

A Report on the Effect of Shade Trees On 'Smog'

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It is generally recognized that in the Los Angeles basin area the air pollutant known as 'smog' results from an involved series of photo-chemical reactions between ozone, peroxides, nitrogen oxides, and oxidized hydrocarbons from various sources including auto exhaust, catalysed by sunlight. An end product is a group of compounds known as peroxyacetyl nitrates (abbreviated 'PANS'). These are considered to be major contributors to eye-irritation and have been shown to cause considerable damage to vegetation. Since no information was available, however, showing the influence of plants on smog itself, gross measurements were undertaken at the Los Angeles State and County Arboretum to determine this effect.

Using recognized methods for 'smog' analysis, air samples were taken simultaneously from two feet above, and below, the leaf canopy of the shade tree *Albizia julibrissen*. Likewise, samples were taken six inches above and below the foliage canopy of the vine *Bougainvillea* 'Orange King'.

The smog analyses showed that the air sample from below the foliage canopy in the shade contained significantly less oxidant (smog) than did the air sample from the sunlight above the canopy. According to the degree of air movement, the reduction of smog in the shade varied from nearly complete elimination to no difference whatsoever when there was a strong breeze. These findings suggested that the observed smog reduction due to shade trees and vines was due to the shade from their leaves.

To answer this question trials were made using shade from opaque objects such as cardboard and aluminum foil. The resulting data showed clearly that the observed reduction in smog under shade trees could be accounted for as a result of the exclusion of direct sunlight.

From these findings it is suggested that some of the undesirable effects of smog

in a localized area such as a garden, or in landscaping around homes and buildings, may be reduced by:

- (1) The planting of shade trees, vines and shrubs, and by encouraging a denser growth of vegetation; or by
- (2) The production of shade by planting and building shaded patios, trellises, pergolas and similar structures.

The concept of shading by plants to reduce indirectly the smog level might also be applied to parking lots, street trees, parks, recreation areas, and other civic plantings. In addition, these plantings would result in beautification and provide a more aesthetically pleasing environment, while at the same time creating a local situation in which the smog concentration would be somewhat abated.

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