

Production potential and returns of mustard (*Brassica juncea*) intercropping systems under rainfed conditions of Haryana

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ABSTRACT

A field experiment was conducted during winter seasons of 1994-1997 at Hisar, to assess the production potential of various pulses and linseed (*Linum usitatissimum* L.) intercropped with Indian mustard [*Brassica juncea* (L.) Czernj & Cosson] under rainfed conditions. On an average, highest seed yield of mustard equivalent (1,878 kg/ha) and net return and (Rs 16,657/ha) were recorded under sole mustard followed by its intercropping with chickpea (*Cicer arietinum* L.) (1 : 5 ratio). Intercropping of mustard with chickpea and field pea increased the LER as compared to sole crops.

Key words : Intercropping, Mustard, Chickpea, Lentil, Linseed, Fieldpea

Intercropping has proved beneficial under adverse climatic conditions. An advantage of intercropping two crop species is likely to occur when individual components are of different morphological and growth habit (De and Singh, 1981). Yield potential of intercropping depends primarily on their optimum proportions in the system. The present study was, therefore, conducted to assess the production potential of chickpea (*Cicer arietinum* L.) fieldpea (*Pisum sativum* var. arvense), linseed (*Linum usitatissimum* L.), lentil (*Lens esculenta* L.) in intercropping system with Indian mustard (*Brassica juncea* L.) under rainfed conditions.

MATERIALS AND METHODS

A field experiment consisting of 10 treat-

ments was conducted in randomized block design with 3 replications during winter (*rabi*) seasons of 1994-97 at research farm Hisar. The soil of the experimental field was sandy loam in texture, low in available N (148-170 kg/ha), medium in available P₂O₅ (14-16 kg/ha) and high in available K₂O (365-370 kg/ha) with pH 7.9. The treatments consisted of sole cropping of mustard, chickpea, fieldpea, linseed, lentil and intercropping of mustard with all these crops in 5 : 1 ratio. Mustard 'RH-30', chickpea 'H 208', fieldpea 'HFP 8112', lentil 'LH 84-8' and linseed 'K₂' were used. In intercropping treatments 5 base crops were sown at a row distance of 30 cm after 1 row of mustard. Sole crops of mustard, chickpea, fieldpea, lentil and linseed were also sown in 30 cm

Table 1. Seed yield (kg/ha) as influenced by various intercropping combinations under rainfed conditions

Treatment	Seed yield (kg/ha)									
	1994-95			1995-96			1996-97			
	Base	Mustard/ intercrop	Mustard yield equivalent	Base	Mustard/ intercrop	Mustard yield equivalent	Base	Mustard/ intercrop	Mustard yield equivalent	Mean mustard equivalent
Chickpea + mustard (5:1)	1,238 (1,173)	641	1,841	1,055 (844)	294	1,138	1,035 (990)	966	1,956	1,636
Fieldpea + mustard (5:1)	410 (323)	737	1,060	512 (409)	317	726	201 (225)	1,005	1,230	1,005
Lentil + mustard (5:1)	188 (170)	843	1,013	Nil	304	304	Nil	1,015	1,015	778
Linseed + mustard (5:1)	267 (342)	726	1,068	578 (722)	302	1,024	642 (725)	996	1,721	1,271
Sole chickpea	1,580		1,498	1,421		1,136	1,326		1,268	1,300
Sole fieldpea	670		533	659		527	284		319	460
Sole lentil	382		346	Nil			65		72	139
Sole linseed	512		662	882		1,102	1,055		1,192	985
Sole mustard	2,135		2,135	934		934	2,565		2,565	1,878
CD (P = 0.05)			312			216			307	219

Figure in parentheses are mustard yield equivalents of a crop

Table 2. Land equivalent ratio (LER) and net monetary returns (Rs/ha) as influenced by various intercropping combinations

Treatment	Land equivalent ratio				Net monetary returns (Rs/ha)			
	1994-95	1995-96	1996-97	Mean	1994-95	1995-96	1996-97	Mean
Chickpea + mustard (5:1)	1.08	1.05	1.15	1.09	14,910	8,070	19,084	14,021
Fieldpea + mustard (5:1)	0.95	1.11	1.10	1.05	7,340	3,950	10,735	7,341
Lentil + mustard (5:1)	0.91	0.32	0.39	0.54	6,867	70	8,172	5,036
Linseed + mustard (5:1)	0.86	0.97	0.98	0.93	7,331	6,840	16,291	10,154
Sole chickpea	1.0	1.0	1.0	1.0	11,731	8,050	11,176	10,319
Sole fieldpea	1.0	1.0	1.0	1.0	2,056	1,960	259	1,425
Sole lentil	1.0	1.0	1.0	1.0	173	Nil	2,100	642
Sole linseed	1.0	1.0	1.0	1.0	3,346	7,620	10,208	7,058
Sole mustard	1.0	1.0	1.0	1.0	18,035	5,940	25,997	16,657
CD (P = 0.05)					2,810	2,294	7,009	2,724

spacing using all recommended agronomic practices. In intercropping treatments, fertilizer dose was calculated on the basis of number of rows of a particular crop. Sowing was done on 24 October during 1994, 1995 and 1996. The amount of winter rains received during crop seasons was 85, 72 and 70 mm with 5, 6 and 7 rainy days during 1994-95, 1995-96 and 1996-97 respectively. Mustard yield equivalent was calculated on the basis of prevailing market prices of different commodities. LER was calculated by taking into consideration the yield of both crops.

RESULTS AND DISCUSSION

Seed yield

There were large variations in seed yield of mustard during different years (Table 1). In 1994-95 and 1996-97, seed yield equivalent of mustard was significant higher in sole cropping than other systems. During 1995-

96, mustard seed yield equivalent was maximum (1,138 kg/ha) in intercropping system with chickpea and it was on par with sole cropping of mustard, pure chickpea and linseed + mustard. It could be due to set back to growth of mustard in late planting because of severe infestation of aphid and white rust.

Land equivalent ratio

On overall mean basis of 3 years, mustard equivalent of 1,878 kg/ha was recorded under sole cropping of mustard which was on par with its intercropping with chickpea (1,636 kg/ha) and significantly higher than all other treatments.

Intercropping of mustard with chickpea and fieldpea increased the land equivalent ratio (LER) as compared to sole crops and the highest LER was recorded in intercropping of mustard with chickpea (1 : 5 ratio). This indicated greater biological efficiency of intercropping treatments. This corroboration

rates the findings of Francis *et al.* (1978). Economic returns net returns (Rs 16,657/ha) were recorded maximum from sole cropping of mustard which was on par with intercropping of mustard with chickpea in 1 : 5 ratio (Rs 14,021/ha) but significantly higher over rest of the treatments.

Therefore to fetch more returns under rainfed conditions of Haryana, mustard as a sole crop or its intercropping with chickpea in 1 : 5 ratio should be grown instead of its

intercropping with any other crop.

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