EFFECT OF INTER CROPPING ON POPULATION DYNAMICS OF MAJOR PESTS OF CHILLI (CAPSICUM ANNUUM L.) UNDER IRRIGATED CONDITIONS

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ABSTRACT

Field experiments were conducted during kharif 2000 and summer 2001. The chilli and intercrops, viz., onion, garlic, brinjal, bhendi, marigold, maize and beans were planted in alternate rows and all the recommended agronomic practices were followed to raise the crop. The pheromone and sticky traps were installed in the experimental plots to catch the adult insects. Chilli intercropped with garlic/onion consistently recorded lower pest infestation levels with higher green chilli yield (6.06 and 6.33 t/ha) and (5.93 and 4.53 t/ha) compared to chilli sole crop (3.26 and 2.53 t/ha) in the two seasons respectively. All the chilli-intercropped treatments were significantly superior with lesser infestation of whitefly, thrips, aphids, jassids and pod borers compared to sole crop of chilli.

INTRODUCTION

Chilli (Capsicum annuum L.) is one of the most important spice crops of India. Among the various bottlenecks for low productivity of chilli in Karnataka, attack of insect-pests forms a major limiting factor, of which the chilli thrips, Scirtothrips dorsalis Hood, whitefly, Bemisia tabaci (Genn.), aphids, Aphis gossypii Glover and Myzus persicae (Sulzer), jassid, Amrasca biguttula biguttula (Ishida), and pod borers like Helicoverpa armigera (Hub.) and Spodoptera litura (Fab.) are more important and economical pests. To avoid such losses, insecticides are mainly used. In order to reduce high cost of pesticides and the adverse effects on the environment, management strategies based on intercropping of chilli with crops like onion, garlic, brinjal, bhendi, beans, marigold and maize are advocated. Keeping this in view, an investigation was carried out to study the efficacy of different intercropping systems with chilli as the main crop. The level of pest incidence was assessed with the help of pheromone and yellow sticky traps.

MATERIAL AND METHODS

Field experiments were conducted during kharif 2000 and summer 2001 under irrigated conditions in Nagarjuna Agriculture Research and Development Institute, Davanagere (Karnataka). The experiments were laid out in randomized block design with eight treatments and three replications. Chilli sole crop was considered as standard check for comparison. The seedlings of chilli (cv. Pusa Jwala), marigold and brinjal, seeds of beans, bhendi and maize and bulblets of garlic and onion were planted/dibbled in alternate rows and the crops were raised following all the recommended agronomic practices. A week after transplanting, yellow sticky paper traps were installed in the middle of each experimental plot (4 m x 5 m), to catch the adults of whitefly, thrips, jassids and aphids and replaced at weekly intervals. Each yellow paper trap (12 cm x 25 cm) was fixed to a wooden plate, fixed to a wooden stand whose height could be adjusted according to that of chilli crop canopy. Similarly, polythene sleeve traps baited with pheromone lures (Helilure® and Spodolure®) in rubber septa was installed at 0.5 m height from the ground level @ 12 traps/ha. The trap lures were replaced at 15 days intervals and maintained throughout the

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cropping period. The number of insects caught was counted and monthly averages were worked out. The data were subjected for √((x+ 0.5)) transformation before statistical analysis.

RESULTS AND DISCUSSION

During kharif 2000, the monthly average of whiteflies caught in the yellow sticky trap ranged from 4.46 to 7.93/trap, being lowest in chilli + garlic intercrop followed by chilli + onion, chilli + beans and chilli + brinjal, at par with each other and significantly superior to rest of the treatments. All the intercropped treatments were significantly superior to chilli sole crop in reducing the whitefly infestation (Table 1). A similar trend was also observed during summer 2001 (Table 2). Garlic intercrop has earlier been reported to reduce the incidence of whitefly on potato crop to which these results agree Mogahed (2003).

During kharif 2000 lower number of aphids was noticed in chilli + garlic (2.46/trap) followed by chilli + onion (2.73/trap), chilli + bhendi (4.13/trap), all being on par statistically, but significantly lower than rest of the intercrop combinations (Table 1). All the intercrop treatments were significantly superior in reducing the aphid population compared to sole crop of chilli. A similar trend was also evident during summer 2001 (Table 2). These results are in agreement with Basavarajappa and Rajasekher (2001) who reported intercrop of chilli + onion reduced the aphid population to the extent of 61.81 per cent compared to sole crop of chilli and in chilli + brinjal to 54.54 per cent, chilli + cotton to 18 per cent. Parajulee et al. (1999) suggested that where cotton is grown without insecticides, relay intercropping aids the early arrival and continuous population increase of predators in cotton, thereby reducing the number and postponing the initial population of A. gossypii.

During kharif 2000, the least pod borer, *H. armigera* moths (6.60/trap) was noticed in chilli + garlic intercrop, followed by chilli + onion (2.60/trap) and chilli + brinjal (3.66/trap) (Table 1). All the intercropped treatments were significantly superior compared to chilli sole crop in reducing the thrips population. A similar trend was also noticed in summer 2001 crop (Table 2). These findings are in conformity with Sharaf El-Din et al. (1993) who reported that intercropping of onion with cotton reduced the incidence of *Thrips tabaci*, *A. gossypii* and *B. tabaci* on onion.

The minimum population of jassid (2.06/trap) during kharif 2000 was noticed in chilli + garlic intercrop, followed by chilli + onion (2.33/trap) and chilli sole crop (3.40/trap) (Table 1). All the intercrop treatments were significantly superior compared to chilli sole crop in reducing the jassid population except chilli + maize (9.13/trap). A similar trend was observed in summer 2001 crop (Table 2). These results find support from Potts and Gunadi (1991) who reported that intercropping of potato crop with *Allium cepa* or *A. sativum* reduced the populations of *M. persicae*, *A. gossypii* and *Empoasca* spp. Mogahed (2003) also noticed that intercropping of potato (cv. Nikola and Sponta) with onion and garlic consistently supported lower infestation of *B. tabaci*, *T. tabaci*, *M. persicae* and *Empoasca discipiens* on potato.

During kharif 2000, the least pod borer, *H. armigera* moths (6.60/trap) was noticed in chilli + garlic intercrop followed by chilli + onion (7.13/trap) and chilli + bhendi (8.20/trap) (Table 1). All the intercropped plots showed significantly lower pest infestation compared to chilli sole crop, except chilli + maize (8.93/trap) and chilli + marigold (7.93/trap). A similar trend was observed in summer 2001 crop (Table 2). These results find support from Coaker (1990) who concluded that intercropping, which is a traditional method of crop production in the tropics, had potential for insect pest suppression in low-input farming.
Table 1. Effect of intercropping on population dynamics of major insect pests of chilli under irrigated condition during kharif 2000

<table>
<thead>
<tr>
<th>Treatment</th>
<th>White fly</th>
<th>Aphids</th>
<th>Thrips</th>
<th>Jassids</th>
<th>Helicoverpa</th>
<th>Spodoptera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chilli + brinjal</td>
<td>5.60 (2.46)</td>
<td>4.40 (2.21)</td>
<td>3.66 (2.04)</td>
<td>5.73 (2.49)</td>
<td>8.46 (2.99)</td>
<td>3.26 (1.93)</td>
</tr>
<tr>
<td>Chilli + onion</td>
<td>4.73 (2.26)</td>
<td>2.73 (1.79)</td>
<td>2.60 (1.77)</td>
<td>2.33 (1.68)</td>
<td>7.13 (2.76)</td>
<td>2.46 (1.72)</td>
</tr>
<tr>
<td>Chilli + garlic</td>
<td>4.46 (2.22)</td>
<td>2.46 (1.72)</td>
<td>2.53 (1.74)</td>
<td>2.06 (1.60)</td>
<td>6.60 (2.66)</td>
<td>3.33 (1.68)</td>
</tr>
<tr>
<td>Chilli + bhendi</td>
<td>6.46 (2.63)</td>
<td>4.13 (2.15)</td>
<td>4.13 (2.15)</td>
<td>5.20 (2.35)</td>
<td>8.20 (2.94)</td>
<td>4.33 (2.19)</td>
</tr>
<tr>
<td>Chilli + maize</td>
<td>7.00 (2.73)</td>
<td>6.73 (2.80)</td>
<td>7.73 (2.86)</td>
<td>9.13 (3.10)</td>
<td>8.93 (3.07)</td>
<td>4.26 (2.18)</td>
</tr>
<tr>
<td>Chilli sole crop</td>
<td>7.93 (2.90)</td>
<td>12.60 (3.61)</td>
<td>3.40 (1.97)</td>
<td>3.40 (1.97)</td>
<td>9.86 (3.21)</td>
<td>7.06 (2.74)</td>
</tr>
<tr>
<td>Chilli + marigold</td>
<td>6.13 (2.57)</td>
<td>6.06 (2.56)</td>
<td>4.66 (2.27)</td>
<td>4.06 (2.13)</td>
<td>7.93 (2.90)</td>
<td>4.13 (2.15)</td>
</tr>
<tr>
<td>Chilli + beans</td>
<td>5.26 (2.40)</td>
<td>5.40 (2.42)</td>
<td>4.33 (2.19)</td>
<td>4.73 (2.28)</td>
<td>8.60 (3.01)</td>
<td>3.73 (2.05)</td>
</tr>
</tbody>
</table>

SEm + 0.03 0.06 0.03 0.02 0.03 0.03 0.20
CD @ (P=0.05) 0.09 0.19 0.09 0.06 0.10 0.11 0.60

* Mean of three replications;
Figures in the parentheses indicates $\sqrt{X}+0.5$ transformed values.

During kharif 2000, the minimum pod borer, *S. litura* moths (2.33/trap) was noticed in chilli + garlic inter crop followed by chilli + onion (2.46/trap) and chilli + brinjal (3.26/trap) (Table 1). All the intercropped plots had significantly low pest infestation compared to chilli sole crop. A similar trend was evident during summer 2001 (Table 2). These results find support from Coaker (1990) who reported that intercropping had potential for insect pest suppression in low-input farming.

**Effect on yield**

The highest chilli yield (6.06t/ha) was recorded in chilli + garlic, followed by chilli + onion (5.93 t/ha) and chilli + marigold (5.13 t/ha) during kharif 2000 (Table 1) while during summer 2001, the fruit yield in the respective treatment was 6.33, 4.53 and 3.60 t/ha. All the intercropped treatments were significantly superior in reducing the pest infestation on chilli and had significantly higher yield compared to sole crop of chilli. Among the intercrops, garlic and onion performed well in reducing the pest load and improving the yield of the main crop. According to Mogahed (2003) the average yield of potato was
enhanced significantly in intercropped plots compared to those, with sole crop of potato. This may be attributed to presence of certain volatile substance present in the intercrop that might restrict colonization of the main crops by important pests. However, further work is needed to elucidate the underlying phenomenon more comprehensively.

REFERENCES