

INTERNATIONAL SYMPOSIUM ON PLANT PATHOGENIC SCLEROTINIACEAE

JOINT

XIX INTERNATIONAL BOTRYTIS SYMPOSIUM
XVII INTERNATIONAL SCLEROTINIA WORKSHOP
II INTERNATIONAL MONILINIA WORKSHOP

A stylized graphic of a plant with several large, blue-outlined leaves. The leaves are arranged in a symmetrical, star-like pattern, with some leaves pointing upwards and others downwards. The leaves have a thick blue outline and a lighter blue fill. The background is a blurred green forest scene with sunlight filtering through the trees.

PRO
GRA
MME



BOTRYSCLEROMONI

Thessaloniki 25–30 May 2025

Session X DISEASE MANAGEMENT – BIOTECHNOLOGICAL APPROACHES

SESSION CHAIRS: JAN VAN KAN and JOHANNA WESCHE

16:00-16:30	KP. 8 Keynote Presentation – MARK BELMONTE <i>Development and application of RNAi technology to protect crop plants from Sclerotinia sclerotiorum</i>
16:30-16:45	O.42 ALBA LOPEZ-LAGUNA <i>Pioneering use of DNA aptamers targeting BcSOD1 protein as a new approach to control Botrytis cinerea and advancing sustainable agriculture</i>
16:45-17:00	O.43 YONG LIANG <i>Botrytis effector protein BcCrh1 as inducer of plant immunity for pathogen control</i>
17:00-17:15	O.44 QINGNA SHANG <i>SsDLD as a potential target for controlling Sclerotinia disease</i>
17:15-17:30	O.45 PIPPA MICHAEL <i>Optimisation of high throughput field phenotyping for Sclerotinia stem rot in lupins</i>

GALA DINNER

21:00 – 24:00	Gala Dinner at Porto Palace Hotel
24:00	End of the Day





O 42. PIONEERING USE OF DNA APTAMERS TARGETING BCSOD1 PROTEIN AS A NEW APPROACH TO CONTROL *BOTRYTIS CINEREA* AND ADVANCING SUSTAINABLE AGRICULTURE

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Abstract

Botrytis cinerea, the necrotrophic fungus behind gray mold disease, poses a significant threat to global crop production. Its control heavily relies on fungicides, but the pathogen frequently develops resistance. This pioneering study introduces, for the first time in crop protection, the use of aptamers. Often referred to as "chemical antibodies", aptamers are short, single-stranded DNA or RNA molecules that can bind to specific targets, such as proteins or small molecules, with high affinity and specificity. In this work, two DNA aptamers, SOD9.14F and SOD9.26F, were designed to bind the superoxide dismutase protein BcSOD1, a crucial enzyme for detoxifying reactive oxygen species (ROS) and promoting fungal virulence. Using SELEX technology, these aptamers were developed from a synthetic single stranded DNA library after nine rounds of selection, exhibiting exceptional specificity and affinity for BcSOD1, with inhibition rates reaching up to 97%. Localized on the fungal surface, the aptamers appear to effectively target extracellular BcSOD1. In vitro and in vivo experiments showcased significant reductions in conidia germination (62%), necrotic areas on tomato leaves and apple fruits (42%), and fungal biomass (58%). RNA-Seq analysis revealed that the treatment of *B. cinerea* with SOD9.26F disrupted ROS detoxification, induced oxidative stress, and imbalanced metabolic processes. Applied to leaves, it activated defence signalling pathways in tomato plants, which could improve stress tolerance. These findings position DNA aptamers as a promising innovative and sustainable alternative to chemical fungicides, addressing fungicide resistance and environmental impact issues. Their application could revolutionize *B. cinerea* management, safeguarding crop production and promoting eco-friendly agricultural practices.

This work has been funded by: AYUDAS A LA I+D+i, EN EL ÁMBITO DEL PLAN ANDALUZ DE INVESTIGACIÓN, DESARROLLO E INNOVACIÓN (PAIDI 2020). Project code: PY20_00048

