Hidden Fire Losses

uncontrolled fires costly to soils, plant cover, water and timber supplies

Woodbridge Metcalf

Long time studies indicate that uncontrolled brush and forest fires profoundly affect soils, plant cover and water, as well as destroying man made structures and interfering with management plans for farms, forests and industries.

Fire damage for the United States in 1947 reached the total of seven hundred million dollars. The tragic consequences of these fires, most of which are the result of careless human actions, are often more far reaching than can be assessed in present dollar and cent valuation. The hidden losses constitute further reasons for the exercise of care in the use of fire.

When walking through a burned forest or brush field after a hot fire, it is not uncommon to sink ankle deep into soft, fluffy ashes. These are the remains of the important humus layer of decaying vegetable material in which myriads of small forms of life had been working to maintain soil fertility. Fire destroys this teeming life and wind and rainfall often carry away the light residue leaving a hard and baked soil surface. Humus is one of the primary requirements of most California soils and its destruction by fire may require many years for replacement.

Most progressive grain farmers recognize the need for humus in the soil and now disk in the residue after harvesting rather than burn the stubble, which was common practice a few years ago. This stubble mulching of level or gently sloping grain fields is in recognition of the fact that even well controlled fires destroy badly needed vegetable material and unnecessarily deplete soil fertility.

Erosion

On slopes where fire has burned the protective humus layer, there is an even more far reaching effect in the loss of soil by accelerated erosion during heavy rains.

Studies have shown that the vegetable layer or humus under forest and brush cover is most important in keeping the soil in a porous condition for the reception of rainfall and checking rapid run-off which results in the washing away of fertile top soil. Loss of this top soil depletes the productive capacity of the site and results in progressively poorer plant cover.

In the case of what had been a tall and beautiful forest of high commercial value, the result may be a dense brush field of valueless chaparral species which for many years may occupy the land so completely as to prevent reforestation by the former desirable trees.

On grazing lands fire also destroys the seeds of the most valuable forage plants, but stimulates seed germination of many unpalatable species. Here erosion of top soil may make it impossible for grasses or herbs of good quality for livestock to come back in the progressively more dry and sterile soil, which eventually may acquire an erosion pavement of coarse gravelly particles.

With decreased percolation of water into the soil because of lowered absorptive capacity and rapid run-off, underground water supplies fail of replenishment, springs dry up earlier in the spring and streams have shorter periods of flow. Thus one hidden effect of fire is to decrease water supplies.

Timber

Even very light surface fires through stands of large, mature forest trees often cause material losses of merchantable timber. This will be seen at the bases of large trees which will be found to have scars known as *cat-faces* in the pine country and *goose-pens* in the redwood region.

Detailed examination of such scars shows them to be the result of repeated fires which have gradually eaten into the wood of these trees until the butt log is often completely unmerchantable though the tree is still alive.

In the case of giant redwoods such fire cavities or *goose-pens* may be six to 10 feet across at the bottom and extend up into the tree 20 to 40 or more feet. In a few cases fires in such cavities have smoldered for weeks and months, finally breaking out near the top of the tree and destroying all of its volume except a narrow cylinder of living sapwood. The result is known as a *chimney tree* and is valueless except as a natural curiosity.

Pines attempt to heal such fire scars by covering the damaged wood with a coating of pitch. This serves the purpose well, but is so flammable that later fires burn even more fiercely and enlarge the scar to considerable size.

Wood rotting fungi may then gain entrance and cause additional losses by making wood adjacent to the scar soft and *punky* with fungus mycelium.

Douglas fir, white fir and red fir are particularly vulnerable to such fungus attack after being scarred by fire and though they may live for years in the forest, they have no commercial value as the wood is too far gone with such *dote* or heart-rot. If such *doty* logs are sawed into lumber and built into a house or other structure, the heart-rot may spread where moisture conditions are high enough and eventually require expensive replacement with sound timbers. Such hidden losses with fire in the forests may not appear for many years and the exasperated owner of the structure rarely traces his trouble to a forest fire.

Further Losses

Where heavy, mature forest stands are wiped out over considerable areas by fire, the hidden losses must include the expense of removing the debris and replanting with seedlings of value for timber purposes. Otherwise it may be many years or decades of virtual nonuse of such lands until reforestation takes place through the uncertain and prolonged process of natural reseeding.

In many such areas it is necessary to include losses due to the depletion of game, fish and birds by such fires. The ruining of formerly scenic and recreational opportunities may be of high economic significance to adjacent rural or mountain communities. Burned forests attract few tourists and pay a minimum of taxes towards the maintenance of schools, roads and other necessities.

Under present economic conditions it

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Stand of Jeffrey Pine killed by fire. Note soil denuded of plant cover.

OLIVES

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With the importation in 1947 and 1948 of about 20 new varieties from France, Italy, Greece, Turkey, Palestine, Egypt, Algeria and Australia, this is now probably one of the most complete collections of table olive varieties in the world.

In connection with this work on varieties, a study has been made of the tree and fruit characteristics of all the available bearing olive varieties in California.

Rootstocks

To supply some information as to the value of own-rooted olive trees in comparison with grafted trees, a rootstock planting will be set out next spring at the Wolkskill Experimental Orchard. A planting of 10 acres will be made with about five acres used for the rootstock tests. Trees will be grown on a number of different rootstocks, including several different *Olea* species, for comparison with the trees started from cuttings.

In preparing trees for this proposed olive planting, tests were made with various hormone root-forming substances to determine their value in rooting softwood olive cuttings.

It was found that indole-butyric acid at about 50 parts per million gave very good results in inducing root formation.

Last spring a similar test was made using hardwood olive cuttings. The results of this test will be known at the end of the current growing season.

Fruit Measurement

During the 1946–47 and 1947–48 seasons, growth studies were made of developing olive fruits. Measurements of fruit size—volume, diameter, fresh weight, and dry weight—moisture content, and oil content were taken. Two years' results have been obtained using the Mission and Manzanillo varieties and a complete report of this work will be published soon.

Pruning

Two pruning plots have been established—one in Tehama County and one in Butte County—to give information on how severely bearing olives should be pruned.

Two years' results, while insufficient for drawing conclusions, have been in agreement that the trees receiving the least pruning have been the most profitable.

Fertilization

To determine whether the time at which nitrogen fertilizers are applied to olives has any effect on fruit set, experimental plots have been established in Tehama and Tulare counties in which different trees are fertilized at about two-month intervals throughout the year. Results must be obtained for several years before valid conclusions can be drawn.

Nontillage

Another phase of current olive research concerns the practice of nontillage in olive orchards—the control of weeds by oil sprays. A number of experimental plots have been set up by the Agricultural Extension Service in the several olive producing counties to examine the feasibility of such practices.

An experimental plot also has been established by the University in Glenn County where trees are grown under clean cultivation, sod culture, and weed control by oil sprays.

Individual tree-yield records were obtained for the 1947–48 season. The maintenance of such plots for a number of years will compare the value of these different types of soil management.

Specialized Studies

A number of other projects are underway, such as nutrition studies, including minor elements, physiological effects of spray materials, collections of desirable variety strains, blossom-thinning sprays, fruit-bud differentiation, irrigation studies and temperature in relation to fruitfulness.

Many of these projects must be carried on for a number of years before definite results can be expected.

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GRUBS

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rotenone-sulfur formula seems superior.

Recent work conducted at the University of California has demonstrated that the northern grub is more resistant to treatment than is the common grub; however, control of either species is often incomplete.

The main value of the present program of area-wide treatment lies in the fact that a single season of community-wide spray treatment in a grubby area will reduce the number of grubs so much that relatively little trouble will be experienced the following year.

There is the immediate advantage of ridding the animals of those grubs currently sapping the vitality and reducing the market value of the stock.

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SEEDS

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Scarification may frequently be harmful, especially with beans because growing points of some seeds are injured by the rough treatment. If not carefully done, too much coat is scratched off causing a rapid decline in viability, and allowing a ready entrance for fungi.

Another practice is to keep the beans and possibly other legumes in a storage of the proper humidity and temperature so that the moisture in the seeds is maintained high enough so there are few or no hard seeds, yet the moisture is not so high as to cause loss of viability.

From the experimental results obtained at Davis, and from the work reported by research workers in Connecticut and in Puerto Rico it seems that at storage temperatures around 70° F, a relative humidity of 50% or a little higher is dry enough to prevent all but a few hard seeds in even the most susceptible varieties.

For long storages of over a year, a lower humidity or a lower temperature is advisable. The seed could then be stored at the higher humidity or temperature for a month or six weeks before expected shipment.

The long time approach is to make selections or breed out of each variety the tendency for hard seed development at normal storage humidities.

Thus, if bean seeds are stored in the proper humidities, hard seeds can be reduced greatly or avoided. If the seed companies and experimental stations test for hard seeds in their breeding and selection programs the strains with genetic tendencies toward hard seeds may be eliminated.

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FIRE

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is important also to consider cost and difficulty of replacement as well as use and occupancy in the case of destruction by fire of homes, farm buildings, fences and other improvements.

Increased costs for materials and wages and marked scarcity of many critical items may make quick replacement of burned facilities virtually impossible without undue delay.

A farm home, barn, milk house or other equipment may be quite as vital in the carrying on of farm operations to the owner as is a factory, mill or office building to a business corporation. The hidden losses must include the cost of replacement and the inconvenience of doing without such destroyed facilities.

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