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Impact of spray plant characteristics on selected spray quality indicators

Abstract

The main aim of the research was to determine the effect of basic morphological characteristics of plants, parameterized by the author of the coefficient of the surface of the spraying, on quality indicators such as the degree of coverage and deposition of zinc containing formulations in a conventional form and in the form of nanoparticles.

The aim of the research was carried out in four basic stages. Two plants were chosen for the study: soybean (dicotyledonous) and onion (monocotyledonous). In the first stage, two greenhouse experiments were carried out, which were divided into three independent series, each series denoting a separate development phase of the plant. In the second stage, in each series of the experiment, the degree of coverage of the sprayed objects and the deposition of zinc to plants was carried out. Plants were sprayed with a foliar fertilizer containing zinc and nanoparticles of zinc oxide (at a dose of $160 \text{ gZn} \cdot \text{ha}^{-1}$). The treatment was performed using two types of standard nozzles: flat fan XR110-02 and double flat fan DF120-02. The degree of coverage was determined using a computer image analysis method. At the same time, as the third stage, the spray characteristics of the tested plants were determined, describing morphological characteristics such as the size of horizontal and vertical surfaces by the spray surfaces coefficient K_{po} . In the fourth stage of the research, the method of microwave wet digestion determined the deposition of zinc to the sprayed plants. The measurement of the amount of the element absorbed by plants was made using a spectrometer.

Analysis of the obtained test results showed a significant impact of the choice of the nozzle on the degree of coverage and deposition. The dependence of the deposition on the degree of coverage of the sprayed plants was also demonstrated. An important achievement of the conducted research was the determination of the impact of morphological characteristics of plants described in the K_{po} coefficient on the quality indicators of the spraying operation.