

Application of Plant Growth Regulators Gibbersib and Silk in Form of Aerosols of Optimal Dispersity

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The plant growth regulators or phytohormones are the natural and synthetic physiologically active substances, which being brought onto a plant can change any biochemical processes in the plant tissue. The utilitarian goals of their application are the enhancement of a crop, acceleration of crop ripening, or a better crop quality. Although a few kinds of such substances are well known, some biological, economical, and technological problems prevent their wide usage in world agriculture. As for technological problems, very serious obstacles may arise. It is known that a phytohormone treatment of any agriculture must be performed during a short period (a few days!), connected with a certain stage of plant growth (leafing, bud, flowering). It would be hard to treat large areas, e.g., of wheat during such a short period of time. Then, the treatment, e.g., of maize or sunflower must be done when their height exceeds 1.5-2 m. It would be hard to use a ground sprayer for such treatment, because it must move like a shuttle just on a treated field so that the maize or sunflower stems could be broken down. There are also the serious problems for aerial spraying - the building of special runways, the long distances between treated fields and a runway, etc.. However, the above problems could be overcome in the so-called Optimum Aerosol Technology (OAT) for application of various kinds of bioactive substances (insecticides, herbicides, fungicides, etc.). It is based on the usage of aerosols with certain sizes (dispersity) for each concrete situation. The above optimal dispersity is dependent on plant species and bioactive substances, landscape and meteorological conditions, etc.. Two types of powerful mobile aerosol generators with adjustable particle dispersity (within 1 - 40 mcm) have been designed in order to realize the above technology. As for a potential usage of phytohormone, the effective width of aerosol treatment can exceed 0.5-2 km from the path-line of the above aerosol generator. Hence, it would be possible to perform the treatment just from the roads along the up-wind edges of treated fields. An additional peculiarity of aerosol treatment is that aerosols precipitate mainly on the upper parts of plants, rather than on soil. These parts are known to be most sensitive for phytohormone action..

In 1994-98 numerous field experiments were performed to record the efficiencies of various kinds of phytohormones for both the aerosol method and the ground spraying. The maize, sunflower, rape grass, and wheat have been chosen as experimental objects. It was found that after application of Gibbersib and Silk on maize the biomass (as a dry weight) increased by 30-70 % compared to the control plots. Aerosol treatments of rape (Gibbersib, Silk) increase the biomass (20-60 %), and the oiliness of rape seeds (3-8 relative %). Practical aerosol treatments of sunflower (175 ha, Gibbersib), and maize (400 ha, Gibbersib, Silk) were performed, and the enhancements of dry biomass of maize (10-20%) and the oiliness of sunflower seeds (7 -15 of rel.%) were recorded.

Unfortunately, no influence of treatments of various sorts of spring wheat by Silk have been found, after both aerosol application and spraying (1996-98).