Annals of Arid Zone 46(2): 213-214, 2007

Short Communication

Effect of Intercropping on the Incidence of Sucking Insect Pests on Moth Bean [*Vigna aconitifolia* (Jacq.) Marechal]

D.K. Bairwa, J.K. Sharma and K.C. Kumawat
SKN College of Agriculture, Jobner 303 329, India

Moth bean (*Vigna aconitifolia* (Jacq.) Marechal) is an important pulse crop well suited for arid and semi-arid regions of the country and is considered to be originated from India. The moth bean seeds contain about 10.30% moisture, 25.66% protein, 2.78% fat, 0.41% mineral matter, 3.90% fiber, 61.76% carbohydrate and lysine, the essential amino acid (Despandey and Rao, 1954; Brown and Gaur, 1960; Pant and Tulsiani, 1963). The crop is damaged at various stages of plant growth by a number of insect pests amongst, which sucking pests, viz., jassid (*Empoasca motti* (Pruthi), whitefly (*Bemisia tabaci* (Genn)] and thrips (*Caliothrips indicus* Bagnall) are most serious pests limiting moth bean yield. Jasids and whiteflies also act as vector of yellow mosaic virus apart from causing direct damage by desaping (Satyavir *et al.*, 1984). Use of appropriate intercropping is gaining momentum in pest management through its physical and biological influences on the succession and population build up of insect pests (Singh and Singh, 1978). Various combinations of crops are grown by farmers, particularly in unirrigated areas, not all of which are entomologically sound. Therefore, intercropping system based on the extent of cooperation generated between the companion crops should now be developed which may create non-overlapping pest sensitivity. The present investigation was, therefore, taken up to study the influence of intercropping on the incidence of sucking insect pests of moth bean.

Field experiments were conducted during kharif 2003 and 2004 at SKN College of Agriculture, Jobner (Rajasthan), to ascertain the pest incidence in moth bean. The experiment was laid out in a randomized block design with five replications. The crop was sown at row to row and plant to plant distance of 30 cm and 15 cm, respectively, in 2.4 x 3.0 m plots. The intercrops grown with moth bean (RMO-40) were pearl millet (MH-171), sesame (RT-46) and clusterbean (Suvidha). The ratio of the sole crop and the intercrop was 3:1 (3 rows of moth bean and 1 row of intercrop). The crops were sown on 20th July 2003 and 23rd July 2004, with a basal dose of 20 kg N and 40 kg P_2O_5 ha^{-1}. The sucking insect pests were counted at weekly interval during the early hours of the day on five randomly selected and tagged plants from each plot. The seed yield of intercrops was converted into moth bean equivalent yield using prevailing market rate of moth bean and other crops with the help of following expression:

Equivalent yield (kg ha^{-1}) =
Seed yield of main crop (kg ha^{-1}) + [(Seed yield of intercrops (kg ha^{-1}) x Price of intercrop (Rs. kg^{-1})/Price of main crop (Rs. kg^{-1})

The population of jassid gradually increased in sole crop as well as in the moth bean intercropped with other crops. The peak activity was observed in second

Table 1. Pest population on different intercrop combinations (Pooled mean, kharif, 2003 and 2004)

Crop combination	Mean pest population at weekly interval								Mean
	1st	2nd	3rd	4th	5th*	6th	7th	8th	
Jassid									
Moth bean + pearl millet	1.12 (1.27)	1.62 (1.45)	5.34 (2.42)	7.84 (2.88)	9.54 (3.17)	6.94 (2.73)	3.16 (1.91)	1.04 (1.24)	4.58 (2.13)
Moth bean + sesame	2.78 (1.81)	3.34 (1.95)	10.48 (3.31)	14.70 (3.90)	18.54 (4.35)	13.30 (3.71)	6.64 (2.67)	2.20 (1.64)	9.00 (2.92)
Moth bean + clusterbean	2.74 (1.80)	3.54 (2.01)	10.78 (3.36)	14.66 (3.89)	19.64 (4.49)	12.96 (3.66)	6.48 (2.64)	1.98 (1.57)	9.10 (2.93)
Sole crop	3.00 (1.87)	4.06 (2.13)	11.90 (3.53)	15.98 (4.05)	21.54 (4.69)	14.24 (3.83)	7.46 (2.82)	2.16 (1.63)	10.05 (3.07)
S.Em±	0.03	0.04	0.05	0.06	0.07	0.06	0.04	0.03	0.02
CD (P=0.05)	0.08	0.12	0.15	0.18	0.19	0.16	0.12	0.10	0.07
Whitefly									
Moth bean + pearl millet	1.06 (1.25)	2.50 (1.73)	6.12 (2.56)	7.96 (2.90)	11.74 (3.50)	6.04 (2.56)	2.84 (1.82)	0.84 (1.15)	4.89 (2.18)
Moth bean + sesame	2.26 (1.65)	4.36 (2.19)	2.94 (3.66)	19.04 (4.42)	22.52 (4.78)	13.32 (3.71)	7.02 (2.74)	1.18 (1.29)	10.33 (3.06)
Moth bean + clusterbean	3.02 (1.86)	5.33 (2.41)	14.4 (3.86)	19.29 (4.44)	23.54 (4.90)	13.89 (3.79)	8.08 (2.92)	1.54 (1.41)	11.14 (3.20)
Sole crop	3.10 (1.89)	5.34 (2.41)	14.00 (3.80)	20.74 (4.61)	24.74 (5.02)	14.24 (3.83)	7.72 (2.86)	1.50 (1.41)	11.42 (3.23)
S.Em±	0.05	0.04	0.06	0.07	0.07	0.06	0.06	0.04	0.04
CD (P=0.05)	0.13	0.13	0.17	0.19	0.21	0.16	0.17	0.12	0.11
Thrips									
Moth bean + pearl millet	0.64 (1.07)	1.26 (1.32)	3.36 (1.96)	4.24 (2.17)	6.50 (2.63)	3.44 (1.98)	1.44 (1.39)	0.80 (1.14)	2.71 (1.71)
Moth bean + sesame	1.84 (1.53)	2.74 (1.79)	5.48 (2.44)	8.74 (3.04)	11.36 (3.43)	7.04 (2.74)	2.98 (1.86)	1.54 (1.42)	5.22 (2.28)
Moth bean + clusterbean	1.86 (1.53)	3.18 (1.91)	6.40 (2.62)	9.46 (3.15)	12.32 (3.58)	7.50 (2.83)	3.62 (2.02)	1.74 (1.49)	5.76 (2.39)
Sole crop	2.14 (1.62)	3.40 (1.97)	6.38 (2.62)	9.90 (3.22)	13.36 (3.72)	7.30 (2.79)	3.50 (1.99)	1.94 (1.56)	5.99 (2.44)
S.Em±	0.02	0.05	0.04	0.05	0.06	0.05	0.04	0.03	0.03
CD (P=0.05)	0.07	0.13	0.13	0.15	0.18	0.15	0.12	0.08	0.08

* peak population of insect pests,
Figures in the parentheses are $\sqrt{x}$ + 0.05 transformed values.

and third week of September during 2003 and 2004, respectively. The mean pooled data of both the years on jassid population revealed that maximum population (10.05 plant^{-1}) was observed on sole crop and minimum population was observed on moth bean + pearl millet intercrop combination (4.58 plant^{-1}). The moth bean + sesame (9.00 jassids plant^{-1}) and moth bean + clusterbean (9.10 jassids plant^{-1}) intercrop combination harboured least population than the sole crop.

The present findings are in conformity with that of Singh and Singh (1978) who reported considerable reduction in incidence of major insect pests under intercropping in comparison to sole crop. In the present investigation, the intercropping moth bean + pearl millet, moth bean + sesame and moth bean + clusterbean minimized the population as compared to sole crop which gets support from Dhuri *et al.* (1986).

The pooled data revealed a definite impact of intercropping system on the whitefly incidence. The peak whitefly population ranged from 11.74-24.74 plant^{-1}. The pooled mean data revealed that the maximum population of whitefly was observed on the sole crop (11.42 plant^{-1}) followed by moth bean + clusterbean (11.14 plant^{-1}) and moth bean + sesame (10.33 plant^{-1}). The minimum infestation was observed in moth bean + pearl millet (4.89 plant^{-1}) intercrop combinations in both the years. The present findings get favor from that of Dhuri *et al.* (1986) who reported that the intercrops invariably reduced pest population in the sole crop.

Pooled data of thrips during kharif 2003 and 2004 showed that sole crop (moth bean) had maximum population as compared to intercropped main crop. The peak activity of thrips population ranged from 6.50-13.36 plant^{-1}. The pooled mean data revealed that the maximum population of thrips was observed on the sole crop (5.99 plant^{-1}) followed by moth bean + clusterbean (5.76 plant^{-1}) and moth bean + sesame (5.22 plant^{-1}). The minimum infestation was observed in moth bean + pearl millet intercrop combination (2.71 plant^{-1}). The present findings are in conformity with that of Dhuri *et al.* (1986) who reported that thrips population in black gram sole crop was reduced with intercropping pigeon pea (0.13 plant^{-1}) and sorghum (0.10 plant^{-1}).

The ratio of main crop and intercrop was 3:1. The equivalent yield and pooled data of both the years was calculated. The pooled data showed that different intercrops increased the yield equivalent of the sole crop. Maximum equivalent yield was obtained from moth bean + sesame (617 kg ha^{-1}) followed by moth bean + pearl millet (542 kg ha^{-1}) and moth bean + clusterbean (495 kg ha^{-1}) intercrop combination. The minimum yield was obtained from sole crop (419 kg ha^{-1}). Sole crop and intercropped yield data showed statistically significant difference among them.

References

Brown, A.S. and Guar, I.C. 1960. Physico-chemical study of *Phaseolus acontifolius* (moth). *Indian Journal of Applied Chemistry* 23: 157.

Despandey, P.D. and Radhakrishna, Rao, M.V. 1954. Nitrogen complex and amino acid composition of (i) *Emerenthus gangaticus* and *Phaseolus acontifolius*. *Indian Journal of Medical Research* 42: 77-83.

Dhuri, A.V., Singh, K.M. and Singh, R.N. 1986. Effect of intercropping on population dynamics of insects pests of blackgram, *Vigna mungo*

(L.) Hepper. *Indian Journal of Entomology* 48: 329-338.

Pant, R. and Tulsiani, D.R.P. 1963. Total soluble carbohydrates and reduction substances of some leguminous seeds. *Current Science* 37: 74-75.

Satyavir, Jindial, S.K. and Lodha, S. 1984. Screening of moth bean cultivars against Jassid, whitefly and yellow mosaic virus. *Annals of Arid Zone* 23: 99-103.

Singh, R.N. and Singh, K.M. 1978. Influence of intercropping on succession and population build up of insect pests in early variety of red gram, *Cajanus cajan* (L.) Millsp. *Indian Journal of Entomology* 40: 361-375.