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Research Note

Influence of intercropping on the conservation of *Chrysoperla carnea* (Stephens) in cotton

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ABSTRACT: Among six intercrops evaluated, cotton (*Gossypium hirsutum* L.) intercropped with sunflower and cowpea in paired row system were favourable for the conservation of *Chrysoperla carnea* (Stephens), Cotton alone was comparatively less favourable to the multiplication of *C. carnea,* which correspondingly recorded more population of insect pests. The population of *C. carnea* did not show any influence on the population of *Amrasca devastans* Ishida.

KEY WORDS: *Chrysoperla carnea, Helicoverpa armigera,* intercropping system, sucking pests

Intercropping or mixed cropping system is one of the important cultural practices in pest management based on the principle of reducing the insect pests by increasing the diversity of the ecosystems and the population of natural enemies (Smith and Van den Bosch, 1970). A lack of synchrony or poor ratio between the number of natural enemies and their hosts, often occurring in crop monoculture could be corrected by providing intercropping conditions (Ananthakrishnan, 1992). Li (1987) reported that cotton intercropped with safflower attracted *Chrysoperla sp.* and *Coccinella septempunctata* Linn., resulting in the effective control of *Aphis gossypii* Glover. Interplanting of maize and cabbage (Wu *et al.*, 1991) and alfalfa (Godfrey and Fleigh, 1994) in cotton fields influenced the natural enemies like spiders, coccinellids and chrysopids. In the present study, some of the intercrops practiced by farmers of Tamil Nadu were tried with cotton to find out the best intercropping system for the conservation of green lacewing, *Chrysoperla carnea* (Stephens) and the management of pests of cotton.

A field experiment was conducted in randomized block design, replicated thrice

during winter season (rainfed) of 1996 at Agricultural College and Research Institute, Madurai. Cotton (Cv. MCU 5) was the base crop raised in paired rows with intercrops namely cowpea (*Phaseolus unguiculata* L.), sunflower (*Helianthus annuus* L.), sorghum (*Sorghum bicolor* L.), blackgram (*Phaseolus mungo* L.), greengram (*Phaseolus radiatus* L.) and clusterbean (*Cyamopsis tetragonaloba* L.). Observations on the mean adult population of *Chrysoperla carnea* and insect pests, namely *Aphis gossypii, Amrasca devastans* Ishida, *Thrips tabaci* Lind. and *Helicoverpa armigera* (Hubner) in 20 plants on various cotton based intercropping systems at an interval of 15, 30, 45, 60, 75 and 90 days after sowing were made and mean population from different dates of sowing for each insect was calculated. No insecticidal spray was given on both cotton and intercrops throughout the period of observation.

The adult population of *C. carnea* was comparatively high when cotton was intercropped with sunflower and cowpea in paired row system, recording 63.6 and 61.8 nos./20 plants, respectively which inturn reduced the population of *A. gossypii, T. tabaci* and *H. armigera* by its predatory activity (Table 1). The activity of *C. carnea* adults was low in cotton alone (31.3/20 plants) which correspondingly recorded a high population of *A. gossypii, T. tabaci* and *H. armigera* (85.5, 67.2 and 42.0/20 plants, respectively). Cotton + blackgram and cotton + greengram were next best intercrops which recorded moderately high population of *C. carnea* and low population of insect pests of cotton (Table 1). Though cotton + sunflower and cotton + cowpea intercropping systems were favourable for *C. carnea*, the high population of *Amrasca devastans* in these above systems indicated that intercrops and predator did not have influence on reducing the population. However, the population of *A. devastans* was low in cotton + clusterbean intercropping system (40.1/20 plants).

Table 1. Population of *C. carnea* adults and insect pests on cotton alone and intercropped

Treatment	Population (Nos./ 20 plants)				
	C. carnea	*A. gossypii*	*A. devastans*	*T. tabaci*	*H. armigera*
Cotton + cowpea	61.8 (7.85)^{b}	55.8 (4.47)^{a}	72.1 (8.49)^{c}	26.3 (5.12)^{b}	25.0 (5.00)^{b}
Cotton + sorghum	37.4 (6.11)^{d}	76.5 (8.74)^{d}	52.8 (7.26)^{b}	49.2 (7.02)^{e}	32.0 (5.65)^{d}
Cotton + sunflower	63.6 (7.97)^{a}	54.2 (7.56)^{b}	67.9 (8.24)^{c}	24.3 (4.92)^{a}	20.0 (4.47)^{d}
Cotton + blackgram	48.2 (6.93)^{c}	70.3 (8.38)^{e}	47.7 (6.90)^{b}	33.9 (5.89)^{d}	29.0 (5.38)^{c}
Cotton + greengram	48.3 (6.95)^{c}	72.1 (8.48)^{e}	48.2 (6.93)^{b}	29.6 (5.44)^{c}	29.1 (5.38)^{c}
Cotton + clusterbean	36.1 (6.00)^{e}	80.1 (8.94)^{d}	40.1 (6.33)^{a}	50.1 (7.07)^{f}	33.3 (5.77)^{c}
Cotton	31.3 (3.59)^{f}	85.5 (9.24)^{f}	95.2 (9.75)^{d}	67.2 (8.19)^{g}	42.0 (6.48)^{e}

Figures in parentheses are square root transformed values.
In a column, means followed by same letter (s) are not significantly different by DMRT (P=0.05).

Cotton is rich in pollen and nectar, which can conserve the adults of *C. carnea* in its ecosystem by attracting from neighboring vegetation. Introduction of some intercrops may supplement the supply of pollen and nectar to the adults of *C. carnea* for longer duration. The population of sucking pests was higher than *C. carnea* in the early stage of cotton as at this stage it could not supply sufficient pollen and nectar for the multiplication of adults of *C. carnea*. During the flowering period, sunflower was the best intercrop for cotton to support the development and reproduction of *C. carnea* by providing the maximum pollen and nectar as adult food (Stork, 1988) which inturn increased the predator population. Hence in cotton + sunflower, both supplied pollen and nectar and host insects for the multiplication of adults and larvae of *C. carnea*. When cowpea, blackgram and greengram were intercropped, cotton supplied pollen and nectar for the fecundity and survival of adults and both cotton and intercrops supplied host insects for larvae.

The present study indicated that intercrops for the cotton are to be selected in such a way that both should provide pollen, nectar and host insects side by side for the survival and multiplication of adults and larvae of *C. carnea*. High population of *A. devastans* on different intercropping systems except cotton + clusterbean is due to less preference of *C. carnea* for jassids as they move fastly by sideward direction. Singh *et al.* (1993) reported the maximum population of *A. devastans* on cotton intercropped with sunflower. However, cotton + clusterbean recorded the lowest population of *A. devastans* as shown by Balasubramanian *et al.* (1998).

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