XXI CABBAGE SEEDPOD WEEVIL TRIAL

Objective: Evaluate the effectiveness of management tools, such as seeding date and variety choice, to minimize cabbage seedpod weevil damage.

Background: *History:* Cabbage seedpod weevil (*Ceutorhynchus obstictus)* was first introduced into the lower mainland of British Columbia from Europe in the 1930's. From there, the insect spread into the Pacific Northwest region (PNW) of the United States. Up until 1995, with the exception of a few reports of spraying for the weevil in the Creston valley of British Columbia, it was believed that the insect remained isolated in the PNW region. Yield losses in the PNW from the weevil have been as high as 35%. In 1996, the larvae of the weevil were found feeding on seeds during an examination of pods at the Lethbridge Canola Production Centre (Canola Council Agronomist: Doug Moisey). Bob Byers and Rick Butts of Agriculture Canada later identified the larvae as *Ceutorhynchus obstrictus*. Since 1996, pod weevil numbers have steadily increased. According to Alberta Agriculture surveys the weevil has spread as far north as Olds, Alberta and as far east as Medicine Hat, Alberta. In 2000, seedpod weevils were identified in southwestern Saskatchewan.

Life Cycle: The cabbage seedpod weevil attacks plants within the *Brassica* family. In the early spring over-wintering adults emerge and begin feeding on stinkweed, flixweed, volunteer canola and wild mustard. The adult weevils begin to move into the fields once canola reaches the bud stage. Damage is inflicted by both adults and larvae. The adult weevils first feed on the flower by piercing the centre of the bud. The resulting damage can either be an aborted flower or damage to petals on fertile flowers. Feeding continues until females reach sexual maturity.

Adults then begin to search for developing (1-2 cm long) pods and begin egg laying. Each female will lay between 60 - 70 eggs. Eggs are typically laid on one side of the pod, but can be laid on both sides of the septum. The larvae hatch within the pod and begin to feed on developing seeds. Each larva consumes approximately six seeds. They then burrow out of the pod, leaving an exit hole. Infection of the pod from fungal agents can occur depending on environmental conditions.

Larvae migrate to the ground to pupate in the soil. A week to ten days later emergence of the next generation of adults begins. Under nomal conditions these new adults feed on late maturing canola and other host plants. If the crop is delayed in maturity, the new adults will begin feeding on the immature seeds within the pods. The adults extract the nutrients from the centre of the seed leaving an outer shell.

Control: Presently the only method is to apply an insecticide at early bud or bloom stage. Seed treatments and varietal resistance are being examined.

Methodology: InVigor 2663 was seeded at three rates (1.0 lb/ac, 3.0 lb/ac and 5.0 lb/ac) on two seeding dates. All treatments were doubled. This allowed for spraying if cabbage seedpod weevil populations were above threshold. The trial was made up of four replicates in a split plot design. The main plots were combinations of planting date and seeding rate. Sub-plots were sprayed vs. unsprayed. Each of the treatments was monitored over the growing season for weevil populations and exit holes. Emergence traps were set up within each treatment to monitor populations of new adults.

LETHBRIDGE (IRRIGATION)

Methodology: This trial was seeded on May 15 and 21 into good seed-bed moisture. All treatments were sprayed with Liberty (1.35 L/ac) and Select (0.025 L/ac) in a tank mix. Lontrel was spot sprayed at 0.2 L/ac to control Canada thistle patches. Decis 5EC was sprayed at 20% bloom on the required treatments to control cabbage seedpod weevil.

Observations: Emergence was variable due to cool weather conditions in the early seeded portions of the trial. The normal seeded treatments emerged evenly and rapidly. Weed control was excellent for all treatments. Second flushes were visible after spraying in the 1.0 lb/ac treatments, and competed with the crop. Cabbage seedpod weevil levels were lower than in previous years, but were still causing damage. Sweep net samples completed 3 days after spraying indicated that weevil levels were zero in the sprayed treatments, whereas the unsprayed treatments still had action threshold levels (3 weevils/sweep).

Results: (a) Plant measurements

CABBAGE SEEDPOD WEEVIL Lethbridge, AB (Irrigation)				
Treatment	**Emergence Counts Plants/m^2**	**Harvest Counts Plants/m^2**	**Ground Cover (%) July 2**	**Lodging Ratio**
Early Planting Date				
1lb/ac sprayed	19	18	85	0.62
1lb/ac unsprayed	16	16	85	0.58
3lb/ac sprayed	49	45	98	0.60
3lb/ac unsprayed	57	57	97	0.62
5lb/ac sprayed	130	110	100	0.65
5lb/ac unsprayed	134	121	98	0.57
Normal Planting Date				
1lb/ac sprayed	26	25	82	0.61
1lb/ac unsprayed	29	29	81	0.61
3lb/ac sprayed	63	60	87	0.63
3lb/ac unsprayed	66	65	84	0.62
5lb/ac sprayed	112	102	90	0.55
5lb/ac unsprayed	106	100	90	0.52

Results: (b) Pod Distribution

CABBAGE SEEDPOD WEEVIL Lethbridge, AB (Irrigation)					
Treatment	**Branches**		**Pod Distribution**		
	Primary	**Secondary**	**# Pods Main Stem**	**# Pods Primary Branches**	**# Pods Secondary Branches**
Early *Planting Date*					
1lb/ac sprayed	9	16	43	220	218
1lb/ac unsprayed	9	18	45	235	270
3lb/ac sprayed	7	6	45	131	35
3lb/ac unsprayed	6	5	39	144	35
5lb/ac sprayed	5	1	32	56	5
5lb/ac unsprayed	5	1	30	50	3
Normal Planting Date					
1lb/ac sprayed	8	12	42	193	142
1lb/ac unsprayed	7	12	40	179	183
3lb/ac sprayed	4	3	30	67	22
3lb/ac unsprayed	5	4	34	78	33
5lb/ac sprayed (check)	4	2	29	59	10
5lb/ac unsprayed	5	2	30	65	9

Results: (c) Exit Hole data*

CABBAGE SEEDPOD WEEVIL *Lethbridge, AB (Irrigation)*						
Treatment	**Exit Hole Damage**					
	Main Stem Average		***Primary Branches Abverage***		***Secondary Branches Average***	
	1 Exit Hole	**2 Exit Holes**	**1 Exit Hole**	**2 Exit Holes**	**1 Exit Hole**	**2 Exit Holes**
Early *Planting Date*						
1lb/ac sprayed	0.2	0	0.6	0.1	0.6	0
1lb/ac unsprayed	1.9	0.2	2.2	0.4	2.2	0.3
3lb/ac sprayed	1.1	0	1.1	0.1	0.2	0
3lb/ac unsprayed	2.1	0.1	1.7	0.2	0.2	0
5lb/ac sprayed	0.6	0	0.4	0	0.1	0
5lb/ac unsprayed	1.8	0.2	0.7	0	0	0
Normal Planting Date						
1lb/ac sprayed	0.2	0	0.6	0	0.3	0.1
1lb/ac unsprayed	0.7	0.1	1.8	0.2	0.9	0.1
3lb/ac sprayed	0.4	0	0.3	0.1	0.1	0
3lb/ac unsprayed	0.4	0	0.5	0	0.2	0
5lb/ac sprayed	0.5	0	0.6	0	0	0
5lb/ac unsprayed	0.5	0	0.6	0	0	0

Results: (d) Yield and Quality Data

CABBAGE SEEDPOD WEEVIL Lethbridge, AB (Irrigation)							
Treatment	**Yield (%)**	**Yield (bu/ac)**	**Contribution Margin ($/ac)**	**Oil (%)**	**1,000 Kernel Weight (g)**	**Growing Degree Days**	**Days To Maturity**
Early Planting Date							
1lb/ac sprayed	74	42.4	234.50	44.3	4.5	1252	122
1lb/ac unsprayed	69	39.5	213.60	44.3	4.6	1252	122
3lb/ac sprayed	90	51.4	320.15	44.3	4.4	1135	105
3lb/ac unsprayed	86	49.0	303.75	44.4	4.4	1135	105
5lb/ac sprayed	90	51.6	314.11	45.1	4.0	1135	105
5lb/ac unsprayed	87	49.7	302.21	44.9	4.6	1135	105
Normal Planting Date							
1lb/ac sprayed	80	45.5	262.40	45.0	4.1	1223	114
1lb/ac unsprayed	72	41.2	228.90	45.0	3.9	1223	114
3lb/ac sprayed	91	52.3	328.25	45.0	4.3	1196	111
3lb/ac unsprayed	84	47.8	292.95	44.9	4.3	1196	111
5lb/ac sprayed (check)	100	57.2	364.51	45.5	4.4	1216	113
5lb/ac unsprayed	96	55.5	354.41	45.5	4.5	1216	113
LSD for any 2 treatments		6.52		0.73			
LSD for sprayed vs. unsprayed		2.35		0.37			
CV%		4.0		0.7			

Discussion:

Spraying the 1.0 lb/ac and 3.0 lb/ac seeding rates produced a significant yield advantage for both planting dates. Spraying to control the cabbage seedpod weevil gave a definite contribution margin advantage.

Damage to pods was more evident on the early-planted treatments. Early-planted treatments were at a more vulnerable stage for the weevil. Although populations were just at action threshold levels (three weevils/sweep) there was enough damage to cause yield losses in unsprayed treatments.

Differences of more than 0.73% in oil content are significant. However, this difference was related to environment and was not related to the weevil damage.