

NAGC Offers Resources for the WAR ON WEEDS

Housed on North Dakota State University's (NDSU) Fargo campus is a unique resource created to be the conduit between academic research and the farm. The National Agricultural Genotyping Center (NAGC) provides diagnostic testing for plants, animals and even honeybees. That capability is helping farmers manage numerous aspects of farming, including weed control.

The NAGC began operating in 2016 and provides a variety of testing services, including DNA tests. Farmers, crop advisors and county weed agents can send in samples for testing.

"Plants, animals and their associated pests all have DNA. We can use

that to our advantage and quickly develop new diagnostic tests, just by analyzing their DNA," NAGC research scientist Zack Bateson says.

Palmer amaranth testing is one area of particular focus for the NAGC as concerns about its increase in North Dakota. Bateson explains that one of the challenges farmers face is how Palmer amaranth can be

hard to distinguish from other pigweed species when plants are small and are most susceptible to herbicide applications. A DNA test is the best way to make a positive identification.

"Our pigweed identification test is unique from other available Palmer amaranth tests in that it not only detects whether a sample contains Palmer amaranth, but we can also



NAGC staff operate the facility, located on the NDSU campus.



Research scientist Zack Bateson examines an incoming sample at the NAGC.



Early identification of pigweed species can help farmers manage them, before they mature.

tell you whether it's waterhemp or in the other pigweed groups like red-root, smooth or Powell amaranth," Bateson states. "That information can have important practical applications to what kind of herbicide farmers might use in the field."

Bateson says that the NAGC gets a lot of weed samples from county weed agents and NDSU Extension specialists. Scientists at the center are also seeing a lot more seed-testing labs send samples. Bateson explains that the NAGC can detect and differentiate Palmer amaranth from the other species from seeds as well as from leaf samples. Numerous

Palmer amaranth infestations are blamed on contaminated seed which is used to plant fields in the Conservation Reserve Program or used for pollinator habitat.

The NAGC has the capability to determine if a plant is or isn't Palmer amaranth. Bateson states that the plan is for tests to go even further: not only informing farmers what species they have in their field or seed samples, but also telling people something about those plant populations, including whether or not the weeds are herbicide resistant.

"There are genetic markers in the pigweed genome that are linked to

herbicide resistance," Bateson explains. "There are a couple markers, in particular, that we're focusing on. The first is glyphosate resistance. In that test, we're looking for a genetic marker that is more abundant in resistant plants. More copies of that genetic marker results in a lot more expression of the protein that allows weeds to escape glyphosate."

Bateson says that the NAGC is also looking to develop DNA tests which indicate resistance to other classes of herbicides, including protoporphyrinogen oxidase (PPO) inhibitors and acetolactate synthase (ALS) inhibitors. That information can be valuable for farmers to decide which herbicides to use in order to manage weeds and which products to avoid.

"We're not in the business to tell growers how to manage," Bateson contends. "We're just trying to help identify the issue because that's the first step into effective management."

Speed is also an asset. Bateson says that the NAGC was estab-

lished to be a high-throughput testing facility. With rush samples, submitters can get test results back in a matter of hours.

Bateson explains that the NAGC is working with NDSU weed scientists on multiple tests. He describes how collaboration is important for gathering and sharing results.

"We're not trying to do everything ourselves. We're always looking for collaborations, and we're always happy to try to help researchers and breeders," Bateson states. "DNA testing can be a lot of work, and you need certain equipment that a typical lab might not have. We can be the work-horse. We can provide that diagnostic data, so they can work on analysis and other elements of their research."

To learn more about the National Agricultural Genotyping Center, visit genotypingcenter.com.

—*Story and photos by Daniel Lemke*



The NAGC can use DNA to determine a weed's species, even from tiny seeds.