Onion

Wednesday morning 9:00 am

Where: Gallery Overlook (upper level) Room C & D

MI Recertification credits: 2 (1B, COMM CORE, PRIV CORE)
OH Recertification credits: 1.5 (presentations as marked)
CCA Credits: PM(2.0)

Moderator: Bruce Klamer, Byron Center, MI

9:00 am — Managing Onion Maggot, Onion Thrips and Associated Pathogens (OH: 2B, 0.5 hr)

- Brian Nault, Entomology Dept., Cornell Univ., Geneva, NY

10:00 am — Identifying and Managing New and Old Onion Diseases (OH: 2B, 0.5 hr)

- Mary Hausbeck, Plant, Soil and Microbial Sciences Dept., MSU
- Prissana Wiriyajitsomboon, Plant, Soil and Microbial Sciences Dept., MSU

10:40 am — Season-Long Weed Control in Onions (OH: 2C, 0.5 hr)

- Bernard Zandstra, Horticulture Dept., MSU

11:00 am — Session Ends

ONION PEST MANAGEMENT IN ONION

Dr. Brian A. Nault, Department of Entomology
Cornell University, NYSAES, 630 W. North St., Geneva, NY 14456
Email: ban6@cornell.edu; Website: http://blogs.cornell.edu/nault/

Onion maggot (*Delia platura* Meigen) and onion thrips (*Thrips tabaci* Lindeman) are major onion pests that can cause significant yield reductions if not managed. Insecticide use is the principal tool for managing both pests, but more research is needed to evaluate the performance of new insecticides and identify strategies that minimize their use without compromising the level of control. Relatively new pesticide seed treatment packages containing novel insecticides are available for onion maggot control (i.e., FarMore FI500 [Syngenta] and Sepresto in the "CAPS" package [Nunhems]). Spinosad and thiamethoxam are the insecticide active ingredients in FarMore FI500, whereas clothianidin and imidacloprid are the insecticide active ingredients in Sepresto. Research is needed to determine if these seed treatment packages should be considered either as stand-alone treatments or combined with chlorpyrifos (e.g., Lorsban Advanced) applied in the furrow at planting to maximize maggot control.

A new insecticide, cyantraniliprole (Exirel), which has excellent activity against onion thrips, is now registered on onion in the U.S. (not yet in New York). Identifying where Exirel fits best in a sequence of foliar-applied products to manage thrips during the season is important. Additionally, long-term management of onion thrips should include tactics that complement insecticide use. One of the most promising and sustainable means to manage insects is to grow cultivars that are resistant to them or the damage they cause. Several commercially available onion cultivars have low levels of resistance to onion thrips and research is needed to evaluate the combination of "thrips-resistant" onions and an IPM-based insecticide program, which already has been developed. This article provides some guidelines on how to improve management of these important pests of onion using reduced-risk insecticides.

Onion Maggot Management

Q: Should chlorpyrifos (e.g., Lorsban Advanced) be applied at planting with new seed treatment packages to improve onion maggot control?

Separate field trials were conducted to evaluate the performance of new seed treatment packages (FarMore FI500) with and without Lorsban Advanced, and Sepresto in the "CAPS" package with and without Lorsban Advanced in a commercial onion field near Sodus, NY in 2013. Onion maggot pressure was extremely high at this test site. In the FarMore Trial (Trial I), onion maggots killed 8 of 10 plants in the fungicide-only control (**Fig. 1**). The percentages of plants killed in all treatments that received an insecticide were significantly lower than the percentage of onion plants killed in the fungicide-only control. However, the percentage of plants killed in plots treated only with Lorsban was high and not commercially acceptable (>4 of 10 plants killed). Onion maggots killed about 1 of 4 plants in the FarMore FI500

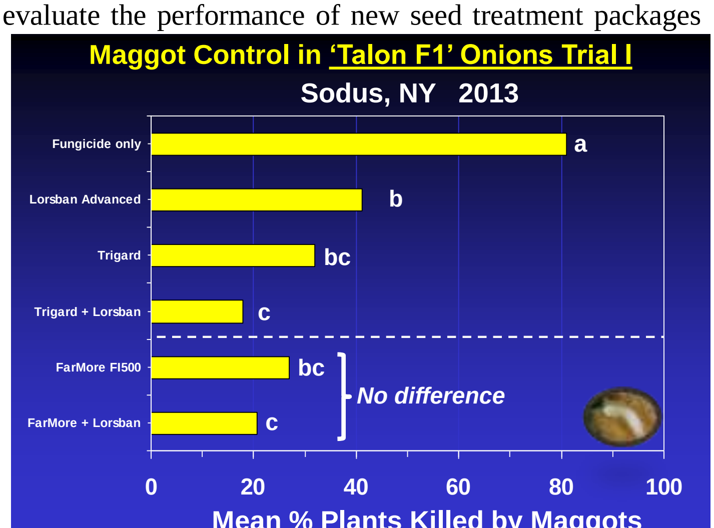


Figure 1. Mean percent onion plants killed by first-generation onion maggots in a trial near Sodus, NY in 2013.

treatment **(Fig. 1)**. This level of damage is greater than desirable, but under such high pressure, this may be a reasonable level of control. Addition of the Lorsban drench to the Farmore FI500 treatment reduced the percentage of plants killed by maggots to 21%, but this level did not differ significantly than the level in the FarMore FI500 treatment alone **(Fig. 1)**. Thus, addition of Lorsban did not significantly improve maggot control. The onion maggot population at this location was likely resistant to Lorsban, so it is understandable that its inclusion with FarMore FI500 did not substantially improve control.

Cyromazine (Trigard) seed treatment significantly reduced onion maggot damage relative to the fungicide-only control, but maggots still killed nearly 1 of 3 plants (**Fig. 1**). As observed many times in past studies, the combination of Lorsban and Trigard seed treatment protected the crop better than using either product alone; however, this difference was only significant when comparing this combination versus Lorsban alone (**Fig. 1**).

In the Sepresto Trial (Trial II), onion maggots killed nearly all of the plants in the fungicide-only control (**Fig. 2**). The percentages of plants killed in treatments that received an insecticide were significantly lower than the percentage of onion plants killed in the fungicide-only control **(Fig. 2)**. However, the percentages of plants killed in the insecticide treatments were high and not commercially acceptable. Onion maggots killed half of the plants in the Sepresto treatment **(Fig. 2)**. This level of damage is far greater than desirable and the addition of the Lorsban drench to Sepresto did not improve control **(Fig. 2)**. As mentioned above, the onion maggot population at this location was likely resistant to Lorsban and explains why its inclusion with Sepresto did not improve control.

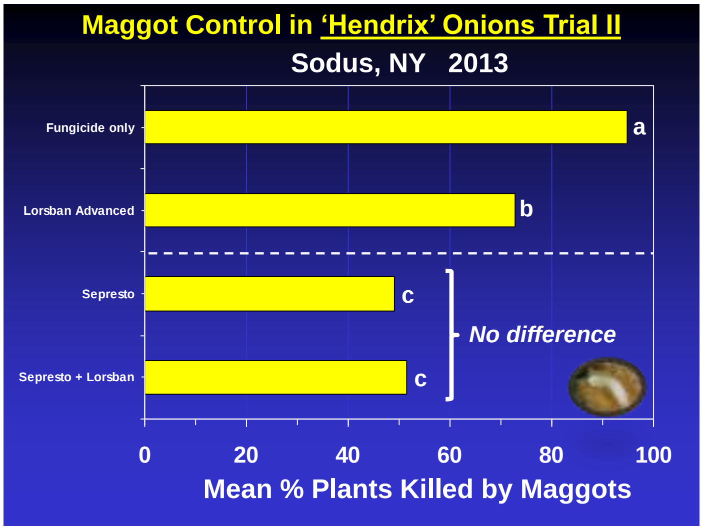


Figure 2. Mean percent onion plants killed by first-generation onion maggots in a trial near Sodus, NY in 2013.

A: FarMore FI500 is an excellent option for onion maggot control and in most situations will not need supplementation with Lorsban. In muck fields where onion maggot pressure is perennially high, inclusion of Lorsban may be warranted. However, if the population is highly resistant to Lorsban, its addition will not be helpful. Our results also indicate that the combination of Trigard seed treatment and Lorsban continues to provide decent control of very high onion maggot infestations. In contrast, Sepresto did not do a very good job of controlling onion maggot in this trial under high pressure. Perhaps, in muck fields where onion maggot pressure is much lower, Sepresto may be adequate to protect the crop.

Onion Thrips Management

Q: When should cyantraniliprole (Exirel) be used during the season to best control thrips?

Based on multiple years of examining efficacy of insecticides to manage onion thrips in onion in NY, the best products have been Agri-Mek SC, Exirel, Movento and Radiant SC (**Fig. 3**). Using these products sparingly in a sequence that provides season-long control will mitigate insecticide resistance development and reduce pesticide and input costs. For example, past studies in NY and MI have shown excellent season-long thrips control with the following sequence of products (in order of first spray to last spray): Movento, Movento, Agri-Mek, Agri-Mek, Radiant and Radiant. Past research in NY also showed that starting with two applications of Movento controlled thrips significantly better than starting with two applications of Exirel (data not shown). Thus, the better question is whether Exirel should be applied in the middle or end of the season in a season-long sequence?

Figure 3. Effective products for thrips control in onion.

In 2014 in a field trial near Elba, NY, three different sequences of insecticide products were evaluated on a weekly basis: (a) Movento, Movento, Agri-Mek, Agri-Mek, Radiant and Radiant (= MMAARR); (b) Movento, Movento, **Exirel, Exirel**, Radiant and Radiant (=MM**EE**RR); and (c) Movento, Movento, Radiant, Radiant, **Exirel, Exirel** (=MMRR**EE**). All insecticide sequence treatments provided excellent season-long thrips control (**Fig. 4**).

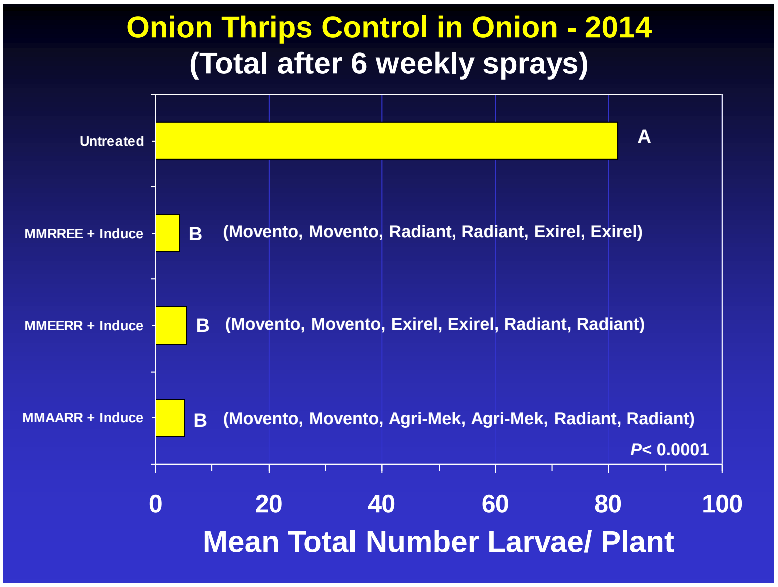


Figure 4. Efficacy of insecticide sequences examined to provide season-long control of onion thrips in an onion field near Elba, NY in 2014.

A: In sequences that were initiated with Movento, placement of foliar applications of Exirel either in the middle of the sequence or at the end of the sequence provided excellent thrips control.

Q: Should surfactants be co-applied with insecticides to improve thrips control? If so, what kind of surfactant works the best?

According to the labels for the four insecticides listed in **Fig. 3,** all should be co-applied with a non-ionic surfactant or methylated seed oil to improve efficacy against thrips. There are many types of surfactants to choose from such as the following: Induce (non-ionic), MSO (methlyated seed oil), Silwet L-77 (organosilicone), and both PureSpray Green and JMS Stylet Oil (mineral oil) (**Fig. 5**). In 2014, an insecticide sequence treatment was evaluated with and without surfactants. The insecticide sequence was Movento, Movento, Agri-Mek, Agri-Mek, Radiant and Radiant [=MMAARR Only]). This insecticide-only treatment failed to effectively manage the thrips infestation. The insecticide treatment co-applied with MSO did not provide as effective thrips control as those co-applied with Induce, Silwet L-77 or JMS Stylet Oil. Those applied with PureSpray Green provided an intermediate level of control between MSO and the others.

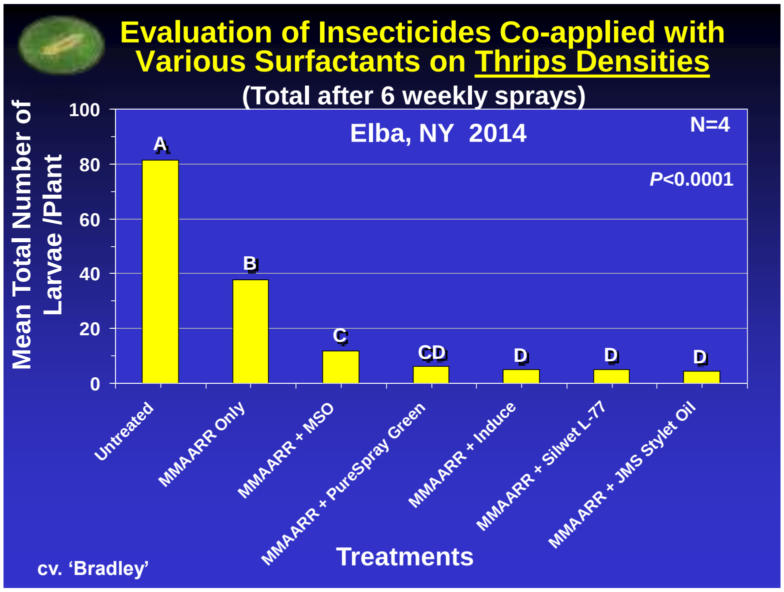


Figure 5. Efficacy of insecticides co-applied with various types of surfactants in which all insecticide sequences were identical, but surfactants differed, to provide season-long control of onion thrips in onion.

A: Yes, surfactants should be co-applied with insecticides to improve efficacy for managing onion thrips. Among the surfactants examined in this study, all those examined significantly improved the performance of the insecticide regimen.

Q: Would combining host-plant resistance with insecticides reduce the number of insecticide applications needed to control onion thrips?

An IPM program for onion thrips should be developed to include multiple strategies. In 2013 and 2014, a strategy that included a cultivar that had a low level of thrips resistance and an insecticide regimen based on a predetermined sequence of products timed using action thresholds was evaluated for thrips control near Elba, NY. Dry bulb onion seeds, cv. ‘Advantage’ (thrips-resistant) and cv. ‘Santana’ (thrips-susceptible) were planted in separate experiments because each had a slightly different maturity (i.e., Advantage matured 7 to 10 days later than Santana). For each cultivar, there were three insecticide treatments: a) no insecticides, b) weekly spray program, and c) action-threshold based spray program. An action threshold of 1 larva per leaf was used for all action threshold treatments.

A Evaluation for Thrips Control using Host Plant Resistance and Insecticides - 2013

Treatment	Sequence of Insecticides Applied									
	Week 1 (July 3)	Week 2 (July 8)	Week 3 (July 15)	Week 4 (July 22)	Week 5 (July 29)	Week 6 (Aug. 5)	Week 7 (Aug. 13)	Week 8 (Aug. 19)	Mean Season # Larvae/Leaf	Mean Damage
1) Advantage + Untreated	-	-	-	-	-	-	-	-	5.1 a	17 a
2) Advantage + Weekly	Movento	Movento	Agri-Mek	Agri-Mek	Lannate	Lannate	Radiant	Radiant	1.2 b	4 b
3) Advantage + Threshold	-	Movento		-	Lannate	Lannate	Radiant	Radiant	1.8 b	5 b
4) Santana + Untreated	-	-	-	-	-	-	-	-	4.0 a	60 a
5) Santana + Weekly	Movento	Movento	Agri-Mek	Agri-Mek	Lannate	Lannate	Radiant	Radiant	1.3 b	5 b
6) Santana + Threshold	Movento	Movento	-	Agri-Mek	Lannate	Lannate	Radiant	Radiant	1.4 b	8 b

B Evaluation for Thrips Control using Host Plant Resistance and Insecticides - 2014

Treatment	Sequence of Insecticides Applied							
	Week 1 (July 29)	Week 2 (Aug 5)	Week 3 (Aug 11)	Week 4 (Aug 18)	Week 5 (Aug 26)	Week 6 (Sep 3)	Mean Season # Larvae/Leaf	Mean Damage
1) Advantage + Untreated	-	-	-	-	-	-	2.2 a	15 a
2) Advantage + Weekly	Movento	Movento	Agri-Mek	Agri-Mek	Radiant	Radiant	0.7 b	1 b
3) Advantage + Threshold	Movento	Movento		Agri-Mek	-	-	0.7 b	3 b
4) Santana + Untreated	-	-	-	-	-	-	2.6 a	36 a
5) Santana + Weekly	Movento	Movento	Agri-Mek	Agri-Mek	Radiant	-	0.8 b	9 b
6) Santana + Threshold	Movento	Movento	-	Agri-Mek	-	-	0.9 b	9 b

Figure 6. Numbers of applications and efficacy of management strategies that combined host plant resistance and insecticide sequences timed using action thresholds to manage onion thrips in onion in (A) 2013 and (B) 2014.

Onion thrips were controlled effectively in both Advantage and Santana plantings following either the weekly spray program or the action threshold program in both years (**Fig. 6A, B**). However, fewer insecticide applications were applied in the action threshold program compared with the weekly spray program (**Fig. 6A, B**). Thrips damage in all insecticide-treated plots was significantly lower than in untreated ones **(Fig. 6A, B)**. Thrips densities in untreated Advantage plots were similar to those in untreated Santana in both years, indicating that the resistant properties in Advantage were insufficient to reduce the thrips infestation (**Fig. 6**). However, thrips damage in Advantage was substantially lower than in Santana; thrips in Advantage tended to concentrate in the neck of the plant throughout the study, while those in Santana fed on the entire leaf surface later in the season, perhaps explaining why more damage occurred in Santana.

A: Yes, inclusion of a cultivar that has thrips resistance with an action-threshold based insecticide regimen can reduce application frequency and still provide excellent thrips control.

Identifying and Managing New and Old Onion Diseases

Prissana Wiriyajitsomboon, Kim Eang Tho, Dr. Jan M. Byrne, and Dr. Mary K. Hausbeck, 517-355-4534
Michigan State University, Department of Plant, Soil & Microbial Sciences

Downy mildew. In 2014, downy mildew was detected in mid-July and was confirmed in two fields in Calhoun and Ottawa Counties, MI. Downy mildew is caused by a water mold, *Peronospora destructor*. The disease can progress rapidly during cool (less than 72°F), wet weather. Optimal conditions for infection are temperatures of 50 to 54°F when there is free water on the leaf for 2 to 4 hours. The spores of the downy mildew pathogen are produced in large masses on the plant tissue and can be disseminated via humid air currents, but are quickly killed during dry conditions. The cycle of infection and spore production can occur multiple times in a season. Sources of disease include infected bulbs, sets, seeds, plant debris, onion cull piles, and volunteers. In addition, overwintering oospores of the pathogen that remain in the soil are able to infect seedlings planted in the following season.

Disease symptoms can be recognized as pale-green yellow to brown elongated patched on leaves. Masses of grayish-purple fuzzy growth usually develop on the older leaves if the environmental conditions are humid (Fig. 1A). Leaf tissue under the pathogen growth turns pale green then yellow. Affected leaves become chlorotic and collapse and die as the disease progresses (Fig. 1B). Yield losses occur as a result of premature death of the onion leaves and bulbs may rot in storage.

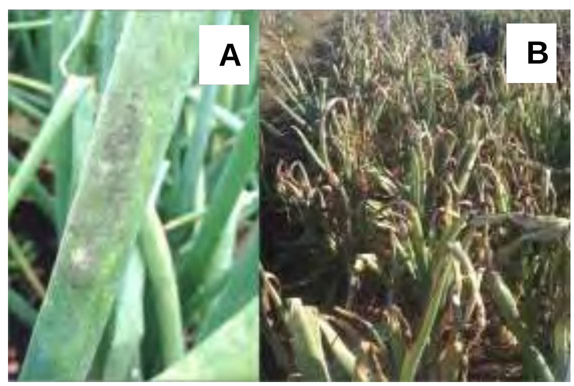


Figure 1. **A,** Growth of downy mildew pathogen on foliage. **B,** Severely infected onions caused by downy mildew.

Bacterial diseases. Bacterial leaf blight, caused by *Pantoea agglomerans*, and bacterial center rot, caused by *P. ananatis*, have been a limiting factor for Michigan onion growers in recent years. Bacterial diseases were prevalent in all onion fields scouted this summer. The occurrence of bacterial diseases has increased over the last several years and has expanded to onion growing areas in multiple counties. *P. agglomerans* isolated from a field in Ottawa County in 2011 was the first documented case of this species occurring in Michigan. In 2014, it was confirmed that *P. agglomerans* was affecting fields located near Allegan, Calhoun, Eaton, Ingham, Newaygo, and Ottawa Counties. *P. ananatis* was confirmed from a field in Allegan County. The detection of bacterial leaf blight in 2014 was earlier than previous years as it was detected on onion seedlings that were at two-leaf stage (Fig. 2A).

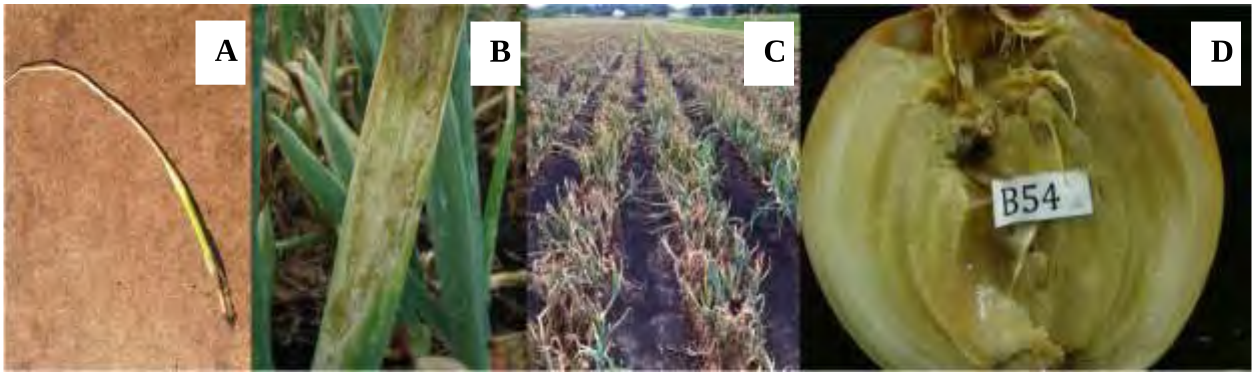


Figure 2. **A,** Symptoms of bacterial leaf blight on a young seedling. **B,** Leaf lesion caused by the bacterial leaf blight pathogen, *Pantoea agglomerans*. **C,** Onion field with extremely severe bacterial leaf blight symptoms. **D,** Bulb rot caused by bacterial infection.

The pathogens responsible for bacterial leaf blight and bacterial center rot are able to cause disease individually or together as a disease complex. Symptoms appear as irregular or linear streaks of necrotic and bleached areas with water-soaked margins extending along the length of the leaves (Fig. 2B). The pathogens not only cause damage on the photosynthetic tissue of the plants growing in fields (Fig. 2C), but they also result in bulb rot in storage (Fig. 2D). Bacterial diseases are favored by warm, humid, and wet weather. Dissemination of the bacteria generally occurs by wind and splashing water. However, a recent report from Georgia in 2014 showed that tobacco thrips (*Frankliniella fusca*) and onion thrips (*Thrips tobaci*) have been identified as vectors of these pathogens.

Bacterial field trial. A trial was conducted in a commercial field with a grower cooperator in Ingham County, MI to investigate the ability of copper-based and antibiotic products to control bacterial leaf blight (Table 1). Treatments were applied as a foliar spray at 7-day intervals. The first treatment was applied on 2 July and additional treatments were made until 20 August. Disease severity was assessed twice using a scale of 1 to 5; where 1 = no disease, 2 = 1 to 25% of foliage blighted, 3 = >25 to 50%, 4 = >50 to 75%, and 5 = >75% of foliage blighted.

Table 1. Products tested for control of bacterial leaf blight in 2014.

Treatment	Active ingredient	FRAC* code	Rate/Acre	Spray Schedule	App. Type
Untreated control	--	--	--	--	--
Kocide 3000	Copper hydroxide	M1	1.50 lb	7 days	Foliar
Cuprofix Ultra 40	Basic copper sulfate	M1	1.25 lb	7 days	Foliar
Nucop	Copper hydroxide	M1	1.50 lb	7 days	Foliar
Kasugamycin	Kasugamysin	24	2.0 pt	7 days	Foliar

*FRAC stands for Fungicide Resistance Action Committee. Numbers and letters are used to distinguish the fungicide groups based on their mode of action, therefore fungicides with the same FRAC code have similar mode of action.

Kocide 3000 was significantly better in reducing bacterial blight severity on the first disease assessment date in comparison to the other treatments. On the second observation date, both Kocide 3000 and Kasugamycin limited bacterial leaf blight compared to the untreated control (Fig. 3).

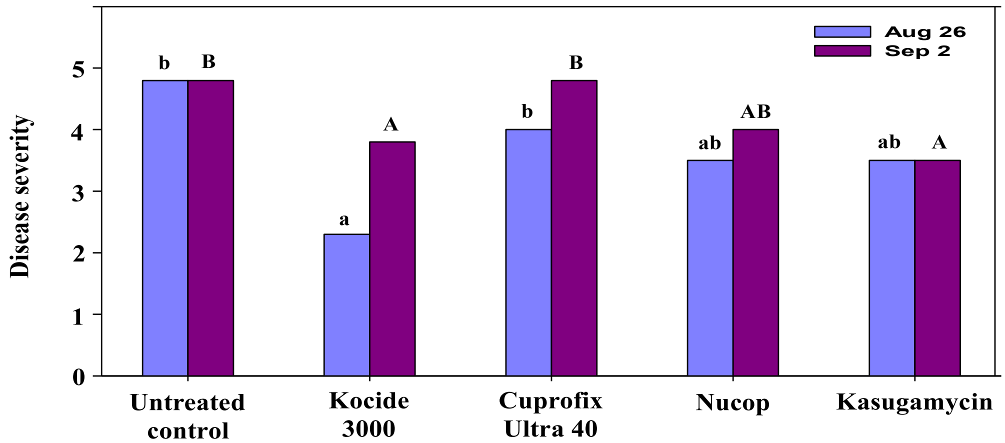


Figure 3. Products tested for control bacterial leaf blight in 2014. Disease severity assessed on 26 August (blue bars) and 2 September (purple bars). Disease severity was rated using a scale of 1 to 5; where 1 = no disease, 2 = 1 to 25% of foliage blighted, 3 = >25 to 50%, 4 = >50 to 75%, and 5 = >75% of foliage blighted. Bars with a letter in common are not significantly different (LSD t test, α = 0.05).

Pink root is one of the many diseases which contribute to destruction of onion roots, causing loss of yield. Yield losses can reach as high as 96%, depending on the growth stages of plant when infected and the amount of pathogen inoculum persisting in the planting area. Under favorable cultural conditions, the onion plant may grow fast enough such that the pink root disease is minimized. In Michigan, pink root management relies on cultivar selection and a long crop rotation.

Pink root fungicide trial. In order to propose control strategies for the control of pink root on onions, a fungicide trial was conducted in a research greenhouse at Michigan State University. Approximately 6-week-old 'Highlander' seedlings were transplanted into plastic pots. Plants were inoculated with millet seed infested with the pink root pathogen, *Setophoma terrestris*, followed by drenching with fungicides (Table 2). There were a total of 20 treatments that included healthy and diseased controls and nine fungicide treatments. Fungicides were either applied once (0 day after inoculation) or twice (0 and 14 days after inoculation). Root density and plant fresh weight were measured at 55 days after inoculation.

Table 2. Fungicides tested for control of pink root in greenhouse trial in 2014.

Trade name	Active ingredient (A.I.)	% A.I.	FRAC code*	Rate/acre**
Cannonball	fludioxinal	50.0	3	0.44 lb
Fontelis	penthiopyrad	20.4	7	2.90 pt
Inspire	difenoconazole	23.2	3	0.44 pt
Inspire Super	cyprodinil+difenoconazole	32.5	9, 3	1.25 pt
Quadris Flowable	azoxystrobin	22.9	11	1.19 pt
Quadris Top	azoxystrobin+difenoconazole	29.6	11, 3	0.88 pt
Switch 62.5WG	cyprodinil+fludioxinal	62.5	9, 12	0.88 lb
Vangard	cyprodinil	75.0	9	0.63 lb
Serenade Soil	*Bacillus subtilis*	1.34		8.0 pt

*FRAC stands for Fungicide Resistance Action Committee. Numbers and letters are used to distinguish the fungicide groups based on their mode of action, therefore fungicides with the same FRAC code have similar mode of action.

**Rate/acre was calculated based on % A.I.

Five fungicide treatments, Quadris Flowable, Quadris Top, Inspire, Inspire Super, and Fontelis significantly limited disease as determined by root density; Fontelis had increased plant fresh weight compared to the other treatments (Fig. 4,5). Phytotoxicity was observed for the applications of Inspire Super, Quadris Top, Switch 62.5WG, and Vangard at 0 days after inoculation and with Inspire Super, Quadris Top, Switch 62.5WG, Vangard, and Quadris Flowable applied 0 and 14 days after inoculation.

Overall, Fontelis applied as a drench was the most effective treatment among the other fungicides; however, the severity of pink root was only partially limited with the fungicide treatments as compared with the untreated healthy control. Phytotoxicity was observed on the plants applied with the fungicides that had either azoxystrobin or cyprodinil as an active ingredient. It was also observed that the phytotoxic effect increased with two applications.

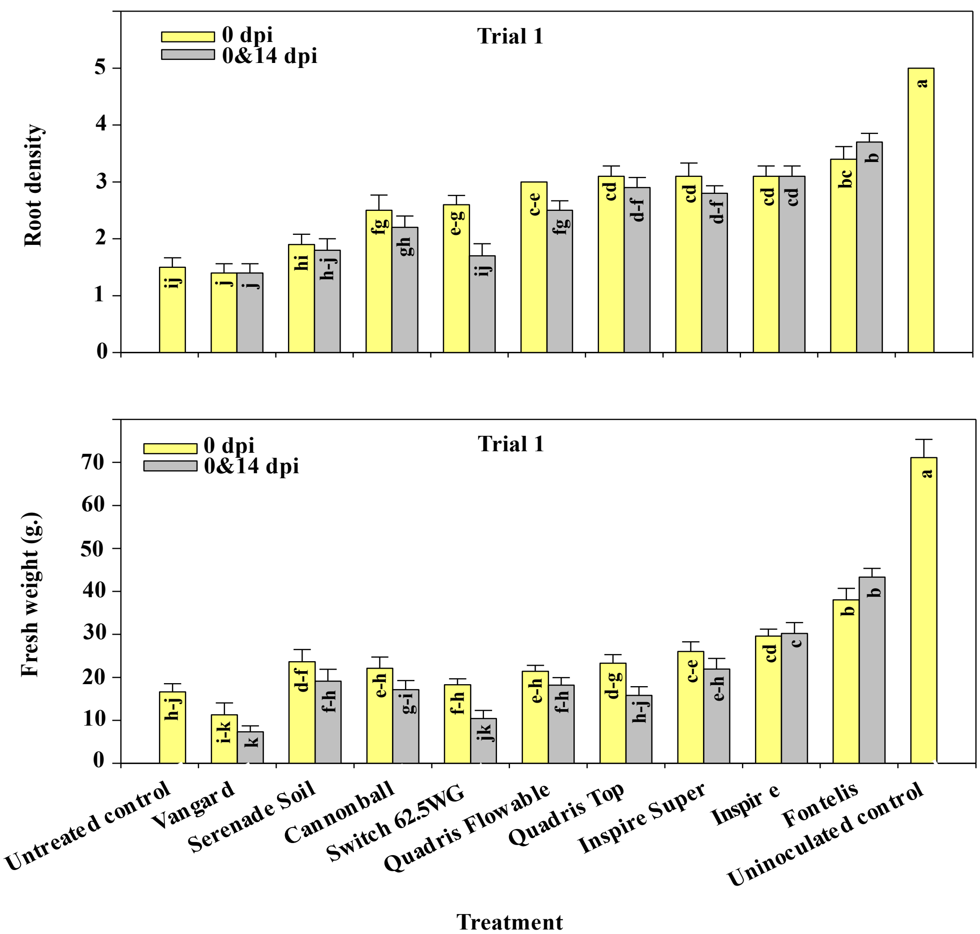


Figure 4. Root density and plant fresh weight of onions treated with fungicides in the greenhouse 0 days after inoculation (yellow bars) or 0 and 14 days after inoculation (grey bars). Root density was rated using a scale from 1 to 5; where 1 = low root density, 2 = low-intermediate, 3 = intermediate, 4 = intermediate-high, and 5 = high root density. Bars with a letter in common are not significantly different (least significant means test, α = 0.05).

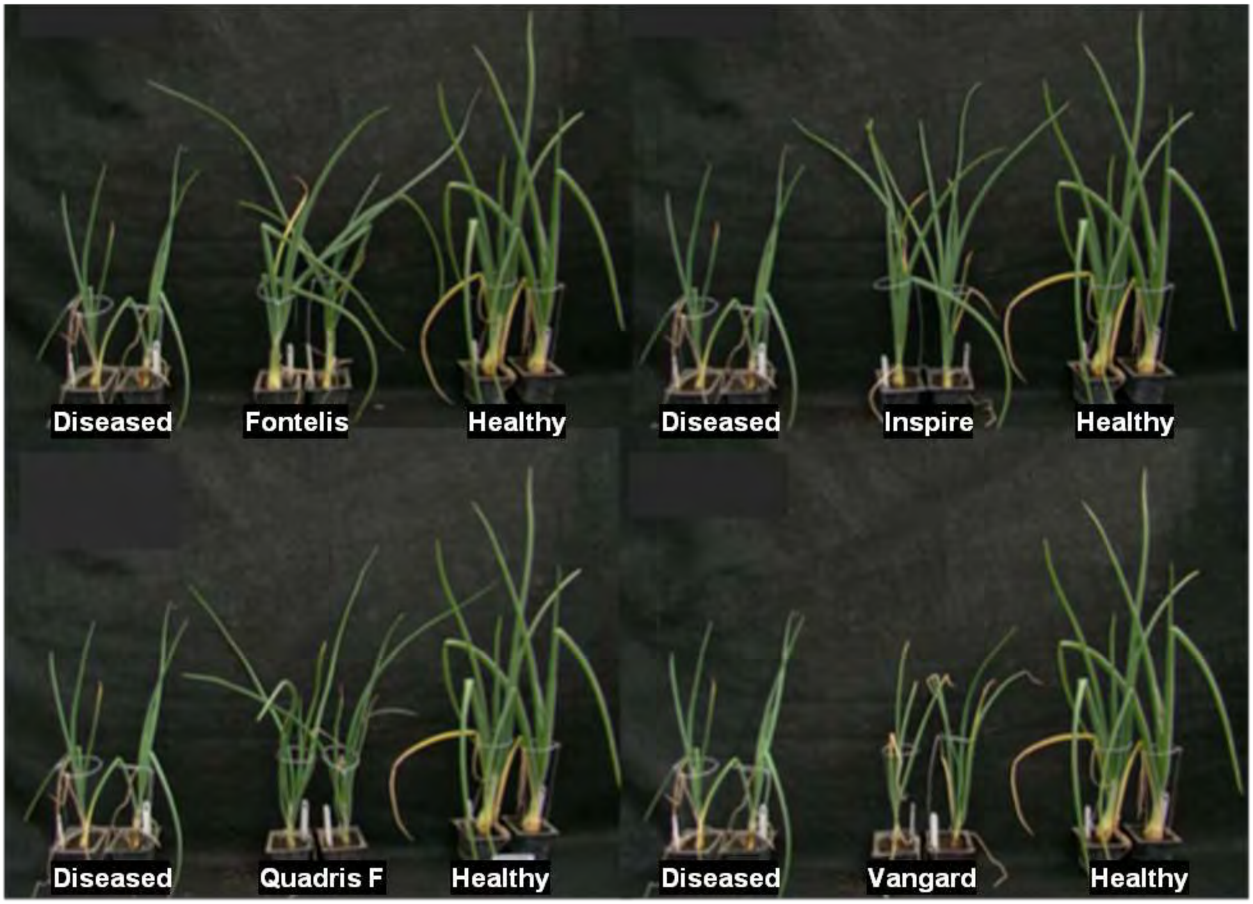


Figure 5. Results of pink root trial comparing a diseased control (left), fungicide treatment (middle), and healthy control (right) of four fungicide treatments. Pictures were taken 55 days after inoculation.

Acknowledgement. This research was supported by funding from the Michigan Onion Committee, and by a State Block Grant administered by the Michigan Onion Committee.

Season-long Weed Control in Onion

EXPO – Grand Rapids, MI
December 10, 2014

Bernard Zandstra
Michigan State University

2014 Research

1. Pre and Post trials on muck soil - Keilen Farms, Lansing
2. Preemergence on mineral soil - Vogel Farms, Fremont
   - Trial was destroyed by hail

Objectives for 2014

1. Determine onion safety of new herbicides
2. Obtain data on Chateau PRE in onion
3. Develop data for use of Zidua PRE on onion
4. Collect data for use of Reflex and Ultra Blazer POST on onion

Which Herbicides are currently labeled for onion - Preemergence?

		max lb ai/A
Prowl H_2O	3 apps (PRE)	6
Outlook	1 app (2 LS)	0.98
Dual Magnum	2 apps (2 LS)	2.6
Chateau	2 apps (3 LS)	0.096
Nortron	2 apps (PRE)	2

Which Herbicides are currently labeled for onion - Postemergence?

Broadleaves		max lb ai/A
GoalTender	2 - 3 apps	0.5
Buctril	1 app	0.25
Starane	1 app	0.123
Nortron	1 app	2
Chateau	1 - 2 apps	0.096

Which Herbicides are currently labeled for onion - Postemergence?

Grasses	max lb ai/A
Fusilade	0.76
Poast	0.86
Select Max	0.48

MICHIGAN STATE UNIVERSITY

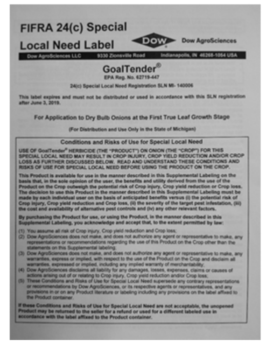
New GoalTender 4SC Label in 2014

24(c) SLN for Michigan

1. For appl. to onion at **1 true leaf stage**
2. The 2d true leaf should have emerged
3. Rate: 4-6 fl oz (0.125 – 0.188 lb ai)
4. 2 - 3 appls; max. 16 fl oz. (0.5 lb ai)/year
5. Minimum 20 gpa; 45 day PHI

MICHIGAN STATE UNIVERSITY

GoalTender 24(c) SLN MI Label



FIFRA 24(c) Special Local Need Label

Dow AgroSciences

Dow AgroSciences LLC 9330 Zionsville Road Indianapolis, IN 46268-1054 USA

GoalTender®

EPA Reg. No. 62719-447

24(c) Special Local Need Registration SLN MI- 140006

This label expires and must not be distributed or used in accordance with this SLN registration after June 3, 2019.

For Application to Dry Bulb Onions at the First True Leaf Growth Stage

(For Distribution and Use Only in the State of Michigan)

Conditions and Risks of Use for Special Local Need

USE OF GoalTender® HERBICIDE (THE "PRODUCT") ON ONION (THE "CROP") FOR THIS SPECIAL LOCAL NEED MAY RESULT IN CROP INJURY, CROP YIELD REDUCTION AND/OR CROP LOSS AS FURTHER DISCUSSED BELOW. READ AND UNDERSTAND THESE CONDITIONS AND RISKS OF USE FOR SPECIAL LOCAL NEED BEFORE USING THE PRODUCT ON THE CROP.

This Product is available for use in the manner described in this Supplemental Labeling on the basis that, in the sole opinion of the user, the benefits and utility derived from the use of the Product on the Crop outweigh the potential risk of Crop injury, Crop yield reduction or Crop loss. The decision to use this Product in the manner described in this Supplemental Labeling must be made by each individual user on the basis of anticipated benefits versus (i) the potential risk of Crop injury, Crop yield reduction and Crop loss, (ii) the severity of the target pest infestation, (iii) the cost and availability of alternative pest controls and (iv) any other relevant factors.

By purchasing the Product for use, or using the Product, in the manner described in this Supplemental Labeling, you acknowledge and accept that, to the extent permitted by law:

(1) You assume all risk of Crop injury, Crop yield reduction and Crop loss;
(2) Dow AgroSciences does not make, and does not authorize any agent or representative to make, any representations or recommendations regarding the use of this Product on the Crop other than the statements on this Supplemental labeling;
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New Prowl H_20 Label for Green Onion

<u>Section 3</u> Supplemental Label

Preemergence: 2 pt (0.95 lb ai) - 2 apps

<u>24(c) SLN</u> Michigan

Preemergence: 4 pt (1.9 lb ai) - 1 application on high-organic muck and mineral soils

- Includes chive, leek, scallions, Japanese bunching onions, green shallots
- 30 day PHI

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2014 <u>Preemergence</u> Application - Muck Soil

1. PRE April 30
2. PO1 May 28 – onion 1 LS
3. PO2 June 19 – onion 3 LS
4. Harvest Sept. 5
5. Onions were handweeded the rest of the season

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2014 Preemergence Ratings - Muck Soil (1)

			Onion Rating 7/7	Harvest kg/plot
1	Prowl H_2O	2 qt x 3 apps	1	51
2	Prowl H_2O	4 qt x 3 apps	1	51
3	Prowl H_2O Chateau	2 qt x 3 apps 1 oz x 3 apps	1.7	52

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2014 Preemergence Ratings - Muck Soil (2)

			Onion Rating 7/7	Harvest kg/plot
4	Prowl H_2O Chateau Chateau	2 qt x 3 apps 2 oz PO1 1 oz PO2	2.3	54
5	Prowl H_2O Zidua Chateau Chateau	2 qt x 3 apps 2.5 oz PO1, PO2 1 oz PO1 2 oz PO2	2.7	62
6	Prowl H_2O Zidua Chateau Chateau	2 qt PRE 7.5 oz PO1 1 oz PO1 2 oz PO2	2.7	68

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2014 Preemergence Ratings - Muck Soil (3)

			Onion Rating 7/7	Harvest kg/plot
7	Prowl H_2O Zidua	2 qt x 3 app 2.5 oz x 3 app	1.7	69
8	Prowl H_2O Dual Magnum Outlook	4 qt PRE 1.3 pt PO1 21 fl oz PO2	1.7	64
9	Handweeded		1.3	61

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Ladysthumb Control Preemergence (1)

			LATH Rating 5/28	LATH Rating 6/16	LATH Rating 7/14
1	Prowl H_20	2 qt x 3 apps	6.3	6.0	6.7
2	Prowl H_20	4 qt x 3 apps	8.3	9.3	9.3
3	Prowl H_20 Chateau	2 qt x 3 apps 1 oz x 3 apps	8.0	7.7	8.7

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Ladysthumb Control Preemergence (2)

			LATH Rating 5/28	LATH Rating 6/16	LATH Rating 7/14
4	Prowl H_20 Chateau Chateau	2 qt x 3 apps 2 oz PO1 1 oz PO2	6.7	9.3	9.0
5	Prowl H_20 Zidua Chateau Chateau	2 qt x 3 apps 2.5 oz PO1, PO2 1 oz PO1 2 oz PO2	6.3	8.3	10.0
6	Prowl H_20 Zidua Chateau Chateau	2 qt PRE 7.5 oz PO1 1 oz PO1 2 oz PO2	6.0	8.3	9.3

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Ladysthumb Control Preemergence (3)

			LATH Rating 5/28	LATH Rating 6/16	LATH Rating 7/14
7	Prowl H_2O Zidua	2 qt x 3 2.5 oz x 3	8.0	8.3	9.0
8	Prowl H_2O Dual Magnum Outlook	4 qt PRE 1.3 pt PO1 21 fl oz PO2	8.0	8.7	6.3
9	Handweeded		1.0	1.0	3.3

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2014 Postemergence Application - Muck Soil

1. PO1 May 27 – onion 1 LS
2. PO2 June 5 – onion 2–3 LS
3. PO3 June 26 – onion 4–6 LS
4. Harvest Sept. 5
5. Plots handweeded after PO3

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2014 Postemergence Results (1)

			Onion Rating 6/5	Onion Rating 7/7	Onion Harvest kg/plot
1	GoalTender	2 oz x 3 apps	2.0	2.0	56
2	GoalTender	4 oz x 3 apps	2.0	2.3	56
3	GoalTender	8 oz x 3 apps	2.0	2.7	52
4	GoalTender Chateau	2 oz x 3 apps 1 oz x 3 apps	2.0	1.3	61
5	GoalTender	2 oz x 2 apps	1.0	1.7	49

2014 Postemergence Results (2)

			Onion Rating 6/5	Onion Rating 7/7	Onion Harvest kg/plot
6	GoalTender Chateau Chateau	2 oz x 2 apps 2 oz PO2 1 oz PO3	1.7	3.0	50
7	Reflex	8 fl oz x 3 apps	1.3	2.3	58
8	Reflex	8 fl oz x 2 apps	1.0	2.0	62
9	Reflex	16 fl oz x 2 apps	1.0	3.0	48

2014 Postemergence Results (3)

			Onion Rating 6/5	Onion Rating 7/7	Onion Harvest kg/plot
10	Ultra Blazer	16 oz x 2 apps	1.3	4.0	51
11	GoalTender Starane Ultra	2 oz x 3 apps 6 fl oz x 2 apps	2.3	2.7	58
12	GoalTender Buctril	2 oz x 3 apps 8 fl oz x 2 apps	2.3	1.3	68
13	Handweeded		1.0	2.7	58

Ladysthumb Control Postemergence (1)

			LATH Rating 6/5	LATH Rating 6/17	LATH Rating 7/7
1	GoalTender	2 oz x 3 app 1 LS	7.7	7.3	7.7
2	GoalTender	4 oz x 3 app 1 LS	7.7	9.0	9.3
3	GoalTender	8 oz x 3 app 1 LS	8.0	7.7	7.3
4	GoalTender Chateau	2 oz x 3 app 1 LS 1 oz x 3 app 1 LS	7.3	7.3	9.3

Ladysthumb Control Postemergence (2)

			LATH Rating 6/5	LATH Rating 6/17	LATH Rating 7/7
5	GoalTender Chateau Chateau	2 oz x 2 apps 2 oz PO2 1 oz PO3	3.3	8.0	9.0
6	Reflex	8 fl oz x 3 apps	9.0	9.7	9.3
7	Reflex	8 fl oz x 2 apps	1.0	9.3	10.0
8	Reflex	16 fl oz x 2 apps	1.0	8.7	8.3

Ladysthumb Control Postemergence (3)

			LATH Rating 6/5	LATH Rating 6/17	LATH Rating 7/7
10	Ultra Blazer	16 oz x 2 app 2 LS	1.0	9.3	10.0
11	GoalTender Starane Ultra	2 oz x 3 app 1 LS 6 oz x 2 app 2 LS	6.7	7.0	9.7
12	GoalTender Buctril	2 oz x 3 app 1 LS 8 oz x 2 app 2 LS	7.0	9.3	10.0
13	Handweeded		1.0	7.0	9.0

Results and Conclusions <u>Preemergence</u> (1)

1. Prowl H_2O was safe on onion: 4 qt x 3 apps
2. Chateau was safe: 1 oz PRE or 2 oz PO1
3. Zidua was safe: 2.5 oz (0.133 lb ai) PRE, PO1, PO2

Results and Conclusions Preemergence (2)

4. Prowl H_2O 4 qt PRE + Dual Magnum 1.4 pt PO1 + Outlook 21 fl oz PO2 was safe on onion
5. Prowl H_2O 4 qt PRE + Dual Magnum 2.7 pt PO1 + Outlook 21 fl oz PO2 was safe on onion

Results and Conclusion Postemergence

1. GoalTender was safe: 8 fl oz (0.25 lb) x 3 apps; starting at 1 LS
2. GoalTender 2 fl oz x 3 apps + Chateau 1 fl oz x 3 apps was safe; starting at 1 LS
3. Reflex was safe: 8 fl oz x 3 apps; starting at 1 LS
4. GoalTender 2 fl oz x 3 apps + Buctril 8 fl oz x 2 apps was safe; starting at 1LS

Most Effective for Ladysthumb Control

1. GoalTender 4 fl oz (0.125 lb ai) x 3 apps, starting at 1 LS
2. GoalTender 2 fl oz x 3 apps + Chateau 1 fl oz x 3 apps
3. Reflex 8 fl oz x 3 apps
4. GoalTender 2 fl oz x 3 apps + Buctril 8 fl oz x 2 apps

Onion Preemergence Recommendations - 2015

1. PRE: Prowl H_2O 2 qt + Buctril 8-12 fl oz
2. 2 LS: Prowl H_2O 2 qt + Chateau 1-2 fl oz
3. 4-6 LS: Prowl H_2O 2 qt + Dual Magnum 1.4 pt
4. 6-8 LS: Outlook 21 fl oz (30 day PHI)

Onion Postemergence Recommendations - 2015

1. Buctril 8-12 fl oz + Prowl H_2O before emergenc
2. Poast or Select Max to kill barley at 4-5”
3. 1 LS: GoalTender 4-6 fl oz
4. 2-3 LS: GoalTender 4-8 fl oz
5. 4-6 LS: GoalTender 2-4 fl oz (45 day PHI)

(GoalTender: Maximum of 16 fl oz/year)

Download Labels

cdms.net

Syngenta indemnified 24(c) labels:

farmassist.com

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- Van Drunen Farms