ENTOMOPATHOGENIC BIOPESTICIDES - AN ALTERNATIVE INCREASING THE ADAPTABILITY OF PLANTS TO STRESS IMPACT AND ECO-FRIENDLY SOURCE FOR THE CONTROL OF PESTS

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CZU:632.937 https://doi.org/10.52757/imb22.34

The use of chemical fertilizers and chemical plant protection products in unacceptable amounts has led to a steady decline in soil and crop productivity worldwide. Pesticides contribute to the pollution of ground and surface waters, and there are strong indications that long term exposure to POPs can have a negative impact on biodiversity (Topping et. al., 2020).

The current level of plant protection does not solve all problems of crop production, since pesticides are not able to protect plants from abiotic stresses. Meanwhile, losses from stress factors are estimated at 51-82% (Monastyrsky O.G., 2011), which significantly exceeds the losses from diseases and pests.

Biotic stress is any stress caused by living organisms like insects, viruses, bacteria, fungi, and arachnids. The plant never develops an adaptive immunity against biotic stress even on repeated exposures. For this very reason biotic stress is the major factor of pre-and post-harvest losses (Singla and Krattinger, 2016). Abiotic stress includes conditions such as drought, temperature fluctuations, high soil salinity, metal toxicity, and oxidative stresses. These stresses can cause permanent damage to a plant such as stunted growth, hampered metabolism, reduced yield, and change in genetic behaviour, leading to mutations in the progeny (Zaidi et al., 2014, Bhat et al., 2020).

The effects of drought and the losses incurred are long term. Groundwater pumping costs continue to rise (Lund et al., 2018), rainfall decreases every year, affecting non-irrigated agricultural land, inter-seasonal droughts and moisture deficits occur, resulting in inevitable drought-like conditions (Kaushik, 2015).

The aim of the work was to establish the possibility for application of entomopathogenic strains *Bacillus thuringiensis* ssp. *kurstaki* (Bt) and *Bacillus thuringiensis* ssp. *thuringiensis* (BT) in a tank mixture for spraying. For this purpose, the effect of the recommended and half concentrations of para-aminobenzoic acid (PABA) on the above-mentioned bacteria colonies was examined *in vitro*. Bacteria were cultivated in liquid mineral nutrient medium for 48 hours at 29°C to the titer of 10^9 CFU/ml. The suspension was inoculated on the solid CGA nutrient media in Petri dishes. After bacterial cultures had grown for 24 hours, sterile disks (five disks per three Petri dishes) impregnated with biologically active substance emulsions were placed on their surfaces. After a week of incubation, the interaction of the studied concentrations of para-aminobenzoic acid (PABA) with bacterial culture was recorded. Bacterial growth inhibition zones were not found. This allows to assume that it is possible to combine working solutions of bioregulators with bacterial strains suspensions and at the same time to reduce the para-aminobenzoic acid (PABA) after effect. The similar results have been reported for *B. thuringiensis* mixtures with the pesticides Sumi-Alpha, Regent, Decis and *Pseudomonas* sp., *Bacillus sp.* with the pesticides Ridomil, Quadris, Raxil and Colfo-Super (Адрианов Ф.Д., 2011; Попов Ю.Б., 2008; Войтка Д.В.,2018).

Acknowledgements. Research was carried out within the State Program project nr. 22.80013.5107.3BL "Methods of complex application of para-aminobenzoic acid derivatives and entomopathogenic microorganisms for the control of harmful organisms on fruit and vegetable crops", funded by the National Agency for Research and Development of Republic of Moldova.