

## EFFECT OF NITROGEN, PLANTING PATTERN AND PLANT POPULATION ON PRODUCTIVITY OF SAFFLOWER + INDIAN RAPE INTERCROPPING

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## ABSTRACT

A field experiment was conducted during post rainy seasons of 1989-90 and 1990-91 on safflower (Carthamus tinctorious L.) + Indian rape (Brassica campestris L. var. Toria) intercropping system in additive series under dryland conditions. The experiment was laid out in R.R.D. with three replications. In addition to sole crops, the treatments involved two planting patterns: uniform spacing (45 cm) of safflower with one row of rapeseed and paired planting (30/60 cm) of safflower with one row of rapeseed; two rapeseed populations: 50% and 75%; and three N levels: 0, 30 and 60 kg N/ha to rapeseed. Recommended doses of fertilisers i.e., 40:30:30 and 60:30:30 were applied to pure crops of safflower and Indian rape, respectively. However, in intercropping, fertilizers were applied according to treatment and the respective population of component crops.

Intercropping of safflower with Indian rape proved advantageous than growing safflower alone. Indian rape population of 50% and 75% were found optimum for 2:1 and 1:1 row ratio, respectively. Increasing levels of N application to rapeseed markedly improved the LER, output input ratio and oil recovery. However, the yield proportion of safflower was decreased in 1:1 row ratio. Paired row planting of safflower with one row of rapeseed at 50% and 60 kg N/ha recorded 48% yield advantage and proved most remunerative.

## INTRODUCTION

Safflower (Carthamus tinctorious L.) is a drought tolerant long duration crop. The initial slow growth of the crop can very well be exploited by taking fast growing early maturing intercrops (Palaniappan, 1985, and Bohra et al., 1993). Indian rape (Brassica campestris var. Toria) owing to its rapid growth and earliness appears suitable for intercropping with safflower. However, the required information on such intercropping is lacking. Hence the present study was undertaken.

TABLE 1. Seed yield, L.E.R., yield proportion of safflower and output-input ratio of safflower + Indian rape intercropping

Row S IR	Treatments		Seed yield (g/ha)				L.E.R.* Proport- ion of Safflower (Mean)	Yield* Proport- ion of Safflower (Mean)	Output- Input Ratio (Mean)			
	Population (%) (kg N/ha)		Indian rape		Safflower							
	S	IR	1989- 90	1990- 91	Mean	1989- 90				1990- 91	Mean	
1:1	100	50	0	9.44	6.15	7.80	4.59	5.90	5.25	1.17	0.43	3.48
1:1	100	50	30	9.59	7.12	8.36	5.83	6.00	5.92	1.29	0.44	3.68
1:1	100	50	60	11.53	7.80	9.57	4.72	6.35	5.54	1.36	0.39	3.79
1:1	100	75	0	8.46	6.62	7.54	5.63	5.15	5.39	1.16	0.49	3.33
1:1	100	75	30	11.20	7.60	9.40	6.82	5.82	6.32	1.40	0.44	3.84
1:1	100	75	60	11.24	8.25	9.75	5.85	6.20	6.03	1.42	0.41	3.75
2:1	100	50	0	6.72	6.12	6.42	6.48	6.90	6.69	1.21	0.53	3.54
2:1	100	50	30	7.81	6.65	7.23	7.22	7.20	7.21	1.32	0.53	3.77
2:1	100	50	60	7.45	6.90	7.18	10.27	7.65	8.96	1.48	0.58	4.11
2:1	100	75	0	7.15	5.21	6.18	7.07	6.42	6.75	1.18	0.55	3.38
2:1	100	75	30	7.94	6.19	7.07	7.35	7.10	7.23	1.30	0.54	3.58
2:1	100	75	60	7.31	6.43	6.87	9.79	7.23	8.51	1.41	0.57	3.82
Indian rape (Sole)				13.92	9.80	11.86	-	-	-	1.00	-	3.79
Safflower (Sole)				-	-	-	11.30	9.44	10.37	1.00	-	3.19
C.D. 5%				1.94	1.18	-	1.29	0.87	N.A.	N.A.	N.A.	N.A.

S - Safflower  
 IR - Indian rape  
 N.A. - Not analysed  
 \*Mead and Willey (1980)

Output-input ratio =  $\frac{\text{Gross return}}{\text{Cost of cultivation}}$

## EXPERIMENTAL

Yield of component crops

Table 1 shows that in general both the crops performed better during 1989-90 than 1990-91. This is attributed to the favourable rainfall conditions during first year. Both the crops recorded higher seed yield in their pure stands. However, in intercropping, Indian rape performed better in 1:1 row ratio while safflower in 2:1 paired row planting and likewise the yield proportion of safflower was considerably high in 2:1 row ratio. The maximum seed yield of Indian rape was obtained in 1:1 row ratio with 75% rapeseed and 60 kg N level whereas, safflower recorded highest seed yield in 2:1 row ratio with 50% rapeseed population and 60 kg N level in both the years.

Land equivalent ratio (LER) and Output-input ratio

Cultivation of Indian rape was found far more remunerative than sole cropping of safflower and the intercropping of safflower with Indian rape proved advantageous than growing safflower alone (Table 1). At 75% Indian rape population, the biological efficiency of the system was better in 1:1 row ratio. However, in 2:1 paired row planting, 50% rapeseed recorded more LER values at all the N levels. Increasing levels of N application to rapeseed markedly improved the LER, output-input and oil recovery (data not reported). Nevertheless, 2:1 safflower + Indian rape intercropping at 50% Indian rape and 60 kg N application produced the maximum yield advantage of 48% and proved most economical (Output-input ratio: 4.11). It was closely followed by 1:1 safflower + Indian rape intercropping with 75% Indian rape at 30 and 60 kg N levels. However, 1:1 row ratio at 75% rapeseed without N proved most inefficient and uneconomical.

## REFERENCES

- Bohra, J.S., Singh, K., Kumar, K. and Varma, S.C. (1993). Effect of row arrangement and safflower population on production potential of barley-safflower intercropping under dryland conditions. In Proceedings of Third International Safflower Conference held in Beijing, China from 14-18 June, 1993.
- Mead, R. and Willey, R.W. (1980). The concept of land equivalent ratio and advantages in yields from intercropping. Experimental Agriculture 16, 217-228.
- Palaniappan, S.P. (1985). Cropping systems in the Tropics: Principles and Management. Willey Eastern, New Delhi.