Indian J. Agron. **41** (2) : 205–208 (June 1996)

Productivity and economics of double-cropping with pulses and oilseeds against the base crop wheat (*Triticum aestivum*)

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Received: September 1994

ABSTRACT

A field experiment was conducted during 1992–93 and 1993–94 to evaluate most productive and economic double cropping with pulses and oilseeds against wheat (*Triticum aestivum* L. emend. Fiori & Paol.). The production potential in terms of wheat-grain equivalent was higher in soybean [*Glycine max* (L.) Merr.]–chickpea or gram (*Cicer arietinum* L.) and blackgram (*Phaseolus mungo* L.)–chickpea double-cropping systems. Growing of chickpea in winter after soybean or blackgram was highly profitable compared with that of wheat. Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson] and linseed (*Linum usitatissimum* L.) were foud next to chickpea on the basis of monetary returns.

Oilseeds and pulses are receiving more attention owing to higher demand and prices. Inclusion of these crops in the sequences change the economics of the sequence cropping (Tomar and Tiwari, 1990; Gupta and Rai, 1990; Umrani *et al.*, 1993). Blackgram (*Phaseolus mungo* L.) –wheat (*Triticum aestivum* L. emend. Fiori & Paol.) and soybean [*Glycine max* (L.) Merr.]–wheat are the dominant double-cropping systems in Tikamgarh district of Madhya Pradesh. The net return per unit area and per unit time can be further increased by including winter-season (*rabi*) pulses and oilseeds instead of wheat because of their higher prices and production. A study was therefore initiated to assess the profitable and viable cropping systems which includes pulses and oilseeds in place of wheat for Tikamgarh district of Madhya Pradesh.

MATERIALS AND METHODS

A field experiment was conducted at the Zonal Agricultural Research Station, Tikamgarh, during winter seasons of 1992–93 and 1993–94. The soil was clay-loam having pH 7.5, electrical conductivity 0.326 mmhos/cm, available N 271 kg/ha, P_2O_5/ha 19 kg and K_2O 380 kg/ha. The total rainfall received during 1992–93 and 1993–94 was 852 and 1,010 mm respectively. The treatments comprised 8 double-cropping systems–blackgram and soybean followed by each of the winter crops, viz. wheat, chickpea, linseed (*Linum usitatissimum* L.) and Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson] and were laid out in a randomised-block design with 4 replications keeping a plot-size of 6

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Table 1. Season-wise productivity from different double-cropping systems

Double cropping	Yield (q/ha)				Mean yield (q/ha)			Wheat-grain equivalent (q/ha)			Duration (days)
	1992–93		1993–94								
	Rainy	Winter	Rainy	Winter	Rainy	Winter	Total	1992–93	1993–94	Mean	
Blackgram–wheat	12.0	47.0	5.0	44.1	8.5	45.5	54.0	74.0	60.0	67.0	218
Blackgram–chickpea	12.0	30.1	5.0	30.6	8.5	30.4	38.9	94.8	111.4	103.1	212
Blackgram–linseed	12.0	22.0	5.0	18.2	8.5	20.1	28.6	89.0	64.4	76.7	212
Blackgram–Indian mustard	12.0	21.3	5.0	21.7	8.5	21.5	30.0	87.4	74.3	80.9	210
Soybean–wheat	21.8	46.9	11.5	44.2	16.7	45.5	62.2	89.8	74.5	82.2	240
Soybean–chickpea	21.8	28.8	11.5	30.6	16.7	29.7	46.4	107.8	123.8	115.8	230
Soybean–linseed	21.8	18.5	11.5	17.5	16.7	18.0	34.7	95.0	78.8	86.9	229
Soybean–Indian smustard	21.8	17.2	11.5	21.5	16.7	19.4	36.1	92.8	90.0	91.4	228
CD (P = 0.05)		1.6		1.8		2.0	3.0	2.4	6.2		

Price of different commodities (Rs/q) : Blackgram, 800–1000; soybean, 700–950; wheat, 355–360; chickpea, 800–1,100; linseed, 1,000; Indian mustard, 1,000

m x 5 m. The package of practices followed are given as below:

The variety, seed rate (kg/ha), fertilizer (kg/ha), spacing (cm), sowing date and harvesting date were respectively 'RU 2', 15, N_{20} P_{60} K_{20}, 30, 17–21 July and 9–10 October for blackgram; 'JS 75–46', 100, N_{20} P_{80} K_{20}, 30, 17–21 July and 25 October–6 November for soybean; 'HI 1077', 100, N_{120} P_{60} K_{40}, 20, 11 November and 20–30 March for wheat; 'ICCV 10', 100, N_{20} P_{60} K_{20}, 25, 26 October–3 November and 6–9 March for chickpea; 'RCL 6', 6, N_{80} P_{40} K_{20}, 25, 26 October–3 November and 4–20 March for linseed; and 'Pusa Bold', 5, N_{80} P_{40} K_{20}, 30, 26 October–3 November and 4–7 March for Indian mustard.

Blackgram and soybean were grown under rainfed conditions. Six irrigations were given to wheat, 2 to chickpea and linseed at flowering and bud development stages, and 3 to Indian mustard at 25, 50 and 75 days after sowing.

RESULTS AND DISCUSSION

The yield of rainy-season crops (blackgram and soybean) suffered during 1993–94 due to heavy rains in September at flowering stage. The yield of winter crops varied significantly in both the years. Among the winter crops, wheat recorded significantly highest yield, followed by chickpea, Indian mustard and linseed (Table 1). The pooled data revealed that among the different cropping systems, the maximum total productivity was recorded from soybean–wheat, followed by blackgram–wheat and then soybean– chickpea. The total duration taken by these cropping systems was 240, 218 and 230 days respectively. However, soybean–chickpea and blackgram–chickpea recorded significantly more wheat-grain equivalent than the remaining double-cropping systems. High wheat-grain equivalent of these cropping systems was owing to inclusion of chickpea which fetched higher price than wheat.

Table 2. Land-use efficiency, production efficiency and economics from different double cropping systems

Double-cropping system	Land-use efficiency (%)	Production efficiency (kg/ha/day)	Net return (Rs/ha)	Net return (Rs/ha/day)	Benefit : cost ratio	Increase in net-return over	
						Blackgram–wheat	Soybean–wheat
Blackgram–wheat	60.0	24.8	16,381	75	2.26		
Blackgram–chickpea	58.8	18.0	29,829	141	4.23	13,448	9,082
Blackgram–linseed	58.8	13.6	20,755	98	3.22	4,374	8
Blackgram–Indian mustard	57.8	14.7	22,530	107	3.54	6,149	1,783
Soybean–wheat	65.8	25.9	20,747	86	2.40	4,366	
Soybean–chickpea	63.0	19.9	32,976	143	3.90	16,595	12,229
Soybean–linseed	62.7	15.4	23,222	101	2.96	6,841	2,475
Soybean–Indian mustard	62.5	16.0	24,952	109	3.21	8,571	4,205
CD (P = 0.05)			3,882				

Although the land-use efficiency and production efficiency were the highest in soybean–wheat and blackgram–wheat, the net return and benefit : cost ratio were highest in soybean–chickpea followed by blackgram–chickpea (Table 2). The increase in net return from soybean–chickpea over blackgram–wheat was Rs 16,595/ha and over soybean–wheat was Rs 12,229/ha. Similarly, increase in net return from blackgram–chickpea over blackgram–wheat was Rs 13,448/ha and over soybean–wheat was Rs 9,082/ha. Singh *et al.* (1993) reported that double-cropping of soybean–chickpea may also result economy in fertilizer and energy use.

Double-cropping of soybean–Indian mustard or soybean–linseed proved better than blackgram–wheat and soybean–wheat, the increase in net return was Rs 2,475–8,571/ha.

It was concluded that growing of chickpea after soybean or blackgram was found highly profitable compared with that of growing wheat. Indian mustard and linseed were found economical next to chickpea. Thus farmers of this region can achieve more profit by taking pulse or oilseed in winter season instead of wheat.

REFERENCES

Gupta, S. R. and Rai, R. N. 1990. Cropping system for different cropland use in Sikkim. *Indian Journal of Agronomy* **35** (1,2) : 36–39.

Singh, Kalyan, Billore, S. D. and Bargale, Mridula. 1993. Economy in fertilizer and energy use through double-cropping of soybean (*Glycine max*)– chickpea (*Cicer arietinum*). *Indian Journal of Agronomy* **38** (4) : 630–632.

Tomar, S. S. and Tiwari, A. S. 1990. Production potential and economics of different cropping sequences. *Indian Journal of Agronomy* **35** (1, 2) : 30–35.

Umarani, N. K., Joshi, A. C. and Kareppa, S. M. 1993. Stability and economics of crop sequences under assured water supply. *Indian Journal of Agronomy* **38** (2) : 163–167.