

DESCRIPTION FOR THE GENERAL PUBLIC

Aphids are among the most dangerous and most common plant pests with economic importance. The fight against these insects is troublesome because of their massive appearance, variety of morphs and complex life cycles. The pea aphid *Acyrtosiphon pisum* (Harris), the bird cherry-oat aphid *Rhopalosiphum padi* (L.) and the green peach aphid *Myzus persicae* (Sulzer) are listed among the 14 species of with the greatest economic importance for agricultural crops, fruits and vegetables. The cypress aphid *Cinara cupressi* (Buckton) is considered to be one of the world's 100 worst invasive alien species and is listed in the catalogue of foreign pest species of importance in agriculture, while the green birch thelaxid *Glyphina betulae* (L.) is listed in the catalog of pests of ornamental plants. Knowledge about the aphid reproductive strategy is the basis for developing effective ways to prevent and combat these pests and the diseases transmitted by viruses. The project involves the examination and comparison of the structures of the reproductive system in key morphs in the life cycle of aphids: viviparous (stem mother) and oviparous (oviparous female and male) generations. In addition, in a model in the study of aphid species *A. pisum*, the development and structure of the male reproductive system and the process of spermatogenesis and sperm ultrastructure will be studied in detail. The structure of overwintering eggs will also be examined in all of the selected species. With the aim of the practical application of the obtained information, the studies of the mechanisms that regulate the development of the aphid reproductive apparatus by common plant biogenic amines will be conducted. It was shown in earlier studies that plants develop defensive molecular mechanisms in their response to an infestation by herbivorous insects. These mechanisms may be restricted to the site of the attack (for example, hypersensitive response, HR) or may have a systemic reach (induced or acquired systemic resistance, ISR or ASR, respectively). The systemic responses are based on a signal transduction through the pathways that are dependent on some phytohormones and the effect is the inhibition or stimulation of certain genes. However, little is known about the influence of such mechanisms on the development of the aphid reproductive apparatus although its functioning determines the density of their population and the losses of the quality and the quantity of crops. New technologies of agricultural and horticultural production will require new methods and measures to combat pests, including such pests as aphids. Since these methods will have an effect on consumer safety and environmental protection, it is necessary that such research be targeted at the lack of basic knowledge about the reproductive biology of aphids in order to fill this significant gap. In this context, the proposed project is part of a global study of an integrated system of plant protection (IPM). In addition to the cognitive aspect, our results may also be used in future application studies, for example, during the testing of plant protection products aimed at the elimination of males, overwintering eggs or the insecticides that are used at the optimum time, in the early decrease of pest populations, to disrupt the development of the stem mothers of aphids.