

This study further revealed that aphid and leafhopper population positively correlated with retainability and egg laying of *C. carnea* adults. Similar correlation was obtained by Medina (1987) between chrysopid and whitefly population. Thakur *et al.*, (1988) found that *C. scelerates* population increased along with increasing population of woolly aphid, *Eriosoma lanigera* longevity.

The negative correlation existed between the retainability and egg laying of *C. carnea* adults with wind speed might be due to the soft bodied and lighter weight nature of *C. carnea* adults, which might be driven away by the wind from the target area.

ACKNOWLEDGEMENT

The authors are grateful to Thiru R. Rangaswamy Associate Professor of Statistics for help in the analysis of data.

Madras Agric. J., 85(5,6): 259 - 261 May, June 1998
<https://doi.org/10.29321/MAJ.10.A00733>

INTERCROPPING SYSTEM CAN ENHANCE THE YIELD OF POTATO AND GROUNDNUT

A.M. PUSTE and A.I. KUNDU

Department of Agronomy
 Bidhan Chandra Krishi Viswavidyalaya
 Mohanpur 741 252, Nadia (W B)

ABSTRACT

Field experiments were carried out during the winter seasons of 1989-91 at the University research farm, Mohanpur (W.B.) to find out the suitable cropping system of potato and groundnut in the Gangetic plains of upland alluvial soil. It revealed that the sole crop yields of potato and groundnut were superior to the respective intercrop yield of the systems. Intercrops of potato and groundnut having 3 : 3 row arrangements maintained row to row 40 cm apart recorded moderate potato tuber equivalence (24.09 t/ha), highest land equivalent ratio (1.49) and maximum monetary advantage (Rs. 4,971/-) presumably due to the highest potato yield (12 t/ha) in the system. However, potato + groundnut intercrops having 2 : 2 row arrangements maintained 30 cm apart exhibited less advantage.

KEY WORDS : Cropping system, intercrops, potato tuber equivalence, Land equivalent ratio and monetary advantage

With the introduction of high yielding and short duration genotypes of field crops, the possibilities and opportunities of growing best compatible crops in mixed stand/intercropping has also increased. Growing of crop mixture is an age-old farm practice. It is undoubtedly a successful and profitable method which maintains the fertility of the soil (Bains, 1968). Practice of growing two or more crops together has been

REFERENCES

- BEGLYAROV, G.V. and USHCHEKOV, A.T. (1977) Biological control of aphids on green crops (in Russian). *Zshch. Rast.*, 2: 25-27.
- MEDINA, C.P. (1987). Biology and ecology of the spiralling whitefly, *Aleurodicus dispersus* Russell (Homoptera : Aleyrodidae) and its natural enemies in the Philippines college, Laguna (Philippines), May 1987.
- SAMSON, P.R. and BLOOD, P.R.B. (1979). Biology and temperature relationships of chrysopa sp., *Micromus tasmaniae* and *Nabis capsiformis*. *Ent. Exp. Appl.*, 25: 253-259.
- THAKUR, J.N., PAWAR, A.D. and RAWAT, U.S. (1988). Observations on the correlation between population density of apple woolly aphid and its natural enemies and their effectiveness in Kullu Valley. *Pl. Prot. Bull.*, 40(2) : 13-15.
- ZHAO JINGZHAO (1987). Biological studies of *Chrysopa shunsis* Kuwayma. *Acta - Phytosociologica Sinica* 14 : 273-276.

(Received : June 1997 Revised : May 1998)

considered as a safeguard against total failure of any particular crop. The cropping systems like potato + groundnut as intercrops may be popularised as both the crops are valuable and needed to earthing up of the soil during growth period and harvesting time and can enrich the fertility status of the soil. Hence, an attempt was undertaken to find out a profitable crop mixture of potato and groundnut suitable for growing in the

gangetic plains of upland alluvial soils of West Bengal.

MATERIALS AND METHODS

The field experiment was carried out during the winter season of 1989-91 at the University research farm (23.5°N, 89°E and 90 m above mean sea level) in the Gangetic plains of upland alluvial soil having pH 7.2. The soil is sandyloam in texture (Entisol soil- sub order udent and great Fleuvudent) with good drainage having moderate status of nitrogen i.e. 292.0, 9.5 and 105.5 kg available N, P and K/ha, respectively. Randomised block design was adopted with eight treatments replicated four times. The treatments consisted of eight cropping system with different spacing and row arrangements of potato and groundnut viz.

- T₁ = Pure potato row to row 30 cm apart
 T₂ = Pure potato row to row 40 cm apart
 T₃ = Pure groundnut row to row 30 cm apart
 T₄ = Pure groundnut row to row 40 cm apart
 T₅ = Potato + Groundnut in 2 : 2 row arrangement maintaining row to row 30 cm apart
 T₆ = Potato + Groundnut in 2 : 2 row arrangement maintaining row to row 40 cm apart

T₇ = Potato + Groundnut in 3 : 3 row arrangement maintaining row to row 30 cm apart

T₈ = Potato + Groundnut in 3 : 3 row arrangement maintaining row to row 40 cm apart

The test varieties of potato and groundnut were Kufri Chandramukhi and JL 24, respectively. Potato and groundnut were fertilized @ 200 : 100 : 60 and 40 : 60 : 40 kg N, P₂O₅ and K₂O/ha, respectively. Half of the N was applied in two equal splits; one at tuber initiation before first earthing up of soil and second at the early bulking stage of potato. Both the crops were sown during the 1st week of December.

Potato tuber equivalence, Land equivalent ratio (LER) and monetary advantage of intercroppings were estimated as per Mandal *et al.* (1988), Anon. (1976) and Willey (1979). Prices of potato tuber (fresh) and groundnut (pods) were Rs. 600/- and Rs. 7,500/- in 1990 and Rs. 650/- and Rs. 8,000/- in 1991 ton⁻¹, respectively.

RESULTS AND DISCUSSION

Crop performance

Both potato and groundnut sole crop yields were superior than the component crop of the respective intercrop yield and the differences were statistically significant in different two years as well as pooled analysed data (Table 1). For the

Table 1. Yield of potato and groundnut as affected by cropping system.

Cropping system	Tuber yield of potato (t/ha)			Yield of groundnut (t/ha)			Potato tuber equivalence (t/ha)		
	1989-90	1990-91	Pooled	1989-90	1990-91	Pooled	1989-90	1990-91	Pooled
Pure potato (30 cm)	13.8	14.6	14.2	-	-	-	-	-	-
Pure potato (40 cm)	15.8	17.9	16.85	-	-	-	-	-	-
Pure groundnut (30 cm)	-	-	-	1.68	1.87	1.77	-	-	-
Pure groundnut (40 cm)	-	-	-	1.32	1.47	1.39	-	-	-
P + G in 2 : 2 ratio (30 cm)	8.6	9.3	8.95	1.04	1.18	1.11	21.60	23.82	22.71
P + G in 2 : 2 ratio (40 cm)	10.8	11.3	11.05	0.86	0.95	0.90	21.55	22.99	22.27
P + G in 3 : 3 ratio (30 cm)	9.4	10.0	9.70	1.15	1.26	1.20	23.77	25.51	24.64
P + G in 3 : 3 ratio (40 cm)	11.8	12.2	12.00	0.92	1.03	0.97	23.30	24.88	24.09
S.E.m ±	0.97	0.77	0.59	0.103	0.13	0.087			
C.D. (0.05)	2.99	2.40	1.81	0.32	0.39	0.27			

Table 2. Land equivalent ratio and monetary advantage for potato + groundnut cropping system

	Land equivalent ratio			Monetary advantage (Rs.)		
	1989-90	1990-91	Mean	1989-90	1990-91	Mean
P + G in 2 : 2 ratio (30 cm)	1.24	1.27	1.25	2,508	3,292	2,900
P + G in 2 : 2 ratio (40 cm)	1.33	1.28	1.30	3,208	3,165	3,186
P + G in 3 : 3 ratio (30 cm)	1.36	1.36	1.36	3,776	4,389	4,082
P + G in 3 : 3 ratio (40 cm)	1.44	1.54	1.49	4,272	5,670	4,971

spacing, the yield of potato and groundnut showed significant difference in both the years and in pooled data also except during 1989-90 in potato. The extent of yield increment by the sole crop over respective intercrop as a whole varied from 28.8 to 37.0 per cent with potato and 30.2 to 37.3 per cent with groundnut, respectively, in pooled analysis which might have resulted from the higher plant population/m² in the former. Among the 4 different intercropping systems of potato + groundnut, maximum potato tuber yield was obtained when sown in 3 : 3 row arrangement maintaining 40 cm row to row distance and minimum was obtained in 2 : 2 row arrangement maintaining 30 cm row distance. In case of groundnut, maximum yield was also observed in the same row arrangement but in 30 cm row distance and the yield was also observed in the same row arrangement but in 30 cm row distance and the yield difference was significantly superior than the other systems except in 2 : 2 ratio maintaining 30 cm row distance where these were statistically at par.

Potato tuber equivalence

Among the 4 different cropping systems, the highest potato tuber equivalence was recorded with potato + groundnut (24.64 t/ha) having 3 : 3 planting row arrangements maintained 30 cm apart presumably due to the highest groundnut yield in the system followed by the same row ratio with 40 cm apart (24.09 t/ha, Table 1). The lowest potato tuber equivalence was observed (22.27 t/ha) when potato and groundnut was planted with 2 : 2 ratio maintained row to row 40 cm apart presumably due to lower yield of groundnut in the system.

Land equivalent ratio

The extent of yield advantage in intercropping over monocropping has been reflected by land equivalent ratio (LER). The highest LER value (1.49) was obtained when planting was done in 3 : 3 row arrangement maintained 40 cm apart, it might be due to relative yield increase of potato in association with groundnut which in turn increased the LER value (Table 2). The lowest LER value was observed in 2 : 2 row arrangement maintained 30 cm apart.

Monetary advantage

The highest monetary advantage (Rs. 4,971/-) was obtained with the planting arrangement in 3 : 3 ratio maintained row to row 40 cm apart followed by in the same ratio (Rs. 4,082/-) but in 30 cm row apart (Table 2). The lowest monetary advantage (Rs. 2,900/-) was obtained in 2 : 2 row arrangement maintained 30 cm apart which was 71.4% lower than that of the highest value obtained in the former.

REFERENCES

- ANONYMOUS (1976). Cropping system program : Component technology developed and evaluation. Pages 337-58. Annual Report, International Rice Res. Ins. Los Banos, Philippines.
- BAINS, S.S. (1968). Pulses are popular for mixed cropping. *Indian Fmg.*, 17 (11) : 19-22.
- MANDAL, B.K., ROY, P.K., DASGUPTA, S. and GHORAI, A.K. (1988). Approaches to assess intercropping advantages. *Indian Agric.* 32 : 13-22.
- WILLEY, R.W. (1979). Intercropping - its importance and research needs. Part I - Competition and yield advantages. *Field Crop Abs.* 32 : 1-10.

(Received : September 1995 Revised : May 1998)