

## Studies on The Effect of Maize and Soyabean Association in Different Proportions on Yield and Grain\*

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Maize and soyabean raised in 1 : 2 and 1 : 1 ratio increased the total grain yield over the pure stand of maize. The crude protein content of maize grain and stover was significantly increased in 1 : 2 : ratio of maize and soyabean than pure stand of maize. However, the crude protein and oil contents of soyabean grain were unaltered due to varied proportions of maincrop.

Maize and soyabean association has been reported to have no adverse effect on the yield of maize (Narang, 1967). Dalal (1977) observed that the maize yield was not affected when soyabean was intercropped in either alternate rows or in alternate pairs of rows. Roquib (1973) reported that maize-soyabean recorded greater yield and better monetary returns than pure stand of either soyabean or maize. Association of maize and soyabean produced maximum yield of total fat and protein and utilised land more intensively with higher value for the land equivalent ratio than the monoculture of maize and soyabean (Beets, 1977). To investigate the effect of maize-soyabean association on the yield and quality of the component crops this study was undertaken.

### MATERIAL AND METHODS

A field experiment was conducted in Tamil Nadu Agricultural University

Farm at Coimbatore during *kharif* 1971. Maize (Ganga 5) and soyabean (EC 39821), both having the same duration (100 days) were raised in 1 : 1, 2 : 1 and 1:2 ratios along with their pure stands, in split plot design replicated four times. The above crop associations were allotted to main plots and two row spacings of 60 and 75 cm to the subplots. Within the row a spacing 22.5 and 5 cm for maize and soyabean respectively was adopted. A uniform fertilizer dose of 108, 54 and 36 kg/ha of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O respectively was applied to both the mixtures and pure stands. The recommended package of practices was adopted.

The yield and yield attributes as influenced by the treatmental effects have been presented by the same authors in another paper (1974). The grain and stover/bhusa samples were drawn by random procedure, dried in oven at 80°C for 24 hours and analysed for N content by microkjeldhal method. Using the

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TABLE Effect of intercropping of maize and soyabean on yield, crude protein and oil content of the Associated crops

Treatments	Maize				Soyabean				Maize			
	grain yield* (kg/ha)	Crude %	protein %	Stover	Grain yield* (kg/ha)	Crude %	protein %	Oil% Grain	Crude protein yield (kg/ha)	Oil yield (kg/ha)	Crude protein yield (kg/ha)	Crude protein yield (kg/ha)
Maize and soyabean 1 : 1 ratio	11208	11.5	3.44	3.44	1731	41.6	4.40	20.20	698	346	1289	1289
Maize and soyabean 2 : 1 ratio	8933	11.3	3.39	3.39	1699	41.4	4.38	20.35	697	340	1009	1009
Maize and soyabean 1 : 2 ratio	14006	10.9	3.36	3.36	1474	41.8	4.44	20.25	590	315	1527	1527
Pure stand of maize	8260	10.3	3.06	3.06	—	—	—	—	—	—	851	851
Pure stand of soyabean	—	—	—	—	1667	41.6	4.45	20.30	670	334	—	—
SE	83	0.09	0.06	0.06	17	0.20	0.07	0.31	—	—	—	—
CD. (5%)	265	0.30	0.20	0.20	NS	NS	NS	NS	—	—	—	—

NS = Not significant

\* The yield of intercrops are computed on equiground utilization basis.

factors 6.25 and 6.18 respectively for maize and soyabean the percentage of N was converted to crude protein percentage. Oil was extracted from the dried soyabean grain meal with solvent either in a soxhlet apparatus and estimated. By multiplying the grain yield and the respective crude protein and oil contents, the yields of crude protein and oil per ha were calculated.

### RESULTS AND DISCUSSION

The data on grain yields, crude protein and oil content and the crude protein and oil yield of soyabean and maize are presented in Table.

The grain yield of maize (Ganga-5) in 1:2 and 1:1 ratios of maize and soyabean was significantly superior to the pure crop of maize on equiground utilization basis. However, the grain yield of soyabean EC 39821 did not vary significantly due to intercropping in different ratios.

The crude protein content in maize grain was significantly increased in 1:1 and 2:1 ratios than in the rest of the treatments. However, the 1:1 and 2:1 ratios were on par in the crude protein content (10.3 per cent) was recorded in the pure stand of maize. It was also observed that both Association of crops and row spacing had no influence on the crude protein and oil content of soyabean grain. It is presumed that the root nodules of soyabean when disintegrated into soil enriched the rhizosphere of the associated maize crop with higher available N content,

which in turn might have increased the crude protein content of maize grain. This is well supported by the findings of Beets (1977), who observed maximum yield of total fat and protein from such association of maize and soyabean. Narang (1967) and Raghavulu (1968) also observed similar increase in crude protein content of cereal grown in association with a legume. Thus, it was clear in the present study that both yield and crude protein content of maize grain were favourably influenced by the association of these two crops to an appreciable extent.

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### REFERENCES

- BEETS, W. E. 1977. Multiple cropping of maize and soyabean under a high level of crop management. *Netherland J. Agric. Sci.* 25: 95-102.
- DALAL, R. C. 1977. Effect of intercropping of maize with soyabean on grain yield. *Trop. Agric.* 54: 189-91.
- JAGANNATHAN, N. T., Y. B. MORACHAN and S. RAMIAH. 1974. Studies on the effect of maize and soybean association in different proportions and spacing on yield. *Madras agric. J.* 61: 386-91.
- MIRCHANDONI, T. J. and S. SEN. 1956. Crop rotation in India. *I.C.A.R. Rev.* 12.
- NARANG, S. D. 1967. Intercropping of maize with soyabean. *Indian Fmg.* 19 : 21.
- RAGHAVULU, P. 1968. Studies on the effect of association of a millet and pulse in different proportions in the presence of nitrogen and phosphorus. Unpub M.Sc.(Ag.), dissertation submitted to Madras University
- ROQUIB, A. 1973. Possibility of growing soyabean (*Glycine max.*) in association with other crops. *Indian J. Agric. Sci.* 43 792-94