

Title:

Genome Editing Center for Sustainable Agriculture

Abstract:

Over the past 250 years, agricultural innovation through crop breeding has been one of the most powerful drivers of human progress. Each major leap forward - from early selective breeding to hybrid crops and modern molecular genetics - has allowed farmers to produce more food using fewer resources, while stabilizing supply chains and lowering risk. In parallel, precision genetic technologies have transformed medicine. Tools such as genome editing are now routinely used to diagnose disease, develop targeted therapies, and save lives because of their accuracy and efficiency. Agriculture now stands at a similar inflection point. Climate change, emerging pests and diseases, water scarcity, and environmental constraints demand solutions that go beyond incremental improvement. Precision genetic technologies create an opportunity to accelerate crop innovation.

North Carolina State University and the state of North Carolina are uniquely positioned to lead this next phase of agricultural innovation by translating biological discovery into practical, high-impact crop solutions. To capitalize on the opportunity, NC State has established at Genome Editing Center **a prioritized portfolio of high-impact crop improvement opportunities designed to address urgent challenges in agricultural productivity, sustainability, and market competitiveness**. The six first commercial-track projects were developed collaboratively with Professor / breeders at NC State and address critical disease threats in highly profitable specialty crops (tobacco, sweetpotato, roses) as well as agronomic trait opportunities in turfgrass and ornamental species.

Collectively these efforts are meant to reduce inputs, mitigate biotic and abiotic stress, unlock new markets, and strengthen supply-chain resilience. Collectively, these opportunities target problems that cannot be efficiently solved through conventional breeding alone and where recent advances in biological understanding create a realistic path to near- and medium-term impact. Each project is positioned to generate tangible value for growers, industry partners, and end users, while supporting environmental goals such as water conservation, reduced chemical inputs, and improved land-use efficiency.