

Effectiveness of different organic and inorganic combination on soil fertility and water holding capacity
of rice field



Report

Submitted by

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Title: Less organic matter, less fertility and water holding capacity of soil

Investigation issue: Land become crack (high capillary rise of water), limit nutrients uptake, less vegetative growth and yield decreased.

Model: Less organic matter, less fertility and water holding capacity of soil.

Objectives:

- i. To identify best source of organic fertilizer & optimum combination of urea & MOP for achieving of high yield.
- ii. To improve & sustain soil health and water holding capacity in order to minimize drought effect.

Materials & Methods

The experiment was conducted in 3 SAFBIN projects sites namely Paba, Boraigram and Potnitolaupazillas of greater Rajshahi. In each upazilla there was one PVS trial (one for each upazilla). Use Organic Manure (FYM+ green manure + poultry litter & inorganic fertilizer (NPK)

Cultivar: Relatively short duration drought tolerant and drought escaping variety BRRIdhan56 was selected for this trial.

Treatment: T1 = 6 (P.L) + 0.18 (N) + 0.075 (P) + 0.09 (K) and T2 = 6 (F.Y.M) + 0.18 (N) + 0.075 (P) + 0.09 (K). Here, P.L = Poultry litter and F.Y.M = Farm yard manure

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 (1st split 10 days after transplanting (DAT) + 2nd split 25 days DAT and 3rd 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 2nd 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: Growth duration (days), fertile tiller/hill, thousand grain weight (gm) and yield (ton/ha) was harvested 10 m² for each plot and replication.

Data Analysis: Combined analyses were tested with Duncan’s Multiple Range Test (DMRT) (Gomez and Gomez, 1984). Simple correlation co-efficient and scatter plot diagram was done to determine the relationships between grain yield and its components with the help of IBM SPSS statistics v20 programme.

Results

Influence of organic and inorganic (T1= Poultry+1/2NPKS, T2= FYM+1/2NPKS) fertilization on plant height and fertile tiller of BRRIDhan56 gown in three locations trails are shown in Fig.1. The highest plant height (114.80

cm) was recorded in Patnitala using T₁ treatment (poultry litter + 1/2 Chemical fertilizer) and the lowest plant height (109.80 cm) was observed in Patnitala with T₂ treatment (FYM + 1/2 Chemical fertilizer). Whereas plant height 112.20 cm and 113.20 cm were noted in Paba using T₁ and T₂ treatment respectively and 110.60 cm and 111.80 cm were noted in Baraigram using T₁ and T₂ treatment respectively. Maximum fertile tiller per hill (11.60) was observed in Baraigram with T₁ treatment (poultry litter + 1/2 Chemical fertilizer) and minimum fertile tiller per hill was noted (9.80) in Patnitala with T₁ treatment (poultry litter + 1/2 Chemical fertilizer). Whereas with T₂ treatment (FYM + 1/2 Chemical fertilizer) in both Paba and Baraigram fertile tiller per hill was 11.20 and with T₂ treatment (FYM + 1/2 Chemical fertilizer) in Paba and Patnitala fertile tiller per hill was 10.60 and 10.20 respectively.

A scatter plot of organic and inorganic (T₁= Poultry+1/2NPKS, T₂= FYM+1/2NPKS) fertilization on yield of BRRIDhan56 grown in three locations was shown in Fig.2. Among the location, the fertilization of FYM+1/2NPKS was produced higher grain yield than poultry litter+1/2NPKS at Patnitala and Baraigram locations but the yield was reduced at Paba location. The highest was observed at Baraigram using FYM+1/2NPKS and the lowest yield was recorded at Paba location using same fertilization.

Two correlation between yield (ton/ha) and fertile tiller/hill using organic and inorganic (A= Poultry+1/2NPKS, B=FYM+1/2NPKS) fertilization in three locations was presented in Fig.2. The fertile tiller had significant correlation with yield using poultry+1/2NPKS at all location. On the other hand similar correlation was observed using FYM+1/2NPKS at three locations.

Detail results of PVS are shown in Table 2. Preference analysis revealed that poultry litter + ½ NPKS was the most preferred fertilization grown at Paba and Baraigram location. On the other hand FYM + 1/2NPKS was preferable fertilization at Patnitala location.

Table 1. Influence of organic and inorganic fertilization on yield components of BRRIDhan-56 rice variety grown in three location trails. Data presents mean value with standard error and differences within location × fertilizers by LSD at 5% level.

Yield components					
Location	Fertilizers	Plant height	Fertile tiller/hill	1000 grain weight (gm)	Yield (ton/ha)
Paba	T1	112.200±3.057a	10.600±.681a	23.040±0.101a	4.460±0.161a
	T2	113.400±3.057a	11.200±.681a	23.180±0.101a	4.310±0.161a
Patnitala	T1	114.800±3.057a	9.800±.681a	23.000±0.101a	4.446±0.161a
	T2	109.800±3.057a	10.200±.681a	23.200±0.101a	4.600±0.161a
Baraigram	T1	110.600±3.057a	11.600±.681a	23.120±0.101a	4.540±0.161a
	T2	111.800±3.057a	11.200±.681a	23.280±0.101a	4.640±0.161a

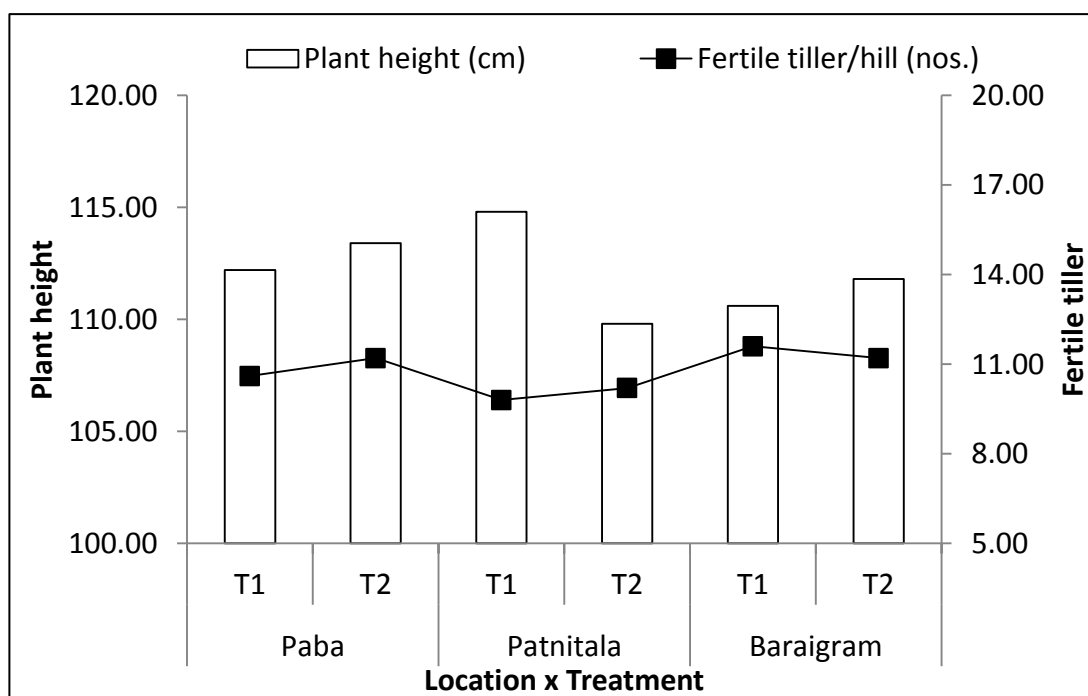


Figure 1. Influence of organic and inorganic (T1= Poultry+1/2NPKS, T2= FYM+1/2NPKS) fertilization on plant height and fertile tiller of BRRIDhan56 gawn in three locations trails.

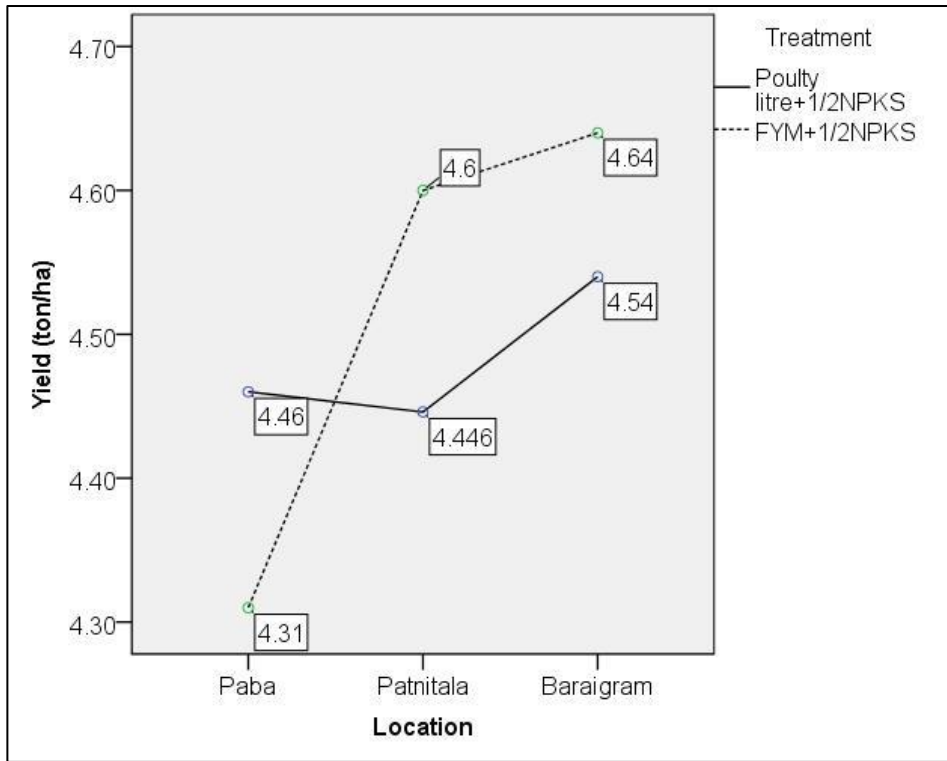
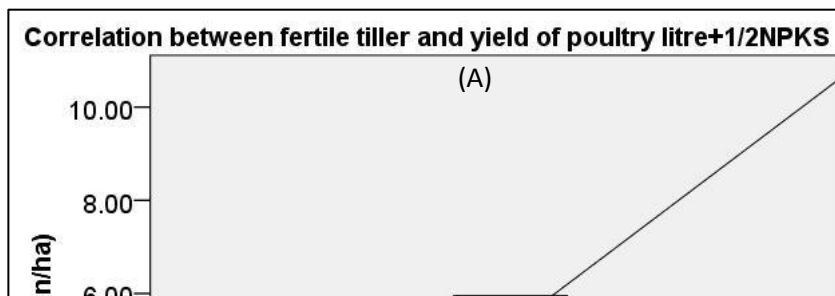


Figure 2. Scatter plot diagram of organic and inorganic (T1= Poultry+1/2NPKS, T2= FYM+1/2NPKS) fertilization on yield of BRRIDhan56 grown in three locations.



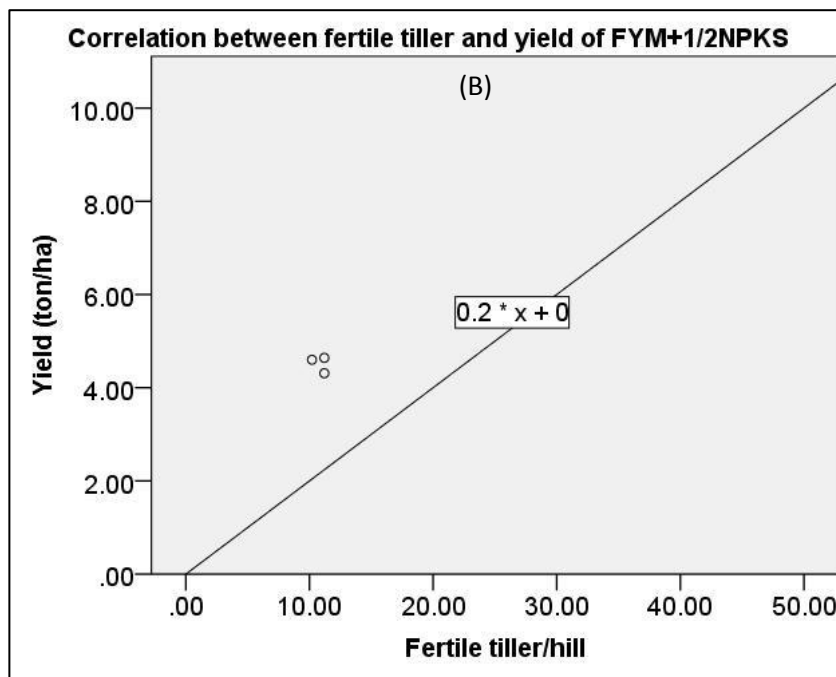


Figure 2. Correlation between yield (ton/ha) and fertile tiller/hill using organic and inorganic (A= Poultry+1/2NPKS, B= FYM+1/2NPKS) fertilization in three locations of Rajshahi Division.

Table 2. 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
BINA dhan7	20	80	16	0.20	3rd	30	120	20	0.17	4th	35	140	41	0.29	2nd