



Research Article

PARTICIPATORY PADDY VARIETAL SELECTION FOR SALT STRESS CONDITION

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Abstract- Salt stress (Salinity) is one of the worsening problems in low-land areas in Pratapgarh, U. P. The build-up of salt as a consequence of the excessive use of irrigation water with improper drainage, coupled with the use of salty irrigation water or sodic soils developed from salt-bearing rocks. Paddy crop is suitable for rehabilitating these soils because of its ability to grow under flooding and its high potential for genetic improvement. Paddy productivity in salt-affected areas is very low (less than 1.5 t/ha) but can reasonably be raised by at least 2 t/ha. Salt-tolerant Paddy varieties also offer great potential to grow in marginal lands, which are usually left fallow particularly during the dry season because of high salinity. Selection of suitable Paddy varieties for salt affected prone areas, under farmer's participation mode is directly involved to choose varietal as it suits. Four salts tolerant improve varieties was grown in trials of participatory variety selection (PVS) in five replications. An experiment was conducted in farmers' fields with farmers participation based on their needs have helped to identify high yielding varieties for their lands. The perusal of data reveals that, out of five selected salt-tolerant varieties, two (CSR-36 and NDR-359) have shown significantly higher grain yield resulting in to the higher adoption by the farmers. Therefore, these two varieties may be recommended for further extension to improve the production of rice under salt stress condition of district Pratapgarh.

Keywords- Participatory Variety Selection, PVS, Salt stress, Paddy, Farmer

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Introduction

Rice is among the most important food crops of the world and it is the most consumed food in India. With the increasing human population in recent years, land scarcity, and high food demand to attain food security, marginal lands such as salt effected-prone areas should be exploited. Salinity is one of the most common problems in rice growing areas of the district Pratapgarh. About 400-950 million hectares of land around the world [1] and 0.83 million hectares in Pratapgarh are affected by different levels of salinity. The rice plant is one of the most suitable crops for salt effected soil, although it is considered to be moderately sensitive to salinity [2]. Soil salinity is one of the major constraints to rice production in canal irrigated areas of Pratapgarh. To reduce salinity, major engineering structure and expensive soil amendments are needed. However, these amendments require large investments. Thus, tailoring rice plants to adapt in salt stress prove to be practical and effective. Numbers of varieties have been developed to cope with the varied soil and climatic conditions of the salt effected prone areas. Therefore, it is very important to find out the suitable salt-tolerant varieties for salt effected prone areas to maintain the optimum productivity. Farmer participatory research emerged as a response to the generation of inappropriate technologies by scientists at KVK or research stations whose work was based on the transfer of technology model [3]. Farmer participation in agriculture research (FPR) has gone beyond On-farm trails which became the standard of FSR, actually calling for farmers in collaboration with researchers to design, monitor and evaluate experiments carried out in their own fields. Some have argued that while FPR approaches can increase participation among farmers, as research methodology, it has not brought about impact and output [4] or may require more than short term technology development efforts.

Evaluation of the varieties at the real environment and participation of the end users in the process of variety selection have been emphasized.

Materials and Method

PVS trials were conducted in five sites at salt effected prone areas of Kalakankar and Babaganj blocks of the district Pratapgarh. In two years, five salt tolerant varieties from CSSRI, NDUAT and Kaveri seeds were placed in PVS trials at five villages of the district. The soil salinity status of the trial plots across the two crop seasons were shown in [Table-1]. All the trial plots had initial soil salinity above the critical level ($>4.0\text{dS/m}$) in 2014 followed by trials in 2015 and evaluation done by the farmers walk in trials fields at five villages.

Table-1 Soil salinity of mother trial plots at five sites across rice crop seasons:

Site/Plot location	Soil EC (dSm-1)	Soil pH
Sekh-hisampur	0.141	8.5
Madhwapur	0.043	8.7
Ainthu	0.104	9.1
Meerapur	0.186	8.6
Mangarh	0.187	8.9
Mean	0.1322	8.76

All five trials managed as on farm trials were done in cooperation with the participating farmers. The participating farmers were divided into 5 groups (5 farmers per group), and a researcher led each group.

Table-2 Varieties from the trial and the frequency of PVS farmers across the location

Treatment	Variety	Number of farmers					Total
		Sekh-hisampur	Madhwapur	Ainthu	Meerapur	Mangarh	
PVS -T1	MTU -7029	1	1	1	1	1	5
PVS -T2	CSR - 36	1	1	1	1	1	5
PVS -T3	CSR - 43	1	1	1	1	1	5
PVS -T4	NDR - 359	1	1	1	1	1	5
Total							20

Table-3 Agronomic performance of the PVS varieties in trial across the locations

Treatment	Variety	Yield (qt./ha)					Mean
		Sekh-hisampur	Madhwapur	Ainthu	Meerapur	Mangarh	
PVS -T1	MTU -7029	64.25	63.25	62.3	64.5	63.5	63.56
PVS -T2	CSR - 36	63.8	60.2	61.5	64	62.1	62.32
PVS -T3	CSR - 43	52.25	51.25	50.5	53.1	52	51.82
PVS -T4	NDR - 359	60.49	61.2	59.5	62	61.5	60.94

Table-4 Performance of the PVS varieties in trial and number of farmers selected each variety

Treatment	Variety	Duration (days)	Preference of farmers (No.)
PVS -T1	MTU - 7029	140	14
PVS -T2	CSR - 36	135	19
PVS -T3	CSR - 43	110	11
PVS -T4	NDR - 359	135	16

Each participating farmer was given a simple PVS evaluation sheet asking them to choose one or two varieties to grow as crop in their fields under their own management. After the field visit, PVS sheets were collected and two/ three farmers from each group were called immediately on a random basis to express their views and opinions on the selection made.

Results and Discussion

PVS is the selection of varieties done by farmers in target environment using their own selection criteria. In PVS, access and selection of varieties are decentralized, with farmers' participation. Plant materials, which have all the combination of characteristics are selected by the farmers for the appropriate plant type and yielding ability in their respective salt stressed farms instead of researchers themselves. 25 farmers took part in PVS at five trial sites. The farmers selected 02 from the 04 varieties and these varieties were designated as PVS-T1 to PVS-T4 representing [Table-2]. There was variation in the choice of PVS-T varieties by the farmers across locations. CSR - 36 (PVS-T2) and NDR - 359 (PVS-T4) were chosen by majority of the farmers followed by PVS-T1 in all the sites. The farmers were listed down the criteria for choosing the varieties due to their lodging tolerance, high yield, freedom from diseases, uniformity in maturity and growth duration. The Chosen varieties by farmers were different for different location. This confirms the site specificity of varieties for complex environment like salt affected areas. There is a considerable variation in yield and other agronomic characteristics of the 04 PVS-T varieties [Table-3]. Most of the farmers preferred varieties had growth duration of 135-145 days. The PVS-T farmers grew their selected varieties as trial in 2015-16, under their own management practices. The farm walks for trials participated by 25 farmers were conducted at five villages. Two PVS-T varieties showed promising results and were selected by farmers [Table-4]. With PVS in the fields, and involvement of relevant local government and extension scientists and varieties were evaluated, selected, and distributed to farmers in the salt affected areas of Pratapgarh. After one seasons of PVS, at least 25 farmers were using the farmers selected varieties for Kharif season. Five varieties for Kharif paddy seasons identified by farmers through PVS showed good potentials for diffusion and were included in the technology refinement and acceptance for the district Pratapgarh.

Application of research: This aimed to identify high yielding, adaptable, and acceptable rice cultivars for sodic soils through farmers' participation. Therefore,

PVS facilitates development of varieties suitable for Salt stress (Salinity) soils and farmers' interests.

Research Category: Salt stress (Salinity) soils and farmers' interests

Abbreviations:

PVS: Participatory variety selection
PVS-T: Participatory variety selection
CSR: Central Salinity Research
NDR: Narendra Dev Rice
CSSRI: Central Soil & Salinity Research Institute
NDUAT: Narendra Dev University of Agriculture & Technology

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