

Aerodynamic properties of boundary layers along screens

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Agricultural screens that cover crops modify the exchange of heat, mass and momentum between the crop and the atmosphere. Properties of the boundary layer above an insect-proof screenhouse in which sweet pepper was grown were investigated experimentally. A flat-roof screenhouse 110 m long, 60 m wide and 3.2 m high was used. Wind and temperature sensors were mounted above the screen 60 m to the east of the western edge of the house and 30 m north of its southern edge. Aerodynamic properties of the wind profile, namely the friction velocity, roughness length, zero plane displacement, and aerodynamic resistance were calculated and presented with respect to the stability of the surface layer above the screenhouse. It is shown that neutral and stable conditions act to inhibit turbulence, to reduce the roughness length, to displace the wind profile upwards to just above the screen, and to increase the aerodynamic resistance, when compared with unstable conditions. The results are compared with previous data obtained for a small shading screen. Good qualitative similarity is obtained between the two sets of data and the causes of the quantitative differences between the two studies under unstable conditions are discussed.