

عنوان مقاله:

Performance of Selected Agricultural Spray Nozzles using Particle Image Velocimetry

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خلاصه مقاله:

The aim of the present study was to investigate the influence of nozzle configurations on spray drift and explain the influences using several atomization characteristics (length of spray sheet, spray angle, velocity distribution of flow field, fluctuation of velocity, and droplet size). Nozzles manufactured by one company (Lechler GmbH, Germany) were tested by spraying local tap water in a wind tunnel at an operating pressure of 0.3 MPa and under room temperature. The nozzles tested were compact air-induction flat fan nozzles (IDK120-02, IDK120-03), standard flat fan nozzles (ST110-02, ST110-03), and hollow-cone swirl nozzles (TR100-02, TR100-03). The atomization process was recorded using a Particle Image Velocimetry (PIV) system, droplet size was measured by a Sympatec Helos laser-diffraction particle-size analyzer, and spray drift was evaluated in a wind tunnel with deposition measured using a calibrated fluorometer (Turner-Sequoia model 450). Results showed that spray drift was significantly different among nozzle types ($P < 0.0005$) and that nozzle configurations influenced breakup length, spray angle, droplet size, and velocity. Nozzles producing larger droplet sizes had lower velocity. Smaller droplets were produced when longer and wider spray sheets were produced. Compared to ST and TR nozzles, IDK nozzles started to breakup in the center of the liquid sheet, producing droplets with larger diameter, lower velocity, and less velocity fluctuation. The IDK nozzle is a good choice for low spray drift at higher wind speeds.

کلمات کلیدی:

Atomization, Droplet Size, Droplet velocity, Particle Image Velocimetry

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