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Influence of groundnut + sesame intercropping in different row proportion on growth, yield and quality of groundnut and sesame

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Abstract
A field experiment was conducted at Agronomy farm Dr. PDKV Akola during *summer* season 2017 to study the production potential and economic feasibility of Groundnut + Sesame intercropping in different row proportions. The soil of experimental plot was low in organic carbon, slightly alkaline in reaction, low in available nitrogen and phosphorus and fairly high in available potassium. Sole groundnut recorded significantly better growth and growth parameters as compared to intercropped Groundnut. Pod yield, Kernel yield of Groundnut also follow same trend as that of growth and growth parameters. Growing of Groundnut + Sesame in 3:3 row proportion adversely reduced the pod, kernel yield, biological yield of Groundnut as compared to other row proportions.

The sole groundnut recorded significantly more plant height (16.62 cm), maximum number of branches (11.35), maximum dry matter (24.37 g) at harvest when compared to intercropped groundnut. The maximum and significant increase was observed when groundnut is sown as sole groundnut i.e pod yield 21.40 q ha^{-1}, kernel yield 14.72 q ha^{-1}. Significant reduction is observed in 3:3 groundnut + sesame row proportion. The sole sesame recorded significantly more plant height (98.4 cm), maximum dry matter (24.37 g) as compared to intercropped sesame. The maximum and significant increase was observed in sole sesame i.e seed yied 8.5 q ha^{-1}, biological yield 25.27 q ha^{-1} Stalk yield 16.77 q ha^{-1}.

Keywords: groundnut, sesame, intercropping, row proportions, yield.

Introduction
Any scheme or plan to increase food and oil production cannot be a total success unless and until an appropriate production-oriented cropping system and production technology are developed and implemented properly. Intercropping is popular in tropical and subtropical countries as it creates favorable micro climate, has low labour requirement, higher stability of yield and productivity, in India. Intercropping is well adopted farming practice under rainfed conditions. In the past, it has been taken as risk minimizing practice in traditional agriculture of dry lands. Simultaneous growing of two or more differing in growth, duration and nutrient requirement, in such a way that, there is no reduction in productivity of major component over sole crop is the profitable practice. They can be grown with the least competition, utilize environmental and manpower resources in a more efficient manner to enhance the total returns (Willey *et al* 1979) [10]. The suggested benefits of legumes are better root stratification, utilization of soil nutrients and nitrogen fixation by the legumes which allows the legume become independent of soil nitrogen and making some nitrogen available to non-legume. While Sesame is non leguminous oilseed crop which grows taller than groundnut. It receives more light and provides more shade to the ground which ultimately helps to conserve the soil moisture.

Groundnut + sesame (6:3) row ratio recorded significantly higher groundnut equivalent yield (6.33 q ha-1) and maximum gross returns of Rs. 9021 ha^{-1} (Khistaria *et al.* 1997) [3].

Material and Methods
A field experiment was conducted at Agronomy farm Dr. PDKV Akola during *summer* season 2017 to study production potential and economic feasibility of Groundnut + Sesame intercropping in different row proportions. There were seven treatments viz., sole groundnut (T_1), sole sesame (T_2), groundnut + sesame 1:1 (T_3), groundnut + sesame 1:1 (T_4), groundnut +

sesame 1:1 (T_5), groundnut + sesame 1:1 (T_6), Groundnut at 30 cm row spacing in between them one line of sesame (T_7). The experiment was laid out in a Randomized Block Design with four replication. The sole crops and intercrops was sown at 30 x 10 cm. recommended fertilizer dose of groundnut (25:25:00 NPK Kg ha^{-1}) is given for sole groundnut, intercropping treatments and recommended fertilizer dose of Sesame (25:50:00 NPK Kg ha^{-1}) is given for sole sesame treatment. Such fertilizers is given in the form of urea, diammonium phosphate. Weeding and plant protection measures were taken as per their need, the required plant population was maintained. The periodic biometric observations were recorded. The crops were harvested at their physiological maturity.

Results and Discussion

Groundnut

The data on growth characters like plant height, dry matter g, number of branches, root nodules per plant and yield characters like pod yield ha^{-1} q, kernel yield ha^{-1} q and quality characters like oil yield q ha^{-1}, oil percentage were presented in Table 1.

The sole groundnut recorded significantly maximum number of branches (11.35), maximum dry matter (24.37 g) at harvest when compared to intercropped groundnut and plant height of sole groundnut (16.62 cm) was superior over all remaining treatments except groundnut at 30 cm row spacing in between them one line of sesame.

Table 1: Growth characters of groundnut as influenced by Groundnut + Sesame in different row proportions at harvest.

Treatments	Plant height (cm)	Dry matter $plant^{-1}$ (g)	Number of branches $plant^{-1}$	Number of root nodules $plant^{-1}$
T_1: Sole groundnut	16.62	24.37	11.35	33.2
T_2: Sole sesame	-	-	-	-
T_3 : 1:1 Groundnut + sesame	16.45	21.75	9.95	30.92
T_4 : 2:1 Groundnut + sesame	16.6	22.37	10.47	31.45
T_5 : 3:3 Groundnut + sesame	16.35	21.12	9.95	29.72
T_6 : 4:2 Groundnut + sesame	16.32	22.12	10	30.8
T_7: Groundnut at 30 cm row spacing in between them one line of sesame	15.65	21.09	10	29.95
SE (m) ±	018	0.37	0.16	0.76
CD @ 5%	0.55	1.12	0.48	NS
GM	16.32	22.14	10.28	31

The pod yield, kernel yield, of groundnut was significantly influenced by different row proportions. The maximum and significant increase was observed when groundnut is sown as sole groundnut i.e pod yield 21.40 q ha^{-1}, kernel yield 14.72 q ha^{-1}. Significant reduction is observed in 3:3 groundnut + sesame row proportion. The variation in kernel yield is observed due to variation in weight of pods per plant, number of pods and plant population.

The quality characters like oil percentage was not influenced significantly by different treatments. But oil yield (q ha^{-1}) was significantly influenced by different row proportions. The maximum oil yield was observed in sole groundnut (7.08 q ha^{-1}). This might be due to the highest plant population.

Table 2: Pod yield (q ha^{-1}), kernel yield (q ha^{-1}) oil percentage, oil yield (q ha^{-1}) of groundnut as influenced by Groundnut + Sesame in different row proportions at harvest.

Treatments	Pod yield (q ha^{-1})	Kernel yield (q ha^{-1})	Oil content (%)	oil yield (q ha^{-1})
T_1: Sole groundnut	21.40	14.72	48.12	7.08
T_2: Sole sesame	-	-	-	-
T_3 : 1:1 Groundnut + sesame	13.97	9.44	47.74	4.5
T_4 : 2:1 Groundnut + sesame	16.87	12.20	48.03	5.85
T_5 : 3:3 Groundnut + sesame	13.53	9.28	48.69	4.51
T_6 : 4:2 Groundnut + sesame	17.72	12.39	47.19	4.84
T_7: Groundnut at 30 cm row spacing in between them one line of sesame	18.97	13.01	47.61	6.19
SE (m) ±	0.20	0.26	0.3	0.12
CD @ 5%	0.62	0.78	NS	0.37
GM	17.08	11.84	47.89	5.49

Sesame

The data on growth characters like plant height, dry matter (g), number of branches per plant and yield characters like capsule yield ha^{-1}(q), grain yield ha^{-1}(q) and quality characters like oil yield (q ha^{-1}), oil percentage were presented in Table.

Maximum plant height recorded by sole sesame (98.4 cm) which is superior over all remaining treatments. While maximum dry matter was recorded by 1:1 groundnut + sesame (31.22) then 2:1, 4:2 groundnut + sesame, sole sesame, 3:3 groundnut + sesame and least dry matter recorded by groundnut at 30 cm row spacing in between them one line of sesame. And non-significant differences was found in number of branches per plant.

Table 3: Growth characters of sesame as influenced by Groundnut + Sesame in different row proportions at harvest.

Treatments	Plant height (cm)	Dry matter $plant^{-1}$ (g)	Number of branches $plant^{-1}$
T_1: Sole groundnut	-	-	-
T_2: Sole sesame	98.4	30.2	3.75
T_3 : 1:1 Groundnut + sesame	95.92	31.22	3.95

T_4 : 2:1 Groundnut + sesame	95.85	30.62	3.75
T_5 : 3:3 Groundnut + sesame	95.72	29.62	3.8
T_6 : 4:2 Groundnut + sesame	94	30.37	3.35
T_7: Groundnut at 30 cm row spacing in between them one line of sesame	90.97	28.5	3.34
SE (m) ±	0.59	0.33	0.10
CD @ 5%	1.78	1	NS
GM	95.14	30.09	3.65

The sole sesame recorded significantly more plant height (98.4 cm), maximum dry matter (24.37 g) at harvest when compared to intercropped sesame. Maximum dry matter per plant (31.22 gm) observed in 1:1 Groundnut + Sesame. Non significant difference is observed in number of branches. Similar results were corroborated by Rathod *et al* (2004) [4].

The seed yied q ha^{-1}, biological yield q ha^{-1}, Stalk yield q ha^{-1}, was significantly influenced by different row proportions. The maximum and significant increase was observed in sole sesame i.e seed yied 8.5 q ha^{-1}, biological yield 25.27 q ha^{-1} Stalk yield 16.77 q ha^{-1}. Significant reduction is observed in 2:1, 3:3, 3:3 groundnut + sesame row proportion respectively. The variation in seed yield is observed due to variation in weight of capsule per plant, number of capsule and plant population.

Table 4: Seed yield ha^{-1}(q), biological yield ha^{-1}.(q), oil percentage, Stalk yield ha^{-1} (q) of Sesame as influenced by Groundnut + Sesame in different row proportions at harvest.

Treatments	Seed yield ha^{-1} (q)	biological yield ha^{-1}.(q)	Stalk yield ha^{-1}.(q)
T_2: Sole sesame	8.50	25.27	16.77
T_3 : 1:1 Groundnut + sesame	5.01	16.77	9.46
T_4 : 2:1 Groundnut + sesame	4.08	14.46	7.13
T_5 : 3:3 Groundnut + sesame	5.18	11.21	6.99
T_6 : 4:2 Groundnut + sesame	5.69	12.17	7.18
T_7: Groundnut at 30 cm row spacing in between them one line of sesame	6.50	22.53	16.03
SE (m) ±	0.16	0.2	0.22
CD @ 5%	0.48	0.62	0.66
GM	5.83	17.07	10.59

Table 5: Oil content (%) and oil yield (q/ha) of sesame as affected by different treatments.

Treatments	Oil content (%)	Oil yield (q ha^{-1})
T_2: Sole sesame	48.5	4.12
T_3 : 1:1 Groundnut + sesame	49.91	1.78
T_4 : 2:1 Groundnut + sesame	49.98	1.51
T_5 : 3:3 Groundnut + sesame	49.46	1.83
T_6 : 4:2 Groundnut + sesame	50.24	1.55
T_7: Groundnut at 30 cm row spacing in between them one line of sesame	49.85	2.85
SE (m) ±	0.36	0.06
CD @ 5%	NS	0.20
GM	49.65	2.27

Economic studies

It could be seen from the table 6 that cropping system had significant influenced on gross monetary return (GMR. Highest gross monetary return (121193 Rs. ha^{-1}), in Groundnut at 30 cm row spacing in between them one line of sesame which was superior over sole groundnut, sole sesame, Groundnut + sesame intercropping in 1:1, 2:1, 3:3, 4:2 and Groundnut at 30 cm row spacing in between them one line of sesame. And 4:2 Groundnut + sesame registered higher groundnut equivalent yield 15.27, which was at par with 2:1 Groundnut+ sesame and Groundnut at 30 cm row spacing in between them one line of sesame.

Table 6: Gross return of different treatments and crop equivalent yield of groundnut.

Treatments	Gross return (Rs ha^{-1})	CEY (G. nut)
T_1: Sole groundnut	63317	11.94
T_2 : Sole sesame	85075	-
T_3 : 1:1 Groundnut + sesame	90774	11.64
T_4 : 2:1 Groundnut + sesame	93356	15.04
T_5 : 3:3 Groundnut + sesame	91754	11.43
T_6 : 4:2 Groundnut + sesame	110213	15.27
T_7: Groundnut at 30 cm row spacing in between them one line of sesame	121193	14.45
SE (m) ±	2029.57	0.28
CD @ 5%	6117.78	0.86
GM	89811.57	13.29

Conclusion

Average result indicating that intercropping groundnut with sesame gave maximum productivity as well as economic return than monoculture of component crops. The economic return were found highest in Groudnut at 30 cm row spacing in between them one line of sesame (T_7). Thus it could be concluded that Groudnut at 30 cm row spacing in between them one line of sesame intercropping system could be adopted for better productivity with maximum profit for the farmers instead of sole groundnut and sole sesame.

References

1. Bhagat BA, SA Chavan, MV Zagade, AV Dahiphale. Intercropping groundnut and sweet corn at different fertility levels and row proportions. Indian J. Crop Science. 2006; 1(1-2):151-153.
2. Dayanand, Meena NL. Influence of intercrops and Sulphur on nutrient uptake and food quality of Groundnut. Indian J. Agric. Sci. 2002; 72(10):594-596.
3. Khistaria MK, Khokhani MG, Vekaria PD, Akbari KN, Yusufzai ASSS. Effect of intercropping of sesame with different row proportions on yield of groundnut. J Maharashtra Agric. Univ. 1997; 14(2):243-244.
4. Rathod PS, Hallikatti SI, Hiremath SM, Kajjidoni ST. Influence of different Intercrops and Row Proportions on Yield and Yield Parameters of Pigeonpea in Vertisols of Dharwad. Karnataka J Agric. Sci. 2004; 17(4):652-657.
5. Sarkar RK, Sanyal SR. Production potential and economic feasibility of sesame-based intercropping system with pulse and oilseed crops on rice fallow land. Indian Journal of Agronomy. 1998; 45(3):545-550.
6. Sathyapriya R, Mohammad Yasin J, Maheshwari, Sangeetha SP. influence if NPK on Productivity and oil yield of groundnut and sunflower in intercropping system under irrigated condition. Int. journal of Agril. Res. 2009; 4(2):97-106.
7. Sutaria GS, Mehta DR. Dry matter production, leaf area, leaf area index and growth rates under sole and

intercropping systems. Advances in plant sciences. 2000; 13:219-225.
8. Tiwari KP, Tomar RKS, Namdeo KN, Raghu JS. Intercropping studies in sesamum with different crops. Bhartiya krishi Anusandhan Patrika. 1996; 11(3):181-185.
9. Toaima SEA, Atalla RA, Sawy WA. Response of some peanut genotypes to intercropping with sesame in relation to yield and yield components. Ann. Agric. Sci. 2004; 42(3):903-916.
10. Willey RW. Intercropping its importance and research needs. Field Crop Abstract. 1979; 32:1-10 and 73-85.