A STUDY OF CO-RELATIONSHIP BETWEEN INTERAL TEMPERATURE OF BUILDINGS AND TREE SHADING IN HOT AND DRY CLIMATE

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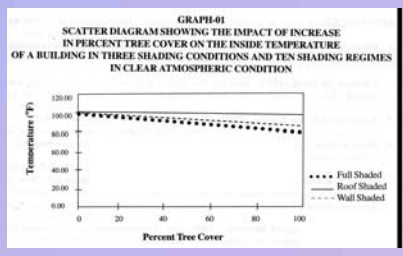
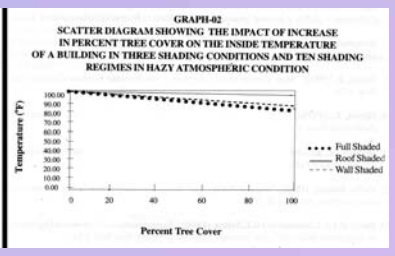
ABSTRACT

The study of tree shade on the internal temperature of a building in hot dry climate was examined using a computer – based model. Clear and hazy atmospheric conditions with solar radiation blocked (as if by trees) were considered for the study. Three shading conditions and ten shading regimes were chosen. It was found that tree shading has the most effective impact on the internal temperature of the building if the walls and roof are shaded.

Using a regression analysis a test of linearity was conducted to determine the relationship between the internal temperature of a building and an increase in tree shade. It was found that a negative linear relationship exists between the internal temperature and the amount of shade.





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A computer programme was developed in Visual Basic (Microsoft) computer language and Microsoft Excel spread sheet program to draw graphic relationships between the area shaded and the inside temperature of the building. Two approaches to simulate irradiance reduction were used in this study. In the first approach, a clear atmospheric condition was chosen, while in the second approach, hazy atmospheric conditions were selected. In both the approaches irradiance reduction by tree shading was measured by running computer simulations at three shading conditions and ten shading regimes, i.e. 0.1 to 1.

INPUT PARAMETERS USED IN THE STUDY

Input Parameters	Values
Latitude	31° 35’ North
Longitude	74 ° 20’ East
Atmospheric extinction coefficient	percent
Solar radiation reaches the earth’s outer atmosphere	Btu/h/ft.sq.
Radiative heat transfer	Btu/h/ft.sq.°F.
Diffused radiation for clear sky (hazy condition)	Ratio
Reflectivity of the concrete surface	percent
Width of the wall of building	inches
Absorption coefficient	percent
Convective coefficient for outside	Btu/h/ft^2 °F
Convective coefficient for inside	Btu/h/ft^2 °F
Thermal conductivity of solids	Btu/h/ft^2 °F
Shading factors	0-1
Declination of sun in the month of June	23.2 Degrees