

# Sugarbeet

## Weed Control

 **Sequence**<sup>®</sup>

**syngenta**<sup>®</sup>



## KEY FEATURES AND BENEFITS

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- **Contact and residual weed control**

- With Sequence, sugarbeet growers are able to gain effective contact plus residual weed control of more than 100 weeds following rainfall

- **Yield Increase**

- Studies have shown that weed control programs containing Sequence yield more than those with straight glyphosate alone

- **Two modes of action**

- A premix of potassium glyphosate and S-metolachlor, Sequence offers growers a dual action herbicide to control troublesome weeds

- **Weed resistance management**

- Sequence added to a glyphosate-tolerant sugarbeet program not only manages weeds more effectively, but it also adds another mode of action to help combat glyphosate resistance

## The Sequence Advantage

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Sequence<sup>®</sup> herbicide, from Syngenta Crop Protection, offers sugarbeet growers higher yields and preserved glyphosate technology through the reliable management of severely damaging weeds threatening sugarbeets. Sequence combines the performance of two powerful weed solutions: glyphosate, a knockdown herbicide, and S-metolachlor, a residual herbicide. With its dual mode of action, Sequence broadens the window of opportunity for flexible application timing while helping progressive growers extend the performance of their glyphosate-based herbicide programs.

Sequence is one more way that Syngenta invests in the sugarbeet industry. Together, Syngenta Seeds-Hilleshög Sugarbeet Brand, Syngenta Seed Care™ and Syngenta Crop Protection offer growers a strong pipeline of solutions for their needs, as well as accessible, knowledgeable sales representatives. Syngenta also supports grower associations that contribute to the industry and benefit sugarbeet growers and their continued success. Invested in protecting sugarbeets from seed to processing, Syngenta serves as a proud partner in the advancement, sustainability and success of sugarbeets, and the industry's role in fulfilling the increasing global demand for food, fuel and energy.

## The Power of Two Modes of Action

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- **Glyphosate** is a non-selective systemic herbicide that inhibits EPSP synthase and is absorbed by leaves and shoots.
- **S-metolachlor** is primarily absorbed by emerging shoots and inhibits lipid synthesis and cell division.

## Resistance Management

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Some naturally occurring weeds that are resistant to glyphosate may exist in any weed population. The repeated use of herbicides with the same mode of action is known to lead a population of resistant weeds. Within the United States, many weed species have been identified as resistant to glyphosate, including horseweed/marestail, ryegrass, common waterhemp and Palmer amaranth. There are currently no known weed biotypes resistant to S-metolachlor.

In Sequence, glyphosate provides broad-spectrum foliar activity with essentially no soil activity. Meanwhile, S-metolachlor is primarily soil active and provides residual control of certain weeds, including those that are resistant to glyphosate. In sugarbeets with Roundup Ready<sup>®</sup> traits where more than one application of glyphosate is required, alternative burndown herbicides are recommended. For optimal weed control, use these burndown products with herbicides employing a different mode of action, multiple modes of action, or in a program with residual herbicides, such as Sequence.

## Sequence Technical Profile

|                    | SEQUENCE  |
|--------------------|---|
| <b>Chemistry</b>   | Glyphosate [EPSP Synthase Inhibitor (Weed Science Society of America (WSSA) Group 9)] and <i>S</i> -metolachlor [VLCFA Inhibitor (WSSA Group 15)] |
| <b>Formulation</b> | 2.25 pounds a.e. per gallon glyphosate and 3 pounds a.i. per gallon of <i>S</i> -metolachlor  |

## Safety Precautions

|   |   |
|---|---|
| <b>Restricted-entry Interval (REI)</b>              | 24 hours  |
| <b>Required Personal Protective Equipment (PPE)</b> | Long-sleeved shirts, long pants, chemical-resistant gloves, socks and shoes   |
| <b>PPE Required for Early Entry</b>                 | Coveralls, chemical resistant gloves, shoes and socks   |
| <b>Storage Requirements</b>                         | Keep container closed to prevent spills and contamination. Do not contaminate water, food or feed by storage or disposal. |



# Weeds Controlled and Application Rates of Sequence

| WEED SPECIES                 | SCIENTIFIC NAME                      | SEQUENCE – PINTS PER ACRE    |     |     |     |
|------------------------------|--------------------------------------|------------------------------|-----|-----|-----|
|                              |                                      | MAXIMUM WEED (HEIGHT/LENGTH) |     |     |     |
|                              |                                      | 3"                           | 6"  | 12" | 18" |
| Barley                       | <i>Hordeum vulgare</i>               |                              |     |     | 2.5 |
| Barnyardgrass                | <i>Echinochloa crus-galli</i>        |                              | 2.5 | 3.5 |     |
| Buckwheat, wild <sup>1</sup> | <i>Polygonum convolvulus</i>         | 3                            |     |     |     |
| Cocklebur, common            | <i>Xanthium strumarium</i>           |                              |     | 2.5 | 2.5 |
| Crabgrass                    | <i>Digitaria</i> spp.                |                              | 2.5 | 2.5 |     |
| Filaree                      | <i>Erodium</i> spp.                  |                              | 2.5 | 3.5 |     |
| Foxtails                     | <i>Setaria</i> spp.                  |                              |     | 2.5 | 2.5 |
| Knotweed                     | <i>Polygonum aviculare</i>           |                              | 2.5 | 3.5 |     |
| Kochia                       | <i>Kochia scoparia</i>               | 2.5                          | 2.5 |     |     |
| Lambsquarters, common        | <i>Chenopodium album</i>             |                              | 2.5 | 3.0 | 3.5 |
| Mustard, blue                | <i>Chorispora tenella</i>            |                              |     | 2.5 | 2.5 |
| Mustard, tansy               | <i>Descurainia pinnata</i>           |                              |     | 2.5 | 2.5 |
| Mustard, tumble              | <i>Sisymbrium altissimum</i>         |                              |     | 2.5 | 2.5 |
| Mustard, wild                | <i>Brassica kaber</i>                |                              |     | 2.5 | 2.5 |
| Nightshade, black            | <i>Solanum nigrum</i>                | 2.5                          | 2.5 | 3.5 |     |
| Nightshade, hairy            | <i>Solanum sarrachoides</i> Sendtner | 2.5                          | 2.5 | 3.5 |     |
| Oats                         | <i>Avena sativa</i>                  |                              | 2.5 |     | 2.5 |
| Oats, wild                   | <i>Avena fatua</i>                   |                              | 2.5 |     | 2.5 |
| Pigweed                      | <i>Amaranthus</i> spp.               |                              | 2.5 | 2.5 | 3   |
| Puncturevine                 | <i>Tribulus terrestris</i>           | 2.5                          | 3.5 |     |     |
| Purslane, common             | <i>Portulaca oleracea</i>            | 2.5                          | 3.5 |     |     |
| Sandbur, field               | <i>Cenchrus incertus</i>             |                              |     | 2.5 |     |
| Sandbur, southern            | <i>Cenchrus echinatus</i>            |                              | 2.5 | 2.5 |     |
| Smartweed (ladysthumb)       | <i>Polygonum persicaria</i>          |                              | 2.5 | 3.5 |     |
| Smartweed, Pennsylvania      | <i>Polygonum pennsylvanicum</i>      |                              | 2.5 | 3.5 |     |
| Sowthistle, annual           | <i>Sonchus oleraceus</i>             |                              | 2.5 | 3.5 |     |
| Sunflower, common            | <i>Helianthus annuus</i>             |                              |     |     | 2.5 |
| Thistle, Russian             | <i>Salsola iberica</i>               | 2.5                          | 3.5 |     |     |
| Velvetleaf                   | <i>Abutilon theophrasti</i>          |                              | 2.5 | 3.5 |     |
| Waterhemp                    | <i>Amaranthus</i> spp.               |                              | 2.5 | 3.5 |     |
| Wheat                        | <i>Triticum aestivum</i>             |                              |     | 2.5 | 2.5 |

<sup>1</sup> Partial control.

Sequence applied after weed emergence will not control glyphosate-resistant biotypes.

## Application Information

### APPLICATION RATES AND EQUIVALENTS

| SEQUENCE<br>(PT/A) | GLYPHOSATE (LB AE/A) | TOUCHDOWN TOTAL <sup>®</sup><br>EQUIVALENT (FL OZ/A) | S-METOLACHLOR<br>(LB AI/A) | DUAL MAGNUM <sup>®</sup><br>EQUIVALENT (PT/A) |
|--------------------|----------------------|--|----------------------------|---|
| 2.5                | 0.7                  | 21   | 0.94                       | 1   |
| 3                  | 0.84                 | 26   | 1.13                       | 1.18  |

### APPLICATION WINDOW AND RATES

| CROP GROWTH STAGE                 | SOIL TEXTURE    | MAXIMUM USE RATE FOR<br>SINGLE APPLICATION (PT/A) |
|-----------------------------------|-----------------|---|
| Two to Eight True Leaf            | Coarse          | 2.5   |
| Two to Eight True Leaf            | Medium and Fine | 3   |
| Eight True Leaf to Canopy Closure | All             | 2.5   |




### APPLICATION GUIDELINES

- Apply Sequence postemergence to sugarbeet varieties that are genetically modified to be tolerant to glyphosate. An application of Sequence to a sugarbeet variety that is not glyphosate-tolerant will result in crop death.
- Since sugarbeet seedlings are very sensitive to weed competition, applications of Sequence should be made when weeds are small (2 to 4 inches).
- Optimum weed control with Sequence can be achieved as part of a weed control program with other herbicides (see chart on next page).
- Control of annual and perennial weeds with Sequence may be improved by adding dry ammonium sulfate (AMS) at 1 percent to 2 percent by weight, or 8.5 to 17 pound per 100 gallons of water. Liquid formulations of AMS may be used at an equivalent rate. Do not reduce the rate of Sequence when using AMS.
- For ground applications, apply Sequence in 10 to 40 gallons of spray mixture per acre.
- For aerial applications, apply in 3 to 15 gallons of water per acre.
- Prolonged exposure of Sequence to uncoated steel surfaces may result in corrosion and possible failure to the part.



## Application Information *(continued)*

### SUGGESTED PROGRAM FOR SUGARBEET WEED CONTROL

| FIRST APPLICATION   | SECOND APPLICATION  | THIRD APPLICATION   |
|---|---|---|
| <b>CROP GROWTH STAGE</b>  |   |   |
|  |  |  |
| <b>Two to Four Leaf Stage</b>   | <b>Six to Eight Leaf Stage</b>  | <b>Eight Leaf to Canopy Closure</b>   |
| Touchdown Total   | Sequence  | Touchdown Total   |
| Touchdown Total   | Sequence  | Sequence  |

### APPLICATION RESTRICTIONS

- Do not apply Sequence before crop emergence.
- Make no more than 4 applications and do not exceed 6.8 pt/A of Sequence per season.
- The interval between applications must be not less than 10 days.
- Apply Sequence at least 60 days before harvest (PHI).
- Do not apply Sequence through any type of irrigation system.
- Do not apply when conditions may cause drift to non-target areas.
- The season maximum application rates for active ingredients (where used in sequence with other glyphosate and S-metolachlor-containing products such as Touchdown Total® or Dual Magnum® herbicides) are as follows:

| CROP GROWTH STAGE                 | GLYPHOSATE (LB AE/A) | S-METOLACHLOR (LB AI/A) |
|-----------------------------------|----------------------|-------------------------|
| Two to Eight True Leaf            | 1.95                 | 2.54                    |
| Eight True Leaf to Canopy Closure | 1.56                 | 2.54                    |

## Activation

Sequence provides residual control of grass and small-seeded broadleaf weeds that emerge after application. However, if activating rainfall or irrigation (0.25 inches) is not received within 7 days after application, residual control may be reduced.

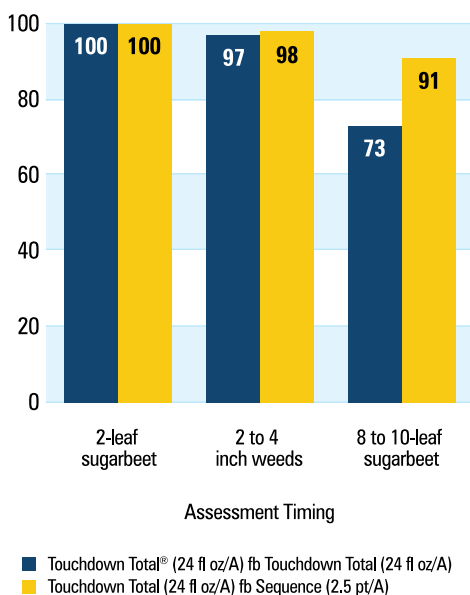
### ROTATIONAL CROP GUIDELINES\*

| TIME                  | CROP(S)                            |
|-----------------------|------------------------------------|
| Zero (0) Days         | Corn, pod crops, sorghum, soybeans |
| 120 Days (4 Months)   | Alfalfa                            |
| 135 Days (4.5 Months) | Barley, oats, rye, wheat           |
| 180 Days (6 Months)   | Tomatoes                           |
| 270 Days (9 Months)   | Clover                             |

\* Corn, pod crops, sorghum, soybeans, root crops, barley, buckwheat, milo, oats, rye, wheat, cabbage, peppers, stone fruits or tree nuts may be planted in the spring following treatment.

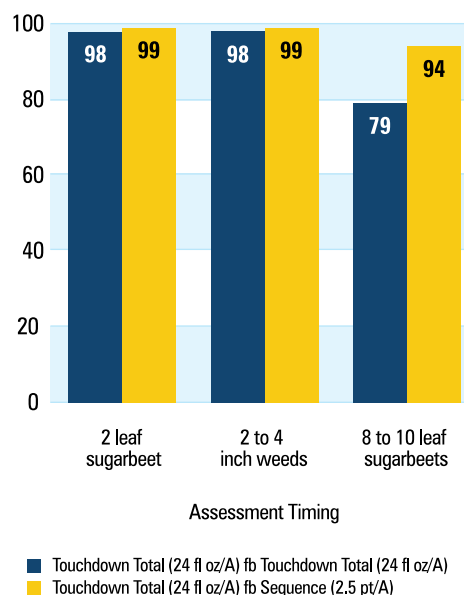
## Performance Results

### BARNYARD GRASS CONTROL (IN PERCENT) IN GT SUGARBEET USING SEQUENCE VS. GLYPHOSATE



**Notes:** App. 1 at 2 true leaf stage. App. 2 at 6 to 8 true leaf stage/2 to 4 inch weeds. [App. 3 (optional) at 10 to 12 true leaf stage of Touchdown Total or Sequence.]  
**Source:** Nine university trials (1 trial with 3 different planting dates), 2008 and 2009. Univ. of Idaho, Univ. of Nebraska, Colorado State Univ. and Univ. of Wyoming.

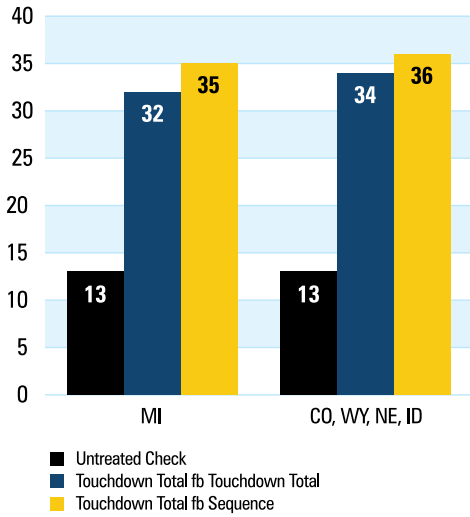
### BROADLEAF CONTROL (IN PERCENT) IN GT SUGARBEET USING SEQUENCE VS. GLYPHOSATE



**Notes:** App. 1 at 2 true leaf stage. App. 2 at 6 to 8 true leaf stage/2 to 4 inch weeds. [App. 3 (optional) at 10 to 12 true leaf stage of Touchdown Total or Sequence.]  
**Source:** Nine university trials (1 trial with 3 different planting dates), 2008 and 2009. Univ. of Idaho, Univ. of Nebraska, Colorado State Univ. and Univ. of Wyoming.

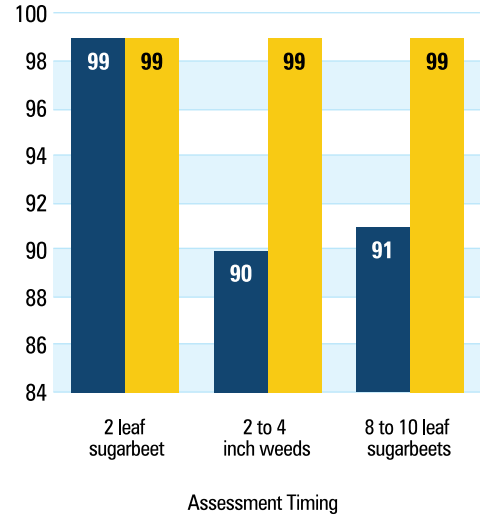
# Performance Results

**YIELD (TON/A) IN GT SUGARBEETS USING SEQUENCE VS. GLYPHOSATE**



**Notes:** CO, WY, NE, ID data combination of nine university trials (1 trial with 3 different planting dates), 2008 and 2009.  
**MI Source:** Michigan State University Weed Science Research Program – Bean and Beet Research Center, 2009.  
**CO, WY, NE, ID Sources:** Univ. of Idaho, Univ. of Nebraska, Colorado State Univ. and Univ. of Wyoming.

**PERCENT CONTROL OF COMMON LAMBSQUARTERS IN GT SUGARBEETS USING SEQUENCE VS. GLYPHOSATE**



**Notes:** App. 1 at 2 true leaf stage. App. 2 at 6 to 8 true leaf stage/2 to 4 inch weeds. [App. 3 (optional) at 10 to 12 true leaf stage of Touchdown Total (24 fl oz/A) or Sequence (2.5 pt/A).]  
**Source:** Michigan State University Weed Science Research Program – Bean and Beet Research Center, 2009.



For more information, visit [www.syngentacropprotection.com](http://www.syngentacropprotection.com), [www.FarmAssist.com](http://www.FarmAssist.com) or call the Syngenta Customer Center at 1-866-SYNGENT(A) (796-4368).

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