in the presence of adequate amounts of the others.

Romaine lettuce, planted three in each pot as 21 day old seedlings, and Atlas barley, planted as seed and thinned to five plants per pot, were selected as the test plants. The plants were irrigated with distilled water and grown for six weeks before they were harvested, ovendried, and the dry weights taken.

When tabulated, the average dry weights of plants from the control soil indicated distinct deficiencies of nitrogen, phosphorus, and sulfur. The deficiencies were shown by poor growth on the check soil and on the treated soil when one of the nutrients was omitted. The treatments which received the combination of nitrogen, phosphorus, and sulfur gave satisfactory yields and produced plants healthy in appearance. The addition of potassium seemed to make no difference.

Test soil from the burned area also showed deficiencies of the same three elements but of a much smaller magnitude. The ratio of the dry weights from the burned soil to the dry weights from unburned soil was greater than one in each case, indicating that the effect of brush burning was to increase the supply of nitrogen, phosphorus, and sulfur.

Undoubtedly the potash also was increased but would not be shown by a growth test on the Parrish test soil which is well supplied with potassium.

Some of the stimulating effect of burning is attributed to increased nitrogen and phosphorus in the soil. Also, the supply of sulfur was found to be greater as a result of the burn.

The unburned soil was acutely deficient in nitrogen, phosphorus, and sulfur as indicated by both lettuce and barley since the yield where nitrogen, phosphorus, and sulfur were added in combination was substantially higher than each case with one of these elements missing.

From these and other studies it is apparent that burning a vegetative cover releases a measurable amount of nitrogen, phosphorus, and sulfur to the soil. This is bound to have a stimulating effect on the succeeding crop, especially where the soil was initially deficient in these nutrients.

The addition of fertilizers to a soil directly following a burn may be unnecessary and application of fertilizer would be more useful the following year, when the stimulating effect of the burn has worn off and the soil is returning to a lower fertility level.

Results of these pot tests with the Parrish loam indicate that on the unburned area applications of nitrogen, phosphorus, and sulfur would be needed for maximum growth of lettuce and barley. However, after the burn, the lettuce responded to both phosphorus and nitrogen, whereas barley responded primarily to nitrogen.

Because grasses, rather than lettuce, would be grown on this soil, the prognosis given by the barley plants probably would be more applicable. Therefore, this situation would appear to call for a light nitrogen application following a burn even though soil supplies of nitrogen, phosphorus, and sulfur available for plant growth are increased following a burn.

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BRIEFS

short reports on current agricultural research

CITRUS VIRUS DISEASES

other than tristeza and psorosis.

Several virus diseases destructive to citrus — including exocortis, cachexia, xyloporosis, stubborn disease, and vein enation—have been found widely distributed in California in the past decade. After years of careful indexing, some citrus clones were found apparently virus-free and some were found carrying single viruses. Such clones are used in current studies on the effects of single and multiple virus infections, at several locations in California.

Research objectives are: more basic information on citrus viruses, on their sources and means of distribution, and on the diseases they cause; improved methods for virus detection; determination of virus susceptibility and tolerance of citrus varieties and scion-rootstock combinations; and acquisition of citrus selections free of all known viruses.

Several citrus selections which are apparently free of viruses are now being grown experimentally. After adequate trials, promising selections will be released to the citrus industry, as primary sources of propagative materials by which most virus diseases will be avoided. Vein enation and tristeza, carried by aphid vectors, can not be prevented in this way.—*E. C. Calavan, Dept. of Plant Pathology, Riverside.*

SHELL BARK

of lemon trees

The recent discovery that exocortis virus is associated with shell bark of lemon trees opens up the possibility of controlling shell bark in future plantings by using exocortis-free planting stock.

Current long-term studies on shell bark are designed to determine: the cause of the disease—especially the role of exocortis virus in its incidence and development—and possible means of spread; tolerance and susceptibility in commercial lemon strains, including exocortis-free nucellar lines; and the importance of inheritance and bud selection.—*E. C. Calavan, Dept. of Plant Pathology, Riverside.*

WATER USE BY RICE

studied in tanks

Evapotranspiration of water from a Caloro rice crop growing on Stockton clay adobe, gray phase, during a 160 day season, from date of flooding to harvest, was between 2.8 and 3.0 acre feet in a two-year study near Richvale.

The study was made in a commercial type rice field with 150 pounds of seed and 40 pounds of nitrogen as ammonium sulfate per acre applied by air. Weekly water loss measurements were made in metal tanks buried in the field prior to sowing, fertilization and flooding. Rice growing in the tanks yielded the same as the surrounding field.

However, the water requirement for field production of a rice crop always exceeds three acre feet because of water volumes required to balance percolation losses downward and laterally and water spilled at the outfall weir.—*Franklin C. Raney, Dept. of Irrigation, Davis, and Dwight C. Finfrock, Dept. of Agronomy, Biggs Rice Expt. Sta.*