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## MODIFYING SOLAR RADIATION

. . . with Landscape Plantings

Landscape professionals have known for ages that landscape plant materials can be functional in many ways besides the commonly accepted role of "beautification." Some of the multiple-purpose functions can be for screens, backgrounds, shade, fruit and nut production, windbreaks, specimens, and numerous other planned uses. However, one of the most important functions that landscape plantings can make is that of modifying the surroundings to the extent of helping to create a more enduring and pleasant environment for people and their possessions.

Four major climatic elements affecting people's comfort are air temperature, solar radiation, air movement, and air moisture (humidity and precipitation). The comfort zone for people varies within local areas and different areas of the world. There is a general comfort zone suitable for most people most of the time. However, with the increasing emphasis on energy conservation concerns, more people will, no doubt, need to adjust to comfort ranges somewhat less desirable than the optimum conditions.

Energy conservation concerns have mainly been focused on structural additions or modifications that block or reduce the indoor/outdoor relationship such as insulating, storm windows, caulking of cracks and openings, and others. Many additional exterior concerns should also be considered such as solar radiation control and reduction of wind velocity.

An estimated one-fifth of the total solar radiation from the sun reaches the earth. The remainder of the radiation impact is divided between reflection into space by clouds; scattering and diffusion by small atmospheric particles, and absorption by suspended carbon dioxide, water vapor, and ozone. Consequently, solar radiation can come as direct rays from the sun or as reflected radiation from atmospheric impediments.

The control of solar radiation can be effected by the use of such structural devices as awnings or other such barriers. However, trees, shrubs, ground covers, and grass are rated highest for exterior radiation control. A single plant or group of plants (depending on the area size) can intercept or break the solar radiation before it strikes a surface or after it is reflected. Interception of solar radiation is accomplished by the use of plants with characteristics such as dense foliage, multiple layers, or density of canopy. Filtration occurs when plants with loose, open foliage are used. Naturally, the immediate surroundings are cooler beneath a plant that completely obstructs rather than filters the solar radiation.

Deciduous plants (those normally shedding their leaves during the winter months) have the advantage of providing shade during the summer months and permitting total or filtered solar radiation during the winter months. Examples of heavy shadow type trees are maples, oaks, and beeches while filtered or lacy shadows are cast by honey locust, and to some extent willow oaks. Vines on trellises provide controlled, seasonal shade as needed.

Reflected sun rays are amplified by light, smooth surfaces and reduced by coarse, dark surfaces. Trees, shrubs, ground covers, and turf used independently or in combination are far more effective in reducing direct or reflected solar radiation than structural surfaces such as paving or barren soil. Plants diffuse the heat, provide shade, and create dead air spaces. To reduce the intensity of heat and light reflected from paving, sidewalks, or buildings, islands of plants, vines growing on the side of a building wall or as ground cover provide a buffer against the intensity of solar radiation, and consequently, creates the protective conditions needed.

Plant materials selected for solar radiation modification purposes should be based on such ecological factors as general adaptation to the local conditions, space, soil conditions, general exposure (sun and shade), minimum of pest problems, functional purpose, and multiple use potential. Endurance or tolerance qualities must sometime take preference over the exotic appearance.

#### Important Facts to Consider: A Summary

By using solar radiation deflectors such as plants and/or structural baffles, the glare of the sun can be reduced, and consequently, reduces the temperature of the immediate area.

Deciduous plants deflect or reduce light intensity during the summer months, but permit warming penetration of the sun rays during the winter months.

Smooth, glossy surfaces reflect more light than rough, porous surfaces.

Ground covers of grass or low growing plants can reduce the summer temperature of the immediate area by ten to fourteen percent.

The successful use of plant, structural, and natural features depend on the degree of planning and implementation and maintenance fitted to the local conditions.

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