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Location specific trails of different paddy varieties in Satpura region of Chhindwara M.P.

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Abstract
Paddy is a major part of the Indian diet, economy, employment, culture and history. Rice is principal food as well as dominant crop of many countries. India is one of the world's largest producers of rice, accounting for 20% of all world rice production. Paddy grows in almost all states in India. Generally, Paddy prefers hot and humid climate. High temperature and heavy rainfall provide ideal conditions for the cultivation of paddy. We have planned to transplant through SRI, eight notified hybrid varieties of paddy. The main aim of this study is based on the location specific trials of paddy varieties. The study is based on 6 parameters that are the indicators of varietal performance at our location. We considered yield as a main parameter to judge the varietal performance. Number of plants/earheads of seed crop which have been observed during field inspection as one unit for field count of all 8 varieties. Maximum yield observed under the variety of GNV 10-89 (50.80 q/ha) followed by BPT 52-04 (49.95 q/ha), IET 19251 (49.44 q/ha), CSR-22 (46.86 q/ha), SIRI- 1253 (44.68), GGV-05-01 (43.66 q/ha) respectively while the lowest yield observed under the variety RP-BIO 226 (41. 92 q/ha).

Keywords: location specific, paddy, earheads, Satpura region, SRI

Introduction
Paddy (*Oryza sativa*) cultivation is the most important agricultural operation in our country, not only in terms of food security but also in terms of livelihood because it plays a major part in the diet, economy, employment, culture and history of India. Rice is principal food as well as dominant crop of India. India is one of the world's largest producers of rice, accounting for 20% of all world rice production. Paddy grows in almost all states in India. Generally, Paddy prefers hot and humid climate. High temperature and heavy rainfall provide ideal conditions for the cultivation of paddy. It is fundamentally a kharif crop in India. It is also grown through irrigation in those areas that receives comparatively less rainfall. The paddy cultivation growing seasons vary in different parts of the country depending upon temperature, rainfall, soil types, water availability and other climatic conditions. The word "paddy" is derived from the Malay word *padi*, meaning "rice plant". Paddy is cultivated at least twice a year in most parts of India but mainly cultivated in Kharif season in Madhya Pradesh. Cultivation of paddy in Madhya Pradesh mainly depends on the monsoon. India has the largest paddy output in the world and is also the largest exporter of rice in the world (2020). In India, West Bengal is the largest rice producing state. The paddy cultivation plays a major role in socio-cultural life of rural India. On the other hand, Paddy fields are a major source of atmospheric methane. Paddy cultivation should not be confused with cultivation of deep water rice, which is grown in flooded conditions. Paddy raised in the well-watered lowland areas is known as lowland or wet Paddy. Rice is not an aquatic plant; it can survive in water but does not thrive under reduced oxygen levels. Hence the method of SRI proves better of paddy cultivation under optimum moisture content. Agricultural production includes two components. They are food grains and non-food grains. All food grains like Paddy, Wheat, Maize, Bajra, Jowar, Ragi, Bengal gram are the main food grain crops in India. All commercial crops are under the category of non-food grains. (Kasula Sekhara 2019) [5]. It can be said that the technological status and methods (practices) in agriculture, the paddy production and productivity is being recognized to change. The problem is that due to ignorance about improved practices in paddy cultivation and suitable methods of cultivation, general farmers were found to have not used judicious application of improved technology and suitable methods of cultivation (Yuan, 2002; Sivanagaraju, 2006) [1].

Botanical distribution of paddy
Kingdom- Plantae
Division- Magnoliophyta
Class- Liliopsida
Order- Cyperales
Family- Graminae
Genus- oryza
Species- Sativa
Sub species- Indica

Soil type for Paddy cultivation
Almost all type of soil can be used for paddy cultivation belonging to the region having high level of humidity, sufficient rainfall with irrigational facilities, and a high temperature. The major types of soils for rice cultivation are black soil, red soil (loamy and yellow), laterite soil, red sandy, and medium to shallow black soil. It can be even cultivated on silts and gravels. Selection of soil should be based on the organic matter content, if the cultivating soil has rich organic matter it is considered to be ideal soil for paddy cultivation. Paddy can be cultivated in both acidic as well as alkaline soil.

Field preparation: For good tillage suitable puddling of soil is required which can restrict the loss of water due to percolation and consequent loss of applied fertilizers. Ploughed the land 3-4 times and each ploughing should be followed by clod breaking operation. Incorporate recommended organic manure in the soil. Level the land properly before letting in water. Water should be let into the field when it is completely dry. Before transplanting, puddled the soil to minimize percolation losses of water.

Nutrient management: Fertilizers should preferably be applied on soil test basis. However, in absence of soil test, following fertilizer schedule may be adopted:

- Well decomposed FYM or any other organic manure @ 10 t/ha should be well incorporated in the soil at final preparation of land.
- For varieties planted in lower belts 120 kg N, 60 kg P2O5 and 30 kg K2O and 25 kg ZnSO4 per ha, respectively.

Half dose of nitrogen along with full dose of P2O5, K2O and ZnSO4 should be applied as basal dose before transplanting at the time of field preparation. Remaining half dose of nitrogen should be applied in two equal splits; one at early tillering stage, 15-18 days after transplanting and another one at panicle initiation stage, 38-42 days after transplanting. If zinc deficiency appears in standing crop, then foliar application of zinc sulphate at the rate of 20-25 g/litre water is sufficient to remove deficiency. In addition to for boron deficiency, foliar application of borax at the rate of 9.1 g or boric acid 5.9 g/litre water is sufficient to overcome the deficiency.

System of Rice Intensification
In SRI paddy cultivation, less quantity of seeds; 5 kg / ha has required. The System of Rice Intensification involves cultivating rice with as much organic manure as possible, starting with young seedlings planted singly at wider spacing in a square pattern; and with intermittent irrigation that keeps the soil moist followed by frequent inter cultivation with weeder called *tauchi gorma/ cono weeder*, that actively aerates the soil. Initially SRI is labour intensive. In SRI, we have transplanted 12-14 days old seedlings at the spacing of plant to plant and row to row 25 cm following square pattern of transplanting. Hence 16-20 plants come under per sq. m and number of total plants per ha. 160000. We have raised the nursery over the raised bed. SRI encourages rice plant to grow healthy with large root volume, profuse and strong tillers, non-lodging, big panicles, more and well filled grain panicles and higher grain weight and resistance against insect pests. Proponents of SRI have reported that the average rice yield with SRI is double the current average yield and can be increased to the level of three to four times. (Shekhar kumar Sinha and Jayesh Talati 2007). Today SRI is being adopted in many states in India and the response from farmers has been overwhelming seeing the benefits of the method, notwithstanding the constraints (Haldar *et al.*, 2012; Sarath and Thilak, 2004).

Methodology for location specific trial
Here at our location at Jawaharlal Nehru Krishi Vishwa Vidhyalaya, Krishi Vigyan Kendra, Chandangaon, Chhindwara (MP) we have planned to transplant through SRI, eight notified hybrid varieties of paddy. The main aim of this study is based on the location specific trials of paddy varieties. The main source of these varieties from College of Agriculture, Raichur, Karnataka. All varieties are notified kind of hybrids. The study is based on 6 parameters that are the indicators of varietal performance at our location. We considered yield as a main parameter to judge the varietal performance. Besides the cost incurred in paddy cultivation with traditional and SRI methods per hectare basis, the yield realized analysis for both the methods is the relevant tool where the prime motive of the activity is profit-measure in the production process. Economist for obvious reason has not developed suitable measures to evaluate cost, returns and

profit in terms other than money, because mostly yield goes on fluctuating with the several biotic and abiotic factors (Jaiswal *et al.*, 1996; Mohandas and Thomas, 1997; Jayapal Reddy *et al.*, 2013) [2].

Field count: Number of plants/earheads of seed crop which should be observed during field inspection as one unit depending upon the cropping pattern and crop is known as field count. There are different crop stages for field inspection to calculate the field count. In case of paddy 1 field count is based on 1000 ear heads. Observation of one count indicates seed plants, rouge, and other observations taken in the step's movement in the field. In paddy we observe the field crop at 6 different stages-

1. At the time of sowing
2. Pre flowering
3. Flowering stage
4. Post flowering and pre harvest stage
5. General performance of the crop
6. At the time of harvesting

$$\text{Number of steps required for one field count} = \frac{\text{No. of plants/earheads to be observed in one field count}}{\text{No. of plants observed in one step}}$$

Agricultural development should receive top priority because cost effective production can be raised more easily in this sector than in any other sectors. A country cannot think of a large-scale transfer of the farming population to non-farming sectors without sufficient food surpluses or considerable reduction in food deficits. (Dr. G.R. Gayathiri, 2017) [3].

In general, the field count for paddy in one step was 25 plants of seed crop. We have counted it in different stages of paddy field crop for all varieties.

Results and Discussion

During kharif, 2019 the average data are presented in Table 1 revealed that minimum plant height observed with the variety of SIRI- 1253 (37.1 cm.) while maximum plant height observed with the variety of BPT 52-04 (50.8 cm.). Maximum number of tillers per plant observed with the variety of GNV 10-89 (18.9 tillers) while minimum observed in RP-BIO 226 (12.6 tillers). The highest seed weight observed with the variety of GNV 10-89 (29.3 gm/1000 seed) whereas lowest grain weight observed 18.7 gm. with the variety of SIRI-1253. Maximum yield of paddy were recorded with the variety of GNV 10-89 (50.70 q/ha) followed by BPT 52-04 (49.43 q/ha), IET 19251(49.10 q/ha), CSR-22 (46.61 q/ha) and GGV-05-01 (44.12 q/ha) respectively whereas minimum yield were recorded with the variety of RP-BIO 226 (41.32 q/ha) (Fig. 1 and 2).

Table 1: Performance of different paddy varieties during Kharif, 2019

S. no.	Name of variety	No. of plants sqm^{-1}	Average plant height, cm (10 plant)	Average no. of tillers plant^{-1}	Average grain weight, gm plant^{-1}	Weight of 1000 seeds	Yield q ha^{-1}
1.	GGV-05-01	20	47.9	15.4	45.4	19.8	44.12
2.	CSR-22	20	51.1	16.7	60.5	25.9	46.61
3.	GNV 10-89	20	42.2	18.9	68.2	29.3	50.70
4.	PNR 150-48	20	44.9	12.8	58.3	24.5	43.11
5.	SIRI- 1253	20	37.1	14.7	41.3	18.7	44.44
6.	BPT 52-04	20	50.8	18.7	56.8	22.9	49.43
7.	IET 19251	20	44.7	18.0	53.7	21.6	49.10
8.	RP-BIO 226	20	41.2	12.6	49.4	20.1	41.32

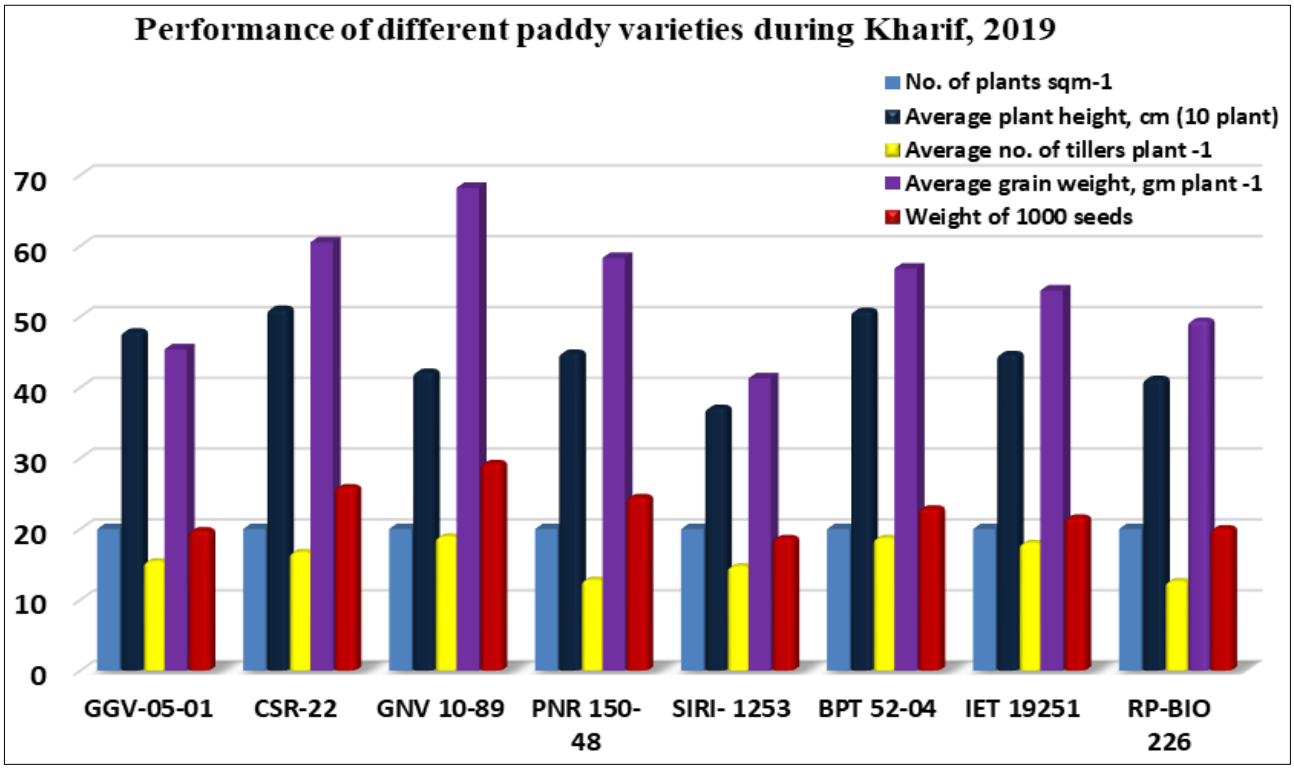

Fig 1: Performance of different paddy varieties during Kharif, 2019

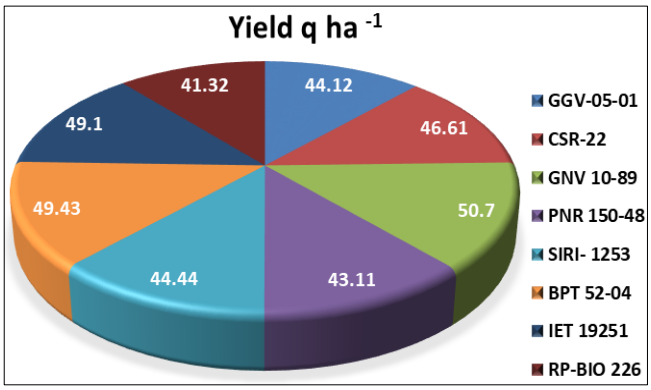

Fig 2: Yield of different paddy varieties during Kharif, 2019

During kharif, 2019 the average data are presented in Table 2 revealed that minimum plant height observed with the variety of SIRI- 1253 (37.0 cm.) while maximum plant height observed with the variety of BPT 52-04 (50.6 cm.). Maximum number of tillers per plant observed with the variety of GNV 10-89 (18.5 tillers) while minimum observed in RP-BIO 226 (13.6 tillers). The maximum seed weight observed with the variety of GNV 10-89 (28.7 gm/1000 seed) whereas lowest grain weight observed 18.9 gm. with the variety of SIRI-1253. Maximum yield of paddy were recorded with the variety of GNV 10-89 (50.90 q/ha) followed by BPT 52-04 (50.46 q/ha), IET 19251(49.78 q/ha), CSR-22 (47.11 q/ha) and GGV-05-01 (44.51 q/ha) respectively whereas minimum yield were recorded with the variety of RP-BIO 226 (42.54 q/ha) (Fig. 3 and 4).

Table 2: Performance of different paddy varieties during Kharif, 2020

S.no.	Name of variety	No. of plants sqm^{-1}	Average plant height, cm (10 plant)	Average no. of tillers plant^{-1}	Average grain weight, gm plant^{-1}	Weight of 1000 seeds	Yield q ha^{-1}
1.	GGV-05-01	20	47.1	14.9	45.9	20.1	44.51
2.		20	50.1	15.7	61.5	25.2	47.11
3.	GNV 10-89	20	41.9	18.5	68.9	28.7	50.90
4.	PNR 150-48	20	43.9	12.1	59.1	25.1	44.20
5.	SIRI- 1253	20	37.0	14.5	42.3	18.9	44.92
6.	BPT 52-04	20	50.6	17.7	56.6	23.4	50.46
7.	IET 19251	20	44.8	18.4	53.9	22.5	49.78
8.	RP-BIO 226	20	41.4	13.6	49.9	21.1	42.51

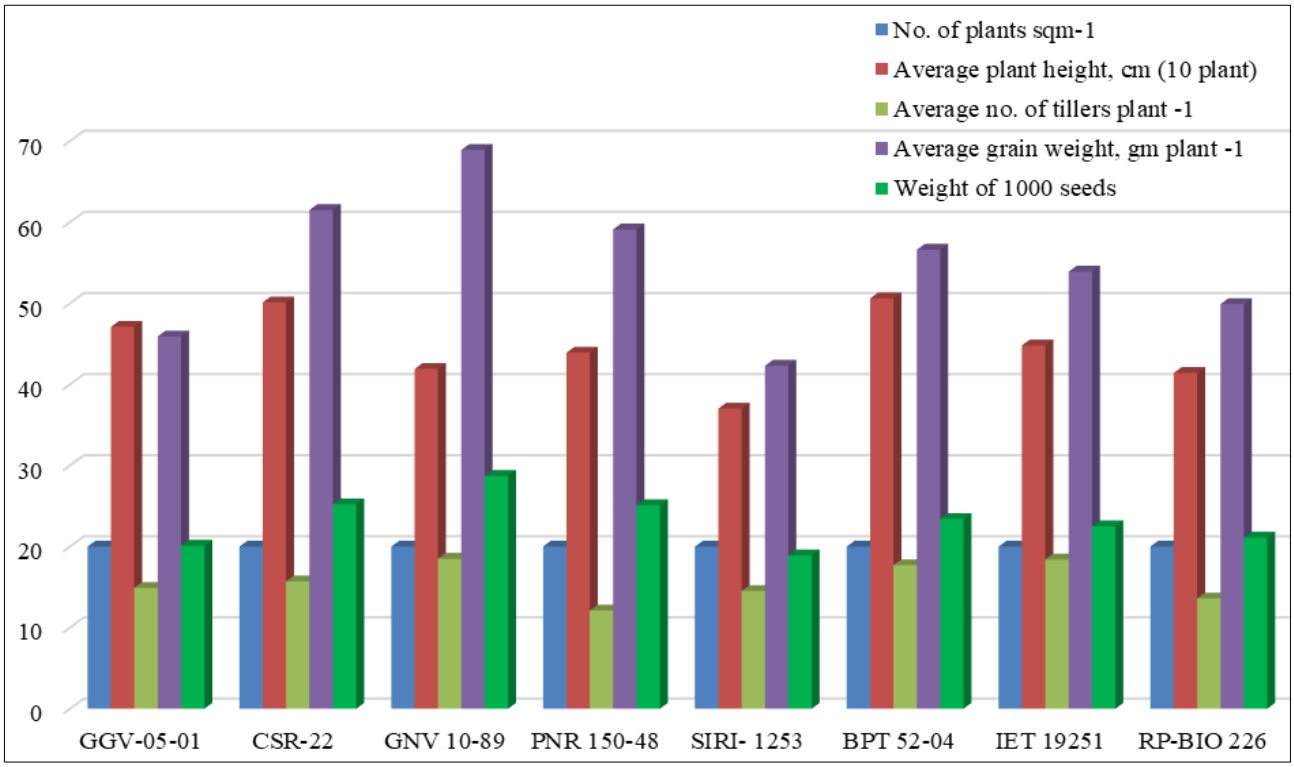

Fig 2: Performance of different paddy varieties during Kharif, 2020

Pooled data revealed that minimum plant height observed with the variety of SIRI- 1253 (37.05 cm.) while maximum plant height observed with the variety of BPT 52-04 (50.7 cm.). Maximum number of tillers per plant observed with the variety of GNV 10-89 (18.7 tillers) while minimum observed in RP-BIO 226 (13.1 tillers). The maximum seed weight observed with the variety of GNV 10-89 (29.00 gm/1000 seed) whereas lowest grain weight observed 18.80 gm. with the variety of SIRI- 1253. Maximum yield of paddy were recorded with the variety of GNV 10-89 (50.90 q/ha) followed by BPT 52-04 (50.80 q/ha), IET 19251(49.95 q/ha), IET 19251 (49.44), CSR-22 (46.86 q/ha) and GGV-05-01 (44.32 q/ha) respectively whereas minimum yield were recorded with the variety of RP-BIO 226 (41.92 q/ha) (Table 3).

Table 3: Average Performance of different paddy varieties during Kharif, 2019 and 2020

S. No.	Name of variety	No. of plants sqm^{-1}	Average plant height, cm (10 plant)	Average no. of tillers $plant^{-1}$	Average grain weight, gm $plant^{-1}$	Weight of 1000 seeds	Yield q ha^{-1}
1.	GGV-05-01	20	47.50	15.15	45.65	19.95	44.32
2.	CSR-22	20	50.60	16.20	61.00	25.55	46.86
3.	GNV 10-89	20	42.05	18.70	68.55	29.00	50.80
4.	PNR 150-48	20	44.40	12.45	58.70	24.80	43.66
5.	SIRI- 1253	20	37.05	14.60	41.80	18.80	44.68
6.	BPT 52-04	20	50.70	18.20	56.70	23.15	49.95
7.	IET 19251	20	44.75	18.20	53.80	22.05	49.44
8.	RP-BIO 226	20	41.30	13.10	49.65	20.60	41.92

Conclusion

This study for location specific trial of different paddy variety indicates that the varietal performance of all 8 variety is good over the climatic conditions of Satpura region. The quantification of yield gap among the varieties with SRI method of paddy cultivation revealed that the SRI method of paddy cultivation with these 8 varieties gave average higher yield in terms of grain product. SRI application with these 8 notified kinds of varieties produces higher yield with increased exposure of crop to sunlight and macro-micro nutrients produce more effective root system. It will have a shorter crop cycle, less need for seeds and fertilizer, less chaffy grain because of higher percentage grain filling, little or no lodging from wind or rain and higher head rice recovery rate, so more milled rice from a given amount of paddy.

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