11.25	4.86	270	3.36	4.29	313	2.30	9.15
	S2	-	-	-	4.03	294	2.64	11.66	-	-	-	4.66	328	2.43	9.52
C.D.(0.05)		0.13	10.4	0.02	0.06	NS	0.02		0.25	4.53	0.15	0.13	6.04	0.04	
C.V.(%)		1.52	1.91	0.54	2.25	16.01	1.19		4.45	1.46	3.87	3.95	2.59	2.53	
<b>Experimental Mean</b>		7.62	472	2.84	<b>3.83</b>	<b>279</b>	<b>2.57</b>	<b>11.46</b>	4.86	270	3.36	<b>4.48</b>	<b>320</b>	<b>2.36</b>	<b>9.34</b>
Soil type		Clay			Clay				Clay loam			Clay loam			
pH		7.20			7.20				7.50			7.50			
RDF (NPK kg/ha) + Zn		150:60:60:25			150:60:60:25				150:50:50:25			120:38:38:25			
S1		CoRH 3			CoRH 3				CoRH 4			CO 47			
S2		ADT 43			ADT 45				CO(R) 50			CORH 3			

M1 : Conventional tillage with hybrid  
M2 : Conventional tillage with high yield variety  
M3 : Zero tillage with hybrid

M4: Zero tillage with high yield variety  
M5: Minimum tillage with hybrid  
M6 : Minimum tillage with high yield variety

Table-4.4.2(R) (Contd..)

Treatments		KANPUR					REWA						
		Kharif (Rice)			Rabi (Linseed)	REY	Kharif (Rice)			Rabi (Linseed)			REY
		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)		Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	Grain Yield (t/ha)	Panicle/m <sup>2</sup> (No.)	Panicle Weight (g)	
M1	S1	4.05	303	3.17	1.15	7.56	7.80	288	2.57	1.57	250	12.13	12.59
	S2	-	-	-	1.23	7.81	-	-	-	1.39	238	14.00	12.04
M2	S1	3.31	259	2.9	1.15	6.82	6.46	253	2.12	1.67	247	14.87	11.56
	S2	-	-	-	1.25	7.13	-	-	-	1.43	235	14.00	10.83
M3	S1	3.31	240	2.56	0.84	5.87	5.09	218	2.17	1.43	236	11.87	9.46
	S2	-	-	-	0.88	6.00	-	-	-	1.48	240	9.43	9.61
M4	S1	2.61	222	2.42	0.84	5.17	4.78	180	1.73	1.41	236	11.33	9.09
	S2	-	-	-	0.88	5.30	-	-	-	1.39	235	10.23	9.02
M5	S1	3.66	269	2.77	1.06	6.90	6.78	253	2.47	1.50	237	13.13	11.36
	S2	-	-	-	1.11	7.05	-	-	-	1.31	207	11.10	10.78
M6	S1	2.90	253	2.60	1.05	6.11	6.15	243	1.87	1.35	216	12.07	10.27
	S2	-	-	-	1.12	6.32	-	-	-	1.28	208	10.00	10.06
C.D.(0.05)													
Mat same V		NS	NS	NS	NS		NS	NS	NS	0.11	8.69	0.44	
Vat same M		NS	NS	NS	NS		NS	NS	NS	0.10	7.34	0.38	
<b>Mean of resource conservation system (RCS)</b>													
	M1	4.05	303	3.17	1.19	7.68	7.80	288	2.57	1.48	244	13.07	12.32
	M2	3.31	259	2.90	1.20	6.97	6.46	253	2.12	1.55	241	14.43	11.19
	M3	3.31	240	2.56	0.86	5.94	5.09	218	2.17	1.45	238	10.65	9.53
	M4	2.61	222	2.42	0.86	5.24	4.78	180	1.73	1.40	236	10.78	9.05
	M5	3.66	269	2.77	1.08	6.97	6.78	253	2.47	1.40	222	12.12	11.07
	M6	2.90	253	2.60	1.08	6.21	6.15	243	1.87	1.31	212	11.03	10.17
C.D.(0.05)		0.17	21.37	0.06	0.21		0.46	12.77	0.14	0.10	5.60	0.31	
C.V.(%)		4.90	8.09	2.21	15.43		7.22	5.2	6.49	5.52	1.88	2.03	
<b>Mean of varieties</b>													
	S1	3.31	257	2.74	1.01	6.41	6.18	239	2.16	1.49	237	12.57	10.72
	S2	-	-	-	1.08	6.60	-	-	-	1.38	227	11.46	10.39
C.D.(0.05)		0.28	NS	0.06	0.04		0.38	26.2	0.13	0.04	3.55	0.18	
C.V.(%)		7.24	9.06	2.03	5.90		5.34	9.49	5.36	4.13	2.11	2.06	
<b>Experimental Mean</b>		3.31	257.44	2.74	<b>1.05</b>	<b>6.50</b>	6.18	239	2.15	<b>1.43</b>	<b>232</b>	<b>12.01</b>	<b>10.56</b>
Soil type		Sandy loam			Sandy loam		Sandy Clay loam			Sandy loam			
pH		7.6			7.6		6.5			7.4			
RDF (NPK kg/ha) + Zn		120-60-60-25			-		100-60-40-20			80:50:40			
<b>Varieties</b>													
	S1	PHB-71			Linseed		PHB-71			JLS 9			
	S2	NDR-359			Shakhar		PS-3			-			

M1 : Conventional tillage with hybrid  
M2 : Conventional tillage with high yield variety  
M3 : Zero tillage with hybrid

M4 : Zero tillage with high yield variety  
M5 : Minimum tillage with hybrid  
M6 : Minimum tillage with high yield variety

Linseed MSP : Rs.4000/-

Table-4.4.3(R): Summary of data on grain yield and ancillary characters of rice from the trial on management of micronutrients in rice based cropping system (in collaboration with Soil Science) India, Rabi 2012-13.

Treatments			KANPUR								
			Kharif-2012				Rabi 2012-13				
			Grain Yield (t/ha)	Panicle e/m <sup>2</sup> (No.)	Panicle Wt. (g)	(%) Increase	Grain Yield (t/ha)	REY	Panicle e/m <sup>2</sup> (No.)	Panicle e Wt. (g)	(%) Increase
T1	NPK Only	NPK Zn + Fe+ Mn	4.43	239	3.05		4.28	8.84	384	1.77	
T2	NPK+ Zn	NPK+Fe+Mn	4.73	244	3.16	6.77	4.04	8.89	360	1.72	-5.61
T3	NPK +Zn +Fe	NPK + Mn	4.83	248	3.13	9.03	4.11	9.07	367	1.74	-3.97
T4	NPK +Zn +Fe+Mn	NPK only	4.86	253	3.12	9.71	3.95	8.93	358	1.70	-7.71
T5	OM+NPK	NPK Zn + Fe+ Mn+Om	5.14	265	3.25	16.03	4.65	9.93	428	2.08	8.64
T6	OM+NPK+Zn	NPK+Fe+Mn	5.36	274	3.28	20.99	4.43	9.93	405	2.00	3.50
T7	OM+NPK+Zn+Fe	NPK + Mn	5.43	275	3.39	22.57	4.48	10.05	417	2.04	4.67
T8	OM+Zn+Fe+Mn	NPK only	5.47	278	3.43	23.48	4.47	10.08	407	2.02	4.44
T9	NPK+ Zn (0.5% spray)	NPK + Zn (0.5% spray)	4.61	240	3.14	4.06	4.23	8.97	380	1.80	-1.17
T10	NPK +Zn +Fe (0.5% spray)	NPK + Zn +Fe (0.5% spray )	4.73	247	3.13	6.77	4.15	9.01	369	1.74	-3.04
T11	NPK +Zn +Fe+Mn (0.5% spray)	NPK + Zn + Fe + Mn (0.5% spray)	4.75	249	3.16	7.22	4.16	9.04	372	1.75	-2.80
T12	OM+NPK+Zn (0.5% spray)	NPK + Zn (0.5% spray)	5.21	269	3.31	17.61	4.53	9.88	425	2.05	5.84
T13	OM+NPK+Zn+Fe (0.5% spray)	NPK + Zn +Fe (0.5% spray)	5.31	273	3.4	19.86	4.45	9.90	415	2.01	3.97
T14	OM+NPK+Zn+Fe+Mn (0.5% spray)	NPK + Zn + Fe + Mn (0.5% spray)	5.35	271	3.38	20.77	4.5	9.99	421	2.03	5.14
		C.D.(0.05)	0.28	8	0.11		0.16		10	0.16	
		C.V. (%)	3.31	1.74	2.05		2.2		1.59	4.9	
		<b>Expt. Mean</b>	5.01	259	3.24		4.32		393	1.89	
		Fert.dose NPK (kg/ha)	120:60:60				120:60:60				
		Variety	NDR- 359				PBW-343				
		Soil type	Sandy loam				Sandy loam				
		pH	7.3				7.3				
		Cropping system	Rice - Wheat				Rice - Wheat				
		Availble NPK	201:21.9:206				201:21.9:196				



Annexure-I

**WEATHER DATA – KHARIF 2013**

ALMORA							
Latitude :	29° 56' N		Longitude:	79° 40' E		Elevation :	1250
Soil type:	Clay loam		Soil pH :	6.5		Soil texture :	Clay
	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Total / Range</b>
No. of Rainy days	02	14	22	18	12	04	72
Total Rainfall (mm)	5.5	342.5	192.2	158.5	68.5	14.0	781.2
Avg. Max. Temp. (°C)	33.2	29.2	28.4	29.6	29.8	27.2	27.2-33.2
Avg. Mini. Temp. (°C)	13.2	20.2	21.3	20.4	18.2	14.0	13.2-21.3
Avg. Sunshine hours	9.14	2.81	3.29	4.5	6.29	6.39	5.40
Avg. wind velocity (Kmh)	2.7	2.5	2.3	2.3	2.1	2.1	2.33

BANKURA							
Latitude:	23° 25' N		Longitude:	87° 10' E		Elevation (m):	84 m
Soil type:	Red Lateritic		Soil pH:	5.6		Soil texture:	Sandy loam
	<b>(June)</b>	<b>(July)</b>	<b>(Aug.)</b>	<b>(Sept.)</b>	<b>(Oct.)</b>	<b>(Nov.)</b>	<b>Total / Range</b>
No. of Rainy days	12	16	12	12	15	NIL	67
Total Rainfall (mm)	482.3	312.4	358.6	239.4	379.2	NIL	1771.9
Avg. Max. Temp. (°C)	34.03	32.83	31.06	32.78	29.96	29.0	29.0-34.03
Avg. Mini. Temp. (°C)	25.71	26.01	25.59	25.53	22.91	16.1	16.1-26.01

CHATHA							
Latitude :	32° 40' N		Longitude:	74° 48'E		Elevation :	293
Soil type:			Soil pH :	7.0		Soil texture :	Clay loam
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	8	13	16	4	4	2	47
Total Rainfall (mm)	141.4	251.2	496.8	79.3	67.2	12.2	1048.1
Avg. Max. Temp. (°C)	37.1	33.9	31.8	32.8	30.6	25.3	25.3-37.1
Avg. Mini. Temp. (°C)	24.5	25.2	24.6	22.8	18.9	9.0	9.0-25.2
Avg. Sunshine hours	7.8	5.9	3.9	6.7	5.8	7.2	6.2
Avg. wind velocity	4.5	3.0	2.1	1.5	0.8	1.1	2.1

CHINSURAH							
Latitude :	22° 52' N		Longitude:	88° 24' E		Elevation :	8.62 msl
Soil type:	Clay Loam		Soil pH :	7.3		Soil texture :	Alluvium
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	24	30	26	21	24	0	125
Total Rainfall (mm)	101.3	317.6	294.4	297.9	201.4	302.2	1514.8
Avg. Max. Temp. (°C)	33.03	32.14	31.47	32.88	36.58	29.18	29.18-36.58
Avg. Mini. Temp. (°C)	26.38	26.52	27.89	26.10	23.72	15.09	15.09-27.89

CHIPLIMA							
Latitude :	20°21'N		Longitude	80°55'E		Elevation :	178.8 mMSL
Soil type:	Mixed Red, Black & Lateritic		Soil pH :			Soil texture :	
	<b>(June)</b>	<b>(July)</b>	<b>(August)</b>	<b>(September)</b>	<b>(October)</b>	<b>(November)</b>	<b>Total/Range</b>
No. of Rainy days	10	24	15	12	7	0	68
Total Rainfall (mm)	153.9	473.0	223.4	161.4	122.2	0	1133.9
Avg. Max. Temp. (°C)	34.97	31.16	31.94	33.03	29.87	27.73	27.73-34.97
Avg. Mini. Temp. (°C)	26.07	26.55	25.71	25.70	24.53	17.80	17.80-26.55

COIMBATORE							
Latitude	11°N		Longitude:	7°E		Elevation (m):	426.72 m
Soil type	Clay		Soil pH :	7.8		Soil Texture:	Heavy
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	19	17	9	11	10	11	77
Total Rainfall (mm)	54.5	21.9	27.3	46.5	141.2	57.9	349.3
Avg. Max. Temp. (°C)	30.6	30.1	31.3	31.2	31.5	29.8	29.8-31.5
Avg. Mini. Temp. (°C)	23.3	23.2	22.6	22.6	21.7	22.2	21.7-23.3
Avg. Sunshine hours	3.3	2.8	5.8	6.1	6.7	5.3	4.28
Avg. wind velocity	11.4	12.8	8.7	7.9	5.2	4.7	7.24

CRR1- CUTTACK							
Latitude :	20.5° N		Longitude:	86.0° N		Elevation :	23.48 m
Soil type:	Clay Loam		Soil pH :			Soil Texture:	
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total / Range
No. of Rainy days	14	11	13	16	-	-	54
Total Rainfall (mm)	301.3	117.8	240.6	699.0	0.0	0.0	1358.7
Avg. Max. Temp. (°C)	30.2	31.2	30.8	29.6	28.4	27.3	27.3-31.2
Avg. Mini. Temp. (°C)	26.0	26.5	25.8	24.5	18.7	15.0	15.0-26.5
Avg. Sunshine hours	2.9	4.1	4.0	4.6	6.7	6.9	4.8
Avg. wind velocity	4.7	3.9	3.4	5.8	2.4	2.4	3.7

DRR, ICRISAT Campus, Ramachandrapuram							
Latitude:	N 17° 31' 02.33"		Longitude	E 78° 16' 43.18		Elevation (m):	19.47 msl
Soil type:	Udorthentic chromusterts		Soil pH	7.2		Soil texture:	Clay loam
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy days	16	19	17	12	12	2	78
Total Rainfall (mm)	102.4	226.7	164.8	277.6	207.2	20.7	999.4
Avg. Max. Temp. (°C)	32.78	28.48	28.41	30.12	29.43	28.42	28.41-32.78
Avg. Mini. Temp. (°C)	22.4	21.35	21.16	21.16	20.38	5.56	5.56-22.4
Solar radiation (CAL/ cm <sup>2</sup> )	15.7	12.69	13.97	16.91	16.02	15.74	91.03
Avg. Sunshine hours	4.31	2.48	3.27	5.59	6.15	6.91	4.79

GANGAVATI							
Latitude :	15° 40' N		Longitude:	76° 31' 40"		Elevation :	419 msl
Soil type:	Medium black		Soil pH :	6.5- 7.5		Soil texture :	Fine
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total / Range
No. of Rainy days	5	3	8	8	None	None	24
Total Rainfall (mm)	34.5	22.5	118.5	108.5	4	Nil	288
Avg. Max. Temp. (°C)	29.0	29.6	30.13	29.8	29.2	29.03	29.0-30.13
Avg. Mini. Temp. (°C)	18.8	18.0	18.0	16.8	14.75	12.30	12.30-18.8

GHAGHRAGHAT									
Latitude :	27° 50' N		Longitude:	81° 20' E		Elevation :	112 msl		
Soil type:	Sandy loam					Soil texture :			
	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec	Total / Range
No. of Rainy days	-	10	14	08	03	05	-	-	40
Total Rainfall (mm)	-	423.3	244.0	171.0	29.0	30.0	-	-	897.3
Avg. Max. Temp. (°C)	43.4	42.08	36.71	39.03	36.37	33.63	30.0	25.45	25.45-43.42
Avg. Mini. Temp. (°C)	23.8	20.73	16.63	16.69	15.95	14.64	13.4	11.09	11.09-23.89
	9						7		

HAZARIBAG							
Latitude :	23°59' N		Longitude:	82° 25' E		Elevation :	614 msl
Soil type:	Sandy loam		Soil pH :	5.7		Soil texture :	Sandy loam
	June	July	Aug.	Sep	Oct	Nov	Total / Range
No. of rainy days	14	15	17	7	9	0	62
Total rainfall (mm)	206.6	247.4	364.6	58.2	241.4	0.0	1118.9
Avg. Max. Temp. (°C)	31.6	30.4	29.8	30.2	27.1	25.5	25.5-31.6
Avg. Mini. Temp. (°C)	21.2	21.8	20.5	20.8	17.2	8.7	8.7-21.8
Avg. Sunshine hours	5.1	4.5	3.9	5.9	4.7	9.2	5.55

HATHWARA							
Latitude :	23° 20' N		Longitude:	86° 25' E		Elevation :	255
Soil type:	Lateritic		Soil pH :	5.7		Soil texture :	Loamy
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy days	11	13	14	12	11	NIL	61
Total Rainfall (mm)	138.5	179.7	378.0	272.9	280.3	NIL	1249.4
Avg. Max. Temp. (°C)	32.7	31.6	30.8	31.9	29.0	27.5	27.5-32.7
Avg. Mini. Temp. (°C)	25.3	25.3	24.9	24.6	21.9	14.4	14.4-25.3
Avg. Sunshine hours	7.4	5.5	5.3	4.8	3.4	7.8	4.8
Avg. wind velocity (Km/h)	3.5	4.0	2.8	2.5	3.2	1.3	2.4

KANPUR							
Latitude :	27°24'N		Longitude:	Elevation (m):		Elevation :	178msl
Soil type:			Soil pH :	Soil pH: 10.3		Soil texture :	Clay loam
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of rainy days	9	16	16	6	4	-	51
Total Rainfall (mm)	359.8	326.1	179.5	95.8	183.2	0	1144.4
Avg. Max. Temp. (°C)	34.8	32.6	32.2	32.5	30.7	27.3	27.3-34.8
Avg. Mini. Temp. (°C)	24.3	23.9	23.6	22.5	18.2	9.3	9.3-24.3
Solar radiation (CAL/CM <sup>2</sup> )	5.1	4.5	4.2	7.4	6.2	5.9	5.5
Avg. Sunshine hours	7.6	5.7	5.5	5.2	4.6	2.7	5.2

KARJAT							
Latitude :	18° 55' N		Longitude:	73° 18' E		Elevation :	51 msl
Soil type:	Medium black		Soil pH :	6.2		Soil texture :	Clay loam
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	26	31	31	21	5	0	114
Total Rainfall (mm)	1205.5	1990.7	568.9	305.6	66.6	0	4137.3
Avg. Max. Temp. (°C)	30.4	27.8	29.8	30.6	32.6	34.75	27.8-34.75
Avg. Mini Temp. (°C)	24.7	24.2	23.5	24.1	23.0	18.19	18.19-24.7
Avg. Sunshine hours	1.3	0.1	1.2	2.8	6.1	8.59	3.3
Avg. wind velocity (Km/h)	5.0	5.1	4.0	3.3	2.2	1.41	3.5

KARNAL							
Latitude :	29° 43' N		Longitude:	76° 58' E		Elevation :	245 msl
Soil type:	Sandy loam		Soil pH :	7.77		Soil texture :	Sandy loam
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	5	7	16	2	3	0	33
Total Rainfall (mm)	157.8	215.4	275.3	13.2	19.2	0	680.9
Avg. Max. Temp. (°C)	35.6	33.6	32.2	33	31.5	26.9	26.9-35.6
Avg. Mini. Temp. (°C)	26	26.6	25.4	23.4	19.4	10	10-26.6
Avg. Sunshine hours	7.3	5.4	5	7.6	5.5	6.7	6.2
Avg. wind velocity (Km/h)	7.5	4.8	3.6	3.1	2.1	2.4	3.9
Avg. Relative Humidity	80(M)	87	51	90	90	86	80.6
	54(E)	68	75	64	52	33	57.6

KHUDWANI							
Latitude :	34°N		Longitude:	74°E		Elevation :	1560 msl
Soil type:	Clay loam		Soil pH:	Neutral		Soil texture :	pH
	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Total / Range</b>
No. of rainy days	12	8	7	9	5	1	42
Total Rainfall (mm)	59	96.8	62.2	187.2	31.8	11.6	448.6
Avg. Max. Temp. (°C)	24.46	29.21	30.94	28.54	27.69	24.10	24.10-30.94
Avg. Mini. Temp. (°C)	9.37	14.71	17.75	17.66	12.18	7.96	7.96-17.75
Avg. Sunshine hours	7.4	8.8	8.8	5.8	7.4	6.6	7.4
Avg. wind velocity (Km/h)	2.4	2.2	1.7	1.4	1.2	1.3	1.7

KAUL							
Latitude :	29° 51' N		Longitude:	76° 41' E		Elevation :	241 msl
Soil type:	Clay loam		Soil pH :	7.8		Soil texture :	Clayloam
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	7	6	12	2	1	0	28
Total Rainfall (mm)	262.0	117.7	345.5	51.8	13.8	0.00	790.8
Avg. Max. Temp. (°C)	36.9	34.2	32.4	33.0	31.8	26.9	26.9-36.9
Avg. Mini. Temp. (°C)	25.5	26.1	24.3	22.4	18.1	10.5	10.5-26.1
Avg. Sunshine hours	7.49	5.95	6.30	8.09	6.38	-	6.8
Avg. wind velocity (Km/h)	57	72	80	71	54	40	62.3

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LUDHIANA							
Latitude :	30°54' N		Longitude:	75° 48' E		Elevation :	247 msl
Soil type:	Loamy Sand		Soil pH :	7.7		Soil texture :	
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy Days	9	7	11	4	3	2	36
Total rainfall (mm)	296.4	110.2	252.1	25.3	36.2	4.6	724.8
Avg. Max. Temp. (°C)	36.6	35.0	33.4	33.0	27.0	25.9	25.9-36.6
Avg. Mini Temp. (°C)	27.2	27.7	26.4	23.5	16.5	10.2	10.2-27.7
Avg. Sunshine hours	7.5	6.5	5.4	6.7	5.3	6.9	6.3
Avg. wind velocity	8.3	6.5	3.7	1.5	1.4	1.9	3.8

MALAN							
Latitude :	32° 1' N		Longitude:	76° 20' E		Elevation :	950 m
Soil type:	Silty clay		Soil pH :	5.6- 5.8		Soil texture :	Silty clay loam
	May	June	July	August	Sept.	Oct.	Total / Range
No. of Rainy days	3	17	23	30	16	8	97
Total Rainfall (mm)	15.8	809.3	1222.1	855.2	194.5	60.2	3157.1
Avg. Max. Temp. (°C)	34.3	33.4	33.7	31.8	30.8	28.6	28.6-34.3
Avg. Mini .Temp. (°C)	17.9	19.5	21.1	21.5	19.8	17.8	17.8-21.5

MANDYA							
Latitude	12.45°- 13.57° N		Longitude	76.48°- 78.24° E		Elevation (m):	695
Soil type	Red		Soil pH	6.5- 7.5		Soil texture:	Sandy loam
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total / Range
No. of Rainy days	03	01	08	05	04	0	21
Total Rainfall (mm)	36.2	21.7	186.8	116.0	56.4	1.4	418.5
Avg. Max. Temp. (°C)	29.2	29.4	29.7	29.8	29.1	27.9	29.1-29.8
Avg. Mini. Temp.(°C)	19.2	19.3	19.0	18.5	16.6	12.5	12.5-19.3
Avg. Sunshine hours	2.6	4.2	4.7	4.3	6.9	8.3	5.1
Avg. wind velocity (Km/h)	8.0	5.0	2.0	2.5	0.7	1.4	3.2

MARUTERU							
Latitude	16.38° N		Longitude:	81.44° E		Soil Ec:	0.93
Soil type	Black alluvial clay		Soil pH:	6.5- 7.5		Soil Texture:	Delta alluvial
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total / Range
No. of Rainy days	13	7	14	15	5		54
Total Rainfall (mm)	211.4	112.6	241	565.2	69.2		1199.4
Avg. Max. Temp. (°C)	30	30.8	35.0	28.8	28.18	27.6	27.6-35.0
Avg. Mini. Temp. (°C)	25.2	25.5	24.8	23.7	21.36	17.7	17.7-25.5
Avg. Sunshine hours	2.16	4.94	4.66	3.43	5.76	5.6	4.4
Avg. wind velocity (Km/h)	11.25	8.1	2.23	2.2	3.69	3.47	5.1

MONCOMPU							
Latitude :	9° 5' N		Longitude:	76° 27' E		Elevation :	2- 3 below msl
Soil type:	Alluvial clay		Soil pH :	5.5- 6.5		Soil texture :	Silty Clay
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy days	26	16	21	14	12	3	92
Total Rainfall (mm)	709	268.2	258	133.8	149.8	20.4	1539.2
Avg. Max. Temp. (°C)	29	30.2	30.3	30.7	31.7	32	29.0-32.0
Avg. Mini. Temp. (°C)	24	24.7	24.5	25.0	24.8	22.6	22.6-25.0
Avg. Sunshine hours	1.8	2.5	1.2	2.7	5.9	7.1	3.5
Avg. wind velocity	72.1	92	80.9	65.8	60.8	50.7	70.3

NAWAGAM							
Latitude :	22 ° 48'		Longitude:	71 ° 3'		Elevation :	32.4 msl
Soil type:	Medium black		Soil pH :	7.84		Soil texture :	Sandy Clay Loam
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy days	07	22	08	10	05		52
Total Rainfall (mm)	176.6	400	119.8	259.4	106.4		1062.2
Avg. Max. Temp. (°C)	35.0	30.6	30.7	31.5	32.8	31.6	30.6-35.0
Avg. Mini. Temp. (°C)	26.1	25.3	25.1	25.9	21.5	16.7	16.7-26.1
Avg. Sunshine hours	5.4	1.42	4.3	6.5	7.6	8.4	5.6
Avg. wind velocity (Km/h)	7.2	6.5	5.6	4.7	2.7	5.0	5.2

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NAGINA							
Latitude :	29° 28' N		Longitude:	78° 32' E		Elevation :	450 msl
Soil type:	Sandy loam		Soil pH :	7.5		Soil texture :	Silty clay loam
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy days	1.0	16	12	07		01	36
Total Rainfall (mm)	2.6	394.1	180.6	130.5		01.2	709
Avg. Max. Temp. (°C)	38.0	32.4	31.5	31.6	30.1	25.7	25.7-38.0
Avg. Mini. Temp. (°C)	25.3	26.0	25.4	23.4	14.6	07.9	7.9-26.0
Avg. Sunshine hours	8.9	3.3	5.0	6.4	8.9	7.9	6.7
Avg. wind velocity (Kmh)	6.9	5.5	3.9	3.5	1.8	1.7	3.8

PANTNAGAR							
Latitude :	29° N		Longitude:	79°3' East		Elevation :	243.84 m
Soil type:	Clay loam		Soil pH :	8.06		Soil texture :	Clay loam
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of rainy days	9	19	19	13	3	1	64
Total Rainfall (mm)	603.4	394.2	455.00	077.8	086.4	0.00	1616.8
Avg. Max. Temp. (°C)	33.2	32.0	32.3	32.8	30.4	26.9	26.9-33.2
Avg. Mini. Temp. (°C)	25.7	25.7	25.4	23.9	19.8	10.6	10.6-25.7
Avg. Sunshine hours	3.6	3.8	5.2	7.4	6.3	7.5	5.6
Avg. wind velocity (Kmh)	5.40	6.26	5.46	3.94	3.45	1.07	4.2

PATTAMBI							
Latitude :	10°N		Longitude:	76° E		Elevation :	25 msl
Soil type:	Sandy loam		Soil pH :	5.3		Soil texture :	Sandy loam
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy days	25	29	24	21	20	18	137
Total Rainfall (mm)	747	1073.5	275.5	242.2	186.2	73.8	2598.2
Avg. Max. Temp. (°C)	29.6	28.6	30.1	30.1	31.3	32.2	28.6-32.2
Avg. Mini. Temp. (°C)	23.8	23.2	23.8	23.7	23.4	23.4	23.2-23.8
Avg. Sunshine hours/day	2.1	0.7	4.5	3.9	5.1	5.4	3.62
Avg. wind velocity	2.8	2.5	3.7	2.7	2.3	2.8	2.80

PUSA							
Latitude :	25°59' N		Longitude:	85°40'E		Elevation :	51.84 M
Soil type:	Sandy loam		Soil pH :	8.2		Soil texture :	Light
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy days	14	09	13	06	06	00	48
Total Rainfall (mm)	217.2	45.4	127.7	111.1	285.0	0.0	1186.4
Avg. Max. Temp. (°C)	33.5	33.5	32.8	34.0	30.2	27.8	27.8-34.0
Avg. Mini. Temp. (°C)	26.4	26.8	26.0	25.8	22.5	14.0	14.0-26.8
Avg. Sunshine hours	4.4	5.6	5.8	6.9	4.9	5.3	5.4

RAGOLU							
Latitude :	18° 24' N		Longitude:	83° 8' E		Elevation :	27.0 msl
Soil type:	Red Sandy clay loam		Soil pH :	6.5 - 7.8		Soil texture :	Low organic matter content
	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total / Range
No. of Rainy days	04	05	10	11	3	0	33
Total Rainfall (mm)	73	145.5	188.5	524.7	30.8	-	962.5
Avg. Max. Temp. (°C)	33.25	32.64	32.48	30.37	29.96	28.64	28.64-33.25
Avg. Mini. Temp. (°C)	28.41	29.96	28.66	28.87	23.45	20.45	20.45-29.96
Avg. Sunshine hours	2.82	4.75	5.01	4.61	6.09	7.29	5.09

RAIPUR							
Latitude :	21° 16' N		Longitude:	80° 36' E		Elevation :	
Soil type:	Alfisol		Soil pH :			Soil texture :	Clayes
	June	July	Aug.	Sep.	Oct.	Nov.	Total / Range
No. of Rainy days	10	50	18	11	08	0	97
Total Rainfall (mm)	237.7	546.7	510.0	166.2	86.4	0.0	1547
Avg. Max. Temp. (°C)	34.5	30.3	29.4	31.2	30.0	29.5	29.4-34.5
Avg. Mini. Temp. (°C)	25.8	24.5	24.2	24.2	24.8	22.3	22.3-25.8
Avg. Sunshine hours	5.1	2.7	2.2	4.9	5.0	8.1	4.6
Avg. wind velocity	8.8	8.0	5.9	2.9	3.3	1.1	5

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SABOUR							
Latitude :	25°15'40" N		Longitude:	87°2' 40" E		Elevation :	46M
Soil type:	Light		Soil pH :	7.28		Soil texture	Sandy Loam
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	11	16	18	9	8	1	63
Total Rainfall (mm)	160.2	150.8	261.4	197.2	291.6	14.2	1075.4
Avg. Max. Temp. (°C)	32.3	33.5	34.6	32.3	28.8	26.9	26.9-34.6
Avg. Mini. Temp. (°C)	26.2	26.9	26.1	26.1	22.6	15.3	15.3-26.69
Avg. wind velocity (Km/Hr)	5.8	7.6	6.7	5.0	3.2	1.0	4.8

TITABAR							
Latitude :	26°35' N		Longitude:	99° 10' E		Elevation :	99.4 msl
Soil type:	Old alluvial		Soil pH :	5.4		Soil texture :	Clay loam
	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov</b>		<b>Total / Range</b>
No. of Rainy days	18	18	8	10	1		55
Total Rainfall (mm)	294.0	458.5	135.7	101.6	0.1		989.9
Avg. Max. Temp. (°C)	33.0	33.0	32.9	30.0	27.5		27.5-33.0
Avg. Mini. Temp. (°C)	24.0	24.5	24.3	20.9	12.4		12.4-24.5
Avg. Sunshine hours	3.5	4.9	4.5	4.0	4.2		4.2

WANGBAL							
Latitude :	24°8' N		Longitude:	94°E		Elevation :	781 msl
Soil type:	Clay loam		Soil pH :	5.5		Soil texture :	Fine
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	15	24	22	10	13	Nil	84
Total Rainfall (mm)	147.4	248.0	251.5	100.4	55.2	Nil	802.5
Avg. Max. Temp. (°C)	34	33	34	32	32	22	22.0-34.0
Avg. Mini. Temp. (°C)	21	21	22	19	13	7	7-22

VARANASI							
Latitude	25° 20' N		Longitude	23° 03'E		Elevation (m)	75.7
Soil type	Medium		Soil pH	7.2		Soil texture	Sandy loam
	<b>June</b>	<b>July</b>	<b>Aug.</b>	<b>Sep.</b>	<b>Oct.</b>	<b>Nov.</b>	<b>Total / Range</b>
No. of Rainy days	8	15	17	6	9	0	55
Total Rainfall (mm)	165.7	194.6	288.9	86.4	138.7	0	874.3
Avg. Max. Temp. (°C)	35.7	33.0	31.3	32.3	28.6	26.7	26.7-35.7
Avg. Mini. Temp. (°C)	27.4	26.7	25.9	25.7	21.5	16.4	16.4-27.4
Avg. Sunshine hours	4.5	5.4	5.0	7.4	6.3	8.0	6.1
Avg. wind velocity	6.4	4.9	3.6	3.5	3.3	1.2	3.8

**Annexure-II**

**ABBREVIATIONS**

<b>Sl. No</b>	<b>Location</b>	<b>Abbreviation</b>	<b>Sl. No</b>	<b>Location</b>	<b>Abbreviation</b>
1	Aduthurai	ADT	30	Pusa	PSA
2	Annamalainagar	AML	31	Raipur	RPR
3	Arundhuthinagar	ARD	32	Ranchi	RCI
4	ARI-Rajendranagar	RNR	33	Rewa	REW
5	Bankura	BNK	34	Titabar	TTB
6	Chatha	CHT	35	Tuljapur	TLJ
7	Chinsurah	CHN	36	Upper Shillong	USG
8	Chiplima	CHP	37	Varanasi	VRN
9	Coimbatore	CBT	38	Wangbal (Imphal)	WBL
10	Faizabad	FZB	39	DRR	DRR
11	Ghaghraghat	GGT	40	<b>Almora</b>	<b>ALM</b>
12	Jagdapur	JDP	41	<b>Chakdha</b>	<b>CKD</b>
13	Kanpur	KNP	42	<b>Cuttack</b>	<b>CTC</b>
14	Karjat	KJT	43	<b>Dharwad (Mugad)</b>	<b>MGD</b>
15	Kaul	KUL	44	<b>Gangavathi</b>	<b>GNV</b>
16	Khudwani	KHD	45	<b>Giridih</b>	<b>GRD</b>
17	Kota	KTA	46	<b>Gerua</b>	<b>GER</b>
18	Ludhiana	LDH	47	<b>Hatwara</b>	<b>HTR</b>
19	Lucknow	LCK	48	<b>Hazaribagh</b>	<b>HZB</b>
20	Malan	MLN	49	<b>IARI, New Delhi</b>	<b>IARI</b>
21	Mandya	MND	50	<b>Karaikal</b>	<b>KRK</b>
22	Maruteru	MTU	51	<b>Karnal</b>	<b>KRL</b>
23	Moncompu	MNC	52	<b>Navsari</b>	<b>NVS</b>
24	Nagina	NGN	53	<b>Nellore</b>	<b>NLR</b>
25	Nawagam	NWG	54	<b>Parbhani</b>	<b>PRB</b>
26	Pantnagar	PNT	55	<b>Ragolu</b>	<b>RGL</b>
27	Patna	PTN	56	<b>Sabour</b>	<b>SBR</b>
28	Pattambi	PTB	57	<b>Umiam</b>	<b>UMM</b>
29	Puducherry	PDC	58	<b>Vadgaon</b>	<b>VDG</b>

Regular Font : Funded centers      **Bold: Voluntary centers**

**Annexure-III**

**Details of herbicide manufacturers Rabi 2012-13 & Kharif 2013**

S.No.	Name of the herbicides	Conc. (%)	Agro-Input-Agency
1.	Flucetosulfuron	10% WG	Dr. S.K. Biswas General Manager – Technical & Registration <b>Indofil Industries Limited Logo</b> Kalpataru Square (4 <sup>th</sup> Floor) Kondivita Road, off. Andheri Kural Road Andheri (East), Mumbai – 400 059
2.	Butachlor	50%EC	<b>Monsanto, Dhanuka, Rallis, Coromondal India, Hindustan Insecticides, Montari, Searle, Siris, Sudanshan Chemcials, Bayer</b>
3.	Bispyribacsodium	10%SC	<b>Bayer Crop Science, PI Industries Ltd</b>
4.	Pendimethalin	30% EC	<b>Bayer, Dhanuka, Rallis, BASF, UPL Chemiova, Crop Health, Syngenta, Meghmani Organics</b>
5.	Metsulfuron methyl + Chlorimuron ethyl	20 WP (10+10)	<b>Dupont India Ltd.,</b> 8 <sup>th</sup> Floor., ELF Plaza Tower, DLF Phase-I GURGAON – 122 002 (Haryana).
6.	2,4 D, Na salt	80 WP	<b>Bayer, Zeneca-ICI, Agromore, Dhanuka, Rallis, Atul, Bharat Pulverizers.</b>



**Annexure-IV**

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**2013-2014**

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