FIELD EVALUATION OF NEW INSECTICIDES AGAINST COTTON THRIPS (*THRIPS TABACI LIND.* ) IN DISTRICT MULTAN

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INTRODUCTION

Cotton (*Gossypium hirsutum* L.) is regarded as mainstay of Pakistan’s economy because it is a major source of foreign exchange and plays vital role in economic development of the country. Pakistan has very low per hectare yield of cotton as compared to other cotton producing countries (Bakhsh et al., 2005). Numerous factors are narrated for the lower productivity of the crop but the most serious one is the intensity of insect pests attack (Anonymous, 2006; Aslam et al., 2004). More than 1326 species of insects have been reported to attack cotton crop in the world (Atwal, 2002) and about 93 insect and mite pests have been reported to attack it in Pakistan (Yunis and Yousaf, 1979). The cotton growing areas of the country after the introduction of Bt.cotton has witnessed a significant change in cropping scheme (Ahsan and Altaf, 2009; Abdullah, 2010). The crop is now sown in the month of February instead of July and this long duration has exposed the crop to a number of insect pests. There is no doubt that the introduction of Bt. cotton in our agricultural landscape has proved beneficial to our farmers in the effective control of some specific lepidopterous species (Arshad et al., 2009) but there is lack of resistance against sucking insect pests (Hofs et al., 2004; Sharma & Pampapathy, 2006; Jeyakumar et al., 2008) so the sucking insect pests have warranted monitoring and intervention with insecticides in the early stage of the crop (Kilpatrick et al., 2005). The sucking insect pests including whitefly (*Bemisia tabaci* Genn.), thrips (*Thrips tabaci* Lind.), and jassid (*Amrasca biguttula biguttula* Ishida) are more injurious to the cotton which cause 40-50 percent damage in the crop (Naqvi, 1976). Thrips (*Thrips tabaci* Lind.) have recently attained the status of a regular cotton insect pest in the Punjab province of Pakistan, probably due to over use of pesticides (Ali et al., 1993). *Thrips tabaci* Lind. is the most important early-season sucking insect pest on cotton. It attacks cotton crop early in the season but high population densities can be seen during second fortnight in September (Ali et al., 1993; Wilson & Bauer, 1993; Gupta et al., 1997; Khan et al., 2008). Both nymph and adult stages of thrips damage the tissue and destroy leaves by sucking the cell sap. Due to attack of this pest leaves curl up and plants remain stunted at initial stage. Thrips has been reported to develop resistance against conventional insecticides, intensive research have been carried out for evaluating new insecticides with novel mode of action against thrips with minimum hazards for mammals and...
natural enemies (Lobna T. M. Zidan, 2012). Ghabn, 1948 and Bournier, 1969 have reported that T. tabaci was responsible for the loss of 50% of young cotton plants and can also act as vector of plant diseases (Sakimura, 1963). Our farmers irrationally use more and more insecticide/pesticide for its control which is detrimental not only to natural enemies but also to our environment hence attempts were made to study the field efficacy of various insecticides against thrips on Bt. cotton.

MATERIALS AND METHODS:

Following insecticides viz. Hicap 20SL (imidacloprid) @500ml/ha, Pirate 360SC (chlorofenapyr) @250ml/ha, Tracer 240SC (spinosad) @125ml/ha, Movento 50WDG (spirotetramat) @500gm/ha, Karate 2.5EC (lambda cyhalothrin) @825ml/ha, Acephate 70WP (acephate) @ 625gm/ha, Imidacloprid 25WP (imidacloprid) @185gm/ha, Momentum 50WDG (chlorofenapyr + nitenpyram) @375gm/ha, Confidor 70WG (imidacloprid) @58gm/ha were sprayed on cotton crop having maximum population of thrips at the farmer's field in Tehsil Shujabad of Multan district. The Cotton variety Bt. 886 was selected for this study. There were ten treatments including control. The plot size for each treatment was 6.45m x 4.94 m. There were six lines in each plot, 75 cm apart; while plant-to-plant distance was 23 cm. All the inputs applied were same in all the treatments. The data of thrips was recorded from 15 leaves selected at random from 15 plants per plot by taking upper, middle and lower portion of the plant before spray and then after 24, 72 and 168 hours of spray. The data was consolidated and percent mortality was calculated by using the formula:

\[
\text{% Mortality} = \left( \frac{\text{Population before spray} - \text{Population after spray}}{\text{Population before spray}} \right) \times 100
\]

STATISTICAL ANALYSIS:

The data were subjected to analysis of variance (ANOVA) by using Statistix Version-9 (www.statistix.com/freetrail.html) (Lawes Agricultural Trust Rothamsted Experimental Station, Rothamsted, UK). The means were separated by LSD (Least Significant Difference).

Table 1.

Percent mortality of thrips 24, 72 and 168 hours after spray 2013.

<table>
<thead>
<tr>
<th>Insecticides</th>
<th>Dose/ha</th>
<th>24 hours MEAN±SE</th>
<th>72 hours MEAN±SE</th>
<th>168 hours MEAN±SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hicap 20SL</td>
<td>imidacloprid</td>
<td>500ml</td>
<td>79.97±4.37ab</td>
<td>75.77±2.07b</td>
</tr>
<tr>
<td>Pirate 360 SC</td>
<td>chlorofenapyr</td>
<td>250ml</td>
<td>74.91±3.80bc</td>
<td>76.14±2.37b</td>
</tr>
<tr>
<td>Tracer 240SC</td>
<td>spinosad</td>
<td>125ml</td>
<td>80.70±1.70ab</td>
<td>79.43±3.23ab</td>
</tr>
<tr>
<td>Movento 50WDG</td>
<td>spirotetramat</td>
<td>500gm</td>
<td>62.67±7.24d</td>
<td>66.21±7.92c</td>
</tr>
<tr>
<td>Karate 2.5EC</td>
<td>lambda cyhalothrin</td>
<td>825ml</td>
<td>68.28±2.82cd</td>
<td>66.22±5.19c</td>
</tr>
<tr>
<td>Acephate 75SP</td>
<td>acephate</td>
<td>625gm</td>
<td>86.91±3.94a</td>
<td>85.41±2.01a</td>
</tr>
<tr>
<td>Imidacloprid 25 WP</td>
<td>imidacloprid</td>
<td>185gm</td>
<td>70.31±4.96bc</td>
<td>65.63±4.69c</td>
</tr>
<tr>
<td>Momentum 50WDG</td>
<td>chlorofenapyr + nitenpyram</td>
<td>375gm</td>
<td>72.96±2.56c</td>
<td>67.75±2.24c</td>
</tr>
<tr>
<td>Confidor 70 WG</td>
<td>imidacloprid</td>
<td>58gm</td>
<td>68.35±2.91cd</td>
<td>67.53±2.31c</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td>5.33±0.67e</td>
<td>4.09±0.25d</td>
</tr>
</tbody>
</table>

LSD Value: 6.97, 6.89, 5.82

Means followed by common letters in the representative category are not significantly different from each other by LSD at \( \alpha = 0.05 \).
RESULTS AND DISCUSSION:

PERCENT MORTALITY OF THRIPS 24 HOURS AFTER SPRAY

The data on the effectiveness of various insecticides for the control of thrips after 24 hours of spray revealed a highly significant difference among treatments in the 2013 trial (F=94.66;df=29,18;P<0.01;Table-I). The maximum percentage of mortality was observed in those treatments where Acephate 75SP (acephate) @ 625gm/ha was sprayed having 86.91% mortality followed by Tracer 240SC (spinosad) @ 125ml/ha (80.70%) , Hicap 20SL (imidacloprid) @ 500ml/ha (79.97%), Pirate 360SC (chlorofenapyr) @250ml/ha (74.91%), Momentum 50WDG (chlorofenapyr+nitenpyram) @375gm/ha (72.99%), Imidacloprid 25WP (imidacloprid) @185gm/ha (70.31%), Confidor 70 WG (imidacloprid) @58gm/acre (68.35%) and Karate 2.5EC (lambdacyhalothrin) @825ml/ha (68.28%) respectively. The minimum mortality of the pest i.e. 62.67% after 24 hours of spray was observed in those treatments where Movento 50WDG (spirotetramat) @500gm/ha was sprayed.

PERCENT MORTALITY OF THRIPS 72 HOURS AFTER SPRAY

Highly significant difference were observed among treatments after 72 hours of spray in the 2013 trial (F=94.76;df=29,18;P<0.01;Table-I). Acephate 75SP (acephate) @625gm/ha proved to be most effective insecticide against thrips by showing 85.41% mortality followed by Tracer 240SC (spinosad) @125ml/ha (79.43%), Pirate 360SC (chlorofenapyr) @250ml/ha (76.14%), Hicap 20SL (imidacloprid) @500ml/ha (75.77%), Momentum 50WDG (chlorofenapyr+nitenpyram) @375gm/ha (67.75%). The minimum mortality of the pest i.e. 65.63% was observed in those treatments where Imidacloprid 25WP (imidacloprid) @185gm/ha was sprayed which is statistically similar to Confidor 70 WG (imidacloprid) @58gm/ha (67.53%), Karate 2.5EC (lambdacyhalothrin) @825ml/ha (66.22%) and Movento 50WDG (spirotetramat) @500gm/ha (66.21%) respectively.

Table 2

Percent mortality of thrips 24, 72 and 168 hours after spray 2014.

<table>
<thead>
<tr>
<th>Insecticides</th>
<th>Dose/ha</th>
<th>Percentage mortality of thrips on cotton after</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean±se</td>
</tr>
<tr>
<td>Hicap 20SL</td>
<td>imidacloprid</td>
<td>500ml</td>
</tr>
<tr>
<td>Pirate 360 SC</td>
<td>chlorofenapyr</td>
<td>250ml</td>
</tr>
<tr>
<td>Tracer 240SC</td>
<td>spinosad</td>
<td>125ml</td>
</tr>
<tr>
<td>Movento 50WDG</td>
<td>spirotetramat</td>
<td>500gm</td>
</tr>
<tr>
<td>Karate 2.5EC</td>
<td>lambdacyhalothrin</td>
<td>825ml</td>
</tr>
<tr>
<td>Acephate 75SP</td>
<td>acephate</td>
<td>625gm</td>
</tr>
<tr>
<td>Imidacloprid 25 WP</td>
<td>imidacloprid</td>
<td>185gm</td>
</tr>
<tr>
<td>Momentum 50WDG</td>
<td>chlorofenapyr+nitenpyram</td>
<td>375gm</td>
</tr>
<tr>
<td>Confidor 70 WG</td>
<td>imidacloprid</td>
<td>58gm</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td>7.44±0.11e</td>
</tr>
</tbody>
</table>

Means followed by common letters in the representative category are not significantly different from each other by LSD at α =0.05.

LSD Value

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.07</td>
<td>7.08</td>
<td>5.25</td>
</tr>
</tbody>
</table>
PERCENT MORTALITY OF THRIPS 168 HOURS AFTERSPRAY

Highly significant difference were observed among treatments after 168 hours of spray in the 2013 trial (F=59.44; df=29,18; P<0.01; Table-I). After 168 hours of spray Pirate 360SC (chlorofenapyr) @ 250ml/ha proved to be most effective against thrips by showing 61.92% mortality followed by Tracer 240SC (spinosad) @125ml/ha (52.54%), Momentum 50WDG (chlorofenapyr+ nitenpyram) @375gm/ha (47.29%), Movento 50WDG (spirotetramat) @500gm/ha (46.94%), Imidacloprid 25WP (imidacloprid) @185gm/ha (42.76%), Acephate 75SP (acephate) @625gm/ha (40.54%), Confidor 70WG (imidacloprid) @58gm/ha (39.45%) respectively. The minimum mortality i.e. 37.25% of the pest after 168 hours of spray was observed in those treatments where Karate 2.5EC (lambdacyhalothrin) @825ml/ha was sprayed.

PERCENT MORTALITY OF THRIPS 24 HOURS AFTERSPRAY

The data on the effectiveness of various insecticides for the control of thrips after 24 hours of spray revealed a highly significant difference among treatments in the 2014 trial (F=71.23; df=29,18; P<0.01; Table-II). The maximum percentage of mortality was observed in those treatments where Acephate 75SP (acephate) @625gm/ha was sprayed having 77.17% mortality followed by Tracer 240SC (spinosad) @125ml/ha (76.55%), Hicap 20SL (imidacloprid) @500ml/ha (71.74%), Pirate 360SC (chlorofenapyr) @250ml/ha (69.34%), Momentum 50WDG (chlorofenapyr+ nitenpyram) @375gm/ha (68.72%), Confidor 70WG (imidacloprid) @58gm/ha (65.59%), Karate 2.5EC (lambdacyhalothrin) @825ml/ha (65.46%) and Imidacloprid 25WP (imidacloprid) (64.12%) respectively. The minimum mortality of the pest i.e. 60.90% after 24 hours of spray was observed in those treatments where Movento 50WDG (spirotetramat) @500gm/ha (60.90%) was sprayed.

PERCENT MORTALITY OF THRIPS 72 HOURS AFTERSPRAY

Highly significant difference were observed among treatments after 72 hours of spray in the 2014 trial (F=69.71; df=29,18; P<0.01; Table-II). The maximum percentage of mortality was observed in those treatments where Acephate 75SP (acephate) @625gm/ha was sprayed having 76.08% mortality followed by Tracer 240SC (spinosad) @125ml/ha (74.30%), Karate 2.5EC (lambdacyhalothrin) @825ml/ha (72.08%), Movento 50WDG (spirotetramat) @500gm/ha (68.72%), Hicap 20SL (imidacloprid) @500gm/ha (67.96%) and Imidacloprid 25WP (imidacloprid) (64.12%) respectively. The minimum mortality of the pest i.e. 60.90% after 24 hours of spray was observed in those treatments where Movento 50WDG (spirotetramat) @500gm/ha (60.90%) was sprayed.

Table 3

Percent mortality of thrips 24, 72 and 168 hours after spray 2013-14.

<table>
<thead>
<tr>
<th>Insecticides</th>
<th>Dose/ha</th>
<th>Percentage mortality of thrips on cotton after</th>
<th>24 hours</th>
<th>72 hours</th>
<th>168 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean±se</td>
<td>Mean±se</td>
<td>Mean±se</td>
<td>Mean±se</td>
</tr>
<tr>
<td>Hicap 20SL</td>
<td>500ml</td>
<td>69.84±10.41abc</td>
<td>71.96±4.09cd</td>
<td>42.49±1.82e</td>
<td></td>
</tr>
<tr>
<td>Pirate 360 SC</td>
<td>250ml</td>
<td>66.70±12.07bcd</td>
<td>72.31±1.19bc</td>
<td>58.18±6.69a</td>
<td></td>
</tr>
<tr>
<td>Tracer 240SC</td>
<td>125ml</td>
<td>72.52±11.40ab</td>
<td>76.87±2.04ab</td>
<td>48.99±1.78b</td>
<td></td>
</tr>
<tr>
<td>Movento 50WDG</td>
<td>500gm</td>
<td>56.32±8.55ae</td>
<td>64.09±4.82ef</td>
<td>41.16±1.84cd</td>
<td></td>
</tr>
<tr>
<td>Karate 2.5EC</td>
<td>825ml</td>
<td>61.02±9.48de</td>
<td>67.62±4.35de</td>
<td>37.66±1.02d</td>
<td></td>
</tr>
<tr>
<td>Acephate 75SP</td>
<td>625gm</td>
<td>75.47±9.22a</td>
<td>80.75±1.83a</td>
<td>39.09±1.93cd</td>
<td></td>
</tr>
<tr>
<td>Imidacloprid 25 WP</td>
<td>185gm</td>
<td>62.19±12.56de</td>
<td>60.86±1.06f</td>
<td>41.40±2.75cd</td>
<td></td>
</tr>
<tr>
<td>Momentum 50WDG</td>
<td>375gm</td>
<td>64.83±7.97cd</td>
<td>67.08±1.64e</td>
<td>47.46±1.42b</td>
<td></td>
</tr>
<tr>
<td>Confidor 70 WG</td>
<td>58gm</td>
<td>61.12±7.04de</td>
<td>66.69±3.12e</td>
<td>37.34±1.20d</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td>5.78±1.17f</td>
<td>5.57±0.08g</td>
<td>6.17±0.35e</td>
<td></td>
</tr>
</tbody>
</table>

Means followed by common letters in the representative category are not significantly different from each other by LSD at α =0.05.
showing 80.75% mortality of the pest followed by Tracer (imidacloprid) &58gm/ha (66.42%), Confidor 70WG (imidacloprid) &58gm/ha (65.86%) and Movento 50WDG (spirotетрамат) &500gm/ha (61.97%). The minimum mortality of the pest i.e. 56.09% after 72 hours of spray was observed in those treatments where Imidacloprid 25WP (imidacloprid)/&58gm/ha was sprayed.

PERCENT MORTALITY OF THRIPS 168 HOURS AFTER SPRAY

The data in the Table reveal that there is significant difference among treatments 168 hours after spray in the 2014 trials (F=50.92; df=29,18; P<0.01; Table-II). The maximum mortality of the pest i.e. 54.44% after 168 hours of spray was shown in those treatments treated with Piratе 360SC (chlorofenapyr) &250ml/ha followed by Momentum 50WDG (chlorofenapyr+nitенpyram) &375gm/ha (47.62%), Tracer 240SC &125ml/ha (45.44%) and Hicап 20SL (imidacloprid) &500ml/ha (43.61%), Imidacloprid 25WP (imidacloprid) &185gm/ha (40.04%) and Moventо 50WDG (sparotetramat) &500ml/ha (39.12%). Confidor 70WG (imidacloprid) &58gm/ha exhibited the lowest percentage mortality i.e.35.24% of the pest after 168 hours of spray which is statistically similar to Acephate 7SSP (acephate) @625gm/acre (37.65%) and Karate 2.5EC (lambdacyhalothrin) &825ml/ha (38.07%) respectively.

PERCENT MORTALITY OF THRIPS 24 HOURS AFTER SPRAY

The cumulative data on the effectiveness of various insecticides for the control of thrips after 24 hours of spray revealed a highly significant difference among treatments (F=89.54; df=29,18; P<0.01; Table-III). The maximum percentage of mortality was observed in those treatments where Acephate 75SP (acephate) @625gm/ha was sprayed having 75.47% mortality followed by Tracer 240SC (spinosad) &125ml/ha (72.52%), Hicап 20SL (imidacloprid) &500ml/ha (69.84%), Piratе 360SC (chlorofенapyr) @250ml/ha (66.70%), Moventо 50WDG (chlorofенapyr+nitенpyram) &375gm/ha (64.83%), Imidacloprid 25WP (imidacloprid) @185gm/ha (62.19%) and Karate 2.5EC (lambdacyhalothrin) &825ml/ha (61.02%). The minimum mortality of the pest i.e.56.32% after 24 hours of spray was observed in those treatments where Moventо 50WDG (spirotетрамat) &500gm/ha was sprayed which is statistically similar to Confidor 70WG (imidacloprid) &58gm/ha (61.12%) respectively.

PERCENT MORTALITY OF THRIPS 72 HOURS AFTER SPRAY

Highly significant difference were observed among treatments after 72 hours of spray (F=184.90; df=29,18; P<0.01; Table 3). Acephate 75SP (acephate) @625gm/ha proved to be most effective insecticide against thrips by showing 80.75% mortality of the pest followed by Tracer 240SC (spinosad) &125ml/ha (76.87%), Piratе360SC (chlorofenapyr) @250ml/ha (72.31%), Hicап 20SL (imidacloprid) @500ml/ha (71.96%), Karate 2.5EC (lambdacyhalothrin) &825ml/ha exhibited (67.62%), Momentum 50WDG (chlorofenapyr+nitенpyram) @375gm/ha (67.08%), Confidor 70WG (imidacloprid) &58gm/ha (66.69%), Moventо 50WDG (sparotetramat) &500gm/ha (64.09%). The minimum mortality of the pest i.e.60.86% after 72 hours of spray was observed in those treatments where Imidacloprid 25WP (imidacloprid) &58gm/ha was sprayed.

PERCENT MORTALITY OF THRIPS 168 HOURS AFTER SPRAY

The data in the Table reveal that there is significant difference among treatments after 168 hours of spray in (F=97.00; df=29,18; P<0.01; Table-III). The maximum mortality of the pest i.e. 58.18% after 168 hours of spray was shown in those treatments treated with Piratе 360SC (chlorofenapyr) @250ml/ha followed by Tracer 240SC &125ml/ha (48.99%), Momentum 50WDG (chlorofенapyr+nitенpyram) @375gm/ha (47.46%), Hicап 20SL (imidacloprid) @500ml/ha (42.49%), Imidacloprid 25WP (imidacloprid) @185gm/ha (41.41%) and Moventо 50WDG (sparotetramat) @500ml/ha (41.16%). Confidor 70 WG (imidacloprid) &58gm/ha exhibited the lowest percentage mortality i.e. 37.34% of the pest after 168 hours of spray which is statistically similar to Acephate 7SSP (acephate) @625gm/acre (39.09%) and Karate 2.5EC (lambdacyhalothrin) &825ml/ha (37.66%) respectively.

DISCUSSION

Chemical control, being rapid method of pest control, is an important practice of Integrated Pest Management (IPM) programme to overcome losses caused by insect pests to crops (Mohyuddin et al., 1997 and Sarfraz et al., 2005). Chemical control is the most popular method for control of insect pests not only in Pakistan (Soomro et al., 2008) but also in the whole world (Yang et al., 2005) so majority of farmers prefer chemical control of insect pests either primary or secondary (Soomro et al., 2000). Some sucking insect pests are cosmopolitan, polyphagous, widely distributed in tropical, subtropical and temperate regions and are also vector of number of viral diseases in large number of plants. Therefore chemical control is necessary to keep population of sucking insect pests below economic threshold level (Serdar et al., 1999). In the present study Acephate 75SP after 24 and 72 hours of post treatment while Piratе 360SC after 168 hours of insecticides application exhibited the highest percentage of mortality. There is no published material to compare this study from Pakistan. The previous studies about efficacy of Confidor and Mospilon against thrips proved to be most effective by Mullins and Christie, 1995; Tufail et al., 1995; Attique and Ghaffar, 1996; Hamed et al., 1997; Wahla et al., 1997; Aheer et al., 2000; Afzal et al., 2001; Saleem et al., 2001; Saleem and Khan, 2001; Aslam et al., 2004; Khattak et al., 2004; Tayyib et al., 2005; Solangi and Lohar, 2007; Shah et al., 2007 is inconsistent to this study which may be
due to development of resistance of thrips against these insecticides. The findings of Din et al., 2015 are consistent to our results to the extent that Acephate 75SP proved to be most effective after 24 hours of application.

COCLUSION:

From the present studies it is concluded that Acephate 75SP @625gm/ha and Pirate 360SC @250ml/hap proved to be most effective against cotton thrips.

ACKNOWLRDGEMENT:

The authors are thankful to Mr. Muhammad Badarud Din of Mauza Murali Wahan Tehsil Shujabad, Multan for providing field and facilitation to conduct experiment.

REFERENCES:


