

CRRI Newsletter

ICAR-CENTRAL RICE RESEARCH INSTITUTE, CUTTACK

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MAIN INSTITUTE CAMPUS

Events

68th Foundation Day and Dhan Diwas

The Central Rice Research Institute (CRRI), Cuttack observed its "68th Foundation Day and Dhan Diwas" on 23 April, 2014. The programme was attended by over three hundred farmers and farmwomen from Assam, Jharkhand and Odisha apart from invited dignitaries and staff of the institute. Padma Bhushan Professor VL Chopra, Former Secretary, DARE, Govt. of India and Director General, ICAR delivered the Foundation Day Lecture on "Enhancing Livelihoods Through Technology" and graced the occasion as Chief Guest. Speaking on the occasion, Professor Chopra recalled the



Padma Bhushan Prof. VL Chopra, Former Secretary, DARE and DG, ICAR & Chief Guest of the function delivering the Foundation Day Lecture

मुख्य संस्थान परिसर

घटनायें

सीआरआरआई का ६८वां स्थापना दिवस तथा धान दिवस

२३ अप्रैल २०१४ को केंद्रीय चावल अनुसंधान संस्थान, कटक ने अपना ६८वां स्थापना दिवस तथा धान दिवस मनाया। संस्थान के कर्मचारियों, आमंत्रित अतिथियों के अतिरिक्त ओडिशा, झारखंड तथा असम से तीन सौ से अधिक किसानों एवं महिला किसानों ने भाग लिया। पद्म विभूषण डॉ.वी.एल. चोपड़ा, भूतपूर्व सचिव, डेयर, भारत सरकार तथा महानिदेशक, आईसीएआर इस दिवस के मुख्य अतिथि थे और उन्होंने प्रौद्योगिकी के माध्यम से जीविकाओं में सुधार विषय पर स्थापना दिवस व्याख्यान दिया। इस अवसर पर संबोधन देते हुए प्रोफेसर चोपड़ा ने सीआरआरआई के गौरवशाली अतीत तथा देश के किसान समुदाय के उत्थान के लिए किए



Chief Guest Prof. VL Chopra inaugurating the "Foundation Day and Dhan Diwas-2014 alongwith Special Guest Padmashri Dr. SVS Shastri and Padmashri Dr. Priyambada Mohanty Hejmadi



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glorious past and immense contributions of the institute in the upliftment of the farming community of the country. He presented the livelihood scenario of the rural India and various options to strengthen it with emphasis on value addition. He strongly advocated for a model involving all the stakeholders for livelihood enhancement.

Padmashri Dr. SVS Shastri, former Project Coordinator, All India Coordinated Rice Improvement Project (now, Directorate of Rice Research), Hyderabad was the Special Guest of the function. Padmashri



Padmashri Dr. SVS Shastri being felicitated by the Chief Guest for his significant contributions to rice science

Professor Priyambada Mohanty Hejmadi, former Vice Chancellor of Sambalpur University a proponent of classical Odishi dance and a renowned practitioner, graced the function as Guest of Honour. Mr. P Krishna Mohan, IFS, Director of Fisheries, Govt. of Odisha, another Guest of Honour, highlighted rice-fish integration approach to enhance the income and nutrition of the people of eastern states. Dr. T Mohapatra, Director of the institute highlighted the eight recently released & notified varieties during last one year by CVRC namely, CR Dhan – 201, 202, 300, 303, 304, 305, 407 & 505 and their suitability for different ecologies, and also three varieties identified recently by the VIC, namely, CR Dhan – 205, 306 & 451. He presented new crop production technologies including farm implements developed by the institute. He described the efforts being made in the direction of enhancing climate resilience of rice crop.

The chief guest inaugurated an exhibition showcasing technologies of CRRRI & its regional stations, KVKs of OUAT, ICAR institutes and state departments. He also felicitated six retired scientists, ten best workers of the institute and twenty one progressive farmers & farm women from Assam, Jharkhand and Odisha for their innovative methods in rice farming. Four publications were released by the dignitaries.

गए अपार योगदानों को याद किया। उन्होंने ग्रामीण भारत के आजीविका परिदृश्य को उजागर किया तथा मूल्य संवर्धन पर जोर देते हुए इसे मजबूत करने के लिए अनेक उपायों के बारे में बताया। उन्होंने आजीविका की वृद्धि के लिए सभी हितधारकों को शामिल करते हुए एक मॉडल विकसित करने के लिए विशेष जोर दिया।

पद्मश्री डॉ.एस.वी.एस. शास्त्री, भूतपूर्व परियोजना समन्वयक, अखिल भारतीय समन्वित चावल सुधार परियोजना (वर्तमान चावल अनुसंधान निदेशालय), हैदराबाद इस अवसर पर विशेष अतिथि थे। पद्मश्री प्रोफेसर प्रियांबदा महांती हेजमादी, भूतपूर्व कुलपति, संबलपुर विश्वविद्यालय तथा शास्त्रीय ओडिशी नृत्य



Chief Guest Prof. V.L.Chopra awarding a progressive farm woman

के प्रस्तावक तथा एक विख्यात कर्ता इस अवसर पर सम्मानीय अतिथि थे। इस अवसर पर एक अन्य विशेष अतिथि श्री एम.पी.कृष्णा मोहन, आईएफएस, निदेशक, मात्स्यिकी, ओडिशा सरकार ने पूर्वी राज्यों के लोगों की आय एवं खाद्य में वृद्धि करने के लिए चावल-मछली समन्वित प्रस्ताव पर जोर दिया। डॉ.त्रिलोचन महापात्र, निदेशक, सीआरआरआई ने हाल ही विमोचित आठ किस्मों के बारे में उजागर किया तथा केंद्रीय किस्म विमोचन समिति द्वारा पिछले एक वर्ष के दौरान अधिसूचित किस्मों जैसे सीआर धान-२०१, २०२, ३००, ३०३, ३०४, ३०५, ४०७ तथा ५०५ एवं विभिन्न पारिस्थितिकियों के लिए उनकी उपयुक्तता के बारे में एवं किस्म पहचान समिति द्वारा हाल में पहचान की गई तीन किस्मों जैसे सीआर धान-२०५, ३०६ तथा ४५१ के विषय में वर्णन किया। उन्होंने संस्थान द्वारा विकसित प्रक्षेत्र उपकरणों सहित फसल उत्पादन की नई प्रौद्योगिकियों को प्रस्तुत किया। चावल फसल में जलवायु लचीलापन की वृद्धि हेतु इस दिशा में किए जा रहे प्रयासों के बारे में भी वर्णन किया।

मुख्य अतिथि ने सीआरआरआई तथा इसके क्षेत्रीय केंद्रों, ओयूएटी के कृषि विज्ञान केंद्रों, आईसीएआर के संस्थानों तथा राज्य विभागों द्वारा विकसित प्रौद्योगिकियों की एक प्रदर्शनी का उद्घाटन किया। उन्होंने छः सेवानिवृत्त वैज्ञानिकों, संस्थान के दस श्रेष्ठ कार्मिकों तथा ओडिशा, असम एवं झारखंड के २१ प्रगतिशील किसानों एवं महिला किसानों को उनके द्वारा नवीन पद्धति से चावल की खेती करने के लिए सम्मानित किया। आमंत्रित अतिथियों ने चार प्रकाशनों का विमोचन किया।

Stakeholders' Meet

A stakeholders' meeting on Rice-based Model Village was held on 9 June 2014 under the chairmanship of Dr. T Mohapatra, Director, CRRI, Cuttack and was attended by 10 representative farmers & 10 representative farm women of the cluster, 10 officials from state developmental departments and farmers' organization apart from scientists and technical staff of the project. Dr. BN Sadangi, Head, Division of Social Sciences & Programme Leader apprised the house about the project objectives, activities, major problems of the cluster and interventions carried by CRRI so far; and relevance of various stakeholders for the success of the project. He gave a brief account of the socio-economic environment of the cluster and technological interventions made by the institute during *Kharif-2013-14* and *Rabi-2014*.

Dr. T Mohapatra, Director, CRRI & Chairman of the Session highlighted some of the initiatives by project personnel in resolving the problems and hastening the developmental activities in the area.

CRRI Signed MoU with Government Institutes / Private companies

A Memorandum of Understanding (MoU) was signed between CRRI and Adarsh Engineers, Cuttack for production and commercialization of CRRI agricultural implements on 3 June 2014.

Official Language Implementation Committee Meeting

Dr. T Mohapatra, Director, CRRI chaired the quarterly meeting of the Official Language Implementation Committee (OLIC) of the Institute for the quarter ending April-June, 2014 held on 27 June 2014. All the Heads of Divisions, the Chief



Dr. T Mohapatra addressing the participants of the meet

डॉ. त्रिलोचन महापात्र, निदेशक, सीआरआरआई, कटक की अध्यक्षता में ९ जून २०१४ को चावल आधारित आदर्श गांव पर हितधारकों के लिए एक बैठक आयोजित की गई जिसमें परियोजना के वैज्ञानिकों एवं तकनीकी कर्मचारियों के अतिरिक्त क्लस्टर के १० किसान प्रतिनिधियों तथा १० महिला किसानों, राज्य विकास विभागों के १० अधिकारियों तथा किसान संगठन से प्रतिनिधियों ने भाग लिया। डॉ. बी.एन.संडगी, अध्यक्ष, सामाजिक विज्ञान प्रभाग तथा कार्यक्रम निदेशक ने सभा को परियोजना के लक्ष्यों, कार्यकलापों, क्लस्टर के प्रमुख समस्याओं तथा अब तक सीआरआरआई द्वारा इस संबंध में किए गए हस्तक्षेपों तथा परियोजना की सफलता के लिए विभिन्न हितधारकों की संगतता के बारे में अवगत कराया। उन्होंने क्लस्टर के सामाजिक-आर्थिक वातावरण के बारे में तथा २०१३-१४ के खरीफ तथा २०१४ के रबी के दौरान संस्थान द्वारा किए गए प्रयासों के विषय में संक्षिप्त में बताया।

डॉ. त्रिलोचन महापात्र, निदेशक, सीआरआरआई ने इस क्षेत्र की समस्याओं के निदान करने तथा विकास कार्यों में शीघ्रता लाने में परियोजना की कार्मिकों द्वारा किए गए कुछ पहल के विषय में उजागर किया।

सीआरआरआई का सरकारी संस्थानों/निजी कंपनियों के साथ समझौता

सीआरआरआई विकसित कृषि औजारों के व्यावसायिकरण एवं उत्पादन के लिए आदर्श इंजीनियर्स, कटक तथा सीआरआरआई के बीच भी ३ जून २०१४ को एक समझौते पर हस्ताक्षर किया गया।



MoU between CRRI and Adarsh Engineers being exchanged in presence of the Director

राजभाषा कार्यान्वयन समिति की बैठक

डॉ. त्रिलोचन महापात्र, निदेशक, सीआरआरआई की अध्यक्षता में अप्रैल-जून, २०१४ को समाप्त तिमाही के लिए राजभाषा कार्यान्वयन समिति की तिमाही बैठक २७ जून २०१४ को संपन्न हुई। संस्थान के सभी प्रभागों के अध्यक्ष, मुख्य वित्त एवं लेखा अधिकारी,



Official Language Implementation Committee Meeting in progress

Finance & Accounts Officer, Senior Administrative Officer and Administrative Officer are the members of this Committee who attended the meeting. Senior Technical Officer (OL) was the member Secretary. The Director reviewed the status of the progress of Official Language use at the Institute. He urged the importance of compliance of various rules and regulations of Official Language. A number of decisions were taken to implement the Official Language policy effectively at the Institute.

Training and Workshop

Two trainers' training programmes on "Package of practices of improved rice production" sponsored by OTELP, Government of Odisha from 19-22 May 2014 and 10-14 March 2014 for 18 livelihood experts from Odisha were organized. Drs. Lipi Das and SK Mishra coordinated the programmes.



Participants, Director and Resource Persons of the training programme on "Package of practices of improved rice production"

Visitors

Team of Economists (Dr. Allan Choppin, Dr KYTE and Dr Elizabeth) from Barkley University accompanied by Dr Manzoor Dar (Sr. Project Consultant, STRASA; IRRI-India) visited the research station on their mission to assess spread of the variety "IR 64-drought" under the MoU signed between IRRI and Barkley University on 7 April 2014.

During the period under report, a total of 895 visitors including 593 farmers, 20 farm women, 238 students, and 36 Agricultural Officers visited CRR, Cuttack from different states of India viz, Odisha, Chattishgarh, Jharkhand and West Bengal, and eight scientists from Nepal. They were taken around various experimental plots, demonstrations, agricultural implementation workshops, net houses and Oryza museum in the institute.



Visitors from Nepal in the Oryza Museum

वरिष्ठ प्रशासनिक अधिकारी तथा प्रशासनिक अधिकारी इस समिति के सदस्य के रूप में इस बैठक में भाग लिया। वरिष्ठ तकनीकी अधिकारी, राजभाषा इस समिति के सदस्य सचिव हैं। निदेशक महोदय ने संस्थान में राजभाषा कार्य की प्रगति की समीक्षा की। उन्होंने संस्थान में राजभाषा संबंधित नियमों एवं प्रावधानों के सुचारु कार्यान्वयन हेतु आग्रह किया। इस बैठक में संस्थान में राजभाषा नीतियों के अधिक से अधिक कार्यान्वयन के लिए कई निर्णय लिए गए।

प्रशिक्षण एवं कार्यशाला आयोजित

ओडिशा के १८ आजीविका विशेषज्ञों के लिए उन्नतशील चावल उत्पादन के लिए खेती पद्धतियों का पैकेज विषय पर १० से १४ मार्च तथा १९ से २२ मई २०१४ के दौरान दो प्रशिक्षण कार्यक्रम आयोजित किया गया। इसे ओडिशा सरकार के ओटीईएलपी द्वारा प्रायोजित किया गया था। डॉ.लिपि दास तथा डॉ.एस.के मिश्र ने प्रशिक्षण कार्यक्रमों का समन्वयन किया।

आगंतुक

अर्थशास्त्रियों का एक दल जिसमें बारक्ले विश्वविद्यालय के डा.एलान चोपीन, डा.काइट तथा डा. एलिजावेथ एवं स्ट्रासा, आईआरआरआई-भारत के वरिष्ठ परियोजना सलाहकार डा.मंजूर दर शामिल थे, आईआरआरआई तथा बारक्ले विश्वविद्यालय के बीच हुए समझौते के तहत 'आईआर ६४-सूखा' किस्म के चावल के प्रसार का मूल्यांकन करने के लिए अनुसंधान केंद्र का परिदर्शन किया।

अप्रैल से जून २०१४ के दौरान, भारत के विभिन्न राज्यों जैसे ओडिशा, छत्तीसगढ़, झारखंड, पश्चिम बंगाल तथा नेपाल से आठ वैज्ञानिकों, ५९३ किसानों, २० महिला किसानों, २३८ विद्यार्थियों तथा ३६ कृषि अधिकारियों समेत कुल ८९५ आगंतुकों ने सीआरआरआई, कटक का परिदर्शन किया। उन्हें संस्थान के कई परीक्षण खेतों, प्रदर्शनों, कृषि उपकरण कार्यशालाओं, नेटहाउस तथा ओराइजा संग्रहालय को दिखाया गया।

CRR I REGIONAL STATION, HAZARIBAG

Front Line Demonstrations (FLD)

Selection of cooperating farmers and fields in different villages of four districts (Chatra, Hazaribag, Saraikela, and Khunti) for conducting ten FLDs covering 10 ha area under Direct Seeded Rice (DSR) condition with varieties CR Dhan 40 & Sahabhazi Dhan has been completed. Seed and other inputs have already been distributed for seeding which is in progress.

IRRI-NFSM (STRASA) sponsored demonstration (rice-chickpea rotation)

One hundred demonstrations covering a total area of 100 ha have been planned to be conducted in three districts (Chatra, Khunti and Deoghar) under DSR using two rice varieties (CR Dhan 40 & Sahabhazi Dhan). Selection of cooperating farmers and fields were completed. Seed & other inputs have already been distributed among the farmers for seeding.

CRR I REGIONAL STATION, GERUA

Front Line Demonstrations in Assam (FLDs)

Altogether 4 front line demonstrations on rice variety 'Naveen' as summer rice were conducted in Assam during *boro/rabi* 2013-14. Three demonstrations of 8 ha each were located at villages - Gorakhat (Darrang district), Hokradoba (Udalguri district) and Mugkuchi (Nalbari district), while one 10 ha demonstration was located at Galdighala in Nalbari district.

BGREI Summer Rice Block Demonstrations in Assam

The scientists from CRR I Regional Station, Gerua visited Baksa, Chirang, Nalbari and Udalguri districts of Assam for technical monitoring of summer rice block demonstrations under BGREI. Altogether 155 nos. of summer rice block demonstrations were conducted during *rabi* 2013-14 under BGREI programme. These demonstrations covered 38,659 ha and were spread over 56 agricultural sub-divisions and 25 districts of Assam. Barring one demonstration each in Bilasipara sub-division of Dhubri district, Hamren sub-division of Karbi Anglong district and Udalguri sub-division of Udalguri district, each demonstration covered 250 ha under summer rice. Hybrids, viz., JKRH 401, PAC 835 and Rajalaxmi & high yielding varieties, viz., IR 64 and MTU 1010 were grown in the demonstrations. The farmers were reluctant to practice line transplanting of rice. As per farmers' perception higher number of labourers was needed to carry out the practice. Line transplanting was

सीआरआरआई क्षेत्रीय केंद्र, हजारीबाग

अग्रिम पंक्ति प्रदर्शन

सीधी बुआई धान दशा के अंतर्गत सीआर धान ४० तथा सहभागीधान किस्मों को चतरा, हजारीबाग, सरायकेला तथा खुंटी जिलों के विभिन्न गांवों के १० हेक्टेयर क्षेत्र में दस चावल प्रदर्शनों का आयोजन किया गया। बुआई के लिए बीज एवं अन्य सामग्री पहले से ही वितरित कर दी गई है। सहयोगी किसानों एवं खेतों का चयन कार्य पूरा हो चुका है।

आईआरआरआई-एनएफएसएम (स्ट्रासा) प्रायोजित प्रदर्शन (चावल-चना फसल चक्र)

सीधी बुआई धान दशा के अंतर्गत सीआर धान ४० तथा सहभागीधान किस्मों को चतरा, खुंटी तथा देबघर जिलों के कुल १०० हेक्टेयर क्षेत्र में सौ प्रदर्शनों का आयोजन किया गया। सहयोगी किसानों एवं खेतों का चयन कार्य पूरा हो चुका है। बुआई के लिए बीज एवं अन्य सामग्री पहले से ही वितरित कर दी गई है।

सीआरआरआई क्षेत्रीय केंद्र, गेरुआ

असम में अग्रिम पंक्ति प्रदर्शन

असम में २०१३-१४ के बोरो/रबी के दौरान ग्रीष्म धान के रूप में नवीन चावल किस्मों पर कुल ४ अग्रिम पंक्ति प्रदर्शन आयोजित किया गया। दरांग जिले के गोराखाट गांव तथा उदालगुड़ी जिले के होक्राडोबा एवं नालबाड़ी जिले के मगुछी प्रत्येक गांवों के ८ हेक्टेयर की भूमियों में तीन प्रदर्शन किए गए तथा नालबाड़ी जिले के गल्दीघाला गांव के १० हेक्टेयर भूमि में एक प्रदर्शन किया गया।

असम में बीजीआरआईआई ग्रीष्म चावल का खेत प्रदर्शन

बीजीआरआईआई के तहत ग्रीष्म चावल का खेत प्रदर्शनों की तकनीकी निगरानी हेतु सीआरआरआई क्षेत्रीय केंद्र, गेरुआ के वैज्ञानिकों ने असम के नालबाड़ी, बक्सा, चिरांग तथा उदालगुड़ी जिलों का दौरा किया। बीजीआरआईआई कार्यक्रम के तहत २०१३-१४ के रबी के दौरान कुल १५५ ग्रीष्म चावल खेतों का प्रदर्शन किया गया। असम के २५ जिलों के ५६ कृषि उप-प्रखंडों में लगभग ३८६५९ हेक्टेयर पर इन प्रदर्शनों का आयोजन किया गया। धूबरी जिले के बिलासीपारा उपखंड, कारबी आंगलॉग जिले के हमरेन उपखंड तथा उदालगुड़ी जिले के उदालगुड़ी उपखंड में २५० हेक्टेयर भूमि में ग्रीष्म चावल पर एक प्रदर्शनों का आयोजन किया गया। इन प्रदर्शन खेतों में संकर जैसे जेकेआरएच ४०१, पीएसी ८३५ तथा राजलक्ष्मी एवं अधिक उपज देने वाली किस्मों जैसे आईआर ६४ तथा एमटीयू १०१० की खेती की गई। किसान कतार में रोपाई करने के लिए अनिच्छुक थे। उनके अनुसार, इस पद्धति में अधिक संख्या में श्रमिकों की आवश्यकता होती है। बोरो चावल के मौसम के दौरान कतार रोपाई पद्धति अधिक अपनाई जाती है। अधिकांश

practiced more in *boro* rice growing season. Most of the farmers were aware of importance of plant protection measures. Taking plant protection measures, mainly insecticidal sprays in standing crop was a common practice but they rarely practiced seed treatment. Farmers were expecting of 6.0 to 7.0 t/ha yield in the demonstrations.

Field day

Field days were organized at Gorakhat (Darrang district) on 27 May 14, Galdighala (Nalbari district) on 07 June 14 and at Hokradoba (Udalguri district) on 10 June 2014. More than 100 farmers participated in each field day. Dr. S.G Sharma, Head, Division of CPB, CRRI, Dr. AK Gogoi, Zonal Project Director, KVKs, Zone III, Dr. N K Sharma, Principal Scientist, AAU & ex-Officer

In-Charge, RRLRRS, Gerua graced the field day meetings at Gorakhat, Galdighala and Hokradoba as the chief guest, respectively. Result of crop cutting experiments on the Naveen variety yielded 6.3 t/ha at Gorakhat (Darrang district), 5.6 t/ha at Galdighala (Nalbari district) and 6.1 t/ha at Hokradoba (Udalguri district). Days to maturity for Naveen in the three demonstrations ranged from 150 to 155 days.



Field-day on rice variety Naveen (Boro 2013-14) in Galdighala village, Gerua

किसान पौध सुरक्षा उपायों की महत्व से अवगत थे। पौध सुरक्षा उपायों में से, वे खड़ी फसल पर कीटनाशक छिड़काव करते थे किंतु वे बीजों का उपचार नहीं करते थे। किसान इन प्रदर्शनों से ६.० से ७.० टन प्रति हेक्टेयर की उपज प्राप्त करने की उम्मीद रखते हैं।

क्षेत्र दिवस

दरांग जिले के गोराखाट गांव में क्षेत्र दिवस २७ मई २०१४ को, नालबाड़ी जिले के गल्दीघाला गांव में क्षेत्र दिवस ७ जून २०१४ को तथा उदालगुड़ी जिले के होक्राडोबा गांव में क्षेत्र दिवस १० जून २०१४ को मनाया गया। प्रत्येक क्षेत्र दिवस के असवर पर १०० से अधिक किसानों ने भाग लिया। डॉ.एस.जी. शर्मा, अध्यक्ष, फसल कार्यिकी एवं जीवरसायन प्रभाग, सीआरआरआई, डॉ.ए.के.गोगोई, क्षेत्रीय परियोजना निदेशक, कृषि विज्ञान केंद्र, क्षेत्र-३, डॉ.एन.के.शर्मा, प्रधान वैज्ञानिक,

एएयू, तथा भूतपूर्व प्रभारी, आरआरएलआरआरएस, गेरुआ ने क्रमशः गोराखाट, गल्दीघाला तथा होक्राडोबा के क्षेत्र दिवसों पर मुख्य अतिथि थे। दरांग जिले के गोराखाट गांव में परीक्षण चावल किस्म से ६.३ टन प्रति हेक्टेयर, नालबाड़ी जिले के गल्दीघाला गांव में इस किस्म से ५.६ टन प्रति हेक्टेयर तथा उदालगुड़ी जिले के होक्राडोबा गांव में इस किस्म से ६.१ टन प्रति हेक्टेयर की उपज प्राप्त हुई। इन तीनों प्रदर्शनों में नवीन किस्म की परिपक्वता १५० से १५५ दिनों के बीच रही।

KRISHI VIGYAN KENDRAS

Santhapur, Cuttack

Training

One on-campus training programme was conducted on "Mushroom Production Technology" for 25 farm women and three off-campus training programmes were organized on "Production technology of rice" and "Integrated Pest Management in paddy nursery at Kherosh and Dhanmandal of Kantapada block and Balijhari of Narsinghpur block for 75 farmers.

Workshop

Review-cum-Action Plan Workshop on Rice Production Technology for KVK scientists was jointly organized by ZPD, Zone-VII, Jabalpur and CRRI, Cuttack during 15 -17 May, 2014 at CRRI.

कृषि विज्ञान केंद्रों

संथपुर, कटक

प्रशिक्षण

मशरूम उत्पादन प्रौद्योगिकी पर २५ महिला किसानों के लिए केंद्र में एक प्रशिक्षण कार्यक्रम आयोजित किया गया तथा नरसिंहपुर प्रखंड के बालिझरी तथा कंटापाड़ा प्रखंड के खेरोश एवं धानमंडल में चावल उत्पादन प्रौद्योगिकी तथा धान नर्सरी में समन्वित नाशककीट प्रबंधन विषयों पर तीन गैर-परीसरीय प्रशिक्षण कार्यक्रम आयोजित किए गए।

कार्यशाला

क्षेत्रीय परियोजना निदेशालय, क्षेत्र-७ जबलपुर तथा सीआरआरआई, कटक द्वारा संयुक्त रूप से सीआरआरआई, कटक के सभागार में १५ से १७ मई २०१४ के दौरान कृषि विज्ञान केंद्र के वैज्ञानिकों के लिए चावल उत्पादन प्रौद्योगिकी पर समीक्षा-सह-कार्ययोजना कार्यशाला आयोजित किया गया।

Exposure Visit

KVK arranged exposure visit for 100 progressive farmers to CRRI, Cuttack on its 68th Foundation Day on 23 April, 2014. The programme was sponsored by ATMA, Cuttack and six progressive farmers were awarded on this occasion for their innovative farm operations. One exhibition stall was also installed for showcasing the rice and other rice-based technologies.

Jainagar, Koderma

Training

Krishi Vigyan Kendra, Koderma conducted 12 training programmes for 315 participants (farmers, rural youths, extension functionaries) to improve their skill and knowledge during April to June 2014. The training courses included (1) scientific cultivation of rice, (2) seed production of rice, (3) scientific cultivation of *kharif* potato, (4) offseason cultivation under shading net, (5) nursery management, (6) scientific cultivation of mushroom, (7) lac cultivation, (8) entrepreneurship development for SHG, (9) scientific cultivation of *kharif* onion, (10) technique of soil sampling, (11) technique of soil & water conservation and (12) technology for production of milky mushroom.

Two training programmes of six days duration on mushroom production were organized for various SHGs of Koderma district during 21 to 26 April & 19 to 24 May 2014.

On Farm Trials (OFTs)

An OFT on 'Mushroom production round the year' was conducted for six farm families in three villages (Singardih, Hasanabad & Gumo) of Koderma district. First, training on mushroom production was imparted to the farmers and then spawn of milky mushroom was distributed to them for mushroom production during summer season.

Field day

A field day on 'wheat cultivation with zero tillage machines' in village Chonadih of Koderma district was organized on 19 April 2014.

Kisan Gosthi

One *kisan gosthi* was organized by SAMRPAN in Naitanr village of Koderma district on 16 April 2014. Similarly, two *kisan gosthis* was organized in collaboration with SAMRPAN at KVK, Koderma sponsored by NABARD during 17-22 April 2014. Seventy

भ्रमण कार्यक्रम

कृषि विज्ञान केंद्र ने २३ अप्रैल २०१४ को सीआरआरआई के ६८वें स्थापना दिवस के अवसर पर १०० प्रगतिशील किसानों को लेकर एक भ्रमण कार्यक्रम का आयोजन किया। इसे आत्मा, कटक ने प्रायोजित किया था तथा छः प्रगतिशील किसानों को इस असवर पर सीआरआरआई एवं कृषि विज्ञान केंद्र प्रौद्योगिकियों को अपनाने एवं प्रसार करने के लिए सम्मानित किया गया। चावल एवं चावल आधारित प्रौद्योगिकियों की प्रदर्शन के लिए एक प्रदर्शनी मंच का आयोजन भी किया गया था।

जयनगर, कोडरमा

प्रशिक्षण

कृषि विज्ञान केंद्र, कोडरमा ने अप्रैल से जून २०१४ के दौरान कौशल एवं ज्ञान में सुधार करने हेतु ३१५ प्रतिभागियों (किसान, ग्रामीण युवक, विस्तार कार्मिक) के लिए १२ प्रशिक्षण कार्यक्रमों का आयोजन किया। धान की वैज्ञानिक खेती, धान बीज का उत्पादन, खरीफ आलू की वैज्ञानिक खेती, छांवदार नेट के नीचे गैर मौसम खेती, नर्सरी प्रबंधन, मशरूम की वैज्ञानिक खेती, लाख की खेती, स्वयं सहायता दल के लिए उद्यमकर्ता विकास, खरीफ प्याज की वैज्ञानिक खेती, मृदा नमूना की तकनीक, मृदा एवं जल संरक्षण की तकनीक, मिलकी मशरूम के उत्पादन के लिए प्रौद्योगिकी विषयों पर प्रशिक्षण प्रदान किया गया। कोडरमा जिले में विभिन्न स्वयं सहायता दल के लिए मशरूम उत्पादन पर २१ से २६ अप्रैल २०१४ तथा १९ से २४ मई २०१४ के दौरान छः दिवसीय वाले दो प्रशिक्षण कार्यक्रमों का आयोजन किया गया।

खेतों में परीक्षण

कोडरमा जिले के तीन गांवों सिंगरडीह, हसानाबाद तथा गुमो में छः कृषक परिवारों के लिए पूरे वर्ष भर मशरूम की खेती पर एक परीक्षण किया गया। सबसे पहले किसानों को मशरूम उत्पादन हेतु प्रशिक्षित किया गया तथा ग्रीष्म मौसम के दौरान मशरूम उत्पादन हेतु उन्हें मिलकी मशरूम के स्पान वितरित किये गये।

क्षेत्र दिवस

कोडरमा जिले के चोनाडीह गांव में जीरो टिलेज सहित गेहूं की खेती पर १९ अप्रैल २०१४ को एक क्षेत्र दिवस आयोजन किया गया।

किसान गोष्ठी

इसी क्रम में, कोडरमा जिले के नैतनार गांव में 'समर्पण' द्वारा १६ अप्रैल २०१४ को एक किसान गोष्ठी आयोजित किया गया। कृषि विज्ञान केंद्र, कोडरमा में समर्पण के सहयोग से १७ से २२ अप्रैल २०१४ को दो किसान गोष्ठियां आयोजित की गईं। इन्हें नाबार्ड ने प्रायोजित किया था। इनमें ७० किसानों एवं विस्तार कार्मिकों ने भाग लिया।

farmers & extension workers participated in the kisan goshthis.

Kharif Workshop

Kharif workshop was organized on 10 June 2014 at KVK, Koderma. The workshop was attended by Dr M Variar (OIC, CRURRS), Dr. NP Mandal (PS), District Agriculture officer, more than 50 extension functionaries and progressive farmers.



Kharif workshop conducted at KVK, Koderma

खरीफ कार्यशाला

कृषि विज्ञान केंद्र, कोडरमा में १० जून २०१४ को खरीफ कार्यशाला आयोजित किया गया। इस कार्यशाला में सीआरयूआरआरएस के प्रभारी अधिकारी डॉ.एम.वरियर, डॉ.एन.पी.मंडल, प्रधान वैज्ञानिक, जिला कृषि अधिकारी, ५० से अधिक विस्तार कार्मिकों तथा प्रगतिशील किसानों ने भाग लिया।

RESEARCH NOTES

Varietal Identification Committee recommended three CRRI cultures for release

CR Dhan 205 [(CR 3001-IR-86931-B-578-CR-5-5-2 (IET 22737))]: Developed from the cross N22 / Swarna, it is identified for aerobic areas of Tamil Nadu, Gujarat, Odisha, Madhya Pradesh and Punjab. It matures in 105-110 days with semi-dwarf plant type (100 cm) and possesses short bold grain with intermediate amylose content and other desirable grain quality parameters. The mean yield in Odisha, Gujarat, Madhya Pradesh and Punjab was 4.0 t/ha, 3.2 t/ha, 3.3 t/ha and 4.5 t/ha, respectively. The average yield is 3.7t/ha in overall 32 locations of the country.



CR Dhan 205 (IET 22737)

CR Dhan 306 [CRK 27(IET 22084)] : Developed from the cross FR 42 B/Pankaj, it is identified for irrigated areas of Madhya Pradesh, Bihar and Pondicherry. It matures in 120-125 days with semi-dwarf plant type (95-100 cm) and possesses short bold grain with good hulling, milling and head rice recovery. It is moderately tolerant to brown spot, stem borer (both dead heart and white ear heads), leaf folder, whorl maggot and WBPH. The average yield of the proposed variety in Madhya Pradesh and Bihar is 6 t/ha, while 6.4 t/ha in Pondicherry.



CR Dhan 306 (IET 22084) at maturity stage

SK Pradhan

CRR 451-1-B-2-1 (IET 22020) : Developed from the cross Vandana/IR64, it is an early culture of 68 days flowering duration with intermediate height (100 cm) and excellent grain quality characteristics. This elite line has been recommended for release for direct seeded rainfed uplands in the states of Jharkhand and Madhya Pradesh.

NP Mandal

Thermo-tolerant plant-growth promoting fungi (PGPF) from hot springs of Odisha

Taxonomically and genetically (18S-rRNA) identified six thermo-tolerant plant growth-promoting fungi were characterized for PGP traits which were submitted to NCBI and NFCCI and received the accession numbers (Table 1). All six isolates showed the ability of phosphate solubilization (83.63–423.67 $\mu\text{g}/\text{ml}$) and ammonia production (11 mM–23 mM) in both ambient (30°C) and elevated temperature (55°C). However, IAA (43.28–55.23 $\mu\text{g}/\text{ml}$) was produced by only two isolate (DEF2 and DEF4) and none of isolates showed other PGP traits like siderophore, HCN and ACC deaminase.

Table 1. Isolation of six thermo-tolerant plant-growth promoting fungi

Isolate no.	Source (Hot spring of Odisha)	NFCCI* (Culture accession no.)	NCBI^ (Gene accession no.)	Organism
ATF1	<i>Atri soil</i>	NFCCI-3438	KJ652020	<i>Aspergillus fumigatus</i> Fresen.
DEF1	Deulajhari water	NFCCI-3439	KJ652021	<i>Aspergillus fumigatus</i> Fresen.
DEF2	Deulajhari paddy soil	NFCCI-3440	KJ652023	<i>Aspergillus oryzae</i> (Ahlb.) Cohn
DEF4	Deulajhari paddy soil	NFCCI-3441	KJ652024	<i>Aspergillus oryzae</i> (Ahlb.) Cohn
DEF7	Deulajhari soil	NFCCI-3442	KJ652025	<i>Aspergillus niger</i> Link
DFR1	Deulajhari soil	NFCCI-3443	KJ652022	<i>Cunninghamella echinulata</i> Kuhn

*NFCCI: National Fungal Culture Collection of India, Pune, India

^NCBI: National Center for Biotechnology Information, New York, USA

U Kumar and T K Dangar

Effect of environment on soak-n-eat rice

Research on identifying rice varieties, the grains of which do not require cooking by boiling and yet become as soft as cooked by just soaking in water at room temperature, has been pursued at this institute. Our earlier finding indicated that with repeated cultivation at

Cuttack, the soaking time of the parboiled grains of the soak n eat rice Aghoni increased from 40 min in 2008 to 90 min in 2010. Hence, a multi-location trial was initiated (2012-13) with three cultivars Aghoni, Nalbora and Ashambiroin in six states (Odisha, W.B., Assam, Bihar, Jharkhand and Meghalaya) to identify regions most suited for cultivation of soak n eat rice cultivars, i.e those, where the parboiled

Table 2. Soaking time of three soak n eat rice varieties grown at different locations (2013-14)

Place of cultivation	Soaking time of parboiled grains of rice cultivars (minutes)		
	Nalbora	Aghoni	Asham Biroin
Gerua (Assam)	No response	55	95*
Chinsurah (WB)	No response	58	75
Cuttack (Odisha)	No response	90	95*

*Hard core remains

grains maintain the soaking time in subsequent seasons. The soaking time did not change for Aghoni and Nalbora in the first season of cultivation in samples grown at Cuttack, though increase in soaking time was observed in samples grown at other sites (Ranchi and Pusa). The analysis of the second season samples (2013-14) indicated that only one rice cultivar i.e. Aghoni maintained the soaking time, that too when grown at Gerua (Assam) or at Chinsurah (WB). Other two cultivars showed substantial increase in soaking time (Table 2). Besides, a hard core was also noticed in the soaked grains of these two cultivars. conclusive evidence, however, may come after the third year of the study.

S G Sharma and Avijit Das

Studies on the mechanism of waterlogging tolerance

The study revealed that under continuous salinity (4 dS m⁻¹) with water logging (~ 50 cm water depth) grain yield drastically decreased due to loss of chlorophyll, impairment of chloroplast structural and functional integrity and overall increase of spikelet sterility (97.2 % in case of susceptible cultivar Varshadhan). Panicle numbers pot⁻¹ greatly decreased due to waterlogging and combined effects of waterlogging and salinity except AC 39416A (Fig. 1). The percentage of chaff was greater in susceptible cultivar Varshadhan (94.4%) followed by Ravan (45%) due to combined effects of waterlogging and salinity. Likely, panicle weight and grain yield



Performance of rice plant under waterlogging with salinity

also decreased due to combined effects of waterlogging and salinity in all the cultivars. However, the reduction of these parameters was greater in susceptible cultivar Varshadhan compared to the other cultivars. The percentage reduction of grain yield (Fig. 2) was maximum in Varshadhan (97.2%), followed by Kamini (72.6%) and SR26B (68.5%) whereas, the per cent reduction of grain yield was minimum in AC 39416A (30.6%).

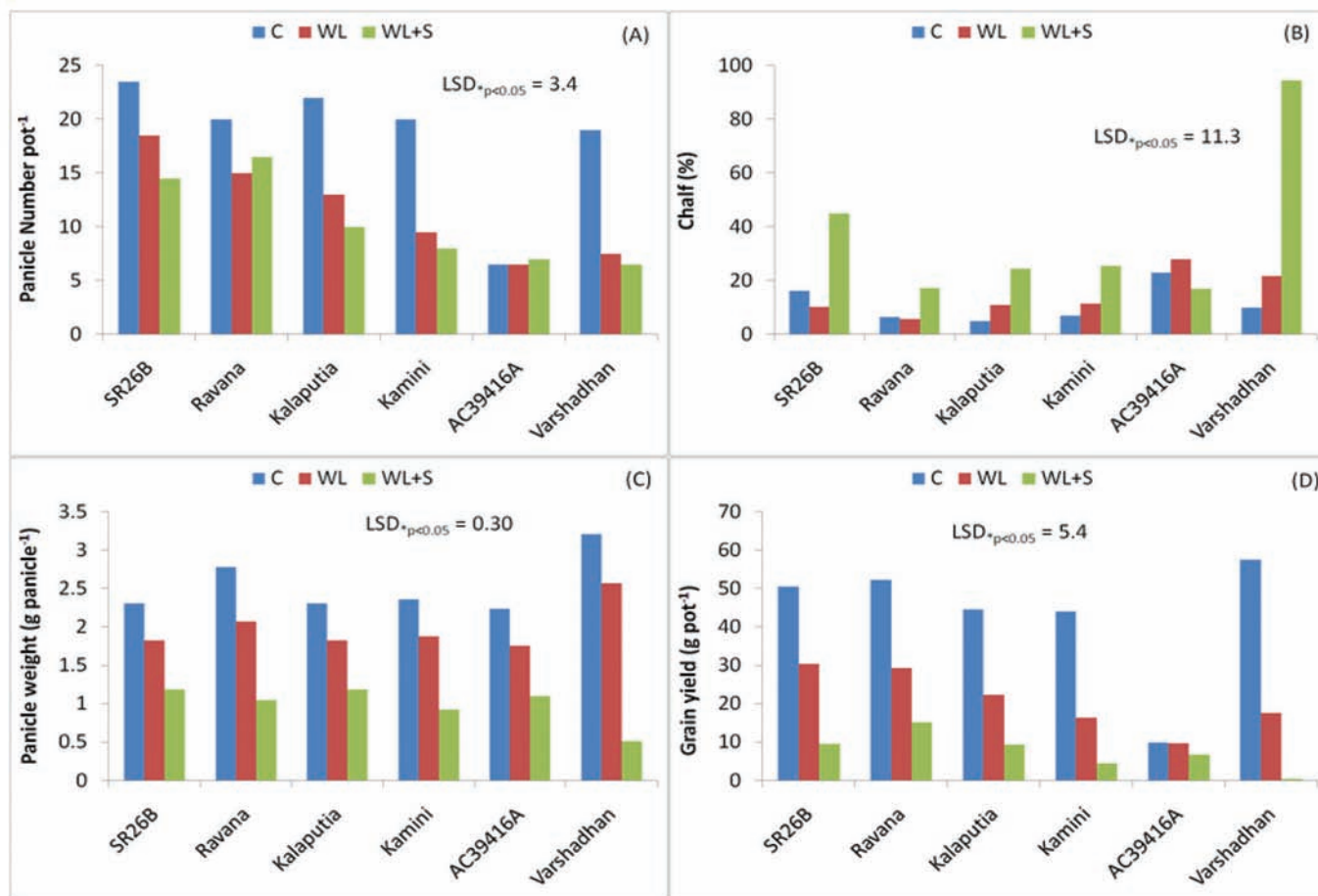


Fig. 1. Grain yield and yield attributing parameters in different cultivars of rice under combined effects of waterlogging and salinity

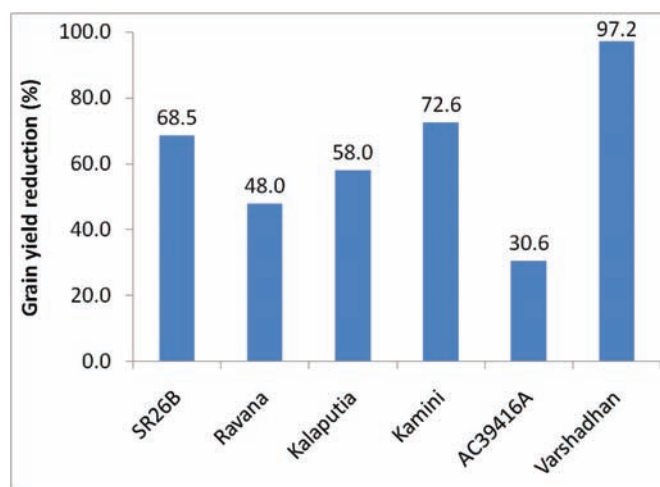


Fig. 2. The per cent reduction of grain yield under combined effects of waterlogging and salinity compared to waterlogging only

Table 3. Effect of medium depth waterlogging (30-50 cm) with (4 dS m⁻¹) and without saline water on yield and yield attributes

Cultivars	Control	Waterlogging	Waterlogging with saline water (4 dS m ⁻¹)
Tiller number pot ⁻¹			
SR26B	23.5	18.5	14.5
Ravana	20	15	16.5
Kalaputia	22	13	10
Kamini	20	9.5	8
AC39416A	6.5	6.5	7
Varshadhan	19	7.5	6.5
LSD* _{p<0.05} , Variety (V) = 2.0, Treatment (T) = 1.4, V x T = 3.4			
Sterility (%)			
SR26B	16.3	10.3	45
Ravana	6.4	5.8	17.3
Kalaputia	5.1	11	24.6
Kamini	7.1	11.6	25.5
AC39416A	23.1	28	16.9
Varshadhan	10.1	21.8	94.4
LSD* _{p<0.05} , Variety (V) = 6.5, Treatment (T) = 4.6, V x T = 11.3			
Single panicle weight (g)			
SR26B	2.31	1.83	1.19
Ravana	2.78	2.07	1.05
Kalaputia	2.31	1.83	1.19
Kamini	2.36	1.88	0.93
AC39416A	2.24	1.76	1.1
Varshadhan	3.21	2.57	0.52
LSD* _{p<0.05} , Variety (V) = 0.17, Treatment (T) = 0.12, V x T = 0.30			
Grain yield (g pot ⁻¹)			
SR26B	50.6	30.5	9.6
Ravana	52.3	29.4	15.3
Kalaputia	44.7	22.4	9.4
Kamini	44.1	16.4	4.5
AC39416A	9.9	9.8	6.8
Varshadhan	57.5	17.7	0.5
LSD* _{p<0.05} , Variety (V) = 3.1, Treatment (T) = 2.2, V x T = 5.4			

RK Sarkar

Weed community composition after 43 years of long-term fertilization in tropical rice-rice system

Biodiversity is central to the study of biology and research on the effects of human activities on biodiversity is becoming increasingly important as extinction levels increase. Many factors are increasing extinction levels, and continuous nitrogen application may be one of the reasons driving terrestrial extinctions. Understanding the response of arable weed community assembly to fertilization is important for designing better weed management strategies in tropical rice-rice systems and also for changes in weed biodiversity. The cumulative effects of various fertilization treatments on weed species composition and diversity along with rice growth and yield were investigated in a long-term fertilizer experiment of rice-rice system established 43 years ago. The long term fertilization experiment was laid out in randomized complete block design with combinations of chemical fertilizers and farm yard manure (FYM) viz., control, N, NP, NK, NPK, FYM, N+FYM, NP+FYM, NK+FYM and NPK+FYM in three replications. A total of 20 weed species were observed in the study, out of which 6 species (i.e. *Cyperus difformis*, *Cyperus tenuispica*, *Fimbristylis miliacea*,

Echinochloa colona, *Oldenlandia corymbosa*, *Lindernia anagallis*) occurred in all treatments and remaining species occurred only in some of the treatments. *Kyllinga brevifolia* was dominated in FYM alone, but absent in all other treatments, likewise *Panicum repens*, *Paspalidium flavidum*, *Cyperus rotundus* and *Sphenoclea zeylanica* was only present in N+FYM, NK+FYM, NP and control treatments, respectively while *Eclipta alba* was observed in treatments, where P was present. Sedges were dominant in all the treatments followed by broad-leaves and grasses, high relative density of weeds was observed in control and FYM treated plots, whereas, low weed density was observed in N, NPK and NPK+FYM treatments (Table 1). The indices of species diversity (species richness, Shannon–Wiener, Pielou and Simpson indices) showed linear relationships with rice yield. The balanced fertilization was more efficient at inhibiting the potential growth of weeds because of the increased growth of rice leading to competition for nutrients. Principal component analysis showed that changes in the weed community composition were due to application of P and FYM. Phosphorus management is an important factor that affects weed density and community composition and should be incorporated as an integrated weed management strategy in the double rice- cropping system. Balance fertilization showed a positive effect on rice yield and negatively affects weeds density, although the effect is negative but balance fertilization is not resulted in species elimination or hampered biodiversity.

Table 4. Weed density, species richness (S), Shannon-Wiener (H2), Simpson (D), Pielou (J) and Whittaker (W) indices of weed communities in different treatments of long term fertilization in rice-rice system

Treatments	Density	S	D	J	W	
Control	331.7b	11.26ab	2.36ab	0.28ef	0.92ab	0.31ab
N	161.0ef	5.62e	1.59f	0.51a	0.62e	0.03f
NP	294.4c	10.43b	2.14c	0.39cd	0.85bc	0.19cd
NK	157.6f	9.66c	2.23bc	0.31e	0.92ab	0.16de
NPK	143.1f	7.39d	1.62f	0.49a	0.65de	0.08ef
FYM	361.6a	11.77a	2.41a	0.22f	0.97a	0.38a
N+FYM	264.7d	8.81c	1.96d	0.43bc	0.81cd	0.12d
NP+FYM	367.6a	10.58bc	2.15c	0.32de	0.93ab	0.25bc
NK+FYM	270.2cd	10.15bc	2.12c	0.33d	0.88abc	0.18cd
NPK+FYM	168.4e	8.56cd	1.86e	0.46ab	0.72d	0.10e

Different letters indicate means that are significantly different among treatments (Least significant difference; $P < 0.05$).

B Lal, Priyanka Gautam, R Raja, Md Shahid, R Tripathi,
P Bhattacharya, BB Panda, S Mohanty, AK Nayak

CRL 74-89-2-4-1 (IET 23193) – a promising aromatic, short-grained rice culture

The entry CRL 74-89-2-4-1 (Pankaj/Padumoni) as IET 23193 in aromatic short grain category was promoted from AVT1 to AVT2 under AICRIP national testing. IET 23193 with yield of 4312 kg/ha excelled the best check, local and ranked first in the trial. With 111 days to 50% flowering, this entry recorded yield advantage of 68.56%, 68.96% and 34.33% over Badshabhog, Kalanamak and local, respectively. IET 23193 showed significant superiority over three checks at CRRRI (3635 kg/ha, 4th), Chinsurah (4889 kg/ha, 1st), Masodha (3606 kg/ha, 4th), Varanasi (5367 kg/ha, 2nd), Raipur (5541 kg/ha, 2nd), Jagdalpur (4833 kg/ha, 3rd), Gerua (4701 kg/ha, 2nd), Sindewahi (4013 kg/ha, 1st), Pondaghat (4557 kg/ha, 2nd), Jagtial (6016 kg/ha, 4th) and Mudigere (3936 kg/ha, 2nd). It was the top entry in eastern region with 34.42%, second in western region (22.56%) and in southern region (43.19%) recording higher yield over the best check. It outperformed the best check in Odisha (9.46%), West Bengal (83.31%), Uttar Pradesh (7.52%), Chhattisgarh (78.31%), Assam (71.82%), Maharashtra (22.56%), Andhra Pradesh (95.51%) and Karnataka (26.01%). It recorded high HRR (68.1%), medium slender aromatic grain, intermediate ASV and intermediate AC (24.09%).

KB Pun

Response analysis of promising upland rice cultures to arbuscular mycorrhizal (AM) inoculation

Upland rice is reported to be colonized by symbiotic arbuscular mycorrhizal (AM) fungi naturally and such association (AM) enhances P acquisition of upland rice. Upland rice varieties are generally responsive to mycorrhizal (AM) inoculation in terms of P uptake and growth promotion. In an effort to analyse varietal (promising cultures in pipeline for release) differences in degree of responsiveness, four cultures viz., CRR 616-B-66-2, CRR 45-109, CRR 676-1 (Vandana NIL) and CRR 596-08-1 were evaluated against highly responsive check (Sathi 34-36) and improved variety Anjali. During vegetative stage (up to 30 DAE), Anjali showed negative response and CRR 676-1 (Vandana NIL) showed highest response among the tested four breeding lines which (Vandana NIL) tended to be at par with Sathi 34-36 both in terms of P uptake and biomass production (Fig. 3) under glass house study. All the varieties will be evaluated in field for their overall response up to maturity.

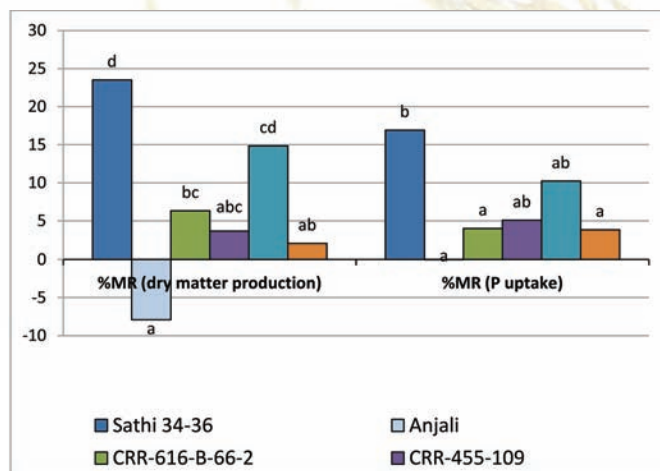


Fig. 3. Mycorrhiza (AM) response (% MR) in terms of growth promotion (dry matter production) and P uptake on AM fungal inoculation of selected advance breeding lines (upland) at early stage (30 DAE)

% MR was calculated using formula; $\%MR = \frac{(AM+) - (AM-)}{AM+} \times 100$

D Maiti, Mukesh Nitin, M Variar

Rank Based Genotype Selection Index (RBGSI)

The objective of the research is to identify the stable genotype with high grain yield. AMMI stability index was proposed to identify the stable genotypes. But, it may happen that the stable genotype may not be high yielding genotype. Hence, a new approach based on AMMI stability index (ASI) and genotype yield was proposed called Rank Based Stability Index (RBSI). Rank Based Stability Index is calculated with following formula:

$RBSI = Rank(ASI) + Rank(\text{grain yield})$

Eighteen rice genotypes evaluated at four environments have been used to find out the genotypes suitable for cultivation based on proposed methodology. The table shows that based on ASI, GEN2 is the most stable genotype but it is having low yield potential; whereas, based on RBSI, GEN7 is the genotype suitable for cultivation under irrigated ecosystem which is stable and also have high yield potential.

NN Jambhulkar and LK Bose

Table 5. Genotypes along with yield, ASI, RBGSI values and their ranks

Sr. No.	Genotype Code	Yield	Rank	ASI	Rank	RBSI	Rank
1	GEN1	2.733	14	4.431	10	24	14
2	GEN2	2.814	13	1.212	1	14	6
3	GEN3	2.652	16	2.481	6	22	12
4	GEN4	3.398	7	6.417	14	21	11
5	GEN5	3.571	6	9.295	18	24	15
6	GEN6	3.365	9	2.29	4	13	4
7	GEN7	3.733	4	1.335	2	6	1
8	GEN8	3.378	8	5.176	11	19	10
9	GEN9	3.654	5	6.034	12	17	8
10	GEN10	3.761	3	6.281	13	16	7
11	GEN11	3.946	1	3.726	9	10	2
12	GEN12	3.852	2	3.65	8	10	3
13	GEN13	2.462	17	7.663	17	34	17
14	GEN14	2.667	15	3.503	7	22	13
15	GEN15	2.202	18	6.699	16	34	18
16	GEN16	3.009	11	6.674	15	26	16
17	GEN17	2.864	12	2.466	5	17	9
18	GEN18	3.253	10	2.077	3	13	5

Efficiency and Effectiveness of PPP in promotion of self-propelled rice transplanters in Odisha

It is observed that PPP mode for promotion of rice transplanters is effective in the state of Odisha and the number of transplanters purchased by farmers in PPP mode has increased significantly to 610 during 2013-14 from a mere three numbers during 2005-06. The transplanters are adopted by large farmers mainly in irrigated areas of Balasore, Cuttack, Kalahandi, Kendrapara, Puri, Sambalpur, Sonepur and Sundergarh districts to overcome labour shortage during peak period. Among the models approved by the Government, the model promoted by VST Tillers and Tractors has been adopted by majority of the farmers followed by Kubota Agriculture Machinery India Pvt. Ltd. due to aggressive marketing by these two firms.

Primary data collected from transplanter owners throughout Odisha revealed that the average cost of transplanting by use of self-propelled transplanter was Rs.6750/- per ha in inland Odisha in comparison to Rs.12650/- in manual transplanting. The cost of planting per ha in coastal Odisha was higher due to higher wage rates and the planting cost was Rs.7550/- for power operated transplanters in comparison to Rs.16100/- by manual transplanting. The cost saving per ha due to use of self-propelled transplanters was Rs.5900/- per ha in inland Odisha and Rs.8550/- per ha in coastal Odisha. There was an increase in yield by 0.75 t/ha in machine transplanted plots over manual transplanted plots. The total monetary gain per ha in machine transplanting over manual transplanting was Rs.15725/- and Rs.18375/- in inland and coastal Odisha respectively. The labor saving due to transplanter use was 53 man-days per ha over manual transplanting.

Though the PPP program was effective in adoption of power operated transplanters in Odisha, it was not inclusive in terms of covering large section of small and marginal farmers. It was observed from the survey that 42% owners have not extended custom hiring service at all to other farmers and have used the planters in their own land only. Among the planter owners who have

extended custom hiring service, there was a bias towards large farmers. The percentage coverage of small and marginal farmers, who have availed custom hiring service, was 42%, while 92% of farmers are small and marginal in the state. Besides the above, there are other bottlenecks in the program also. The transplanters were promoted / marketed through PPP mode without imparting proper training to operator and educating the owners about the techniques of raising of mat type nursery. As a result, 58% of the owners were of the opinion that the machine was underutilized during the season. Timely supply of canal water helps in timely planting. But, majority of the farmers, who depend on supply of canal water for preparation of main field were of the opinion that they did not get canal water in time. About 92% of the owners complained against timely supply of spare parts and prompt after sales service.

The policy implications emerged from the study to make the program more efficient and inclusive are: a) A legal bond should be executed with the owners that at least 30 to 50 small and marginal farmers per year should be covered through custom hiring by the owners; b) Before supply of transplanter, training to driver and the techniques of raising mat type of nursery should be made compulsory; c) Spare parts should be kept ready by dealers, so that the machine does not remain idle for more days as the duration of planting time is limited d) Cooperation with irrigation department is essential for timely release of water for field preparation.

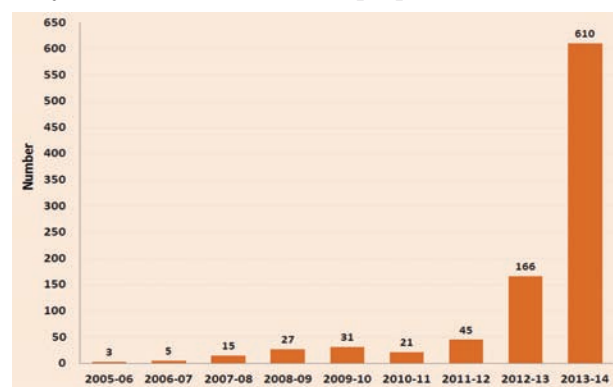


Fig.4. Increase in adoption of transplanters in Odisha

P Samal

Participation in Symposia/Seminars/Conferences/Training/Workshop/Meeting/Visits


Dr. T Mohapatra visited Bangladesh as a member of Indian delegation as a part of MoU between IRRI and NFSM to observe the performance of high yielding and salt tolerant rice varieties and hybrids from 2-5 April 2014.

Dr. SM Prasad attended the Officers Conference in the office of the Deputy Director of Agriculture, Cuttack on

“National Mission for sustainable Agriculture” (NMSA) on 4 April 2014.

Drs T Mohapatra, KB Pun, M Variar, NP Mandal, CV Singh, Yogesh Kumar, S Lenka, T Singh, K Pande, JN Reddy, SK Pradhan, P Swain, MK Kar, SSC Patnaik, SK Dash, K Chhatopadhaya, J Meher, and RK Sahu attended the 49th Annual Rice Group Meeting at DRR, Hyderabad from 4-8 April 2014.

Drs JN Reddy and M Variar attended the 13th Review, Planning and Steering Committee Meeting of the



Consortium for Unfavourable Rice Environments (CURE) at Danang City, Vietnam and presented the progress report under Submergence component of CURE at CRRI Cuttack from 8-10 April 2014.

Mr RK Sahu attended the 24th Annual Group Meeting of AICRP-NSP (Crops) at S.K. University of Agriculture & Technology, Srinagar (J & K) from 24 -26 April 2014.

Dr. SM Prasad attended the Action Plan Workshop of KVKs of Odisha organized at CIFA, Bhubaneswar from 25 -26 April 2014.

Dr. T Mohapatra attended the meeting on “Interactive Conference of the Vice Chancellors and Directors” at New Delhi on 28 April 2014.

Dr. T Mohapatra attended the “XII Plan EFC Memo of Main Scheme, CRRI (CRRI, DRR, AICRP-rice and CRP Biofortification) – PAMD appraisal note” at New Delhi from 30 April – 1 May 2014.

Dr. T Mohapatra attended the Research Advisory Committee (RAC) meeting at DRR, Hyderabad on 2 May 2014

Dr. P Mishra attended Akhi Muthi Celebration organized by the NGO Shakti at Taradpada, Jagatsinghpur as chief guest on 2 May 2014.

Dr. T Mohapatra attended and presented a paper on “National Rice Development Strategy” in the GRiSP-CORRA organized meeting on Asian National Rice Development Strategy at Kuala Lumpur, Malaysia from 6-7 May 2014.

Dr. Sanjoy Saha visited Uttar Banga Krishi Viswavidyalaya, Cooch Behar, West Bengal on 7 May 2014.

Dr. SM Prasad attended the programme on “National Mission for Sustainable Agriculture (NMSA) at Collectorate Cuttack on 7 May 2014.

Dr. Sanjoy Saha visited different blocks of Darjeeling, Cooch Behar and Uttar Dinajpur districts of West Bengal for monitoring BGREI program from 6-9 May 2014.

Mr. TR Sahoo visited to verify the quality planting material production in different nurseries in Athagarh Sub Division on 9 May 2014.

Dr. T Mohapatra attended as a speaker and delivered a plenary lecture on “SNPs in stress responsive genes and their relevance to abiotic stress tolerance in rice” in the PAG Asia 2014 Conference on “Connecting Rice Genomics to Breeding” held at Singapore from 19-21 May 2014.

Drs JN Reddy, KB Pun, M Variar, NP Mandal, Anantha MS and Yogesh Kumar, SSC Patnaik and RK Sahu attended the Workshop of “STRASA phase 2 and launching of STRASA Phase 3” at NASC Complex, New Delhi from 20 to 23 May 2014.

Mr. TR Sahoo attended a Short course on “Participatory research for gender mainstreaming concern in agriculture” at DRWA, BBSR from 22 -31 May 2014.

Dr. M. Chourasia attended the Farmer’s-Scientist interaction programme at ATMA Cuttack on 23 May 2014.

Dr. Yogesh Kumar participated in Kisan Gosthi organized by Nav Bharat Jariti Kendra, Khunti branch, Jharkhand on 25 May 2014.

Dr. SG Sharma visited CRRI Regional Station, Gerua, ICAR NEH Complex for Eastern Region, Umiam and RRS, Chinsurah from 26-29 May 2014.

Dr. T Mohapatra attended IFPRI-NAIP workshop on “Priority Setting, Monitoring and Evaluation in National Agricultural Research System: Status, Experiences and Way forward” at NASC Complex, Pusa, New Delhi on 27 May 2014.

Dr. D Maiti attended the National Symposium On “Plant Pathology in Genomic Era” held at IGKV, Raipur during 26-28 May 2014. Dr Maiti delivered a oral presentation on Arbuscular Mycorrhiza and chaired the combined technical session: (V) Advances in understanding the biology of plant viruses and (VI) Climate change and emerging plant diseases on 27.05.2014.

Dr. SM Prasad attended the Review Meeting on Finalization of Agro climate wise common Action Plan (ofts) of Odisha jointly organized by Zonal Project Directorate, Zone-VII, Jabalpur and Directorate of Extension, Education, OUAT, BBSR from 27 -28 May 2014.

Dr. T Mohapatra attended a meeting on “Sharing of data from studies concerning arsenic contamination in rice & to initiate systematic scientific study” at Nabanna, 325 Sarat Chatterjee Road, P.S. Shibpur, Howrah, Kolkata on 30 May 2014.

Dr. VK Singh attended the Zonal Workshop of Zone II, held at NIRJAFT, Kolkata from 2-3 June 2014.

Dr. T Mohapatra attended the Foundation Day programme of the National Academy of Agricultural Sciences at New Delhi on 5 June 2014.


Dr. BC Patra attended Seminar jointly organized by Orissa Environmental Society (OES) and Indian Science Congress Association (ISCA) at Bhubaneswar on the occasion of observation of World Environment Day on 5 June 2014.

Dr. T Mohapatra attended NAIP-IFPRI workshop on “Impact of capacity building programmes under NAIP” at NASC Complex, New Delhi on 7 June 2014.

Dr. SM Prasad attended RPSC meeting of Akashwani Cuttack on 9 June 2014.

Dr. Sanjoy Saha attended the ‘Review meeting’ at Directorate of Agriculture, Jessop Building, Kolkata with State Agriculture Department, Government Of West Bengal on different issues related to BGREI Program on June 10 2014.

Dr. VK Singh attended *Kharif* workshop organized by ATMA, Koderma held on 10 June 2014.



Dr. VK Singh attended Regional Workshop on 'Integrated Farming System' organized by PDFSR, Modipuram held at ICAR RCER, Patna on 11 June 2014.

Dr. T Mohapatra attended 7th PAC meeting at INSA, New Delhi on 12 June 2014.

Dr Yogesh Kumar attended Technical Committee Meeting held under NFSM program organized by SAMITI, Department of Agriculture, Government of Jharkhand on 14 June 2014.

Dr Yogesh Kumar attended Annual Group Meet on Soybean held at Birsa Agricultural University, Ranchi on 15 June 2014.

Dr. M Din attended visited Dhamtari and Durg Districts of Chhattisgarh State from 17 to 18 June 2014.

Dr Yogesh Kumar participated in *Kisan Gosthi* organized by Torpa Rural Development Society for Woman, Jharkhand in Diaakil village of Torpa block under Khunti district in Jharkhand on 21 June 2014.

Dr. VK Singh attended ATMA GB meeting held at Koderma on 24 June 2014.

Dr. T Mohapatra attended 10th Meeting of General Council (GC) of National Food Security Mission (NFSM) at Krishi Bhawan, New Delhi on 25 June, 2014.

Mr. Bhoopendra Singh attended 'XXVII Extension Education Council Meeting of Birsa Agricultural University, Ranchi held at Krishak Bhawan of the University on 25 June 2014.

Dr. T Mohapatra and Dr. BN Sadangi attended ICAR Regional Committee meeting-II at CIFRI, Barrackpore, Kolkata from 27-28 June 2014.

Publication

Research Papers

Imam J, Alam S, Mandal NP, Variar M, Shukla P. 2014. Molecular screening for identification of Blast resistance genes in North East and Eastern Indian Rice Germplasm (*Oryza sativa* L.) with PCR based markers. *Euphytica*. **196**:199-211.

Imam J, Mahto D, Mandal NP, Maiti D, Shukla P and Variar M. 2014. Molecular analysis of Indian rice germplasm accessions with resistance to blast pathogen. *Journal of Crop Improvement*, **28**:1-11

Kumar, Yogesh, Clarice J. Coyne, Jinguo Hu, Soon-Jae Kwon, Ted Kisha, Rebecca McGee and A. Sarker. 2014. Target Region Amplification Polymorphism (TRAP) for assessing genetic diversity and marker-trait associations in chickpea Germplasm. *Genetic Research & Crop Evolution*, **61**:965-977.

Mondal B, Loganandhan N and Raizada A. 2014. Meteorological drought and coping strategies by small and marginal farmers in semi-arid Karnataka. *Indian Journal of Soil Conservation*, **42**(1): 54-61.

Mondal B, Singh A, Singh DR and Sekar I. 2014. Watershed-livestock linkages: A study in Bundelkhand Region of Madhya Pradesh. *Indian Journal of Animal Research*, **48**(3): 262-269. DOI: 10.5958/j.0976-0555.48.3.056.

Sinha MK, Thombare NN and Mondal B. 2014. Subclinical mastitis in dairy animals: Incidence, economics and predisposing factors. *The Scientific World Journal*, Vol. 2014, Article ID 523984. DOI:10.1155/2014/523984. 4 p.

Swain Padmini, Anumalla M, Prusty Smita, Marndi BC and Rao GJN. 2014. Characterization of some Indian native landrace rice accessions for drought tolerance at seedling stage. *Australian Journal of Crop Science*, **8**(3): 324-331.

Policy papers

Din M, Meheta CR, Annamalai SJK, Singh M, Behera D and Paikray PK. 2014. Road map for Mechanization in Rice Cultivation. CRRI Policy Paper no.2, Cuttack, India p. 48.

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Maiti D, Toppo NN, Nitin M, Singh CV and Variar M. 2014. Crop management approaches for enhancing native arbuscular mycorrhiza aided phosphorus nutrition of upland rice and its relevance under drought prone environment In: Abstracts - National symposium on Plant Pathology in Genomic Era", IGKV, Raipur, 26-28 May :15.

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Sharma SG and Mishra P .2014. A Farmers Guide to proper storage and improving out turn ratio (OTR) of Paddy Rice.(Hindi) CRRI Technology Bulletin No.100, Cuttack, India.

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Swain P, Mohanty S, Bhattacharya P, Baig MJ, Chattopadhyay K, Singh ON and Sarkar RK. 2014. Rice cultivation in rainfed upland and drought prone areas under changed climate. CRRI Technology Bulletin No.101, Cuttack, India.

Foreign Deputation

Dr. Mukund Variar, OIC, CRURRS, Hazaribagh, Dr. D P Singh Principal Scientist, Division of Crop Physiology and Biochemistry and Dr. JN Reddy, Principal Scientist, Division of Crop Improvement, CRRI, Cuttack attended a workshop on "13th Review and Planning and Steering Committee of CURE" in Vietnam from 08-10 April 2014.

Dr. Lambodar, Behera, Principal Scientist, Division of Crop Improvement, CRRI, Cuttack attended a training course on " SNP Data Analysis" in Philippines from 5-9 May 2014.

Dr. T Mohapatra, Director, CRRI attended the workshop on "Asian National Rice Development Strategic" in Malaysia from 6-7 May 2014.

Dr. T Mohapatra, Director, CRRI to attended the workshop and presented a research paper on "SNPs in stress responsive genes and their relevance to abiotic stress tolerance in rice" in Singapore from 19-21 May 2014.

Dr. Mohammed Shahid, Scientist, Division of Crop Production attended the "20th world Congress of Soil Science" jointly organized by Korean Society of Soil Science & Fertilizer, Rural Development Administration and International Union of Soil Science held at Jeju Island, South Korea from 8- 13 June 2014.

Dr. O N Singh, Principal Scientist and Head, Division of Crop Improvement visited Bangladesh as a focal point expert for country participation in the Expert Consultation Meeting for the Inception on Identification of rice varieties tolerant to abiotic stress" from 10-11 June 2014

Institute Seminars/Lecturers

Dr. T Mahapatra, Director, CRRI, on 'Use of mutants to understand genome function : experience with Nagina-22' on 23 June 2014.

Awards/Recognition

Dr Dipankar Maiti, Zonal Councillor (East zone) of the Indian Phytopathological Soc. (IPS) was honoured by the President, IPS by presenting "Scroll of honour" on 27 May, 2014 during 66th annual general body meeting of the society held at IGKV, Raipur (Image 3) for successfully organizing zonal (east zone) chapter of National Symposium during 24-25 October 2013 at CRURRS, Hazaribagh.

Appointment

Shri Surendra Kumar joined as Scientist (Genetics and Plant Breeding), in the Crop Improvement Division, CRRI on 7 April 2014.

Shri Manoj Kumar Yadav joined as Scientist (Plant Pathology), in the Crop Protection Division, CRRI on 8 April 2014.

विदेश प्रतिनियुक्ति

डॉ.मुकुंद वरियर, प्रभारी अधिकारी, सीआरयूआरआरएस, हजारीबाग, डॉ.डी.पी.सिंह, प्रधान वैज्ञानिक, फसल कार्यिकी एवं जीवरसायन प्रभाग तथा डॉ.जे.एन.रेड्डी, प्रधान वैज्ञानिक, फसल उन्नयन प्रभाग, सीआरआरआई, कटक ने ८ से १० अप्रैल २०१४ के दौरान विएतनाम में १३वीं क्योर समीक्षा एवं योजना तथा संचालन समिति पर आयोजित कार्यशाला में भाग लिया।

डॉ.लंबोदर बेहेरा, प्रधान वैज्ञानिक, फसल उन्नयन प्रभाग, सीआरआरआई, कटक ने ५ से ९ मई २०१४ के दौरान आईआरआरआई, फिलीपाइन्स में एसएनपी आंकड़ा विश्लेषण पर आयोजित प्रशिक्षण कार्यक्रम में भाग लिया।

डॉ.त्रिलोचन महापात्र, निदेशक, सीआरआरआई, कटक ने १९ से २१ मई २०१४ के दौरान सिंगापुर में दबाव प्रतिक्रियात्मक जीन में एसएनपी तथा धान में अजैविक दबाव सहिष्णुता के प्रति उनकी संगतता पर आयोजित कार्यशाला में भाग लिया तथा अनुसंधान पेपर प्रस्तुत किया।

डॉ.मोहम्मद शाहिद, वैज्ञानिक, फसल उत्पादन प्रभाग, सीआरआरआई, कटक ने ८ से १३ मई २०१४ के दौरान दक्षिण कोरिया के जेजू द्वीप में अंतर्राष्ट्रीय मृदाविज्ञान संघ तथा कोरियाई मृदाविज्ञान तथा उर्वरक संघ, ग्रामीण विकास प्रशासन द्वारा संयुक्त रूप से बीसवीं विश्व मृदाविज्ञान कांग्रेस में भाग लिया।

डॉ.ओ.एन.सिंह, प्रधान वैज्ञानिक तथा अध्यक्ष, फसल उन्नयन प्रभाग ने १० से ११ जून २०१४ के दौरान बांग्लादेश में अजैविक दबाव के प्रति सहिष्णु धान किस्मों की पहचान का आरंभ पर आयोजित विशेषज्ञ सलाहकार बैठक में राष्ट्र प्रतिनिधि विशेषज्ञ के रूप भाग लिया।

संस्थान सेमिनार/व्याख्यान

डॉ.त्रिलोचन महापात्र, निदेशक, सीआरआरआई, कटक ने २३ जून २०१४ को जीनोम कार्य को समझने के लिए नगीना-२२ के साथ म्यूटेंट का उपयोग पर एक सेमिनार व्याख्यान दिया।

पुरस्कार/मान्यता

डॉ.दीपांकर मैती, क्षेत्रीय पार्षद, पूर्वी क्षेत्र, भारतीय फाइटोपाथोलोजिकल संघ को संघ के अध्यक्ष द्वारा आईजीकेवी, रायपुर में आयोजित २७ मई २०१४ को ६६वें वार्षिक बैठक में सीआरयूआरआरआरएस, हजारीबाग में २४-२५ अक्टूबर २०१३ के दौरान राष्ट्रीय परिसंवाद के पूर्वी क्षेत्र चैप्टर को सफलतापूर्वक आयोजन करने हेतु स्काल ऑफ हॉनर प्रदान करके सम्मानित किया गया।

नियुक्ति

श्री सुरेंद्र कुमार ने सीआरआरआरआई के फसल उन्नयन प्रभाग (आनुवंशिक एवं पादप प्रजनन) में वैज्ञानिक के पद पर ७ अप्रैल २०१४ से कार्यभार संभाला।

श्री मनोज कुमार यादव ने सीआरआरआरआई के फसल सुरक्षा प्रभाग (पादप रोगविज्ञान) में वैज्ञानिक के पद पर ८ अप्रैल २०१४ से कार्यभार संभाला।

Shri Aravindan S joined as Scientist (Plant Pathology), in the Crop Protection Division at CRRI on 15 April 2014.

Dr. S P Singh joined as Sr Scientist (Plant Physiology), in the Division of Crop Physiology and Biochemistry, CRRI on 6 May 2014.

Dr. Ranjan Kumar Mohanta joined as Subject Matter Specialist (Animal Science) at Krishi Vigyan Kendra, Santhapur, CRRI on 21 May 2014.

Promotion

Dr. Pradip Kumar Sahoo promoted from Senior Technical Officer to Asst. Chief Technical Officer w.e.f. 3 July 2014.

Dr. J.R.Mishra promoted from 7-8 to T-9 w.e.f. 15 July 2011.

Shri H.Thakuria promoted from Senior Technical Assistant to Technical Officer w.e.f. 3 February 2012.

Transfer

Dr. Srikanta Kumar Lenka, Sr. Scientist (Plant Pathology) transfer from RRLRRS, Gerua (Assam) to CRRI w.e.f. 5 May 2014.

Dr. Kanchan Saikia, Sr. Scientist (Agril. Entomology) transfer from CRRI, Cuttack, joined RRLRRS, Gerua (Assam) w.e.f. 7 May 2014.

Dr Avijit Das, PS in Division of Crop Physiology and Biochemistry was transferred to NIRJAF Kolkata and relieved on 6th June, 2014.

श्री अरविंदन.एस ने सीआरआरआरआई के फसल सुरक्षा प्रभाग (पादप रोगविज्ञान) में वैज्ञानिक के पद पर १५ अप्रैल २०१४ से कार्यभार संभाला।

डॉ.एस.पी.सिंह ने सीआरआरआरआई के फसल कार्यिकी एवं जीवरसायन प्रभाग (पादप कार्यिकी) में वरिष्ठ वैज्ञानिक के पद पर ६ मई २०१४ से कार्यभार संभाला।

डॉ.रंजन कुमार महांत ने सीआरआरआरआई के कृषि विज्ञान केंद्र, संधपुर में एक विषयवस्तु विशेषज्ञ के रूप में (पशुविज्ञान) २१ मई २०१४ से कार्यभार संभाला।

प्रोन्नति

डॉ.प्रदीप कुमार साहु को वरिष्ठ तकनीकी अधिकारी से सहायक मुख्य तकनीकी अधिकारी के पद में ३ जुलाई २०१४ से पदोन्नति मिली।

डॉ.जे.आर.मिश्र को टी-७-८ से टी-९ के पद में १५ जुलाई २०११ से पदोन्नति मिली।

श्री एच.ठाकुरिया को वरिष्ठ तकनीकी सहायक से तकनीकी अधिकारी के पद में ३ फरवरी २०१२ से पदोन्नति मिली।

तबादला

डॉ.श्रीकांत कुमार लेंका, वरिष्ठ वैज्ञानिक (पादप रोगविज्ञान) का आरआरएलआरआरएस, गेरुआ, असम से सीआरआरआई, कटक में ५ मई २०१४ को तबादला हुआ।

श्री कांचन साइकिया, वरिष्ठ वैज्ञानिक (कृषि कीटविज्ञान) का सीआरआरआई, कटक से आरआरएलआरआरएस, गेरुआ, असम में ७ मई २०१४ को तबादला हुआ।

डॉ.अविजित दास, प्रधान वैज्ञानिक का सीआरआरआई, कटक से एनआईआरजेएफटी, कोलकाता में ६ जून २०१४ को तबादला हुआ।

Necrology

Miss Monika Majhi, Senior Technical Assistant Social Science Division passed away on 31 May 2014. The Director and staff of the institute pay their condolences to the grieved family.



Late Miss Monika Majhi

निधन

सुश्री मोनिका माझी, वरिष्ठ तकनीकी सहायक, सामाजिक विज्ञान प्रभाग का ३१ मई २०१४ को निधन हो गया। निदेशक तथा संस्थान के कर्मचारियों ने शोकसंतप्त परिवार के प्रति संवेदना व्यक्त किया।

Retirement

Dr. K. Pande, Principal Scientist and Shri Budhimanta Sahoo, SSS retired on 30 April 2014.



सेवानिवृत्ति

डॉ.के.एल.पांडे, प्रधान वैज्ञानिक तथा श्री बुद्धिमंत साहु, एसएसएस ३० अप्रैल २०१४ को सेवानिवृत्त हुए।

Dr. S.N. Tewari,
Principal Scientist
retired on 31 May 2014.



डॉ.एस.एन.तिवारी, प्रधान
वैज्ञानिक ३१ मई २०१४ को
सेवानिवृत्त हुए।

Dr. K S Behera,
Principal Scientist, Dr. P
N Mishra, Principal
Scientist, Dr. N
Bhattacharya, T-5, Shri R
K Mishra, T-5, Shri A B
Khan, SSS, Shri Budhia
Rout, SSS, retired on 30
June 2014.



डॉ.के.एस.बेहेरा, प्रधान
वैज्ञानिक, डॉ.पी.एन.मिश्रा, प्रधान
वैज्ञानिक, श्री ए.बी.खान,
एसएसएस, श्री बुधिया राउत,
एसएसएस, डॉ.एन भट्टाचार्या,
टी-५, श्री आर.के.मिश्र, टी-५
३० जून २०१४ को सेवानिवृत्त हुए।

From Director's Desk

Mechanization of Rice Farming and Post-harvest Operations: Way Forward

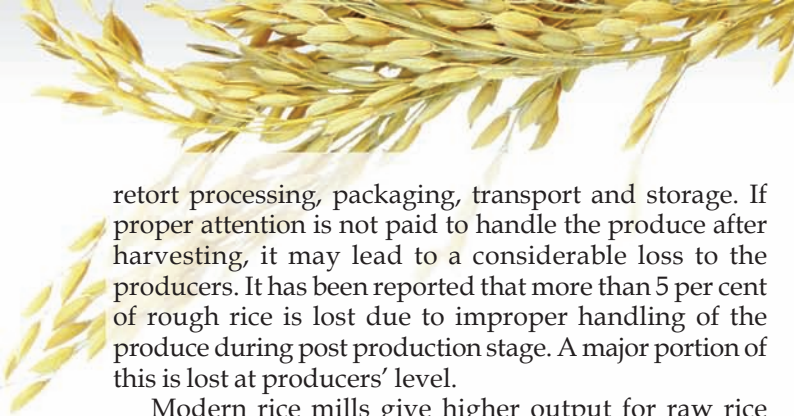
Rice farming is labour intensive, requiring about 800 to 900 labour-hours to cultivate one hectare of land. In recent years, scarcity of labour and high labour wages, migration of agricultural labourers to other sectors due to drudgery in agricultural operations, higher earnings from other vocations and declined interest of youths in agriculture are negatively impacting rice cultivation. Since the involvement of women workers in transplanting, weeding, harvesting and post harvest operations of rice is more than men, their health remains an important issue in absence of adequate mechanization. Yet another pertinent dimension is the large number of small and marginal land holdings owned by resource poor farmers, who are not in a position to afford costly farm implements.

Availability of adequate farm power is very crucial for timely farm operations for increasing production and productivity and handling the crop produce to reduce losses. There has been close nexus between farm power availability and increased productivity. Those states having higher farm power availability have higher productivity. The productivity of rice in Punjab, Haryana and Western Uttar Pradesh is more than the states like Assam, Bihar, Jharkhand, Eastern Uttar Pradesh, Chhattisgarh, Orissa and West Bengal. The low productivity states have farm power availability less than

1.50 kW/ha as against 3.5kW/ha and 2.25 kW/ha available in Punjab and Haryana, respectively. The level of mechanization in India (52%) is lower than United State (95%), Western Europe (95%), Russia (80%), Brazil (75%) and China (65%).

Mechanization of the farming practices can definitely help to overcome the cost escalation and drudgery reduction in farm operations. International and national experience has clearly established the benefits of mechanization in terms of enhanced productivity by about 15% and reduction in cost of production by 20%, apart from increase in cropping intensity, timeliness in farm operations and reduction in drudgery. Advancements in electronics and information technology are now permitting considerable up-gradation of farm machinery. During the past years, a number of farm implements and technologies have been designed and introduced for adoption by the farmers and entrepreneurs. However, with the passage of time and change in the socio-economic condition of the farmers, there is the need to develop refined package of technology for different types of ecologies i.e. lowland and upland and cultivation practices.

Post-harvest operations determine the quantity and quality of rice. These include on-farm handling, cleaning, grading, moisture conditioning, milling, puffing, flaking,



retort processing, packaging, transport and storage. If proper attention is not paid to handle the produce after harvesting, it may lead to a considerable loss to the producers. It has been reported that more than 5 per cent of rough rice is lost due to improper handling of the produce during post production stage. A major portion of this is lost at producers' level.

Modern rice mills give higher output for raw rice milling in terms of total (6.6%) and head rice (15.1%) as compared to traditional huller mills. There is also advantage of around 6% and 2% of total and head rice yield while milling parboiled rice in modern mills as compared to huller milling. The total number of huller mills in the country today is more than 85,000 which produces more than 50% of the milled rice in the country. Thus, there is scope to enhance the milled rice output by 6-8% through modernization of huller mills in the country.

Against this background, a discussion meeting on "Road map for rice mechanization" was held on 27.05.2013 at CRRI, Cuttack under the Chairmanship of Dr. M.M. Pandey, the then Deputy Director General (Engg), ICAR, New Delhi. A number of experts from different institutions of the country and abroad from IRRI participated in this meeting and gave their valuable suggestions. Accordingly, two documents, namely, on "Road map for mechanization of rice cultivation" and "Road map for post-harvest processing and value addition in rice" were prepared and got released on different occasions during April-June 2014.

The research priorities identified during the discussions and highlighted in these two documents include: i) development of precision pneumatic rice planting machine, applicator for deep placement of Urea Super Granule and top dressing of fertilizer, efficient power weeders for upland and lowland situations in the plain and hilly terrains and light weight reaper for hilly areas, ii) identification/ design of sensors for detecting biotic and abiotic stresses, iii) development/adaptation of machinery for variable rate application of fertilizers and agro-chemicals, iv) right-sizing of the precision technologies available in developed countries to make it suitable for Indian conditions, v) development/adaptation of machinery for sowing/planting under crop residue conditions, vi) development of more energy efficient and

sustainable rice cleaning, parboiling, drying and storage systems suitable for small farmers and entrepreneurs, vii) single pass rice mill with metal polishers with better performance as a substitute for hullers and viii) technology for efficient utilization of rice husk for production of producer gas, furfural, activated charcoal, oxalic acid and bear like beverage.

The road map suggests a few policy measures for mechanization of rice cultivation and post-harvest operations: i) Farm power availability in the country needs to be scaled up to above 2.20 kW/ha from the present level of 1.84 kW per ha (2012-13) to achieve food grain production of 280 million tonne by 2020. ii) Steps have to be taken for availability of agricultural implements at Block and Panchayat level. iii) Custom hiring of costly farm implements and easy availability of credit are required for small and marginal farmers to accept the improved production technology. iv) Agro-processing centers for paddy cleaning, drying, parboiling, storage, milling and seed processing in the production catchment areas need to be encouraged. v) Training needs to be imparted to the farmers and other stakeholders on use/repairing and maintenance of farm implements as well as on scientific storage practices to minimize storage losses. vi) Incentive provision may be made for modernization of hullers for increasing milled rice output and clean by-products for economic use. vii) Rice mill cluster program may be mobilized for better utilization of rice bran for production of edible oil. viii) Proper procurement policy and improved marketing infrastructure is required to improve the economic conditions of the rice farmers.

Mechanization of rice farming and post-harvest operations is the need of the hour. This will certainly help reduce the cost of cultivation and thus making rice farming remunerative and attractive. Mechanization services being challenging and respectable, will in all probability attract the unemployed rural youth to remain associated with rice farming. It is high time that conscious efforts are made to fill the research gaps for development of appropriate technologies and bring-in the desired changes in the government policy and support system so that mechanization gets the much-needed boost in the country.*

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