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Letter to Editor

Applicability of Aerosol Spectrometers for Control of the Efficiency of Automatic Artificial Pollination in Agricultural Biotechnology and Analysis of Contamination in Plant Quarantine Assessment

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Letter to Editor

It is well known and obvious that manual and mechanical pollination of plants (hand pollination / mechanical pollination, including automatic options, known in Western literature under the name "materially engineered artificial pollinators" [1]) can, in a number of cases, be the only alternative and the most accessible a way to industrially support certain crops (from pumpkin to vanilla or date palms). However, the results of automatic pollination (using most types of aerosol pollinators) in many cases leave much to be desired. Often the pollen agglutinates or does not reach the target point when dispersed, and in some cases a stream of mechanical particles with an unobvious distribution of sizes and mechanical parameters is dispersed along with it, often damaging the flower. Therefore, it is necessary to control the size and aerodynamic parameters of pollen during massive pollination. However, there are no known tools available to implement such a qualimetric measurement in "materially engineered artificial pollinators".

We propose to use for this purpose aerosol spectrometers of a wide range, developed by the team of Yu.V. Zhulanov, starting from the period of work at the Karpov Institute of Physical Chemistry under the management of the academician I.V. Sokolov-Petryanov (from the 1970s) to 2020 (before demolishing of the laboratory). It is known that pollen can be considered within the framework of aerosol concepts, for the implementation of which appropriate counters and analyzers were created, including Coriolis samplers and aerosol impactors [2-6], including software for deciphering pollen by particle size, and sometimes also by particle shape (as in scanning cytometry) [7]. Unfortunately, the main trends in aerosol pollen analysis (in the wake of the growth of allergic reactions since the 70s of the twentieth century [8,9]) have been reduced to the analysis of allergic pollen aerosols [10-14], and agrobiological applications of such techniques have not been developed. We propose to use appropriate counters, operating from the cellular level to the level of multicellular reproductive structures [15,16], to control the dispersed composition and refractive parameters of pollen used in pollination. At the same time, in order to quarantine plants and prevent spore contamination, the size of parasitic particles, potentially attributed to fungal agents [17,18] and viruses (such as tobacco mosaic, etc. [19]), can be controlled.

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