



Research Article

Evaluation of different intercropping row proportions of chickpea with various *Rabi* oilseed crops under rainfed condition

B.R. MANJITH KUMAR., CHIDANAND P. MANSUR, P.M. SALIMATH AND S. VISHWANATHA

ABSTRACT : A study was carried out at Annigeri to compare the performance of various row proportions of *Rabi* oilseed crops with chickpea on growth, yield and economics under rainfed situation. Sole crop of chickpea, wheat, safflower and mustard recorded higher growth, yield and yield components as compared to intercropping systems. Among the various intercropping systems, chickpea + safflower 4:2 row ratio (1301 kg/ha) resulted with the highest equivalent yield of chickpea and also same treatment revealed higher LER values (1.70), net returns (Rs.33025 ha⁻¹) and benefit: cost ratio (4.62).

KEY WORDS : Cropping system, Chickpea, Wheat, Safflower, Mustard, Rainfed

How to cite this Article : Manjith Kumar, B.R., Mansur, Chidanand P., Salimath, P.M. and Vishwanatha, S. (2012). Evaluation of different intercropping row proportions of chickpea with various *Rabi* oilseed crops under rainfed condition, *Internat. J. Forestry & Crop Improv.*, 3 (2) : 72-75.

Article Chronical : Received : 19.01.2012; Revised : 30.07.2012; Accepted : 06.08.2012

INTRODUCTION

Chickpea, wheat and safflower are usually grown as sole crop as well as intercropping systems on residual moisture or under protection irrigated condition in northern dry zone of Karnataka. Productivity and economics of these crops can greatly to be enhanced by growing it in intercropping systems in optimum row proportions. Safflower is important oilseed crop of this region. However, its cultivation is decreased year by year because of difficulties in harvest due to spines. Hence, there is need for substitute for this crop from any other oilseed

crop. The very objective of the present investigation is to introduce mustard as one of oilseed crop in *Rabi* for substitute safflower under rainfed conditions.

EXPERIMENTAL METHODS

A field trail was laid out at Zonal Agricultural Research Station, Annigeri, in a randomized block design with three replications during *Rabi* season of 2007-08 under rainfed condition. There were twelve treatments consisted of sole chickpea, sole wheat, sole mustard and sole safflower and intercropping of mustard and safflower with chickpea in 3:1 and 4:2 row proportions and with wheat in 3:1 and 5:1 row proportion. The soil was medium black having pH of 7.65. The organic carbon, P and K content of the soil was 0.45 per cent, 28 kg ha⁻¹ and 314 kg ha⁻¹, respectively. All sole crops were fertilized with recommended dose of fertilizers and in case of intercropping, fertilizer dose was adjusted for the proportionate area of the crops. The seeds of chickpea were treated with *Rhizobium*, wheat seeds with Bavistin and safflower and mustard were treated with Captan, respectively. The seeds of wheat and mustard were sown continuously on the line only

MEMBERS OF RESEARCH FORUM

Address of the Correspondence :

B.R. MANJITH KUMAR, Department of Agronomy, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA
Email : manjeetkumar2007@gmail.com

Address of the Coopted Authors :

CHIDANAND P. MANSUR AND S. VISHWANATHA, Department of Agronomy, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA

P.M. SALIMATH, Agricultural University, SHIVAMOGA (KARNATAKA) INDIA

using recommended seed rate. In case of chickpea and safflower two seeds were dibbled in each spot of 4 to 5 cm deep in the row and later only one seedling was maintained by uprooting excess seedlings at 15 DAS for maintaining the requisite population. A common spacing of 30 cm x 10 cm was adopted for all intercrops and sole crops were sown with respective recommended spacing. The crop-wise harvesting was done at maturity. The analysis was done as individually crop basis.

EXPERIMENTAL RESULTS AND ANALYSIS

The results obtained from the present study have been discussed in detail under following heads :

Chickpea:

The maximum chickpea grain yield (1012 kg ha⁻¹), straw yield (1166 kg ha⁻¹), 100 grain weight (20.27 g), pods/plant (43.95), total dry matter production (13.78 g plant⁻¹) at harvest of crop and plant height at 60 DAS (29.7 cm) was recorded with sole chickpea as compare to rest of the. Among intercropping system chickpea + mustard 4:2 row ratio recorded higher seed yield (825 kg ha⁻¹), straw yield (903 kg ha⁻¹), 100 grain weight (20.17 g), pods/plant (42.73), total dry matter production (13.46 g plant⁻¹) at harvest of crop and plant height at 60 DAS (29.2 cm) followed by chickpea + safflower 4:2 row proportion. Singh and Yadav (1992) and Singh *et al.* (1988) also reported similar results (Table 1 and Fig.1).

Mustard:

Maximum and significantly higher plant height at 60 DAS (96.7 cm), total dry matter production (22.14 g plant⁻¹) at harvest

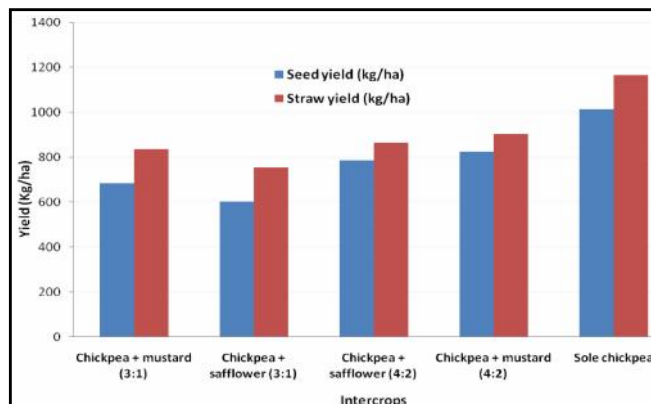


Fig. 1 : Influence of different row ratio on yield of chickpea under intercropping system

of crop, siliquae/ plant (107.6), 1000 seed weight (3.16 g), seed yield (700 kg ha⁻¹) and straw yield (1893 kg ha⁻¹) recorded sole mustard as compared to rest of the treatments. Among intercropping treatments chickpea + mustard 4:2 row ratio recorded higher plant height at 60 DAS (92.2 cm), total dry matter production (21.55 g plant⁻¹) at harvest of crop, siliquae/ plant (104.6), 1000 seed weight (3.11 g), seed yield (386 kg ha⁻¹) and straw yield (47 kg ha⁻¹) followed by chickpea + mustard 3:1 row ratio. Das *et al.* (1992) also obtained higher seed yield in sole mustard over intercropped mustard (Table 2 and Fig.2).

Safflower:

Significantly higher plant height at 60 DAS (49.4 cm), total dry matter production (97.67 g plant⁻¹) at harvest of crop, capitula /plant (27.09), 1000 seed weight (45.99 g), seed yield

Table 1 : Influence of different row ratio on total dry matter production, yield components and yield of chickpea

Treatments	Plant height (cm)	Total dry matter (g plant ⁻¹)	Pods/ plant	100 grain weight (g)
Chickpea + mustard (3:1)	27.7	12.76	42.17	19.85
Chickpea + safflower (3:1)	26.9	12.13	41.52	19.84
Chickpea + safflower (4:2)	28.2	13.09	42.52	19.92
Chickpea + mustard (4:2)	29.2	13.46	42.73	20.17
Sole chickpea	29.7	13.78	43.95	20.27
S.E.±	0.38	0.02	0.42	0.15
C.D. (P=0.05)	1.21	0.07	1.35	NS

Table 2 : Effect of different row ratio on total dry matter production, yield components and yield of mustard

Treatments	Plant height (cm)	Total dry matter (g plant ⁻¹)	Siliquae/ plant	1000 seed weight (g)
Chickpea + mustard (3:1)	91.4	21.17	103.0	3.09
Wheat + mustard (3:1)	87.2	19.56	94.4	2.87
Chickpea + mustard (4:2)	92.2	21.55	104.6	3.11
Wheat + mustard (5:1)	89.2	20.44	99.4	3.06
Sole mustard	96.7	22.14	107.6	3.16
S.E.±	1.03	0.10	0.42	0.08
C.D. (P=0.05)	3.36	0.33	1.38	NS

(1033 kg ha⁻¹) and straw yield (2069 kg ha⁻¹) were recorded with sole safflower as compared to different intercropping systems. Among intercropping treatments chickpea + safflower 4:2 row ratio recorded higher seed yield (975 kg ha⁻¹), stover yield (1931 kg ha⁻¹), 1000 seed weight (43.20 g), capitula/plant (25.83) and total dry matter production (91.65 g plant⁻¹) at harvest of crop and plant height at 60 DAS (46.6 cm), which was at par with

wheat + safflower 5:1 row ratio. Singh and Yadav (1992) and Hiremath *et al.* (1992) also reported similar results on chickpea, wheat and safflower intercropping system (Table 3 and Fig.3).

Among the various row adjustments intercropping systems, chickpea + safflower 4:2 row ratio (1301 kg/ha) resulted with the highest equivalent yield of chickpea. The second best treatment for equivalent yield was chickpea + mustard in 4:2

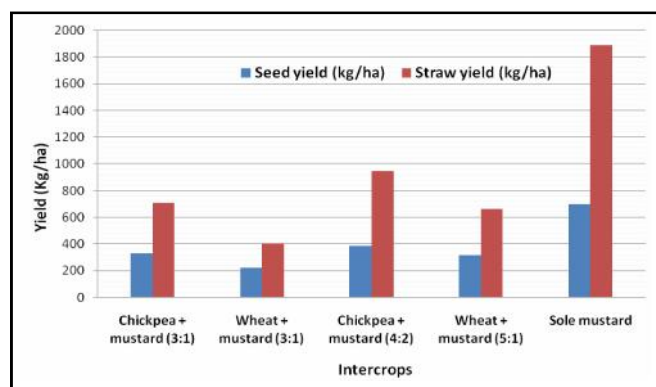


Fig. 2 : Effect of different row ratio on yield of mustard under intercropping system

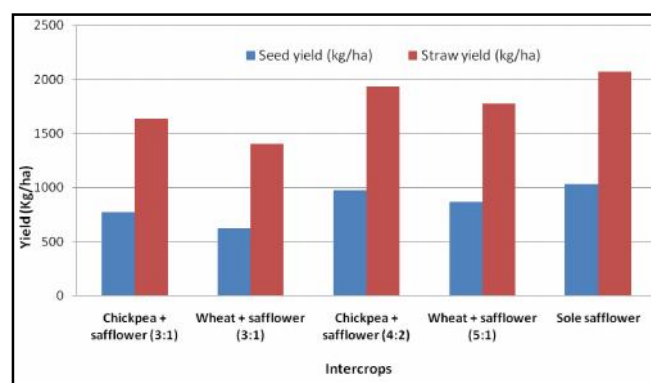


Fig. 3 : Influence of different row ratio on yield of safflower under intercropping system

Table 3 : Influence of different row ratio on total dry matter production, yield components and yield of safflower

Treatments	Plant height (cm)	Total dry matter (g plant ⁻¹)	Capitula/ plant	1000 seed weight (g)
Chickpea + safflower (3:1)	44.1	86.62	21.99	39.09
Wheat + safflower (3:1)	42.4	76.28	18.81	30.83
Chickpea + safflower (4:2)	46.6	91.65	25.83	43.20
Wheat + safflower (5:1)	48.4	94.58	22.40	40.68
Sole safflower	49.4	97.67	27.09	45.99
S.E.±	0.71	1.05	1.18	1.40
C.D. (P=0.05)	2.27	3.41	3.83	4.57

Table 4 : Chickpea equivalent yield, land equivalent ratio (LER), gross returns, net returns and benefit : cost ratio as influenced by different intercropping systems

Treatments	Chickpea equivalent yield (kg ha ⁻¹)	LER	Gross returns (Rs. ha ⁻¹)	Net returns (Rs. ha ⁻¹)	Benefit : cost ratio
T ₁ - Chickpea + mustard (3:1)	1013	1.15	32732	23827	3.68
T ₂ - Chickpea + safflower (3:1)	1024	1.35	33197	24157	3.67
T ₃ - Wheat + safflower (3:1)	740	1.24	25783	17694	3.19
T ₄ - Wheat + mustard (3:1)	582	1.00	20433	12287	2.51
T ₅ - Chickpea + safflower (4:2)	1301	1.70	42153	33025	4.62
T ₆ - Chickpea + mustard (4:2)	1206	1.37	38960	29923	4.30
T ₇ - Wheat + safflower (5:1)	916	1.66	31617	23487	3.89
T ₈ - Wheat + mustard (5:1)	767	1.30	26805	18775	3.34
T ₉ - Sole chickpea	1012	1.00	32391	24744	4.23
T ₁₀ - Sole safflower	1034	1.00	18603	11408	2.58
T ₁₁ - Sole wheat	1185	1.00	19514	13107	3.04
T ₁₂ - Sole mustard	700	1.00	22756	15229	3.02
S.E. ±	14	0.04	414	417	0.05
C.D. (P=0.05)	42	0.12	1245	1253	0.15

row ratio (1206 kg/ha). The land equivalent ratio was highest in chickpea + safflower 4:2 row ratio (1.70) which was at par with chickpea + mustard 4:2 row ratio (1.66) (Table 4).

The gross returns were also maximum under 4:2 row ratio of chickpea + safflower (Rs.42153 ha⁻¹) followed with chickpea + mustard 4:2 row ratio (Rs.38960 ha⁻¹). The total net returns were also high (Rs.33025 ha⁻¹) under chickpea + safflower 4:2 row ratio, next best was noticed in chickpea + mustard 4:2 row ratio (Rs. 29923 ha⁻¹). The benefit: cost ratio also recorded maximum under chickpea + safflower 4:2 row ratio (4.62) followed by chickpea + mustard 4:2 row ratio (4.30). Intercropping of mustard in chickpea or wheat revealed LER value (1.22- 1.37) which reveal yield advantage of 22 to 37 per cent over sole crop (Table 4).

REFERENCES

- Das, K., Shyam, N.N. and Baroova, S.R. (1992). Intercropping of wheat (*Triticum aestivum*) with rapeseed (*Brassica napus*) and mustard (*Brassica juncea*) under rainfed conditions. *Indian J. Agron.*, **37**(3): 543-545.
- Hiremath, S.M., Chittapur, B.M. and Hosmani, M.M. (1992). Intercropping of wheat (*Triticum aestivum*) and safflower (*Carthamus tinctorius*) at different spatial arrangements. *Indian J. Agron.*, **37**(2): 338-340.
- Singh, D.K. and Yadav, D.S. (1992). Production potential and economics of chickpea (*Cicer arietinum*) based intercropping systems under rainfed condition. *Indian J. Agron.*, **37**(3): 424-429.
- Singh, R.C., Rao, P. and Dahiya, D.R. (1988). Effect of crop geometry and intercropping on gram production. *Legume Res.*, **11**(3): 139-142.
