

VIRTIGATION - Press Release



EU-funded VIRTIGATION project tackles viral disease in tomatoes and cucurbits

15 September 2021 – The EU-funded VIRTIGATION project has been launched to develop solutions against emerging viral diseases in tomatoes and cucurbits. Especially begomoviruses and tobamoviruses are threatening tomatoes and cucurbits across the world, having already led to colossal losses ranging from 15% to devastating entire yields.

Currently, the most dangerous begomoviruses affecting tomatoes and cucurbits are the Tomato yellow leaf curl virus (TYLCV) and the Tomato leaf curl New Delhi virus (ToLCNDV), both transmitted by whiteflies. Since the early 1990s, TYLCV has been wreaking havoc in greenhouses and fields in Spain and Italy, and ToLCNDV was detected for the first time in Europe in 2012, infecting zucchini in Spain. In recent years, another pathogen has emerged as a serious threat to tomatoes: the tobamovirus known as Tomato brown rugose fruit virus (ToBRFV), which is transmitted mechanically through, for example, injuries on plants. This tobamovirus has not only hit Southern Europe, but also Northern Europe: outbreaks have affected Germany, the Netherlands, the UK, France and Belgium.

Similar to the human SARS-CoV-2 virus, these plant viruses are not limited by European borders. Tomato and cucurbit crops were ravaged in EU neighboring countries and trade partners like Morocco, Israel and India, thereby making these plant viruses a global challenge. The EU-funded VIRTIGATION project aims to protect tomatoes and cucurbits from these viral diseases.

Multi-billion value chain at risk

Tomato and cucurbit plants infected by these viruses often develop severe symptoms, which cause a decrease in photosynthesis and a disruption of the plant hormone balance and the growth physiology of the plant. While the begomoviruses ToLCNDV and TYLCV are transmitted rapidly due to their whitefly vector, the mechanically transmitted tobamovirus ToBRFV circulates even faster. Warm weather conditions and the increasing emergence of pesticide resistance in insects are likely accelerating the spread of these viruses. Intensive production practices, like pruning and trellising followed by multiple sequential harvesting, are also likely accelerating ToBRFV spread. These plant viruses are spreading rapidly through fields and greenhouses, as these viruses are highly stable and aggressive. To date, few viable remedies exist to tackle the devastation caused by these plant viruses. Currently, mainly chemical pesticides, aimed at the virus-transmitting vectors, are being used to

manage these viruses, thereby exposing growers, consumers and the environment to dangerous chemical residues. Unless effective and environmentally friendly solutions are found to protect tomatoes and cucurbits against damage from these viruses, a multi-billion value chain is at risk.

Bio-based innovations to reduce pesticides and crop losses

In response to these global virus threats, the VIRTIGATION project aims to reduce tomato and cucurbit crop losses by up to 80%. In Europe and Israel, VIRTIGATION seeks to possibly even eradicate crop losses. Moreover, the project aims to cut in half, or even fully eliminate in some circumstances, the use of chemical pesticides to control plant viruses and their insect vectors. VIRTIGATION will propose and demonstrate several innovative bio-based solutions, which, alone or in combination, will target the viruses, and whiteflies transmitting these diseases, in tomato and cucurbit plants. The project will develop integrated pest management strategies, including plant vaccines based on cross-protection, natural viral resistance by classical breeding techniques, biopesticides, like plant extracts, targeting viral insect vectors, and sustainable disinfection of contaminated soil and substrate.

Furthermore, VIRTIGATION strives to enable a deeper understanding of plant-virus-vector interactions, by considering the impacts caused by climate change. It will also develop advanced diagnostic tools like viral genome sequencing to enable the early detection of virus variants, and further identify conditions and factors leading to outbreaks. Finally, VIRTIGATION's proposed solutions will be validated in industrially relevant field trials equivalent to Technology Readiness Level - TRL 5.

International collaboration led by the world-renowned Katholieke Universiteit Leuven – KU Leuven

VIRTIGATION brings together 25 partners from academia, industry, research & technology organizations, agricultural extension services and SMEs from 12 countries: Belgium, Spain, Luxembourg, UK, Italy, the Netherlands, France, Germany, Austria, Israel, Morocco and India. VIRTIGATION is led by the Department of Biosystems at the KU Leuven university in Belgium, one of the oldest and most renowned research universities across the globe. The VIRTIGATION Coordinator, Hervé Vanderschuren, Professor of Tropical Horticulture, outlines the ambition of the project:

“Over the last years, the society has become aware of the importance to develop our capacities to cope with pandemics. Viral diseases not only impact human health directly, they can also undermine the sustainability of our food production systems when they cause important losses to crops. Therefore, there is a pressing need to increase our knowledge and capacities to implement novel and sustainable solutions, such as the deployment of crop varieties resistant to viral diseases, biological control of insect vectors transmitting viral diseases, as well as the development of vaccines to prevent viral diseases to rapidly propagate in susceptible crop varieties. The VIRTIGATION consortium will use a multidisciplinary approach to develop the aforementioned solutions, in order to reduce the impact of emerging viral diseases on tomato and cucurbits.”



Multi-stakeholder network

VIRTIGATION will engage in a bottom-up, multi-actor approach to tailor its solutions to the needs of the agriculture and horticulture sectors. It will collaborate with key players such as farmers, growers, research centers, and seed and plant protection industries. VIRTIGATION will enable its key actors to co-design its research activities, and train them in applying its developed bio-based remedies. Through its multi-actor approach, VIRTIGATION will create a multi-stakeholder network on emerging plant virus

detection and knowledge exchange. Its ambitions are to gather national know-how through the coordination efforts of National Knowledge Brokers, and foster cooperation between partners in Europe, Israel, Morocco and India to combat the viral diseases affecting tomatoes and cucurbits.

KEY FACTS

The VIRTIGATION project

The VIRTIGATION project, titled “Emerging viral diseases in tomatoes and cucurbits: implementation of mitigation strategies for durable disease management”, operates under the EU Horizon 2020 program to address new and emerging risks to plant health, thereby contributing to sustainable food security. The VIRTIGATION members are at the forefront of efforts to safeguard tomatoes and cucurbits as vital staple crops in fields and greenhouses across the globe.

The VIRTIGATION consortium

KU Leuven (Belgium), DCM NV (Belgium), Fundacion para las tecnologias auxiliares de la agricultura (Spain), Luxembourg Institute of Science and Technology (Luxembourg), University of Greenwich (United Kingdom), Consejo Superior de Investigaciones Cientificas (Spain), Centre de recerca en agrigenomica CSIC-IRTA-UAB-UB (Spain), Università degli studi di Catania (Italy), Wageningen University (Netherlands), Stichting Wageningen Research (Netherlands), Institut national de recherche pour l’agriculture, l’alimentation et l’environnement (France), EMWEB (Belgium), The Agricultural Research Organisation of Israel – The Volcani Centre (Israel), Proefcentrum Hoogstraten (Belgium), Association Provençale de recherche et d’experimentation legumiere (France), Julius Kuhn-Institut Bundesforschungsinstitut für Kulturpflanzen (Germany), Syngenta France SAS (France), Scientia Terrae (Belgium), Huerta Valle Hibri2 SL (Spain), Agencia de gestion agraria y pesquera de Andalucia (Spain), Landwirtschaftskammer Nordrhein-Westfalen (Germany), STE Maraisa SA (Morocco), RTDS Association (Austria) and Corteva Agriscience Italia SRL (Italy) all as beneficiaries, and the University of Agricultural Sciences Bengaluru (India) as an international partner of the project.

Funding & Duration of the VIRTIGATION project

EUR 7 million has been contributed by the EU’s Horizon 2020 research and innovation programme. VIRTIGATION will run for four years, from the 1st of June 2021 until the 31st of May 2025.

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[VIRTIGATION Project](https://www.youtube.com/watch?v=VIRTIGATION)



[VIRTIGATION](https://www.researchgate.net/publication/VIRTIGATION)

CORDIS: <https://cordis.europa.eu/project/id/101000570>



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