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Performance of Chilli as Intercropped with Mustard

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Abstract: The experiment was conducted to evaluate the performance of chilli as intercropped with mustard. The plant population of mustard varied from 25 to 75% against 100% chilli plant population in different intercropping treatments. Different intercropping combinations significantly influenced plant height, fruit length, fruit diameter, individual fruit weight and yield of dried chilli. Yield of dried chilli decreased with the increase of mustard population but 100% chilli + 25% mustard combination produced identical yield with sole chilli. At least 25% mustard could be accommodated in chilli + mustard intercropping without reduction in chilli yield. Mustard could be grown with chilli as intercropped in seeding ratio of 25% mustard + 100% chilli for higher yield and profit.

Key words: Chilli, intercropping, plant population, mustard

Introduction

Chilli is a largely grown winter spices crop of Bangladesh. It covers an area of about 1,75,230 acres with a total production 1,42,060 metric tons (Anonymous, 1999). Farmers of our country grow chilli both as monocrop and intercropped with other rabi crops. Intercropping is an old age practice and farmers prefer it for getting an extra benefit. Intercropping paves the way for increasing crop production per unit land area. This has been reported from many countries viz., Bangladesh, India, China, Taiwan, Sri Lanka, Vietnam, Africa and Latin America (Beets, 1977). Higher yield advantage may be possible in intercropping systems, depending upon the level of management and compatibility of component crops (Kushwaha, 1985). Intercropping provides an opportunity to avoid crop competition and advantages of increased production and greater profit-margin (Evans, 1960; Grimes, 1963; Kurata, 1966) and gives higher resource use efficiency (Hashem and Maniruzzaman, 1986). It also increases land equivalent ratio (LER) to a varying degrees (Mohta and De, 1980).

Mustard is the most important oil seed crop in Bangladesh which may be grown as intercropped with different rabi crops. However, study on the compatibility of mustard as intercropped with chilli is very scanty. A short duration locally improved variety (Tori-7) of mustard, which is widely grown by the farmers, but its performance as intercropped with chilli is yet to be studied. The present experiment was therefore, undertaken to know the performance of chilli as intercropped with mustard for higher total productivity and income of the growers.

Materials and Methods

The experiment was conducted during the rabi season of 1999-2000 and 2000-2001 at the Spices Research Sub-Centre, Joydebpur, Gazipur. The soil was silty clay loam with pH 6.8. The organic matter contents of the soil was 1.8% and total N was 0.11%. Average soil moisture contents at the sowing time at 5-20 cm depth were 21.0%. Total average rainfall during both of the growing periods was 509 mm. The experiment was laid out in a randomized complete block design with three replications. Three intercropping treatments i.e. 1 row mustard alternate with 1 row chilli (T₁), 1 row mustard alternate with 2 row chilli (T₂) and 1 row mustard alternate with 3 row chilli (T₃) along with sole chilli (T₄) and sole mustard (T₅) were studied. Chilli was main crop and therefore its population was 100% in all the intercropped combinations. But the mustard population was varied as per different planting sequence and it was 75, 39 and 25%. The crops were planted in last week of November. The unit plot size was 5.8 x 3.2 m². Sole chilli was sown in 40 cm apart lines and plant to plant spacing was 40 cm. Sole mustard was sown in 30 cm apart lines and plant to plant spacing was maintained at 5 cm. Sole chilli

and intercropping treatments received N,P,K,S and Zn @, 100, 67, 100, 20, and 4 kg ha⁻¹, respectively. Cowdung was applied @ 5 t ha⁻¹ in all the treatments. Half of the cowdung was applied during final land preparation. The remaining half of cowdung and the entire quantity of P, S, Zn and one third of N and K were applied during pit preparation. The rest of N and K were applied in two equal splits at 25 and 50 days after transplanting. In sole mustard, N, P, K, S and Zn were applied @ 100, 30, 40, 30, and 4 kg ha⁻¹, respectively. Half of the N and all fertilizers were applied during final land preparation. Rest of the N was applied at 25 days after sowing. All required intercultural operations-viz weeding, irrigation and pest control measures were done as and when needed. Mustard was harvested in 1st week of February and chilli was harvested up to mid April. Data on the yield and yield contributing characters was collected and analyzed statistically and means were separated by DMR test. Chilli and mustard equivalent yields were computed by converting the yields of intercrops into the yields of chilli or mustard on the basis of market price of individual crops. Cost and benefit analysis was done for each treatment on a hectare basis.

Results and Discussion

The result was found consistent in both the years and therefore, pooled analysis over the year was done.

Performance of chilli: Data on growth, yield and yield components of chilli as influenced by different combinations with mustard is shown (Table 1). Plant height, fruit length, fruit diameter, individual fruit weight and dry chilli yield were significantly affected when grown in different combinations with mustard. Plant height reduced significantly in 1 row chilli alternate with 1 row mustard (100% C+ 75% M) combination. However, other combination (100% C+ 39% M) and 3 rows of chilli (100% C+ 25% M) alternate with 1 row mustard produced identical yield with sole chilli. Individual fruit weight, fruit length and fruit diameter decreased significantly with the increase in mustard population. The highest yield of dried chilli was obtained from sole chilli which was statistically identical to that of 100% chilli + 25% mustard combination. But the yield of chilli was significantly reduced in 100% chilli + 39% mustard combination followed by 100% chilli + 25% mustard. The lowest yield of chilli was recorded when chilli was grown with 75% mustard. Probably mustard was more competitive to chilli in respect of light and nutrients sharing. But from the study it is clear that 25% mustard population could be accommodated successfully without reduction of chilli yield. Similar result was obtained by Qasem *et al.* (1986) who reported that 10-20% maize did not affect the yield of chilli in chilli + maize intercropping system. Mamun *et al.* (1998) also reported that 25% of onion could be accommodated

Mamun *et al.*: Chilli-mustard intercropping

Table 1: Yield and yield contributing characters of chilli affected by chilli-mustard intercropping system

Treatment	Plant height (cm)	No. of Primary branches	Individual fruit wt. (g)	Fruit length (cm)	Fruit diameter (cm)	Dry yield (t ha ⁻¹)
T ₁	42.4b	3.6	0.94c	4.55c	0.49c	0.71c
T ₂	45.5ab	3.8	0.98bc	4.69bc	0.55bc	0.93b
T ₃	46.6a	37.0	1.05b	4.85b	0.59b	1.10ab
T ₄	47.7a	3.8	1.20a	5.59a	0.62a	1.15a
CV(%)	6.3	11.0	7.0	6.65	4.9	9.3

Table 2: Yield and yield contributing characters of mustard affected by chilli-mustard intercropping system.

Treatment	Plant height (cm)	No. of primary branches	No. of siliqua plant ⁻¹	No. of seeds Siliqua ⁻¹	1000 seed wt. (g)	Yield (kg ha ⁻¹)
T ₁	60.0	2.5	51.0	8.63ab	2.13	477.0b
T ₂	61.4	2.6	53.7	8.10b	2.20	375.2c
T ₃	61.2	2.7	53.3	8.18b	2.17	315.8d
T ₄	62.9	2.6	53.3	9.42a	2.25	753.1a
CV(%)	8.5	7.6	6.25	7.65	5.75	10.74

Table 3: Cropping index, crop equivalent yield and economics of chilli and mustard in intercropping system

Treatment	Cropping Index (%)		Yield reduction (%)		Crop equivalent yield		Gross return (Tk. ha ⁻¹)	Total variable cost (Tk. ha ⁻¹)	Net return (Tk. ha ⁻¹)	BCR
	Chilli	Mustard	Chilli	Mustard	Chilli	Mustard				
T ₁	60.2	73.0	39.8	27.0	0.92	2.13	32005	21941	10064	1.46
T ₂	78.8	57.4	21.2	42.6	1.09	2.54	38178	21697	16481	1.76
T ₃	93.2	48.3	6.8	51.7	1.24	2.88	43237	21671	21566	2.00
T ₄	-	-	-	-	1.18	-	41300	22129	19171	1.87
T ₅	-	-	-	-	-	0.75	10542	7335	3207	1.43

T₁ = 1 row chilli+ 1 row mustard, T₂ = 2 row chilli + 1 row mustard
Price of chilli = 32 Tk./kg and Mustard = 14 Tk./kg

T₃ = 3 row chilli+ 1 row mustard, T₄ = Sole chilli

with chilli in chilli + onion intercropping system.

Performance of mustard: Different planting combinations significantly influenced the yield of mustard only (Table 2). Significant highest mustard yield was obtained from sole crop due to higher number of plant population. Among the intercropping treatments, the highest yield was recorded from 100 %C+ 75 %M followed by 100 % C + 39 % M and 100 % C + 25 % M. The yield difference was mainly due to the difference in plant population per unit area. Seed yield reduced significantly with the decrease in mustard population. Similar result was observed by Karim *et al.* (1990) who reported that the lower yield of mustard was obtained in mustard-linseed intercropping due to the lower mustard plant population. The lowest mustard yield was recorded from 100% chilli + 25% mustard. Other growth and yield contributing characters like plant height, number of primary branches, number of siliqua per plant, number of seeds per siliqua and 1000 seeds weight did not differ significantly due to the variation of planting combination. As mustard is a tall stature crop compared with chilli, therefore, it was not affected by shading. Competition for other resources like nutrients and water was not observed at all. That's why the different growth and yield parameters were not affected by intercropping with chilli.

Index of yield (chilli and mustard): Intercropping showed a depressing effect on the yield of both the crops in chilli-mustard intercropping system in comparison with sole crops. The extent of yield reduction in chilli was maximum (39.8%) in 100% chilli + 75% mustard combination. The minimum reduction (6.8%) was calculated from 100% chilli + 25% mustard combination. In case of mustard the maximum and minimum (51.7 and 27 %) yield reduction was recorded from 100% chilli + 25% mustard and 100% chilli + 75% mustard combination, respectively (Table 3).

Crop equivalent yield: Chilli equivalent yield was highest in 100% chilli + 25% mustard combination in compared to sole crop and other intercropped combinations. The lowest value was calculated from 100% chilli + 75% mustard plant population. But in mustard all the planting combination in intercropping system markedly increases the crop equivalent yield as compared with sole crop. The value was almost three times higher in 100:25 chilli-mustard combination than sole mustard.

Economic analysis: An analysis on cost and return of chilli + mustard intercropping is given in Table 3. The highest gross return as well as net return was obtained from 100% chilli + 25% mustard combination followed by sole chilli. Other treatments produced lower values than sole chilli but higher than sole

mustard. The cost of cultivation was higher in sole chilli than other combination due to higher price of chilli seed. Similarly, the benefit cost ratio was maximum (2.0%) in 100% chilli + 25% mustard combination which was followed by sole chilli. However, the other intercropping combination produced lower value than sole chilli. Considering the cost and return analysis it was evident that intercropping of chilli with mustard with a seeding rate of 100% chilli + 25% mustard could be grown instead of sole chilli for higher monetary advantage.

From the two years of experimentation it is found that mustard could be grown with chilli as intercropped. At least 25% of mustard could be accommodated without reduction of chilli yield. Considering the agro-economic performance of chilli + onion intercropping system it is evident that chilli and mustard could be grown as intercropped at a ratio of 100:25 (chilli: mustard) for higher yield and profit.

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