

PRODUCTIVITY AND NET RETURNS OF MIXED CROPPING OF RAINFED SESAMUM WITH PULSES

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A field experiment with different sesamum-Pulses mixed cropping systems and N levels was conducted under dryland conditions at Tamil Nadu Agricultural University, Coimbatore. All the mixed cropping systems gave higher total productivity than the pure crop of sesamum. The highest productivity and net returns were obtained from sesamum-greengram system in 1:1 row arrangement. Nitrogen application at 15 kg/ha was found adequate.

Sesamum is an important oilseed crop in India but its productivity and economic returns are low. Pulses constitute an important source of protein and they are capable of fixing atmospheric nitrogen and making it available to the associated crops. Mixed cropping of these two crops may be an attractive proposition to attain the twin objectives of higher productivity and reduced fertilizer application.

MATERIALS AND METHODS

An experiment was conducted during *Kharif* season, under dryland conditions at the Tamil Nadu Agricultural University farm Coimbatore. The soil of the experimental field was a well drained clayey loam with a PH of 8.0 and was medium in N (268 kg/ha), high P (28 kg/ha) ha and high K (572 kg/ha). The total rainfall during the crop growth period (August–November) was 294 mm in 60 rainy days.

The experiment was laid out in a split plot design, replicated thrice with the main plot treatments of N levels (5, 15 and 45 kg/ha) and subplot treatments of sesamum and pulses viz, blackgram, greengram and redgram mixtures under two row-ratios of 1:1 and 2:1. The crop

varieties sown were TMV, (Sesamum) CO₁ (Blackgram), CO₂ (Greengram) and CO₃ (Redgram). The spacing adopted for sesamum pure crop was 22.5 X 22.5 cm whereas for mixtures of Sesamum + Blackgram and Sesamum + Greengram it was 22.5 X 10.0 cm and for Sesamum + Redgram it was 22.5 X 20.0 cm.

Twenty five kg/ha each of P₂ O₅ (single super phosphate) and K₂ O (muriate of potash) were basally applied uniformly. Nitrogen, as per the treatments, was applied in the form of urea basally. Pulse seeds were treated with the appropriate rhizobial cultures and sown in line as per the treatments.

RESULTS AND DISCUSSION

The main yield of sesamum decreased in 1:1 row (59 % to 61.7%) and 2:1 row ratio (70.7 to 74.6%) arrangement as a result of reduction in population to the extent of 50% and 33%, respectively compared to sole crop (Table 1) Little difference was noted among the pulses in yield value and blackgram, greengram and redgram performed in that order. Total productivity data indicated that 1:1 row arrangement was superior to 2:1 row. But a slight

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Table 1. Grain yields of sesamum, pulses and sesamum + pulses (kg/ha) as affected by the treatment

Row ratio	Crop mixture	Seed yield											
		Sesamum				Pulses				Sesamum + Pulses			
		N levels (kg/ha)			Mean	N levels (kg/ha)			Mean	N levels (kg/ha)			Mean
		5	15	45		5	15	45		5	15	45	
Pure	Sesamum	394	532	611	512	—	—	—	—	394	532	611	512
	Sesamum + Blackgram	268	348	333	316	292	323	306	307	560	671	639	623
1:1	Sesamum + Greengram	252	339	344	312	316	341	318	325	568	680	662	637
	Sesamum + Redgram	239	329	337	302	325	284	326	312	564	613	663	614
2:1	Sesamum + Blackgram	300	406	441	382	161	210	203	191	461	616	644	574
	Sesamum + Greengram	299	387	437	374	166	238	212	205	465	625	649	582
	Sesamum + Redgram	289	366	430	362	209	272	254	245	498	638	684	607
	Mean	292	387	419		245	277	260		530	639	636	
	CD 5%	Nitrogen levels : 6.90						Nitrogen levels : 11.45					
		Row Ratios : 10.45						Row Ratios : 18.81					

Table 2. Effect of Nitrogen levels (5, 15 and 45 kg/ha) and Row Ratios (1:1 and 2:1) on Monetary return (Rs/ha) of mixed cropping of sesamum with pulses

Row Ratio	Crop Mixture	Net Return			
		N levels			Mean
		5	15	45	
Pure	Sesamum	501.00	835.50	917.75	751.42
	SB	726.00	953.00	742.75	807.42
1:1	SG	720.00	964.25	799.00	827.75
	SR	711.00	831.50	302.50	781.67
2:1	SB	549.50	894.00	841.25	761.58
	SG	556.75	897.75	848.25	767.58
	SR	621.25	914.09	919.00	818.08
	Mean	640.79	898.86	838.65	
	N levels		S.E.	C.D 5%	
			16.54	52.29	
	Row Ratios		24.10	67.48	
	Interaction		42.81	124.15	
			42.52	131.01	

difference in the performance of pulses was noticed due to row arrangement. Greengram was superior in 1:1 row while redgram was superior in 2:1 row (Table 1). Similar results were obtained by Chandrasekaran *et al.* (1974). The yield reduction in pulse was of a much larger magnitude than the yield increase of sesame due to wide row arrangement. However, redgram did not show any reduction and its yield was more than commensurate with the reduction in population. In general, 1:1 row arrangement is better for mixed cropping, as observed in 1:1 cotton greengram system (Anon, 1971) and 1:1 barley, gram and 1:1 barley - chickpea systems (Searma, 1966).

Total seed yield of sesame increased due to nitrogen addition significantly. 1:1 row arrangement was significantly superior to 2:1 row arrangement. Greengram was the most suited companion crop. Nitrogen at the medium level of 15 kg/ha was significantly superior to other levels. Significant increase in sesame yield was obtained at 28 kg N/ha in a fertile loam soil by Singh *et al.* (1960).

The economics of mixed cropping revealed that net returns from crop mixtures were higher irrespective of the pulse crop raised compared to sole crop of sesame. Sharma *et al.* (1973) obtained promising results from Soybean-Arhar mixture ensuring much higher net returns than traditional monoculture. Kairon and Singh (1972) reported similar results with cotton + mung system. The net returns increased in 1:1 row arrangement with sesame-greengram system in (10.16% over sole crop).

Sesame-redgram system in 2:1 row arrangement gave 8.87% higher return than sole sesame, indicating that net returns increased considerably without involving much cost by intercropping of sesame with a competitive pulse crop. Net returns also increased significantly due to N fertilisation. The highest net returns of Rs. 898.86 were obtained with medium nitrogen level (15 kg/ha) which was significantly superior to other levels. In conclusion, it may be stated that sesame can be mixed cropped with green gram in 1:1 row arrangement for higher productivity and net returns under rainfed conditions.

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