RESPONSE OF CABBAGE APHID, *Brevicoryne brassicae* LINNAEUS TO CERTAIN CULTURAL MEASURES ON THE INFESTATION LEVELS OF CANOLA CROP IN SOHAG REGION
Salman, A. M. A.¹ and H. E. Sakr²
1- Plant Protection Department, Faculty Of Agriculture, South Valley University, Sohag.
2- Plant Protection Department, Faculty of Agriculture, Shoubra El-Kima, Ain Shams University, Cairo.

ABSTRACT

The effect of some agricultural practices such as farmyard manure, first irrigation, space of planting and phosphorus fertilization level on the infestation of canola plants with the cabbage aphid, *Brevicoryne brassicae* L. was studied at the Experimental Farms of South Valley University at Sohag, during 2003 / 2004 and 2004 / 2005 growing seasons. Results revealed that the number of *B. brassicae* was significantly increased at 45 kg chemical nitrogen plus farmyard manure than at 15 or 30 units / feddan of chemical nitrogen during the two seasons. The canola plants which irrigated at 45 and 60 days as a first irrigation harboured highly significant numbers of *B. brassicae* compared with the plants irrigated at 15 or 30 days. Results show also that the population density of *B. brassicae* was significantly increased when using 10 and 15 cm planting space and by increasing phosphorus fertilization levels during the two seasons of study, the high rate of phosphorous fertilization led to the significantly increasing of the population density of *B. brassicae* regardless of using 20 cm space of planting and 45 kg P/feetdan.

Keywords: *Brevicoryne brassicae* L., farmyard manure, space of planting, phosphorus fertilization, first irrigation, canola plant.

INTRODUCTION

Canola plants, *Brassica napus* L. has always been an important of canola oil is derived from the seeds. It is widely used in salad dressings, margarines and shortenings and can also be used as a cooking oil as a source of good fat. Canola plants in sohag region are usually infested with various insect pests which threaten the yield. The most economically important pest is the cabbage aphid, *Brevicoryne brassicae* Linnaeus causes seed yield losses, yield components, oil content and oil quality either directly by feeding or indirectly through their role as vectors of plant viruses (Lerin, 1995, Brown et al., 1999, Schliephake et al., 2000 and Walsh and Jenner, 2002). Also it is the most abundant and important aphid species on canola crop (Ellis and Farrell, 1995 and Rohilla et al., 1996, Ellis et al., 1999 and Saha et al., 1999). Many authors fulfilled interesting work upon the use agricultural practice to manipulate the aphid populations, (Soliman et al., 1985, Pasol et al., 1985, Abou Said and Draz, 1989, Ahmed et al., 1992, Helaly et al., 1994, Burgess et al., 1996, Khattak et al., 1996, Van Emden, 1996, Abou – Aaina et al., 1997, Almicoeli et al., 1997, Saha et al., 1999, Campbell and Ridout, 2001, Etay and Moshe 2001 and Siman, 2002).
Salman, A. M. A. and H. E. Sakr

Therefore, the subject of the present work was carried out to evaluate the response of cabbage aphid, *Brevicoryne brassicae* L. to farmyard manure, first irrigation, space of planting and phosphorus fertilization levels.

**MATERIALS AND METHODS**

Three experiments were conducted during two successive seasons (2003 / 2004 and 2004 / 2005) at the Experimental Farm of Faculty of Agriculture, Sohag, South Valley University.

1- **Effect of farmyard manure on the infestation of canola plant by the cabbage aphid, *Brevicoryne brassicae* L.**

This experiment was included five treatments farmyard manure; farmyard manure + 15 kg N Urea (46.5 %); farmyard manure + 30 kg N Urea; farmyard manure + 45 kg N Urea (Recommended); and 45 kg N Urea, design with four replicates. The plot size was 10.5 m². Seeds were sown of November 5 and 7 during both seasons. Bactol variety was used at a seed rate of 3 kg / feddan. Farmyard manure was applied during soil preparation at a recommended rate (20 m³ / feddan). Chemical nitrogen fertilizer was added in the form of Urea (46.5 %) and applied in three equal doses before the first, second and third irrigation times. Normal recommended cultural practices were followed uniformly, and insecticides were entirely avoided. For each considered treatment, five random branches of flowers were visually examined at 3 – 4 days intervals during the beginning of flowers.

2- **Influence of first irrigation on the population densities of the cabbage aphid, *Brevicoryne brassicae* L.**

The experiment was laid out in a complete randomized block design with four replications. Each plot was 10.5 m². Seeds of bactol variety was sown of November 5 and 7 during both seasons at a seed rate of 3 kg / feddan. Nitrogen fertilizer was used in the form of Urea (46.5 % N) and applied in two equal doses before the first and second irrigations. Regular cultural practices as recommended for canola production were applied and no pesticides treatments were applied. The water regime was after 15, 30, 45 and 60 days throughout the growing seasons. Samples of five branches of flowers were taken randomly twice in week each plot.

Samples were kept in polyethylene bag until they were examined in the laboratory. Cabbage aphid were counted at 3 – 4 day interval till the end of experiment.

3- **Impact of space of planting and phosphorus fertilization levels on the population density of *Brevicoryne brassicae* L. infesting canola plant.**

A split plot design with four replicates was used in this experiment. The plot size was 10.5 m². During the two successive seasons 2003 / 2004 and 2004 / 2005, four seeds of canola plant, bactol variety were sown on one side of the ridge at 10, 15 and 20 cm hill spacing (main plots). Seeds were sown of November 5 and 7 during both seasons, respectively. After complete
emergence, plants were thinned to two plants per hill. The three rates of phosphorus fertilization (15, 30 and 45 kg P₂O₅ feddan) were distributed in the sub-plots. Regular cultural practices were applied as recommended for canola plant production and no pesticides treatment were applied. Samples of 5 branches of flowers were randomly taken twice in week from each plot during the beginning flowers until end of season. These samples were kept in transparent polyethylene bags and transferred to the laboratory for counting the cabbage aphid on the same day.

The data obtained were statistically analyzed using "F" test, means were compared using L. S. D. at 5 % level of probability.

RESULTS AND DISCUSSION

1-Effect of farmyard manure on the infestation of canola plant by the cabbage aphid, *Brevicoryne brassicae* L.

Data presented in Table 1 show that the effect of farmyard manure on the infestation of canola plant by cabbage aphid, *Brevicoryne brassicae* L.

Results show that population density of *B. brassicae* L was significantly higher on fertilized canola plants with farmyard manure plus 45 kg N (Urea 46.5 %) than canola plants fertilized only with farmyard manure or 45 kg N (Urea 46.5 %) during the two seasons. Also results indicate that the infestation of *B. brassicae* was increased significantly at a rate of 45 kg N (Urea 46.5 %) plus farmyard manure as compared with other chemical nitrogen added to farmyard manure showed the increasing with *B. brassicae* populations during both seasons with an average of (358.8 and 385.8) individuals, respectively. These results are in agreement with those obtained by Broadbent *et al.*, (1952) who found that the highest populations of aphids on potato plants achieved by dung, ammonium sulphate and superphosphate. Boguleanu *et al.*, (1977) found that the greenbug, *Schizaphis graminum* on wheat plants was found to be most abundant on the plants fertilized by chemical nitrogen fertilizer plus farmyard manure. Siman (2002) who found that the infestation of *R. padi* and *S. graminum* were increased significantly at a rate of 75 kg N (Urea 46.5 %) plus farmyard manure as compared with other chemical nitrogen added to farmyard manure.


<table>
<thead>
<tr>
<th>Treatments</th>
<th>Avg. no. aphids / 5 branches of flowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmyard manure</td>
<td>296.3</td>
</tr>
<tr>
<td>Farmyard manure + 15 kg N</td>
<td>308.3</td>
</tr>
<tr>
<td>Farmyard manure + 30 kg N</td>
<td>340.0</td>
</tr>
<tr>
<td>Farmyard manure + 45 kg N</td>
<td>358.8</td>
</tr>
<tr>
<td>45 kg.</td>
<td>297.3</td>
</tr>
<tr>
<td>L. S. D.</td>
<td>4.44</td>
</tr>
</tbody>
</table>

Means followed by the same letter are not significantly different at 5 % probability level.
Salman, A. M. A. and H. E. Sakr

2- Influence of the first irrigation on the population density of cabbage aphid, *Brevicoryne brassicae* infesting canola plants.

Statistical analysis of the data presented in Table 2 showed that population density of *B. brassicae* significantly affected by prolonging the first irrigation in both seasons. It is evident that the highest numbers of *B. brassicae* were recorded at 45 and 60 days (275 – 326 and 393.8 – 525.0 individuals / 5 branches of flowers) during 2003 / 2004 and 2004 / 2005 seasons. This may be attributed to the increasing of the essential amino acids in the plants at this stage that leads to increase the infestation of canola plants with the pest. Our finding of this study are agreement with those obtained by Wearing (1968) who mentioned that the fecundity of *Brevicoryne brassicae* increased with water shortage as a result of the enrichment of phloem sap with nitrogen compound.


<table>
<thead>
<tr>
<th>Irrigation intervals</th>
<th>Avg. no. aphids / 5 branches of flowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>167.5 D</td>
</tr>
<tr>
<td>30</td>
<td>196.3 C</td>
</tr>
<tr>
<td>45</td>
<td>275.0 B</td>
</tr>
<tr>
<td>60</td>
<td>326.0 A</td>
</tr>
<tr>
<td>L. S. D.</td>
<td>25.85</td>
</tr>
</tbody>
</table>

Means followed by the same letter are not significant different at 5% probability.

Abou Said (1987) stated that sugar beet plants were heavily infested with *Scrobipalpa ocellatella* and *Temorthinus brevirostris* when prolonging the irrigation. Burgess et al., (1996) reported that the infestation of *Brevicoryne brassicae* increased with water deficit. Silman (2002) who found that the broad bean plants which irrigated as 50 and 65 days as a first irrigation harboured highly significant numbers of *Aphis craccivora* compared with the plants irrigated at 20 or 35 days.

3- Impact of planting space and phosphorus fertilization levels on the population density of *Brevicoryne brassicae* L.

3.1- Planting space:

Data presented in Table 3 show the effect of the planting space on the population density of *B. brassicae* on canola plants during 2003 / 2004 and 2004 / 2005 seasons (Average numbers / 5 branches of flowers on three different planting spaces) (10, 15 and 20 cm.). Results obtained show that the population density of *B. brassicae* on canola plants was highly significant when using 10 and 15 cm planting space (the average numbers were 815.0 and 532.9 individual / 5 branches of flowers during 2003 / 2004 season and 965.67 and 619.17 individual / 5 branches of flowers during 2004 / 2005 season compared with 20 cm planting space during both seasons with an average 416.3 and 492.5 individuals / 5 branches of flowers). Our results agree with Way and Heathcote (1966) who found that the increasing in broad bean plants led to increase in the numbers of *Aphis fabae*. Helaly et al.,

(1994) stated that the abundance of *Aphis gossypii* Glover and *Tetranychus* Spp was significantly affected by space of planting. Simon (2002) who found that the population density of *A. craccivora* on broad bean plants was highly significant when using 10 and 20 cm planting space compared with 30 cm planting space.

Table (3) : Impact of planting space and phosphorus fertilization levels on the population density of *Brevicoryne brassicae* L. during 2003 / 2004 and 2004 / 2005 seasons.

<table>
<thead>
<tr>
<th>Planting space (cm)</th>
<th>P - Levels (P₂O₅ kg/fed.)</th>
<th>Avg. no of aphids / 5 branches of flowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>15</td>
<td>716.3 C</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>793.8 B</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>935.0 A</td>
</tr>
<tr>
<td>Mean</td>
<td>815.0 A</td>
<td>966.67 A</td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td>387.5 EF</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>516.3 D</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>695.0 C</td>
</tr>
<tr>
<td>Mean</td>
<td>532.92 B</td>
<td>619.17 B</td>
</tr>
<tr>
<td>20</td>
<td>15</td>
<td>267.5 G</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>350.0 F</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>416.3 E</td>
</tr>
<tr>
<td>Mean</td>
<td>344.58 C</td>
<td>407.92 C</td>
</tr>
<tr>
<td>All average of P-levels (P₂O₅ kg/fed.)</td>
<td>15</td>
<td>457.1 C</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>553.37 B</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>682.1 A</td>
</tr>
<tr>
<td>L.S.D. at 0.05</td>
<td>Planting Space</td>
<td>20.64</td>
</tr>
<tr>
<td></td>
<td>P - levels</td>
<td>22.64</td>
</tr>
<tr>
<td>Planting Space X P - levels</td>
<td></td>
<td>40.20</td>
</tr>
</tbody>
</table>

3.2-Phosphorus fertilization levels:

Data presented in Table 3 shows the response of canola plants to the infestation with cabbage aphid at different rates of phosphorus fertilization during 2003 / 2004 and 2004 / 2005 seasons. In general the infestation with the cabbage aphid increased significantly with an increase of phosphorus rates during both seasons (Average numbers / 5 branches of flowers on three rates of phosphorus fertilization (15, 30 and 45 kg / P₂O₅ feddan). Our results show that the population density of *B. brassicae* on canola plants was significant when using 45 kg / P₂O₅ feddan during two seasons compared with 15 and 30 kg / P₂O₅ feddan. Our findings are in agreement with Baker and Tauber (1951), who revealed that high rates of phosphorus fertilization are favourable conditions to the green peach aphid, *Myzus persicae* infestation.

Abdel – Rihim et al., (1984) found that superphosphate increased the fecundity of *Sitobion avena* on wheat plants. Similar results obtained by Hassanein (1994) and Simon (2002), who reported that phosphorus fertilization increased the infestation of broad bean plants with *Aphis craccivora*. On the other hand, Sharaf and Nazer (1983), Omer et al., (1993) and El – Rafie (1999) stated that the use of P₂O₅ fertilizer improved the
development of the tomato plants, that leads to encouragement white flies migration to infest the healthy plants. Meanwhile, Saha et al., (1999) revealed that applying potash at 45 kg / ha lead to the highest aphid, Lipaphis erysimi (Kalt.) incidence on canola plants.

3.3-Interaction between space of planting and phosphorus fertilization levels:
Data also presented in Table 3 show the interaction between space of planting and phosphorus fertilization levels. Results showed that there was significant interaction levels during 2003 / 2004 and 2004 / 2005 seasons. It is evident that canola plants sown on 10 cm and received P at a rate of 45 kg / feddan harboured the highest numbers of B. brassicae during both seasons as compared with other treatment (Average numbers 935.0 and 1150.0 individuals / 5 branches of flowers). Our results agree with Elman (2002) who reported that broad bean plant sown on 10 cm and received P at rate of 45 kg / feddan received the highest numbers of Aphid craccivora.

Generally, thus, it could be recommended that using 15 – 20 cm planting space, first irrigation at 15 – 30 days from planting date, 15 – 30 Kg phosphorus and 45 Kg nitrogen fertilization and preventing the canola crop.

REFERENCES


Salman, A. M. A. and H. E. Sakr


استجابة حشرة من الكركب لبعض العمليات الزراعية على مستويات إصابة محصول الكنولو بمنطقة سوهاج

أحمد محمود على سالمان، حامد الدمرداش صقر

1) قسم وقاية النبات - كلية الزراعة بسوهاج - جامعة جنوب الوادي.
2) قسم وقاية النبات - كلية الزراعة بسوهاج - جامعة جنوب الوادي.
3) قسم وقاية النبات - كلية الزراعة بسوهاج - جامعة جنوب الوادي.

يعتبر محصول الكنولو من أهم المحاصيل الزراعية، وتصدرها هاما من مصادر
استخلاص الزيوت النباتية في العالم حيث يحتل المرتبة الثالثة من حيث كمية إنتاج الزيوت النباتية بعد زيت النخيل وزيت فون الصويا، كما أن زيت الكنولو من أعظم الزيوت النباتية عند استخدامه في تغذية الإنسان حيث يحتوي الزيت على 6% فقط من الأحماض الدهنية المشعة، 
94% لحماض دهنية غير مشعة. لذلك تتعرض زراعات الكنولو خلال هذه الفترة لهجوم واسع
النطاق من حشرة من الكركب والتي تسبب أضرار بالغة للمحصول نظراً لتكيفها على الأوراق
والشمعية الزهرية والقرون ووفرة النمو الوراثي التي تؤدي إلى جفاف الأوراق والثورات الناتجة
للمطر العفن الأسود.

ذلك، فإن لازم دراسة استخدام بعض الإجراءات الزراعية وهى (السماك، الغبارية، ورشة
المحيط، السماكOmega، ورشة الزراعة والتضمن الفوسفورى، على إصابة نباتات الكنولو بهذه
الاقة بمنطقة سوهاج خلال موسمين متتاليين من 2003 و2004 / 2005 وذات النتائج المحسوبة عليها مماثلة:

عند إضافة السماد البلدي إلى مستوى 60 وحدة أوزيل من سماد اليوريا أدى إلى زيادة
ممنوية في تعداد حشرة من الكركب على نباتات الكنولو وأن نباتات الكنولو التي أعطيت ربة
المحيطية على 15 يوماً من الزراعة أدت إلى زيادة ممنوية تعداد حشرة من الكركب من
النباتات التي أعطيت ربة المحيطية على 100 يوماً من الزراعة. عند زراعة نباتات الكنولو
على سطاء 60 سم أدى إلى زيادة ممنوية تعداد حشرة من الكركب كما أن زراعة نباتات
الكنولو على سطاء 20 سم وتسجدها بها على معدل سماد فوسفاتي بدم 45 كجم / فدان كان له
الأثر في زيادة الممنوية للإصابة بحشرة من الكركب خلال موسم الدراسة.

وينتشر من ذلك، أن هذه التوصية لزراعة محصول الكنولو بمحافظة سوهاج بأنه يجب
عدم الإطالة الشديدة لرية المحيط مع التقليل بقدر الإمكان من السماد الأروي عند إضافة السماد
البلدي وكذا السماد الفوسفاتي، وتجنب زراعة النباتات مما يترك عليه زيادة الإصابة بحشرة من
الكركب لنباتات محصول الكنولو.