



While wood and field burning in general is not a major contributor to photochemical air pollution, uses of some fuels in those fires can be. This Californian is creating a smoke plume that is visible for miles. He's trying to keep



the fire hot enough to burn some orchard trees. Discarded auto tires, used for years to keep fires hot, are going to be outlawed. Authorities say there are other ways to keep fires hot without causing obnoxious pollution.

RESearch IN California into the pollution consequences of agricultural burning may offer some solace, if not some solutions, to city officials and others who must dispose of diseased street and ornamental trees.

The fact is, clean burning of woody materials may not be as much a contributor to dangerous types of air pollution as has been assumed.

For some areas, such as those where trees afflicted with Dutch elm disease must be destroyed, the only sure method of eradication is burning. Yet, states and the federal government are moving rapidly toward the elimination of open burning as an air pollution control measure.

Several points with respect to burning wood wastes are worth remembering by city street tree maintenance men and others who have burning to do but hope to avoid the wrath of air pollution control authorities.

—Burning should be done on a somewhat breezy day when there is

Though Pollution of Air Is Low,

Where There's Smoke, There's Fire of Protest

By THORNE B. GRAY
Modesto, Calif.

no inversion layer to keep smoke from dispersing.

—Fires should be kept as hot as possible, but without using such controversial measures as throwing rubber tires or smoky fuels into the fire.

—Fuel should be as dry as possible before the fires are lighted.

If these rules are followed, a strong case can be made that such fires do not contribute appreciably to the air pollution problem.

To understand why, it first is important to know the difference between particulate air pollution and photochemical air pollution.

Briefly defined, photochemical air pollution is the chemical product of the mixture of some pollutants, mainly hydrocarbons, and sunlight. The common term for the resultant material is smog, and even a small amount of smog can be harmful to humans and plants. A level of .15 parts per million will cause eye irritation.

Causes More Barking Than Bite

Particulate air pollution, on the other hand, often causes more public outcry and anguish than does actual smog. In many areas, particulate air pollution is severe and dangerous, especially when emissions fail to disperse or where they affect urban populations. In the great Central Valley of California, farmers are faced with learning to conduct necessary burning while not causing visible or harmful particulate pollution, and they are having some success.

“As far as particulate matter is concerned, as far as aesthetic values and their impairment and the effects on visibility, no one I know of, who is a responsible person, will deny that agricultural burning doesn't contribute,” admits Victor P. Osterli, a researcher with the University of California extension service who has done substantial work on air pollution and farm burning.

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"But from the standpoint of gaseous emissions, of hydrocarbons particularly, when you consider quantitative emissions from a given volume of plant wastes, smog generation is small by comparison with the internal combustion engine source," he said. "Likewise, smog production gets smaller yet when compared with the total volume of gasoline usage in a metropolitan area and its surroundings."

Osterli's office at the university's Davis campus is in the center of the rice producing area of the Central Valley, and rice stubble burning often has been an acute problem for farmers and their city neighbors. Other farmers must annually burn orchard prunings and there is a continuing need to burn entire orchards which have been removed to make way for new crops.

Thus far, neither the state nor counties in the valley have seen fit to abolish rice field or other agricultural burning. Instead, some effective voluntary controls have been devised with the help of the weatherman.

Ventilation Index Established

A ventilation index for each day is published by the US Weather Bureau, based on the height of the mixing layer of the atmosphere plus wind velocity, as predicted for mid-afternoon. Values range from zero to 2,000, with the higher numbers representing the best weather for burning. Compliance with the index is voluntary, but well over half the farmers heed it and the results, in terms of air pollution incidents, have been encouraging.

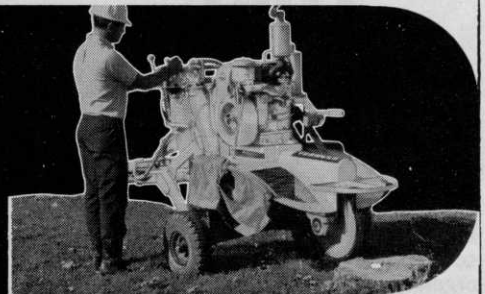
Osterli said in the San Francisco Bay area, the Bay Area Pollution Control District relies on the ventilation index to outlaw all open burning when conditions are unfavorable.

Agricultural burning, of course, involves thousands of acres and often is an annual occurrence. Sometimes the burning must occur in the same months when air pollution is greatest from other sources. In part, controls on farm burning have proved one point: air pollution continues anyway.

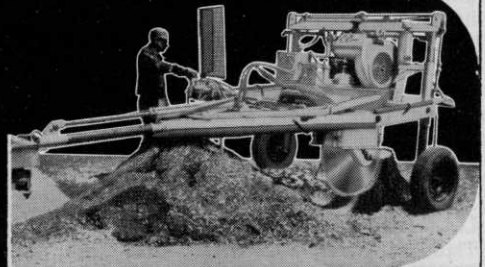
A city fire to remove bark beetles which spread Dutch elm disease, by comparison, would never approach the aggravating smoke levels found in Oregon's Willamette Valley last year, for instance. Grass seed harvesters there burned off some 240,000 acres of stubble last summer when conditions were bad and the smoke drifted over the city of Eugene. On Aug. 12, conditions became so poor

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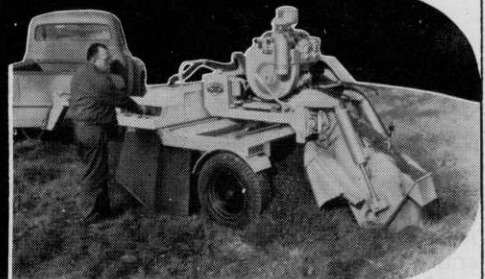
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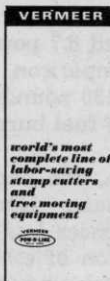
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the day was labeled Black Tuesday and the Lane County Air Pollution Control Authority received 2,000 protesting telephone calls. Finally, Gov. Tom McCall declared a health and safety emergency until atmospheric conditions improved.

Burning Tower Tests

Dr. Ellis Darley of the Statewide Air Pollution Research Center, University of California at Riverside, has investigated both rice and grass stubble fires, and other agricultural fires, for several years. Darley and his associates use a burning tower which permits them to measure the smoke ingredients from sample fires. The fires are laboratory versions of those which burn the same ingredients on farms.

Scores of such fires have been tried in the burning tower, and the results show conclusively agricultural burning is a negligible source of photochemical air pollution when compared with the emissions of the internal combustion engine.

Darley hesitates to apply his findings directly to the type of burning which might be conducted by a nurseryman in destroying a city tree — he never has tested the pollution output of any fuel more than two inches in diameter. He is certain the thicker the fuel, the longer the fire will burn and the more pollutants will be created, though how much more is in doubt.

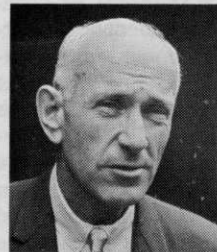
While the State Air Resources Board continues to rely on estimates of such pollutant levels compiled prior to Darley's work, Darley is convinced the estimates are high, even for heavier materials such as orchard trees. "Their estimates don't come out with our measured figures," he said.

Ideal: Hot Fire, Dry Fuel

In general, Darley said the hotter the fire and drier the fuel, the less the pollution. The cooler the fire and wetter the fuel, the greater the pollution. If a fire merely smolders, particulate air pollution can become highly significant.

Fruit prunings, he found, yielded 13.9 pounds of hydrocarbons per ton of fuel burned, barley straw yielded 18.2 pounds per ton burned and native brush yielded 6.7 pounds per ton burned. By comparison, the gasoline engine yields 130 pounds of hydrocarbons per ton of fuel burned, he reported.

For one hydrocarbon, the photochemically active ethane, Darley found the value differences less diverse: 2.7 pounds per ton of ethane were produced in the fruit pruning



Dr. Ellis Darley

Statewide
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fire against about 7.8 pounds from auto exhausts. Estimating some 151,000 tons of fruit prunings, barley straw and native brush are burned per year in the San Francisco Bay area, Darley estimated some 950 tons of hydrocarbon effluent would be generated per year, an average of 2.6 tons per day. Automobile emissions greatly exceed that figure in the same area on a per day basis.

Withall, the indisputable fact remains that agricultural burning causes substantial amounts of particulate air pollution. Those who light such fires are creating a conspicuous source of pollution, and the finger of blame is easily pointed toward them. The fact that particulate pollution is less dangerous, in many instances, than is automobile-caused smog, often makes little impression on the general public.

To continue burning diseased trees, regardless of how necessary the burning may be to eradication of a disease, nurserymen and tree crewmen will have to carefully marshal facts, arguments and burning procedures which are as pollution-free as possible.

Fast-Growing, Salt-Tolerant Pine Shows Promise at MSU

Michigan foresters and commercial landscapers may soon have a new pine tree.

According to J. W. Wright, Michigan State University forestry professor, the new hybrid cross between Austrian pine and Japanese red pine shows promise for use in pulpwood operations and in roadside plantings.

The hybrid was first discovered in 1961 by MSU foresters at the W. K. Kellogg Forest near Battle Creek. Hybrid trees were growing naturally in an open area between mature stands of Japanese red pine and Austrian pine.

"These hybrids show excellent growth," says Wright, "growing faster than either parental species."

Other characteristics which make the hybrid potentially useful include earlier reproduction, good recovery from transplanting shock and the possibility of tolerance to salt.