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## Varietal Performance and Chemical Control of Aphids on Canola

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### Abstract

Two experiments were conducted to see the performance of 3 canola (*Brassica napus*) varieties against aphids attack and to determine the most effective and economical insecticide against this pest on canola (*Brassica napus*). The results show that all of the tested canola varieties (Dankeld, Altex and Wester) was found non-resistant to the attack of aphids however, Dankeld variety showed least susceptibility to the attack of this pest compared to other tested varieties. The effectiveness of four different tested insecticides against aphids on canola show that Tamaron 600SL gave significantly highest reduction in the aphid population followed by Folidole 50EC, Ripcard 5EC and Novacron 50WSC and in increase of yield of canola seeds respectively.

### Introduction

**Varietal performance:** Prasad (1983) reported the minimum mean aphid infestation index in the mustard cultivar IB-680 and the maximum in the yellow sarson variety IB-787. The index was less than the overall mean in 4 cultivars of yellow sarson, 8 of brown sarson and 36 of mustard. Prasad and Phadke (1984) stated that yield losses were greater in 1981-82 and 1982-83 than in 1983-84, because of the higher level of aphid infestation during the first two years. The aphid population differed significantly between varieties in all the years of the study. However, with a few exceptions, no significant differences were observed within a group of varieties.

Malik (1988) reported that *Brassica juncea*, *B. napus*, *B. nigra* and 3 varieties of *B. campestris* were found susceptible to the attack of aphid.

Prasad and Phadke (1989) studied the incidence of *Lipaphis erysimi* on 69 cultivars belonging to 4 groups of *Brassica* spp. at New Delhi, India, in 1984-87. These cultivars were sown at the same time. Aphid incidence showed variability among cultivars of the same group as well as between different groups. The relative incidence between groups, in descending order, was yellow and brown sarson, raya, gobhi sarson and karanai. Early flowering cultivars were more heavily infested than later ones.

**Chemical control:** Karishniah and Mohan (1983) conducted an experiment on mustard aphid and observed that mustard aphid population on cabbage was in considerable number after third spray in November. Quinalphos, Mathamidophos, Chloropyrifos (0.5 kg ai ha<sup>-1</sup>), Monocrotophos (both 0.3 and 0.5 kg ai ha<sup>-1</sup>) Endosulfan (0.7 kg ai ha<sup>-1</sup>) gave effective control and suppressed the population for over fortnight. Performance of Monocrotophos at 0.3 kg ai ha<sup>-1</sup> was equally good as that at 0.5 kg ai ha<sup>-1</sup> Phospamidon, Phenthoate, Methomyl, Chloroafenvenphos, Asspnate, Malathion, Cajrab Fenetrothion, Trichtorphon, Garlic oil, Carbaryl and Dicrotophos were also found ineffective.

Thakur and Kashyap (1989) tested the toxicity and persistence of 7 compounds on final instar nymphs of mustard aphid (*Lipaphis erysimi*) on sarson in Himachal Pradesh, India. Demeton-S-methyl retained some toxicity 21 days after spraying on sarson leaves. Phosphamidon

persisted for 15 days, Dimethoate 10 days, Formmothion 7 days, Monocrotophos 7 days, Fenitrothion 5 days, Melathion 3 days. In laboratory ingestion tests, toxicity to aphid mellifera was determined. The LD50 values were 0.0067, 0.0238, 0.0164, 0.0408, 0.0416, 0.0251 and 0.0615 percent respectively. When honey bees were exposed to sprayed mustard flower, they died after 8 h (Phosphomidon) or longer; most compounds caused 100 percent mortality within 48 h, except malathion (upto 65%).

Khan and Rabbani (1996) tested eight insecticides for the control of *Brevicoryne brassicae* L on *Brassica napus*. Bulldock TM 525 @ 1.00 lit. ha<sup>-1</sup> gave an excellent control of the pest, followed by Padan @ 700 g, Dimecron @ 0.6, Almos-D @ 2.00, Pay-off-D 50/200EC @ 0.5, Nuvacron 40 SCW @ 0.5, Ammo-M-550 EC @ 1.2 and Cropguard 50/300 @ 0.5 lit. ha<sup>-1</sup> in order of effectiveness.

### Materials and Methods

**Varietal Trial Experiment:** This experiment was laid out in R.C.B. design and replicated 3 times. Three canola varieties (Dankald, Altex and wester) were selected for their resistance against aphids. The seeds were sown on 03-11-97 in the plots measuring 3 x 5 meters each in Tar wattar condition. Plant to plant and row to row distance was kept 30 cm and 5 cm respectively. Thining was done at seedling stage. This trial received no insecticidal treatment except keeping all the agronomic practices uniform for all of the plots. Weekly data was recorded on the basis of number of aphids on 3 inch pieces of leaves/panicle in three different plants of each variety which was selected randomly in each of the 3 replications. Data obtained from each variety were subjected to statistical analysis and means were separated by LSD test.

**Chemical Control Experiment:** The chemical control trial was also carried out in R.C.B. design (replicated 3 times) against aphids by using following insecticides and a check plot.

Canola variety Dankald was sown on 13.1.97 in all the sub-plots measuring 3 x 5 m<sup>2</sup> in tar wattar condition. The row to row and plant to plant distance was kept 30 cm and 5 cm respectively. All agronomic practices were followed

uniformly in all of the plots. First treatment of insecticides was given on 14-2-98, when the number of aphids reached to 10-15 per 3 inch of leaves (Economic threshold level).

Sr.No.	Trade Name	Common Name	Dose/acre
1.	Folidol	Methylparathion	250 ml
2.	Tamaron	Methamidophos	400 ml
3.	Ripcord	Cypermethrin	200 ml
4.	Novacron	Monocrotophos	400 ml

The insecticides at the above mentioned dose was sprayed using Knapsack Sprayer. The data was recorded after 24h, 48h, 72h, 1 week, and two weeks intervals on the basis of number of aphids per 3 inch pieces of leaves/panicle on three different plants selected randomly in each treatment. For counting purpose, aphids on these selected pieces of leaves were brushed on a sticky sheet. The data of treated plots was compared with the control plots. The 2nd spray of insecticides at the recommended doses was done using Knapsack sprayer on 12-3-98 when the number of aphids again reached to 10-15 aphids per 3 inch piece of leaves (Economic threshold level). The data was recorded in the same way as recorded in case of first spray. The data was subjected to statistical analysis and significant difference of the means were tested by L.S.D. test.

The crop was harvested on 20-4-98 in the morning time to reduce chances of splitting of mature pods. Plants of each sub-plot were tied separately and respective tags were attached to them. After threshing seeds were cleaned and weighted separately. The cost benefit ratio was determined on the basis of yields achieved in each treated and untreated sub-plots.

## Results and Discussion

**Varietal performance:** The results in Table 1 indicates that the varieties were statistically highly significant from each other. Maximum aphids infestation was recorded in Weaster while minimum infestation was recorded in Dankeld. The results reveal that none of the variety was found resistant to the attack of aphids however aphid attack was less in Dankeld as compared to other tested varieties. The results are in close agreement to the results obtained by Malik (1988).

Table 1: Varietal performance against aphids

S.No.	Varieties	R1	R2	R3	Mean aphids Population
1	Dankeld	585	475	542	534 C
2	Altex	1135	1166	1212	1171 B
3	Westar	1355	1775	1442	1654 A

Means followed by similar letter in each treatment do not differ significantly at 0.05 percent level of significance.

### Chemical control of aphids

**Percent mortality after 24 hours of 1st spray:** It is evident from the data (Table 2) that maximum percent mortality (87.91) was recorded in Tamaron 600 SL treated plots which significantly reduced the pest population as

compared to all other insecticides. Ripcord 5EC, Folidole 50EC and Novacron 40 WSC gave 83.26, 78.36, and 76.38 percent mortality, respectively, which were significantly different to the check plot.

The analysis of variance indicates that the differences in the mean values for percent mortality due to different insecticidal treatments were significant from each other. Shafique (1984) recorded 51, 60, 78 and 96 percent mortality of aphids after 24 hours of the application of Dimecron 100 EC, Lannate 20 EC Inexiot 60 EC and Tamaron 96EC respectively. These results are in agreement with the results presented in the Table 2. The results are also in agreement to the results of Tando and Bhatti (1982).

**Percent mortality after 48 hours of 1st spray:** The results show that Tamaron 600 SL was most effective in reducing the pest population after 48 hours of spray and was significantly different as compared to all other treatments (Table-2). It is evident from results that effect of insecticides was significantly different in reducing pest population from each other and similarly all insecticides gave significant mortality as compared to check plot. It is clear from the results that highest percent mortality (90.95) was recorded in Tamaron 600 SL treated plot followed by Folidole 50EC (88.75), Ripcord 5EC (84.82) and Novacron 40 WSC (78.54). All insecticides significantly reduced pest population as compared to check plot. These results are in agreement with those of Shafique (1984).

**Percent mortality after 72 hours of 1st spray:** The results obtained after 72 hours of 1st spray (Table-2) reveal that maximum percent mortality (95.61) was recorded in Tamaron 600 SL treated plots followed by Folidole, Ripcord and Novacron. All tested insecticides were found significantly different from control.

It is evident from the results that all insecticides Tamaron 600 SL, Folidole 50EC, Ripcord 5EC and Novacron 40 WSC gave 95.61, 91.25, 89.09 and 82.14 percent mortality of aphids, respectively, which were highly significant as compared to check plot, but Folidole 50EC and Ripcord 5EC were found non-significantly different to each other.

From these results, it is clear that all insecticides significantly reduced the pest population as compared to check plot. These results are in agreement to the results obtained by Shafique (1984).

**Percent mortality after one week of 1st spray:** The results recorded after one week of 1st spray (Table-2) show that maximum percent mortality was recorded in Tamaron 600 SL treated plots. The data show that Folidole 50EC, Ripcord 5EC and Novacron 40 WSC also significantly reduced pest population as compared to the check plot. Folidole 50EC and Ripcord 5EC were found non-significantly different to each other. These results are in close agreement to the results of Karishniah and Mohan (1983). Shafique (1984) also obtained more or less similar results.

Table 2: Percent mortality after 24, 48, 72 hours, 1 week and 2 week of first spray

Recommended Dose	Precent mortality				
	24 hr	48 hr	72 hr	1 week	2 week
T <sub>1</sub> 250 ml/acre	78.36 B	88.75 AB	90.25 B	92.89 B	79.63 BC
T <sub>2</sub> 400 ml/acre	87.91 A	90.95 A	95.61 A	96.73 A	95.22 A
T <sub>3</sub> 200 ml/acre	83.26 AB	84.82 B	89.09 B	91.13 B	77.70 C
T <sub>4</sub> 400 ml/acre	78.38 B	78.54 C	82.14 C	83.98 C	81.90 B
T <sub>5</sub> -----	4.77 C	6.38 D	10.32 D	12.41 D	15.82 D

DT<sub>1</sub> = Folidole 50Ec      T<sub>2</sub> = Tamaron 600SL      T<sub>3</sub> = Ripcard 5EC  
 T<sub>4</sub> = Novacron 40 Wsc      T<sub>5</sub> = Control

Means followed by similar letter in each treatment do not differ significantly at 0.05 percent level of significance.

Table 3: Percent mortality after 24, 48, 72 hours, 1 week and 2 week of second spray

Recommended Dose	Precent mortality				
	24 hr	48 hr	72 hr	1 week	2 week
T <sub>1</sub> 250 ml/acre	85.82 B	87.70 B	91.61 B	96.75 A	92.73 B
T <sub>2</sub> 400 ml/acre	89.71 A	91.99 A	95.24 A	94.22 A	98.05 A
T <sub>3</sub> 200 ml/acre	84.34 B	86.60 B	90.27 B	92.65 A	91.55 B
T <sub>4</sub> 400 ml/acre	76.94 C	79.41 C	82.78 C	87.40 C	88.37 B
T <sub>5</sub> -----	07.22 D	10.63 D	14.08 D	25.72 C	25.72 C

T<sub>1</sub> = Folidole 50Ec      T<sub>2</sub> = Tamaron 600SL      T<sub>3</sub> = Ripcard 5EC  
 T<sub>4</sub> = Novacron 40 Wsc      T<sub>5</sub> = Control

Means followed by similar letter in each treatment do not differ significantly at 0.05 percent level of significance.

Table 4: Grain yield of Brassica napus (kg plot<sup>-1</sup>)

S.No.	Treatment	Recommended	R1	R2	R3	Grain yield (Kg/plot)
1	Folidole 50Ec	250 ml/acre	1.42	1.32	1.32	1.35 A
2	Tamaron 600SL	400 ml/acre	1.38	1.47	1.46	1.44 A
3	Ripcard 5EC	200 ml/acre	1.30	1.47	0.85	1.20 A
4	Novacron 40 Wsc	400 ml/acre	1.66	0.59	0.91	1.05 A
5	Control	-----	1.02	0.55	0.68	0.75 B

Means followed by similar letter in each treatment do not differ significantly at 0.05 percent level of significance.

Table 5: Cost Benefit Ratio

S.No.	Insecticides	Output (Rs./acre)	Cost Benefit Ratio
1	Folidole 50EC	6300	1:1.80
2	Tamaron 600SL	6720	1:1.92
3	Ripcard 5EC	5600	1:1.60
4	Novacron 40 WSE	4900	1:1.40
5	Control	3500	

WSC (81.90). It is evident from results that mortalities provided by Folidole 50EC, Tamaron 600 SL, Ripcord 5EC and Novacron 40 WSC were not only significant to each other but also to check plot. These results are in agreement to the results of Karishnia and Mohan (1983) who found that Methamidophos and Monocrotophos (both 0.3 and 0.5 kg ai ha<sup>-1</sup>) gave effective control of aphids.

**Percent mortality after 24 hours of 2nd spray:** The results obtained after 24 hours of 2nd spray indicate that the percent mortality ranges from 76.94 to 93.75 percent (Table-3). Maximum Mortality (89.71%) was obtained in Tamaron 600 SL treated plots followed by Folidole 50EC

(85.82%), Ripcord 5EC (84.34%) and Novacron 40 WSC (76.94%).

It is obvious from results that all insecticides significantly reduced the pest population as compared to the check plot. Folidole 50EC and Ripcord 5 EC were found non-significant to each other. Maximum mortality (89.71%) of aphids was obtained in Tamaron 600 SL treated plots after 24 hours of 2nd spray. This results are in confirmation to the results of shafique (1984) who also obtained maximum percent mortality (96%) of aphids by the application of Tamaron 600 SL. The results are also in agreement to the results of Tando and Bhalla (1982) who found that methyl Parathion effectively controlled aphids population.

**Percent mortality after 48 hours of 2nd spray:** The results recorded after 48 hours of 2nd spray reveal that Tamaron 600 SL gave the maximum mortality (91.99%) as compared to all other tested insecticides. Folidole 50EC, Ripcord 5EC and Novacron 40 WSC gave 87.7, 86.6, 79.40 percent mortality respectively which is highly significantly different to the check plot but Folidole 50EC and Ripcord 5EC were non significant to each other (Table-3). It is clear from the

results that Tamaron 600 SL gave the maximum mortality of aphids. These results are in agreement to the results reported by Shafique (1984).

**Percent mortality after 72 hours of 2nd spray:** It is evident from the data recorded after 72 hours of 2nd spray that maximum percent mortality (95.24%) was recorded in Tamaron 600 SL treated plots compared to all other plots. The data in Table-3 reveal that Folidole 50EC and Ripcord 5EC gave 91.61 and 90.27 percent mortality, respectively which was significantly differ to check plot but non significantly different to each other. The results of all insecticides were found significantly different from check plot. These results agree to the results of Shafique (1984).

**Percent mortality after one week of 2nd spray:** The results recorded after one week of 2nd spray (Table-3) reveal that Tamaron 600 SL, Folidole 50EC, Ripcord 5EC were highly significantly influenced the percent mortality of the pest as compared to Novacron 40 WSC but were not significantly different from each other. All insecticides significantly reduced the pest population as compared to check plot. These results are in close agreement to the results of Shafique(1984). Tamaron 600 SL, Folidole 50EC, Ripcord 5EC and Novacron 40 WSC effectively controlled aphid population after one week. The results are also more or less similar to the results of Karishniah and Mohan (1983) who obtained effective control of aphids with the application of Methamidophos (0.5 kg ai ha<sup>-1</sup>), Monocrotophos (both 0.3 and 0.5 ai ha<sup>-1</sup>).

**Percent mortality after two weeks of 2nd spray:** It is evident from data that maximum mortality (98.05%) was obtained in Tamaron 600 SL treated plots followed by Folidole 50EC, Ripcord 5EC and Novacron 40 WSC which provided 91.21, 91.55 and 83.37 percent aphid mortality respectively (Table-3). Folidole, Ripcard and Novacron were significantly different as compared to check plot but these were found non-significant to each other. These results are in agreement to the results of Karishnia and Mohan (1983).

**Grain yield (kg/plot):** The data in Table-4 show that grain yield was significantly higher in all insecticidal treated plots than the check plot. Maximum grain yield of 1.44 kg plot<sup>-1</sup> of 3 x 5m<sup>2</sup> size was obtained in Tamaron 600 SL treated plot followed by Folidole 50 EC, Ripcard and Nuvacron

1.35, 1.20, 1.05 kg plot<sup>-1</sup>, respectively. Similarly the yield obtained by Ripcord 100 g EC and Novacron 40 WSC treated plots was 1.207 kg and 1.053 kg which is significantly higher than the check plot but at par with each other. These results are in agreement to the results of Shafique (1984).

**Cost Benefit Ratio:** Out of four insecticides used against rape seeds aphid, Tamaron ranked 1st followed by Folidol, Ripcord and Nuvacron which provided per acre earning in term of Rs.6700.00, 6300.00, 5600 and 4900.00, respectively, as compared to check in which rap seeds of worth 3500.00 per acre (Table 5) were obtained.

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