Rwanda is advancing its fight against crop disease and low yields with innovations in potato seed multiplication, and Musanze Central Station is leading the charge.

Alongside other national seed centers in Rwerere, Gakuta, Gishwati and Nyamagabe, Musanze plays a key role in improving potato productivity and developing disease-resistant varieties. What sets Musanze apart is its advanced capacity to produce and process a wide range of high-quality potato seed varieties using modern agricultural technologies.

Nikuze Fidela, potato research coordinator at the Rwanda Agriculture and Animal Resource Development Board (RAB), said the station follows a structured process to ensure quality from lab to field. The process begins with a stage known as G0, in which tissue culture is used to produce seedlings that are free from pests and diseases.

“These are pre-basic seeds, and they serve as the foundation for our entire multiplication system,” Nikuze said.

The seedlings are then used to produce minitubers—early-stage seed potatoes—through four main systems. In the conventional screenhouse method, seedlings are planted in treated, pest-free soil inside controlled environments to produce pre-basic seed. The sandponic system involves growing seedlings in sand mixed with nutrients and treated with targeted fungicides and pesticides.

The aeroponic system, which is gaining popularity in Rwanda, suspends potato plants in air, allowing their roots to absorb nutrients from a mist environment. This encourages healthy root development and yields high-quality seed. In the direct transfer method, seedlings are initially planted in nurseries and then moved to open fields, where they grow into second-generation seeds.

These seeds are later classified into three categories basic, certified and satisfactorily seed depending on quality and market readiness.

Nikuze said specific nutrients and hormones are used to simulate natural soil conditions, helping the plants absorb sugars and other essential compounds. The mixture, which includes compost, sugar and distilled water, is carefully adjusted to a pH of around 5.9, ideal for potato growth.

“Potatoes grown under aeroponics don’t develop underground like traditional crops,” she said. “They require well-controlled environments with light and darkness cycles—typically 16 hours of light and 8 hours of darkness—at 21 degrees Celsius. After three to four weeks, they’re ready for multiplication.”

At the Open Forum on Agricultural Biotechnology (OFAB), researchers are working to tackle late blight disease, a major challenge for Rwandan farmers. Pasifique Shimiyimana, a team leader at Alliance for Science Rwanda said late blight has forced farmers to spend up to 40 percent of their investment on pesticides and labor.

“Now we have a solution,” Shimiyimana said. “We are testing genetically enhanced potato varieties that are growing without any pesticide application and showing no signs of disease. In the same fields, traditional varieties are already infected.”

He said the new varieties would allow farmers to avoid costly chemical inputs and achieve better harvests, ultimately lowering consumer prices through increased supply.

Seed multiplication is a key driver in scaling up Rwanda’s potato production. High-quality seed can increase yields from 7 to 10 tons per hectare to between 20 and 30 tons, significantly boosting farmer incomes.

Dr. Athanase Nduwumuremyi, Senior research fellow and Roots and Tubers Program coordinator at RAB

Dr. Athanase Nduwumuremyi, Senior research fellow and Roots and Tubers Program coordinator at RAB said developing new seed varieties is essential to overcoming declining yields and ensuring sustainable farming.

“We’re working to develop high-yield seeds that don’t require excessive inputs and can resist disease in both rainy and dry seasons,” he said. “These new seeds will reduce reliance on chemical pesticides and improve resilience to climate change.”

He also addressed concerns about the safety and taste of genetically enhanced potatoes. “We are not changing their nutritional value or flavor. We are simply giving them the ability to resist disease,” he said.

Dr Nduwumuremyi said all new seed varieties are subject to review by regulatory bodies such as the Rwanda Environment Management Authority to ensure consumer safety and nutritional quality.

The research is currently in laboratory stages. Once approved by relevant institutions, the seeds will be distributed to farmers for field trials.

Dr Nduwumuremyi said Rwanda’s limited arable land should not be an obstacle to achieving food self-sufficiency. With improved seeds, yields could reach up to 40 tons per hectare.

“Our goal is to align agricultural productivity with the National Strategy for Transformation and reach our food security targets by 2029,” he said.

As Rwanda continues investing in agricultural innovation, Musanze and its partner stations are proving that scientific research and local application can work hand-in-hand to secure a more sustainable future for the nation’s farmers and food systems.