Efficacy of quinalphos 25 EC for the management of wheat aphid

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ABSTRACT

The present investigation was undertaken to find out the effective and economical control measures for the management of foliage feeding wheat aphids, for which three insecticides viz quinalphos 25 EC, thiamethoxam 25 % WG, and spinosad 45 EC were evaluated. Minimum aphid population was observed in case of quinalphos 25 EC @1600 ml/ha and was found at par with spinosad 45 EC @125 ml/ha and was found significantly better than other treatments, viz. quinalphos @1200 ml/ha and thiamethoxam 25 % WG @ 100 gm/ha including untreated check after 7 days of treatment. However, quinalphos 25 EC @1600 ml/ha and spinosad 45 EC @125 ml/ha and significantly better than other treatments including untreated check. Grain yield of plot treated with quinalphos 25 EC @1600 ml/ha was registered with highest yield (39.25 q/ha) and significantly better than other treatments including control. Cost-benefit ratio and net profit calculated for different insecticidal treatments revealed that quinalphos 25 EC @1600 ml/ha (1:9.65) was found highly cost effective as compare to other insecticides.

Key words: Aphid, Quinalphos, Wheat, Yield.

The total area under wheat in the world is about 225.62 million ha with a production of 685.6 million tons (Anonymous, 2015). The normal world productivity is 3039 Kg/ha. The major wheat producing countries are China, India, USA, France, Russia, Canada, Australia, Pakistan, Turkey, UK, Argentina, Iran and Italy. These countries contribute about 76% of the total world wheat production. India stands first in area and second in production next to China in the world. The India’s share in world wheat area is about 12.40%, whereas it occupies 11.77% share in the total world wheat production. In term of production, UP occupies first place followed by Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar, Maharashtra, Gujrat, West Bengal, Uttrakhand, Himachal Pradesh, Jammu& Kashmir and Karnataka. The contribution of these states in the production is about 99.5%. The total area under wheat in Himachal Pradesh is about 371.06 thousands ha with a production of 538.0 thousands metric tons (Anonymous, 2014). The normal state productivity is 1597 Kg/ha.

Among the major insect-pests on wheat crop in India, aphids have been recorded as a key and most dreaded pest in wheat growing regions and also have been reported as major insect-pest of wheat in India (Singh, 1986). Many aphids species usually attack the wheat crop, such as *Sitobion miscanthi* (Takanashi), *S.avenae* (Fabricius), *Rhopalosiphum maidis* (Fitch) and *R. padi* (Linnaeus) in north India. *Rhopalosiphum maidis* (Fitch) and *R. rufiabdominalis* (Sasaki) are common in Himachal Pradesh (Bhalla and Pawar, 1977). These aphids develop colonies on leaves including flag leaves, stem and green ears. Both nymphs and adults cause damage by sucking sap from tender leaves and developing grains. The continuous feeding on sap by a large number of aphids leads into yellowing, curling and subsequent drying of leaves which ultimately results into reduction in number and size of earheads (Bhalla, 1971). The aphid complex caused 3.53-21.05 per cent yield losses in PBW 343, the most predominant variety of wheat in Punjab (Singh and Deol, 2003). As no sources of resistance varieties are available against cereal aphid in India, so their infestation is usually controlled by conventional insecticides. Thus the present investigation were undertaken to evaluate the efficacy of some newer insecticides against wheat aphids in Himachal Pradesh.

Field investigations were carried out during *rabi* 2011 and 2012 at Rice and Wheat Research Centre, Malan of CSK Himachal Pradesh KrishiVishvidyalaya. Besides this, the experiment was also conducted at farmer’s field at Birta in Kangra district during 2013. The wheat variety Aradhanawas raised in plots, each measuring 9m² using recommended agronomic practices. New insecticides like thiamethoxam 25% WG @ 100 g/ha and spinosad 45 EC @ 125 ml/ha were tested against wheat aphids along with quinalphos 25 EC @ 1200ml/ha & 1600ml/ha. An untreated control was also kept where no insecticide was applied. All...
the insecticides were applied with high volume sprayer using 750 litres of water/ha. The experiment was conducted in RBD design with three replications. Spraying was done for each treatment on 23.11.2011 and 01.12.2012. The insecticides were sprayed at ear head stage when the aphid incidence crossed economic threshold level of 5 aphid incidence. earhead (Singh, et al., 2003). For recording the observations, ten tillers were marked in each plot and observations on aphid population were recorded seven and 15 days after each spray. The grain yield per plot was recorded and converted into q/ha. The economics of different insecticidal treatments was worked out on the basis of prevailing market price of insecticides and application cost. Net profit and cost benefit ratios were also worked out.

The perusal of pooled data revealed that minimum aphid population /10 flag leaves was observed in case of quinalphos 25 EC @1600 ml/ha (17.33 aphids) and was at par with spinosad 45 EC @125 ml/ha (20.33 aphids) and were found significantly better than other treatments, viz. quinalphos @1200 ml/ha (22.16 aphids) and thiamethoxam 25 % WG @ 100 gm/ha including untreated check after 7 days of treatment. However, quinalphos 25 EC @ 1600 ml/ha (96.50 aphids) was found at par with spinosad 45 EC @ 125 ml/ha (124.16 aphids) and significantly better than other treatments including untreated check. Grain yield of plot treated with quinalphos 25 EC @1600 ml/ha was registered with highest yield (39.25 q/ha) and significantly better than other treatments including control. Cost-benefit ratio and net profit calculated for different insecticidal treatments revealed that quinalphos 25 EC @1600 ml/ha (1:9.65) was found highly cost effective as compare to other insecticides (Table 1). The results of this field study clearly indicated that quinalphos 25 EC @1600 ml/ha was found most effective against wheat aphid. In addition, higher dosage of quinalphos (1600 ml) was found most effective as compare to lower dosage (1200ml). Researchers like (Akbar et al., 2010; Gray et al., 1996; Babu and Sharma, 2003 and Patil et al., 2009 also reported similar observations on the efficacy of various chemicals against wheat aphid. On farm demonstration was also conducted on farmer’s field’s at Kangra to check and confirm the efficacy of quinalphos 25 EC against aphid.

### Table 1: Economics of different treatments

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Dose</th>
<th>Wheat aphid population/ 10 flag leaves after treatments</th>
<th>Yield (q/ha)</th>
<th>Value of additional grain yield(Rs)</th>
<th>Cost of one round of spray (Rs)</th>
<th>CBR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quinalphos 25EC</td>
<td>1200ml/ha</td>
<td>22.16 (4.76)</td>
<td>146.00 (11.51)</td>
<td>33.14</td>
<td>13077</td>
<td>2000</td>
</tr>
<tr>
<td>Quinalphos 25EC</td>
<td>1600ml/ha</td>
<td>17.33 (4.24)</td>
<td>96.50 (9.49)</td>
<td>39.25</td>
<td>20257</td>
<td>2100</td>
</tr>
<tr>
<td>Thiamethoxam 25 % WG</td>
<td>100gm/ha</td>
<td>28.50 (5.40)</td>
<td>158.33 (12.07)</td>
<td>32.22</td>
<td>11996</td>
<td>2200</td>
</tr>
<tr>
<td>Spinosad 45 EC</td>
<td>125 ml/ha</td>
<td>20.33 (4.59)</td>
<td>124.16 (10.67)</td>
<td>33.14</td>
<td>13077</td>
<td>2125</td>
</tr>
<tr>
<td>Untreated</td>
<td></td>
<td>90.50 (9.36)</td>
<td>187.83 (13.12)</td>
<td>22.01</td>
<td>-</td>
<td>5.60</td>
</tr>
<tr>
<td>CD at 5%</td>
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</tbody>
</table>

Figures in parentheses are arc sine transformed value

Cost of Spinosad 45 SC is Rs 680/200ml
Cost of Quinalphos 25 EC is Rs 250/ litre
Cost of Thiamethoxam 25 % WG is Rs 500/100g
Wheat @Rs 1175/q
Labour charges Rs 170/ day (10 man days/ ha)

On Farm Demonstration at Kangra during 2015

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Dose</th>
<th>Yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quinalphos 25EC</td>
<td>1600ml/ha</td>
<td>32.00</td>
</tr>
<tr>
<td>Spinosad 45 EC</td>
<td>125 ml/ha</td>
<td>23.00</td>
</tr>
<tr>
<td>Untreated</td>
<td></td>
<td>19.00</td>
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</tbody>
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REFERENCES


