CRRI NEWSLETTER

CENTRAL RICE RESEARCH INSTITUTE
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
CUTTACK (ORISSA) 753 006, INDIA

Phone: **91-671-2367768-83 | *Fax:* 91-671-2367663 | *Telegram:* RICE**
Email: **crrictc@ori.nic.in *or* ctk_crriinfo@sancharnet.in *or* directorcrri@satyam.net.in**
URL: http://www.crri.nic.in

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A Success Story.....

Orissa Farmer Succeeds in Commercial Rice-fish Farming with CRRI Technology

SHRI Sunakar Mishra of village Mahisara under Dharmasala block and Jajpur district in Orissa has developed a 35 acres large rice-fish farm following the technology developed at CRRI, Cuttack. He has availed a loan amount of Rs 53 lakh for mainly the land shaping and some amount (Rs 3.70 lakh) for seeds of rice, fish and prawn, out of the total Rs 93.52 lakh sanctioned by State Bank of India, Jajpur Town Branch. The farmer purchased a Pocoline Hitachi Machine (LNT 90) and did entire earth work in the farm. The project includes a subsidy amount of Rs 20 lakh from Agricultural Production and Investment Corporation

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1. Shri Sunakar Mishra at his Rice-fish farm with Dr. D.P. Sinhababu, Principal Scientist, CRRI. 2. Shri Misra with improved Guava plants raised in the bunds. 3. Shri Mishra with his machine.

Limited (APICOL), Orissa to be released after completion of the scheme. Shri Mishra grows CRRI semi-deepwater rice varieties (Varshadhan, Durga) along with around 3 lakhs juveniles of fresh water prawn (*Macrobrachium rosenbergii*) and 2 lakhs fry of fish (Catla, *Catla catla* and Rohu, *Labeo rohita*). Vegetables (Bitter gourd, okhra, ridge gourd), tuber crops and puse (Pigeonpea) are being grown on wide bunds (8 meter) all around. The farmer plans to grow around 10,000 improved Guava and 2,000 tissue cultured Banana, 200 Coconut plants, besides agro-forestry with 2,000 Sisso (*Dalbergia sisso*) plants. Shri Mishra expects an annual return of Rs 60 lakhs from the farm and is confident of refunding the entire released loan amount in the first year iteself. Further, the farmer also visualizes phase by phase utilization of Rs 2.2 crores for farm and other infrastructures development in his total 60 acres area and desires to take up commercial farming of rice including quality rice, fish, prawn, horticultural crops, plantation crops and agro-forestry in the farm with expert advice of CRRI scientists.

Varietal Improvement of Aromatic Short Grain Rices

PRELIMINARY evaluation of 236 aromatic short grain rices collected from different states was done employing augmented design with 5 checks (Ketekijoha, CRM 2007-1, Pusa Sugandha-3, Pusa Basmati-1, Tarori Basmati) with five blocks. Based on the agro- morphological characters, it was observed that most of the collections were tall with wide range of duration for flowering (90-120 days). The collections viz., Badashahbhog, Domsiha, Gopal Bhog, Nalidhan, Badaguda, Benugopal, Benubhog, Bhuinsa sal, Ganjeikali, Kankjeera and Kalajiri showed an yield potential of 2.5 -3.0 tha^{-1}.

Genetic Improvement of Elite *Indica* Cultivars through Marker Assisted Backcross Breeding

IN continuation of the back cross program, crosses were attempted for generating BC_2F_1 generation using ARBN 137 (in IR 24 back ground) and a number of positive BC_2F_1 hybrids were obtained after employing markers specific genes for resistance to BLB *i.e.* xa 5, xa 13 and Xa 21.

The program also employed gene pyramids developed in the back ground of both PR 106 ((P2 and P9) and Pusa 44 (B4-4 and 573-2-5) to transfer the BLB resistance genes into the background of both Lalat and

Tapaswini. Under the programme, a number of crosses were attempted and F_1 hybrids were generated. Back crosses were attempted by using these hybrids and the recurring parents and BC_1F_1 plants were produced and molecular analysis was performed on the hybrids.

Marker-assisted Breeding for Bacterial Blight Resistance and Evaluation of MAS Products

TWENTY-TWO gene pyramided lines with single and combination of genes (xa5, xa13, Xa21) in the background of Swarna along with three checks (Swarna, Rajshree and Mahsuri) were evaluated in a replicated trial for grain yield and some of its component characters. Among the different lines tested CRMAS 2232-9 carrying xa5 single gene gave highest grain yield of 6764 kgha^{-1} followed by the check Rajshree (6425 kgha^{-1}). On the other hand most of the pyramided lines gave higher grain yield than the original parent Swarna. Interestingly, lines with one or two resistance genes gave higher yield than the lines containing all three genes.

Triasulfuran–A Promising Herbicide for Transplanted Rice

TRIASULFURAN (a low dose, broad spectrum sulfonylurea herbicide) was found to be highly effective for controlling most of the broadleaf weeds and sedges in transplanted rice field during the wet season as early post-emergent application.

The herbicide at 9 gha^{-1} controlled the weeds effectively (WCE 89%) when applied 5 days after transplanting in rainfed shallow lowlands and produced comparable yield with weed free check. However, the efficiency of Triasulfuran was further improved (WCE 91%) when tank mix of Triasulfuran (9 gha^{-1}) + Pretilachlor (500 gha^{-1}) was applied 5 days after transplanting which helped in achieving better control of grasses particularly *Echinochloa spp*.

Improvement of Nitrogen Use Efficiency

A field experiment was conducted during the wet season under favourable lowland conditions with *cv*. Gayatri as a test crop at N level of 60 kgha^{-1}. Results indicated that grain yields of rice significantly increased with N fertilizer applied in any form or method over 'no N' control. The grain yield ranged from 4.69 tha^{-1} in control to 5.23 tha^{-1} in urea amonium phosphate (UAP) + gypsum + prilled urea (PU) top dressing. Grain yield obtained with leaf colour chart

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based N application (at 45 kgha^{-1}) was almost at par with that recorded with the conventional three split N application (at 60 kgha^{-1}) which resulted in a saving of 15 kg N per ha and higher physiological efficiency of the N absorbed by the rice plants in the former method. Nitrogen uptake by rice crop varied from 82.46 kgha^{-1} in control to 99.55 kgha^{-1} in the treatment receiving deep placement of USG at 7 DAT. The agronomic N use efficiency in terms of grain yield obtained with every kg of nitrogenous fertilizer, was higher in UAP + gypsum + PU top dressing than other treatments.

Identification of QTLs Linked to Brown Plant Hopper Resistance in Rice

A total of 177 rice microsatellite specific primers, located at a distance of 10 cm apart on nine chromosomes of rice, were used for parental polymorphism study between susceptible cultivars *viz*. Swarna ,TN1, and resistant cultivars *viz*. Dhobanumbari and Salakathi. Seventy one primers (40%) revealed polymorphism between cultivars. A total of 330 bands were amplified of which 146 were polymorphic (44%). Number of bands per primer ranged from one to seven (RM447) with an average of 1.86 bands per primer. Two primers, RM203 and RM407 amplified a maximum of five polymorphic bands. Percentage of polymorphic primers varied from 0.31 (Chromosome 6 and 12) to 0. 64 (Chromosome 11).

Transfer of BLB Resistant Genes to Popular Rice Varieties

THE research on the transfer of Bacterial Blight resistance genes to the popular commercial rice cultivar Swarna using modern DNA marker technology has resulted in the development of 45 lines which on testing in the simulated epiphytotic condition for two seasons finally gave rise to 25 lines. These lines carry Bacterial Blight resistant genes (xa5, xa13 and xa21) either singly or in different combinations. These 25 lines were tested at 16 locations in the country during wet season of 2005. Computation of the result revealed that three entries viz. CRMAS 2232-65, CRMAS 2232-66 and CRMAS 2232-71 performed very well in most of the test sites with severity index (SI) 3.5 to 3.7 as against severity index 7.4 of the susceptible check TN 1. These three cultures which had combination of three resistant genes *viz*. xa5, xa13 and xa21 exhibited very high promising index (PI) 71.5 to 77.0.

Mass Multiplication of Natural Enemies and Studies on Egg Parasitoids of Rice Pests

OBSERVATIONS on the natural egg parasitism of yellow stem borer of rice indicated that *Telenomus dignoides* was the dominant parasitoid with 42.8% parasitism followed by *Trichogramma japonicum* (17.8%) and *Tetrastichus schoenobii* (7.14%). Partial parasitism by *T. dignoides* to the extent of 58.3% was also observed.

Assay of Bt against Leaf Folder

THE bacteria isolated from the Bt formulations (biolep, bioasp and halt) and indigenous Bt var. *morrisoni*, *tolworthi*, *thompsoni* and *kurstaki* were tested in the laboratory on diet assay by spraying on potted plants against leaf folder. Compared to indigenous Bt, the formulations were effective against the pest effecting more than 50% mortality for same dose of inoculums.

Management of Rice Storage Insects

COMBINED formulation of eucalyptus oil mixed with sunflower oil (1:1) applied as paddy grain treatment at 1 mlkg^{-1} grains showed absolute grain protection against paddy moth, *Sitotroga cerealella* Oliv. and lesser grain borer, *Rhyzopertha dominica* Fabr. for 6 months under artificial infestation of the test insects.

Insuf (Sulfer 80% WP), the micronized wettable sulphur was evaluated as paddy seed protectant against two major insect pests of stored paddy (*S. cerealella* and *R. dominica*). Admixing of the insuf at 1gkg^{-1} seeds could absolutely check the multiplication of the test insects under artificial infestation for a period of 12 months, without adversely affecting the viability of the seeds. For the first time sulphur is recorded to be an effective paddy seed protectant having application cost of only Rs. 8 per 100 kg seeds.

Effect of Different Treatments on Quality of Brown Rice during Storage

BROWN rice is richer in nutrients than the milled rice but has a relatively shorter shelf life and gets infested with pests and microbes during storage for long periods of time. This is a big problem in its popularization among the rice consumers. It was observed that the samples stored at room temperature with Parada Tikia (Jandu Pharmacy) at 1 tablet per half kg grain and boric acid at 1 gkg^{-1} grain remained free from any infestation up to 3 months. The same was true with the sample kept at 10°C to 12°C. Among

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these three treatments, rice stored with Parada Tikia and that at 10°C to 12°C tasted better than that stored with boric acid. The experiment continues.

KVK, Santhpur

Trainings Organized

Ten training programmes on post harvest technology, medicinal plant cultivation, improved package of practices of vegetable cultivation, groundnut cultivation and fodder cultivation were conducted on 28 Jan and 16 Feb at different villages under KVK, Santhpur. More than one hundred farmers benefited from these training programmes.

Front Line Demonstrations

Frontline demonstrations on oilseed crop like Groundnut (*var.* Smruti) and pulses like Blackgram (*var.* PDU-1) were conducted at village Budukunia, Arada and Sigmapur. The increase in yield in groundnut and blackgram was found to be 56% and 66% respectively over the local check.

CRRI Participated in Agricultural Exhibitions

THE CRRI participated in the North -East Agri Expo 2006 organized by Government of Nagaland State held at Dimapur, Nagaland during 27-31 Mar 2006 which was inaugurated by Honourable Union Minister of Agriculture Shri Sharad Pawar. The CRRI showcased the advanced rice production technologies relevant to North-East Hills which were highly appreciated by the farmers, scientists and agro-entrepreneurs. Drs. N.K. Sarma, S.K .Rautray, and Shri D.R. Sahoo represented the institute in this exhibition.

The CRRI also participated in a district level agricultural exhibition at Telengapentha, Cuttack on 19 Mar 2006. It was organized by Deputy Director Agriculture, Cuttack. Inaugurating the exhibition Shri Surendra Nath Nayak , Minister Agriculture, Government of Orissa applauded the efforts of CRRI scientists in enhancing the rice production in the state and suggested the state government officials to keep liaisoning with CRRI for providing good quality high yielding seeds to the farmers of Orissa. On this occasion Shri Ashok Pattanaik, Scientist delivered a lecture on 'Prospects of aromatic rice cultivation in Orissa.' The Cuttack Sadar MLA Shri Prabhat Ranjan Biswal in his address advocated for profit oriented scented rice cultivation in a large scale. In this exhibition the promising rice production technologies evolved by the CRRI were exhibited and demonstrated for the awareness of farming community. Drs. A.K. Mohanty, .S. N. Meera and Shri A.K. Parida represented CRRI in this exhibition.

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Symposium/Conference/workshops/Visits/ Trainings Attended

SHRI M.N. Bhakta attended the training programme on "Statistical techniques for agricultural research with emphasis on use of softwares" held at IASRI, New Delhi from 21 Dec 2005 to 10 Jan 2006.

Dr P. Samal attended the 13th Annual Conference of the Agricultural Economics Research Association (India) at CSAUA&T, Kanpur during 6-7 Jan 2006.

Drs P. Samal and (Mrs.) J. Nayak attended the 2nd Annual Review and Planning Workshop of the IFAD funded multi stake holder project on "Accelerating technology adoption to improve rural livelihoods in the rainfed eastern Gangetic plains" at IGKV, Raipur from 18-20 Jan 2006.

Dr G.J.N. Rao attended the Review meeting of the Network Project "Transgenic in Crops" at NRCPB, New Delhi from 20-21 Feb 2006.

Dr K.M. Das attended the short course training on "Biological Agents in the Control of Plant Diseases" at project Directorate, Biological Centre, Bangalore from 20-25 Feb 2006.

Shri D.S. Meena attended the Krushak Krishi Vigyan Mela at IARI, New Delhi from 23-25 Feb 2006.

Dr S.R. Dhua attended a National Seed Seminar on "Prosperity through quality seeds" at ANGRAU, Hyderabad from 24-26 Feb 2006.

Dr R. Bhagawati attended the short training course on "Biocides in plant disease management" at AC&RI, TNAU, Madurai from 20 Feb to 1 Mar 2006.

Dr H.N. Subudhi attended a computer training programme at CMC, Hyderabad from 6-10 Mar 2006.

Dr S.R. Dhua attended a training programme on "DUS testing" at seed Technology Department, IARI, New Delhi from 6-10 Mar 2006.

Dr (Mrs.) Lipi Das and Shri D.S. Meena attended the training programme on "Women groups for Agril. Development" at MANAGE, Hyderabad from 20-24 Mar 2006.

Dr J.N. Reddy attended Annual Planning Meeting of the "Eastern India Rainfed Low Land Shuttle Breeding Network" (EIRLSBN) held at New Delhi during 23-24 Mar 2006.

Radio and TV talks delivered

SHRI K.S. Behera, Principal Scientist, Entomology delivered a talk on "Integrated insect pest management in Rabi paddy" on AIR, Cuttack broadcast on 15 Feb 2006.

Dr (Mrs.) Mayabini Jena, Senior Scientist, Entomology delivered a talk on "Management of insect pests of rice through plant products" on Doordarshan telecast on 21 Feb 2006.

Shri R.C. Dani participated as expert in a discussion on "Integrated Rice Pest Management" on Doordarshan telecast on 6 Mar 2006 and delivered a talk on "Rice Pest Management" on E-TV telecast on 8 Mar 2006.

Visits

A total of 627 visitors comprising 490 farmers and farm women, 74 Agricultural Extension Officers, 61 Students and 2 NGO personnel visited the in-

stitute during the period under report. They were taken around various experimental plots, demonstrations, implement workshops, net houses and Display Hall of the institute.

Dr P.K. Ghosh, Deputy Director (Research) and Dr S. Som, Deputy Director (Seeds) of Department of Agriculture, Government of Tripura visited the Rainfed Lowland Rice Research Station (RRLRRS), Gerua, Assam and had discussion with the scientists and Officer-in-Charge of the Station.

Seminars

DR Sheshasayee, Asst. Professor, University of Agricultural Sciences, Bangalore delivered a seminar on 'Physiological strategies for crop improvement–Trait based approach for drought tolerance' on 9 Jan 2006.

Dr. Y. Jagadeesh Babu, Department of Geography, Mc Master University, Canada delivered a lecture on 'Modelling green house emission fluxes and carbon sequestration in tropical Indian rice ecosystem' on 7 Mar 2006.

Dr S.R. Dhua, Principal Scientist, CRRI delivered a seminar on 'Present status of preparedness for plant variety protection' on 17 Mar 2006.

Awards

DR (Mrs.) P. Krishnan, Senior Scientist was conferred the award for Advancement of Agricultural Sciences (Senior) by Indian Society of Plant Physiology, New Delhi during the National Seminar on "Crop productivity and Quality Improvement through Physiological Interventions" held at Navsari Agricultural University, Navsari, Gujarat on 23 Nov 2005.

Dr (Mrs.) Jagadiswari Rao, Principal Scientist was conferred Scientist of the Year Award, 2006 by Bioved Research Society, Allahabad during 8th Agricultural Scientists and Farmers Congress at BHU, Varanasi on 21 Feb 2006.

Accomplishments

SHRI Prasanta Kumar Jena , T-2 (Driver) was selected by Orissa Kabaddi Association to represent the state in the National East Zone Kabaddi Championship 2006.

Shri B.K.Sahoo, Assistant Administrative Officer was selected as a Technical Officer by Orissa Kabaddi Association to supervise the Kabaddi Championship.

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Director: S.G. Sharma

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