GHAGRAGHAT

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The crop research station at Ghaghraghat was established in 1976 with the major mandate of developing varieties to suit deep water ecosystem of rice.

Major contributions to AICRIP

Crop Improvement

Plant Breeding

- Altogether, 7 rice varieties belonging to deep water, semi deep water and flash flood situations have been developed at the research station.

Details of varieties released at Crop Research Station, Ghaghraghat, Bahraich.

Sl. No.	Varieties/ Parentage	Released by	Area of adaptation	Yield t/ ha	Special features
1.	Jalmagna Local selection from land race Bodhan	SVRC	Deepwater (>100cm)	4.0	Red kernel, fast elongation,nodal tillering
2.	Chakia 59/ Selection from land race (Bahraich Distt.)	SVRC	Semi deep water (50-100cm)	3.0	White kernel, moderate elongation
3.	Madhukar/ Land race selection from Gonda Distt.	SVRC	Flash flood	2.8	White kernel, submergence tolerance(7-10d)
4.	Jalnidhi/ Local selection from Goanth	SVRC	Deepwater (>100cm)	4.5	Fast elongation,kneeing ability,nodal rooting & tillering, red kernel
5.	Jalpriya/ IET 4060/ Jalmagna	SVRC	Semi deep water (50-100cm)	3.5	Moderate elongation,good grain type,better cooking quality,white Kernel
6.	Barh awarodhi/ Madhukar/ Sona	SVRC	Flash flood	3.5	Submergence tolerance (10d),white Kernel

Sl. No.	Varieties/ Parentage	Released by	Area of adaptation	Yield t/ ha	Special features
7.	NDGR 201/ Selection from land race Pansar (Bahraich Distt)	CVRC	Semi deep water (50-100cm)	4.0	Moderate tillering, red kernel,brown rice zinc content 30.3 ppm & 19.2 ppm iron, polish rice zinc content 18.2 ppm & 8.8 ppm iron.

- In order to identify suitable high yield, better survival traits and grain quality, various experiments were conducted in prevailing rice ecosystem at centre during the past years. The most promising entries ecosystem wise are summarized in table below

Promising varieties/ entries identified till *kharif* 2010-11.

Deep Water Water (> 100cm)	Semi Deep Water Water (50-100cm)	Flash flood (Intermittent flood)
NDGR 403	NDGR 222	NDGR 88
NDGR 426	NDGR 348	NDGR 70
NDGR 444	NDGR 392	FRG 13
NDGR 445	NDGR 250	NDGR 113
NDGR 448	NDGR 272	NDGR 106
NDGR 449	NDGR 373	NDGR 89
NDGR 464	NDGR 266	NDGR 127
NDGR 465	NDGR 278	Bajara-6
NDGR 467	NDGR 296	IR62648-B-5-1
NDGR 469	NDGR 274	IR1398-2-13
NDGR 478	NDGR 340	NDGR 63
NDGR 486	IR65764-R-13-1	NDGR 65
NDGR 489	IR65761-R-15-18	
IR67824-64T96-1-1-5-3	IR65761-R-11-15	
NDGR 530	*NDGR 266	
NDGR 542	NDGR 1501	
	NDGR 1512	
	NDGR 1514	

DWR-AVT-1 experiment sowing water depth at CRS, Ghaghraghat

*** Promising entry in pipe-line and tested in RATDS at State Level.**

- A wide range of donors for different traits were identified from different trials (IRRI, Thai and national trials). The identified donors have been procured to enrich the gene bank for utilization in breeding programme.

List of donors identified for different traits

142.24 mm	Donors
Elongation ability	Jalmagna, Jalnidhi, Saingar, LMN111 IR40905-11-3-15-2-2-21
Kneeing ability	Jalmagna, TCA 269, TCA4
Erect flag leaf blade	IR22, IR24, IR36, IR42, PSBRC2, PSBRC48
Submergence tolerance	Nimbuiya, Beller, Amghaud, Malhi qud, Ramkajari
Drought tolerance	Annada, Varani-deep and Azucena
Purple color of stigma	BP176, DV85, Aswara-Kora & 7 Jalmagna
Anthocynin coloration on stem node	DV85, K39-96-1-1-1-2, ACC13742 PSBRC92, Jalmagna
Stem borer resistance	TKM6, PSBR68, IR46 & CO14

- A wide range of crosses from *Jalnidhi*, *Barh Avarodhi*, FRG13, *Chakia 59*, *Sabita*, *Annada*, *Nagina 22* have been made at CRS Ghaghraghat. Fixed materials received from different crosses, viz. Samson Polo/ Jalnidhi, Ravana / Mahsuri, Sabita/ CN718-8-21-10, Sabita/ CR333-310, Daeng Loem/Jalnidhi, CR661-236/ Swarnadhan, PS41/ CR780-1936-1, PS46/ NDR8009, IR498307/ Gayatri, Swarna/ Pusa 4, Swarna/ NDR 8009, Sambha Mahsuri/ NDR 20 from AICRIP have been evaluated under waterlogged condition. Fixed lines of these crosses are under evaluation in preliminary station experiments.
- Non-destructive screening techniques have been developed for assessing elongation ability. Results revealed that 500 ppm GA3 (Gibberalic acid) application at 4-5 leaf stage, short duration flooding treatment at 21 days old

seedling, horizontal orientation of shoots method to distinguish the elongation types from the non-elongating ones.

- Under evaluation of post flood management technology, farmers' participatory approach was followed and found that high and stable yield after double transplanting of rice crop can be obtained by first transplanting 3 weeks old seedling, then uprooting the transplanted crop after 4 weeks and again transplanting. Besides, the aged seedling of 7 weeks old seedling of *Barh Avarodhi* variety after the flood recede has also been recommended for transplanting to minimize the yearly loss of crop productivity and reduce the farmer loss in high risk flood prone areas.
- Under post flood management technology, the sprouted seeds of short duration varieties, *viz*. NDR 97, NDR 118 and NDR 1 directly seeded in the field after receding of last flood performed well. This technology may compensate the loss of farmers in high risk areas.

Flood prone rice varieties showing regeneration after submergence at CRS, Ghaghraghat

Crop production

Agronomy

- Package of practices were standardized for growing deep water rice and found that one ploughing by mould board plough and twice by country plough and planking after each ploughing was the most remunerative tillage practice. Second fortnight of April was the most optimum time for sowing, 80 kg seed/ha by seed drill, 100 kg/ha behind country plough, and 120 kg seed/ha by broadcast method was the optimum seed rate at 25 cm apart. Application of 20 kg N/ha either through urea super granules (USG) placement in 8-10 cm water depth or neem cake coated urea (NCU) as basal resulted the higher yield and nitrogen use efficiency over prilled urea. Pre-emergence spray of butachlor @ 1.5 kg a.i. /ha controlled the weeds efficiently before water accumulation. Use of sweep hoe controlled the weeds effectively in early water accumulation.
- Integrated use of 50% RDN by Farm Yard Manure + 50% RDF through inorganic fertilizers produced the highest yield of rice and succeeding lentil under shallow deep, semi deep water and flood-prone areas.
- Green manuring of *Sesbania rostrata in situ* to rice along with 50% RDF to both rice and wheat gave the higher productivity, nutrient uptake and benefit cost ratio in rice wheat cropping system.

Crop Protection

Entomology

- Among the newer insecticides evaluated over the years, imidacloprid 200 SL @ 25 g.a.i. ha^{-1} & profenphos 50 EC @ 500 g.a.i. ha^{-1} (1998-99); flubendiamide 480 SC @ 24 g.a.i. ha^{-1} & clothianidin 50 WDG @ 15 g.a.i. ha^{-1} (2004-05); and indoxacarb 15 EC @ 30 g.a.i. ha^{-1} & lambda cyhalothrin 5 CS @ 12.5 g.a.i. ha^{-1} (2005-06); neonicotinoid + synthetic pyrethroid 22% @ 44 g.a.i. ha^{-1} & deltamethrin 10 EC @ 15 g.a.i. ha^{-1} (2006-07); flubendiamide 36% + fipronil 30% @ 33 g.a.i. ha^{-1}& bifenthrin 10 EC @ 50 g.a.i. ha^{-1} (2007-08); acephate 75 SP @ 800 g.a.i. ha^{-1}, flubendiamide 20 WDG @ 175 g.a.i. ha^{-1} (2009-10); and acephate 75 SP @ 667 g ha^{-1}, buprofezin + acephate 20+50 WP @ 1000 g ha^{-1} & acephate 95 SG @ 592 g ha^{-1} (2010-11) have been found promising against rice stem borer and significantly superior over untreated control and check insecticides monocrotophos 36 EC @ 0.5 kg.a.i. ha^{-1}, chlorpyriphos 20 EC @ 0.5 kg.a.i. ha^{-1} and carbofuran 3 G @ 1.0 kg.a.i. ha^{-1} under semi deep water situation.
- The sowing of sprouted seed immersed in 0.05% solution of fipronil 5 EC followed by drenching of nursery 5 days before pulling with fipronil 5EC @ 100 g. a. i. ha^{-1} was most effective in suppressing the yellow stem borer infestation and increasing grain yield under semi deep water rice situation.
- The tank mixture of imidacloprid 200 SL @ 0.25 ml lit^{-1} & propiconazole 25 EC @ 1.0 ml lit^{-1}, flubendiamide 20 WDG @ 0.25 g ha^{-1} & isoprothiolane 40 EC @ 1.50 ml ha^{-1} and ethiprole+imidacloprid 80 WG @ 0.25 g ha^{-1} & hexaconazole 5 SC @ 2.0 ml ha^{-1} was effective against stem borer and blast under semi deep water rice situation.
- The ETL for stem borer was estimated to be 5% larval infestation level. The regression analysis and calculation of confidence interval of β indicated that the decrease in grain yield is expected to fall between 39.8 and 209 kg ha^{-1} 95% of times within the range of 0-20% larval infestation levels.
- The estimation of yield losses at booting stage indicated that stem borer caused yield losses of up to 38.1% with 50% WE infestation.
- Growing of trap crop *Pusa Basmati 1* along with main crop *Jalpriya* in 1:9 ratio significantly reduced stem borer infestation and increased the yield of main crop.
- Neemgold-4 (azadirachtin-300 ppm) @ 2.0% and Biolep @ 2.0 kg ha^{-1} was as effective as standard test insecticide chlorpyriphos @ 0.05% against YSB under deep water rice.

Plant Pathology

- The entries from coordinated trials NSN 1, NSN 2, NHSN and DSN have been evaluated against blast and brown spot over the years and several promising entries were identified. IET 21404, 21405, 21857, 22214, 21807, RP Patho-3 and VL 30919 were most promising against leaf blast, whereas IET 21582, 21946, 20370, NVC, RP Patho-3, RP Patho-4 and RP Patho-8 were most promising against brown spot.
- *Barh Avarodhi*, FRG 10 and Cross 116 have been identified as moderately resistant against leaf and neck blast under natural field condition.
- An average yield loss of 35.65% was recorded due to blast (leaf and neck blast) disease. Ecomonas @ 10 g lit^{-1} (bio-pesticide) was found effective against blast. Application of Tilt @ 1lit ha^{-1} was found suitable to control glume discoloration disease of rice. Mancozeb 75 WP @ 2.54 g lit^{-1} was effective against blast and increasing yield. Folt 80 WP @ 2 g lit^{-1} was effective in controlling false smut and increasing yield.
- The variety Tetep showed resistant reaction, whereas Tadukan, Raminad *Str.* 3 and IR 64 showed moderately resistant reaction in field virulence study of *Pyriculariya grisea*.
- In new fungicides evaluation, 3 sprays of tricyclazole 75 WP @ 0.6 g/lit was most effective against leaf and neck blast infestation and increasing the grain yield. Isoprothiolane 40 EC @ 5 ml/lit followed by metaministrobin 20 SC @ 2ml/lit and propiconazole 25 EC @ 1ml/lit were also effective against blast.