



Productivity of Fenugreek Varieties (*Trigonella foenum-graecum* L.) in the Coastal Saline Areas of Noakhali

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Abstract

The experiment was conducted at the farmer's field of Boyerchor, Hatia, Noakhali under On-Farm Research Division, Bangladesh Agricultural Research Institute (BARI), during the *rabi* seasons of 2011-2013 to study the effect of variety on the productivity of fenugreek in coastal saline soil. The experimental treatments included 3 varieties viz. V₁ = BARI Methi 1, V₂ = BARI Methi 2, V₃ = Local Methi. The experiment was laid out in a randomized complete block design with six dispersed replications. There was a strong varietal influence on crop growth and seed yield. Among the varieties, BARI Methi 2 showed the best results in terms of plant height, number of branches, number of pods and number of seeds pod⁻¹ resulting in the highest seed yield of 1497 kg ha⁻¹. It was also observed that plant mortality of fenugreek was highly affected at germination stage when the soil salinity was above 4 dSm⁻¹. However, at the later stages of crop growth up to the maturity, the salt tolerance of the crop was higher varying from 4-12 dSm⁻¹. It was indicated that critical range of salinity level for cultivation of fenugreek was 3.42-12.2 dSm⁻¹ from germination till to maturity. Among the fenugreek varieties, BARI Methi 2 offered the highest net return of Tk. 50150 coupled with a benefit cost ratio of 3.03. Though total cost was the same, BARI Methi 2 showed higher BCR (3.03) over BARI Methi 1 and local Methi due to yield differences.

Keywords: Variety, fenugreek, saline areas

1. Introduction

Fenugreek (*Trigonella foenum-graecum* L.) is a diploid, annual, self pollinating plant that is strongly scented (Acharya *et al.*, 2006). It is locally known as "methi" and belongs to the family Leguminosae and sub family Papilionaceae. It is widely used as a spice and condiment to add flavor in various foods (Dwivedi *et al.*, 2006). Fenugreek is a diverse species. Scientists have widely debated the probable ancestry of *Trigonella foenum-graecum*

(L.), although the divergent schools of opinion identify three probable centers of origin for the plant i.e Mediterranean region, Asian/India and Turkey (Acharya *et al.*, 2008; Vavilov, 1991; Fazli and Hardman, 1968; De Candolle, 1964; Dangi *et al.*, 2004). Fenugreek is now cultivated in all habitable continents of the world. Some of these continents have a long history of use, while other continents only started cultivating the crop during the past 2-3 decades (Prasad, 2011). Asia is positioned in 1st place among continents in terms of fenugreek production and acreage. India

is leading in fenugreek seed production, producing about 90 % of the world fenugreek production (Acharya *et al.*, 2008). Among other Asian countries; Iran, Israel, China and Pakistan also have high levels of production. A wide range of medicinal properties has been attributed to fenugreek such as wound-healing, bust enhancement, enhanced lactation in weaning mothers, as an aphrodisiac, anti-diabetic, anti-hyperthyroidism, anticancer, gastro-protective, antioxidant, antipyretic, antimicrobial, anthelmintic, antisterility, antiallergy and antiinflammatory effects (Acharya *et al.*, 2008; Krishnaswamy, 2008).

In the district of Noakhali, about 3-4 lakh ha land remains fallow during dry season because of varying degrees of soil salinity. Most of the lands are owned by the absentee landlords and are cultivated by the cashless poor farmers. Fallow- Fallow –T. Aman is the major cropping pattern of that region. Farmers of Boyerchar and Nolerchar under the Hatia upazilla of Noakhali cultivate fenugreek as cash crop during *rabi* (winter) season. They neither use any fertilizer nor maintain any improved management practices. Spice Division of BARI has developed some potential high yielding varieties of fenugreek (BARI, 2011). Farmers cultivate their local variety with low yield potentiality. The effect of variety on the productivity of fenugreek in the coastal saline areas of Noakhali region as well as in Bangladesh content is very limited in different books, annual research reports and journals. Hence, the present research was carried out to evaluate the effect of variety on productivity of fenugreek in coastal saline areas under farmer's field condition.

2. Materials and Methods

The experiment was conducted at Boyerchor, Hatia, Noakhali during rabi seasons of 2011-2013 under farmer's field condition to study the effect of variety on the productivity of fenugreek in coastal areas. There were three fenugreek cultivars: V_1 = BARI Methi 1, V_2 = BARI Methi 2, V_3 = Local Methi as three treatments. The

experiment was laid out in a randomized complete block design with six dispersed replications. The size of unit plot was 10 m × 8 m. The unit plots were separated by 0.75 m spacing.

The land was opened with a power tiller and prepared by ploughing four times followed by laddering. Weeds, stubble and crop residues were removed. Fertilizers were applied at the rate of 80-35-68-2000 (N-P-K-cowdung kg ha⁻¹), respectively (BARI, 2011). All amount of decomposed cowdung, triple super phosphate (TSP), muriate of potash (MoP) and half of Urea were applied as basal by broadcasting and mixed with soil thoroughly at the time of final land preparation. The rest half of urea was applied in 30 days after sowing (DAS). The quantity of seeds required for each plot was weighed on the basis of recommended seed rate of 10 kg ha⁻¹ and was kept in polythene bags (BARI, 2011). The seeds were sown on 1st to 2nd week of December in each year maintaining 25 cm apart lines at a depth of about 3-4 cm. Weeding was done twice.

The three years (2011-2013) average maximum and minimum temperatures and rainfall in Noakhali are presented in Figure 1. During the growing season of fenugreek there was almost no rainfall except in February, where rainfall observed in a very minimum level. Harvesting was done on 3rd week to last week of March in each year. Data on the different crop parameters were collected from the 10 sample plants and then average was taken. The collected data were analysed statistically using MSTAT-C programme and the treatment means were separated with least significant difference (LSD) (Gomez and Gomez, 1984).

3. Results and Discussion

3.1. Effect of variety

The effect of variety on crop growth and yield attributes was significant (Table 1). The variety BARI Methi 2 was superior in respect of plant height, number of branches plant⁻¹, and total

number of pods plant⁻¹ and number of seeds pod⁻¹ compared to other varieties which resulted in the highest seed. In contrast, the lowest plant height, number of seeds pod⁻¹, pod length and seed yield was recorded in BARI Methi 1.

The highest plant population (no. m⁻²) was recorded in BARI Methi 2 (46.0) followed by BARI Methi 1 (43.5) (Table 1). In contrast, the lowest plant population was recorded in Local Methi (43.0). The tallest plants were observed in BARI Methi 2 (45.5cm) followed by Local Methi (45.1 cm) and the shortest plants were recorded in BARI Methi 1 (35.5 cm).

The highest number of pods plant⁻¹ (31.8) was observed in BARI Methi 2 which was

statistically similar to that of BARI Methi 1 (28.7). The highest pod length was observed in BARI Methi 2 (8.0 cm) followed by Local Methi (7.8 cm), while the lowest pod length was recorded in BARI Methi 1 (6.4 cm). The highest number of seeds pod⁻¹ was recorded in BARI Methi 2 (12.1) followed by Local Methi (11.9). The highest 1000-seed weight was recorded in Local Methi (10.7 g) which was statistically similar to that of BARI Methi 2 (10.3 g). The highest seed yield of (1497 kg ha⁻¹) was recorded in BARI Methi 2, which was significantly different from that of local Methi (1245 kg ha⁻¹). The lowest seed yield of (1019 kg ha⁻¹) was recorded in BARI Methi 1 (Figure 2.). Yield variation of different fenugreek varieties was also reported by BARI (2012).

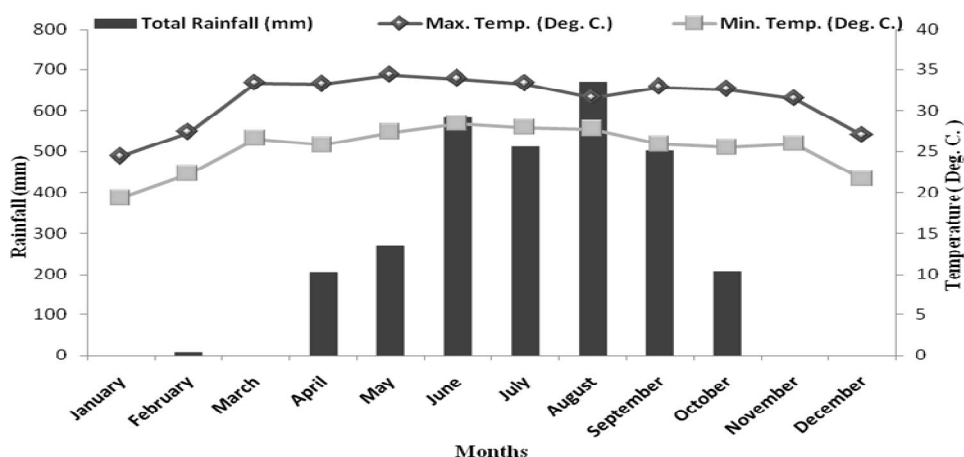


Figure 1. Three years (2011-13) average maximum and minimum temperatures and total rainfall in the experimental site of Noakhali

Table 1. Effect of variety on the growth and yield contributing characters of fenugreek (methi) at Boyerchar, Hatia, Noakhali during *rabi* seasons 2011-2013

Variety	Plantm ⁻²	Plant height (cm)	No. of branch plant ⁻¹	No. of pods plant ⁻¹	No. of Seeds pod ⁻¹	Pod length (cm)	1000 seeds wt. (g)
BARI Methi 1	43.5	35.5	2.9	28.7	10.3	6.4	7.5
BARI Methi 2	46.0	45.5	3.2	31.8	12.1	8.0	10.3
Local Methi	43.0	45.1	2.2	20.8	11.9	7.8	10.7
LSD (0.05)	2.48	9.86	NS	9.10	NS	NS	2.26
CV (%)	5.47	7.38	12.96	11.66	6.21	6.56	6.79

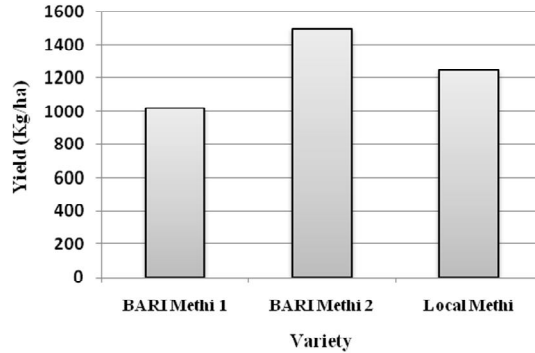
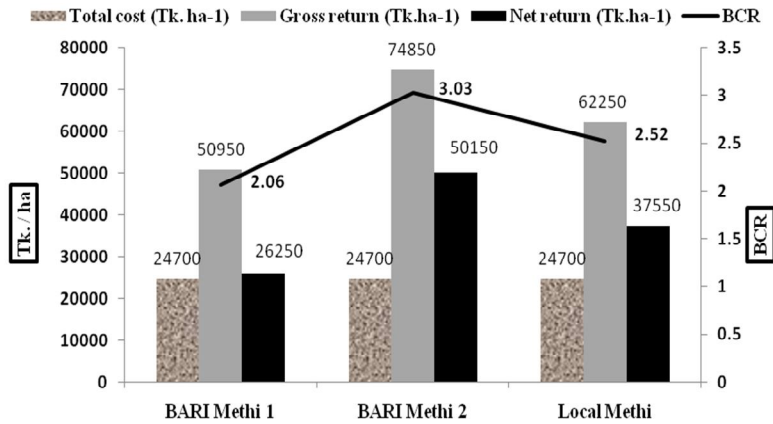


Figure 2. Seed yield of fenugreek varieties

Table 2. Relationship between soil salinity and plant mortality of fenugreek at different physiological stages

Salinity range (dS/m)	Plant Mortality (%)		
	Germination stage	Vegetative stage	Maturity stage
0-2	0	0	0
2-4	19	9	0
4-8	26	15	0
8-12	42	32	2
12->19	>60	>36	>6



Unit market price of fenugreek = 50 Tk/kg

Figure 3. Cost and return of fenugreek varieties at Boyerchar, Hatia, Noakhali

Salt tolerance level of fenugreek was recorded at various physiological stages of crop growth. The fenugreek crop could tolerate a wide range of saline condition (2-12 dSm⁻¹) of the soil at various growth stages. It was observed that plant mortality of fenugreek was highly affected at germination stage when the soil salinity was above 4 dSm⁻¹. The present findings agree with those of Amin *et al.* (2011), who reported that the initial soil salinity level of >4 dSm⁻¹ is very harmful for emergence of any crop. It was also found that the crop was severely affected in germination and vegetative stage (Table 2).

At salinity level beyond 10 dS/m, it is not feasible to cultivate fenugreek at the coastal saline areas of Noakhali because of high mortality. At the maturity stage salinity could not affect the plant adversely (0-2% mortality rate). Salinity range above 8 dSm⁻¹ during germination to vegetative stage may cause yield reduction by 30-40 % (Table 2).

3.2. Economic analysis

Cost and return analysis of fenugreek varieties is shown in Figure 3. It was revealed that BARI Methi 2 gave the highest gross return (74850 Tk. ha⁻¹), net return (50150 Tk. ha⁻¹) and benefit cost ratio (3.03) over Local Methi and BARI Methi 1 (Fig. 3). BARI Methi 1 gave the lowest gross return (50950 Tk. ha⁻¹), net return (26250 Tk. ha⁻¹) and benefit cost ratio (2.06). BARI Methi 2 gave more net return and produced 478 kg ha⁻¹ higher yield than the BARI Methi 1.

4. Conclusions

Based on the experimental results, it may be concluded that fenugreek yield is associated variety. Among the three varieties, BARI Methi 2 performed the best. The variety BARI Methi 2 showed superiority in respect of plant height, number of branches plant⁻¹, total number of pods plant⁻¹ and number of seeds pod⁻¹ to other varieties resulting in the highest seed yield of 1497 kg ha⁻¹. The initial salinity level of above 4 dSm⁻¹ is very harmful to the germination of the

crop. Fenugreek crop may be cultivated under a wide range of saline condition (2-12 dSm⁻¹) of the soil. BARI Methi 2 offered the highest net return of Tk. 50150 coupled with a benefit cost ratio as high as 3.03 over BARI Methi 1 and the Local Methi.

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