

PERFORMANCE OF DIFFERENT CROP SPECIES WITH POINTED GOURD (*Trichosanthes dioica* Roxb.)

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Abstract

The experiment was conducted at the Regional Agricultural Research Station, Jessore during the period from November 2008 to April 2010 to find out the suitable component crop and planting system under intercropping system with pointed gourd for higher yield and economic return. The treatment combinations were T₁ = Pointed gourd (PG) sole, T₂ = PG + radish + mungbean (1 row at the boarder of the bed) + amaranth (broadcast), T₃ = PG + radish + mungbean (2 rows at the boarder of the bed) + shabuj shak (broadcast), T₄ = PG + radish + Indian spinach (1 row at the boarder of the bed), T₅ = PG + radish + Indian spinach (2 rows at the boarder of the bed) and T₆ = PG + radish + mungbean: Indian spinach (1 : 1 row at the boarder of the bed). The fruit yield (26.27-30.50 t/ha) of pointed gourd did not affect by sole and different intercropping systems. The highest pointed gourd equivalent yield (68.02 t/ha), gross return (Tk.1020300/ha) and net return (Tk.631466/ha) and benefit cost ratio (2.62) was obtained from the intercropping combination of PG + radish + Indian spinach (2 rows at the boarder of the bed).

Keywords: Intercropping of crop species, pointed gourd, component crops.

Introduction

Pointed gourd (*Trichosanthes dioica* Roxb.) is an important dioecious vegetable crop belonging to the family Cucurbitaceae. Fruits are rich in vitamin and minerals and contain 9.0 mg Mg, 2.6 mg Na, 83.0 mg K, 1.1 mg Cu, and 17.0 mg S per 100g edible part (Singh, 1989). It has also high industrial value as different types of jam, jelly, and pickles can be made from this vegetable. Pointed gourd has a good medicinal value. It is easily digestible, diuretic, and laxative, invigorates the heart and brain and is useful in the disorder of the circulatory system (Malek., 2009). It was reported that pointed gourd possesses the medicinal property of lowering the total cholesterol and blood sugar (Chandrasekar *et al.*, 1988; Sharma and Pant, 1988; Sharma *et al.*, 1988). Pointed gourd is grown in the raised bed with support of trellis. Pointed gourd requires 7-8 months to reach its reproductive phase. In this period, farmers grow some quick vegetables (Lal sak, Indian spinach, etc.) and pulses as inter/mixed cropping with pointed gourd before reaching reproductive phase of pointed gourd at the same

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field. Intercropping is one of the most important, viable and profitable systems of Bangladesh. Intercropping increases total productivity through efficient utilization of inter-rows' space and different growth resources (Willey, 1979). Selection of component crops (Uddin and Satter, 1993; Bagum *et al.*, 2010), spatial arrangement of component crops (Islam *et al.*, 2004, Islam *et al.*, 2006) and fertilizer management (Islam *et al.*, 2007; Akhteruzzaman *et al.*, 2008) are the important factors of intercropping systems for getting higher productivity. In greater Jessore area, farmers grow pointed gourd with radish and after harvest of radish, they grow Indian spinach or mungbean under the trellis of pointed gourd. But they don't follow the actual planting system as well as suitability of crop combinations for more economic return for intercropping with pointed gourd. Therefore, the experiment was undertaken to find out the suitable component crop and suitable planting system under intercropping with pointed gourd for higher productivity and profitability.

Materials and Method

The experiment was conducted at the Regional Agricultural Research Station of Bangladesh Agricultural Research Institute, Jessore during November 2008 to October 2010. The soil of the experimental field was silty clay loam in texture belonging to Calcareous Brown Flood Plain under AEZ-11. Initial soil sample was collected from experimental field and analyzed. The analytical results are presented in Table 1.

Table1. Analytical results of soil of the experimental field.

pH	OM (%)	Total N (%)	Available P (ppm)	Exchange - able K (meq/100g)	Exchange -able Ca (meq/100 g)	Available Zn (ppm)	Available S (ppm)	Available B (ppm)
6.6	1.15	0.061	35	14.3	5.7	1.00	20	0.60

The treatment combinations were T_1 = Pointed gourd (PG) as sole crop, T_2 = PG + radish + mungbean (1 row at the boarder of the bed) + amaranth (broadcast), T_3 = PG + radish + mungbean (2 rows at the boarder of the bed) + Shabuj sak (broadcast), T_4 = PG + radish + Indian spinach (1 row at the boarder of the bed), T_5 = PG + radish + Indian spinach (2 rows at the boarder of the bed), and T_6 = PG + radish + mungbean : Indian spinach (1 : 1 row at the boarder of the bed). The experiment was laid out in a randomized complete block design with three replications. The unit raised bed (trelli) size was 6.0 m x 1.50 m. pointed gourd vines and radish were sown on 22 November 2008; mungbean and Indian spinach on 07 March 2009 as per treatment after harvesting of radish. Amaranth and Sabujsak were sown after harvest of

mungbean as per treatment. Pointed gourd (var. BARI Potal-1), radish (var. Pinky), mungbean (var. BARI Mungbean-6) and local variety of Indian spinach, Amaranth, and Sabujsak were used in the experiment. Six plants of pointed gourd were planted per trelli. One male pointed gourd per 12 plants of female was grown in between two plots from proper pollination of the crop. For pointed gourd in each pit 1.0 kg cowdung, 250 g mustard oil cake, 46g, N, 34g P, 65g K, and 27 g S were applied at time of vine planting in 2008. During May-June 2009, 500 g cowdung, 32 N, 18g P, and 50 g K were also applied in each pit of pointed gourd as ring method. All intercrops were grown with their recommended doses of fertilizers, spacing, and seed rates as sole crop. Irrigation, weeding, and other intercultural operations for pointed gourd, radish, mungbean, and Indian spinach were done as and when required.

After completion one crop cycle, the pointed gourd vines were cut at ground level on mid-September 2009 and cultivated as ratoon crop. During 01 November 2009 radish (var. Pinky) was sown again as intercrop in all treatments except sole pointed gourd. After harvest of radish, mungbean and Indian spinach were sown at the same date like previous year. The crop received total rainfall during the crop season was 1049.5 mm in 2008-09 and 773.1mm in 2009-10 (Fig. 1). Yield component data were taken from selected 5 plants of pointed gourd and yield data of all the crops were taken from whole plot and analyzed statistically in individual year. Means were separated by LSD Test at 5% level. Yield of component crops was converted into equivalent yield on the basis of the prevailing market price of individual crop (Bandyopadhyay, 1984).

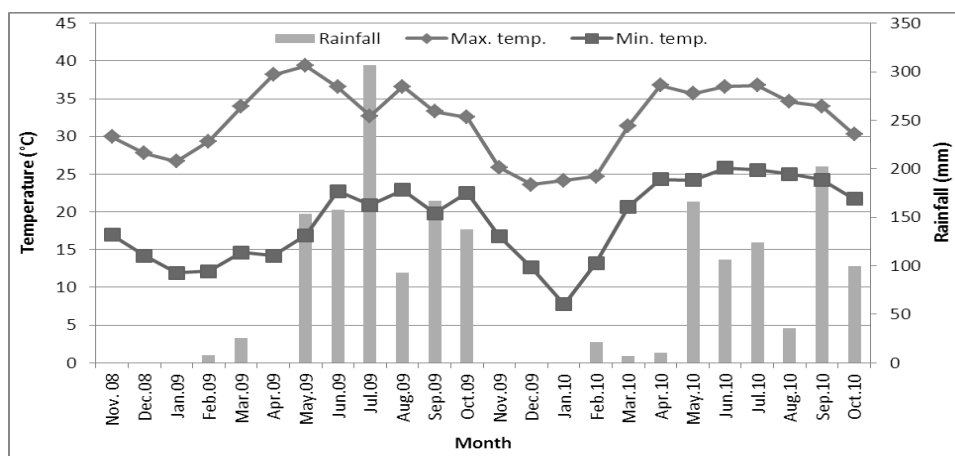


Fig. 1. Average monthly maximum, minimum temperature and monthly total rainfall during November 2008 to October 2010.

Pointed gourd equivalent yield (PEY) = $Y_{sp} + \{(Y_{ir} \times Pr) + (Y_{im} \times Pm) + (Y_{iis} \times Pis) + (Y_{ia} \times Pa) + (Y_{is} \times Ps)\} / Pp$

Where,

Y_{sp} = Yield of sole pointed gourd (t/ha), Y_{ir} = Yield of intercrop radish (t/ha), Y_{ia} = Yield of intercrop amaranth (t/ha), Y_{im} = Yield of intercrop mungbean (t/ha), Y_{iis} = Yield of intercrop Indian spinach (t/ha), Y_{is} = Yield of intercrop sabujasak (t/ha), Pis = Selling price of Indian spinach, Pr = Selling price of radish

Pa = Selling price of amaranth, Ps = Selling price of sabujasak, Pm = Selling price of mungbean

Relative yield calculated as follows

Relative yield (RY) = Y_{ip}/Y_{sp}

Where, Y_{sp} = Pointed gourd sole yield (t/ha) and Y_{ip} = Yield of pointed gourd in intercrops (t/ha) Market prices of all crops were recorded during their harvesting time. Gross return, cost of cultivation and net return (Tk./ha) was computed from sole and intercropping systems per hectare basis. The results obtained for two years were almost similar, hence the data were pooled.

Table 2. Yield component and yield of pointed gourd and intercrops (Pooled data of 2008-10).

Treatments	Pointed gourd			Intercrops (t/ha)		
	Fruits/plant (no.)	Wt of fruits/plant (kg)	Fruit yield (t/ha)	Root yield of radish	Seed yield of mungbean	Biomass yield of leafy vegetables
T ₁	115	6.78	30.50	-	-	-
T ₂	113	6.62	29.61	41.70	0.36	11.43
T ₃	102	5.98	26.86	41.76	0.49	6.93
T ₄	113	6.53	29.44	43.84	-	66.81
T ₅	101	5.90	26.27	42.86	-	82.94
T ₆	103	5.95	26.80	42.59	0.42	61.16
CV (%)	8.87	10.35	10.41	9.10	5.62	5.20
LSD _(0.05)	NS	NS	NS	NS	0.72	4.49

NS= Not significant

Results and Discussion

Fruit yield and yield attributes of pointed gourd in sole and intercrop combinations

Number of fruits/plant, fruit weight per plant, and fruit yield/ha of pointed gourd are presented in Table 2. Fruit yield and yield components of pointed gourd was not affected significantly by different intercropping systems. The results showed that the companion crops did not influence the yield of pointed gourd in the intercropping systems. Sole pointed gourd showed slightly higher yield than intercropped. Minimum yield reduction (1.0 t/ha) of pointed gourd was observed in T₅ treatment and others were similar with yield reduction of about 3.0 t/ha.

Yield of intercrops

Root yield of radish was not significantly influenced by different treatments but seed yield of mungbean was significantly affected (Table 2). Treatment T₃ showed highest seed yield (0.49 t/ha) of mungbean as compared to T₂ and T₆ treatments, respectively. Biomass yield of leafy vegetables also differed significantly where treatment T₅ (Indian spinach) produced higher yield. Indian spinach gave much higher biomass yield than amaranth. Though treatment T₅ showed much higher biomass yield but pointed gourd yield was reduced as compared to T₄ treatment.

Table 3. Pointed gourd equivalent yield (PEY), relative yield, cost and benefit analysis of different treatment (Pooled).

Treatments	PEY (t/ha)	Relative yield	Gross return (Tk./ha)	Cost of cultivation (Tk./ha)	Net return (Tk./ha)	Benefit cost ratio
T ₁	30.50	1.00	457500	276610	180890	1.65
T ₂	45.49	0.97	682350	301055	381295	2.27
T ₃	45.12	0.88	676800	312166	364634	2.17
T ₄	64.93	0.97	973950	372433	601517	2.61
T ₅	68.02	0.86	1020300	388834	631466	2.62
T ₆	61.44	0.88	921600	354388	567212	2.60

T₁ = Pointed gourd (PG) sole

T₂ = PG + radish + mungbean (1 row at the boarder of the bed) + amaranth (broadcast)

T₃ = PG + radish + mungbean (2 rows at the boarder of the bed) + shabuj sak (broadcast)

T₄ = PG + radish + Indian spinach (1 row at the boarder of the bed)

T₅ = PG + radish + Indian spinach (2 rows at the boarder of the bed) and

T₆ = PG + radish + mungbean : Indian spinach (1 : 1 row at the boarder of the bed)

Price:

Pointed gourd (PG) = Tk.15.00 per kg

Radish = Tk.3.00 per kg

Mungbean = Tk.60.00 per kg

Indian spinach = Tk. 6.00 per kg

Amaranth/Shabuj Shak = Tk.8 .00 per kg

Pointed gourd equivalent (PEY), relative yield, and economic evaluation

The equivalent yield of pointed gourd was influenced markedly in response to different component crops (Table 3). The highest pointed gourd equivalent yield (PEY) was obtained from the treatment T₅ (68.02 t/ha) followed by that in T₄ (64.93 t/ha) and T₆ (61.44 t/ha) treatment, while T₁, T₂ and T₃ treatment gave the lowest PEY. Higher pointed gourd equivalent yield was recorded from all the intercropping treatments. Such yield advantages could be due to combined yield of pointed gourd and component crops. Higher equivalent yields were also reported by Ahmed *et al.* (2010) and Mahfuza *et al.* (2012) in intercropping systems compared to sole crop. The relative yields of intercropped ranged from 0.86 to 0.97 depending upon the different planting systems. The minimum yield reduction (3%) of pointed gourd was recorded from the T₂ and T₄ treatments and others ranged from 12-14%. Cost and return analysis of intercropping of different component crops with pointed gourd are presented in Table 2. The highest gross return (Tk. 1020300/ha) and net return (Tk. 631466/ha) obtained from T₅ treatment. Sole pointed gourd gave the lowest gross return (Tk. 457500/ha) and net return (Tk. 180890/ha). Net return was higher under intercropping systems than that of sole pointed gourd. The cost of cultivation was highest under intercropping systems, particularly in T₅ treatment which was mainly due to more expenditure for purchase of seedling of Indian spinach. Maximum benefit cost ratio (2.62) was also obtained from T₅ treatment followed by that of T₄ and T₆ treatments.

Conclusion

It appears from the results that radish, mungbean, Indian spinach, amaranth, and Sabuj shak could be grown as intercrop with pointed gourd. However, pointed gourd + radish + 2 rows of Indian spinach at the boarder of the bed followed by pointed gourd + radish + 1 or 2 rows of Indian spinach at the boarder of the bed was found most productive and profitable.

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