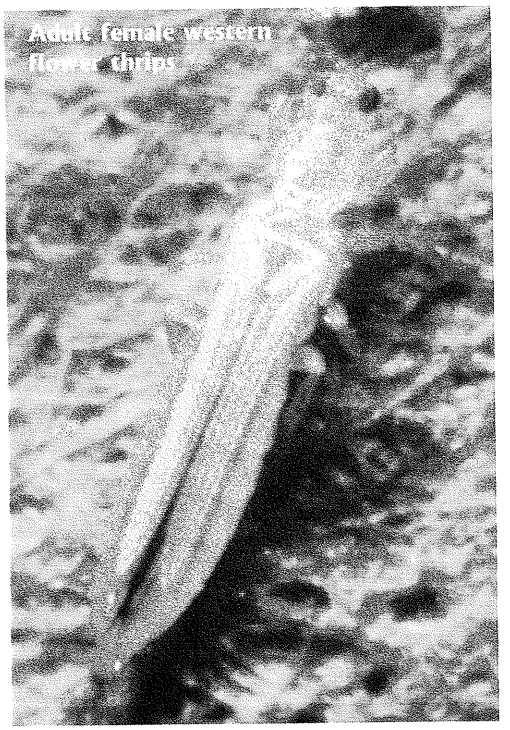
CARP-SCDC 11/00-06

Impact of Thrip Populations in Canola

Final Report to Saskatchewan Canola Development Commission
Project CARP/SCDC 11/00-06

Owen Olfert, Bob Elliott, Murray Braun
Saskatoon Research Centre
107 Science Place, Saskatoon, SK



SUMMARY

Decis controlled thrip populations at late bud or early flowering for up to 48 hours but re-infestation was evident after 7 days at one of the three sites

Benefits of chemical control appears to have been limited in 2001. There was no significant difference between yields in treated and untreated plots.

As a monitoring tool, collecting and washing racemes provided a better estimate of thrip population levels than did sweep samples.

RECOMMENDATIONS

1. Weather conditions for 2001 at the three sites when compared to long-term averages were 110% of normal for temperature and 54% of normal for precipitation. These conditions affected crop development as well as thrip population dynamics. It is recommended that study be repeated under more typical growing conditions.

2. Plant sampling (20 cm racemes) appears to be a better estimate of population density than sweeps. It is recommended that the method be evaluated to determine the optimum timing, length of plant sample and number of plants sampled required to provide an accurate estimate of thrip populations.

3. It was observed in preliminary field assessments that lygus bugs and thrips were often found in combination. It is recommended that the economic impact on canola of thrip and lygus bug populations in combination should be assessed.

TECHNICAL REPORT

A. Background:

Thrips (Thysanoptera) are minute, slender-bodied insects with rasping-sucking mouthparts and feed by rasping the surface of canola buds and sucking up the liberated plant fluid. When population levels are high, thrips can also be found feeding on exposed leaf surfaces. Both adults and nymphs cause damage. Flower thrips have a very extensive range of hosts, including cereals and broadleaved crops such as canola. Flower thrips feed on the thick fleshy petals, pistils, and stamens of the flower and buds. Canola pods damaged by thrips are often curled and tend to drop prematurely (Figure 1).

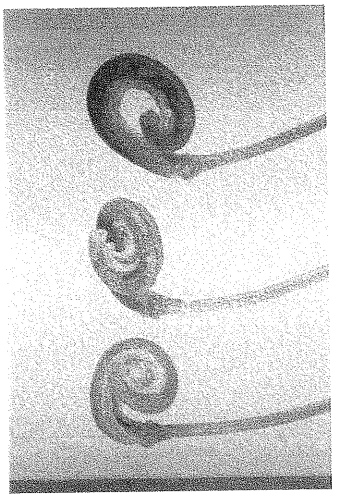


Figure 1. Typical symptoms of thrip infestation in canola

Flower thrips (Thysanoptera) are pests of a broad range of plants (North Dakota Field Crop Insect Management Guide 1999). The presence of thrips on canola was documented in the 1980's (Burgess and Weegar; Canadian Entomologist 120: 815-819). At that time, they found that there were nine species of thrips present in canola beginning in pre-bloom; *Frankliniella tritici* was the most common, followed by *Thrips tabaci* and *Taeniothrips vulgatissimus*. Burgess and Weegar felt that all three species may potentially be having an economic impact on canola because they were appearing throughout canola bloom. *T. vulgatissimus* has a wide distribution including most of temperate North America (Chaisson, 1986).

Limited surveys, conducted by AAFC-Saskatoon, in Saskatchewan in 1999 indicated that *Taeniothrips vulgatissimus* (predominant species in SK and AB) was present in all canola fields sampled (n=30). The density of thrip populations was estimated by counting the number of thrips on 20cm plant stalk samples (n=10 per field). Thrip density ranged from 2 to 44 thrips per 20 cm stalk. If extrapolated to the overall plant, thrip density could range from 50 to 2000 per plant. The mean density of thrips in the 30 canola field was eight thrips per stalk (about 400-500 per

plant). Symptoms of thrip damage in canola were reported at Whitefox, Brooksby, Meadow Lake, Saskatoon and Unity. In 2000, only infested fields (n=12) between Duck Lake and Nipawin were examined. Thrip numbers in these fields ranged from 2 to 120 thrips per raceme (20cm). Estimated damage (curled or missing pods) ranged from an average of 2% to 40%.

B. Objectives:

1. To develop monitoring protocols for thrips in canola and relate population densities to damage symptoms.

2. To assess the economic impact of thrips in infested fields of canola by comparing chemically-treated plots with check plots

C. Project Activities and Methods:

A preliminary survey of insects was conducted in canola field sites throughout central and northern Saskatchewan to identify suitable study sites. Sampling methods included taking 25 sweeps/plot with a standard insect sweep net, bagging the contents and examining the contents in the lab. In addition to the sweep samples which also collected thrips, 25 plant racemes with buds/blossoms (20 cm) were removed per field, taken back to the laboratory where the thrips were extracted using a soapy water bath. Thrips were identified to species level. Field sites containing predominantly thrip populations were selected over other potential field sites that also had significant populations of lygus bugs.

Three canola fields were identified in late June, 2001, with low, medium and high density of thrips. All fields were located in central Saskatchewan within a 50 km radius of Muenster, SK. Each field was staked into eight strips 15 meters wide and the width of the field (Figure 2). Four strips were randomly selected to receive an insecticide treatment and four strips were left as check plots. A weather station (Campbell Scientific data-logger) was established at a central location to record meteorological conditions before, during and after the application of insecticide (Figure 3).

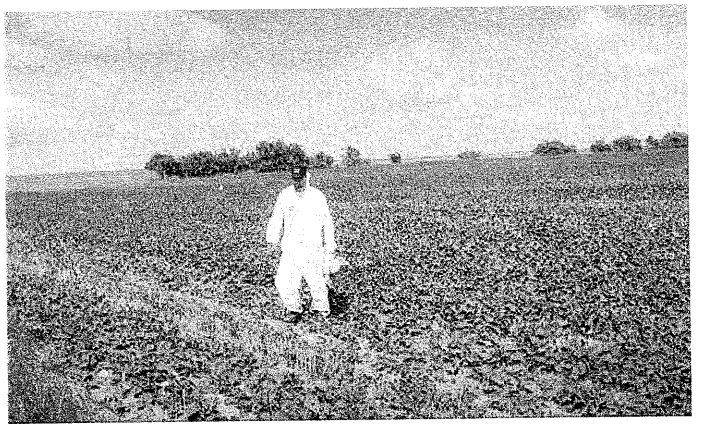


Figure 2. Field plots being prepared for insecticide treatments to control thrips

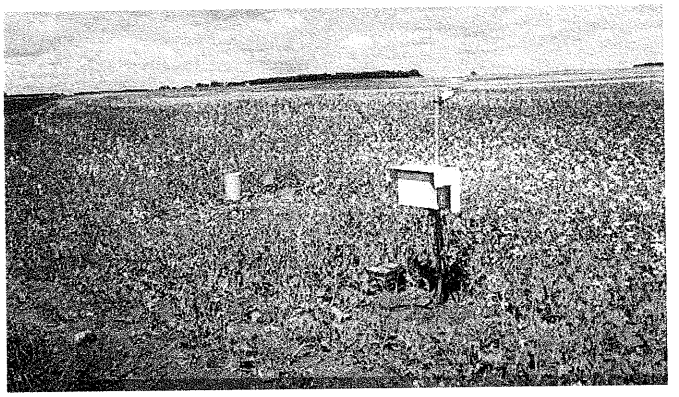


Figure 3. Weather data-recording equipment in canola at Muenster, SK

To determine population density estimates prior to the insecticide treatment, ten racemes (20cm portions of the top of the canola plants) were removed from each plot, taken to the laboratory and washed with soapy water to extract the thrips. As well, 20 sweeps with an 18" sweep net were taken per plot. Contents were bagged and frozen and insects counted later.

Insecticide (Decis™ 5.0 EC; deltamethrin) was applied on June 27 using a Melroe Spra-Coupe 220. The sprayer was equipped with conventional flat fan nozzles (XR8003), at a pressure of 40 psi and travel speed of 12.9 Km/h, the application volume was 100 l/ha. The spray boom was 10 m wide and the nozzles 60 cm above the canola canopy. The deltamethrin was applied at a rate of 0.1 L/ac (12.5 g AI/ha). Spraying was done at 9:00 am with winds at about 20 km/hour. Thrip populations were estimated 2 days and 7 days post spray. These samples were taken in the same manner as the pre-spray samples done on June 26. To visually estimate plant damage, six plants were taken from each plot on July 22 and the number of curled pods, aborted pods and good pods were counted. To estimate yield, three 1.2 x 15m strips were harvested from each of the eight plots on September 7. Seed was cleaned and weighed.

All data were analyzed using ANOVA (Systat, Inc.). A split-plot model was used to identify significant differences between fields, treatments and interactions between fields and treatments.

D. Results and Conclusions

Survey. Results of the preliminary survey of canola fields (n = 30) indicated that thrip population densities were significantly lower in 2001 than 2000. Thrip densities (number of thrips per 20 cm raceme) in 2001 ranged from 0.7 - 17.4 thrips; the overall mean was 3.0 thrips per 20 cm raceme. In last year's survey, the range of thrip densities was 2 - 120 thrips per raceme.

Weather. Weather conditions for 2001 growing season at the three sites when compared to long-term averages were 110% of normal for temperature and 54% of normal for precipitation.

Control of Thrips. Applications of deltamethrin controlled thrips when applied at late bud or early flowering for at least 48 hours, in some cases up to seven days (Figure 4). Results suggest that thrips are able to successfully re-infest canola after 7-days post treatment. Thrip densities increased at one of three sites after 7 days post treatment (Figure 5).

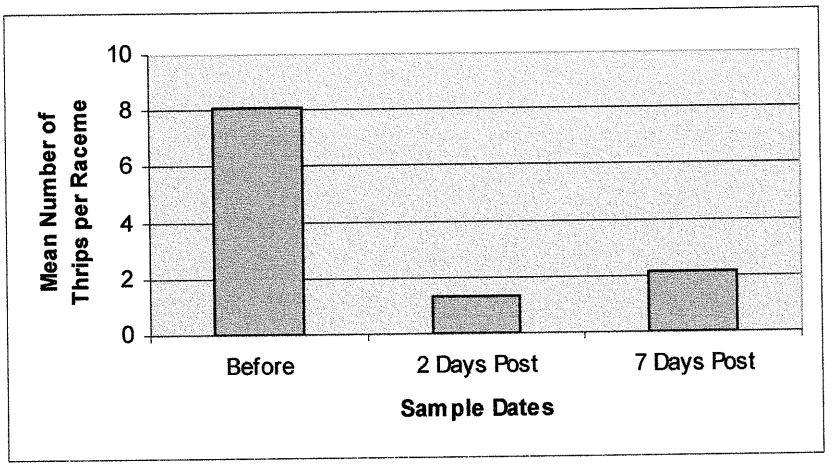


Figure 4. Overall, mean number of thrips per raceme (canola plant) at three sites in Saskatchewan in 2001 on three sample dates (before, 2 days post and 7 days post treatment of Decis to control thrips).

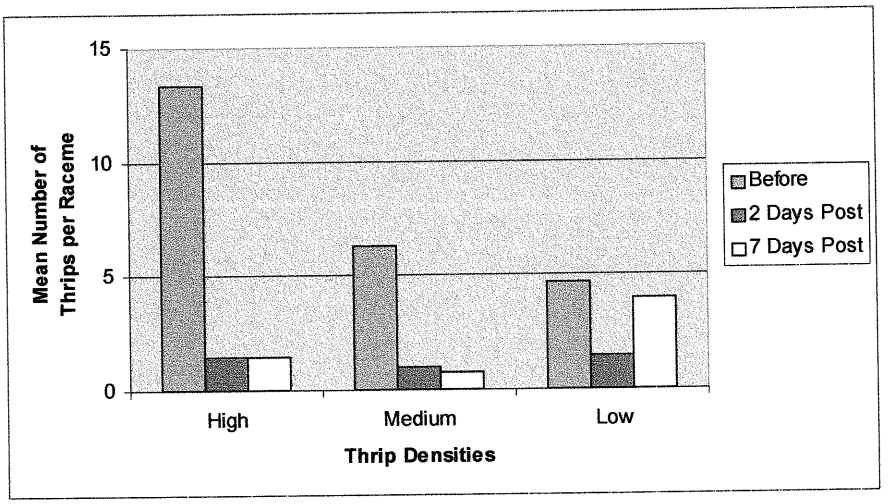


Figure 5. Overall, mean number of thrips per raceme (canola plant) at three sites in Saskatchewan in 2001 on three sample dates (before, 2 days post and 7 days post treatment of Decis to control thrips).

Control of Thrip Damage and Yield. Although, there was a trend towards reduced pod abortion (Figure 6) and curled pods (Figure 7), the benefits of control were not evident in 2001 in terms of yield increase (Figure 8). There were no significant differences in yield between treated and untreated plots at any thrip density level (low, medium or high).

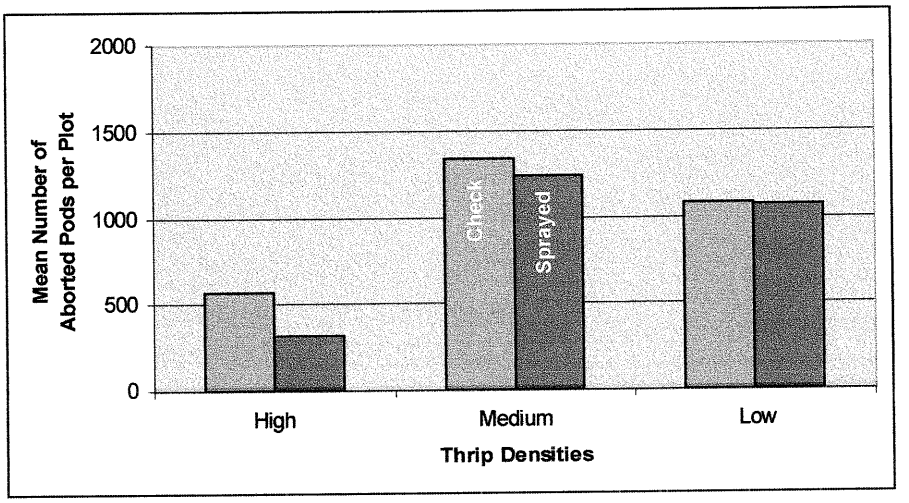


Figure 6. Mean number of aborted canola pods per plot at three fields sites with low, medium and high relative thrip densities in check plots and in plots sprayed with Decis to control thrips in Saskatchewan in 2001

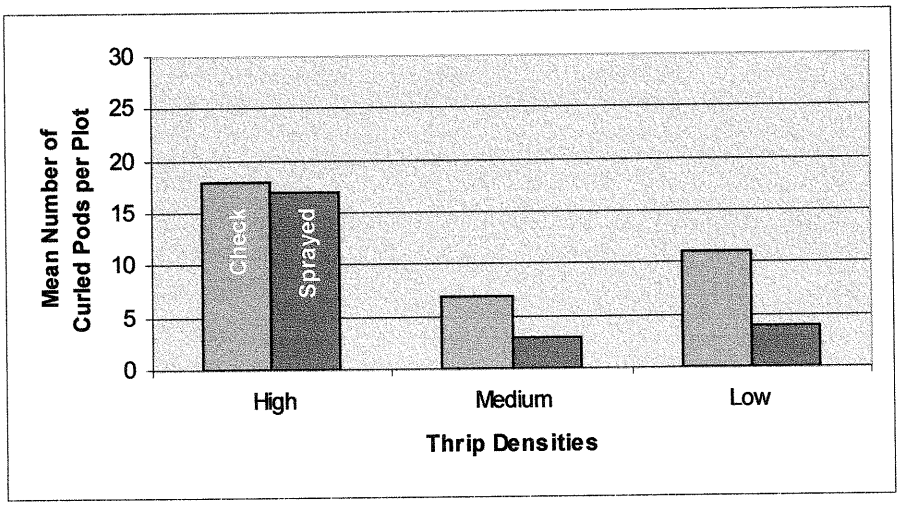


Figure 7. Mean number of curled canola pods per plot at three fields sites with low, medium and high relative thrip densities in check plots and in plots sprayed with Decis to control thrips in Saskatchewan in 2001

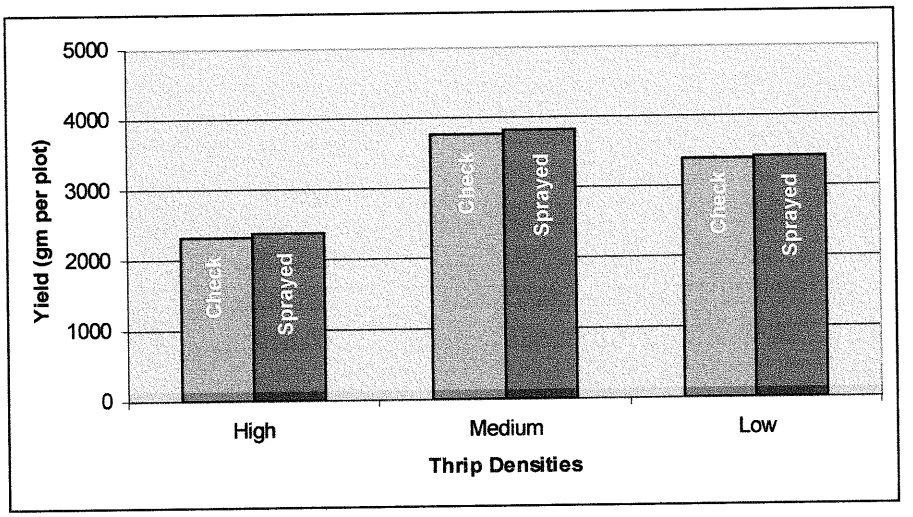


Figure 8. Mean yield (gms per plot) at three fields sites with low, medium and high relative thrip densities in check plots and in plots sprayed with Decis to control thrips in Saskatchewan in 2001

Plant Sampling versus Sweep Sampling. The plant sampling method to determine thrip densities appears to be a more useful protocol than sweep sampling. Thrip densities on check plants and sprayed plants were significantly different 2 days ($F=8.9$, $df = 1$, $P = 0.015$) and 7 days ($F = 7.0$, $df = 1$, $P = 0.027$) after treatment. Thrip numbers were also lower in sweep samples after spraying, however, thrips densities were not significantly different in check and sprayed plots on each sampling date based on sweep samples.

E. Project Public Information

An oral presentation to participants of the *SCDC Field Day* was made in July, 2001, Saskatoon.

F. Acknowledgements

The authors wish to acknowledge the financial support from the Saskatchewan Canola Development Commission and AAFC-Matching Investment Initiative. Thanks go to Mr. A. Moorman and Mr. K. Rueve for the three field sites; to Dr. T. Wolf and B. Caldwell for the field applications; to Aventis CropScience for the deltamethrin; and to R. Weiss for database management.

CARP SCDC 11/00-06
IMPACT OF THRIP POPULATIONS IN CANOLA
DR. OWEN OLFERT
A03582

OutSide Funding

Activity

Budget Budget $4,000.00

Date	P.O. No.	Supplier	Name	Est. Cost	Actual Cost	YTD	Balance
2001/2002		O/H			$600.00	$600.00	$3,400.00
2001/2002		Gagnon	salary		$1,672.65	$2,272.65	$1,727.35
2001/2002		Woods	salary		$807.46	$3,080.11	$919.89
2001/2002		Moorman	rental		$200.00	$3,280.11	$719.89
2001/2002		Rueve	rental		$125.00	$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89
						$3,405.11	$594.89

Summary

Salary	$2,480.11
Rental	$325.00
Overhead	$600.00
Total	$ 3,405.11