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Effect of Companion Cropping of Sesame on Development of Pigeonpea

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The field study was laid out during two consecutive *rainy* seasons of 2016-17 and 2017-18 at Soil Conservation and Water Management Farm, C.S. Azad University of Agriculture and Technology, Kanpur. The main objective was to find out the yield of main crop of pigeonpea and sesame and their economic I term of net profit. The fertility status of experimental plot was medium. The three treatments i.e., pigeonpea sole, sesame sole and pigeonpea + sesame (1+1) additive series were tested. The total productivity of pigeonpea + sesame was highest (20.30 q/ha) in comparison to pigeonpea sole (17.34 q/ha) and sesame alone (6.32 q/ha). The pooled data display that maximum cost of cultivation Rs. 56191/ha observed under pigeonpea + sesame cropping system. The highest gross return Rs. 116053/ha, net return Rs. 54862/ha and BCR 1:2.07 were also recorded with pigeonpea + sesame (1+1) additive series.

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1. INTRODUCTION

In India, however, it is being grown for more than three thousand years. It is specially one of the most important pulse crops of India only next to chickpea. The crop is extensively grown in Uttar Pradesh, Andhra Pradesh, Madhya Pradesh, Maharashtra and Bihar.

In area where the annual rainfall is in the range of 600-850 mm companion cropping is being recommended is followed in different parts of country. The sesame is drought resistant and has a capacity to low level management conditions may be ideal combination for sustainable cropping system. The sesame companion cropping is practiced as an insurance of crop failure under rainfed condition.

The intercropping of sesame in pigeonpea is a general practice as it is more remunerative. This intercropping serves as a kind of insurance against total crop failure due to abnormal rainfall and a safeguard against the pests and diseases [1].

Therefore, productivity and profitability increases through companion cropping of pigeonpea and sesame, is the subject matter of this manuscript.

2. MATERIALS AND METHODS

The field study was laid out under rainfed condition during two consecutive rainyseasons of 2016-17 and 2017-18 at Soil Conservation and Water Management Farm, C.S. Azad University of Agriculture and Technology, Kanpur. The three treatments were tested i.e., pigeonpea alone planted at 60 cm apart, sesame sole planted at 30 cm apart and pigeonpea + sesame (1+1) planted under additive series. The main crop was pigeonpea while sesame was planted in the inter spaces of two rows of pigeonpea. The experimental soil was typic eroded Gangetic alluvial representing Kanpur Type-1. The soil was sandy loam having pH 7.7, organic carbon 0.33%, available N 172.00 kg/ha, available P_2O_5 17.50 kg/ha and available K_2O 183.00 kg/ha, therefore fertility status of plant nutrients was medium. The pH was determined by Electrometric glass electrode method as discussed by Piper [2]. The organic matter was analyzed by Walkley and Black's rapid titration method [3]. The available P_2O_5 and available K_2O were analyzed by Olsen's method and Flame photometric method, respectively, [4]. The available Nitrogen was analyzed by Kjeldalh's method as suggested by Subhiah and Asija [5]. The cultivars Amar (KA-32-1) of pigeonpea cv. and cv. Shekhar (SH-446) of sesame were shown under alone and companion cropping. The sole crops of pigeonpeawas fertilized with 20 kg N + 40 kg P_2O_5/ha+20 kg K_2O/ha while sole and intercropped sesame were fertilized with 40 kg N + 20 kg P_2O_5+20 kg K_2O/ha. The recommended conservation agronomical practices were followed for raising of experimental crops during two experimental seasons. The harvesting a crop was made at complete maturity stage. The treatments were replicated thrice in a split plot design. The obtained data analyzed by standard method as suggested by Cochran and Cox [6]. The economics computed and pooled to draw valid conclusion from the study is the subject matter of this manuscript.

3. RESULTS AND DISCUSSION

The pooled data on growth parameters, yield traits, grain yield and economic studies are reported in Table 1&2 and discussed here under appropriate heads-

It is worthwhile to mention here that results and discussions were presented on the basis of average/pooled data of both the years.

3.1 Sole Pigeonpea v/s Intercrop Pigeonpea

3.1.1 Growth traits

The effect of cropping systems did not display marked variation in plant stand at harvest. Thus uniformity in plant stand provided equal opportunity to every treatment for expressing its full potential regarding growth and development of crop. Cropping system significantly affected plant height of pigeonpea crop measured at maturity stage. Pure crop of pigeonpea produced taller plants over intercrop of pigeonpea. This was due to adverse effect of sesame intercrop on intercrop pigeonpea. The intercrop sesame added smother effect on pigeonpea.

Table 1. Growth and yield traits under different treatments

(Pooled data of two years)

S.N.	Treatment	Plant stand at harvest (000, /ha)	Plant height at maturity (cm)	Pods/plant	Seed/pod	1000-seed weight (g)
1.	Pigeonpea alone	61.80	200.09	332.90	4.20	101.30
2.	Sesame alone	185.40	107.80	55.50	46.20	2.40
3.	Pigeonpea+sesame (1+1) a.s.	61.10	188.45	325.60	4.00	99.90
	S.E.(d±)	1.40	3.26	2.27	0.10	1.16
	C.D. 5%	6.07	9.62	6.30	0.28	3.48

Table 2. Yield and economic study

Pooled data of two years)

S. N.	Treatment	Average yield of main crop (q/ha)	Intercrop yield (q/ha)	Total productivity (q/ha)	Economic study (Rs. /ha)			BCR
					Cost of cultivation	Gross return	Net return	
1	Pigeonpea alone	17.34	-	17.34	49861.00	100248.00	50387.00	2.01
2	Sesame alone	06.32	-	06.32	31561.00	34056.00	2495.00	1.07
3	Pigeonpea+ sesame (1+1) a.s.	16.61	3.69	20.30	56191.00	116053.00	54862.00	2.07
	S.E.(d±)	-	-	-	-	-	-	-
	C.D. 5%	-	-	-	-	-	-	-

3.1.2 Yield contributing characters

Yield traits of pigeonpea noted in term of pods/plant, seeds/pod and 1000-seed weight, which was superior undersole cropping of pigeonpeaover the intercrop of pigeonpea. The reduction in yield traits of pigeonpea in intercropping, supported by smothering effect of sesame on pigeonpea.

3.1.3 Grain yield of pigeonpea

Perusal of data available in Table-2 make it clear that the highest grain yield of pigeonpea was weighed under sole cropping ofpigeonpea(17.34 q/ha) over the intercropped pigeonpea (16.61 q/ha). Therefore, the pigeonpea grain yield was higher by a margin of 0.73 q/ha or 2.55% under sole cropping of pigeonpeaover intercropping of pigeonpea. The considerable improvement of yield contributing traits under pure cropping of pigeonpea, supported to highest grain yield of pigeonpea under pigeonpea + sesame (1+1)a.s.

3.1.4 Grain yield of sesame

The sole crop of sesame produced seed yield by 6.32 q/ha in comparison to intercropped sesame with pigeonpea (3.69 q/ha). The considerable improvement in pod/plant, seed/pod and 1000-seed weight in sole cropping of sesame, supported to the higher seed yield under sole cropping of sesame. The higher final plant stand under sole sesame i.e., 100 % also responsible for higher seed yield of sesame alone.

3.1.5 Economic study

The maximum cost of cultivation was observed under pigeonpea + sesame (1+1) additive intercropping by Rs. 56191/ha. It might be attributed to total population adjustment under both component crops of the system and their total input requirements. The highest gross return (Rs. 115053/ha), net return (Rs. 54862/ha) and BCR (1:2.07) were observed under pigeonpea + sesame intercropping. It may be due to higher total productivity of planting system. These results ae in agreement with those reported by Reddy *et al.* [7] Dudhade*et al.* [8] Sharma *et al.* [9] and Kumawat *et al.* [10]

4. CONCLUSION AND RECOMMENDA-TION

Since, the cropping system of pigeonpea + sesame gave net return by Rs. 54862/ha, therefore, farm families residing in the vicinity of rainfed area may be advocated for adoption of intercropping of pigeonpea + sesame for higher total productivity and profitability and harvest the fruits of newly generated technology.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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