



# DRR



## Newsletter

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### DRR celebrates foundation day

DRR celebrated its foundation day on April 2<sup>nd</sup> with great enthusiasm. Dr. P. Raghava Reddy, the honourable Vice Chancellor, ANGRAU graced the occasion as the Chief Guest. It was well attended by a spectrum of dignitaries including the founder Coordinator Dr. W.H. Freeman, former Directors and staff of DRR and invitees from neighbouring institutes like NAARM, DOR and others. DRR staff, who have served ICAR and DRR for more than thirty years were honoured with a memento and a certificate. The DRR foundation Day award for Best Researcher was given to Dr. M. Ilyas Ahmed; Best worker (Technical) to Mr. M. Vijayakumar, Best worker



(Administration) to Mr. K. Satyapriya and the best paper award was bagged by Ms. Himabindu and her coworkers Mr. R.M. Sundaram, Dr. C.N. Neeraja, Dr. B. Mishra and Dr. J.S. Bentur. Certificates of appreciation were also given to staff with outstanding contribution in Research and Sports.

### Sensitization workshop on IPR

As per the recommendations of ICAR for effective management of IPR issues, DRR has recently constituted the Institute Technology Management Unit and Institute Technology Management Committee. As a follow up, DRR organized a two day Sensitization Workshop on "Intellectual Property Management in Agriculture" during 29 -30<sup>th</sup> January 2008, to create awareness and training of Scientists of DRR regarding IP management in Agriculture. The workshop was inaugurated by Dr. S. Mauria, ADG (IPR & Policy), ICAR, New Delhi. In his inaugural address he outlined the history of development of IPR policy in Indian Agriculture and highlighted the essential components of ICAR guidelines on IPR. Dr. B.C. Viraktamath, Project Director, DRR underlined the importance of ITMC and ITMU in his opening remarks. During the workshop about 15 presentations were made by faculty members of DRR and invited speakers from NAARM, DOR, NBPGR, CRIDA and Sathguru Management Consultants. During the wrap-up session Dr. N. Shobha Rani, Chairperson ITMU summarized the important issues that emerged during the workshop.



## Training on Integrated Pest Management in Rice

DRR organized a 5 day training program on “Integrated Pest Management in Rice” during 11-15<sup>th</sup> March 2008. Thirty four participants from Private/ Public Agro input agencies benefited from



the training. The programme covered several lectures, practicals and field visits. Concepts of IPM were presented to the trainees and

different components were elaborated with illustrative examples and participants were encouraged to develop location cum situation specific IPM action plans.

## New Facilities

Radio Isotope Laboratory in Biotechnology section was inaugurated by Dr. B.C.Viraktamath, Project Director on 1<sup>st</sup> January 2008.



DRR participated in the exhibition held at Agri Expo-2008 organized by Centre for sustainable Agriculture, New Delhi. from Feb 18<sup>th</sup> to 19<sup>th</sup> 2008 at Lucknow.

## RESEARCH NOTES

### Aflatoxin contamination in rice and its management

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In India, bulk of rice is grown in wet season, where the crop is exposed to frequent and heavy rainfall and floods, particularly just before harvest. Often harvested sheaves remain wet and grains become prone to invasion by fungi. Such grains with moisture content higher than the desired levels enter the storage system. As a result, invasion by both, field and storage fungi take place. In general, fungal invasion leads to discoloration, loss in viability and quality of the grains. Aflatoxin contamination of agricultural commodities including rice is a serious food safety issue besides being a significant

economic concern. Hence, studies were undertaken to collect rice samples from all parts of the country, isolate the toxigenic fungi, characterize the major toxin involved and manage the toxigenic fungi and toxin contamination.

Over 900 rice samples covering 250 varieties in 20 States in India were collected from areas exposed to rain / flood or stored in storage bins or from the whole sale / retail market places. Using agar plate method, aflatoxin-producing mycoflora were isolated

### Aspergillus contamination of rice under different storage conditions

Source of seed collection	Seed samples (No.)	<i>Aspergillus</i> contamination (%)				AfB <sub>1</sub> Positive (%)
		<i>Af</i>	<i>An</i>	<i>Ao</i>	<i>Ap</i>	
Rain exposed / Damp areas	88	39.5	9.0	6.8	16.8	93.2
Stored for > 3 Years	256	14.3	30.8	1.4	5.6	77.3
Stored for < 3 Years	250	6.2	19.0	1.2	5.0	40.8
Stored for Unknown years	164	19.4	25.7	0.7	3.8	78.7
Market samples	162	19.1	10.7	0.3	0.2	74.7
<b>Total</b>	<b>920</b>					<b>68.7</b>

*Af: Aspergillus flavus; An: A. niger; Ao: A. ochraceus; Ap: A. parasiticus*

and identified. Quantitative estimation of aflatoxin B<sub>1</sub> produced by *A. flavus* per g of rice was made. Biocontrol agents, plant extracts and fungicides were tested for their efficacy in checking the growth of *Aspergilli*.

*Aspergillus* contamination was detected in most of the seed samples. *Aspergillus flavus*, *A. niger*, *A. ochraceus* and *A. parasiticus* were identified from these samples. In general, the *Aspergillus* contamination was more in the seed samples collected from the crop / seed exposed to rain followed by seed stored for long periods (Table). Around 60 to 84 % of the seed samples collected were found positive to Aflatoxin B<sub>1</sub>. Of the samples collected from different sources, 93 % of the seed which was exposed to rain was found positive followed by the samples stored for more than 3 years (77 to 79 %) and the samples collected from consumer markets (75 %).

Of these, 21 seed samples recorded 32.8 to 308 µg aflatoxin B<sub>1</sub> / Kg seed, which is above the permissible limit.

The infection of *Aspergilli* in rice grains was recorded in surface-sterilized seed, kernel, hull and kernel powder. The scanning electron microscopic (SEM) examination showed the presence of *Aspergillus* spp. particularly *A. parasiticus* in kernel, starch, endosperm and embryo (Fig. 1). The discoloured kernel revealed the presence of tubular, long, turgid and ramified hyphae both in vegetative or reproductive stage and had disintegrated starch. Young or matured vesicles with primordia of phialides or matured phialides with globose to sub-globose rough walled conidia of *Aspergillus* sp. were also detected in the kernels of discoloured rice. *Aspergilli* had apparently entered through the crevices and cracks in starch grain. Consumption of these discoloured rice grains is a definite risk to health.

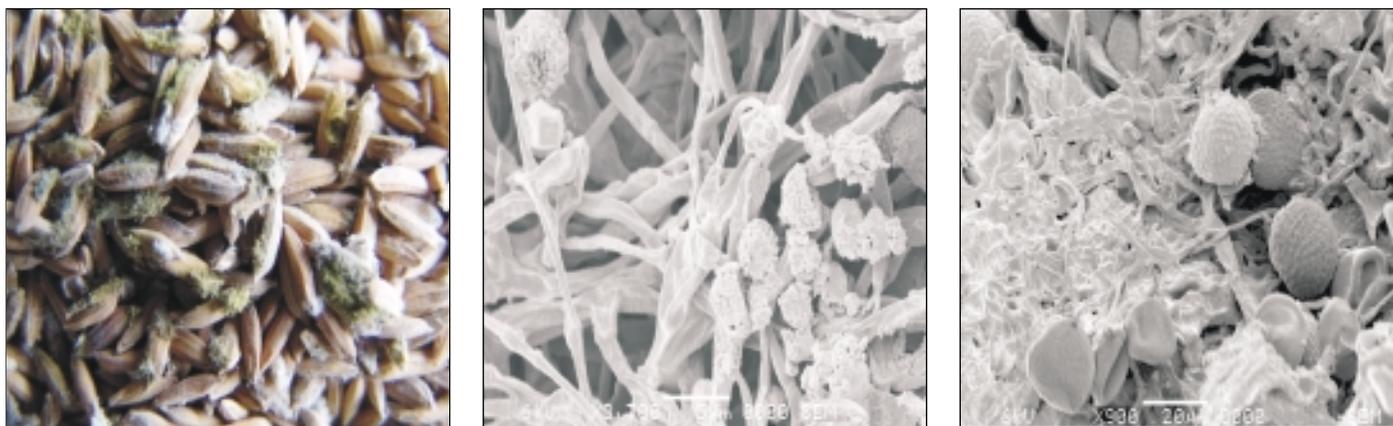


Fig. 1 a. Discolored Seed b. SEM showing hyphae with stipe, vesicles, primordia of phialides and c. globose to sub-globose structures

Biological agents like *Trichoderma virens*, *Pseudomonas fluorescens*, and *Rhodococcus erythropolis*, plant extracts like clove, garlic, neem, turmeric extracts, and fungicides like

carbendazim prevented or drastically reduced the growth of *Aspergillus* spp.

## Organic farming – a better option to sustain our soil health/quality

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Increased/indiscriminate use of chemical fertilizers and pesticides has resulted in several harmful effects on soil, water and air leading to reduced productivity and affecting human health. Favourable improvement in soil physical, fertility and biological properties has been claimed in many organic farming experiments. To validate the influence of organic farming on soil health and quality in terms of nutrient availability, biological activities and rice productivity, a study was initiated during 2004-05.

The experimental site is a clayey vertisol at DRR farm. Lay out had two main plot treatments of with and without plant protection measures and four sub plot treatments involving application of 1) 100% inorganics, 2) 100% organics, 3) INM with 50% inorganics+50% organics and 4) control (no fertilizers/manures application) with four replications. Fine quality rice varieties, BPT

5204 and Vasumati were tested during wet (*kharif*) and dry (*rabi*) seasons, respectively.

Organic sources used were, green manure (*Sesbania aculeata*) and paddy straw during wet seasons and straw plus poultry manure during the dry seasons. The results pertaining to the initial two years of study (transition period) are reported here.

After two years, pesticide application did not show significant difference in crop productivity but it resulted in a significant reduction in soil biological quality parameters such as microbial biomass carbon and nitrogen and soil enzymes activity. Grain yield data indicated the superior performance of inorganic fertilizers (by 10-15%) and INM (by 4-20%) over organics alone. However, organics increased soil microbial populations such as nitrogen fixers (*Azotobacter* and *Derxia*: 52 x 10<sup>4</sup> and 3 x 10<sup>4</sup> CFU /g soil,

respectively) compared to inorganics ( $5 \times 10^4$  and  $1.2 \times 10^4$  CFU/g soil, respectively) after two years. Significant increase in microbial biomass carbon, nitrogen and enzyme activities such as dehydrogenase and alkaline phosphatase were recorded in plots treated with organics, over those with inorganics and control.

This reflected a significant increase in soil fertility indicators, soil

organic carbon and available nutrients as given in the table below. Organic sources, being substrates for all beneficial soil microorganisms involved in nutrient cycling, improved the soil available nutrient status and overall soil quality. Thus there is a scope for yield improvement also in the years to come. Experiment is being continued with fixed plot treatments.

### Soil quality/health indicators at the end of two years

Treatment	Soil fertility indicators			Soil biological quality indicators							
	SOC (%)	P <sub>2</sub> O <sub>5</sub> (kg/ha)	K <sub>2</sub> O (kg/ha)	BMC (µg C/g soil)		BMN (µg C/g soil)		Dehydrogenase (µg TPF/g soil/24h)		Phosphatase (µg p nitrophenol /g soil/ h)	
				NPP	PP	NPP	PP	NPP	PP	NPP	PP
Inorganics	0.78	126	507	643	478	371	181	1377	1327	250	204
Organics	0.93	149	601	1048	957	492	262	1658	1588	306	236
INM	0.85	130	559	784	737	449	214	1521	1420	261	229
Control	0.67	98	498	561	350	324	176	1230	1073	179	169
Mean	0.80	124	541	759	623	408	208	1447	1352	249	210

BMC- microbial biomass carbon; BMN-microbial biomass nitrogen; NPP-no plant protection; PP-plant protection measures given; SOC- soil organic carbon.

## Rice black bug *Scotinophara lurida* (Burmeister) a new pest of rice in Cauvery Delta Region

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Of late, the rice black bug (RBB) *Scotinophara lurida* (Burmeister) (Fig A) has become a major pest of rice in the Cauvery Delta region of Tamil Nadu. It was noticed for the first time in large numbers during April-June 2004, following Tsunami strike in December 2003 and hence the local farmers named it as '*Tsunami Insect*'. Four species of *Scotinophara* have been identified from the populations with *S. lurida* (Burmeister) being the predominant species (96%) and rest being *S. bispinosa* F. (2%), *S. scottii* Horvath (1%) and *S. westwoodi* Westwood (1%).

The pest has been observed to infest the crop at the tillering stage and the population building up over time, causing heavy damage at the maturity phase of the crop. Both nymphs and adults are found to feed primarily at the base of stems in a group by removing plant sap. During night the bugs move up to panicle and feed on filling grains causing discoloration. At early stage of infestation outer leaves of the infested plant show yellowing or reddening and subsequently the plants dry. Due to heavy infestation the whole field gives a burnt appearance (bug burn symptom) similar to that of feeding damage caused by brown planthopper (Fig.B)



At TRRI farm during 2005 and 2006 the pest incidence was monitored using a light trap while crop infestation was monitored by counting insects on 100 randomly selected hills. The results showed pest abundance from March to May (*summer*) and September to November (*rabi*). Peak infestation with 28 bugs/hill was recorded in May coinciding with maturity phase of the crop while peak catches in the light trap was noticed during the full moon weeks of April 2005 (7480 bugs) or May 2006 (3020 bugs). Avoiding continuous flooding by practicing alternate wetting and drying of fields, judicious use of N fertilizer and avoiding use of synthetic pyrethroids helped reduce pest incidence. Draining water

from the field and spraying Acephate 75 WP @ 625 g/ ha using high volume sprayer (500 lit/ ha) was advised for controlling the pest. Setting up of light trap @ 1 per 5 acre was also found useful in mass trapping the RBB adults.

The above observations indicated that RBB is one of the emerging potential pest problems in rice crop in Cauvery Delta region and calls for periodic monitoring and forewarning for the benefit of the farmers.

We thank A.T. Barrion and Dr R.C. Joshi, PhilRice, Philippines for their help in identifying the species.

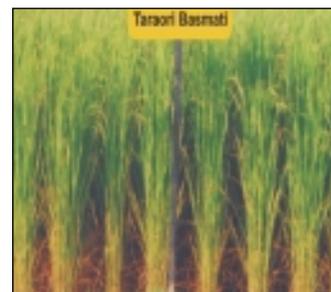
## PROFILES OF AICRIP CENTRES

### Rice Research Station, Kaul (CCS Haryana Agricultural University)

Research work on rice was initiated at Haryana Agricultural University, Hisar in 1970. The Rice Research Station was later on established at Kaul during February, 1972 with the objectives of developing high yielding semi-dwarf, better quality, non-scented and scented rice varieties and hybrids. The centre has well-equipped laboratories, screen houses, Agro-met observatory, short term germplasm cold storage facility and a well laid out 84 acres of farm for research and seed production.

#### Major Achievements

- ◆ Developed four non-scented high yielding rice varieties viz. HKR 120, HKR 126, HKR 46 and HKR 47
- ◆ Released two scented rice varieties viz., Taraori Basmati and Haryana Basmati-1
- ◆ Developed a non-scented high yielding rice hybrid Haryana Shankar Dhan-1 and 2 and the variety HKR 127
- ◆ Developed seed production and cultivation packages for irrigated transplanted rice varieties and hybrids
- ◆ Developed integrated pest management practices against major insect pests and diseases like blast, bacterial blight, false smut, stem borer, leaf folder and WBPH
- ◆ Organized Dhan Mela every year in addition to Field Days/Kisan Divas etc.
- ◆ Breeder and TFL seed of rice varieties is produced every year to meet the requirement of seed agencies and farmers



#### Scientists Involved

Seven scientists viz. Dr. Rattan Singh, Dr. Chander Kishor, Dr. Ram Singh, Dr. Khushi Ram, Dr. Lakhi Ram and Dr. B.S. Mehla are actively engaged in AICRIP research activities of the station.

### Rice Research and Regional Station - Khudwani

Rice Research and Regional Station, Khudwani was started in 1941, as Main Rice Research Station under Department of Agriculture, Govt. of Jammu & Kashmir. It was taken up by Sher-e-Kashmir University of Agricultural Sciences and Technology in the year 1982. The centre is situated at 74.5°E longitude and 33.43°N latitude and at an altitude of 1560 m *msl*. The centre occupies an area of 16 ha and under its administrative control has one Rice Research Sub-station (HARS-Larnoo) located 50 km away at an altitude of 2250

m *msl*. This sub-station caters to high altitude rice research focused mainly on the improvement of japonica rice which is cultivated in very high altitude areas of Kashmir.

#### Major Achievements

Till date 10 varieties have been released for intermediate/ valley basin areas and 5 were released for very high altitudes of J&K. The

centre has rich germplasm collection which comprises of local land races (124), elite breeding lines (250), released varieties (15), fine grained/ aromatic genotypes (53), cold tolerant lines (66), Japonica types (35) and another 57 exotic temperate lines which have been evaluated and are maintained at Khudwani and Larnoo stations.

Besides, the hybrid development programme is under way where two CMS lines *viz.*, SKAU-7A and SKAU-11A have been developed in our local cold tolerant genetic background of local and tolerant varieties using WA source. For the improvement of japonica rice by way of crossing with high yielding indica types, the use of wide compatibility gene source has been effectively utilised. The centre is working on the enrichment of aroma in local aromatic landraces like Mushk Budji and Kamad.



Rice Research and Regional Station - Khudwani



Shalimar rice -1

### Varieties developed at Khudwani centre

#### Varieties released for valley temperate/ intermediate zone (1300-2000m msl) of Jammu and Kashmir

Variety	Year of release	Maturity (days)	Yield/ha (q)	Remarks
China-972	1955	150	45-50	Lodging and shattering resistant, moderately resistant to blast
China-988	1955	148	50-55	Lodging and shattering resistant, moderately resistant to blast
China-1039	1956	138	50-55	Moderately cold tolerant, early maturing
China-1007	1956	145	55-60	Lodging and shattering resistant, cold tolerant, resistant to blast
K-60	1962	145	55-60	Cold tolerant
K-65	1966	145	55-60	Easy threshability
K-39 (SKAU-5)	1978	140	55-60	Cold tolerant, high HRR, resistant to lodging
Chenab (SKAU-23)	1996	140	60-65	High yielding, cold tolerant, synchronous maturity, suitable for temperate and intermediate subtropical zones
Jhelum (SKAU-27)	1996	140	65-70	High yielding, cold tolerant, medium slender grains
Shalimar Rice-1	2005	145	75-80	Resistant to blast, high yielding, high HRR, lodging and shattering resistant

#### Varieties released for very high altitude (>2000 m msl) areas of Jammu and Kashmir

Variety	Year of release	Maturity (days)	Yield/ha (q)	Remarks
Shenei	1967	135	30-35	Cold tolerant
China-971	1967	135	30-35	Cold tolerant, recommended for 1850-2200 m
Barkat (K78-13)	1974	140	35-40	High yielding, universal donor for cold tolerance, high HRR
K-332	1982	135	40-45	High yielding, short bold grain, high HRR
K-429 (Kohsaar)	2002	135	45-50	High grain yield, tolerant to blast, cold tolerant, high HRR
Shalimar Rice-2	UVC approved (2006)	135	50-55	High grain yield, blast resistant, cold tolerant, high HRR

## INSTITUTIONAL ACTIVITIES

### Workshops/Seminars participated

- ◆ Dr. B.C. Viraktamath, Project Director participated in the National Seminar on “Strategies for commercialization of public bred hybrids in India” organized by JNKVV at Jabalpur during 23-24<sup>th</sup> February and delivered a lecture on “Hybrid Rice in India – Strategies for commercialization of public bred hybrids”.
- ◆ Dr. B.C. Viraktamath participated in the SAARC Conference on ‘Science led transformation in agriculture’ at NASC, New Delhi during 5-6<sup>th</sup> March 2008.

### Important meetings/ Events

- ◆ Dr. S.P.Singh, PS (Agronomy) participated in the national technical coordination committee (R-W) meeting on 4<sup>th</sup> January 2008 under the chairmanship of DDG (CS), ICAR at Directorate of Maize Research, New Delhi.
- ◆ Dr. B.C. Viraktamath, Project Director participated in the ICAR Regional Committee meetings Zone II at CIFRI, Kolkata on 5<sup>th</sup> February
- ◆ Dr. B.C. Viraktamath, Project Director, attended the Germplasm Registration Committee meeting at NBPGR, New Delhi under the chairmanship of DDG (CS) on 16<sup>th</sup> February, 2008.
- ◆ Dr. B.C. Viraktamath, Project Director, Dr. N. Shobha Rani, Principal Scientist (Plant Breeding) and Dr. G. Padmavathi Senior Scientist (Plant Breeding) attended South Asia launch and planning workshop on IRRI Project “Stress tolerance rice for farmers of Africa and South Asia” at New Delhi from 16-17<sup>th</sup> March

### Deputations abroad

- ◆ Senior Scientists Drs. M.S. Ramesha and G. Padmavathi were deputed to attend a Training Course on “Marker Assisted Selection: Theory, Practice and Application” at IRRI, Philippines during 21<sup>st</sup> January to 1<sup>st</sup> February 2008.
- ◆ Dr. C. S. Reddy, Principal Scientist (Plant Pathology) participated at the “3<sup>rd</sup> Advances against Aspergillosis Conference” held at Miami, Florida, USA, during January 16-19<sup>th</sup>, 2008.
- ◆ Dr. Sheshu Madhav, Scientist, Senior Scale has been deputed to Ohio State University, Columbus, USA under DST sponsored BOYSCAST fellowship for a period of one year beginning April 2008.

### Distinguished Visitors/ Seminars

- ◆ Dr. D.S. Brar, Head, Division of Plant Breeding, Genetics and Biotechnology, International Rice Research Institute, Philippines visited DRR on 3 and 4<sup>th</sup> January 2008

- ◆ Dr. M.A. Ansari, Research Scientist, Department of Biological Sciences, Swansea University, UK delivered a guest Lecture on “A Novel bio control approach for management of pests of crops” on 11<sup>th</sup> January 2008 at DRR.
- ◆ Dr. Ronnie Coffman and a batch of 30 students from Cornell University and Indian Universities on study tour visited DRR on 7<sup>th</sup> January 2008.
- ◆ Dr. Anil Prakash Joshi, Founder Himalayan Environmental Studies and Conservation visited DRR along with his Cycle Yatra team on 5<sup>th</sup> February 2008.
- ◆ Dr. Jagadish Timsina, System Agronomist (Cereals and Legumes), CESD, IRRI, Philippines had a discussion with scientists of crop production division on 11<sup>th</sup> February
- ◆ Dr.G.S. Khush and his team from USA visited DRR on 14<sup>th</sup> February 2008.
- ◆ A delegation of 10 Iraqi officials visited DRR during 3-8<sup>th</sup> March to know the latest developments in varietal/hybrid development, seed production and seed technological aspects, as a part of FAO sponsored training program.
- ◆ A delegation consisting of the Minister of Agriculture, Govt. of Afghanistan along with 30 officials of the Seed Federation of Afghanistan and Progressive Farmers visited DRR on 13<sup>th</sup> March 2008.

### Awards/Recognition

DRR sports contingent participated in the 25<sup>th</sup> ICAR Southern Zone Sports Meet Zone IV at RRC Grounds, Secunderabad during 2-6<sup>th</sup> Feb 2008 and stood fifth in overall points. Individual medals won were:

- Gold : Chess (Women) – Ms. Sudha Nair  
Table Tennis (Women) Singles – Dr. K. Surekha  
Table Tennis (Women) Doubles – Dr. K.Surekha & Ms.Rekha Rani
- Silver : Shuttle Badminton (Women’s Doubles) -  
Dr. Chitra Shankar and Ms. K. Kousalya
- Bronze: Discuss Throw (Women) – Dr. Chitra Shanker  
Shotput (Women) – Ms. U. Rama
- ◆ Dr. C. S. Reddy, Principal Scientist (Plant Pathology) received an award, “**International Society for Human and Animal Mycology (ISHAM) Scholar**” at the 3<sup>rd</sup> Advances Against Aspergillosis Conference held at Miami, Florida, USA, during Jan.16-19, 2008, for his contribution on the ‘**Aflatoxigenic Aspergilli, Aflatoxin contamination and other related aspects**’.

- ◆ Dr. S.R. Voleti, P. Raghuvver Rao and D. Nageswara Rao received the best Poster award for the paper entitled “Physiological flowering time: Does it vary with phytothermic indexing?” “ at the International Symposium on “Agrometeorology and Food Security (INSAFS)” held at CRIDA, Hyderabad from 18-21<sup>st</sup> February



- ◆ Dr. Mangal Sain received the best oral presentation award on SRI at the 10<sup>th</sup> Indian Agriculture Scientists and farmers congress organised by Bioved Research and Communication Centre, Allahabad from 15<sup>th</sup> -16<sup>th</sup> Feb 2008.

## Personalia

- ◆ Mr. Seshu Babu, Office Superintendent breathed his last on 14<sup>th</sup> Jan 2008 due to a massive heart attack
- ◆ Mr. G. Rama Rao (T-4), Entomology Unit and Mr. P. Mallaiah (SSGr.IV), Plant Breeding unit, superannuated from Councils service on 31<sup>st</sup> January 2008.



- ◆ Mr. K. Ramachander, (T-5), Soil Science division, superannuated from Councils service on 31<sup>st</sup> March 2008.
- ◆ Dr. A. S. Hari Prasad, Senior Scientist, has joined DRR on 3<sup>rd</sup> March 2008 on transfer from IARI, New Delhi.

## Rice news from around the world

- ◆ The Svalbard Global Seed Vault (SGSV) nicknamed the “Doomsday vault” was opened on February 26<sup>th</sup> 2008 on a remote island in the Arctic circle receiving inaugural shipments of 100 million seeds that originated in over 100 countries. IRRI is contributing the largest number of accessions for any crop (70,180) and the largest estimated number of seeds (35,577,576) in Rice.
- ◆ Japanese Scientists have developed a rice-based vaccination for cholera. According to the study the team of scientists was able to store the rice seed vaccines for 18 months without the need for cold storage. Because they require neither refrigeration (cold-chain management) nor a needle, these rice-based mucosal vaccines offer a highly practical and cost-effective strategy for orally vaccinating large populations against mucosal infections, including those that may result from an act of bioterrorism. (Source: PNAS 104:10986-10991, 2007).

## Forthcoming Events

- ❖ Training Course on marker assisted selection in Rice - July 15- 19, 2008
- ❖ Training Course on Quality Control in Basmati Rice - July 25 – 30, 2008

## DIRECTOR'S MESSAGE

I am pleased to present the second issue of sixth volume of the DRR newsletter. It is heartening to note that AICRIP centres have contributed research notes for publication in the newsletter. We are looking forward to greater contribution from the centres about their institute profiles, release of new varieties and new technologies developed and short notes on important research findings. We fervently hope that all coordinating centres will contribute to the newsletter to make it an effective means to share information.

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