The importance of stacked corn traits

Planting corn hybrids with multiple herbicide tolerances and modes of action against pests helps protect yield potential, reduce labor and fuel needs, and preserve more tools for future use.

Pest problems in corn

Corn crops face several pest challenges from insects, weeds and even volunteer corn. There can be multiple ways to deal with these pressures, including incorporating integrated pest and/or weed management programs. However, attention also needs to be paid to the potential for weed and insect resistance. Left unchecked, insects like corn earworm and European corn borer can damage yields, with declines of up to 25% from corn borer presence.[1] Weed like waterhemp and marestail can take 5-20% and 32% of corn yield, respectively.[2,3] Highly competitive volunteer corn can reduce yields by 13% in corn fields while encouraging western corn rootworm and gray leaf spot disease in later crops.[4]

Introduction of biotechnology traits

The 1996 release of herbicide-tolerant corn and hybrids with protection against European corn borer changed farming practices. Corn traits these days have built upon those foundations, allowing for the use of additional herbicides and protecting against more insects. Traits help protect yields against damage caused by pests—following their adoption corn yields have improved by about two bushels per acre annually, which is a bigger and more consistent improvement than what farmers had experienced previously.[5]

Although hybrids with multiple traits may be more expensive than conventional hybrids, they can provide overall savings in terms of management, labor and fuel costs—especially when fuel prices are high or in areas where finding on-farm workers is a challenge. Yields also tend to be more consistent, especially when using corn hybrids with multiple stacked traits, according to data from the Wisconsin Corn Hybrid Performance Trials.[5]

Addressing weed resistance with multiple modes of action

Since the release of glyphosate-tolerant corn and the overreliance on one weed control method, 48 weed species have developed resistance.[6] Bringing new traits to market takes a long time, which heightens the importance of employing an integrated weed management program that uses multiple tools—including row spacing, mechanical practices and incorporating herbicides with multiple, different modes of action.[7]

Corn hybrids with tolerance to multiple herbicides allow for the use of more modes of action against weeds and extend the lifetime of these herbicides by delaying the development of resistance. For example, planting PowerCore® Enlist® corn provides tolerance to four herbicides, including 2,4-D choline, glyphosate, glufosinate and FOPs. Glufosinate and 2,4-D choline can help manage late-season broadleaf weeds and 2,4-D choline can be sprayed on PowerCore Enlist corn up to 30" without causing damage. Having access to multiple modes of action also helps farmers address glyphosate-resistant grasses—including volunteer corn. Planting PowerCore Enlist corn, which is tolerant to FOPs, provides a way to control resistant grasses and volunteer non-Enlist® corn in Enlist corn fields with options like Assure II.[8]

Conclusion

There is a selection of tools available to farmers seeking to control weeds and insects in corn fields. However, as weeds and insects develop resistance to chemical control products, making the best use of integrated programs helps protect yield potential and supports the use of current control methods into the future. Planting corn hybrids with tolerance to herbicides with multiple modes of action—like PowerCore Enlist corn—can be one way to help farmers manage weeds and pests.

---

[1] Myers, Scott, Michael Ballweg, and John Wedberg. "Assessing the Impact of European Corn Borer on Corn Grown for Silage," *Focus on Forage* 3, no. 3(2000).

[2] Hartzler, Bob, and Dawn Nordby. "Influence of Corn on Waterhemp Growth," Iowa State University Extension and Outreach: Integrated Crop Management. Accessed September 1, 2022. https://crops.extension.iastate.edu/encyclopedia/influence-corn-waterhemp-growth.

[3] "Resistant Horseweed (Conyza Canadensis) with Tiafenacil Mixes in Corn." *Weed Technology* 35, no. 6 (2021): 908–11. doi:10.1017/wet.2021.44.

[4] Chalal, Parminder, and Amit Jhala. "Control of Glyphosate-Resistant Volunteer Corn in LibertyLink Soybean." Cropwatch. Updated June 12, 2017. https://cropwatch.unl.edu/2017/control-glyphosate-resistant-volunteer-corn-liberty-link-soybean.

[5] Gullickson, Gil. "Are Traits Worth the Expense?" *Successful Farming* March 10, 2017. Accessed September 1, 2022. https://www.agriculture.com/are-traits-worth-the-expense.

[6] Baek, Yousoon, Lucas Bobadilla, Darci Giacomini, Jacob Montgomery, Brent Murphy, and Patrick Tranel. "Evolution of Glyphosate-Resistant Weeds." Reviews of environmental contamination and toxicology vol. 255 (2021): 93-128. doi:10.1007/398_2020_55.

[7] Blois, Matt. "Following several fallow decades, herbicide companies are searching for new modes of action." *C&EN* 100 no 22, June 17, 2022. https://cen.acs.org/environment/pesticides/crop-protection-herbicide-mode-action-glyphosate/100/i22.

[8] Hartzler, Robert, and Prashant Jha. "2021 Herbicide Guide for Iowa Corn and Soybean Production." Iowa State University Extension and Outreach. Updated February 2021.