

# **Participatory variety selection and adaptation performance of the varieties in diverse climatic situation**



## **Report**

**Submitted by**

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**Title:** Participatory Variety Selection and adaptation performance of the varieties in diverse climatic situation

**Investigation issue:** Use long duration variety; Swarna to manage the drought, BRRIdhan49, Provide supplemental irrigation (if there scope), Use additional chemical fertilizer to meet-up the loses.

**Model:** Participatory Variety Selection and adaptation performance of the varieties in diverse climatic situation.

**Objectives:** To identify adaptive rice variety in Rainfed area.

### **Materials & Methods:**

The experiment was conducted in 3 SAFBIN projects sites namely Paba, Boraigram and Potnitola upazillas of greater Rajshahi. In each upazilla there was one PVS trial (one for each upazilla).

**Cultivar:** Relatively short duration drought tolerant and drought escaping varieties are selected for this trial. The varieties will be: V1= BINADhan7, V2= BRRIDhan56, V3= BRRIDhan57 and V4= BRRIDhan49.

**Design** The trial was laid out in RCBD with 3 replications. Individual plot size was 6 m x 4 m with 4 border rows alongside the whole experimental field. 21 – 25 days old seedlings were transplanted having 3-4 seedlings per hill with spacing 20 cm X 15 cm.

**Fertilizer Mgt:** The following fertilizers were used:

Urea: 180 kg/ha applied in 3 equal splits (1<sup>st</sup> split 10 days after transplanting (DAT) + 2<sup>nd</sup> split 25 days DAT and 3<sup>rd</sup> split at the panicle initiation stage.

TSP: 75 kg/ha applied before final land preparation.

MOP: 90 Kg (½ at the basal + ½ with the 2<sup>nd</sup> top dress of urea)

Gypsum: 60 Kg/ha

**Pest Mgt:** Perching and judicious pesticide were used. In case of stem borer attack Virtako were applied. When rice bug infestation noticed at the flowering stage then any melathion sprayed avoiding pollination time (10 AM-14 AM). Rat infestation controlled by using bait, watering or put carefully Phostoxin tablet inside hole and blocked hole with mud.

**Participatory Variety Selection:** In each site a field day was arranged where farmers (both male & female), academician, seed dealer, reporter, livestock officer and other service providers from GO & NGO were participated in the voting process. In Patnitala, Paba and Baraigram total voters were 19, 20 and 62 respectively. Each voter receives 5 ballots (marbel) and casted vote in their preferred variety. Voting data were analyzed by preference analysis (PA) using the “**The preference index (PI)**” (IRRI). The preference index (PI) for each variety was calculated following the formula

$$\text{PI} = (\text{No. of votes for variety}) / (\text{total votes cast})$$

**Data Recording:** Name of the cultivar, date of seeding, date of transplanting, seedling age, flowering date, number of productive tiller per hill, farmers preference score, date of Maturity, date of harvest, yield and yield components (harvested 10 m<sup>2</sup> for each variet and replication.

Data Analysis: Combined analyses were performed for growth duration, fertile tillers, thousand grain weight and yield using CROPSTAT 7.2.

## Results

Combined analyses of the data obtained from baby trial viz. growth duration, fertile tiller, thousand grain weight and yield of the rice varieties BRRIdhan56, BRRIdhan57, BRRIdhan49, BINAdhan7 are presented in (Table 1 and 2) and Fig. 1 and 2. Growth duration varied significantly among the varieties. Similarly location had significant effect on growth duration so was interaction effect between variety x location (Figure 1). BRRIDhan56 was taken lowest time at all location and highest growth duration was recorded by BRRIDhan49 at all the three location. The result indicating that local agro-climatic condition of the trial location had strong effect on the growth duration of a particular variety.

The yield performance of four rice variety was shown in table 1. Fertile tiller production differed among the varieties but locations and their interaction with variety was not significant (Table 2). BRRIDhan49 was produced significantly highest number of fertile tiller at all the location, similar result was also observed for BINADhan7 at Paba only. In case of total grain weight variety, location and there interaction was significantly differed. Among the varieties the most slender grain recorded in BRRIDhan56 followed by BINA dhan7. The lowest total grain weight was recorded for BRRIDhan49. BRRIDhan49 was produced significant grain yield at all the location followed by BINADhan7 at Paba and Baraigram location. There was no significantly differences among the four varieties was grown at Baraigram. The lowest yield was recorded for BRRIDhan57 for all location significantly.

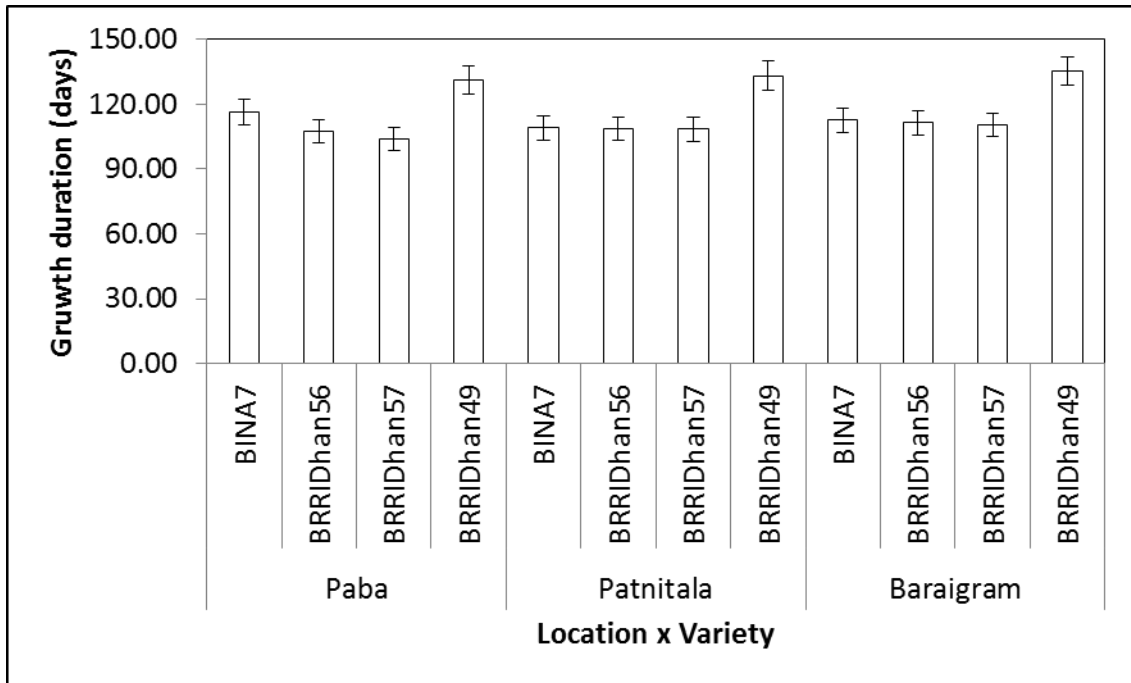
Three-location trail of four rice variety was evaluated for yield performance was shown in table 2. Grain yield analysis revealed that variety significantly varied (Table 1). Mean factorial effect of location and vareity on fertile tillers, grain weight (gm) and yield are compared using LSD test. The location trial was significant for each variety. There was no significant difference among location for BINADhan7 and BRRIDhan49 for fertile tiller/hill but BRRIDhan56 and BRRIDhan57 showed significantly different fertile tiller at all location. The highest number of fertile tiller was recorded at Paba for all varieties. In case of total grain weight, all location was not significantly different for BRRIDhan56 & 57. The highest and significant total grain weight was produced at Patnitala by all varieties.

Irrespective of variety, grain yield among the location varied significantly with the least yield obtained from the location Patnitala. Grain yield in location was not significantly differing for BRRIDhan56 & 57. Among the location the highest mean of yield was recorded in Paba for all varieties.

A scatter plot of four rice variety and three locations on yield are shown in Fig. 2. Highest yield recorded in BINADhan7 (4.82 t/ha) at Paba and the lowest yield was found in BRRIDhan57 at Baraigram. It is necessary to mention that among the location Baraigram is highly drought prone location compared to other two locations. While in other locations Patnitala gave intermediate yield with all varieties. The grain yield was significantly different with BRRIDhan57 and BRRIDhan56. On same location BRRIDhan49 and BINADhan7 had lowest differences. At Baraigram, all varieties produced comparatively lowest grain yield. Grain yield of BINADhan7,

BRRIDhan56 and BRRIDhan49 was less differences at Baraigram. In the North west Bangladesh drought is a common phenomenon rainfall usually ceases in October that affects long duration rainfed rice's very severely than short duration rice. Among the variety tested BRRI dhan56 found most droughts tolerant and gave consistently higher yield among the short duration varieties. BRRI dhan57 and BINAdhan7 are drought escaping.

Detail results of PVS are shown in Table 3. Preference analysis revealed that in all the BRRI dhan56 was the most preferred variety with highest preference index (PI) followed by BRRI dhan57 and BINA dhan7. BRRIdhan56 has unique drought tolerant capacity with good yield potential and less risk for the region. Meaning in severe drought years it can produce acceptable yield about 3.5 t/ha but in normal year 4.5- 5.0 t/ha. Interestingly, after harvest of BRRI dhan56 farmers can get opportunity to grow second crops like lentil, chickpea, grass pea, linseed and barley using residual moisture under complete rainfed situation that in consequent increase farm productivity and income.



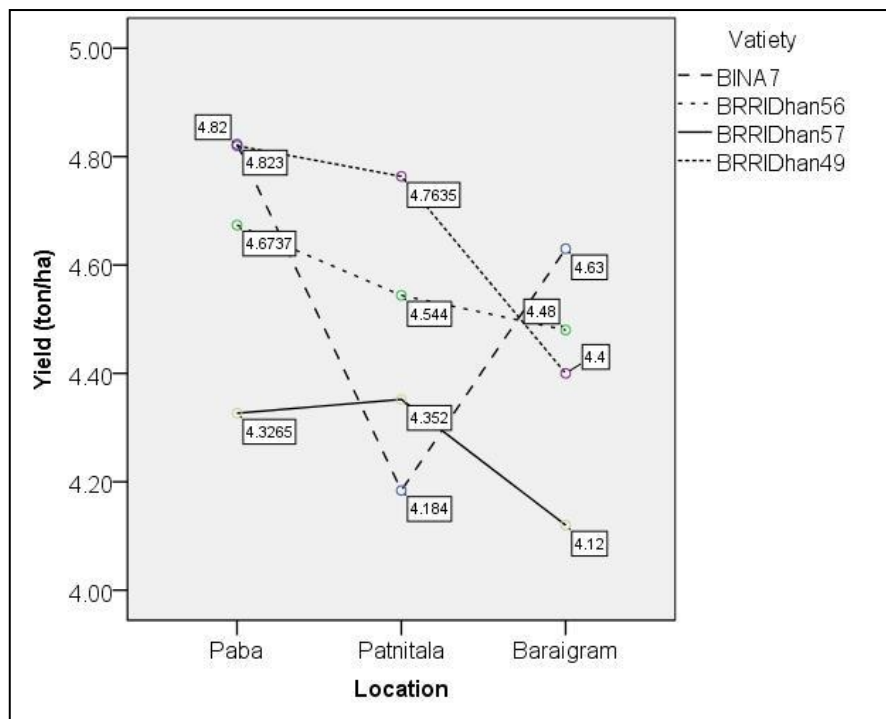
**Figure 1.** Effect of location and variety on growth duration of four rice varieties.

**Table 1.** Yield performance of four rice variety grown in three locations. Data presents mean value with standard error. Differences among varieties by LSD at 5% level.

Location	Variety	Yield components		
		Fertile tiller/hill	Total grain weight (gm)	Yield (ton/ha)
Paba	BINA7	15.200±0.605 a	21.040±0.078 b	4.823±0.040 a
	BRRIDhan56	11.133±0.350 b	23.130±0.045 a	4.674±0.023 b
	BRRIDhan57	12.850±0.428 b	19.120±0.055 d	4.327±0.029 c
	BRRIDhan49	15.333±1.105 a	20.100±0.142 c	4.820±0.074 a
Patnitala	BINA7	13.940±0.558 b	23.400±0.297 a	4.184±0.170 c
	BRRIDhan56	10.460±0.228 c	22.900±0.121 ab	4.544±0.070 ab
	BRRIDhan57	11.460±0.395 c	19.000±0.210 c	4.352±0.120 bc
	BRRIDhan49	16.910±0.279 a	22.450±0.148 b	4.764±0.085 a
Baraigram	BINA7	14.800±0.568 b	20.520±0.157 b	4.630±0.159 a
	BRRIDhan56	11.700±0.328 c	23.010±0.091 a	4.480±0.092 a
	BRRIDhan57	12.100±0.402 c	19.075±0.111 d	4.120±0.112 a
	BRRIDhan49	16.667±1.037 a	19.900±0.287 c	4.400±0.290 a

**Table 2.** Multi-location trial of four rice variety for the evaluation of yield performance. Data presents mean value with standard error. Differences among location by LSD at 5% level.

Variety	Location	Yield components		
		Fertile tiller/hill	Total grain weight (gm)	Yield (ton/ha)
BINA7	Paba	15.200±0.806 a	21.040±0.106 b	4.823±0.135 a
	Patnitala	13.940±0.140 a	23.400±0.150 a	4.184±0.191 b
	Baraigram	14.800±0.806 a	20.520±0.106 c	4.630±0.135 ab
BRRIDhan56	Paba	11.133±0.289 ab	23.130±0.104 a	4.674±0.075 a
	Patnitala	10.460±0.289 b	22.900±0.104 a	4.544±0.075 a
	Baraigram	11.700±0.289 a	23.010±0.104 a	4.480±0.075 a
BRRIDhan57	Paba	12.850±0.321 a	19.120±0.073 a	4.326±0.068 a
	Patnitala	11.460±0.454 b	19.000±0.103 a	4.352±0.096 a
	Baraigram	12.100±0.321 ab	19.075±0.073 a	4.120±0.068 a
BRRIDhan49	Paba	15.333±0.801 a	20.100±0.372 b	4.820±0.149 a
	Patnitala	16.910±0.310 a	22.450±0.144 a	4.764±0.058 ab
	Baraigram	16.667±0.801 a	19.900±0.372 b	4.400±0.149 b



**Figure 2.** Scatter plot of genotype x environment interaction of four rice variety grown in three locations of Rajshahi Division.



Table 8. Participatory Variety Selection from Mother Trial in 3 districts of Rajshahi, Natore and Naogaon, T Aman 2013.

Variety	Paba					Patnitala					Baraigram				
	Voter (no.)	Total Ballots	Attained Vote	PI	Pre. Position	Voter (no.)	Total Ballots	Attained Vote	PI	Pre. Position	Voter (no.)	Total Ballots	Attained Vote	PI	Pre. Position
BRRIdhan56	20	80	32	0.40	1st	30	120	45	0.37	1st	35	140	71	0.51	1st
BRRIdhan57	20	80	22	0.27	2nd	30	120	24	0.20	3rd	35	140	24	0.17	3rd
BRRIdhan49	20	80	10	0.13	4th	30	120	31	0.26	2nd	35	140	04	0.03	4th
BINAdhan7	20	80	16	0.20	3rd	30	120	20	0.17	4th	35	140	41	0.29	2nd