

## Managing Volunteer Corn in 2,4-D Tolerant Soybeans — Olmsted and Waseca Counties, MN

Cooperator: University of Minnesota Extension  
Nearest Town: Waseca and Rochester  
Soil Type: Clay loam and loam  
Tillage: Conventional  
Previous Crop: Corn  
Planting Date: Waseca: 05/28/2022 Rochester: 06/02/2022  
Spray Dates: Waseca: POST I 06/28/2022 POST II: 07/05/2022  
Rochester: POST I 07/01/2022 POST II 07/09/2022  
Variety: Stine 19EC12  
Row Width: 30 inch  
Harvest Population: 150,000  
Experimental Design: Randomized complete block with 4 replications

### Purpose of Study:

Soybean varieties tolerant to 2,4-D-choline, glyphosate, and glufosinate have been widely adopted by Minnesota soybean growers. While 2,4-D tolerant soybeans provide growers with another site of action to manage glyphosate-resistant weed populations, there has also been difficulty in achieving adequate control of volunteer corn in this system. ACCase-inhibiting herbicides are often the primary tool for managing volunteer corn and the ACCase-inhibiting herbicides when tank mixed with auxinic herbicides showed antagonism and resulted in reduced control of grassy weeds. Growers relying on previously effective herbicide rates and application strategies are often surprised when they do not achieve adequate volunteer corn control. The objective of this research was to evaluate the interaction between ACCase-inhibiting herbicides (clethodim and quizalofop-ethyl) and 2,4-D choline alone or tank-mixed with glyphosate or *S*-metolachlor for glyphosate-resistant volunteer corn control in 2,4-D tolerant soybean.

### Results:

Generally, lower rates of either volunteer corn controlling graminicide resulted in reduced volunteer corn control, although reduced control was more pronounced with quizalofop-ethyl (Assure II) treatments. Higher graminicide rates helped overcome the antagonism between ACCase-inhibiting herbicides and 2,4-D choline and could be a useful strategy for managing volunteer corn. Sequential applications of quizalofop-ethyl (Assure II) provided better control of volunteer corn. Glyphosate did not appear to cause any antagonism.

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## TREATMENTS

### •PREEMERGENCE

•All treatments have a preemergence 1.33 pt/A Dual II Magnum

### •POSTEMERGENCE

#### 1.UNTREATED

2.Enlist + Glyphosate + Select Max 6 oz + (AMS & NIS)

3.Enlist + Glyphosate + Select Max 6 oz + Dual + (AMS & NIS)

4.Enlist + Glyphosate + Select Max 9 oz + (AMS & NIS)

5.Enlist + Glyphosate + Select Max 9 oz + Dual + (AMS & NIS)

6.Enlist + Select Max 6 oz + (AMS & COC)

7.Enlist + Select Max 6 oz + Dual + (AMS & COC)

8.Enlist + Select Max 9 oz + (AMS & COC)

9.Enlist + Select Max 9 oz + Dual + (AMS & COC)

10.Enlist + Glyphosate + Assure II 4 oz + (AMS & COC)

11.Enlist + Glyphosate + Assure II 4 oz + Dual + (AMS & COC)

12.Enlist + Glyphosate + Assure II 12 oz + (AMS & COC)

13.Enlist + Glyphosate + Assure II 12 oz + Dual + (AMS & COC)

14.Enlist + Assure II 4 oz + (AMS & COC)

15.Enlist + Assure II 4 oz + Dual + (AMS & COC)

16.Enlist + Assure II 12 oz + (AMS & COC)

17.Enlist + Assure II 12 oz + Dual + (AMS & COC)

18.Enlist + Glyphosate+ (AMS) fb1 Select Max 6 oz + (COC & AMS)

19.Enlist + Glyphosate + (AMS) fb Assure II 4 oz + (COC & AMS)

#### 20.WEED FREE

\*1= graminicide in a sequential treatment 5-7 days after initial POST treatment

COC = SuperbHC®

NIS = Preference®

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## HERBICIDE RATES

Enlist One at 2 Pints per acre

Glyphosate as Roundup PowerMax3 at 30 ounces per acre

S-metolachlor as Dual II Magnum at 1 pint per acre

Clethodim as SelectMax; High rate 9 oz per acre, Low rate 6 oz per acre

Quizalofop-ethyl as Assure II; High rate 12 oz per acre, Low rate 4 oz per acre

## ADDITIVE RATES

AMS as Amsol

AMS rate for first POST treatment in the sequential treatments (#18 and #19): 2.5% v/v

AMS in all other mixes was at 5% v/v

COC as SuperbHC® at 1 quart per acre

NIS as Preference® at 0.25% v/v

## SPRAYER INFO

Tractor mounted sprayer with 15 GPA using AIXR spray tips.

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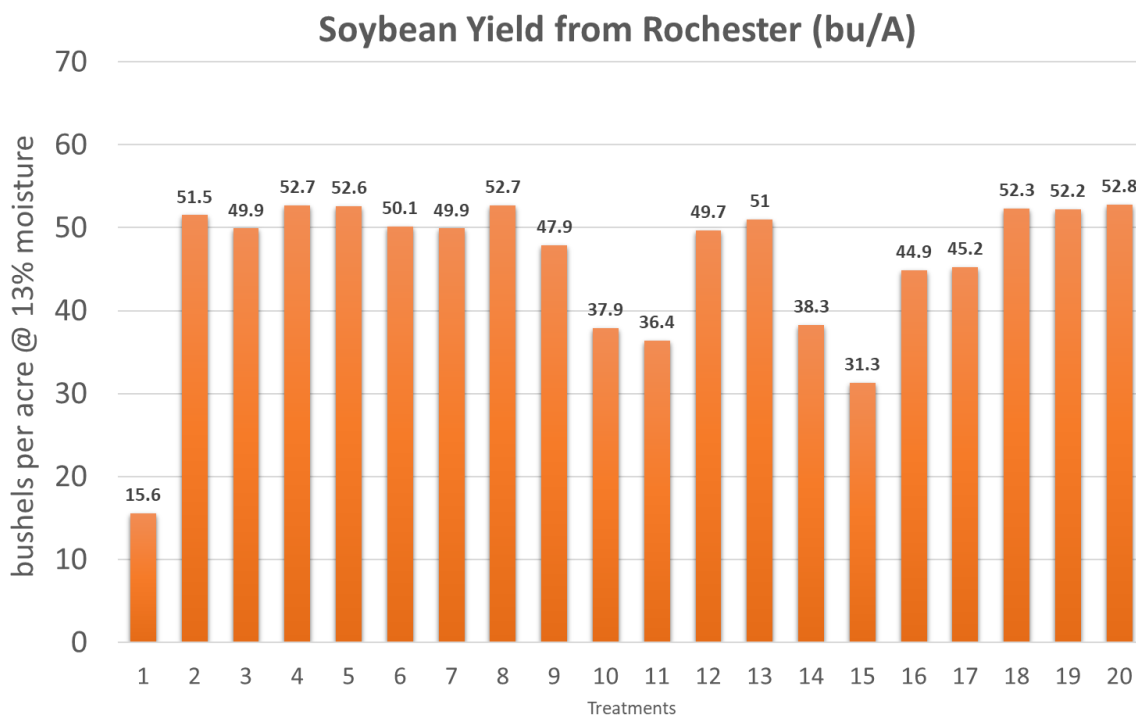
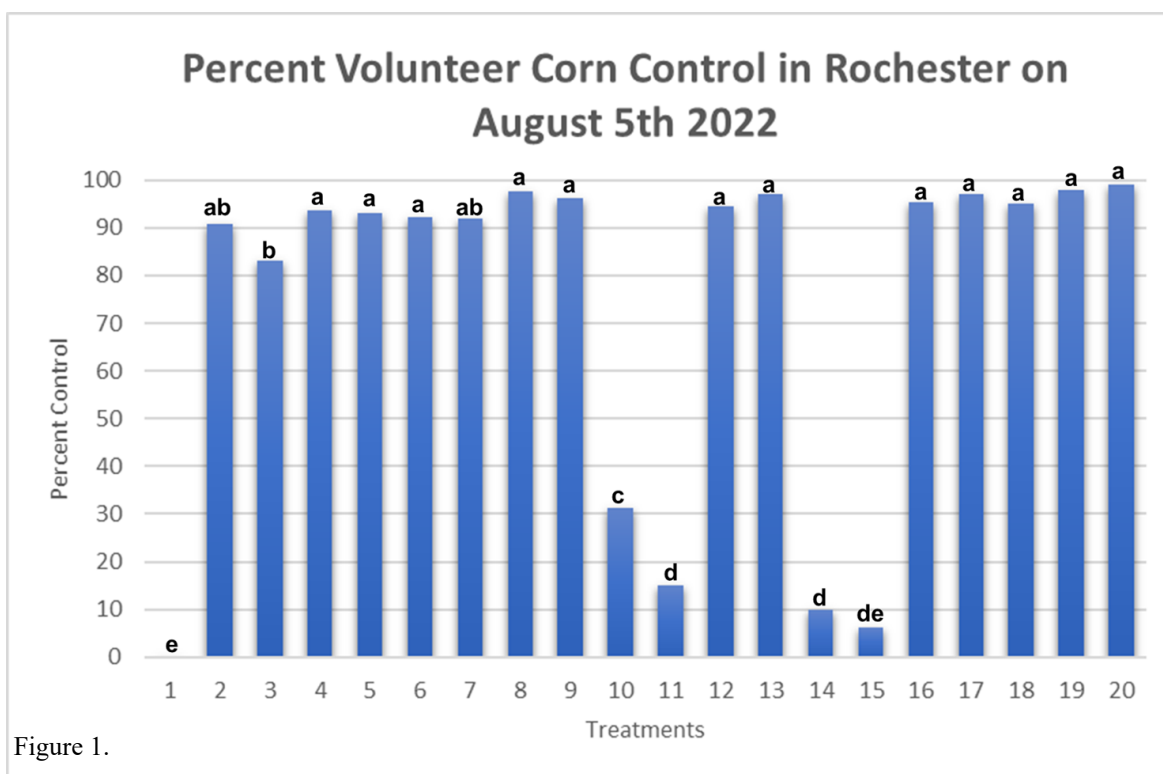


Figure 3.

# Managing Volunteer Corn in 2,4-D Tolerant Soybeans — Olmsted and Waseca Counties, MN

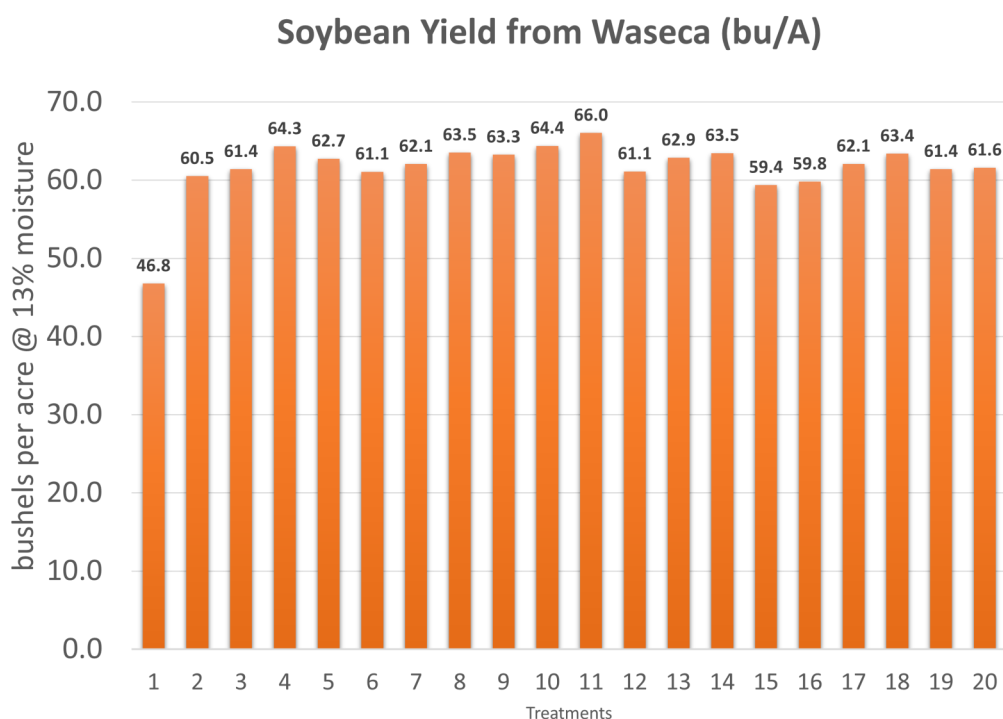
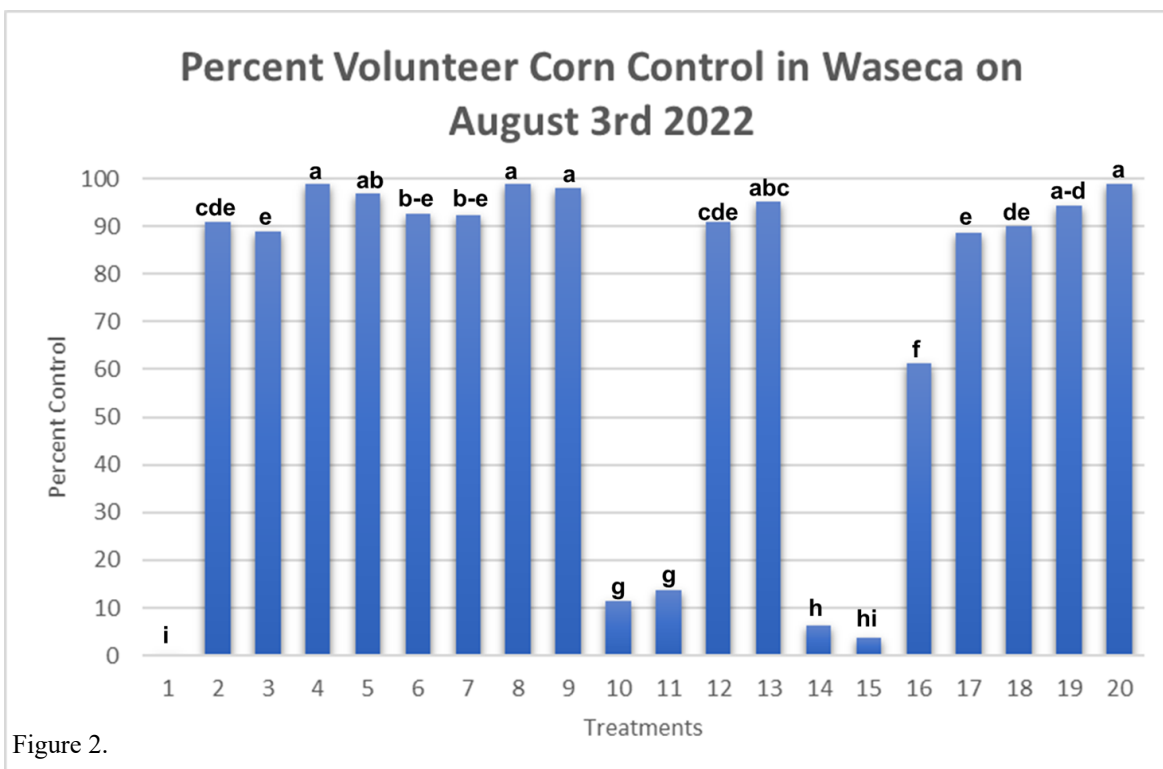


Figure 4.

# Managing Volunteer Corn in 2,4-D Tolerant Soybeans — Olmsted and Waseca Counties, MN

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## RESULTS

- At Rochester, the low rates of quizalofop-ethyl in tank-mixes with or without glyphosate resulted in reduced volunteer corn (VC) control (Figure 1)
- At Waseca, the low rates of clethodim and quizalofop-ethyl in tank-mixes with or without glyphosate resulted in reduced VC control, although differences were more pronounced with low rates of quizalofop-ethyl (Figure 2)
- Addition of glyphosate did not play a role in antagonism and was marginally beneficial when added to tank-mixes with quizalofop-ethyl (Figures 1 and 2)
- S-metolachlor did not show a consistent VC control response between sites (Figures 1 and 2)
- Sequential applications with the low rate of either graminicide adequately controlled VC (Figures 1 and 2)
- At Rochester, the low rates of quizalofop-ethyl in tank-mixes with or without glyphosate resulted in reduced yield and the addition of glyphosate to the high rates of quizalofop-ethyl was slightly beneficial to yield (Figure 3)
- Treatments did not have clear impact on yield at Waseca (Figure 4)

# Managing Volunteer Corn in 2,4-D Tolerant Soybeans — Olmsted and Waseca Counties, MN

Photos of what antagonism looked like (4oz of Assure II in tank mix vs. 4 oz of Assure II applied sequentially):



# Managing Volunteer Corn in 2,4-D Tolerant Soybeans — Olmsted and Waseca Counties, MN

## Rochester Data August 5th rating date, Percent Volunteer Corn Control

| Pest Name | Rating Date | Rate      | Appl | volunteer corn |
|-----------|-------------|-----------|------|----------------|
| No. Name  | Rate Unit   | Code      |      | Aug-5-2022     |
| 1         | UNTREATED   |           |      | 0.0e           |
| 2         | Enlist One  | 2pt/a     | A    | 90.8ab         |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Select Max  | 6fl oz/a  | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | NIS         | 0.25% v/v | A    |                |
| 3         | Enlist One  | 2pt/a     | A    | 83.0b          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Select Max  | 6fl oz/a  | A    |                |
|           | Dual        | 1pt/a     | A    |                |
|           | Magnum      | 3qt/a     | A    |                |
|           | NIS         | 0.25% v/v | A    |                |
| 4         | Enlist One  | 2pt/a     | A    | 93.5a          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Select Max  | 9fl oz/a  | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | NIS         | 0.25% v/v | A    |                |
| 5         | Enlist One  | 2pt/a     | A    | 93.0a          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Select Max  | 9fl oz/a  | A    |                |
|           | Dual        | 1pt/a     | A    |                |
|           | Magnum      | 3qt/a     | A    |                |
|           | NIS         | 0.25% v/v | A    |                |
| 6         | Enlist One  | 2pt/a     | A    | 92.3a          |
|           | Select Max  | 6fl oz/a  | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 7         | Enlist One  | 2pt/a     | A    | 91.8ab         |
|           | Select Max  | 6fl oz/a  | A    |                |
|           | Dual        | 1pt/a     | A    |                |
|           | Magnum      | 3qt/a     | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 8         | Enlist One  | 2pt/a     | A    | 97.5a          |
|           | Select Max  | 9fl oz/a  | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 9         | Enlist One  | 2pt/a     | A    | 96.3a          |
|           | Select Max  | 9fl oz/a  | A    |                |
|           | Dual        | 1pt/a     | A    |                |
|           | Magnum      | 3qt/a     | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 10        | Enlist One  | 2pt/a     | A    | 31.3c          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Assure II   | 4fl oz/a  | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 11        | Enlist One  | 2pt/a     | A    | 15.0d          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Assure II   | 4fl oz/a  | A    |                |
|           | Dual        | 1pt/a     | A    |                |
|           | Magnum      | 3qt/a     | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |

| Pest Name | Rating Date | Rate      | Appl | volunteer corn |
|-----------|-------------|-----------|------|----------------|
| No. Name  | Rate Unit   | Code      |      | Aug-5-2022     |
| 12        | Enlist One  | 2pt/a     | A    | 94.5a          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Assure II   | 12fl oz/a | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 13        | Enlist One  | 2pt/a     | A    | 97.0a          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Assure II   | 12fl oz/a | A    |                |
|           | Dual        | 1pt/a     | A    |                |
|           | Magnum      | 3qt/a     | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 14        | Enlist One  | 2pt/a     | A    | 10.0d          |
|           | Assure II   | 4fl oz/a  | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 15        | Enlist One  | 2pt/a     | A    | 6.3de          |
|           | Assure II   | 4fl oz/a  | A    |                |
|           | Dual        | 1pt/a     | A    |                |
|           | Magnum      | 3qt/a     | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 16        | Enlist One  | 2pt/a     | A    | 95.3a          |
|           | Assure II   | 12fl oz/a | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 17        | Enlist One  | 2pt/a     | A    | 97.0a          |
|           | Assure II   | 12fl oz/a | A    |                |
|           | Dual        | 1pt/a     | A    |                |
|           | Magnum      | 3qt/a     | A    |                |
|           | Amsol       | 3qt/a     | A    |                |
|           | COC         | 1qt/a     | A    |                |
| 18        | Enlist One  | 2pt/a     | A    | 95.0a          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Amsol       | 2.5% v/v  | A    |                |
|           | Select Max  | 6fl oz/a  | B    |                |
|           | Amsol       | 3qt/a     | B    |                |
|           | COC         | 1qt/a     | B    |                |
| 19        | Enlist One  | 2pt/a     | A    | 98.0a          |
|           | PowerMax 3  | 30fl oz/a | A    |                |
|           | Amsol       | 2.5% v/v  | A    |                |
|           | Assure II   | 4fl oz/a  | B    |                |
|           | Amsol       | 3qt/a     | B    |                |
|           | COC         | 1qt/a     | B    |                |
| 20        | WEED FREE   |           |      | 99.0a          |

# Managing Volunteer Corn in 2,4-D Tolerant Soybeans — Olmsted and Waseca Counties, MN

## Waseca Data August 3rd rating date, Percent Volunteer Corn Control

| Pest Name               | VC         |
|-------------------------|------------|
| Rating Date             | Aug-3-2022 |
| Trt Treatment Rate Appl | 10*        |
| No. Name Rate Unit Code |            |
| 1 UNTREATED             | 0.0i       |
| 2 Enlist One 2pt/a A    | 91.0cde    |
| PowerMax 3 30fl oz/a A  |            |
| Select Max 6fl oz/a A   |            |
| Amsol 3qt/a A           |            |
| NIS 0.25% v/v A         |            |
| 3 Enlist One 2pt/a A    | 88.8e      |
| PowerMax 3 30fl oz/a A  |            |
| Select Max 6fl oz/a A   |            |
| Dual 1pt/a A            |            |
| Magnum 3qt/a A          |            |
| Amsol 3qt/a A           | 99.0a      |
| NIS 0.25% v/v A         |            |
| 4 Enlist One 2pt/a A    |            |
| PowerMax 3 30fl oz/a A  |            |
| Select Max 9fl oz/a A   |            |
| Amsol 3qt/a A           |            |
| NIS 0.25% v/v A         | 97.0ab     |
| 5 Enlist One 2pt/a A    |            |
| PowerMax 3 30fl oz/a A  |            |
| Select Max 9fl oz/a A   |            |
| Dual 1pt/a A            |            |
| Magnum 3qt/a A          | 92.5b-e    |
| Amsol 3qt/a A           |            |
| NIS 0.25% v/v A         |            |
| 6 Enlist One 2pt/a A    |            |
| Select Max 6fl oz/a A   |            |
| Amsol 3qt/a A           | 92.3b-e    |
| COC 1qt/a A             |            |
| 7 Enlist One 2pt/a A    |            |
| Select Max 6fl oz/a A   |            |
| Dual 1pt/a A            | 99.0a      |
| Magnum 3qt/a A          |            |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 8 Enlist One 2pt/a A    | 98.0a      |
| Select Max 9fl oz/a A   |            |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 9 Enlist One 2pt/a A    |            |
| Select Max 9fl oz/a A   | 11.3g      |
| Dual 1pt/a A            |            |
| Magnum 3qt/a A          |            |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             | 13.8g      |
| 10 Enlist One 2pt/a A   |            |
| PowerMax 3 30fl oz/a A  |            |
| Assure II 4fl oz/a A    |            |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             | 13.8g      |
| 11 Enlist One 2pt/a A   |            |
| PowerMax 3 30fl oz/a A  |            |
| Assure II 4fl oz/a A    |            |
| Dual 1pt/a A            |            |
| Magnum 3qt/a A          | 13.8g      |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 12 Enlist One 2pt/a A   |            |
| PowerMax 3 30fl oz/a A  | 91.0cde    |
| Assure II 12fl oz/a A   |            |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 13 Enlist One 2pt/a A   | 95.3abc    |
| PowerMax 3 30fl oz/a A  |            |
| Assure II 12fl oz/a A   |            |
| Dual 1pt/a A            |            |
| Magnum 3qt/a A          | 6.3h       |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 14 Enlist One 2pt/a A   |            |
| Assure II 4fl oz/a A    | 3.8hi      |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 15 Enlist One 2pt/a A   |            |
| Assure II 4fl oz/a A    | 61.3f      |
| Dual 1pt/a A            |            |
| Magnum 3qt/a A          |            |
| Amsol 3qt/a A           | 88.7e      |
| COC 1qt/a A             |            |
| 16 Enlist One 2pt/a A   |            |
| Assure II 12fl oz/a A   |            |
| Amsol 3qt/a A           | 90.0de     |
| COC 1qt/a A             |            |
| 17 Enlist One 2pt/a A   |            |
| Assure II 12fl oz/a A   |            |
| Dual 1pt/a A            | 94.3a-d    |
| Magnum 3qt/a A          |            |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 18 Enlist One 2pt/a A   |            |
| PowerMax 3 30fl oz/a A  | 99.0a      |
| Amsol 2.5% v/v A        |            |
| Select Max 6fl oz/a B   |            |
| Amsol 3qt/a B           |            |
| COC 1qt/a B             |            |
| 19 Enlist One 2pt/a A   | 99.0a      |
| PowerMax 3 30fl oz/a A  |            |
| Amsol 2.5% v/v A        |            |
| Assure II 4fl oz/a B    |            |
| Amsol 3qt/a B           |            |
| COC 1qt/a B             |            |
| 20 WEED FREE            | 99.0a      |

| Pest Name               | VC         |
|-------------------------|------------|
| Rating Date             | Aug-3-2022 |
| Trt Treatment Rate Appl | 10*        |
| No. Name Rate Unit Code |            |
| 12 Enlist One 2pt/a A   | 91.0cde    |
| PowerMax 3 30fl oz/a A  |            |
| Assure II 12fl oz/a A   |            |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 13 Enlist One 2pt/a A   | 95.3abc    |
| PowerMax 3 30fl oz/a A  |            |
| Assure II 12fl oz/a A   |            |
| Dual 1pt/a A            |            |
| Magnum 3qt/a A          | 6.3h       |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 14 Enlist One 2pt/a A   |            |
| Assure II 4fl oz/a A    | 3.8hi      |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 15 Enlist One 2pt/a A   |            |
| Assure II 4fl oz/a A    | 61.3f      |
| Dual 1pt/a A            |            |
| Magnum 3qt/a A          |            |
| Amsol 3qt/a A           | 88.7e      |
| COC 1qt/a A             |            |
| 16 Enlist One 2pt/a A   |            |
| Assure II 12fl oz/a A   |            |
| Amsol 3qt/a A           | 90.0de     |
| COC 1qt/a A             |            |
| 17 Enlist One 2pt/a A   |            |
| Assure II 12fl oz/a A   |            |
| Dual 1pt/a A            | 94.3a-d    |
| Magnum 3qt/a A          |            |
| Amsol 3qt/a A           |            |
| COC 1qt/a A             |            |
| 18 Enlist One 2pt/a A   |            |
| PowerMax 3 30fl oz/a A  | 99.0a      |
| Amsol 2.5% v/v A        |            |
| Select Max 6fl oz/a B   |            |
| Amsol 3qt/a B           |            |
| COC 1qt/a B             |            |
| 19 Enlist One 2pt/a A   | 99.0a      |
| PowerMax 3 30fl oz/a A  |            |
| Amsol 2.5% v/v A        |            |
| Assure II 4fl oz/a B    |            |
| Amsol 3qt/a B           |            |
| COC 1qt/a B             |            |
| 20 WEED FREE            | 99.0a      |