

Growth and green pod yield of garden pea varieties under different nutrient levels

M. K. Alam, M. M. Uddin, M. Ahmed, M. A. Latif¹ and M. M. Rahman

On-farm Research Division, BARI, Tangail, ¹Department of Genetics and Plant Breeding, PSTU, Bangladesh

Abstract: An experiment was conducted in the medium high land under irrigated situation at the Farming System Research and Development (FSRD) site, Elenga, Tangail during two consecutive years 2006-07 and 2007-08 to evaluate the performance of different fertilizer treatment on garden pea varieties under farmers' field condition. Three varieties viz. BARI Motor shuti-1 BARI Motor shuti-2 and BARI Motor shuti-3 were considered as first factor treatment. Fertilizer combination T₁: N₅₀ P₂₆ K₄₂ S₁₂ & T₂: N₅₀ P₂₆ K₄₂ S₁₂ + B₁ Mo₁ Zn₁ kg/ha were taken as the second factor. BARI Motor shuti-1 and BARI motor shuti-2 along with the fertilizer dose N₅₀, P₂₆ K₄₂ S₁₂ and 1 kg/ha of each Mo, B & Zn, produced the highest pod yield of 12.35 t/ha and 8.51 t/ha during 2006-07 and 2007-08 respectively.

Key words: Morphological traits, Varying level of fertilizer, Garden pea

Introduction

Pea (*Pisum sativum* L.) is a leguminous crop belonging to the family leguminosae, which contains higher amount of protein and is an excellent human food. Peas are common nutritious vegetable grown in cool season all over the world (Pandita and Pratap, 1986). It ranks 3rd in protein content after garlic and beans. The most of the cultivars studies in Pakistan contain 20-22% protein (Jabeen *et al.* 1988). Lukina (1990) obtained 24.3-26.6% protein while worked with in 158 pea cultivars. In Bangladesh it occupies an area of 12486 ha with production of 58700 metric tons. In Tangail, it occupies 761 ha having 3499 metric ton production with an average yield 3.49 t/ha (BBS, 2004). The yield is very low Maynard *et al.* (1986) reported that per hectare yield of pea can be increased by growing high yielding, pest and disease resistant varieties with proper production technology. Pea can be grown in soils from sandy loam to clay, though best results are obtained on well drained, loose friable loamy soils. Nitrogen is required for improving vegetative growth of plant resulting more pods and higher green pod yield. The phosphorus plays a prominent role in pod development, seed size and resistant against diseases. The role of K in plants includes cation transport across membrane, water economy, energy metabolism and enzymes carbohydrate movement (Collins and Duke, 1981), and consequently stimulates vegetative growth and decreases the translocation of photosynthesis in to storage organs. Therefore, a balanced fertilizer can play a key role in

increasing production of garden pea. As such the present study was under taken to verify the combined effect of fertilizer nutrients on the performance of garden pea varieties.

Materials and Methods

The experiment was conducted at the Farming System Research and Development (FSRD) site, Elenga, Tangail during two consecutive years 2006-07 and 2007-08 under farmers' field condition. It was laid out in factorial randomized complete block design (RCBD) with four replications. Three varieties viz. BARI Motor shuti-1, BARI Motor shuti-2 and BARI Motor shuti-3 were considered as the first factor. Two fertilizer doses viz; T₁: N₅₀ P₂₆ K₄₂ S₁₂ and T₂: N₅₀ P₂₆ K₄₂ S₁₂ + B₁ Mo₁ Zn₁ kg/ha were considered as the second factor treatments. The unit plot size was 5 m x 4.2 m. The seeds were sown on 26 November in 2006-07 and 27 November in 2007-08 respectively with 30 x 15 cm. Weeding, pests control and other cultural managements were done as per recommendation of Rashid *et al.* (2006). The BARI Motor shuti-1 was harvested during 3-12 March, BARI Motor shuti-2 during 5-15 March and that of BARI Motor shuti-3 during 15-25 January over the year. The initial soil test values of the experimental plot have been presented in Table 1. The data on different yield parameters and pod yield were recorded. Data were analyzed statistically using crop stat analytical package and presented in Tables 2, 3 and 4.

Table 1. Initial nutrient status of the experiment field

Location	pH	OM %	Ca	Mg	K	Total	P	S	B	Cu	Fe	Mn	Zn
			meq/100 g			N %							
Elenga, Tangail	5.9	0.75	5.60	1.5	0.12	0.08	17	15	0.34	5.68	228	24.7	1.32
Critical level	-	-	2.0	0.8	0.20	-	14	14	0.20	1.0	10	5	2.0

Results and Discussion

Effect of variety: BARI Motor shuti-1 gave superior plant height (95.3 cm, 92.2 cm), pods per plant (16.9), seeds per pod (8, 6) 1000 fresh seed weight (62.7 g, 57.4 g) and the highest green pod yield (11.44 t/ha 8.11 t/ha) over that of BARI Motor shuti-2 and -3 during 2006-07 and 2007-08 respectively. (Table 2a and 2b). The higher yield obtained

in BARI motor shuti-1 might be due to its genetical potentiality as it production higher number of pods per plant, seeds per pod and heavier seed size.

Effects of fertilizer: Table 3a and 3b reveal that all the yield parameters of garden pea significantly varied due to fertilizer levels applied. Treatment T₂ (N₅₀ P₂₆ K₄₂ S₁₂ & 1 kg/ha of each Mo, B and Zn) performed best over T₁ (N₅₀ P₂₆ K₄₂ S₁₂ & 1 kg/ha) treatment.

Plant height: The highest plant height (84.8 cm and 75.2 cm) was obtained while treated with N₅₀ P₂₆ K₄₂ S₁₂ & 1 kg/ha of each Mo, B and Zn (T₂). It indicated that the varying level of fertilizer package increased the plant height. Sheikh (1997) and Anjum and Amjad

(1999) obtained the similar plant height while working with fertilizer levels in garden pea. The present results are in agreement with their findings. Pandita and Pratap (1986) found similar results in plant height of pea by using different fertilizer.

Table 2a. Effect of variety on yield and yield parameters of garden pea (2006 - 07)

Variety	Plant height (cm)	Pods/plant	Seeds/plant	1000 fresh Seed weight (g)	Green pod yield (t/ha)
BARI motorshuti-1	95.3	16	8	62.7	11.44
BARI motorshuti-2	89.0	15	4	54.0	10.88
BARI motorshuti-3	62.4	7	6	60.2	7.10
LSD (0.05)	5.09	1.41	0.46	2.96	0.96
CV (%)	4.8	8.6	5.7	3.9	7.6

Table 2b. Effect of variety on yield and yield parameters of garden pea (2007 - 08)

Variety	Plant height (cm)	Pods/plant	Seeds/plant	1000 fresh Seed weight (g)	Green pod yield (t/ha)
BARI motorshuti-1	92.2	9	6	57.4	8.11
BARI motorshuti-2	89.6	8	5	51.8	6.89
BARI motorshuti-3	51.5	6	5	49.5	5.84
LSD (0.05)	3.84	0.55	0.30	2.96	0.53
CV (%)	4.6	6.8	5.2	5.3	7.1

Table 3a. Effect of fertilizer dose on yield and yield parameters of garden pea (2006 - 07)

Treatments	Plant height (cm)	Pods/plant	Seeds/plant	1000 fresh Seed weight (g)	Green pod yield (t/ha)
T ₁ =N ₅₀ , P ₂₆ , K ₄₂ , S ₁₂ kg/ha	79.7	11	6	56.4	9.21
T ₂ =N ₅₀ , P ₂₆ , K ₄₂ , S ₁₂ & 1 kg/ha of Mo, B & Zn.	84.8	14	7	61.6	10.40
LSD (0.05)	4.16	1.15	0.38	2.42	0.78
CV (%)	4.8	8.6	5.7	3.9	7.6

Table 3b. Effect of fertilizer dose on yield and yield parameters of garden pea (2007 - 08)

Treatments	Plant height (cm)	Pods/plant	Seeds/plant (no)	1000 fresh Seed weight (g)	Green pod yield (t/ha)
T ₁ =N ₅₀ , P ₂₆ , K ₄₂ , S ₁₂ kg/ha	75.2	7	5	50.4	6.69
T ₂ =N ₅₀ , P ₂₆ , K ₄₂ , S ₁₂ & 1 kg/ha of Mo, B & Zn.	80.4	8	5	55.4	7.20
LSD (0.05)	3.14	0.45	0.24	2.42	0.43
CV (%)	4.6	6.8	5.2	5.3	7.1

Pods per plant: The highest number of pods per plant (14 and 8) was found from the received the fertilizer dose N₅₀ P₂₆ K₄₂ S₁₂ & 1 kg/ha of Mo, B and Zn (T₂). The results are in agreement with Rao *et al* (1994).

Seeds per pod 1000 seed weight (g): The number of seeds per pod were the highest (7 and 5) while treated with T₂(N₅₀ P₂₆ K₄₂ S₁₂ & 1 kg/ha of Mo, B and Zn). Tiraporn

(1992) obtained the similar results while working with maize. The present finding corroborates with his results. The highest 1000 fresh seed weight (61.6 and 55.4 g) were also obtained from plants treated with the same fertilizer dose (T₂).

Green pod yield: The highest green pod yield (10.40 t/ha and 7.20 t/ha) were obtained in plants treated with N₅₀ P₂₆ K₄₂ S₁₂ & 1 kg/ha of Mo, B and Z (T₂) during 2007 and 2008 respectively. The unusually foggy weather prevailed during 2007-08 resulting inferior yield contributing parameters and as such lower green pod yield. While working with rice Lopez *et al* (1988) also observed similar result.

Interaction of variety and fertilizer dose: Table 4 expresses that the BARI Motor shuti-1 along with N₅₀ K₄₂ S₁₂ and 1 kg/ha of Mo B and Zn provided the highest pod yield (12.35 t/ha and 8.51 t/ha) in both the years conducted. The BARI Motor shuti-3 along N₅₀ P₂₆ K₄₂ S₁₂ and 1 kg/ha provided the lowest pod yield (6.84 t/ha and 5.65 t/ha) in the two consecutive years.

Table 4. Interaction effects of variety and fertilizer dose on yield and yield parameters of garden pea

Variety X Treatments	Pods/plant (no)		Seeds/plant (no)		1000 fresh seed weight (g)		Green pod Yield (t/ha)	
	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08	2006-07	2007-08
BARI motorshuti-1 x T ₁	15	8	7	6	61.3	55.8	10.5.3	7.70
BARI motorshuti-1 x T ₂	18	9	8	6	64.0	59.0	12.35	8.51
BARI motorshuti-2 x T ₁	12	7	4	5	51.3	48.9	10.27	6.72
BARI motorshuti-2 x T ₂	17	9	5	5	56.7	54.6	11.48	7.06
BARI motorshuti-3 x T ₁	7	5	6	5	56.4	46.5	6.84	5.65
BARI motorshuti-3 x T ₂	8	6	7	6	64.0	52.5	7.36	6.03
LSD (0.05)	1.99	0.78	0.65	0.42	4.19	4.19	1.35	0.75
CV 9%)	8.6	6.8	5.7	5.2	3.9	5.3	7.6	7.1

T₁ = N₅₀, P₂₆, K₄₂, S₁₂ (kg/ha), T₂ = N₅₀, P₂₆, K₄₂, S₁₂ & 1 kg/ha of Mo, B and Zn

Results of two consecutive years reveal that BARI Motor shuti-1 and 2 along with N₅₀ P₂₆ K₄₂ S₁₂ and 1 kg/ha each of Mo, B and Zn provided the higher pod yield. Therefore, BARI motor shuti-1 and 2 along with N₅₀ P₂₆ K₄₂ S₁₂ and 1 kg/ha each of Mo, B and Zn may be recommended for large scale production.

References

- Anjum M.A. and Amjad, 1999. Response of okra (*Abeimoschus esculentus* L Moench) to different levels of fertilizers Pak. J. Bio. Sci. 2: 7940796.
- BBS, 2004. Yearbook of Agricultural statistics of Bangladesh Bureau of statistics. Ministry of Planning, Dhaka. p. 974-110.
- Collins, M. and Duke, S. H. 1981. Influence of potassium fertilizer rate on photosynthesis and N-fixation of alfalfa. Crop Sci. 21: 481-485.
- Jabeen, T., Iqbal, P. and Khalil, I. A. 1988. Amino acid and mineral composition of pea cultivars grown in Peahawar, Pak. J. Agric, Res. 9: 171-174.
- Lukina, N. I. 1990. Results of a study of pea for protein contents and yield. Moskovskoe Otdelenie VIR, Mikhnevo, Moscow. Scientific Khyber, 13-1, January, 200, pp:55.
- Lopez, N. R., Urbano, B. G. and Pervez, M. 1985. Effect of different rates of NPK application on rice during spring season. Suelosy Agroquimica, 8: 39-51.
- Maynard, D. N., How, T. K. and Hochuth, G. J. 1986. Evaluation of pea cultivars in row spacing and supplemental fertilization. Proceeding of American Society for Tropical Hort. 30: 187-199.
- Pandita, M. L. and Pratap, P. S. 1986. In vegetable crop, pea and beans. Ed. T. K. Bose, M. G. Som and J. Kabir, Naya prokash, 206, Bidhan sarani, Calcutta, India, pp: 549-580.
- Rao, V. P., Raikhellar, S. V. and Sondge, V. D. 1994. Nutrient uptake and fertilizer use efficiencies in sesame (*Sesamum indicum* L.) as influenced by irrigation and fertilization. Ann. Agroc. Res, 15: 280-285.
- Rashid, M., Shahab uddin, A. M., Halim, G. M., Rahman, M. T., Shaha, S. and Khan, A. S. M. M. R. 2006. Shabji Utpadaner kola Kausha, BARI. Page-131-135.
- Sheikh M. A. 1997. Effect of various levels of nitrogen on vegetative growth and flower production of gladiolus. M. Sc. Thesis, Sindh Agricultural University, Tandojam, Sindh, Pakistan.
- Thirapom, R., Feil, E. and Stemp, P. 1992. Effect of nitrogen fertilization on grain yield and accumulation of N, P. and K in grains of tropical maize. J. Agron and Crop Sci. 169: 9-16.