

Technical Bulletin



ARREST the Spread of Herbicide Resistant Kochia

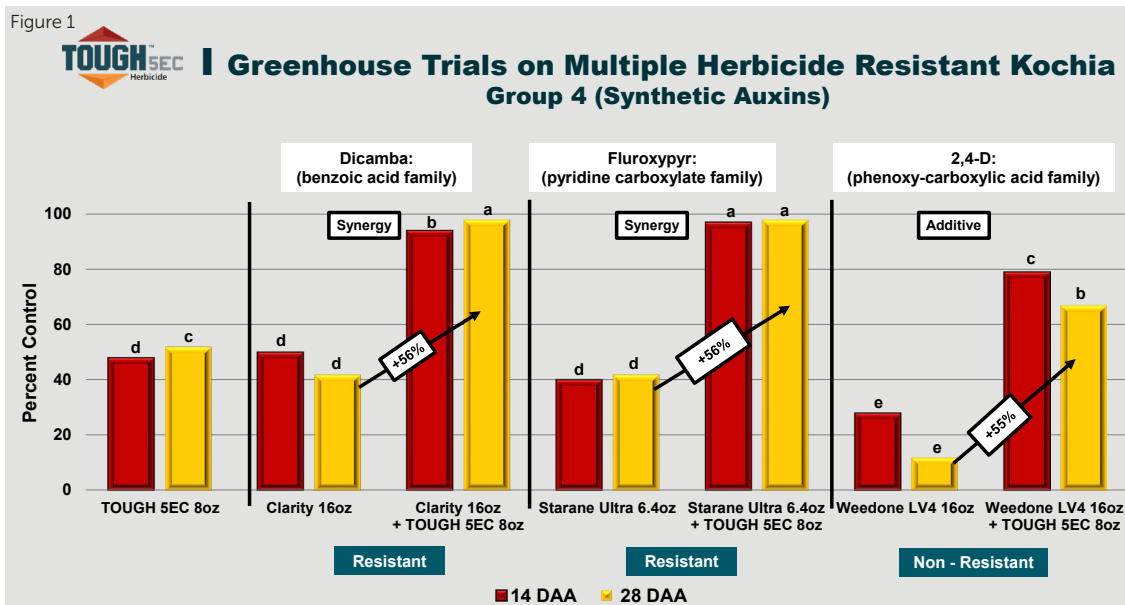
The rapid evolution of kochia populations that are resistant to multiple herbicide Groups: G9 (glyphosate), G2 (ALS), G4 (Clarity, Starane Ultra, 2,4-D), G5 (atrazine) and G14 presents a serious management challenge for limiting economic crop production loss from weed competition. Adding to the urgency is the fact that no new chemistries are on the horizon for kochia control. Therefore, it is imperative that growers utilize all available tools to preserve the herbicide chemistries we have available today.



Photo shows kochia quickly outnumbering corn plants in field.

Research conducted in 2023, by Dr. Kumar while at Kansas State University, recently published in Weed Technology Journal*, suggests that tank-mixing TOUGH® 5EC with: Glyphosate, Clarity, Starane Ultra, atrazine and others results in unexpected “synergistic” or additive levels of increased control of herbicide resistant kochia.

Results of a greenhouse trial on multiple herbicide classes resistant (MHCR) kochia (Figure 1) shows synergy [defined by Colby’s Formula] for dicamba and fluroxypyr and additive control with 2,4-D when including TOUGH 5EC in the spray-mix. Plants were 2.4-3.5” tall at application.



Kochia confirmed resistant: dicamba and fluroxypyr NIS 0.25% added to all Dr. Kumar, Kansas State University - 2023

*<https://www.cambridge.org/core/journals/weed-technology/article/synergistic-effect-of-pyridatebased-herbicide-mixtures-for-controlling-multiple-herbicide-resistant-kochia/5BD8767BC7F9F326916BEE24F7841F9>

See Reverse



Belchim USA

225 Wilmington West Chester Pike | Suite 200 | Chadds Ford, PA 19317

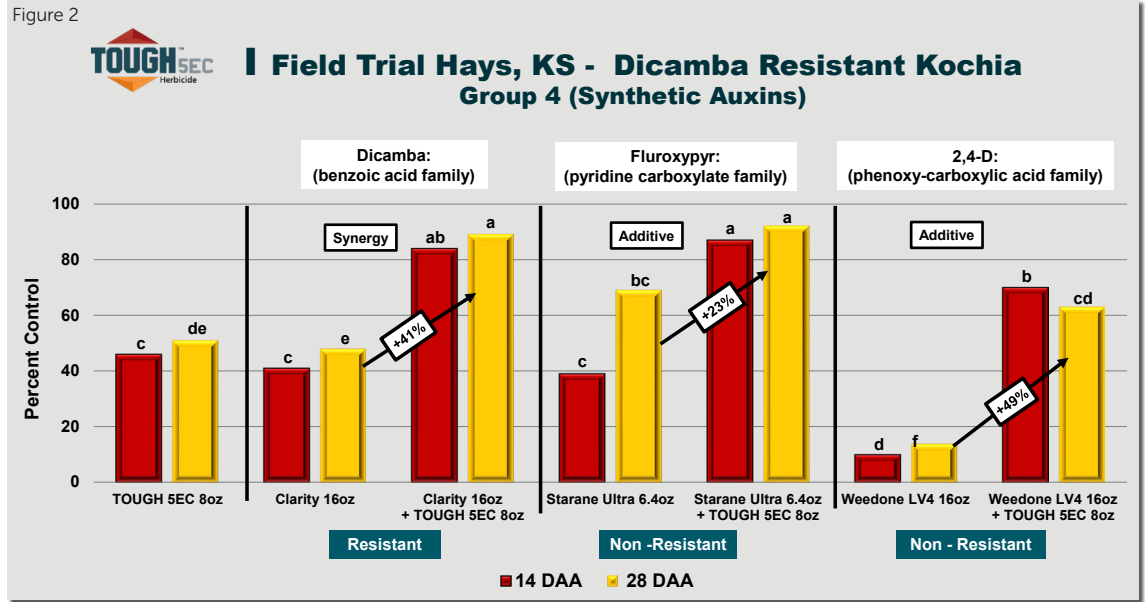
Phone: 855-445-7990 | www.belchimusa.com

info.usa@belchim.com

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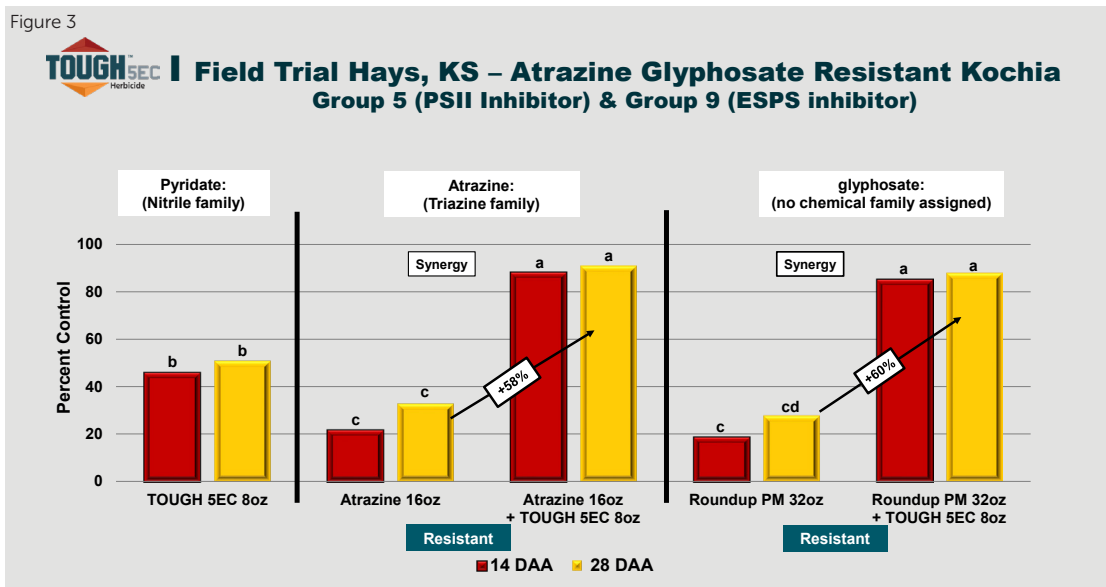
GROWING TOGETHER

Field trials were initiated based on the findings of the greenhouse studies. Results shown in Figure 2 corroborate the findings in the greenhouse trials, showing TOUGH’s synergistic effect, and significant improved control of both resistant and non-resistant kochia.



Kochia confirmed resistant: dicamba resistant NIS 0.25% added to all Dr. Kumar, Kansas State University - 2023

Additional field trials were conducted on atrazine and glyphosate resistant kochia. The results (Figure 3) clearly show the synergistic effect of adding TOUGH 5EC to the tank for a dramatic increase in control of this herbicide-resistant weed. Although TOUGH is also a PSII inhibitor like atrazine, it uniquely binds to a different site than atrazine, giving improved control of atrazine resistant weeds.



In previous trials across the cornbelt, increased levels of control have been observed with other weeds, such as common waterhemp and palmer amaranth, when adding TOUGH to these herbicides

Kochia confirmed resistant: atrazine & glyphosate NIS 0.25% added to all Dr. Kumar, Kansas State University - 2023

The research conducted at Kansas State University demonstrates that TOUGH 5EC is a tool available now to ARREST the spread of resistance and preserve many of the current POST herbicide tools!

