The Ecoscan 9(1&2): 471-473, 2015 (Supplement on Rice)
AN INTERNATIONAL QUARTERLY JOURNAL OF ENVIRONMENTAL SCIENCES

GROWTH AND YIELD ATTRIBUTES OF RICE (*ORYZA SATIVA* L.) AS INFLUENCED TO AGE OF SEEDLINGS AND FERTILIZER MANAGEMENT

P. R. CHAUDHARI*, A. P. PATEL, V. P. PATEL, L. J. DESAI, J. V. PATEL, D. R. CHAUDHARI AND D. H. TANDEL
Department of Agronomy, N. M. Collage of Agriculture,
Navsari Agricultural University, Navsari - 396 450 (Gujarat), INDIA
e-mail: chaudharipankaj89@gmail.com

ABSTRACT

An experiment was conducted under South Gujarat Agro Climatic condition on clayey soil of the Regional Rice Research Station, Vyara, (Gujarat) during kharif-2012 with a view to "Growth and yield attributes of rice (Oryza sativa L.) As influenced to age of seedlings and fertilizer management".Main plot treatments consist of three different age of seedling. The sub-plot treatment consisted of three fertilizer levels with different mode and type of application. The result revealed that age of seedling and fertilizer treatments significantly influenced the yield and yield attributes of rice. Number of tillers per m2 and number of effective tillers per m2 (115.86 cm, 128.10 cm, 198.93 per m2 and 176.85 per m2, respectively), Grain and straw yield (4950 and 5598 kg ha-1, respectively) were significantly higher with the transplanting of seedling at 19-21 days old being at par with 12-14 days old seedling. Basal application of 60% N in the form of briquettes with 20% N in the form of Urea at panicle initiation stage yielded significantly higher compare to 100% RDF.

KEY WORDS
Fertilizer, growth
Rice
Seedling age
Yield, yield attributes

Received : 07.11.2014
Revised : 18.01.2015
Accepted : 17.04.2015

***Corresponding author**

INTRODUCTION

Among the cereals, rice occupied the second position next to wheat with regard to food value (Anon., 2010**a**). India has largest area 42.5 million hectare with production 106 million tonnes of rice and average productive was 3.45 tonnes ha^{-1}. (Anon., 2013).In Gujarat, about 8.36 million hectares area with the production of 17.90 lakh tonnes and a productivity of 2.14 tonnes ha^{-1}. (Anon.,2013). The rice productivity is less than 2 tons per hectare in most of the states (Dash, 2009).

Due to uncertainty of monsoon rains, the transplanting of rice gets prolonged. Under such situation, comparative evaluation of young aged seedlings needs to be done, to make the crop more accommodative in the system and to obtain the good yields.The chemical fertilizers are considered as essential part of modern farming and their use in different countries has increased considerably day-by-day. Their application directly or indirectly causes series of changes in physical, chemical and biological properties of soil (Divya and Belagali, 2012). Rice crop is a heavy feeder of fertilizers and need nitrogen for its rapid growth at all the stages of growth, as nitrogen is an element which gets rapidly mineralized and leached away its deficiency is found prominent in growth stages of crop hence to overcome this situations the fertilizer management practices like split application, use of briquettes has been formulated to ultimately achieve the goal of profitable rice cultivation and production.

The excessive use of chemicals in agriculture causeswater pollution and human health hazards. After years of highyields, rice soils are depleted of nutrients. Therefore theapplication system of rice intensification technology wouldbe necessary for sustainable rice production in the future and when the planting densities exceed the optimumlevel, competition among plants becomes severe andconsequently the plant growth slows and the grain yielddecreases. As the tiller production in rice is very lowand most of them are low yielding. This paper deals with theobjective to determine suitable spacing and number ofseedlings for rice varieties under SRI based cultivationpractices to maximize their yield (Damini, *et al* 2014).In SRI use of young seedlings, TP of single seedlings with wide spacing, mechanical weeding, water management anduse of compost as far as possible. The practice of limited use of glyricidia and deep point placement (8 to 10 cm soil depth) of fertilizer nitrogen as urea super granules (USG) or pillow shaped UB-DAP was agronomical most efficient than conventional application of prilled urea (PU) in transplanted rice with this technique the farmer could achieve yield potential of the improved high yielding varieties using about 40% less fertilizer compared with locally recommended NP rate of fertilizer The placement of UB-DAP helps in rice plant to use efficiently the applied nutrients by controlling their rate and duration of Bio-availability and reducing the lossesthrough. With the

considering above fact, the present investigation entitled "Growth and yield attributes of rice (*Oryza sativa* L.) as influenced to age of seedlings and fertilizer management" was planned.

MATERIALS AND METHODS

An experiment was conducted under South Gujarat agro climatic condition at the Regional Rice Research Station (RRRS), Navsari Agricultural University, Vyara, Dist. Tapi (Gujarat) during *kharif*-2012 with a view to study the "Growth and yield parametersyield attributes of rice (*Oryza sativa* l.) as influenced to age of seedlings and fertilizer management". The soil of experimental field was clayey in texture, low in available nitrogen (Kjeldahl method) medium in available phosphorus (Olesen's method) and medium in available potassium (Flam photometric method) and slightly alkaline in reaction with 7.5 pH (Potentiometric method).Split plot design was laid out with four replicationas age of seedlings in main plot treatments *i.e.* A_1 (12-14 days old seedling), A_2 (19-21 days old seedling) and A_3 (25-28 days old seedling) and fertilizer application in sub plots treatments, *viz.*, F_1: apply N and P @ 60-30 kg ha^{-1} in the form of pellet, F_2:Recommended dose of fertilizers (100:30: 00 NPK) and F_3: apply 60% Recommended dose of N and full dose of P in the form of Pellets (Briquettes) at the time of planting at 8-10 cm deep in alternate row in square + 20 % N in the form of urea broadcasting at panicle initiation stage.The paddy variety 'NAUR-1" was selected for the present investigation.

RESULTS AND DISCUSSION

Growth attributes

Effect of age of seedlings

The data present in Table 1, Transplanting of A_2 (19-21 days old seedling) was recorded significantly higher plant height at 60 DATP and at harvest, number of tillers per $m^2$and number of effective tillers per m^2 (115.86 cm, 128.10 cm and 198.93 per m^2, 176.85 per m^2, respectively) which were remained at par with A_1(12-14 days old seedling, 114.95 cm, 125.56 cm, 196.23 per m^2 and 173.90per m^2, respectively) and This might be due to transplanting of seedling from younger stage provide quick and better establishment of younger seedling leads to more utilization of nutrient and natural resources provided excellent vegetative growth.Thus result is in agreement with the finding of Mishra (2002), Singh and Singh (2009) Kavitha *et al.* (2010) and Damini *et al.* (2014).

Effect of fertilizer

Application of F_3 (Urea Briquettes + 20 per cent N through Urea) recorded significantly the higher rice plant height at 60 DATP as well as at harvest (107.76 and 121.20 cm, respectively) which was remained at par with F_1 (Urea Briquettes, 107.30 cm and 117.78 cm, respectively). Application of F_3 (Urea Briquettes + 20 per cent N through Urea) recorded significantly higher number of tillers and number of effective tillers per m^2 (198.05 per m^2 and176.47 per m^2, respectively), which was comparable with application of F_1 (Urea Briquettes, 191.61 per m^2 and168.45 per m^2, respectively). Bulbule *et al.* (2005) and Mandhe *et al.* (2006).

Yield and yield attributes

Effect of age of seedling

The result presented in Table 1 indicated that the significantly superior length of panicle and number of grain per panicle were found with the treatment A_2 (29.78 cm and 154.50), which were at par with A_1 (29.46 cm and149.0). Lowest length of panicle and number of grain per panicle were recorded under treatment A_3 (28.86 cm and 141.91). The results pertaining to grain yield and straw yield of rice revealed that treatment A_2 (4950 and 5598 kg ha^{-1},respectively) found significantly superior over treatment A_3 (4290 and 4813 kg ha^{-1}, respectively) but remained at par with A_1 (4930 and 4813 kg ha^{-1}, respectively). The reason might be due to vigorous and healthy growth of plant which developed more productive tillers and stronger root system and insure greater resource utilization. The present findings are in close agreement with those reported by Patel *et al.* (1978), Singh and Singh (2009) a Manjunatha *et al.* (2010) and Damini *et al.* (2014).

Effect of fertilizer

The result indicate that the application due to the Urea Briquettes + 20 per cent N through Urea (F_3) recorded

Table 1: Growth and yield attributes of rice (*Oryza sativa* l.) as influenced to age of seedlings and fertilizer management

Treatment	Plant height (cm)		No. of tillers	No. ofeffective	length of	Numberof	Grain	Straw
	60 DATP	At harvest	Per m^2	tillersPer m^2	panicles	grain per	yield	yield
Main plot (Age of seedlings)				(cm)	panicle	(kg ha^{-1})	(kg ha^{-1})	
A_1(12-14 days)	114.95	125.56	196.23	173.90	29.46	149.00	4930	5152
A_2(19-21 days)	115.86	128.10	198.93	176.85	29.78	154.50	4950	5598
A_3(25-28 days)	90.15	101.22	172.41	148.75	28.86	141.91	4290	4813
S Em ±	0.93	1.38	4.86	5.03	0.19	2.73	121.	142
CD at 5%	3.24	4.79	16.84	17.43	0.68	9.46	419	490
CV %	3.04	4.06	8.92	10.48	2.34	6.38	8.91	9.46
Sub plot (Fertilizer level)								
F_1 (UB)	107.30	117.78	191.61	168.45	29.05	151.83	4768	5200
F_2 (RDF)	105.90	115.90	177.90	154.56	29.16	138.66	4427	4847
F_3 (UB+ 20% N)	107.76	121.20	198.05	176.47	29.89	154.91	4928	5514
S Em ±	0.50	1.16	3.02	3.21	0.16	1.79	75.14	114
CD at 5%	1.49	3.47	8.97	9.55	0.49	5.34	223	338
CV %	1.63	3.42	5.53	6.69	1.95	4.20	5.53	7.60
Interaction								
A x M	NS	NS	NS	NS	NS	NS	NS	NS

significantly higher length of panicle (29.89 cm), while treatment F_1 (29.05cm) and F_2 (29.16cm) remained at par with each other. Significantly higher number of grain per panicle (154.91) observed due to application of F_3 which was remained at par with treatment F_1 (151.83) and treatment F_2 recorded significantly lower number of grain perpanicle (138.66). The reason might be due to because of proper nourishment of crop when fertilized the briquettes and decrease in lateral distance between placement site of briquette (modified spacing 15x15x25 cm) and four hills promote the balanced and uniform supply of nutrient that boosted the crop growth. These findings are in conformity with those of Mishra *et al.* (1999), Bulbule *et al.* (2005) and Bhagat *et al.* (2005).

The result pertaining to grain yield, revealed that due to application of treatment Urea Briquettes + 20 per cent N through Urea (F_3) was found significantly higher grain yield (4928 kg ha^{-1}) was observed which was remained at par with treatment application of F_1 (4768 kg ha^{-1}) and treatment F_2 found significantly lower grain yield (4427 kg ha^{-1}). The straw yield, under treatment F_3 (5514 kg ha^{-1}) recorded significantly superior over treatment F_2 (4847 kg ha^{-1}) but remained at par with treatment F_1 (5200 kg ha^{-1}). The reason might be due to Urea Briquettes are slow releasing nitrogen and minimum losses of nutrient. Due to its compactness, deep placement and slow but prolong continuity of nutrient than prilled urea (PU) and uniform supply of nutrient which could be automatically maximum utilization of nutrient to rice plant and contributed towards higher grain yield and yield contributing component. The present findings are in close agreement with those reported by Bulbule *et al.* (2005) andBhagat *et al.* (2005).

From the result, it can be concluded that for securing higher production of transplanted*kharif*ricevariety "NAUR-1", it is recommend to use 19 to 21 days old seedlings with the application of 60% recommended doseof N and full dose of P in the form of Pellets (Briquettes) at the time of planting at 8-10 cm deep in alternate row in square + 20 per cent N in the form of urea broadcasting at panicle initiation stage.

REFERENCES

Anonymous 2010. OCED- FAO Agricultural Outlook 2011- 2020.

Anonymous 2013. Forth advance estimate, Indian agri., state. New Delhi: Ministry of agriculture.

Bhagat, S. S., Khawale, V. S., Dongarkar, K. P. and Gudhadhe, N. N. 2005. Effect of spacing and Fertilizer Briquette on Growth and yield of lowland Paddy. *J. Soils and Crops*. **15(2):** 462-465.

BulBule, A. V., Patil, V. S. and Jangle, G. D. 2005. Efficient fertilizer management through deep placement as briquette for lowland rainfed transplanted *rice. J. Maharashtra Agricultural University*. **30(3):** 259-26.

Daftadar, S. Y.,Wagle, S. M. and Savant, N. K. 1997. Improved N and P fertilizer Management increase the rice yield of small resource poor farmers International Rice Commission Newsletter (FAO, Rome). **46:** 71-72.

Damini, T., Patel, A. K., Samaptika, K., Sharma, M. K. and Meshram, M. R.2014.Performance of transplanted scented rice (Oryza sativa l.) under SRI based cultivation practices; asustainable method for crop production.*The Bioscan*.**9(2):** 539-542.

Dash, M. C. 2009. Bio resources as a tool for food security, andSustainable development for rural livelihood in India In the context ofindustrial development and environmental protection: an overview.*The Ecoscan.* **3(3&4):** 201-208.

Divya, J. and Belagali, S. L. 2012. Effect of chemical fertilizers onphysico-chemical characteristics of agricultural soil samples ofNanjangudtaluk, Mysore District, Karnataka, India. *The Ecoscan*. **6(3&4):** 181-187.

Kavita, A. P., Ganesaraja, V., Pulpandi, V. K. and Subramanian, R. 2010. Effect of Age of Seedling, Weed management practices and Humid acid application on System of rice intensification. *Indian J. Agricultural Research*. **44(4):** 294-299.

Manjunatha, B. N., Basavarajappa, R., Siddaram.;Policepatil, A. S.,Yogeeshappa, H. and Kalyanamurth,Y. K. N. 2010. Effect of age of seedling under different system of rice intensification (SRI).*International J. Agricultural Science*. **6(2):** 377-379.

Mendhe, J. T., Mankar, P. S., Jarande, N. N. and Kanase, A. A. 2006. Effect of Briquette, inorganic fertilizer and organic manure fertilization on the growth and yield of rice. *J. Soils and Crops*.**16(1):** 232-235

Mishra, B. K., Das, K. K., Jena, D. and Swain, S. K. 1999. Evaluation of placement methods for urea super granules in wet land rice soil. *Indian J. Agronomy*. **44(4):** 710-716.

Mishra, B. N. 2002. Influence of plant density and age of seedlings on productivity and quality of a scanted and non Scanted rice (Oryza sativa L.) hybrid. In extend summaries IInd Int. Agronomy congress on balancing food and environment security-A continuing challenge held at IARI New Delhi, Nov. 26-30, **2:** 854-856.

Patel, B. I., Patel, P. G., Naik, A. G. and Patel, I. G. 1978. Not on time of seedling and seedling age on performance of Rice. *Gujarat Agricultural University Research J.* **4(1):** 53-55.

Singh, U. P. and Singh, Y. 2009. Effect of seedling age and number of yield of bororice. *Oryza Volume*. **46(2):** 156-157.