

NICRA News

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NICRA
National Initiative on Climate Resilient Agriculture



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From the Research Front



During the past three months, a series of reviews were held in different partner institutes. The prominent ones are those held in IIHR, Bangalore to streamline the NICRA projects in horticulture; NDRI, Karnal to review the animal sciences projects; IARI, New Delhi to review the crop sciences projects and ICAR-RCNEH, Umiam to take stock of the projects in the northeastern region. Establishment of facilities such as FATE, CTGC, Biochar Kiln are nearing completion in ICAR RCNEH. A review of the facilities established under NICRA at CIAE, Bhopal was conducted during this period. The team of scientists visited the sites of installation and reviewed the progress. The team also discussed about the administrative and financial issues concerning the implementation of the project. In September, the sixth meeting of the expert committee of sponsored/competitive grants component was held in New Delhi to consider proposals for sponsored projects category for the year 2012-13. Seven concept notes were presented during the meeting for the consideration of the expert committee. Thrust areas for funding under this component will be finalized after discussion with the expert committee of NICRA and DDGs of ICAR.

Many PIs have started reporting initial progress under the basic and strategic research components. A few of them are highlighted in this issue. We encourage all the PIs and Co-PIs to contribute to the newsletter and share the outcomes with the larger NICRA platform

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From Across the KVKs

The quarter that has passed by witnessed several significant events and interventions related to especially floods and droughts. The NICRA villages in the north east suffered due to flood during the early part of the monsoon whereas those in the east coast suffered from cyclonic storm during November. Interventions such as staggered community nursery, improving drainage and sowing of flood tolerant varieties addressed this issue to some extent. There are several stories explaining these in detail in this newsletter. Rainwater harvesting was carried out with full vigour in the NICRA villages in the drought-prone areas. It has been estimated that over 500 rainwater harvesting structures have either been setup or repaired/renovated enabling creation of over 80000 m³ additional storage capacity across the 100 KVKs. Similarly, nearly 300 different types of crops and varieties were promoted for coping with droughts/floods. The overall impact of the demonstrations being laid out in the 100 NICRA villages is gradually emerging as a grand picture.



In an attempt to showcase the interventions under technology demonstration component, an attempt was made to include selected presentations in the National KVK conference held in Ludhiana during November. Initially, the Zonal Project Directors identified 2-3 KVKs for presenting significant findings in a workshop held in September. A total of 24 KVKs participated and presented their achievements. Of these, 12 were shortlisted and were asked to present the initial outcomes in a special session on NICRA at the National KVK conference. This gave a wide exposure to the good work going on in different climatically vulnerable areas of the country. Besides these, an attempt is being made to compile the best initial outcomes in the form of a publication. Nearly 60 KVKs have contributed excellent stories on coping with climate variability. A few of the Zonal Project Directors have compiled the climate resilient interventions being implemented by the NICRA KVKs of the zone. The recent publication brought out by Zone V is an example. A copy of this publication is available on NICRA website (<http://nicra-icar.in>).

Sreenath Dixit
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Technology Demonstration Component

Research Focus

International Center for Ecological Engineering, Kalyani University, West Bengal

The growth trials of water chest nut *Trapa* in outdoor tanks showed that mixed fertilizer would be an effective manure combination for commercial production of *Trapa* in the fields which, otherwise, would be a profitable proposition to make wise use of vast number of wetlands and ditches for production of chest nut. This will help in CO₂ sequestration in water bodies.



A highly CO₂-tolerant microalgal consortium (CMAC) comprising primarily of *Chlorella* sp., *Scenedesmus* sp., *Sphaerocystis* sp. has been identified and developed as a biological tool performance for the wetland system to mitigate greenhouse gases. The CMAC having profuse growth in wastewater system showed 53–100% CO₂ sequestration. Its capacity by mass balance calculation was 150 to 291 mg CO₂/g.

Indian Agricultural Research Institute, New Delhi

Physiological trait-based phenotyping and marker based genotyping for moisture and heat stress in wheat: Genotypes have been selected from Indian and international core set for various physiological traits pertaining to drought and heat tolerance which includes leaf chlorophyll content, canopy temperatures, relative water content, specific leaf area and leaf senescence, etc. The international core set consists of 146 lines of genetic resources (including drought-adapted cultivars, advance lines, elite landraces, products of inter-specific hybridization and RIL/DH populations from China, India, CIMMYT, ICARDA, Australia etc.). The international core set has been physiologically characterized under Mexican conditions and a number of parental lines from previous QTL mapping studies are included in the set. These include major QTLs on 4A (Berkut) and 6A (Krichauff) from the Berkut/Krichauff population, QTLs on 1B, 3B, 4A and 4B from Seri/Babax and a major QTL on 7A from RAC875/Excalibur. The Indian core set consisted of 17 lines including released varieties and parents of mapping populations under development.

IIHR, Bangalore

A simple bottle trap containing a semi-synthetic medium enriched with fish proteins has been devised to attract the mango pollinator, *Chrysomya megacephala*. Pet bottles of 2 l capacity were used with cubes (2 x 2x 2cm) of medium placed inside along with soil to facilitate pupation. A single trap could attract 10-15 adults, comprising about 80% females. These traps can be used for multiplication as well as monitoring the population dynamics of calliphorid in relation to climate variables during off-season.



Central Marine Fisheries Research Institute, Kochi

Experiments conducted on cobia larvae showed that a 10C rise in the ambient temperature for cobia larvae at 20 DPH (days post harvest) showed only slight decrease in survival.(100 -93%). Growth was faster at 32oC at 40 DPH. However, beyond 32oC, poor weight gain was noticed. Studies showed that rotifers multiplied faster with a 20C rise in temperature after 48 hours of incubation using *Nannochloropsis* as feed. The ambient temperature was 27.5 -29 oC. An increase of 14% was noticed in the count of rotifers maintained with *Nannochloropsis* sp. as feed. Technology Demonstrations of Cobia farming in sea cages were held at West Godavari, Andhra Pradesh and Mandapam, Tamil Nadu and for artisanal pen and cage culture of pompano at Vethalai, Ramanathapuram.



De silting of checks dams: Baramati, Maharashtra

The drought situation during the current year was very serious with only 180 mm rainfall from June to Sept. with four dry spell of 10-15 days intervals during this period. Therefore, only 10% area was sown during kharif. The major intervention undertaken in the village during 2011 was desilting of 6 check dams. This involved excavation of 47759 cu m silt which was applied to 26 ha of poor quality land owned by 35 farmers. This increased water storage capacity of these check dams by 40%. With a rainfall of 73 mm in first fortnight of October the all check dams were filled with water. This has helped in recharging of 76 open wells in the village. With the failed kharif season, the water in the recharged wells is the only hope for the farmers to expect a decent rabi crop and this water is expected to protective irrigation to 182 ha. Despite a meagre rainfall of 253 mm, irrigation pumps operate for 6-8 h/day providing protective irrigation to rabi crops.



Commodity group of Vegetable Growers' Exposure Visit: Nandurbar

As a part of capacity building interventions, a commodity group was formed for vegetable growers. This group consists of small farmers who cultivate vegetables on very small patches of land of about 10-15 guntas. Because of the small quantity of produce, they often do not get good price for their produce.

These farmers were taken for an exposure visit to some progressive vegetable farmers in the nearby villages. During the exposure visit, an interaction of NICRA farmers was organized with different commodity wise groups. Farmers also visited KVK, Nandurbar. An orientation programme was conducted at KVK. A lecture on the concept of commodity wise group and vegetable production was conducted by Shri. R.M. Patil, (SMS, Horticulture). The farmers also visited demonstration farm at KVK. Shri. R.R.Bhavsar, Farm manager narrated about the various demonstrations conducted at KVK, farm during field visit. They also visited Automatic Weather Station installed at KVK farm. Total 23 farmers from NICRA village participated in this exposure visit.



Hon'ble Vice-Chancellor, R.V.S.K.V.V, Gwalior Visits NICRA Villages in Datia, M.P.

Dr. A. K. Singh Honorable Vice-Chancellor, RVSKVV, Gwalior visited Sanora and Barodi villages where KVK, Datia is implementing NICRA Project. Dr. S. S. Tomar, Director Extension RVSKVV, Gwalior and Dr. H.S. Yadav, Director Research Services were also present on the occasions. Dr. R. K. S. Tomar, Programme Coordinator, Krishi Vigyan Kendra, Datia facilitated the visit of dignitaries to the project intervention site. Dr. A. K. Singh visited NICRA site office situated at the adopted village, NADEP tank, water harvesting structures like farm ponds, rainwater harvesting poly check dam and renovated check dam. He interacted with the farmers where VCRMC members and farmers shared the experiences and benefits of the NICRA projects. During the interaction, Director Extension Services and Director Research Services answered all the questions and problems related with seed availability to the farmers and satisfied them. There were 65 farmers and RAWE students, College of Agriculture, Gwalior were also present at the moment. Scientists of the KVK, Datia Dr. B. S. Kasana (Agronomy), Dr. Y. C. Rikhari (Fisheries), Dr. A. K. Singh (Plant Protection) were present and made preparation for visit.



Zero tilled wheat saves cost and escapes terminal heat: Morena, MP

Area under long duration varieties of pigeonpea which dominated in Morena district of Madhya Pradesh is shrinking as compared to previous years. This reduction of area is due to fact that long duration pigeonpea takes 220 to 250 days for maturity, and consequently only a single crop could be grown in a year. Further, several times long duration crop suffers from severe frost and diseases like wilt and sterility mosaic. Short duration pigeonpea base sequential cropping has emerged due to development of short-duration photo- and thermo-intensive cultivars and expansion of irrigation facilities. The soil of the



demonstration site was sandy loam in texture. The climate of this zone is characterized as semi-arid extremely hot during May-June. Annual rainfall received 644.4mm during 2010-11 was mostly concentrated in the months of July and August. In this region, sowing of short duration pigeonpea by the farmers' is from 15th June to 1st week of July and harvesting during 15th November to 1st week of December. After harvesting of short duration pigeonpea, wheat crop sowing is delayed due to 5 to 8 tillage operations and pre-irrigation after harvest of pigeonpea for sowing of wheat. Timely planting of wheat is crucial as yield reductions of 1 – 1.5% per day occur for each day after the optimum sowing date of wheat. In addition to this land preparation requires high input, energy and increased cost of cultivation of wheat crop. Delayed in sowing of wheat required more input like seed, nutrient, irrigation etc. and crop was also affected by terminal heat. To overcome above problems, conservation tillage and management of pre-irrigation is the only way to mitigate the adverse effects on wheat crop in pigeonpea-wheat cropping sequence.

On farm demonstrations were conducted using five locations in alluvial soils of NICRA village by zero tillage (ZT) sowing method of wheat (*Triticum aestivum*) after harvest of pigeonpea during rabi season of 2010-11. For timely sowing of wheat, pre-irrigation before harvest of pigeonpea and just after harvest sowing of wheat by using zero-till seed drill along with recommended dose



of fertilizers was 100kg N, 60kg P₂O₅, 40kg S and 20kg ZnSO₄/ha for wheat. Full dose of P, S, Zn and half dose of N was applied as basal application in wheat crop and remaining N at panicle initiation stage. The sources of N, P and S were urea, dia-ammonium phosphate and elemental sulphur, respectively. A variety of wheat 'MP 4010' was sown after harvest of pigeonpea and package of practices were followed as per recommendation. Total five recommended irrigations were applied at stages of CRI, tillering, flowering, milking and grain development.

Zero tillage sowing method resulted in increase in yield, net return, B:C ratio, energy output, use-efficiency and productivity of energy as compared with conventional tillage sowing method of wheat. The percent increased in grain and straw yield by 5.32 to 5.94% with ZT demonstration fields as compare with conventional tillage sowing method of wheat. Maximum cost of production was observed in conventional tillage in comparison to zero tillage.



In zero tillage treatment Rs.3760/ha was saved as compared with cost of cultivation in conventional tillage.

In order to popularize zero tillage sowing method of wheat after harvesting of short duration pigeon pea through custom higher service in NICRA village. Thirty two farmers of NICRA village of Morena district were involved and sowing of 50ha wheat by zero tillage sowing method during 2011-12 resulting additional 112q grain and saving Rs 1.88 in NICRA village. The innovative message of zero tillage cultivation of wheat has spread in neighboring villages of NICRA village in the districts and around 200 ha in the district are being covered during current rabi, 2012. It was concluded that adoption of zero tillage practice of sowing of wheat after harvesting of short duration variety of pigeonpea produced higher yield and profit, saved from terminal heat, energy and resources under the soil and climatic conditions of Gird zone of Madhya Pradesh.



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