J. Agrofor. Environ. 3 (1): 13-15, 2009 ISSN 1995-6983

Effects of variety and source of compost on the yield and yield components of lentil

S. Barman, M.S.U. Bhuiya and M.Z. Haque
Department of Agronomy, Bangladesh Agricultural University, Mymensingh-2202

Abstract: A field experiment followed by a randomized complete block design with four replications was carried out at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensigh, during the *Rabi* season of 2007 to 2008 with a view to studying the effects of variety and compost from different sources on the yield and yield components of lentil. The varieties BINA masur 2, BARI masur 3 and BARI masur 4 as well as compost of *Mimosa invisa, Sesbania rostrata, and Sesbania aculeata* were included in the study. The results showed that variety had significant effect on plant height (cm), number of branches plant^{-1}, effective tillers plant^{-1}, non effective tillers plant^{-1}, total pods plant^{-1}, total seeds plant^{-1}, 1000-seed weight (g), seed yield (kg ha^{-1}), straw yield (kg ha^{-1}), and biological yield (kg ha^{-1}) except harvest index (%).The highest seed yield was produced by the variety BARI masur 3 (946 kg ha^{-1}) and the lowest by BARI masur 4 (900 kg ha^{-1}). Compost significantly influenced number of branches plant^{-1}, effective tillers plant^{-1}, non-effective tillers plant^{-1}, total pods plant^{-1}, total seeds plant^{-1}, seed yield (kg ha^{-1}), straw yield (kg ha^{-1}), biological yield (kg ha^{-1}), and harvest index (%) of lentil. Other yield components like plant height (cm) and 1000-seed weight (g) were not significantly influenced by compost. The highest seed yield (986 kg ha^{-1}) was given by *Mimosa invisa* compost followed by *Sesbania aculeata* and *Sesbania rostrata*. The highest seed yield (1033 kg ha^{-1}) was recorded from the interaction of BARI masur 3 and *Mimosa invisa* compost. Thus from the results of the experiment, it may be concluded that *Mimosa invisa* may be used as compost for growing lentil.
Key words: Compost, Lentil, Yield components, yield.

Introduction

Lentil (*Lens culinaris L.* Medik) is one of the most important pulse crops grown in Bangladesh. It belongs to the sub family Papilionaceae under the family Leguminosae. In Bangladesh, it is popularly known as *Masur*. The lentil crop covers 44 percent of the total area under pulses and shares approximately 45 percent of the total requirement of pulse in the country (BBS, 2007). Total production of lentil in Bangladesh during 2006-2007 was 1,17,000 tons from an area of 1,37,652 hectares with an average yield of 0.84 ton ha^{-1} (BBS, 2007). It occupies a unique position in the world of agriculture by virtue of its high protein content and capacity for fixing atmospheric nitrogen. In a developing country like Bangladesh, pulse constitutes the major concentrate source of dietary protein. It is considered as poor man's meat as it is the cheapest source of protein for under privileged people who can not afford to buy animal protein (Gowda and Kaul, 1992).

At present, pulses are beyond the reach of the poor people because of its sky kissing price. In Bangladesh, capita^{-1} day^{-1} consumption of pulse is only 11g (BBS, 2007) while the World Health Organization (WHO) suggests to intake at least 45g of pulses capita^{-1} day^{-1}. It clearly indicates that the consumption of pulses by Bangladeshi people in their daily diet is far below than the recommendation. The protein content of lentil seed is found to vary from 25.70 to 33.40 percent (Singh *et al.*, 2001). The Stover of the plants together with husk is popularly known as *Bhushi* is a high protein concentrate feed for cattle, horse, pig and sheep (Tomar *et al.*, 2000). Lentil being a legume crop can fix atmospheric nitrogen through root nodule by *Rhizobium* bacteria which may reduce the pressure of nitrogenous fertilizer application to the crops. It is evident that pulse containing cropping pattern helped to increase organic matter in the soil (Islam, 1998).

Sesbania rostrata, Sesbania aculeata and Mimosa invisa are legume crops in Bangladesh, can be used for the preparation of quality compost. These can be used in the soil for increasing the organic matter status and thereby nourishing the subsequent crop. Researchers from different countries of the world evaluated the beneficial effects of *Sesbania rostrata* and *Mimosa invisa* as green manure as well as weed suppressing crops (Kaufusi and Asghar, 1990; Kumar, 1996). In Bangladesh, scientists have already explored the possibilities of increasing soil organic matter and supply of nutrient to the subsequent crop through green manuring of *Sesbania rostrata* and *Mimosa invisa* and the positive response in enhancing soil organic matter has already been documented (Barman *et al.*, 2005 and Nasrin, 2005).But their uses as compost need to be explored.

Sesbania rostrata and *Mimosa invisa* are newly introduced legume species in Bangladesh. These could be easily used as composting materials. Lentil is a crop of legume family which needs less nitrogen as it can fix atmospheric N by its own mechanism. Therefore, compost of legume crops may be used for lentil production with less cost to meet the requirement of N as well as to enrich the soil health. The study on growing pulse crop with compost is limited. In these circumstances, there is a need to formulate an input package with source of compost, so that it will be technically effective and feasible, economically viable, socially acceptable and environment friendly for lentil production. In view of the above facts a study was, therefore, undertaken to reveal the effect of variety and source of compost on the yield components and yield of lentil.

Materials and Methods

The experiment was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University (BAU), Mymensigh during the period from November 2007 to March 2008. The land was medium high having sandy loam soil and belongs to Sonatola series under the non - calcareous dark-grey floodplain soil of Old Brahmaputra floodplain AEZ-9 (UNDP and FAO, 1988). The experiment was consisted of two factor, Variety viz. BINA masur 2, BARI masur 3, BARI masur 4 and Compost viz. 'Lajjabati' (*Mimosa invisa*), African dhaincha (*Sesbania rostrata*), Deshi dhaincha (*Sesbania aculeata*). The experiment was laid out in a randomized complete block design with four replications. The unit plot size was 5m^2. Compost from different sources like *Sesbania rostrata, Sesbania aculeata* and *Mimosa invisa* were prepared in

three different pits. The crops were grown in separate fields and cut into pieces before flowering stage. The cut pieces were then put in the pits and covered with soils. After three months the decomposed compost were used in the experimental plots.

The land was manured with the compost prepared from *Sesbania rostrata*, *Mimosa invisa* and *Sesbania aculeata* @ 15 ton ha^{-1}. The whole amount of compost from different sources was applied during land preparation.

Seeds of lentil of the cultivars were collected from the Bangladesh Agriculture Research Institute (BARI), Gazipur and the Bangladesh Institute of Nuclear Agriculture (BINA) Mymensigh. Seeds with 92% germination capacity were sown uniformly in 30cm apart lines in hand made furrows on 25 November 2007 @ 13 kg ha^{-1} and covered with soil by hand.

After the emergence of seedlings, gap filling was done. Two times weeding were done to control weeds. The crop was harvested at full maturity on 18 March 2008. The harvested crop was brought to the threshing floor and dried for three days. There the seeds and straw were separated and cleaned. The cleaned seeds were dried in sun for 3-4 consecutive days. The yield of seed was adjusted at 12% moisture content.

Data were recorded on plant height (cm), branches $plant^{-1}$, effective and non-effective tillers $plant^{-1}$, pods $plant^{-1}$, seeds $plant^{-1}$, 1000-seed weight (g), seed yield $plant^{-1}$, straw yield $plant^{-1}$ were recorded from randomly selected plants of each plot. The yield/ha was estimated from the yield/plant. The data were analyzed statistically and the mean differences were evaluated by least significance difference (Gomez and Gomez, 1984).

Results and Discussion

The result showed that the variety exerted significant influence on all parameter except harvest index. The highest Seed yield (946 kg ha^{-1}) was recorded in the BARI masur 3. The highest seed yield in the BARI masur 3 was attributed due individual seed weight. The lowest seed yield (900 kg ha^{-1}) was produced by the BARI masur 4. The highest plant height (42.55 cm), Straw yield (1317 kg ha^{-1}) and biological yield (2262 kg ha^{-1}) was produced by the BARI masur 3 as shown in Table 1.

Table1. Effect of variety on yield contributing characters of lentil

Variety	Plant height (cm)	Branches $plant^{-1}$	Effective tillers $plant^{-1}$	Non-effective tillers $plant^{-1}$	Total pods $plant^{-1}$	Total seeds $plant^{-1}$	1000-seed weight (g)	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Biological yield (kg ha^{-1})
BINA masur 2 (V_1)	40.00 b	4.00 a	89.83 a	7.31 a	97.14 a	149.42 a	22.61 b	940 a	1274 a	2214 a
BARI masur 3 (V_2)	42.55 a	3.77 b	73.57 b	4.86 b	78.43 b	113.40 b	24.17 a	946 a	1317 a	2262 a
BARI masur 4 (V_3)	37.90 c	3.93 a	72.62 b	7.43 a	80.05 b	116.73 b	25.15 a	900 b	1203 b	2103 b
Sx̄	0.59	0.05	0.91	0.10	0.89	1.77	0.41	0.013	0.016	0.021
LS	**	**	**	**	**	**	**	**	**	**
CV (%)	6.13	4.42	4.01	5.04	6.63	4.84	5.88	4.98	4.27	5.37

In each column, figures bearing common letter(s) don't differ significantly as per DMRT at 1% level of significance, ** = Significant at 1% level of probability, NS = Not significant, CV = Coefficient of variation, LS = Level of significance.

Compost showed significant influence on branches $plant^{-1}$, effective tillers $plant^{-1}$, non- effective tillers $plant^{-1}$, total pods $plant^{-1}$, total seeds $plant^{-1}$, straw yield (kg ha^{-1}) and biological yield (kg ha^{-1}). The highest seed yield (986 kg ha^{-1}) was recorded from the compost *Mimosa invisa*. The lowest seed yield (819 kg ha^{-1}) was produced by Control plot. The highest number of branches $plant^{-1}$ (4.11), effective tillers $plant^{-1}$(81.89), non- effective tillers $plant^{-1}$ (7.31), total pods $plant^{-1}$ (89.20), total seeds $plant^{-1}$ (134.84), straw yield (1403 kg ha^{-1}) and biological yield (2390 kg ha^{-1}) were produced by the compost *Mimosa invisa* as shown in Table 2.

Table 2. Effect of compost on yield contributing characters of lentil

Compost	Branches $plant^{-1}$	Effective tillers $plant^{-1}$	Non-effective tillers $plant^{-1}$	Total pods $plant^{-1}$	Total seeds $plant^{-1}$	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index (%)
Control (C_0)	3.78 b	79.18 a	5.46 d	84.63 bc	127.36 b	819 b	1111 d	1930 d	42.35 b
Lajjabati (*Mimosa invisa*) (C_1)	4.11 a	81.89 a	7.31 a	89.20 a	134.84 a	986 a	1403 a	2390 a	41.31 b
African dhaincha (*Sesbania rostrata*) (C_2)	3.73 b	74.67 b	6.96 b	81.62 c	119.09 c	952 a	1320 b	2272 b	41.94 b
Deshi dhaincha (*Sesbania aculeata*) (C_3)	3.98 a	78.96 a	6.41 c	85.37 b	124.78 bc	957 a	1224 c	2181 c	43.98 a
Sx̄	0.06	1.05	0.11	1.03	2.04	0.015	0.018	0.025	0.50
LS	**	**	**	**	**	**	**	**	**
CV (%)	4.42	4.01	5.04	6.63	4.84	4.98	4.27	5.37	3.54

In each column, figures bearing common letter(s) don't differ significantly as per DMRT at 1% level of significance, ** = Significant at 1% level of probability, NS = Not significant, CV = Coefficient of variation, LS = Level of significance.

The interaction between variety and compost exerted a significant influence on all parameter except 1000-seed weight (g). It was observed that BARI masur 3 produced the highest plant height (cm), straw yield (kg ha^{-1}) and biological yield (kg ha^{-1}) with compost *Mimosa invisa*. The highest plant height (47 cm) was found in BARI masur 3 with compost *Mimosa invisa* and the shortest one (35.20 cm) was found in BARI masur 4 with Control treatment. The highest seed yield (1033 kg ha^{-1}) was produced BARI masur 3 with compost *Mimosa invisa* and the lowest seed yield (743 kg ha^{-1}) was recorded in BARI masur 3 with Control treatment. The highest straw yield (1500 kg ha^{-1}) was produced by BARI masur 3 with compost *Mimosa invisa* and the lowest straw yield (1047 kg ha^{-1}) by the BARI masur 4 with Control treatment. The results indicate that the highest biological yield (2533 kg ha^{-1}) was produced by BARI masur 3 with compost *Mimosa invisa* and the lowest one (1830 kg ha^{-1}) was obtained by the BARI masur 4 with Control treatment as shown in Table 3.

Table 3. Interaction effect of variety and compost on yield contributing characters of lentil

Interaction (Variety × Compost)	Plant height (cm)	Branches $plant^{-1}$	Effective tillers $plant^{-1}$	Non-effective tillers $plant^{-1}$	Total pods $plant^{-1}$	Total seeds $plant^{-1}$	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index (%)
$V_1 \times C_0$	39.00 b-e	4.27 a	87.27 bc	5.07 d	92.33 cd	142.53 bc	931 b-e	1187 de	2117 d	43.94 ab
$V_1 \times C_1$	37.73 cde	4.07 ab	100.07 a	9.33 a	109.40 a	167.33 a	1007 abc	1277 cd	2284 c	44.10 ab
$V_1 \times C_2$	41.27 bcd	3.67 cd	90.53 b	9.07 a	99.60 b	151.80 b	887 e	1267 d	2153 d	41.16 cde
$V_1 \times C_3$	42.00 bc	4.00 ab	81.47 de	5.77 c	87.23 de	136.00 cd	937 b-e	1367 bc	2303 c	40.64 de
$V_2 \times C_0$	42.53 b	3.53 d	82.07 cde	4.57 de	86.63e	131.27 d	743 f	1100 ef	1843 f	40.32 de
$V_2 \times C_1$	47.27 a	4.00 ab	66.73 h	5.73 c	72.47g	109.47 e	1033 a	1500 a	2533 a	40.75de
$V_2 \times C_2$	43.07 b	3.87 bc	75.27 fg	4.80 de	80.07 f	108.47 e	996 a-d	1433 ab	2429 ab	41.05cde
$V_2 \times C_3$	37.33 cde	3.67 cd	70.20 gh	4.33 e	74.53 g	104.40 ef	1010 ab	1233 d	2243 cd	45.04 ab
$V_3 \times C_0$	35.20 e	3.53 d	68.20 h	6.73 b	74.93 fg	108.27 e	783 f	1047 f	1830 f	42.80 bcd
$V_3 \times C_1$	36.87 de	4.27 a	78.87 ef	6.87 b	85.73 e	127.73 d	919 de	1433 ab	2353 bc	39.08 e
$V_3 \times C_2$	40.33 bcd	3.67 cd	58.20 i	7.00 b	65.20 h	97.00 f	973 a-d	1260 d	2233 cd	43.59 abc
$V_3 \times C_3$	39.20 b-e	4.27 a	85.20 bcd	9.13 a	94.33 c	133.93 cd	923 cde	1073 f	1997 e	46.26 a
$\bar{}$Sx	1.19	0.10	1.82	0.19	1.79	3.53	0.027	0.031	0.043	0.87
LS	**	**	**	**	**	**	**	**	**	**
CV (%)	6.13	4.42	4.01	5.04	6.63	4.84	4.98	4.27	5.37	3.54

In each column, figures bearing common letter(s) don't differ significantly as per DMRT at 1% level of significance, ** = Significant at 1% level of probability, NS = Not significant, CV = Coefficient of variation, LS = Level of significance; V_1 = BINA masur 2, V_2 = BARI masur 3, V_3 = BARI masur4; C_0 = Control, C_1 = Lajjabati(*Mimosa invisa*), C_2 = African dhaincha(*Sesbania rostrata*), C_3 = Deshi dhaincha(*Sesbania aculeata*)

From the result it may be concluded that BARI masur 3 with compost from *Mimosa invisa* performed best in respect of seed yield of lentil. However, to reach definite conclusion, further studies are needed to be carried out in different agro-ecological zones of Bangladesh.

References

Barman, N.K., Uddin, M.R., Salam, M.A., Bhuiya, M.S.U. and Sarkar, M.A.R. 2005. Effect of nitrogen and compost from Mimosa invisa on the performance of wheat. Bangladesh J. Crop Sci. 16(1): 45-50.

BBS (Bangladesh Bureau of Statistics). 2007. Statistical Year Book of Bangladesh. Bangladesh Bur. Stat., Stat. Div., Min. Plan. Govt. People's Repub. Bangladesh. pp. 126,532.

Gomez, K.A. and Gomez, A.A. 1984. Duncan's Multiple Range Test. Statistical Procedures for Agricultural Research. 2nd End. John Wiley and Sons. p. 207-215.

Gowda, C.L.L. and Kaul, A.A. 1992. Pulses in Bangladesh, BARI and FAO publication. 6(1): 27-29.

Islam, M.S. 1998. Nutrient status of Bangladesh soils. Annual report for 1998. Bangladesh Agril. Res. Inst., Gazipur, Bangladesh. pp. 82-85.

Kaufusi, P. and Asghar, M. 1990. Effect of intercropping plant materials on corn growth. Nitrogen Fixing Tree Res. Report. 8: 81-82.

Kumar. M.H.T. 1996. Benefits of growing green manure crop in coffee under coconut. Indian Coffee. 60 (12): 7-8.

Singh, B., Niranjan, R.K. and Pathak, R.K. 2001.ffect of organic matter resources and inorganic fertilizers on yield and nutrient uptake in the rice-wheat cropping system. International Rice Notes. (2): 7-58

Tomar, S.K., Tripathi, P. and Rajput, A.L. 2000.Effect of genotype, seedling method and diammonium phosphate on yield and protein and nutrient uptake by lentil (Lens culinaris L. Medik). Indian J. Agron. 45(1): 148-152.

UNDP (United Nations Development Programme) and FAO. 1988. Land Resources Appraisal of Bangladesh for Agricultural Development. Report No. 2. Agro-Ecological Regions of Bangladesh. United Nations Dev. Prog. and Food and Agric. Org. pp. 212-221.