Academy of Romanian Scientists *Volume 13, No. 2, 2024, pp. 63 - 73*
Annals Series on Biological Sciences Online ISSN 2285 – 4177

ORIGINAL PAPERS

INNOVATIVE SOLUTIONS FOR PLANT PROTECTION BASED ON VEGETAL EXTRACTS AND LEATHER WASTE CAPITALIZATION – APPLICATION ON STRAWBERRY CULTURES

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Abstract. *Innovative solutions in the decisive control of pests and elective treatments to stimulate agricultural production will accomplish the need to feed a growing global population and the long-term toxicity of synthetic fungicides. The product development is based on indigenous potential of natural antifungal compounds (eg vegetable extracts from fenugreek and marigold, tomato glycoalkaloids, etc.) as well as on circular bio-economy - obtaining protein hydrolysates from tannery waste. In this economic niche context, an innovative bio-fungicide and bio-stimulator prototype was created, with enhanced effectiveness through the profile and ratio of the associated active compounds, with an extended spectrum of action, GLYCAM-STIM Combo. The impact of two variants of biopesticide was compared to the commercial ecological product Serenade, on strawberries - Premial variety. It was investigated the development of gray rot - Botrytis cinerea and the effect on the production and quality of the*

fruits. The results demonstrate the limitation of the frequency of the attack and its intensity, the increase of fruit firmness and mass (by 8g) and the production's rise by 7t/ha. The data confirm the applicability's extension of the multifunctional biopesticide also at the level of the strawberry species, as well as in the protection of cherry orchards. The research was carried out within the project BIO-PLANT-PROTECT 262 / 2021.

Keywords: biopesticide, plant biostimulator, marigold, fenugreek, Botrytis cinerea, strawberries

DOI [10.56082/annalsarscibio.2024.2.63](https://doi.org/10.56082/annalsarscibio.2024.2.63)

1. Introduction

The pesticide concept had a significant evolution over time, starting from the product's efficacy, but with a significant focus on the ecological impact. A large number of pesticides have been withdrawn from the market due to high toxicity, long decomposition time, improper application methods. Many cases of chronic or acute toxicity and increased resistance of target species, replacement of target species with resistant pest species and environmental contamination have been reported. (1) Considering all these aspects, a series of properties of the products under development are required to ensure a proper toxicity / efficacy balance: high selectivity on target species, low toxicity on non-target organisms; high effectiveness using reduced amounts of pesticides; low persistence in the environment (rapid decomposition) to avoid bioconcentration and biomagnification in the food chain, in order to prevent the development of resistance in organisms.

The use of biopesticides began at the end of the 1800s, when fungal spores were used to control insect infestations. (2). Botanical pesticides have gained great importance in recent years, through the development of research on plant sources, estimating over 6500 species of plants with active potential, with different combinations of chemical compounds, from over 240 families. (3) Different species can be mentioned, e.g. Chrysanthemum cinerariaefolium, Chrysanthemum coccineum, Haloxylon salicornicum, Stemona japonicum, Schoenocaulon officinale, Origanum vulgare, Thymus vulgaris, Azadiractina indica, Leuzea carthamoides, Mentha spp., Lavendula spp., Nicotiana spp., containing polyphenols, α - chaconine, nicotine, thymol, carvacrol, pyrethrins, rotenones, with direct action, through multiple mechanisms, on various species of insects, fungi or bacteria that destroy the crops. [4]. (5)

The fenugreek extract (Trigonela foenumgraecum), having a phytochemical content of phenolic compounds, flavanols and flavones, alkaloids and pro-anthocyanidins, has a strong inhibitory effect on micellar growth. The