

EFFECT OF CLEAR AND DEFUSE GLASS COVERING MATERIALS ON FRUIT YIELD AND ENERGY EFFICIENCY OF GREENHOUSE CUCUMBER GROWN IN HOT CLIMATE

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ABSTRACT

Using proper greenhouse covering materials can provide a suitable environment for plant growth in Saudi Arabia. The effects of three different greenhouse covering materials, clear glass, polycarbonate and diffuse tempered glass were used to evaluate its effect on cucumber productivity, water and energy use efficiency. Results show that either water or light use efficiency was higher in compartments covered with diffused or clear glass than polycarbonate compartment. In consequence, fruit yield of cucumber plants/m² was significantly higher (58%) in clear and diffuse glass greenhouses as opposed to polycarbonate greenhouse. In term of the effect of cultivar or plant density, no significant differences on cucumber yield were found. Using of different covering materials did affect environmental data of greenhouses. Less light was transmitted through polycarbonate cover than clear or diffuse glass. The photosynthesis active radiation (PAR) was 996, 1703, 1690 mol/m²/d, while the electricity consumption was 2.97, 3.44, and 2.88 kWh under polycarbonate, clear glass, and diffuse glass, respectively. Meanwhile, diffuse glass compartment revealed 16% lower of water consumption than other covering materials. In this respect, it could be concluded that using diffuse glass, as a greenhouse cover material, has a strong positive influence on crop productivity under Saudi Arabia climate.

Key words: *Cucumis sativus*, water use efficiency, light transmission, polycarbonate, greenhouse covering materials, yield