

## Evaluation of Greenhouse Covering Materials

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**Abstract :** Covering materials of greenhouses is the most governing component of the construction which controls two major parameters the amount of light and heat diffused from the surrounding environment into the internal space. In hot areas, balancing between inside and outside the greenhouse consumes most of the energy spent in production systems. In this research, a special testing apparatus was fabricated to simulate the structure of the greenhouse provided with a 400W full spectrum light. Tests were carried out to investigate the effectiveness of different commercial covering material in light and heat diffusion. Twenty one combinations of Fiberglass, Polyethylene, Polycarbonate, Plexiglass and Agril (PP nonwoven fabric) were tested. It was concluded that Plexiglass was the highest in light transparency of 87.4% where the lowest was 33% and 86.8% for Polycarbonate sheets. The enthalpy of the air moving through the testing rig was calculated according to air temperature differences between inlet and outlet openings. The highest enthalpy value was for one layer of Fiberglass and it was 0.81 kj/kg air while it was for both Plexiglass and blocked Fiberglass with a value of 0.5 kj/kg air. It is concluded that, although Plexiglass has high level of transparency which is indeed very helpful under low levels of solar flux, it is not recommended under hot arid conditions where solar flux is available most of the year. On the other hand, it might be a disadvantage to use Plexiglass specially in summer where it helps to accumulate more heat inside the greenhouse.

**Keywords :** greenhouse, covering materials, aridlands, environmental control

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