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Efficiency of Different Chemicals on Canola Strain Rainbow (*Brassica napus* L.) For Aphids Control

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Abstract: Field studies were carried out to evaluate the effects of different insecticides as foliar application for the control of aphids population on canola (*Brassica napus* L.) crop. The insecticides Endosulfan (Thiodan 35EC), Fenpropathrin (Sanitol 20EC) and Dimethoate (Systoate 40EC) were sprayed with knapsack sprayer at the normal recommended doses and a check plot was also maintained for comparison. The efficacy of these insecticides was assessed by counting the aphids mortality and their influences on grain yield on treated plots. Studies revealed that all the tested insecticides were superior and most promising for aphids management and provided better crop yield as compared to untreated plot (140 aphids per plant and 1707 g yield per $8m^2$). Endosulfan was proved highly toxic to control aphids population (4.66 aphids $plant^{-1}$) and maximum yield was obtained (2322.0 g/$8m^2$) followed by Fenpropathrin and Dimethoate (6.83, 13.17 aphids $plant^{-1}$ and 2107.0, 1948.0 g/$8m^2$ grain yield, respectively).

Key words: Aphids, canola, *Brassica,* insecticide

Introduction

In the agrarian economy of Pakistan, canola is attaining the prominent position as an important source of plant protein and oilseed crop. It is not only an important dietary element of our people, but is also used in the food industry. Although, a large quantity of oilseeds crops are grown in various areas of Pakistan, yet the amount of oil which is extracted from these oilseeds is insufficient to meet our requirements. Consequently, we have to import a large quantity of edible oil 143.5 ('000' tones) from other countries. So, a huge amount of foreign exchange amounting to Rs. 19044.8 millions) is spent to import the edible oil (Anonymous, 2000-2001). Much of the our foreign exchange can be saved by increasing its yield and the area under cultivation. Its productivity in our country is low, which can be attributed due to improper management practices for which its production is declining continuously. The only alternative left is to increase its yield by better crop management.

Canola crop is attacked by several insect pests, but one of the most important insect is aphid which causes serious damage to this crop. In rape and mustard seeds, 50-75% reduction in yield has been attributed due to aphids infestation (Beg, 1982). The predominant species of aphids infesting this crop is *Lipaphids erysimi* Kalt. however, *Myzus persicae* Sulzer is also often associated. Aphids colonies feed on growing shoots, inflorescence and underside of the leaves. In severe infestation, entire crop plants are densely covered with aphids causing stunting growth and poor pods formation (Maiti *et al.*, 1988). The common practice for inhibiting insects population in our agro eco-system is the use of insecticides. Therefore, in the present studies, it was contemplated to evaluate the efficiency of different insecticides as a control approach for canola crop.

Materials and Methods

These studies were conducted in the field at NIA experimental farm, Tandojam. The canola variety 'Rainbow' was sown on 30-11-2001 with single row hand drill on well prepared seed bed. This research trial was laid out in RCB design with four treatments including a control and replicated thrice. All the agronomic practices were kept normal and uniform in all the treatments. At the initial stage, the growth of canola crop was healthy, but after some weeks of crop planting, when the aphid population reached to economic threshold level on 22-02-2002, the crop was sprayed twice using 3 insecticides at an interval of 20 days with knapsack hand sprayer. The toxicants employed for aphid management during herein reported studies were: Thiodan 35EC (T1, Endosulfan), Sanitol 20EC (T2, Fenpropathrin) and Systoate 40EC (T3, Dimethoate) belonging to organochlorine, organophosphate and pyrethroid groups, applied at the recommended doses of 800, 350 and 400 ml $acre^{-1}$, respectively. Spray operations were carried out when wind velocity was normal and dew drops dried up to avoid insecticidal drift. Toxicity of tested toxicants were judged by noting aphids population and crop yield. Data on insect population was recorded from 15 randomly

selected plants in each treatment. The observations recorded were number of aphids (nymphs and adults) per plant and crop yield per plot in $8m^2$. Data base upon both these parameters was averaged from all the plots and presented in the form of mean values separately of each treatment. Mean data expressed in counting aphids density and crop yield was analyzed statistically.

Results

It has been observed that after the insecticidal application, the insect population in all the treated plots were drastically reduced than untreated plots, so any of these insecticides can be used for aphids control. Although, all the tested insecticides controlled aphids population below economic threshold level, yet Endosulfan proved to be the most effective.

Aphids mortality: The results from the present study revealed that after both sprays, endosulfan gave the highest overall toxicity against aphids population (4.66 aphid $plant^{-1}$). fenpopathrin gave the second highest toxicity (6.83 aphid $plant^{-1}$) followed by dimethoate (13.17 aphid $plant^{-1}$), which was seemed to be the least toxic among all the tested chemicals, against control (140.0 aphid $plant^{-1}$) treatment Table 1. In the untreated plots aphids population growth was continued with out any interference. These results fully justify the findings of earlier workers; Pareek and Noor (1980) conducted the trial against *Myzus persicae* Sulzer under field conditions and found that dimethoate insecticide gave the least control than other tested insecticides. Zaman (1986) showed that fenpropathrin exhibited least toxicity against aphids. Misra (2002) stated that conventional insecticides like dimethoate proved inferior in controlling aphids than newer insecticides. Present study negates the finding of Macro (1981) that endosulfan gave inferior control of this pest. Flanders *et al.* (1984) concluded that dimethoate was the most promising for developing insect management programme. Arora and Sidhu (1991) and Bodhade *et al.* (1992) reported the effectiveness of dimethoate in controlling aphids population in crop field.

Seed yield: Data on seed yield showed that endosulfan proved significantly the best towards obtaining maximum seed production (2322 g $plot^{-1}$). The plots treated with fenpropathrin and dimethoate gave 2107 and 1948 g yield $plot^{-1}$, respectively. The yield was minimum in untreated plots (1707 g). The data showed that insecticides treated plots provided significantly the highest yield than the untreated plots, because the aphids
population was multiplying in the plots with out treatment (Table 1). Choudhary and Dadheech (1989) were in the opinion, that failure for aphids control during early stages, of crop caused despaing and weakening of the plants,which ultimately reduced the yield to the extent of 54.04%. Symith *et al.* (1992) were also reached to the similar conclusion that crop yield was the greatest in chemically treated plots than control.

Table 1: Efficacy of different insecticides for aphids control and their effects on grain yield

Treatments	Aphids population per plant	Grain yield $8m^2$ (g)
Endosulfan T_1=(Thiodan 35EC)	4.66b	2322.00a
Fenpropathrin T_2=(Sanitol 20EC)	6.83b	2107.00b
Dimethoate T_3=(Systoate 40EC)	13.17b	1948.00c
Untreated T_4= Control	140.00a	1707.00d

Present study has shown that endosulfan was most toxic for aphids control and exhibited maximum crop yield than rest of the two insecticides. This findings in agreement with the opinion of Sachan and Sharma (1987), who recommended endosulfan against insect protection. Best control by endosulfan may be due to its persistence nature of endosulfan on the crop (Naik and Verma, 1992). According to Antonious *et al.* (1998), the long persistence of chlorinated pesticides (endosulfan) increase the risk of exposure of consumers. Razi *et al.* (2002) estimated that 12% vegetable samples collected from market were found contaminated with endosulfan ranging from 60 to 90 kg 100 g^{-1}. However, Fabellar and Heinrichs (1984) showed that endosulfan was least toxic to natural enemies, which exert significant influence on most pest population.

Observations revealed that after treatment, three insecticides have favorable effects on plant health. Majority of treated plants showed vigorous blooming responses. Further, the treated plants were somewhat taller than the plants in untreated plots. The author is confident that these beneficial effects upon treated plants were due to the suppression of aphids population. It can also be assumed that it may be due to useful influence of insecticides themselves on physiological and biochemical changes in plant. It may be attributed due to the coexistence of both the thoughts. To integrate biological and chemical control, physiologically selective insecticides should be used to favor the survival of natural enemies to overcome the pest population.

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