



Studies on effect of parallel crops on productivity of groundnut (*Archis hypogaea* L.)

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Abstract : The present investigation was laid out at Zonal Agricultural Research Station, Mainpuri, C.S. Azad University of Agriculture and Technology, Kanpur with the objective to workout effect of parallel crop on productivity of groundnut in Semi-Arid Tropics of Uttar Pradesh. The sole crop of groundnut significantly registered higher pod yield. The maximum reduction in pod yield by 26.55 per cent was noted with companion cropping of pigeonpea while it was 17.25 per cent with sesame and 19.75 per cent with foxtail millet. The companion ship of groundnut+pigeonpea gave 4 per cent more yield advantage. Relative crowding coefficient was calculated higher in groundnut + pigeonpea, resulted in the pigeonpea produced more yield than the expected yield and showed the dominancy over groundnut while other two companion crops did not show dominancy. Higher aggressivity in groundnut + pigeonpea indicated the bigger difference between actual and expected yield of pigeonpea. Competition ratio was computed higher in groundnut + pigeonpea by 1.50 times. Beside to above, intercrop pigeonpea precluded from the incidence of nematode with eco-friendly management. Therefore, the companion cropping of groundnut + pigeonpea may only be suggested for the farming and other two systems of companion cropping should be deleted from the recommended agro-techniques.

Key Words : Relative crowding coefficient, Aggressivity, Competition ratio, LER

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INTRODUCTION

Companion cropping has long been recognized as a very common technology throughout the developing tropics. Its importance was highlighted almost 60 years ago in a very comprehensive review by Aiyar (1949). Historically, however, it has been regarded as a primitive technology which gives way to sole cropping as a natural and inevitable consequence of agricultural development. More recently it has been realized that companion cropping remains an extremely wide spread practice and it likely to continue, so far at least the foreseeable future (Okigbo and Greenland, 1975).

The recent trend in the changing agriculture, the cultivation of more than one crop simultaneously to avoid crop losses and combat problem of pest and disease susceptibility. In Uttar Pradesh pigeonpea, pearl millet, sorghum, small millet, sesame are intercropped in groundnut

by farmers. The constraints received from the farmer's fields, that they do not harvest the full yield from companion cropping systems due to inadequate technology followed by them, whatever, yield and profit meet from the association ship, they become satisfy.

With the view to find out the congenial crop for companion cropping of groundnut, the experiment was conducted with different crops.

MATERIALS AND METHODS

A field experiment was laid out for two years, during the monsoon season at Zonal Agricultural Research Station, Mainpuri, situated in South-Western-Semi-Arid Zone (5), Uttar Pradesh. The soil of the experimental site was sandy loam having pH 8.6, organic carbon 0.13 per cent, total nitrogen 0.01 per cent, available phosphorus 9.0 kg/ha and available

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potash 291 kg/ha. The treatments comprised of sole crop of groundnut, pigeonpea, sesame, foxtail millet, groundnut intercropped with pigeonpea, sesame and foxtail millet. A uniform dose of $N_{20} P_{30} K_{45}$ kg/ha was given at planting while 150 kg gypsum applied at planting and 150 kg/ha broadcasted between the flowering and pegging stages of groundnut. No fertilizer was given to intercrops. The rows ratio of planting between groundnut and intercrops was 5:1. In intercropping the plant stand of groundnut, pigeonpea, sesame and foxtail millet were adjusted by 83 per cent, 22 per cent, 17 per cent, and 17 per cent, respectively. The sowing of sole and intercrops were done in the first fortnight of July, during two years. The cv_s, Amber of groundnut, UPAS 120 of pigeonpea, R.T. 54 of sesame and Nischal of foxtail millet were used. The groundnut, pigeonpea, sesame and foxtail millet were harvested after 128, 135, 90 and 83 days after planting, respectively. The groundnut and pigeonpea were harvested in second fortnight of November, while sesame and foxtail millet in first fortnight of October, during two years.

The pod yield of groundnut was statistically analyzed. It was further computed for different competition functions, land equivalent ratio, competitive ratio, relative crowding coefficient and their products, aggressivity of intercrops on groundnut as described by Willey (1979).

RESULTS AND DISCUSSION

The results of the present study alongwith relevant discussion have been presented as under:

Yield of sole and companion crops:

The sole crop of groundnut significantly registered higher pod yield (18.15 q/ha) over pod yield of groundnut grown in companion ship of different crops, during both the years of experimentations. Pod yield of groundnut under different companion cropping system was reduced by 4.82 q/ha or 26.55 per cent, 3.13 q/ha or 17.25 per cent and 3.58q/ha or

19.75 per cent due to intercrops of pigeonpea, sesame and foxtail millet, respectively. Therefore, the maximum reduction in pod yield was noted in the association of pigeonpea, while minimum reduction was recorded with sesame closely followed by foxtail millet. The pigeonpea, sesame and foxtail millet in companion cropping were given 30.10 per cent, 15.85 per cent and 19.50 per cent yield in comparison to their sole crops, respectively (Table 1).

The pod yield reduction in groundnut was due to the combined effect of smothering as well as lower plant stand of groundnut, adjusted in the companion cropping system. These results confirm the findings of Kaviman *et al.* (1989), conducted the experiment on intercropping of pigeonpea, sesame and finger millet at Agricultural Research Station, Aliyar Nagar, Coimbatore.

Groundnut equivalents:

The maximum groundnut equivalent was computed in groundnut + pigeonpea by 20.64 q/ha. The groundnut equivalent of groundnut + pigeonpea was higher by a margin of 2.49 q/ha or 13.70 per cent, 4.23 q/ha or 25.75 per cent and 4.81 q/ha or 30.40 per cent over the sole crop of groundnut, groundnut + sesame and groundnut + foxtail millet, respectively (Table 1).

Land equivalent ratio (LER):

The higher LER was in the intercropping of groundnut + pigeonpea by 1.04. The companion ship of groundnut + pigeonpea gave 4 per cent more yield advantage. The other two sequences of intercropping were failed for providing the suitable companion ship (Table 1).

Competition functions:

Relative crowding coefficient:

The relative crowding coefficient in intercropping of groundnut + pigeonpea was computed greater than one, therefore, pigeonpea produced more yield than the expected

Table 1 : Yield, groundnut equivalents LER and competition functions under different cropping systems (Pooled data of two years)

Crop sequence	Yield (q/ha)		Groundnut equivalent (q/ha)	LER	Relative crowding coefficient	Aggressivity	Competition ratio
	Sole and inter cropped groundnut	Sole and inter crops					
Sole groundnut	18.15	-	18.15	1.00	-	-	-
Sole pigeonpea	-	15.45	-	1.00	-	-	-
Sole sesame	-	3.53	-	1.00	-	-	-
Sole foxtail millet	-	10.20	-	1.00	-	-	-
Groundnut + pigeonpea	13.33	4.65	20.64	1.04	1.47	0.42	1:1.48
Groundnut + sesame	15.02	0.56	16.41	0.99	0.92	(-) 0.06	1:0.93
Groundnut + foxtail millet	14.57	1.99	15.83	1.00	0.77	0.19	1:1.19
S.E. (m ²)	0.65	-	0.83	-	-	-	-
C.D. 5%	2.00	-	2.78	-	-	-	-
C.V. (%)	8.30	-	-	-	-	-	-

yield. The higher coefficient of pigeonpea indicated the dominance over groundnut and thus, gave yield advantages. Other two intercropping sequences *viz.*, groundnut + sesame and groundnut + foxtail millet showed less than one, therefore, sesame and foxtail millet produced less yield than the expected yield. These two intercrops were not showed the dominance over groundnut and failed in producing the yield advantages (Table 1).

Aggressivity:

The negative value of aggressivity in groundnut + sesame indicated that the both components were equally competitor. In other two sequences of intercropping the differences were bigger between actual and expected yields (Table 1).

Competition ratio:

Competition ratio indicated that the intercrop pigeonpea and foxtail millet produced 1.48 and 1.19 times, respectively, as much as expected and it was 1.48 and 1.19 times as competitive, while in case of sesame intercrop, no competition was noted (Table 1).

Eco-friendly management of nematode incidence:

The non-host crop of groundnut precluded the

infestation of nematode in pigeonpea, therefore, better yield of pigeonpea was harvested in groundnut + pigeonpea association from nematode infested soil.

From the above results, the companion cropping of groundnut + pigeonpea may only be suggested for the farming under semi-arid ecology of Uttar Pradesh to fulfill the domestic need of farmers. Other two companion cropping systems should be deleted from the recommended agro-techniques of companion cropping.

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