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 (presentations as marked)
CCA Credits: NM(0.5) PM(1.5)
Moderator: Ben Werling, West Michigan Vegetable Educator, MSU Extension, Hart, MI

9:00 am	Investigating Onion Diseases New and Old (OH: 2A, 0.5 hr) • Mary Hausbeck, Plant, Soils and Microbial Sciences Dept., MSU
9:40 am	Interactions Between Onion Thrips and Bacterial Leaf Blight • Zsofia Szendrei, Entomology Dept., MSU
10:10 am	Fertility and Irrigation Considerations: Growing Onions on Mineral Soils • Darryl Warncke, Crop & Soil Sciences Dept., MSU
10:30 am	Season-Long Weed Control in Onions (OH: 2C or 3p, 0.5 hr) • Bernard Zandstra, Horticulture Dept., MSU
11:00 am	Session Ends

Investigating Onion Diseases: New and Old

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Michigan State University, Department of Plant, Soil and Microbial Sciences

Bacterial leaf blight, caused by *Pantoea agglomerans* has been a limiting factor for Michigan onion growers in recent years. The bacterium was isolated from onion plants in Ottawa County in 2011 and was the first documented case of this pathogen occurring in Michigan. More expansive studies have been conducted since 2014 confirming that *P. agglomerans* affected onion fields in Allegan, Calhoun, Eaton, Ingham, Newaygo, and Ottawa Counties. A collaborative study with Dr. Zsofia Szendrei of the Department of Entomology at MSU was conducted and indicated that an increase in thrips is associated with an increase in bacterial leaf blight. This study also showed that limiting thrips with an effective insecticide program could also limit bacterial leaf blight. The specifics of these field trial results will be handled through Dr. Szendrei and her laboratory.

Along with bacterial leaf blight, onion growers are also managing additional serious leaf blights caused by fungal pathogens including Stemphylium. An aggressive pathogen in Michigan for the last couple of growing seasons, Stemphylium is not always readily controlled by the fungicide programs that limit purple blotch. Newly registered fungicides may offer some assistance to limit Stemphylium leaf blight and were evaluated.

Pink root research has been ongoing in the lab for several years and that work has officially wrapped up. Our results on cultivar susceptibility to pink root and the efficacy of fungicides have been posted in previous Great Lakes Expo proceedings. In these proceedings we discuss the influence of onion root age on pink root disease.

Evaluating fungicides for Stemphylium leaf blight control.

This study was conducted at a grower cooperator's farm located in Hamilton, MI. Onion 'Gunnison' seeds were sown on raised beds consisting of eight rows of plants spaced 6 inches apart and 2 inches within a row. A completely randomized block design with four replicates was established in an area 100 feet long by seven beds. Treatments were applied as a foliar spray and reapplied at 7-day intervals using a CO_2 backpack sprayer and a broadcast boom equipped with three XR8003 flat-fan nozzles with the outer nozzles angled toward the center, calibrated at 50 psi and delivering 50 gal/A.

Disease assessment. Disease severity was assessed using the Horsfall-Barratt scale. Onions from the center 5 feet of the four rows of the treatment plots were harvested, dried, then topped, graded, and weighed. Data were analyzed using an analysis of variance, with means separation performed using Fisher's protected least significant difference (LSD).

Results. Necrosis of the leaves was the result of bacterial leaf blight, anthracnose, and Stemphylium leaf blight. All treatments were significantly better than the untreated control at the final rating (Table 1). Both rates of Luna Tranquility SC significantly limited disease symptoms in comparison to all other treatments. The lower rate of Luna Tranquility SC (12 fl oz/A) was just as effective at controlling disease symptoms as the higher rate (1 pt/A); therefore, growers can consider using the lower rate without jeopardizing disease control in their onion fields. Fontelis SC was similar to the higher rate of Luna Tranquility SC (1 pt) in its efficacy. Fontelis SC is recommended to be used with an adjuvant, such as 1% methylated seed oil (MSO), on onions which could have improved its results. The recommended application rate for Fontelis SC is 16 to 24 fl oz/A. Luna Tranquility SC and Fontelis SC are both included in the fungicide group 7 (Table 3). Therefore, it is important that growers alternate between these and other fungicides with different modes of action to limit the development of resistance.

Table 1. Evaluation of fungicide treatments for controlling foliar disease of onion.

Treatment and rate/A, *application schedule*, applied at 7-day intervals	Necrotic tissue severity*		
	8/15	8/25	8/31
Untreated control	6.0 a**	7.0 a	10.8 a
Luna Tranquility SC 12 fl oz + Act. 90 1 pt, *apps A-J*	2.8 c	3.3 d	6.3 e
Luna Tranquility SC 1 pt + Act. 90 1 pt, *apps A-J*	2.8 c	3.8 cd	6.0 e
Fontelis SC 24 fl oz, *apps A-J*	3.5 b	4.3 bc	8.0 d
Quadris Opti SC 1.6 pt, *apps A,C,E,G,I -alt-* Mancozeb DF 2 lb, *apps B,D,F,H,J*	5.5 a	6.5 a	9.8 b
Merivon SC 5 fl oz, *apps A,C,E,G,I -alt-* Mancozeb DF 2 lb, *apps B,D,F,H,I*	3.8 b	4.8 b	8.8 c
Mancozeb DF 2 lb, *apps A-J*	5.5 a	6.5 a	9.8 b

*Rated on the Horsfall-Barratt scale of 1 to 12, where 1=0% plant area diseased, 2=>0 to 3%, 3=>3 to 6%, 4=>6 to 12%, 5=>12 to 25%, 6=>25 to 50%, 7=>50 to 75%, 8=>75 to 87%, 9=>87 to 94%, 10=>94 to 97%, 11=>97 to <100%, 12=100% plant area diseased.

**Column means with a letter in common are not significantly different (LSD t Test; *P*=0.05).

Significant differences were detected among treatments with respect to total bulb yield and yield for each bulb grade (%) (Table 2). The treatment of Merivon SC (*apps A,C,E,G,I)* alternated with Mancozeb DF (*apps B,D,F,H,I)* produced the highest total bulb yield and the highest yield of large-sized bulbs. Fontelis SC produced the lowest yield of small bulbs and was statistically similar to the treatment of Merivon SC alternated with Mancozeb with respect to large bulb yield and total yield. The treatment of Quadris Opt SC (*apps A,C,E,G,I*) alternated with Mancozeb DF (*apps B,D,F,H,J*) produced the lowest overall yield and the highest percentage of small bulbs.

Table 2. Yield and grade of onion treated with fungicides to control foliar diseases of onion.

Treatment and rate/A, *application schedule*, applied at 7-day intervals	Bulb yield (lb/5 ft row)						
	Small (<2")		Med (2-3")		Large (>3")		Total
	lb	%	lb	%	lb	%	lb
Untreated control	3.6	10.2 ab	21.8 a	61.7 a	10.0 d	28.1 d	35.4 bc
Luna Tranquility SC 12 fl oz + Act. 90 1 pt, *apps A-J*	2.7	7.1 b-d	17.1 c	44.4 cd	18.7 b	48.5 ab	38.4 ab
Luna Tranquility SC 1 pt + Act. 90 1 pt, *apps A-J*	3.2	8.5 a-d	19.4 a-c	50.1 bc	16.1 bc	41.3 bc	38.7 ab
Fontelis SC 24 fl oz, *apps A-J*	2.2	5.5 d	18.6 bc	46.5 cd	19.2 ab	48.0 ab	40.0 ab
Quadris Opti SC 1.6 pt, *apps A,C,E,G,I -alt-* Mancozeb DF 2 lb, *apps B,D,F,H,J*	3.9	11.9 a	18.0 bc	55.5 ab	10.6 d	32.5 d	32.4 c
Merivon SC 5 fl oz, *apps A,C,E,G,I -alt-* Mancozeb DF 2 lb, *apps B,D,F,H,I*	2.6	6.0 cd	17.4 bc	40.3 d	23.2 a	53.7 a	43.2 a
Mancozeb DF 2 lb, *apps A-J*	3.3	9.3 a-c	20.1 ab	57.1 ab	12.3 cd	33.6 cd	35.6 bc

*Rated on the Horsfall-Barratt scale of 1 to 12, where 1=0% plant area diseased, 2=>0 to 3%, 3=>3 to 6%, 4=>6 to 12%, 5=>12 to 25%, 6=>25 to 50%, 7=>50 to 75%, 8=>75 to 87%, 9=>87 to 94%, 10=>94 to 97%, 11=>97 to <100%, 12=100% plant area diseased.

**Column means with a letter in common or with no letter are not significantly different (LSD t Test; *P*=0.05).

Pink root and onion root age.

Pink root, incited by *Setophoma terrestris*, reduces bulb size and yield. Early infection by the pink root pathogen has been associated with premature bulb formation that greatly limits yield and quality. Infected roots appear light pink in color, become dark red or purple, shrivel, die, and finally detach from the plant (Figure 1). The above-ground symptoms of severely infected plants may resemble drought stress. Infected plants commonly survive but are stunted and produce small bulbs due to restriction of the root system.

Figure 1. Comparison of root systems of (left) a healthy and (right) an onion infected with pink root.

Over the years, our observations included a significant amount of pink root disease in many of Michigan's onion fields. To address this, an ambitious research program was initiated to examine potential avenues of management, as our observations indicated that pink root is damaging productivity. Historically, producers have considered pink root an insignificant problem as it was associated primarily with onions already senescing at season's end. However, producers who have moved to mineral soils that do not have a history of onion production (and pink root) are experiencing a significant benefit.

The objective of this pink root study was to determine if plant age influences the ability of *S. terrestris* to colonize onion root cells. Two onion cultivars that represent a high level of susceptibility ('Highlander') and a low level of susceptibility ('Hendrix') to pink root were chosen. 'Hendrix' and 'Highlander' onions were inoculated with the pathogen at 3, 5, 7, or 9 weeks old and evaluated for disease. Root density, plant height, fresh weight, number of total leaves per plant, and bulb circumference were compared between healthy and diseased plants of the same age.

The results show that the density of the root system was reduced as a result of pink root infection regardless of onion age or cultivar (Figure 2). When 3-week old 'Highlander' plants were inoculated with *S. terrestris*, plant height, fresh weight, and bulb circumference were significantly reduced compared to healthy plants. When 3- or 5-week old 'Hendrix' onion plants were inoculated with the pink root pathogen, the bulb circumference was reduced compared to healthy plants (Table 4). Microscopic observation revealed both young and older roots were infected with the pink root pathogen. As the roots age, there is more colonization by *S. terrestris*. However, the greatest reduction in onion plant and bulb size occurred when roots were infected by the pink root pathogen when they were young. 'Hendrix' onions that have been shown to be less susceptible to pink root in previous field studies showed a reduced frequency of root colonization in this study than the more susceptible cultivar 'Highlander.'

Figure 2. Five week old 'Hendrix' (top) and 'Highlander' (bottom) onion seedlings. Root systems are stunted and discolored by seven days post-inoculation.

Table 4. Measurement and differences of plant fresh weight and bulb circumference of the uninoculated control and plants inoculated when 3, 5, 7, and 9 weeks old.

Age at inoculation (weeks)	Weight (g)						Bulb circumference (cm)					
	'Highlander'			'Hendrix'			'Highlander'			'Hendrix'		
	Unin.[z]	Inoc.[y]	Diff.[x]	Unin.	Inoc.	Diff.	Unin.	Inoc.	Diff.	Unin.	Inoc.	Diff.
3	15.1	4.5	70.2[*]	7.0	3.9	44.8[*]	4.3	2.2	47.7[*]	2.9	2.2	23.7[*]
5	39.8	23.9	39.9	31.9	23.1	27.8	7.9	5.7	27.9[*]	7.2	4.5	37.6[*]
7	48.5	29.9	38.3	40.1	29.4	26.5	8.9	7.1	20.4	8.1	6.1	24.3
9	56.9	38.8	31.9	46.4	31.3	32.7	9.4	7.0	25.0	8.2	6.4	21.6

[*]Differences between inoculated and uninoculated plants are significant. ($\alpha<0.05$)
[z]Unin. = uninoculated plants.
[y]Inoc. = inoculated plants.
[x]Diff. = Difference between inoculated and uninoculated plants (percentage)

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Growing Onions on Mineral Soils: Soil Fertility and Irrigation

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In Michigan and the other Great Lakes states yellow bulb storage onions have been and continue to be grown primarily on muck (organic) soils. The dark colored muck soils warm quickly in the spring, provide good soil moist for good seed-soil contact resulting in good germination, establishment and growth. Rotation of crops is important for production of any crop, and especially onions. Onions have been grown quite intensively on many acres of the muck soils. Being able to grow onions on mineral soils, particularly the loam and sandy loam soils, provides additional opportunities for crop rotation.

Many of the management practices used in growing onions in mineral soils will be similar to those used on muck soils, but some differ due to differences in soil properties (Table 1). Soil pH affects the availability of most plant essential nutrients. Table 2 shows the effect of soil pH on nutrient available in muck and mineral soils. In muck soils the most favorable pH range for growing onions is 5.5 to 6.0 while in mineral soils the most favorable range is 6.2 to 6.8. When lime is needed, lime muck soils to pH 5.5 and mineral soils to pH 6.5. The nutrient requirements are similar for onions on muck and mineral soils. The amounts of nutrients to apply should be based on soil tests. The primary supplemental nutrients required are nitrogen, phosphorus, and potassium. The more of these nutrients already present in the soil the less that will need to be added. Yellow bulb storage onions will generally accumulate in each 100 cwt of onions produced 25 lbs N, 14 lbs phosphate (P_2O_5), and 24 lbs potash (K_2O). Significant amounts of nitrogen (N) can be mineralized (released) from the organic matter of muck soils (100 + lbs/a), but much smaller amounts are released from mineral soils (10 – 30 lbs/a). Therefore, the amount of supplemental N to apply for onions in mineral soils will be more than in muck soils. On average the difference is around 50 lbs/a.

To minimize the risk of nitrogen loss by leaching or denitrification (i.e. conversion to nitrous oxides) it is important to use multiple applications of N. This will be the same on both mineral and muck soils. A good program is to include 40 lbs N/a in the preplant broadcast-incorporated fertilizer. Then, split the remaining amount of required N between topdress applications during the last week of May and during mid to late June. Some nitrogen can also be included in foliar sprays (~4 lb/a/application), especially when spraying manganese.

Phosphorus and potassium requirements are similar in muck and mineral soils. Base the amounts to apply on soil test information. Have at least one soil test for every 10 to 15 acres. The critical soil test levels differ between mineral and muck soils. Due to differences in densities of the soils. In mineral soils the critical P test is near 45 ppm and the critical K test is near 90 ppm (Table 1). In muck soils critical test values are 120 ppm P and 300 ppm K (Table 1). Phosphorus, along with nitrogen, is important for early plant growth and establishment of seeded onions. Studies over the years have shown that placing a band of fertilizer containing N and P two inches directly below or 1 inch to the side and 2 inches below the seed will enhance early growth, and many times increase yield of marketable bulbs. This can be done with either dry blends or liquid fertilizers. When onions are grown on raised beds the broadcast-incorporated nutrients will be more concentrated in the root zone.

Other nutrients of importance for onions are manganese (Mn), copper (Cu) and sulfur (S). Of these Mn is probably the most important on both mineral and muck soils. When fertilizer is being band placed it is good to include up to 2 lbs Mn per acre. Putting Mn in the broadcast fertilizer is not beneficial. Onions respond well to multiple foliar applications of Mn (about 1.0 lb Mn/acre/application) especially when the soil pH is above 6.5 in mineral soils and 5.5 in muck soils. Make the first application when the onions have

3 to 4 true leaves followed by 2 additional applications 2 - 3 weeks apart. Most mineral soils naturally contain adequate copper, and today most muck soils contain enough copper from past copper fungicide applications on various vegetable crops. In muck soils adequate sulfur generally becomes available through decomposition of the organic matter. Onions grown on sandy low organic matter (< 2 %) mineral soils may benefit from supplemental S (about 5 lbs/a) applied in the broadcast preplant fertilizer. Be sure to use a sulfate form, such as in ammonium sulfate, magnesium sulfate, or calcium sulfate.

Onions have been grown in muck soils because those soils generally have good moisture supplying properties which reduce the likelihood of moisture (drought) stress. Muck soils contain 4.0 to 5.0 inches of available water per foot of soil whereas sandy loam soils contain around 1.0 inch per foot of soil. Hence it is essential to have irrigation available on mineral soils. Irrigation is important for getting onions established and for providing water when rainfall is insufficient. When onions are actively growing they will utilize 1 to 1.5 acre-inches of water per week. In scheduling irrigation take into consideration the moisture content of the soil, water use by the onions and rainfall. Since sandy loam soils only hold about 1 inch of water per foot it is important to only apply 0.5 to 0.75 inches of water at each irrigation. Putting on more than this may result in leaching nitrogen out of the root zone.

Seeding oats or barley prior to planting the onions is important for protecting the onion seedlings from wind damage. This may be even more important on sandy mineral soils than on muck soils.

Application rates of herbicides will most likely be lower on mineral soils due to lower organic matter content. Over application can result in stunting of onion growth. The weed spectrum may also be different on mineral soils. With more options for crop rotation on mineral soils, root diseases, such as pink root, should be less. Scouting and management guidelines for insects and diseases will be similar for onions being grown on mineral and muck soils.

In summary the main management practices that different between mineral and muck soils when growing seeded onions are associated with soil pH, nitrogen, irrigation and herbicides. All other management practices should be similar.

Table 1. Summary of similarities and differences for onions grown in mineral and muck soils.

	Mineral Soil Sandy loam- Loam	Muck Soil
Organic matter content (%)	1.0 – 3.0	30 – 70
Available water (inches/ foot)	0.8 – 1.3	4.0 – 5.0
Favorable soil pH range	6.2 – 6.8	5.4 - 6.0
Nitrogen recommendation (lb/a)	190	140
Adequate P soil test (ppm)	45 +	120 +
Adequate K soil test (ppm)	90 +	300 +
Adequate Mg soils test (ppm)	35 +	100 +

Table 2. Favorable soil pH for availability of selected nutrients.

	Mineral Soil Sandy loam- Loam	Muck Soil
Nitrogen	6.0 – 7.5	> 5.2
Phosphorus	6.2 – 7.0	> 5.2
Calcium	> 6.2	> 5.5
Magnesium	> 6.2	> 5.2
Sulfur	6.0 – 8.0	> 5.5
Boron	5.2 – 7.0	5.0 – 6.0
Copper	5.0 – 6.8	5.5 – 6.0
Manganese	< 6.5	< 5.5
Molybdenum	> 6.5	> 5.5
Zinc	< 6.8	5.0 – 5.8

Onion Weed Control

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EXPO 2016
Grand Rapids, MI
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Current PRE Herbicide Labels for Onion

1. **Prowl H_2O:** Muck Soil, 2 qt x 3 appl PRE
   Mineral Soil, 1.5-3 pt after 2 LS
2. **Dual Magnum:** 0.67-1.3 pt x 2 appl after 2 LS
3. **Outlook:** 21 fl. oz. after 2 LS
4. **Chateau:** 1-2 oz. at 3-6 LS; max. 3 oz./yr

POST Herbicides for Onion

1. **GoalTender**: 2-6 fl. oz. after 1 LS; max. 16oz./yr
2. **Moxy:** 8-16 fl. oz. PRE or 2-5 LS
3. **Starane**: 5 fl. oz. at 2-6 LS
4. **Nortron**: 16 fl. oz. x 4 appl anytime
5. **Fusilade, Poast, Select Max**: grass control

Major Weed Problems in Onions

1. **Ladysthumb, smartweed**
2. **Yellow nutsedge**
3. **Shepard's purse, marsh yellowcress, Virginia pepperweed**
4. **Common ragweed, common groundsel**
5. **Common lambsquarters**
6. **Spotted spurge**
7. **Nightshades (eastern black, hairy)**
8. **Pigweeds, amaranths**

Objectives for 2016

1. Use herbicide combinations for maximum effectiveness
2. Data to support Chateau PRE label
3. Data to support Zidua label
4. Data to support Bicyclopyrone label

Preemergence Herbicides – Muck Onion Tolerance – 2016 (1)

	Treatment	Rate lb ai/A	Onion Rating 6/13	Onion Rating 7/6	Yield 8/29 kg/plot
1	Zidua Prowl H2O	0.133 PRE 1.9 PO1,2	2	2.7	28
2	Zidua Prowl H_2O	0.198 PRE 1.9 PO1,2	1.7	1.7	36
3	Zidua Prowl H_2O	0.133 PRE 1.9 x 3	1.7	1.7	39
4	Zidua Prowl H_2O	0.198 PRE 1.9 x 3	2	2	30

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Preemergence Herbicides – Muck Onion Tolerance – 2016 (2)

	Treatment	Rate lb ai/A	Onion Rating 6/3	7/6	Yield 8/29 kg/plot
5	Prowl H_2O Zidua	1.9 PRE, PO2 0.133 PO1	2	2.3	30
6	Prowl H_2O	1.9 x 3	1.7	1.7	34
7	BIR Prowl H20	0.033 PRE 1.9 PO1,2	2.7	1.7	31
8	Prowl H_2O BIR	1.9 x 3 0.033 PO1,2	2	1	35

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Preemergence Herbicides – Muck Onion Tolerance – 2016 (3)

	Treatment	Rate lb ai/A	Onion Rating 6/3	7/6	Yield 8/29 kg/plot
9.	Prowl H_2O BIR Chateau	1.9 x 30.133 0.045 PO1 0.032 PO1,2	2	1	38
10.	Chateau Prowl H_2O	0.032 x 3 1.9 x 3	1.7	1.3	37
11.	Handweeded		3.3	2	28

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Preemergence Onion Weed Control – Muck – 2016 (1)

	Treatment	Rate lb ai/A	LATH 6/3	RRPW 6/3
1.	Zidua Prowl H_2O	0.133 PO1 1.9 PO1,2	4.3	10
2.	Zidua Prowl H_2O	0.198 PRE 1.9 PO1,2	4.7	9.3
3.	Zidua Prowl H2O	0.133 PRE 1.9 x 3	6.7	9.7
4.	Zidua Prowl H2O	0.198 PRE 1.9 x 3	7	9.7

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Preemergence Onion Weed Control – Muck – 2016 (2)

	Treatment	Rate lb ai/A	LATH 6/3	RRPW 6/3
5.	Prowl H_2O Zidua	1.9 PRE, PO2 0.133 PO1	3	3.3
6.	Prowl H_2O	1.9 x 3	5.7	4
7.	BIR Prowl H2O	0.033 PRE 1.9 PO1,2	3.3	3.3
8.	Prowl H2O BIR	1.9 x 3 0.033 PO1,2	3.3	2.7

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Preemergence Onion Weed Control – Muck – 2016 (3)

	Treatment	Rate lb ai/A	LATH 6/3	RRPW 6/3
9.	Prowl H_2O BIR Chateau	1.9 x 3 0.045 PO1 0.032 PO1,2	5.7	3.3
10.	Chateau Prowl H_2O	0.032 x 3 1.9 x 3	6.7	5.3
11.	Handweeded		1.7	3.3

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Postemergence Herbicide – Muck Onion Tolerance – 2016 (1)

	Treatment	Rate lb ai/A	Rating 6/24	Rating 7/6	Kg/plot 8/30
1.	Goaltender	0.063 x 4	2.3	2.7	36
2.	GT	0.125 x 4	2.3	2	33
3.	GT	0.25 x 4	2	1.7	42
4.	GT Chateau	0.125 x 4 0.032 x 3	2.7	2	44

Postemergence Herbicide – Muck Onion Tolerance – 2016 (2)

	Treatment	Rate lb ai/A	Rating 6/24	Rating 7/6	Kg/plot 8/30
5.	GT Reflex	0.125 x 1 0.125 x 2	2.3	2.7	40
6.	GT BIR	0.125 PO1 0.033 PO2,3	1.7	1.7	39
7.	GT BIR	0.125 x 3 0.033 x 3	2.3	1.3	41
8.	GT BIR	0.125 x 3 0.045 x 3	2.3	2	36

Postemergence Weed Control – Muck – 2016 (1)

	Treatment	Rate lb ai/A	LATH 6/13	LATH 6/24	RRPW 6/13	RRPW 6/24
1.	Goaltender	0.063 x 4	6.7	8.3	9	10
2.	GT	0.125 x 4	7	8.7	8.7	10
3.	GT	0.125 x 4 0.032 x 3	9	10	10	10
4.	GT Chateau	0.125 x 4 0.032 x 3	9	10	10	10

Postemergence Weed Control – Muck – 2016 (2)

	Treatment	Rate lb ai/A	LATH 6/13	LATH 6/24	RRPW 6/13	RRPW 6/24
5.	GT Reflex	0.125 x 1 0.125 x 2	9	8.7	6	7
6.	GT BIR	0.125 PO1 0.033 PO2,3	6.7	7.3	5.3	5.3
7.	GT BIR	0.125 x 3 0.033 x 3	9.3	10	10	10
8.	GT BIR	0.125 x 3 0.045 x 3	10	10	10	9.7

Preemergence Herbicide – Mineral Soil Onion Tolerance – 2016 (1)

	Treatment	Rate lb ai/A	Rating 6/2	Rating 6/23	Kg/plot 8/24
1.	Prowl H20	0.95 x 3	1	1.3	82
2.	Prowl H2O Chateau	0.75 x 3 0.016 x 3	8.3	7	36*
3.	Zidua	0.067 x 3	7.7	6	31*
4.	Prowl H20 Zidua	0.75 x 3 0.067 x 3	7.3	6.7	25*

Preemergence Herbicide – Mineral Soil Onion Tolerance – 2016 (2)

	Treatment	Rate lb ai/A	Rating 6/2	Rating 6/23	Kg/plot 8/24
5.	Prowl H20 BIR	0.75 x 3 0.033 x 3	3.3	8.3	0.2*
6.	Prowl H2O BIR	0.75 x 3 0.033 x 2	1.3	4.3	10*
7.	Prowl H2O BIR	0.75 x 3 0.045 x 3	7.7	9.7	0.1
8.	GT Chateau	0.063 x 2 0.032 x 2	4.3	3	60*

Conclusions – Onion Muck Soil – 2016 (1)

1. Zidua was safe PRE on onion on muck soil
2. Bicyclopyrone (BIR) was safe PRE on onion
3. Chateau 1 oz was safe PRE on onion
4. No PRE treatment provided good control of LATH
5. Zidua PRE provided good RRPW control

Conclusions – Onion Muck Soil – 2016 (2)

6. BIR provided good LATH and RRPW control POST
7. BIR was more effective on weeds POST
8. Chateau 1 oz + Prowl H2O 2 qt was safe PRE and POST and provided good control of LATH and RRPW
9. GT and BIR controlled LATH and RRPW and had good yield

Conclusions – Onion Mineral Soil- 2016

1. Prowl H_2O 0.95 x 3 was safe on onion
2. Chateau, Zidua, BIR caused yield reduction PRE
3. Chateau, Zidua, BIR controlled HANS and LATH PRE

Potential Onion Labels

1. Zidua – PRE – 1-2 years
2. Bicyclopyrone – POST – 3-4 years
3. Stinger – POST – spot sprays for thistle – 2-3 years
4. Reflex – POST 2-3 years

Recommendations - Muck

1. Prowl H_2O 2 qt x 3
2. Dual Magnum 1.3 pt x 2
3. Outlook 21 fl oz – YENS control
4. Chateau 1-2 oz after 3 LS
5. Goaltender 0.125 x 4

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- Van Drunen Farms
- Vogel Farms

Labels

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