CUSTOMICS sets out to make Europe's seed trade safer, smarter and more secure

Rome, September 17 – A new European research and innovation project, **CUSTOMICS**, has officially launched with a clear goal: to make vegetable seed inspections at EU borders faster, smarter and more effective, while protecting agriculture, food security and public health.

Illicit trade in seeds is a growing challenge for European agriculture. Counterfeit and illegally traded seeds can undermine intellectual property rights and disrupt legitimate markets, while inadequately controlled seed movements may also increase the risk of introducing harmful pathogens into the EU. At the same time, climate change is altering the distribution of crops, pests and plant diseases, making it easier for new threats to spread across borders.

CUSTOMICS plans to address these challenges by developing a scalable, rapid inspection platform that combines next-generation sequencing (NGS), portable technologies and secure data management to verify seed identity and detect microbial hazards. The project will use tomato seeds as a proof-of-concept crop before exploring how the approach can be extended to other vegetable species relevant to European agriculture.

From weeks of testing to rapid border decisions

Today, verifying the genetic identity of a seed variety can take weeks or even months, while conventional microbiological testing is often labour-intensive and designed to target specific pathogens. These limitations make it difficult for customs and phytosanitary authorities to make rapid decisions when goods cross EU borders. CUSTOMICS aims to change this by combining genomic authentication of seed varieties with metagenomic pathogen screening in a single, field-adapted approach. The genomic component will help determine whether seeds match their declared variety, supporting the detection of counterfeit or fraudulent products and helping to protect intellectual property rights. At the same time, metagenomic analysis will enable the screening of seed lots for a broad range of microbial contaminants, rather than relying solely on pathogen-by-pathogen testing. By bringing these capabilities closer to the point of inspection through portable sequencing technologies, CUSTOMICS strives to provide rapid and reliable information that can support real-time border control decisions.

Connecting science, customs and law enforcement

Technology alone cannot solve the challenge of illicit seed trade. CUSTOMICS therefore brings together expertise in plant science, microbiology, molecular biology, genomics, bioinformatics, plant breeding, cybersecurity, law enforcement and regulatory frameworks. A key element of the project will be the development of standardised approaches that improve interoperability among customs, phytosanitary authorities and law enforcement agencies. EU customs laboratories in Italy and France will be directly involved in validating the solutions in realistic inspection scenarios, helping ensure that the tools developed respond to operational needs. The project will also prototype a

Funded by
the European Union

cybersecurity-enabled EU-wide database of fraud and crime cases. The database will support secure information sharing and allow new incidents to be cross-referenced with previous cases, helping authorities build a more comprehensive picture of illicit seed trade and strengthen evidence-based enforcement.

"CUSTOMICS brings together advanced genomics with the realities of customs and law enforcement. It aims to develop an integrated technologically driven workflow for detecting illegal imports of agri-food products and identifying microbial contaminants that may be harmful to human health and the environment. Our ambition is to create an operational solution that can deliver timely reliable information where it is needed most – at the border," says the project coordinator Vittoria Locato from Università Campus Bio-Medico di Roma.

A One Health approach to safer food and agriculture

CUSTOMICS adopts a One Health-informed approach, recognising that plant health, environmental health, food security and public health are closely interconnected. Preventing the introduction of harmful pathogens and reducing the circulation of fraudulent seed material helps protect agricultural production and biodiversity while reducing risks to food systems and supporting consumer confidence. The project also considers the changing risk landscape created by climate change, including the potential emergence and spread of pathogens in new geographical areas.

Although tomato seeds will serve as the initial proof of concept, CUSTOMICS is being designed with scalability and replication in mind. The workflows and protocols developed by the consortium will be designed so that they can ultimately be adapted to other vegetable species of importance to European agriculture. The project will also place end users at the centre of the development process. Customs and law enforcement authorities, together with phytosanitary and regulatory stakeholders, will help shape and validate the solutions to ensure that they are practical, legally compliant and fit for real-world use. By combining cutting-edge genomics, portable technologies, cybersecurity and the expertise of European enforcement authorities, CUSTOMICS aims to build a new generation of intelligent border inspection capabilities, helping Europe tackle illicit seed trade while protecting the resilience of its food and agricultural systems.

KEY FACTS

Full Name: Leveraging Cybersecurity and NGS Protocols for the Detection of Illegal Vegetable Varieties and Microbiological Hazards to Strengthen EU Customs Security

Start date: September 1, 2026

Project duration: 36 months

Funded by
the European Union

Budget: €2,792,002.50

Project Coordinator: Università Campus Bio-Medico di Roma

WEBSITE: customics-project.eu

Social media: LinkedIN

PROJECT PARTNERS:

FRANCE:

- ESSEC Business School
- Service Commun des Laboratoires (SCL)

CROATIA:

- RISE- Research and Innovation Services d.o.o.

ITALY:

- Agenzia delle Dogane
- Arma dei Carabinieri
- Genechron Srl
- Università Campus Bio-Medico di Roma

NETHERLANDS:

- Douane Laboratorium

SPAIN:

- Center for Research in Agricultural Genomics
- IESE Business School
- Sequentia Biotech

CONTACT

Project Coordinator

Università Campus Bio-Medico di Roma

Vittoria Locato

Email: V.Locato@unicampus.it

Project Management

RISE- Research and Innovation Services d.o.o.

Josip Luša

Email: j.lusa@rise-innovation.eu

Funded by the European Union

CUSTOMICS

Funded by
the European Union