



Bicyclopyrone:

The Unique Active Ingredient That
Helps Acuron Brand Herbicides
Deliver Maximum Performance



syngenta[®]

▼ Problem:

Weeds Are Becoming Harder To Control

As weeds become harder to control with each passing season, growers are actively seeking herbicides that control nutrient- and yield-robbing weeds better, faster, longer and with greater consistency.

- ▶ 7 out of every 10 growers are looking for improved waterhemp and Palmer amaranth control¹



- ▶ Growers say consistent performance on heavy weed populations is the driving factor when choosing a preemergence corn herbicide²



- ▶ Growers rank controlling heavy-pressure weeds, specifically broadleaf weeds, with greater consistency as most important when choosing a corn herbicide³



▼ Solution:

A Unique Active Ingredient Specially Developed To Meet Grower Needs

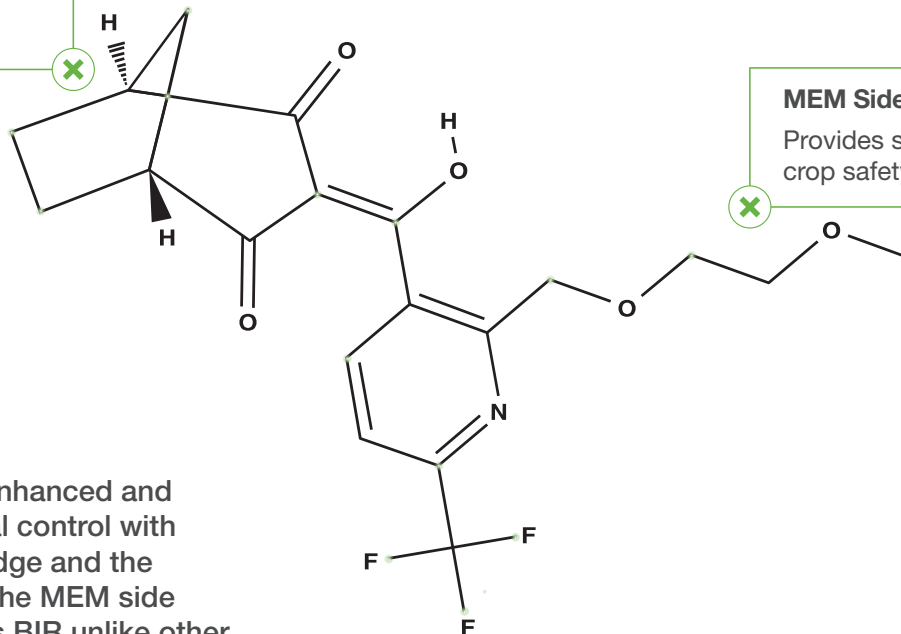
To help corn growers control tough weeds other products were missing, Syngenta went in search of a new molecule for higher level weed control. Scientists researched and developed bicyclopyrone (BIR) over 18 years to provide faster knockdown, enhanced control and longer-lasting residual weed control. What makes BIR so unique? It's in the way the molecule was designed.

THE BIR MOLECULE

The BIR molecule has two unique features that power its performance:

Bicyclic Dione Bridge

Provides enhanced and longer-lasting residual control



MEM Side Chain

Provides superior crop safety

The combination of enhanced and longer-lasting residual control with the bicyclic dione bridge and the superior crop safety the MEM side chain provides makes BIR unlike other HPPD-inhibiting herbicides.

“ When we started evaluating BIR in corn, it became evident pretty quickly that we had a superior product relative to other HPPD herbicides that offered improved control of large-seeded broadleaf weeds. Today, it’s still one of the best offerings for corn farmers I have ever seen in terms of broad-spectrum weed control.”

Stott Howard, Ph.D, Heartland Region Head for Crop Protection Field Development, Syngenta



Today, BIR delivers a step change in weed management over industry standards as part of our Acuron corn herbicide brands:



▶ **Acuron® corn herbicide**

- For preemergence and post-emergence control, Acuron helps growers find 5-15 more bushels than any other corn herbicide because of its combination of powerful weed control, longest-lasting residual and proven crop safety⁴
- Contains four active ingredients and three effective sites of action

▶ **Acuron Flexi corn herbicide**

- Excellent preemergence and post-emergence crop safety enables application flexibility from 28 days preplant up to 30-inch corn
- Contains three active ingredients and two effective sites of action

▶ **Acuron GT corn herbicide**

- The only glyphosate premix available with the active ingredient BIR; this advanced technology makes Acuron GT the ultimate post-emergence-plus-residual herbicide
- Contains four active ingredients and three sites of action

▼ BIR Plus Mesotrione:

A Dynamic, Powerful Duo

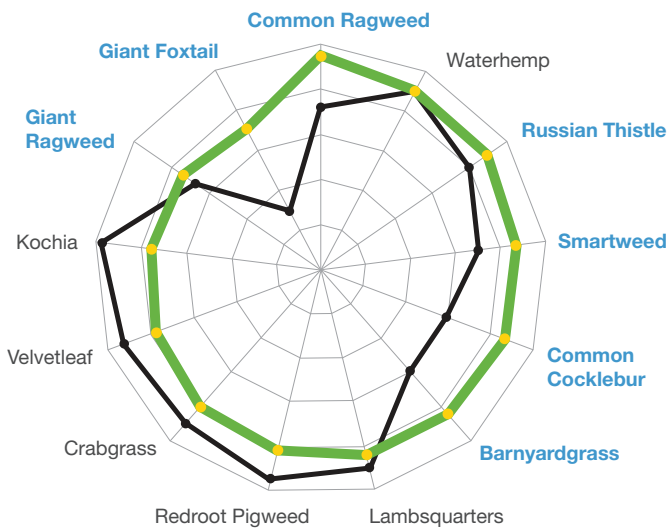
BIR complements mesotrione, another active ingredient in Acuron brand herbicides. Together they bring an improved level of broad-spectrum weed control in both preemergence and post-emergence corn herbicide applications.

► LET'S TAKE A CLOSER LOOK

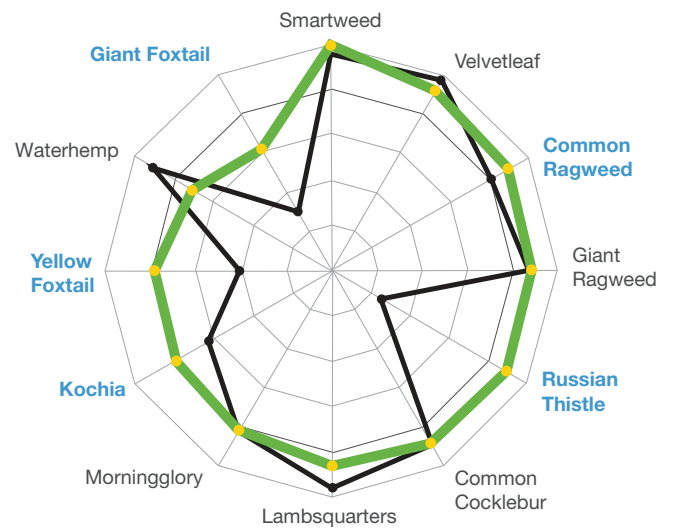
Comparing the weed control profiles of **BIR** and **mesotrione** – where the farther the line is from the center of each chart, the better the control – it's clear both active ingredients complement each other's strengths and weaknesses, resulting in an enhanced level of overall control that growers can trust.

Bicyclopyrone (BIR) ■ Mesotrione (Callisto® corn herbicide) — Enhanced control with BIR ■

RESIDUAL CONTROL
(preemergence to weed) – 28 DAT



FOLIAR CONTROL
(post-emergence to weed) – 7 DAT



Preemergence, BIR alone provides enhanced residual control of barnyardgrass, common cocklebur, common ragweed, giant foxtail, giant ragweed, smartweed and Russian thistle. Post-emergence, BIR alone provides enhanced control of common ragweed, kochia, Russian thistle and giant and yellow foxtail. The BIR plus mesotrione combination is especially effective on difficult-to-control broadleaf weeds like cocklebur, giant ragweed, kochia, morningglory, Palmer amaranth and waterhemp.

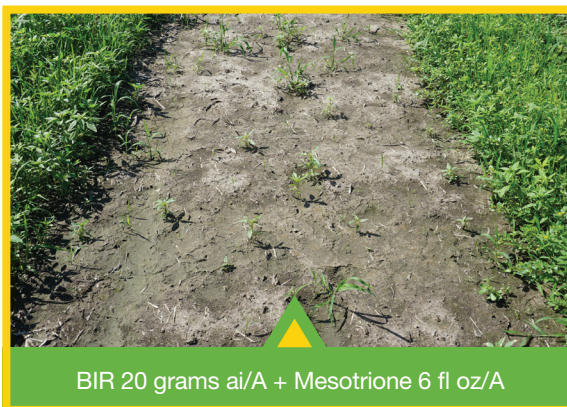
PRE application rate: BIR 0.7 oz ai/A; Mesotrione 4.96-6.4 fl oz/A | POST application rate: BIR 0.7 oz ai/A; Mesotrione 2.85-3.2 fl oz/A +/- Adjuvant | BIR rate of 50 g/ha = rate applied in 3 qt/A of Acuron herbicide | Weed Control 28 +/- 7 Days After Treatment (DAT) | Sources: PRE = 77 internal Syngenta and external university trials in the U.S.; 2008-2017. POST = 264 internal Syngenta and external university trials in the U.S.; 2008-2017.

▼ BIR Plus Mesotrione In Action

When BIR and mesotrione are combined, they provide enhanced residual and foliar weed control. Here's what that looks like in the field.

RESIDUAL CONTROL (preemergence to weed)

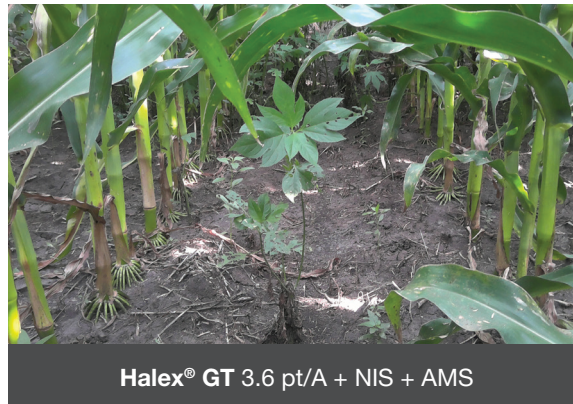
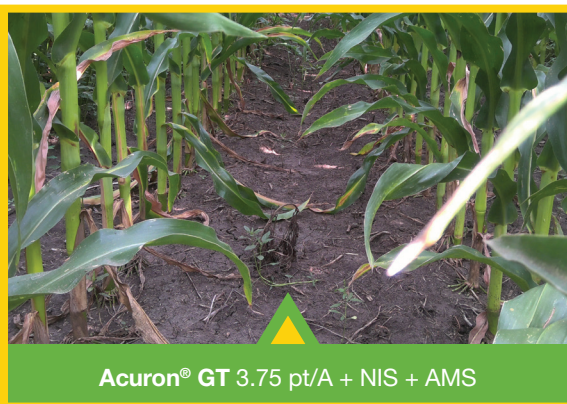
BIR plus mesotrione resulted in a cleaner field 28 days after treatment (DAT) compared to mesotrione alone. Weeds present: *Amaranthus* weeds and annual grass.



Source: Syngenta bare-ground trial, Pana, IL; 2019.

FOLIAR CONTROL (post-emergence to weed)

BIR helped Acuron GT provide enhanced control of giant ragweed compared to Halex® GT 56 DAT.



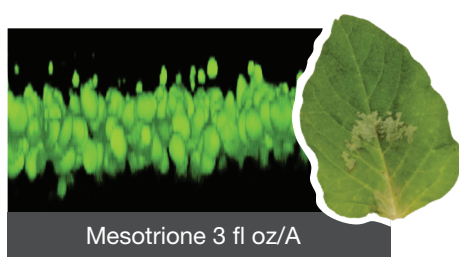
Source: Syngenta trial: Byron, MN. 2020.

Why Are BIR Plus Mesotrione So Effective Together?

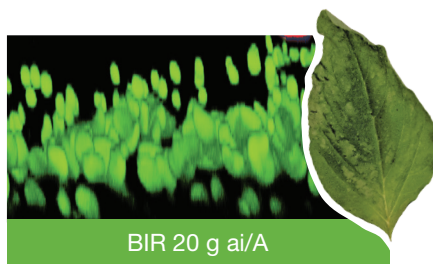
BIR and mesotrione interrupt chloroplast activity by blocking the function of the essential plant enzyme HPPD. They are both competitive inhibitors of HPPD and by binding very tightly to the enzyme's active site, they render the enzyme inactive. This stops the formation of carotenoid pigments, leading to bleaching in sensitive plants/weeds. Corn plants are tolerant because they rapidly metabolize BIR and mesotrione into inactive compounds.

Let's Look Under the Microscope

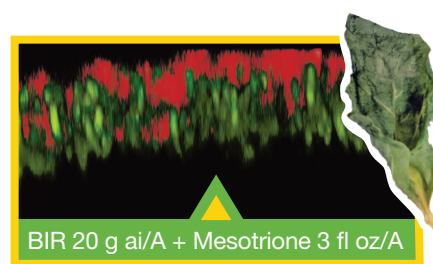
We used a laser-scanning microscope to visualize chloroplast activity after applications of the HPPD components in Acuron on waterhemp (*Amaranthus*) leaves. **BIR plus mesotrione provided a significant reduction in chloroplast activity.**



You can see signs of leaf injury; chloroplast imaging revealed slight deterioration.



You can see clear signs of leaf injury; chloroplast imaging revealed significant deterioration.



The leaf treated with both BIR and mesotrione showed enhanced control. You can see the leaf is beginning to die; chloroplast imaging showed signs of necrosis (red areas = plant death).

Source: Jealott's Hill International Research Center in the United Kingdom; 2021.

How Can BIR Help Growers?

We understand that growers' needs are different and that's why we developed Acuron, Acuron Flexi and Acuron GT. No matter which BIR-powered corn herbicide brand growers choose for their farm, they'll reap the following on-farm benefits:

- ▶ Faster knockdown
- ▶ Enhanced and more consistent weed control
- ▶ Longer-lasting residual
- ▶ Superior crop safety
- ▶ Protection of more corn yield potential than competitive herbicides

Acuron, Acuron Flexi and Acuron GT Accolades

- ▶ Acuron is the #1 corn herbicide⁵
- ▶ Growers rank Acuron the highest-recommended preemergence and post-emergence herbicide for control of tough weeds⁶
- ▶ Acuron Flexi has been the most preferred brand for the past three years⁷
- ▶ Acuron GT was the 2021 New Product of the Year award winner⁸



Want More Information?

Talk to your local Syngenta retailer or sales rep, or visit www.Syngenta-US.com/Crop-Protection/Herbicides to learn more about Acuron brand corn herbicides.



¹Syngenta market research; 2019.

²Syngenta market research; 2021.

³Syngenta market research; 2021.

⁴Acuron yield advantage range based on 2016 Syngenta and university replicated trials comparing Acuron to Corvus[®], Resicore[®], SureStart[®] II, and Verdict[®] applied preemergence at full and labeled rates.

⁵Acuron is the #1 corn herbicide premix. FarmTrak data: all U.S. corn herbicide acres; 2021.

⁶Syngenta market research; 2021.

⁷Stratus survey 2019, 2020 and 2021.

⁸The Scoop's 2021 New Product of the Year: <https://www.thedailyscoop.com/news/new-products/scoops-2021-new-product-year#>.



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Performance assessments are based upon results or analysis of public information, field observations and/or internal Syngenta evaluations. Trials reflect treatment rates commonly recommended in the marketplace.

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