

Title: Evaluation of Atrazine Alternatives for Efficacy of Weed Control in Sweet Corn on Long Island

Project Leaders:

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Abstract

On Long Island, the use of atrazine is being closely evaluated as a herbicide for sweet corn growers. Although some products containing atrazine have been voluntarily withdrawn from registered use on Long Island, there are several that remain available. Our goal was to evaluate and demonstrate viable cultural practices, herbicide alternatives and supplements to atrazine for weed management in this important crop. A demonstration was conducted on a grower fields that featured the most effective alternatives and reduced (atrazine) rate combinations that are currently available. A field trial and demonstration, conducted at LIHREC, evaluated for a second year the efficacy of currently registered alternatives on several common weed species. Another field trial evaluated how plant-back restrictions on some vegetable crops might influence the grower's choice of weed management tool. The demonstration plots and results were displayed at the LIHREC plant science day and also presented at grower meetings.

Background and Justification

For many years, atrazine has been a mainstay of conventional sweet corn production in New York and other states. Atrazine provides long term control of many broadleaf weeds when used as a preemergence or early postemergence application. On Long Island, atrazine is subject to scrutiny because of its potential for ground water detection. Previously, we conducted field trials to evaluate performance of other herbicides registered on sweet corn - when applied alone or in combination with reduced rates of atrazine. We evaluated safety to two sweet corn varieties and efficacy on six common weed species. The results indicate that with one exception, most of the herbicides have a fairly broad level of safety on the tested varieties. The degree and longevity of control of common annual weed species of these atrazine alternatives is a concern. Additionally, plant back restrictions of several of these herbicides affects the ability to double crop in a growing season and also the choice to crop in the following year.

Objectives

Our goals were to evaluate the level of control of several common weed species with pre- and postemergence applications of herbicides registered for use on Long Island grown sweet corn. Combinations were evaluated to determine if the same broad spectrum of control can be achieved with these alternatives alone or combined with reduced atrazine rates. also we wanted to determine which of the available materials can be applied without injuring other vegetable crops that might be planted after sweet corn.

Procedures

In 2015, two field trials were established that evaluated several registered herbicides for performance with reduced rates of atrazine. The treatments consisted of both pre- and post-emergence combinations with atrazine. A split timing application of ProwlH20 was evaluated to determine if that strategy might safen the corn crop against late season lodging.

A trial was established at the Long Island Horticulture Research and Extension Center on Riverhead Sandy Loam in late June 2015. The treatments consisted of a reduced rate of atrazine in combination with label use rates of Accent, Callisto, and Impact. In addition to being applied alone, they were applied as a tank mix with ProwlH20. The crop: 'Providence' sweet corn was evaluated for post treatment injury and late season lodging.

A second, single replicate demonstration plot was established at a nearby sweet corn grower's field (Fox Hollow Farm). At this site, all treatments were applied post-emergence, 15 days after planting 'Aces' sweet corn. Atrazine and atrazine plus ProwlH20 combined with Accent, Callisto, or Impact were applied.

A field trial and greenhouse bioassay were established at the LIHREC in 2014-2015 to determine if 1x and 2x (labeled use rates) are biologically detectable after 9 months in the field. The herbicides evaluated were Prowl H2O (pendimethalin at 3 and 6 pts.), impact (topramezone at 0.75 and 1.5 fl oz.), Callisto (mesotrione at 3 and 6 fl oz.), Sandea (halosulfuron at 0.66 and 1.33 oz.), Laudis (tembotrione at 3 and 6 fl oz.) and Accent (nicosulfuron at 0.33 and 1.3 oz.). Plots in Riverhead Sandy Loam with 2% organic matter that had been recently tilled were treated on August 7, 2014. Irrigation was applied within 24 hours of treatment. The trial design was split plot (herbicide = main plot) and replicated three times. In early May 2015 (9.5 months later), three samples of each plot (4" core) were removed from the field and combined. In the greenhouse, the samples were planted with four common vegetable crop seeds, sweet corn, tomato, green bean and zucchini. Emergence data were collected on May 18, 2015. After analysis, the split plot effect (herbicide rate) was not significant for any factor, so the data were combined over both rates of each herbicide.

Results and Discussion

The results suggest that any of the treatments that had ProwlH20 in them caused measurable lodging later in the season. Those treatments that only combined atrazine with either Accent, Callisto, or Impact did not cause lodging. Although weed pressure was fairly light in this trial, any combinations with reduced rates of atrazine provided excellent broad spectrum control. None of the treatments had a significant negative impact on sweet corn yield. Evaluations of the demonstration plot suggests that, in fields that are more heavily infested with crabgrass than with either barnyard grass or fall panicum, Callisto either alone or with ProwlH20 provide superior control than these combinations with Impact or Accent. Lodging was not measured in these plots.

In the soil residual study, crabgrass spp. was the major component of the resident vegetation in the treated soil. Emergence numbers were recorded with the other planted bioassay plants. The results suggest that Callisto was the only herbicide that still had a significant effect on the crabgrass emergence. However, compared to the untreated control, none of the herbicides showed significant negative effect on the growth of the vegetable crops. These results suggest that application of these herbicides in one season will most likely not have any harmful effects on vegetable crops planted the following season.

In summary, it appears that there are several herbicides that can be applied with relative safety to sweet corn as well as several common vegetable crops planted the following year. Most

of the herbicides would be best used as companions to reduced atrazine rates to provide better control of annual grasses. Varying the choice of products from year to year will provide better overall control and help prevent build up of tolerant weed species or resistant biotypes.

Project Locations

Suffolk County, New York

Long Island Horticultural Research and Extension Center, Riverhead, New York

Fox Hollow Farm, Riverhead, New York

Sample Resources Developed

The results have been reported to stakeholders in a number of ways, including presentations at the 2015 & 2016 LI Agricultural Forum, and published in the local CCE newsletter and monthly magazine. An online (pdf) document is being written, detailing the best management practices for annual weed control for Long Island-grown sweet corn. We estimate reaching most of the conventional, commercial sweet corn growers (approximately 35-50). In pursuing this project and disseminating the information we gather, we have provided a tool to growers to continue to raise sweet corn in an environmentally responsible and economical manner.