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NEW ENGLAND VEGETABLE AND SMALL FRUIT I

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Bacillus thuringiensis Products for Early-Season European Corn Borer Control

Ruth Hazzard University of Massachusetts Extension

n most of New England, European corn borer (ECB) is the only caterpillar pest of sweet corn duing the early season. Early plantings typically receive one to three applications of broad-spectrum insecticides for control of ECB. If these materials could be replaced with products containing *Bacillus thuringiensis* (*B.t.*), this could reduce the risk of pollution of air and water, as well as injury to applicators. It could also conserve the natural enemies of corn pests, such as twelve-spotted ladybeetles, that are present in early-season corn.

1994 On-farm Trials

Testing any new practice on a field scale under a wide variety of conditions is a critical step to determining how well it will work in real farming sys- page 2

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Bacillus thuringiensis

tems. Based upon positive results in controlling the borer with *B.t.* products at research farm trials, we invited 14 growers from six different counties in Massachusetts to test these products on there own farms during 1994.

Growers divided early plantings of corn and tested B.t. products against either conventional sprays or no spray in the case of organic growers. Different types of spray equipment were used including standard mist blowers, ULV airblast sprayers, hand guns and booms with and without drop nozzles..

Fields were scouted at the pretassel stage, and sprays were recommended if > 15% of plants were infested with the borer. Early-season ECB pressure was very high in 1994. All fields exceeded the action threshold with average infestation being 44%. Growers used either Dipel EStm, Condor XLtm or MVPtm with a spreader sticker. Rates used were 3-4 qt/acre MVP, 1 pt/acre Dipel ES and 1.25-1.75 pt/acre Condor XL. Most growers made two applications of *B.t.* five to seven days apart. Conventional materials were generally applied on the same day and included esfenvalerate, permethrin, methomyl and thiodicarb.

An early flight of corn earworm occurred at some farms, for which we recommended that a broadspectrum insecticide be applied to all fields.

Farmers took harvest samples of at least 200 ears/field to evaluate damage. Ears were considered damaged when ECB had bored through the husk to the ear, causing feeding injury to the kernels.

Results

B.t. vs. Conventional. Among all thirteen trials in which *B.t.* was compared with a conventional spray, the average damage was slightly higher in the *B.t.* treatments, but the difference was not statistically significant (Table 1).

Table 1. Comparison of Mean % Damage in <i>B.t.</i> and Conventional Blocks							
Treatment	# of Trials	Mean % Damage from ECB					
B.t.	13	4.56a*					
Conventional	13	2.75a					
*Means followed by different.	the same letter ar	e not significantly					

B.t. vs. Unsprayed. Table 2 shows that the unsprayed fields on the three farms in this trial had significantly higher damage than the fields sprayed with *B.t.*

Table 2. Comparison of Mean % Damage in *B.t.* and Unsprayed Blocks

Treatment	# of Trials	Mean % Damage from ECB		
B.t.	3	3.41a*		
No Spray	3	19.90Ь		
*Means followed by the	he same letter are not s	ignificantly different.		

B.t.s Compared. The three **B.t.** materials showed no apparent differences in effectiveness.

What Does This Mean?

1994 was a good year to put *B.t.* products to the test, because ECB numbers were high. Even under heavy borer pressure, *B.t.* products gave > 95% clean ears, comparable to that achieved by synthetic materials. This is an acceptable level of insect control for many farmers, especially because corn borer damage is easily seen and damaged ears can be culled during picking. However, there is a cost whenever corn has to be culled. Jude Boucher of the University of Connecticut IPM Program has estimated that for every 1% increase in culled corn, it costs \$29/acre if you are a retail grower and \$12/acre if you sell wholesale. Because of this, many growers strive for > 98% clean corn (see January 1993 *Grower*).

Even though the control achieved with B.t.s was not statistically different from conventional products, the numerical difference of 1% or 2% damage may make some growers hesitant to use B.t. products without further testing. This factor has to be weighed against the greater safety and lower environmental impact of the B.t. products.

One concern that growers may have is that an early flight of corn earworm can damage early corn, and *B.t.* products are not effective against corn earworm. A strategy in which growers used *B.t.* products to control ECB in the tassel, then switched to a synthetic material during silking, gave good control of both insect pests in these trials.

Another concern is cost. Based upon average price information from several suppliers, *B.t.* products ranged in cost from \$9.90/acre to \$16.80/acre at the rates used. The four conventional products which growers used ranged from \$8.60/acre to \$11.50/acre for intermediate application rates. Thus, switching to *B.t.*s could mean no change or up to an \$8/acre increase in cost.

It should be noted that all but two growers in this trial did use a sticker with the *B.t.* One of those who did not had the highest damage from ECB with *B.t.*, 19% damage. Further tests are needed to determine if a sticker is critical to efficacy, but until these are done, it is suggested that a sticker be used. The cost of adding a sticker is approximately \$.75 per acre. Based on these results, we believe that *B.t.* products show good potential for effectiveness and warrant further testing in 1995.

Note: Appreciation is due to all the farmers who committed part of their early-season crop to these trials, the manufacturers who provided product and the field staff who collected data–Joe Marcoccia and Mark Mazzola. We would also like to thank Jim Mussoni, a private IPM consultant who conducted five of the trials with his clients.



Rye Mulches for Pumpkin Weed Control: A Summary of Three Years of Trials

Dale Riggs, Charles Bornt, Robin Bellinder, Douglas Goodale and Russell Wallace Cornell University

umpkins are a minor vegetable crop nationally but of major importance in New England. Because of this, there are few products labeled for weed control in pumpkins. Since weeds are a BIG problem, what's a grower to do? Based on research done by Dr. Robin Bellinder, the New York Capital District Area Vegetable Program Advisory Committee decided to test rye mulches for pumpkin weed control. Tim and Colleen Stanton of Fuera Bush, New York, graciously offered their farm for the trial.

What Did We Find?

We found that winter rye, grown to a height of 30" in the spring, killed with glyphosate and then planted into, gave weed control that was superior to all treatments except weekly hand weeding. Table 1 gives weed control ratings, percent sound handles and average fruit weight for the treatments. No weed control ratings or fruit size are given for the rye mulch plots in 1993 because we had poor plant stands due to the drought.

Table 1 shows a trend toward a higher percentage of pumpkins with sound handles in plots that had better weed control. Fewer weeds results in lower humidity levels, faster drying conditions and better fungicide coverage. This all adds up to less disease problems which increases the percentage of marketable fruit.

Table 1 also shows that when pumpkins grew in the rye, the thirty-inch rye treatment resulted in the highest average fruit weight. These were followed by the stale seedbed and hand weeded plots, which also had satisfactory weed control.

What Does This All Mean?

It means that rye mulches for weed control are an option that many New England pumpkin growers may find useful in their operation. It won't necessarily work for everyone, but we had three very different years to test this system and work out the "bugs". Tim and Colleen Stanton believe in the system enough to put half their pumpkin acreage into rye mulches in 1995. They are doing this for several reasons. \triangleright page 4

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Treatment	1992		1993		1994					
	Percent Weed Control	Average Fruit Weight	Percent Weed Control	Percent Sound Handles	Average Fruit Weight	Percent Weed Control	Percent Sound Handles	Average Fruit Weight		
20" Rye	63.3	8.41	-	-	-	72.0	64.2	13.5		
30" Rye	80.0	10.38	-	-	-	91.0	64.9	16.4		
30" Mowed Rye	-	-	-	-	-	81.7	82.9	16.4*		
Command	70.0	9.14	96.0	61.5	10.0	63.2	50.3	9.2		
Stale Seedbed	63.3	8.09	55.0	42.1	7.7	90.2	55.1	14.3		
Weedy Check	63.3	8.57	57.5	54.1	6.6	70.0	53.1	12.7		
Hand Weeded Check	-	-	99.2	59.8	9.3	99.5	60.9	14.1		
*Only 10% to 33% of t	the plant star	d of other pl	ots.							

Table 1. Weed Control Ratings, 1992-1994; Percentage of Pumpkins with Sound Handles, 1993-1994; and Average Fruit Weight, 1992-1994.