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ICAR-Indian Institute of Rice Research

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Launching of Pradhanmantri Kisan Samman Nidhi

On the occasion of launching of 'Pradhanmantri Kisan Samman Nidhi' a programme was organised at ICAR-IIRR on 24 February, 2019. Hon'ble Member of Parliament, Shri. Bandaru Dattatreya graced the occasion. Dr. Ch. Srinivasa Rao. Director, NAARM; Dr. A. Vishnuvardhan Reddy, Director, IIOR; Dr. Y. G. Prasad, Director, ATARI; Dr. Ravindra Chary, Director (A), CRIDA; Dr. R. N. Chatterjee, Director, DPR; Dr. S. Vaithiyanathan, Director, NRC on Meat; Dr. R. Jagadeeswar, Director of Research, PJTSAU and Dr. P. Ananda Kumar, Emeritus Scientist, IIRR also present on the occasion. Dr. S.R. Voleti (Director-Acting, IIRR) welcomed the guests. Hon'ble member of the Parliament spoke about the salient features of the scheme and felicitated the progressive farmers in recognition of their services. Scientific fraternity of Hyderabad and farmers attended the programme in large numbers.

Smart Rice Hackathon 2019 (24 hours continuous) has been organised at ICAR-Indian Institute of Rice Research during 9-10th February 2019 in connection with National Science Day. This was the First Hackathon in ICAR involving engineering students for developing IT based solutions to farmers using Artificial Intelligence.

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Research Highlights

Sustainable intensification of rice-maize system through conservation agriculture

Mangal Deep Tuti, R. Mahender Kumar, B. Sreedevi, Soumya Saha, M.N. Arun, B. Nirmala, T. Vidhan Singh and Bandeppa

Indian Institute of Rice Research, Rajendranagar, Hyderabad- 500 030, Telangana, India

A study was conducted on the effect of different rice establishment methods, mulching stubbles and tillage on economics and system productivity of rice-maize system. In summer season (April and May) dhaincha was grown, harvested at 45 days and incorporated in to the soil. In *kharif* the trial consisted of two main treatments *i.e.* conventional manual transplanting and direct wet seeding and 3 sub plots with different dates of sowing *i.e.* 15th, 30th June and 15th July, replicated four times. Date of nursery raising and direct sowing in wet seeding was same. Similarly, in *rabi* two tillage treatments (conventional and minimum tillage) were imposed over the *kharif* treatments. High yielding rice variety RNR 15048 was taken in *kharif*. In *rabi* single cross maize hybrid variety DHM 117 was taken. All the agronomic package and practices were followed as per recommendation. Manual transplanting method resulted significantly higher grain yield of 5.3 t/ha than 4.3 t/ha in direct wet seeded rice (Fig.1). Similarly, among the 3 date of sowings, 1st date of sowing resulted the higher grain yield (5.0 t/ha).

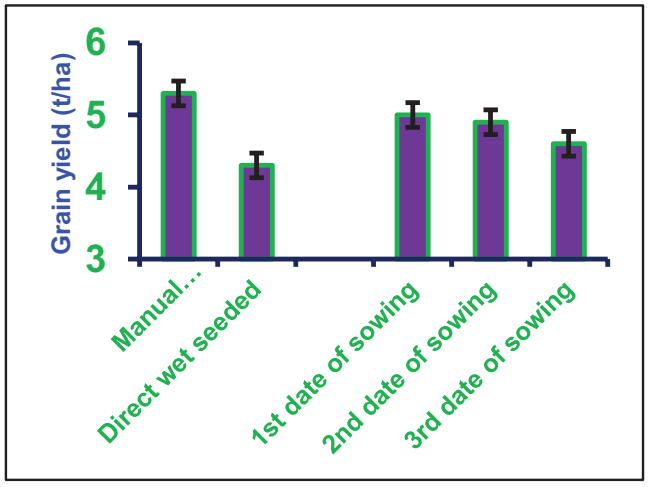


Fig. 1. Effect of establishment method on productivity of rice in rice-maize cropping system

Artificial screening technique of rice genotypes to identify the promising sources against false smut disease under field conditions

D. Ladhalakshmi*, G.S. Laha, M. Srinivas Prasad, R. M. Sundaram, D. Krishanaveni, B. Divya, P.C. Latha, D. Sanjeeva Rao and N. Sarala

Indian Institute of Rice Research, Rajendranagar, Hyderabad- 500 030, Telangana, India
ladhasavitha@gmail.com

Rice false smut caused by *Ustilaginoidea virens* (teleomorph: *Villosiclava virens*) is gaining importance in many rice growing areas in India as it directly infects the grains and reduces the economic yield. Identification of suitable artificial screening technique to evaluate large number of germplasms is essential to identify the genotypes resistant to false smut disease. During 2018 *Kharif*, 162 genotypes belonging to different categories *viz*., HWR

lines (wild rice introgression lines), selected germplasm entries and Swarna/*Oryza nivara* lines were screened through artificial inoculation under field conditions. Different rice genotypes were grown in the field and plants were selected for inoculation of the pathogen at booting stage. Pure culture of the false smut pathogen was mass multiplied in potato sucrose broth in a rotary shaker at 27 ± 2^{0}C with 125 rpm for 2 weeks. Conidia were harvested through centrifugation and suspended in sterile distilled water and 2 ml of conidial suspension (2 x 10^5 conidia/ml) was injected into the individual tillers using a sterile hypodermic syringe during evening hours. For each genotype, 2 - 4 tillers were artificially inoculated. Plant inoculation was done during middle of August 2018 to first week of September 2018 (due to difference in maturity period of genotypes). The plants were observed for symptom of expression from 15 DAI (days after inoculation) onwards till maturity. Out of 162 genotypes that were artificially inoculated with false smut pathogen, 92 genotypes showed varied level of susceptibility (with number of smut balls/panicle ranging from 1-31). The genotypes *viz*., GP 235 (2018) and HWR 4 showed highest level of susceptibility with number of smut balls/panicle ranging from 28 to 31 (Fig 1). Percentage of infection among different categories of genotypes ranged from 40-80% (Table 1). Number of entries from selected germplasm, HWR and NPS lines (2018) did not show any disease and are good sources of resistance to false smut disease. However, these genotypes will be re-evaluated either by artificial inoculation under glass house or field condition. It was concluded from the study that the standardized artificial screening technique can be followed under field conditions to identify the resistant sources against false smut disease of rice.

Table 1: Details of rice genotypes inoculated artificially with *U. virens* and percentage of infection

Details of genotypes	Total no.of genotypes inoculated	Total no. of genotypes expressed symptom	Percentage of infection	Maximum no. of smut balls per panicles
HWR lines	33	28	84.84%	31
Germplasm lines 2017	12	10	83.33 %	17
Germplasm lines 2018	67	38	56.17%	28
NPS lines	50	20	40%	20

Figure 1: Under artificial inoculation, rice genotypes expressed varying level of susceptibility against false smut disease

GenotypexEnvironment interaction on rice grain yield, iron and zinc concentration

[1]Surekha, K., [1]Madhu Babu, P., [2]Bhowmick, M. K., [3]Alok Pandey., [4]Baskar, A., [5]Sireesha, A., [1]Sanjeeva Rao, D., [1]Ravindra Babu, V and [1]*Neeraja, C. N.

[1]ICAR-IIRR, [2]Chinsurah, [3]Faizabad, [4]Karaikal, [5]Maruteru

**cnneeraja@gmail.com*

To study the interaction of genotype and environment and their influence on yield, and content of iron (Fe) and zinc (Zn) in grains a trial was constituted under CRP-biofortification during *kharif*-2016. Improved germplasm of 15 varieties were tested at four locations *viz*., Chinsurah (CHN), Faizabad (FZB), Karaikal (KRK) and Maruteru (MTU) (Table 1). The varieties Taroari Basmati, Akut phou and ARB-45 did not germinate at most of the locations. The yield data from all the four locations and Fe and Zn (estimated in Atomic Absorption Spectrophotometer)

concentration in brown rice from three centres for top three varieties were presented in Table 2.

At CHN, the varieties Kadamakudy Pokkali, Kalinga-3, DRR Dhan 45 and BPT 5204 recorded higher and almost similar yields with higher Fe content in BPT/CM MS, MTU1010, Chittimutyalu (CM) and Improved CM and high Zn in Kasturi and Improved CM. Similarly, at KRK, the varieties BPT 5204, DRR Dhan 45, Kadamakudy pokkali and Kasturi recorded higher yields in that order with high Fe in Chittimutyalu and Improved Chitti Mutyalu and high Zn in Kalinga-3, High Iron Rice and Improved Chitti Mutyalu. At FZB, the grain yield recorded was comparatively higher in Kadamakudy Pokkali, BPT/CM MS, BPT 5204 and Kalinga-3. At MTU, Improved CM, ARB-45, Kadamakudy Pokkali and DRR Dhan 45 recorded higher yields with high Fe in Kalinga -3, DRR Dhan 45 and Chittimutyalu and high Zn in Kalinga-3and Chittimutyalu.

Among the top three varieties, Kadamakudy pokkali at all 4 locations and DRR Dhan 45 and BPT 5204 at three locations recorded higher yields. The variety Improved Chitti Mutyalu at CHN and KRK and Chittimutyalu at MTU recorded high Fe and though they are not high yielders. The variety Kalinga -3 recorded high Fe and Zn at KRK and MTU and high Fe at MTU though it is a high yielder at CHN and FZB. Thus, some entries performed well at all locations and recorded comparatively higher yields than other entries and some common entries recorded higher micronutrient content at more than one location. In general, high yielders have not recorded high micronutrient levels at most of the locations. Thus, from this preliminary study, it is clear that GxE interaction is evident in case of grain yield and micronutrient concentration and further confirmation studies are needed for drawing clear cut conclusions.

Table 1: Varieties tested across locations

Name of the Variety	Name of the Variety	Name of the Variety
Kasturi	ARB-45	DRR Dhan 45
Taroari Basmati	High Iron Rice	MTU 1010
Improved Chitti Mutyalu	Kadamakudy pokkali	BPT X CM MS
Akut phou	NC 365	Chittimutyalu
Kanchana	Kalinga -3	BPT 5204

Table 2: Grain yield, Fe and Zn levels in top 3 Varieties

SNo	Location		Grain Yield(t/ha)		Fe content (ppm) in Grain		Zn content (ppm) in Grain	
			Variety Name	GY	Variety Name	Fe	Variety Name	Zn
1	Chinsurah	1	DRR Dhan-45	5.18	BPT X CM MS	40.9	Improved Chitti Mutyalu	31.9
		2	Kalinga-3	5.05	Chitti Mutyalu	26.8	Kasturi	31.1
		3	Kadamakudy pokkali	4.98	MTU 1010	26.4	BPT X CM MS	27.9
2	Faizabad	1	Kadamakudy pokkali	6.34	-	-	-	-
		2	BPT X CM MS	5.78				
		3	BPT 5204	5.68				
3	Karaikal	1	BPT 5204	5.55	Chitti Mutyalu	53.0	Kalinga -3	41.3
		2	DRR Dhan 45	5.25	Improved Chitti Mutyalu	45.1	High Iron Rice	36.8
		3	Kasturi & Kadamakudy pokkali	4.50	MTU 1010	37.8	Improved Chitti Mutyalu	36.4
4	Maruteru	1	Improved Chitti Mutyalu	7.8	Chitti Mutyalu	62.5	Chitti Mutyalu	30.2
		2	ARB-45	6.61	Kalinga - 3	47.1	Kalinga -3	21.8
		3	Kadamakudy pokkali	5.39	DRR Dhan 45	43.3	Improved Chitti Mutyalu	19.7

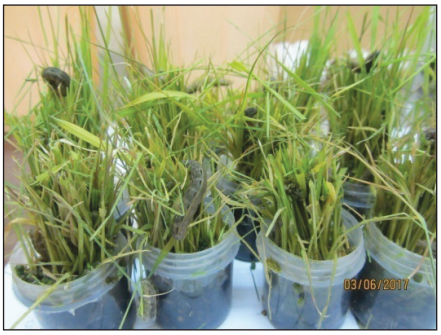
Pathogenicity of entomopathogenic nematodes to rice swarming caterpillar *Spodoptera mauritia*

Satish N. Chavan, N. Somasekhar, Y. Sridhar and Gururaj Katti

ICAR-Indian Institute of Rice Research, Hyderabad, 500030

Rice swarming caterpillar or armyworm, *Spodoptera mauritia* Boisduval (Noctuidae: Lepidoptera) is a sporadic pest of rice which occasionally causes severe losses to the rice crop. Off late it's occurance is becoming frequent in several parts of the country, especially in eastern and southern India causing severe losses in wet season rice crop. In the present study the pathogenicity of three EPN species viz. *Steinernema glasseri, Heterorhabditis indica,*

and *Metarhabditis amsactae* to rice swarming caterpillar, *S. mauritia* was evaluated in laboratory bioassays. All three EPN species tested viz. *S. glasseri, H. indica* and *M. amsactae* were found pathogenic to the rice swarming caterpillar causing more than 62 per cent insect mortality 48 hours after exposure. Among the EPN species tested, *H. indica* was found highly virulent which caused complete insect mortality. The insect larvae were killed in about 24-48 h after inoculation with EPN. The LD_{50} of *H. indica* against **S. mauritia** was 41, 26 and 19 IJs/larvae at 24, 48 and 72 h of exposure respectively. This investigation demonstrated the pathogenicity of EPN viz. *H. indica, S. glasseri* and *M. amsactae* to rice swarming caterpillar and these EPNs can be used as biocontrol agents for the management of rice swarming caterpillar in rice.



Larvae of *Spodoptera mauritia* feeding on rice plants *Heterorhabditis indica*

Healthy larvae of *S. mauritia*

S. mauritia* larvae infected with nematode *Heterorhabditis indica

Molecular characterization of rice brown planthopper BPH, *Nilaparvata lugens* (Stål) (Homoptera: Delphacidae) populations of India

V Shilpakala, V Jhansi Lakshmi, M Seshumadhav, NC Venkateswarlu, Gururaj Katti, PM Chirutkar and G Padmavathi

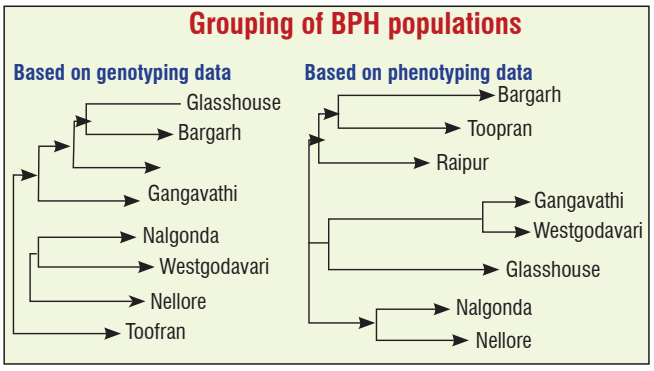
ICAR-Indian Institute of Rice Research, Hyderabad, 500030

**Email: padma_gpv@yahoo.co.in*

Owing to the extensive cultivation of resistant rice cultivars, brown planthopper-BPH, *Nilaparvata lugens* an important sucking pest of rice has been evolving into new biotypes that are able to overcome the host plant resistance. Presently four biotypes are identified based on host plant differentials and in India biotype-4 is present. In this investigation, BPH populations from hot spot regions of the country were characterised using SSR markers to study the diversity. BPH populations were collected from different regions in India *viz*., Bargarh-Orissa, Raipur-Chattisgarh, Gangavathi-Karnataka, Kampasagar-Telangana, West-Godavari-AndhraPradesh, Toopran-Telangana, IIRR-Hyderabad and their reaction to host plant differentials was evaluated in Glasshouse by Standard-SeedBox-Screening-Technique (SSST).

DNA was extracted from eight BPH populations by CTAB method and was analyzed by PCR using 98 BPH specific-SSR-markers. Genotyping data of SSR markers were analyzed using Unweighted pairgroup method with Arithmetic Mean (UPGMA) method using DARwin V6.0. This analysis clustered eight BPH populations into three groups: Group 1 consisting of four populations *i.e.,* IIRR, Bargarh, Raipur, Gangavathi. Gangavathi population outgrouped by having only similarity of 0.39 from other three populations. In this cluster IIIR glasshouse population showed similarity of 0.51 with Bargarh population. Raipur population showed similarity of 0.50 with IIRR and Bargarh population. Bargarh and Raipur population showed common reaction in four gene differentials (ARC 10550, RP 2068, MTU 1010 and Sinnasivappu) whereas IIRR and Gangavathi population shared common reaction with only RP 2068. Group- 2 is separated into two sub groups *viz.*, Nalgonda, West Godavari as one with similarity of 0.43 and Nellore into another sub-group with similarity of 0.40. Nellore and Nalgonda populations shared common reaction in three gene differentials (ARC 10550, Chinsaba and

RP 2068). Toopran BPH population alone grouped into one (Group 3) with the similarity of 0.35. This population showed its reaction in seven out of thirty gene differentials. Dissimilarity between IIRR and West Godavari populations is highest with 0.84 value and lowest dissimilarity was observed between Raipur and Bargarh population with 0.47 value. This indicates that Raipur and Bargarh populations are similar whereas IIRR and West Godavari population are quite different.



Bapatla Mahsuri (BPT 2295): A variety released for single cropped areas of Andhra Pradesh

Krishna Veni,B., Suneetha,Y., Mrudhula,K.A and Rama Rao, C.V

Agricultural Research Station, Bapatla, Guntur, Andhra Pradesh

BPT 2295 is a high yielding, non-lodging, semi-dwarf, long duration variety suitable for cultivation during *Kharif* season. It has erect plant type with medium green foliage, profuse tillering ability, long & dense panicle with more number of grains (250-300) and no shattering of grains under normal conditions. Due to non-lodging nature, it is very much suitable for mechanical harvesting. Bapatla Mahsuri is a photo insensitive variety and comes to harvest within 150 - 155 days during *Kharif* season and is suitable for late planting (up to October) conditions also. It has light brown coloured glume and medium slender grains, kernels are white and transluscent and comes under fine grain category. With high milling and head rice recovery, Bapatla Mahsuri possess all the physic-chemical quality parameters in desirable range and has very good cooking and eating quality. BPT 2295 exhibited tolerance to BPH, leaf blast and neck blast diseases. It is tolerant to salinity (recorded score 4 in screening trial conducted under saline condition at ARS, Machilipatnam) and can tolerate water logging conditions also for about 7-10 days. With high yield potential (6.5-7.0 t/ha) under irrigated conditions, BPT 2295 is very much suitable for single cropped wetlands of Andhra Pradesh.

Physico-chemical and biochemical quality parameters of Bapatla Mahsuri

S.No	Quality parameter	DESCRIPTION
1	Kernel length	5.02
2	Kernel breadth	1.81
3	L/B ratio	2.77
4	Hulling (%)	80.6
5	Milling (%)	70.4
6	Head rice recovery (%)	60.2
7	1000 grain weight (g)	16.52
8	Chalkiness	Absent
9	Volume expansion ratio	4.2
10	Gelatinization temperature	Intermediate
11	Water uptake	340
12	Kernel length after cooking(mm)	9.6
13	Keeping quality	Good
14	Cooking quality	Excellent & non sticky
15	Elongation ratio (mm)	1.91

S.No	Quality parameter	DESCRIPTION
16	Alkali spreading value	5.0
17	Amylose content (%)	24.8
18	Gel consistency (mm)	22
19	Protein content (%)	6.03
20	Fe content in brown rice (ppm)	7.9
21	Fe content in polished rice (ppm)	2.2
22	Zn content in brown rice (ppm)	12.0
23	Zn content in polished rice (ppm)	9.5
24	Antioxidant activity in brown rice (mg AAE/100g)	26.87
25	Total phenol content in brown rice (mg/100g)	75.59
26	Total starch (%)	63.88
27	Rapidily digestible starch (%)	58.49
28	Slowly digestible starch (%)	38.69
29	Resistant starch (%)	2.84
30	Aroma	Non scented

Starch profile in different colored rice (*Oryza sativa* L.) genotypes

Sandeep Raja, D[1], Krishna Veni, B[2] and Sridevi, P[3]

[1]Post Harvest Technology Centre, Bapatla, [2]ARS, Bapatla, [3]Agril. College, Bapatla

Rice (*Oryza sativa* L.) is the most important cereal crop and staple food of over half of the world's population. As the primary dietary source of carbohydrates, rice plays an important role in meeting energy requirements and nutrient intake. Now-a-days, with sharp increase in life-style related health problems and consumer's awareness about functional foods, research has been focussed on health and beneficial effect of different cereal starches. Eighteen genotypes possessing red, black and light brown pericarp color were estimated for total starch, amylose content, Rapidly Digestible Starch (RDS) & Slowly Digestible Starch (SDS) and Resistant Starch (RS) at Post harvest Technology Centre (PHTC), Bapatla. Low amylose content was exhibited by BPT 3137 (16.4%) while Matta Triveni recorded maximum value (27.4 %) followed by Samyuktha (26.36 %) and Harsha (25.4%). All other genotypes manifested intermediate amylose content which is desirable. Genotypes showed wide range of variation for total starch ranging from 53.16% (BPT 2858) to 81.78% (BPT 3145). Among the genotypes tested, rapidly digestible starch is minimum in BPT 2848 (49.75%) and maximum in BPT 2776 (65.97%) whereas SDS varied from 32.21% (BPT 2858) to 43.34% (BPT 2848). Like RDS, SDS is expected to be completely digested in the small intestine, but for one or other reason it is digested more slowly, resulting in slow and steady release of blood glucose. Hence, genotypes with high SDS values will have low GI and are desirable for inclusion in diabetic diet. Other genotypes which recorded high SDS include BPT 2270 (42.84), BPT 2660 (41.14) and BPT 5204 (41.02). The resistant starch escapes enzyme hydrolysis in small intestine and gets fermented in large intestine and the metabolites formed during fermentation may serve as energy source for colonocytes and thus help to maintain colon health. Among the genotypes under study, minimum RS content was observed in Jyothi (1.1%) while maximum RS was manifested by BPT 2848 (3.97%) followed by BPT 3111 (3.52%), BPT 3145 (3.41%) and BPT 2595 (3.21%).

Starch profiles of different colored rice genotypes (*Oryza sativa* L.)

S.No.	Designation	Amylose content (%)	Total Starch content (%)	Rapidly Digestible Starch (%)	Slowly Digestible Starch (%)	Resistant Starch (%)
Light brown pericarp colored genotypes						
1	BPT 5204	22.6	65.39	56.53	41.02	2.45
2	BPT 2270	20.9	62.78	54.59	42.84	2.57
3	BPT 2295	24.1	63.88	58.49	38.67	2.84
4	BPT 2595	23.9	62.52	64.46	32.33	3.21
5	BPT 2782	21.5	63.41	60.69	37.05	2.26
6	BPT 2660	21.1	64.16	56.64	41.14	2.24
7	BPT 2776	23.6	70.80	65.97	32.85	1.18
Red pericarp colored genotypes						
8	MathaTriveni	27.4	79.33	63.88	34.91	1.21
9	Annapurna	18.9	71.84	61.74	36.94	1.32
10	Harsha	25.4	77.11	60.59	36.85	2.56
11	Jyothi	22.0	69.42	64.59	34.31	1.10
12	Samyuktha	26.4	69.35	62.77	34.34	2.89
13	BPT 3111	23.0	68.77	64.20	32.28	3.52
Black pericarp colored genotypes						
14	BPT 3137	16.4	75.33	60.59	38.16	1.25
15	BPT 3145	21.7	81.78	58.69	37.90	3.41
16	BPT 3136	21.1	81.66	65.03	32.43	2.54
17	BPT 2848	20.9	70.49	49.75	43.34	3.97
18	BPT 2858	24.3	53.16	61.32	32.21	2.89

Climate resilient management practices in rice and rice based cropping systems

Mangal Deep Tuti,* R. Mahender Kumar, B. Sreedevi, Aarti Singh, Soumya Saha and K. Surekha

ICAR-IIRR, Rajendranagar, Hyderabad-500030

To address the issue of sustainability of food production on account of changing climatic conditions a combination of nutrient management practices were tested in rice and rice based cropping system under predicted climate change. For this purpose an experiment was conducted during *rabi* 2015-16 and *kharif* 2016 at seven locations. There were six treatment combination {T_1: Recommended dose of NPK fertilizers (RDF) (split application of Nitrogen (50% Basal+25% Active tillering + 25% flowering and P & K as Basal); T_2: Azotobactor + Phosphate solubilising bacteria (PSB) 3.5 kg each + 75% RDF; T_3: Azotobactor + PSB 3.5 kg each + brown manuring with Dhaincha + 75% RDF; T_4: Azotobactor + PSB 3.5 kg each + brown manuring with Dhaincha + residue mulch @ 2 t/ha + 75% RDF; T_5: Azotobactor + Phosphate solubilising bacteria (PSB) 3.5 kg each + brown manuring with Dhaincha + residue mulch @ 2 t/ha + 50% RDF; and T_6: Azotobactor + Phosphate solubilising bacteria (PSB) 3.5 kg each both seed and soil application + FYM @ 5 t/ha + 50% RDF }. Rice-wheat at Kanpur, Rice-rice at Maruteru, Rice-linseed at Chinsurah and Rice-chickpea system at Vadagaon were tested at research farm of respective places. Rice-rice and rice-wheat system were more productive compared to rice-linseed and rice-chickpea systems. The highest system productivity was recorded in rice-rice system (9.67 t/ha) with recommended dose of NPK fertilizers (split application of nitrogen (50% basal + 25% active tillering + 25% flowering and P & K as basal). However, in rice-wheat system, Azotobactor + PSB 3.5 kg each + brown manuring with dhaincha + residue mulch @ 2 t/ha + 75% RDF resulted the highest system productivity of 9.48 t/ha. Similarly, Among the rice-rice systems conducted at 3 locations (Maruteru, Moncompu and Puducherry) it was revealed that Azotobactor + PSB 3.5 kg each + brown manuring with dhaincha + residue mulch @ 2 t/ha + 75% RDF was the best treatment for enhancing the system productivity (12.5 t/ha) at Puducherry.

Effect of crop growth stages on microbial diversity in different rice establishment methods

Bandeppa*, P.C. Latha, K. Surekha, Kalyani.M.B, R. M. Sundaram, M. D. Tuti and C. Chandrakala

Indian Institute of Rice Research, Hyderabad-500 030, India

*E-mail: bgsonth@gmail.com

An experiment was conducted to study the influence of rice crop growth stages on microbial population in different rice establishment methods. Samples were collected from the IIRR research farm for total microbial enumeration at different crop growth stages *viz*. tillering, flowering, and harvesting from different rice establishment method namely, aerobic rice (AR), alternate wetting and drying (AWD) and NTP. Samples were analyzed using specific media. Sample collected from AR method at flowering stage were found to support highest microbial population; bacteria (270 CFU/ gram of soil), actinomycetes (120 CFU/ gram of soil) and fungi (25 CFU/ gram of soil). Microbial communities peaked at the flowering stage and it levelled off towards harvest and the subsequent fallow period, the probable reason for higher number of microbes at flowering stage is the colonization of root surface and better utilization of root exudates, as plants are known to release up to 20 per cent of photosynthetically assimilated carbon as rhizodeposition. NTP method at harvesting stage was found with lowest microbial population; bacteria (150 CFU/ gram of soil), actonomycetes (50 CFU/ gram of soil) and fungi (12 CFU/ gram of soil) (Fig.1). The grain yield was highest in NTP (7.3 t/ha) followed by AWD (5.9 t/ha) and AR (3.9 t/ha).

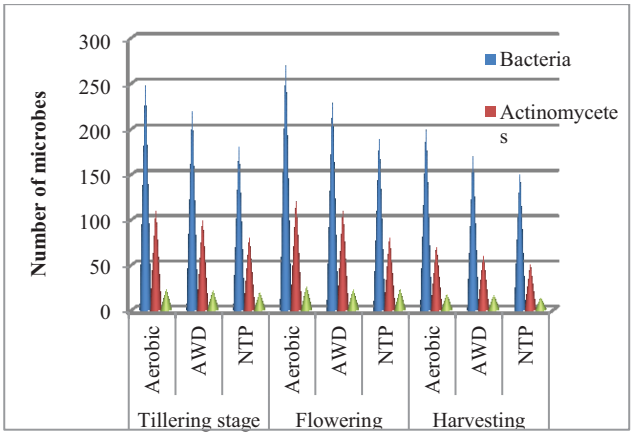


Fig.1 Total Number of Microbes at different crop growth stages and different rice establishment method

Panorama of Institutional Activities

Inauguration of Women's Cell

On 1 January 2019, 'Women's Cell was inaugurated at ICAR-IIRR for the benefit of women staff of the Institute.

Smart Rice Hackathon (SRH 2019) on artificial intelligence module for Rice Pest Detection

Smart Rice Hackathon 2019 (24 hours continuous) has been organised at ICAR-Indian Institute of Rice Research during 9-10th February 2019 in connection with National Science Day. This was the First Hackathon in ICAR involving engineering students for developing IT based solutions to farmers using Artificial Intelligence. The problem statement was "Mobile based AI module for rice pest detection". Totally eleven abstracts were received and five teams comprising of 4 students and one mentor each were shortlisted for participating in the Hackathon. Dr. S. K. Soam, Joint Director, ICAR-NAARM was the chief guest for the Inaugural session held on 9th February 2019. Dr. S. R. Voleti, Director, welcomed chief guest and all the teams from different colleges. Subject matter experts from Entomology, Pathology, Physiology and Agronomy (Drs. G. Katti, M. S. Prasad, D. Subrahmanyam, A. S. Hariprasad and R. Mahender Kumar) acted as Internal mentors and evaluators during the Hackathon. Computer Experts (Drs. M. Balakrishnan and N. Srinivasa Rao, ICAR-NAARM and R. Nagarjuna Kumar, ICAR-CRIDA) acted as external mentors and evaluators for the Hackathon. All teams actively participated throughout the Hackathon with much enthusiasm.

Closing session of Smart Rice Hackathon (SRH) was held at 10 AM on 10th February 2019. The teams presented their methodologies, outputs followed by demonstration of mobile app. Two best prizes and two consolation prizes were announced. A team from Jawaharlal Nehru Technological University stood first followed by the team from Narayanamma Engineering College. Teams from Vasavi engineering college and Mahatma Gandhi Engineering College received consolation prizes. A team of scientists comprising of Drs. B. Sailaja, Ch. Padmavathi, D. Krishnaven and B. Sreedevi coordinated the event. The "Aavishkar App" developed by JNTU college of Engineering, pest detection by the farmers can be done with real time images captured at field level using deep learning techniques of Artificial intelligence. This app will be further validated at field level and will be released during AICRIP workshop.

National Science Day celebrations at ICAR- IIRR on 28 February 2019

National Science Day was celebrated at ICAR – Indian Institute of Rice Research, Rajendranagar, Hyderabad on 28th February 2019. Sixty students from local engineering colleges along with mentors and 20 scientists from IIRR participated in the science day celebrations. Dr. Ch. Padmavathi, ICAR-IIRR welcomed the participants. Dr. S. R. Voleti, Director (A), ICAR-IIRR welcomed the students and apprised them of IIRR research and co-ordination (AICRIP) activities and significant achievements. He gave a brief introduction about artificial intelligence (AI) and said that India ranks third in terms of high quality publication in artificial intelligence. The chief guest, Dr. S. K. Soam, Joint Director (Acting), NAARM, Hyderabad delivered a special lecture on "Artificial Intelligence in Agriculture". He elaborated on potential areas for development of AI based applications in Agriculture. He emphasised the need to focus on image analysis based applications and block chain technologies. The awards for winning teams in "Smart Rice Hackathon" were distributed on this occasion. Finally, vote of thanks was presented by Dr. D. Krishnaveni.

Skill development training programme on Quality seed grower

Skill development training programme on "Quality seed grower" was conducted at ICAR – IIRR Hyderabad from 6th February to 4th March 2019. The training programme was sponsored by Rastriya Krishi Vikas Yojana (RKVY) through Agriculture Skill Council of India (ASCI). A group of 20 unemployed youth from nine districts of Telangana state were trained in quality seed production in different crops like Rice, sorghum, maize, sunflower, millets, vegetables and other crops. Hands on training was imparted in package of practices for quality seed production, crossing techniques, supplementary pollination, pest and disease management, seed testing, processing and storage. The trainees were taken to different research institutes, private seed companies and seed growers association. After completion of the training programme, trainees were employed in govt institutes and some started their own enterprises.

International women's day celebrated

International Women's Day was celebrated on March 8, 2019 by ICAR-IIRR on March 8, 2019 at the Institute. The theme for International Women's Day, '**Think Equal, Build Smart, Innovate for Change',** puts innovation by women at the heart of efforts to achieve gender equality. Speaking on the occasion the Director (A), Dr. S.R. Voleti appreciated and highlighted the significant contribution of all the women personnel of the institute representing the scientific, technical, administrative and supporting farm staff cadre. The need for celebrating women's achievements, raising awareness against bias and committed action for equality for a better and balanced world was stressed upon. As a special feature the work of women scientists was highlighted on 'Jaikisan' program of ETV channel for farmers. The strength and power of mentoring, coaching for collective growth of women was reiterated upon by Dr. Amtul Waris, the coordinator of the Women's Day celebrations.

Outreach Programmes

Training programme for tribal farm women on usage of Biofertilizers & Biopesticides and their application in Crop Improvement

Training programme for tribal farm women on "Usage of Biofertilizers & Biopesticides and their application for Crop Improvement" was conducted on 10th January 2019 at Devarkonda Mandal, Nalgonda District by Agri Biotech Foundation in collaboration with ICAR-IIRR under DST sponsored collaborating project on 'Technological empowerment of tribal farm women through good agricultural practices and eco-entrepreneurship development in rice-based cropping systems in Devarakonda Mandal, Telangana'. A total of 80 farmers participated in the training programme.

Training program on enhancing farmer's income through rice-based cropping systems'

An off-campus training program 'Enhancing farmers' income through rice-based cropping systems' was organized on 7th February 2019 at Deverakonda Mandal, Telangana. About 70 farmers participated in the program. A farmer-scientist interaction was organized. Farmers were advised to reduce the cost of cultivation by using good agricultural practices such as quality seed, the recommended dosage of fertilizers and manures, timely weed management, timely irrigation, and integrated pest management. Dr. B. Nirmala and Dr. Amtul Waris coordinated the training program.

Farmer-scientist interaction meeting

A farmer-scientist interaction was organized at Kommanpally village, Mummidivaram Mandal, East Godavari District, Andhra Pradesh on 6th March 2019. About 50 farmers participated in the program. The participants shared their experiences related to paddy cultivation and raised queries related to adoption of water saving technologies in general and direct seeded rice in particular. Awareness among the farmers was created about the water saving technologies in rice production. The farmers were advised to reduce the cost of cultivation by adoption of water saving technologies. Dr. B. Nirmala, Senior Scientist, IIRR and Dr. S. Narasimham, Agriculture Officer, Andhra Pradesh coordinated the interaction.

Exposure visit & eco-entrepreneurship training for tribal farm women

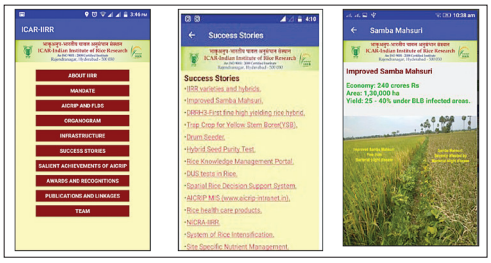
An Exposure visit to ICAR–IIRR and Agribiotech Foundation, Hyderabad was organized on March 16, 2019 for tribal farm women from Devarakonda Mandal, Nalgonda District under the DST sponsored project, 'Technological empowerment of farm women through good agricultural practices'. The Director, ICAR-IIRR, Dr. S. R. Voleti addressed the farm women and urged them to keenly observe the various research activities on the IIRR farm during their visit and adopt improved varieties, management practices on their farms to enhance the yield and thereby income of their families. Dr. V. Sandhya gave hands-on-training on production of biopesticide, Trichoderma. The program was coordinated by Dr. Amtul Waris.

IIRR Geoportal (http://www.iirr-geoportal.in.) developed

IIRR geoportal was developed using open source technologies GeoServer and GeoExt. Geo-referenced maps can be easily published in this portal. Since there are many GIS based applications developed in IIRR, the entire work was effectively visualised through this portal. Geo-referenced maps of AICRIP funded centres, rice area and yield maps and rice pest and disease distribution maps, rice yield map generated from Spatial Rice DSS, suitable areas for hybrid seed production, heat zones identified during flowering period of rice crop, soil quality maps, agro-climatic zones maps were successfully published in this portal.

IIRR Profile mobile app developed

Developed a Mobile App on "IIRR Profile" using android application and published successfully on Google Play Store and link is available in IIRR and Krishi Portal sites. This App highlights the success stories and significant achievements of IIRR. This can be downloaded and installed on all android mobiles. (https://play.google.com/store/apps/details?id=in.iirrmobapp.hava.myapp5_4_18)



Rice IPM mobile app developed

Developed a mobile App on 'Rice IPM' in Telugu language, demonstrated and installed successfully for 75 farmers. This is currently available in google play store. https://play.google.com/store/apps/details?id=org.iirr.varipirusasyarakshana&hl=en

Staff Activities

Awards & Fellowships

- Dr. A. P. Padma Kumari Principal Scientist (Entomology) was elected as Life Fellow of the Entomological Society of India, New Delhi
- Dr. A. P. Padma Kumari Principal Scientist (Entomology) received best paper award on IIRR Foundation day for the paper on "Rice husk ash and imidazole application enhances silicon availability to rice plants and reduces yellow stem borer damage" in Field crops research
- Dr. Divya Balakrishnan selected for INSA-DST-JSPS post-doctoral fellowship under Indo-Japanese Joint Project on "Establishment of Young Researcher Fellowship Programme 2018-2019" Jan - July 2019
- Satish Chawan selected for "Netaji Subhash ICAR International Fellowship 2018-19" for pursuing PhD studies at Ghent University, Ghent, Belgium.

Trainings/Symposium attended

- Dr. N. Sarla (National Professor) attended XIV Agriculture Science Congress, February 20-23, 2019 at New Delhi.
- Dr. B. Sailaja attended Smart India Hackathon 2019 software version took place on 2-3 March, 2019 at Sri Sivasubramaniya Nadar College of Engineering, Chennai.

Deputations

- Dr. Divya Balakrishnan, Scientist (Biotechnology) on deputation to work with Dr. Y. Fukuta, JIRCAS, Okinawa under INSA-DST-JSPS post-doctoral fellowship from 27 Jan 2019 to 26 July 2019.
- Dr. Satendra Mangrautia, Scientist (Biotechnology) is on deputation to Institute of Molecular Physiology, Heine University, Düsseldorf, Germany under Lal Bahadur Shastry outstanding Young scientist Award from 30 March 2019 to 29 June 2019.

Retirements

- Mr. V. Srinivasa Rao, Technical Assistant (Driver) retired from the service on attaining the age of superannuation on 28 February 2019.
- Mr. Anata Reddy, Technical Officer retired from the service on attaining the age of superannuation on 28 February 2019.

Editorial Committee: Drs. Y. Sridhar, C. Gireesh, P. Senguttuvel, Divya Balakrishnan, Bandeppa, Mr. U. Chaitanya

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Director

ICAR-Indian Institute of Rice Research

Rajendranagar, Hyderabad – 500 030, Telangana, India.

Phone: +91-40-24591216, 24591254

Fax: +91-40-24591217 e-mail : pdrice@drricar.org ; URL: http://www.drricar.org