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## Production oriented survey (POS) on different aspects of rice cultivation and farmers practices of Eastern U.P.

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### Abstract

Production Oriented Survey (POS) on rice cultivation was conducted by Crop Research Station, Ghaghraghat, Bahraich to under programme of AICRP, Indian Institute of Rice Research (ICAR), Rajendranagar, Hyderabad during kharif, 2020. Production oriented survey was conducted in five districts viz., Bahraich, Barabanki, Gonda, Balrampur and Shravasti when the crops were in tillering to booting or grain filling to maturity stage. Predominant rice varieties were HYVs like NDR 359, Sarjoo 52, Samba Mahsuri, Jalpriya, Jalmagna, Lalmati, Madhukar and Pusa Basmati 1 and hybrids like Arize 6444 and Arize 6444 Gold. Different cropping system followed by the farmers were rice-wheat, rice-wheat-black gram, rice-vegetables, ricesugarcane/lentil, rice-wheat-mentha, rice-lentil+mustard, rice-pea + mustard, ricewheat+mustard-green gram, rice-lentil, rice-lentil + mustard + vegetables and others. Biotic stresses like diseases sheath blight and bacterial leaf blight and insects stem borer, leaf folder and gundhi bug were observed from low to moderate intensity. Blast was severe in some fields in Barabanki and Shravasti and brown spot was severe in some areas in Gonda and Shravasti. High intensity of sheath blight was recorded in some fields in Bahraich. Intensity of other diseases and insect pests was low to moderate. Application chemical pesticides were not common among the farmers. In some fields symptoms of zinc deficiency were noticed. However, false smut was noticed in the late maturing/hybrids rice varieties from severe intensity in all the surveyed districts. Among weeds observed were *Echinochloa colona*, *Eclipta alba*, *E. crusgalli*, *Cyperus iria*, *C. rotundus*, *Cloeme viscosa*, *Fimbristylis dichotoma* and *Paspalum distichum*. Farmers were using weedicides like butachlor, pretilachlor, bispyribac sodium and 2, 4-D to control the weed infestation in rice crop. Shortage of farm labourers coupled with higher labour wages are the major constraint in rice production in the surveyed districts.

**Keywords:** leaf blast, neck blast, sheath blight, brown spot, leaf folder, gundhi bug, stem borer

### Introduction

Rice is the staple food crop of India and occupies highest area among all the crops grown in the country (Shobha Rani *et al.*, 2010) [7]. The loss of these traditional varieties would not only cause insecurity in the rice growing areas of India (Vijayalakshmi K *et al* 2007) [11] Rice is only the cereal crop cooked and consumed mainly as whole grain, and quality considerations are much more important than for any other food crop (Hossain *et al.*, 2009) [1]. Currently India produces rice that is sufficient not only to meet the domestic demands, but also was the largest exporter during 2012 (Mahender Kumar *et al.*, 2013) [3], imparted to the selected farmers regarding different aspect of cultivation (Venkattakumar *et al.*, 2010) [10]. Rice is the only crop grown in the wet season from lowland ecosystem. Poor sunshine, inclement weather, disease pest incidence and the associated adversities affect crop growth. Insect-resistant crops have revolutionized modern agriculture and have become a major tool of integrated pest management programs, leading to reduction in insecticide use while protecting the environment and human health. In natural conditions, plants suffer from various types of stresses caused by living organisms like bacteria, viruses, fungi, parasites, significant and non-significant insects. Like livestock, plants also have a defence system, which provides tolerance against environmental stresses. On invasion by pathogens and herbivorous pests, plants make use of pre-existing physical, chemical and mechanical barriers to protect themselves. The plant defence functions are also activated upon attack by pest; plant protection functions as a unit to decrease negative responses of biotic stress.

Production oriented survey (POS) on rice cultivation was conducted by Rice Research Station, Bankura under programme of AICRP, Indian Institute of Rice Research (ICAR), Rajendranagar, Hyderabad-50003 during kharif, 2009., of India (Adhikari *et al.*, 2011).

The summer monsoon accounts for 70-80% of the annual rainfall over major parts of South Asia. There is a large variability in the monsoon rainfall on both space and time scales. Consequently, the Indian regions experiences drought-floods in some parts of the country or the other almost every year during the monsoon period between June September. Drought in the Indian region is mainly due to various kinds of failure of rains from southwest monsoon (Laha *et al.*, 2009)<sup>[2]</sup>. Also there seems to be some association between El Nino and La Nina events and weak monsoons. Commonly followed crop rotation practices were rice-wheat, rice-lentil, rice-potato, ricepotato-mentha, rice-vegetables, rice-lentil+mustard, rice sugarcane, rice-mustard, ricewheat+mustard, rice-wheat-black gram, rice-wheat+lentil and rice-pea. Most of the farmers used cow dung and farm yard manure (FYM) as seed bed manuring and fertilizers like urea and DAP in the nursery. The application of basal fertilizers *viz.*, N, P2O5 and K2O were in less quantity. Farmers used different implements like tractor, combined harvester, thresher, shallow pump, and sprayer.

## Materials and Methods

### Description of study area

In Eastern Uttar Pradesh, five districts that belongs plan tarai belt namely Bahraich, Barabanki, Gonda, Balrampur and Shravasti districts were surveyed during the kharif cropping season, 2020. Among five districts, twelve blocks and nineteen village was surveyed thoroughly comprising hundred (100) farmers (Table 1).

### Methodology and collection of data

Production oriented survey is conducted by a team of subject matter experts (from different state agricultural universities and ICAR Institutes) along with officials from state department of agriculture with an objective to collect information on different aspects of rice cultivation from different rice growing states of India, during the main crop season (June to December). The survey is based on both eye-ball survey by team of pathologist, breeder, entomologist and agronomist and questionnaire based survey. The different aspects that are covered in the survey are prevailing climatic conditions for rice cultivation, varietal profile in a particular region, extent of use of organic manure and inorganic fertilizers, occurrence of different biotic and abiotic problems and their management and various needs of the farmers and problems faced by the farmers. During 2019, the survey was conducted Uttar Pradesh.

## Results and Discussion

### District Wise Observations

**Bahraich:** Data was presented in table 1 to 4 POS was conducted in 6 villages in 3 blocks majority of the farmer's population are marginal. Their crops were tillering to booting or grain filling to maturity stage at the time of survey. The fields surveyed were under rainfed lowland and semi-deep ecosystems. In general the weather conditions were normal for rice cultivation. Predominant rice varieties in the district were NDR 359, Pusa Basmati 1, Sarjoo 53, Arize 6444 and Arize 6444 Gold. Farmers followed a variety of crop rotation practices *viz.*, rice-wheat, rice-wheat-black gram, ricevegetables, rice-sugarcane/lentil, rice-wheat-mentha, rice-lentil+mustard, rice-pea + mustard, rice-wheat+mustard-green gram, rice-lentil, rice-lentil + mustard + vegetables and others. Average rice yield among HYVs and hybrids ranged

from 4500-5200 kg/ha while in case of basmati varieties, it was about 2500 kg/ha. Planting was done mainly during 1st - 3 rd week of July. None of the farmers contacted adopted any seed treatment practices and in some places. All the farmers contacted applied FYM/compost in the nursery. Few also applied urea or mixture of urea and DAP in the nursery. In the main fields, fertilizers were applied @ 60-100 kg urea/ha, 60-100 kg DAP/ha and 40-60 kg MOP/ha. Potash was applied by about 50% farmers. About 25% farmers applied zinc sulphate. All the farmers applied FYM in the main field. Planting was random. Among weeds *Cyperus rotundus*, *Cyperus iria*, *Cyperus diformis*, *Echinochloa colona*, were a major problem. Generally hand weeding and used herbicides were practiced. Implements like tractor, cultivator, rotavator and harrow were used by the farmers. Diseases like blast, neck blast, brown spot, false smut, sheath rot, grain discoloration were recorded in low to moderate intensity. Sheath blight was wide spread and its intensity was high (up to 30%) on Pusa Basmati 1 in Adampur village. High intensity of False smut was recorded in some fields form especially on hybrids and late varieties. Intensity of insect pests like stem borer and gundhi bug was low. Application of chemical pesticides was very less. There were symptoms of zinc and iron deficiency in some of the places.

**Barabanki:** Five villages in 3 blocks in this district were covered for production oriented survey (table 1 to 4). In general, the weather conditions were normal for rice cultivation. Commonly grown rice varieties were Sukha Pankhi, Madhukar, Lalmati, Dhaniya, Arize 6444, Arize 6444 Gold and Pusa Basmati. Many farmers are growing variety Lalmati because it is early maturing, fine grained, less susceptible to pests and diseases and have better market price. Different crop rotations followed by the farmers were ricelentil + mustard, rice-wheat-mentha, rice-vegetables and rice-wheat. Average yield in the district was 3600-4800 kg/ha. Planting was done during last week of June to 1st week of July. None of the farmers contacted adopted any seed treatment. All the farmers contacted applied FYM in the nursery. None of them applied any chemical fertilizers in the nursery. In the main fields, fertilizers were applied @ 80-100 kg urea/ha and 60-80 kg DAP/ha. Very few applied muriate of potash. All the farmers applied FYM in the main fields. Planting was random. In general, the intensity of common weeds like *Cyperus spp.* and *Echnochloa spp.* was low. Implements like tractor, cultivator, rotavator, power tiller and disc harrow were used by the farmers. Shallow tube wells were the main source of irrigation and farmers used diesel for different agricultural operations. Staffs of state department of agriculture and private dealers advised the farmers regarding fertilizers and pesticide use. Among the biotic constraints, leaf blast was wide spread and its intensity was high (up to 35%) on Sukha Pankhi variety in Namipur village. Intensity of other diseases and insect pests was low to moderate infecting mostly high yielding varieties (Muralidharan *et al.*, 2003)<sup>[4]</sup>. Application of pesticides was not common among the farmers. There were symptoms of zinc and iron deficiency in some of the places. High intensity of False smut was recorded in some fields form especially on hybrids and late varieties. Among the insect pests namely stem borer, green leaf hopper, leaf folder and gundhi bug were prominent. But in low intensity it was observed that farmers generally did not follow standard methods of plant protection measures (Sharma *et al.*, 2012)<sup>[6]</sup>. However, false smut was very wide spread.

Fungicides like carbendazim, propiconazole and hexaconazole for different diseases and insecticides like chlorpyrifos, cartap hydrochloride and folidal for different insect pests were used by the farmers.

**Gonda:** Two villages (in 2 taluks/blocks) involving 10 farmers were surveyed in this district when the crops were in heading to milk stage. The fields surveyed were under upland ecosystem. In general, the weather conditions were normal for rice cultivation. Commonly cultivated varieties were NDR 359, Samba Mahsuri and Pusa Basmati 1. Common crop rotation practices followed by the farmers were rice-wheat, rice-lentil + mustard, rice-sugarcane + black gram and rice-sugarcane. Average seed rate for HYVs was 25-30 kg/ha while for hybrids it was 15-20 kg/ha. Only 20% farmers contacted followed seed treatment with carbendazim (2 g/kg). About 80% farmers told that they applied FYM both in the nursery. In the nursery, about 50% farmers contacted also applied chemical fertilizers like DAP. In the main fields, fertilizers were applied @ 100-120 kg N/ha, 50-60 kg P<sub>2</sub>O<sub>5</sub>/ha and 50 kg K<sub>2</sub>O/ha. Majority (90%) of the farmers also applied zinc sulfate (15-20 kg/ha). Few farmers applied green manures and growth regulators like Zyme (10 kg/ha) in the main fields. Farmers followed random planting. Intensity of common weeds like *Echinochloa crusgalli*, *E. colona*, *Cyperus rotundus*, *Cyperus iria* and *Fimbristylis dichotoma* was low to medium. In addition to hand weeding, the farmers applied weedicides like butachlor (2.5 l/ha) and Nominee Gold (200 ml/ha) for managing the weeds. Some of the common needs of the farmers were quality seeds of HYVs and drying and storage facilities. Implements like tractor, rotavator, sprayer and combine harvester were used by the farmers. Most of the farmers used combine harvester. Shallow tube wells and canal were the main sources of irrigation. Officials from state department of agriculture and university were the main advisors to the farmers. Average rice yield in the district ranged from 4900-5000 kg/ha in case of HYVs and 3200-4000 kg/ha in case of Pusa Basmati 1. Officials from state department of agriculture and private personnel were the main advisors to the farmers. Among the diseases, brown spot was severe (up to 28%) in some fields in Chhataivani village. Other diseases like blast, neck blast, sheath blight and false smut and insect pests like stem borer and grasshoppers were in low to moderate intensities. High intensity of False smut was recorded in some fields form especially on hybrids and late varieties. Application of pesticides was not common among the farmers. There were symptoms of zinc and iron deficiency in some of the places. Data was presented in table 1 to 4

**Balrampur:** Production oriented survey was conducted in two villages (in 2 blocks table 1 to 4) in this district when the crops were in tillering or maturity stage. The fields surveyed were either in upland or rainfed lowland ecosystem. The weather conditions were normal for rice cultivation.

Prominent rice varieties in this area were Sarrjoo 52, Arize 6444 and Pusa Basmati 1. The main cropping systems were rice-wheat, rice-lentil + mustard and rice-vegetables. Average rice yield was 4000-5000 kg/ha in case of HYVs and about 3200 kg/ha in case of Pusa Basmati 1. Planting was mainly done during last week of June. A seed rate of 20 kg/ha was used by the farmers. None of them adopted seed treatment. All of them applied FYM in the nursery. In the main fields, fertilizers were applied @ 100 kg urea/ha and 89 kg DAP/ha. Few also applied muriate of potash (60 kg/ha). All the farmers contacted applied FYM in the main fields. Farmers adopted random method of planting. Weed population was low and farmers practiced only manual weeding. Intensity of different biotic constraints was low to moderate. Symptoms of zinc deficiency were noticed in some places. High intensity of False smut was recorded in some fields form especially on hybrids and late varieties. Among the diseases blast, grain discoloration, false smut were observed (Upmanyu and Rana, 2013) <sup>[9]</sup>. Farmers generally used fungicides like carbendazim @ 2 g per liter of water and hexaconazole @ 1 ml per liter of water to control blast and sheath blight. Insecticides like acephate @ 1g per liter of water was used to control plant hoppers (Prakasam *et al.*, 2013) <sup>[5]</sup>.

**Shravasti:** Two villages (in 2 blocks) were covered for production oriented survey in this district when the crops were in tillering or maturity stage. Data was presented in table 1 to 4 fields surveyed were under rainfed lowland ecosystem. In general, the weather conditions were normal for rice cultivation. Popular rice varieties cultivated in this area were Jalpriya, Jalmagna, Madhukar, Pusa Basmati 1 and Arize 6444. Different cropping systems followed by the farmers were rice-wheat, rice-mustard + lentil, rice-vegetables and rice-lentil + sugarcane. Average yield was 3500-4200 kg/ha. A seed rate of 18-22 kg/ha was used by the farmers and none of the farmers contacted adopted seed treatment. All of them applied FYM in the nursery and few of them also applied urea. In the main fields, fertilizers were applied @ 80-100 kg urea/ha, 80 kg DAP/ha and 60 kg MOP/ha. Intensity of weeds in and around rice fields was low and farmers managed weed problem by manual weeding. Severe incidence of rice blast (up to 45%) was recorded in varieties like Jalpriya in Ekona village and on Madhukar variety in Pershona village. High incidence of brown spot was recorded in some fields of NDR 359 in Ekona village. Intensity of other diseases and insect pests was in low to moderate intensity. Symptoms of zinc deficiency were noticed in some places. High intensity of False smut was recorded in some fields form especially on hybrids and late varieties. Among the disease blast, false smut, grain discoloration and sheath rot were observed. Farmers applied fungicides like Carbendazim @ 2 g per liter of water to control blast and sheath blight. Among insecticides, most of the farmers used acephate @ 1g per liter of water to control plant hoppers (Srinivas *et al.*, 2011) <sup>[8]</sup>.

**Table1:** Particulars of survey in different districts, blocks and villages of Eastern Uttar Pradesh

Districts	Blocks	Villages
Bahraich	Jarwal Kasba, Kaisarganj and Phakharpur	Adampur, Tappe Sipah, Ichchapur (Gajodharpur), Umari, Badrauli and Nandwal
Barabanki	Ramnagar, Sirauli and Gauspur	Namipur, Ramnagar, Sirauli Gauspur, Ganespur and Gobaraha
Gonda	Colonelganj and Mankapur	Chhataivani and Bandraha
Balrampur	Balrampur and Rehara Bazar	Bhagabatiganj and Rehra
Shravasti	Sirsiya and Ekona	Khairi Pershona and Ekona

**Table 2:** Widely grown varieties in plane and tarai zone of Eastern U.P.

Districts	Varieties
Bahraich	NDR 359, Pusa Basmati 1, Sarjoo 53, Arize 6444 and Arize 6444 Gold
Barabanki	Sukha Pankhi, Madhukar, Lalmati, Dhaniya, Arize 6444, Arize 6444 Gold and Pusa Basmati 1
Gonda	NDR 359, Samba Mahsuri and Pusa Basmati 1
Balrampur	Sarjoo 52, Arize 6444 and Pusa Basmati 1
Shravasti	Jalpriya, Jalmagna, Madhukar, Pusa Basmati 1 and Arize 6444

**Table 3:** Prevalence of diseases of survey in different districts

Districts	BL	NBL	BS	ShB	FS	ShR	GD	Khaira
Bahraich	M (12- 20%)	L (8%)	L-M (3- 25%)	L-S (8- 30%)	M-S (12- 45%)	L (8%)	L (5%)	M
Barabanki	M-S (12- 35%)	L (5-8%)	L-M (5- 20%)	L (8%)	M-S (11- 46%)	T (<2%)	-	M
Gonda	L-M (10- 12%)	L (5-8%)	M-S (12- 28%)	L-M (8- 18%)	L-M (5- 15%)	L (7%)	-	M
Balrampur	L (8- 10%)	L (6%)	L-M (10- 15%)	L-M (9- 22%)	M-S (13- 41%)	L (5%)	-	M
Shravasti	M-S (12- 45%)	L-M (8- 20%)	L-S (10- 30%)	M (15- 18%)	M-S (9- 39%)	L (5-8%)	-	M

**Table 4:** Prevalence of Insect/ pest of survey in different districts

Districts	SB	LF	GB	GH	Rat
Bahraich	L (2-5%)	L (7%)	L (2-3%)	L (3- 6%)	T (2%)
Barabanki	L (5-8%)	L (5%)	L (2-7%)	L (2-3%)	T (1-2%)
Gonda	L (5%)	L (6%)	L (2-5%)	T (<2%)	-
Balrampur	L (5%)	L (8%)	L (3-9%)	L (4- 8%)	-
Shravasti	L (5%)	L (4%)	L (4-7%)	L (2- 8%)	-

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