DAMAGE POTENTIAL OF INSECTS IN WINTER SOWN CANOLA IN THE SOUTHEASTERN UNITED STATES

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INTRODUCTION

Canola-quality rapeseed (Brassica napus L.) is being evaluated as a winter annual grain crop for the southeastern United States. Because the crop has not been previously grown in the Southeast, the insect fauna of rapeseed in this area is unknown. In Idaho, where winter rape has been grown for many years, the cabbage seedpod weevil (Ceutorhynchus assimilis Paykull) is a major pest (McCaffrey et al. 1986). Larvae feed on seeds within the seedpod and each larva may consume 5-7 seeds. Secondary insect pests in Idaho include aphids, flea beetles, lygus bugs, armyworms, cabbage worms and diamondback moth larvae (Murray et al. 1987). Most of these insects also are reported to attack autumn-planted rapeseed in Tennessee (Friboug et al. 1989). Evaluations of rapeseed in Alabama, found that aphids form dense colonies on stem terminals and can cause significant damage during flowering (Hoveland et al. 1981). My objectives were to survey the phytophagous insects associated with rapeseed and to assess the damage potential of insects to the crop in Georgia.

MATERIALS AND METHODS

An experiment was conducted at Griffin and Plains, Ga. during 1988-1989 to assess the impact of insect damage during autumn and spring (flowering) on the production of 'Cascade' rapeseed. Seed was sown in 20-cm rows using a grain drill in plots measuring 1.5 by 6.1 m. Autumn treatments were untreated, lindane seed treatment, carbofuran 10G applied in-furrow at planting @ 1.1 kg AI/ha, and carbofuran foliar applied at 1.1 kg AI/ha 3 and 5 weeks after planting. Spring treatments were untreated or treated twice (14 days apart) during at full bloom with endosulfan @ 1.1 kg AI/ha. Foliar sprays were applied with a CO_2-powered backpack sprayer which delivered 250 liters/ha.

A split plot design was used with spring treatments as whole plots and autumn treatments as split plots. Whole plots were arranged in a randomized complete block design with 4 replications. Seedling number and damage and aphid numbers were measured after planting. Plots were sampled during flowering with a sweep net and the percentage of aphid infested stalks was measured. Pods (100/plot) were inspected for damage by C. assimilis before harvest. Plots were harvested with a small plot combine. Grain weight, test weight, moisture and oil content were measured, and yields were adjusted to 8% moisture content. Results were analyzed

with an analysis of variance, and means were separated using a protected Least Significant Difference procedure.

Additional plantings of rapeseed, primarily 'Cascade' and 'Delta', near Calhoun, Griffin, Perry and Plains, Ga. were surveyed for insects beginning in 1988. Calhoun and Griffin are located in the Piedmont (northern) region, and Perry and Plains are in the Coastal Plain (southern) region of the state. Insects were collected using a standard sweepnet (50 to 500 sweeps/field/ sample date) during the seedling, rosette, flowering and seed-fill stages of plant development.

RESULTS AND DISCUSSION

Survey of Potential Pests.

The most significant pest of canola throughout most of the season were aphids, primarily the turnip aphid (Lipaphis erysimi (Kaltenbach)) and to a lesser extent green peach aphid (Myzus persicae (Sulzer)). Aphids fed on the lower surface of leaves in the autumn and winter, but moved to the bud and flower terminals in the spring. Aphid injury distorted leaves, stunted vegetative-stage plants and inhibited flowering and pod formation. The primary lepidopterous defoliator attacking canola was the Plutella xylostella (L.). Larvae caused extensive defoliation in some plantings in late winter in southern Georgia where mild temperatures did not limit activity in the winter. Larvae also were observed feeding on pods during the spring.

The most severe pest of pods and seeds was C. assimilis. Larvae develop inside the pod and consume 5-7 seeds per larva. Adults also were observed producing small feeding punctures in maturing seed before harvest. Numbers of C. assimilis were not large in this study, but populations of this insect usually increase over a number of years before economic damage occurs (McCaffrey et al. 1986). C. assimilis was collected only in the Piedmont region and has not been collected in the Coastal Plain region thus far. A number of species of Heteroptera were collected during flowering and pod development. Feeding can cause flower abortion or deformation of developing seed. Lygus lineolaris (Palisot de Beauvois) was common at both locations during flowering and pod development, and the stink bug Murgantia histrionica (Hahn) also was found feeding and reproducing in canola. Lygus spp. have been associated with yield losses in spring-sown canola in Canada (Butts and Lamb 1990); but numbers of these heteropteran species were not large and their damage potential in fall-sown canola has not been determined.

The most significant insect pest of spring-sown canola in North America is a complex of flea beetles which defoliate and kill seedlings (Lamb 1988). Several species of flea and leaf beetles (Chrysomelidae) were collected during the autumn and spring but damage has been very limited in Georgia.

Assessment of Insect Damage.

Autumn treatments with carbofuran did not significantly ($P > 0.05$) affect plant number but did prevent insect defoliation of seedlings at both locations. Aphid numbers at Griffin were low in the autumn, and aphids infested <1.5% of stalks in the spring in untreated plots. Aphids, primarily L. erysimi, were prevalent at Plains during the autumn and spring when infestations reached 11.8% infested stalks in untreated plots. C. assimilis was not present at Plains, but this species infested 4.5% of pods in untreated and 1.3% of pods in treated plots at Griffin. Lygus bugs and P. xylostella, also occurred in low numbers at both locations.

Insecticide usuage did not significantly ($P > 0.05$) affect grain yield at Griffin "Table 1"; however, yield was lower by 290 kg/ha in spring untreated than treated plots. Damage persumably was caused by both C. assimilis and aphids. Autumn treatments of carbofuran and spring treatments controlled aphids at Plains and prevented a reduction in grain yield of up to 673 kg/ha "Table 1". Grain test weight and oil content treatments were not significantly ($P > 0.05$) affected by insect control at either location (data not shown). These results indicate that insects, particularly aphids and C. assimilis, may limit grain production of canola in Georgia.

Table 1. Effect of insect control during the fall and spring on grain yield of 'Cascade' canola at two locations in Georgia during 1988-1989.

		Grain yield(kg/ha)	
Time	Treatment	Griffin	Plains
Fall	Untreated check	2639	1437a
	Lindane seed treatment	2378	1606ab
	Carbofuran 4F foliar spray	2547	1696bc
	Carbofuran 10G in-furrow	2412	1884c
	LSD (0.05)	ns	211
Spring	Untreated	2349	1567a
	Treated[1]	2639	1744b
	LSD (0.05)	ns	149

Means within time followed by the same letter are not significantly different ($P > 0.05$; Least Significant Difference); NS = not significant.

[1] Two sprays two weeks apart of endosulfan at 1.1 kg AI/ha during fall bloom.

REFERENCES

BUTTS, R.A. and R.L. LAMB. 1990. Injury to oilseed rape caused by mirid (Lygus) (Heteroptera: Miridae) and its effect on seed production. Ann. Appl. Biol. 117: 253-266.

FRIBOUG, H.A., C.R. GRAVES, G.N. RHODES, JR., J.F. BRADLEY, E.C. BERNARD, G.M. LESSMAN, M.A. MUELLER, R.B. GRAVES, M.L. THORNTON, B.A. LATKA, and A.M. PLOUY. 1989. Rapeseed - a potential new crop for Tennessee. Tennessee Agric. Exp. Stn. Bull. 669, 40 p.

HOVELAND, C.S., J.W. ODOM, R.L. HAALAND, and M.W. ALISON, JR. 1981. Rapeseed in Alabama. Alabama Agric. Exp. Stn. Bull. 532, 18 p.

LAMB, R.J. 1988. Assessing the susceptiblity of crucifer seedlings to flea beetle (Phyllotreta spp.) damage. Can. J. Plant Sci. 68: 85-93.

McCAFFREY, J.P., L.E. O'KEEFE, and H.W. HOMAN. 1986. Cabbage seedpod weevil control in winter rapeseed. Univ. of Idaho Agric. Exp. St. Information Series 782, 4 p.

MURRAY, G.A., D.L. AULD, L.E. O'KEEFE, AND D.C. THILL. 1987. Winter rape production practices in northern Idaho. Idaho Agric. Exp. Stn. Bull. 634, 14 p.