D. E. Munnecke, P. A. Chandler, and J. L. Bivins

Investigations show

Azalea Root Rot

can be controlled by soil treatment

Azalea root rot frequently causes serious plant losses, especially during prolonged cold, wet weather.

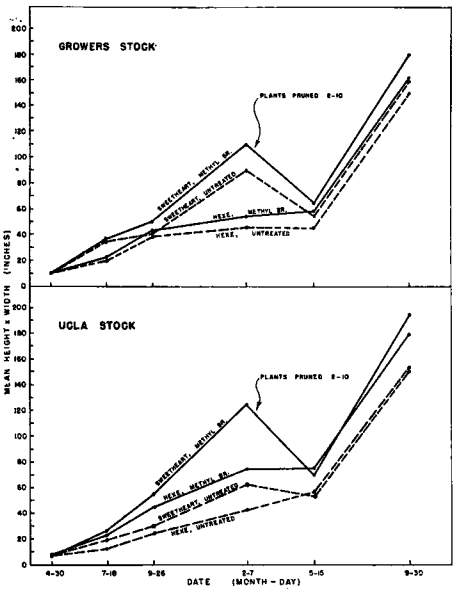
Usually diseased plants are scattered at random in the beds, but in areas of poor drainage, a majority of plants may be stunted or killed. When infected plants are grown in greenhouses for flowering, profuse leaf fall occurs.

Azalea root rot is caused primarily by a species of *Pythium*, although *Phytophthora*, *Fusarium*, *Rhizoctonia*—fungi that cause root rots in other plants—and parasitic nematodes are commonly found on affected roots.

Infected plants first lose vigor, the leaves wilt and become dull green. Later, wilt intensifies and leaves fall until only a few terminal ones remain. No characteristic stem symptoms appear aboveground, but the below-ground portion may be brown to black externally, with no evident streaking or rotting. The roots and crown are black and rotten and the root ball is usually less than half the size of that on a healthy plant. In severe cases most of the fibrous roots are decayed. Occasionally the fine roots are stubby and blunt rather than long and pointed.

In an experiment with commercial varieties, chemical soil treatments were tested for control of root rot over a two-year period. The test area, containing approximately 4,000 plants, was divided into three randomized blocks. The growing medium—peat moss and pine shavings—was treated with: methyl bromide, one or two pounds per 100 square feet; Vapam, injected, five milliliters per 6" centers, or drenched, one pint per 80 square feet; Telone, a nematocide, injected, one or three milliliters per 10" centers. The doses were equivalent to commercial rates of application.

Two varieties were used, Sweetheart and Hexe, taken from the grower's stock plants. Half of each variety was propagated to the lining-out stage at Los Angeles and the other half was propagated routinely in the grower's nursery. The Los Angeles stock was produced under stringent sanitary conditions and was presumed to be almost free of pathogens, whereas the grower's stock was not presumed to be pathogen-free, although no disease was evident. The test plots were handled in the same manner as the larger commercial planting. After the first year, newly prepared beds were treated and the plants were spaced farther apart, as in the commercial routine. At the end of the second season the plants were graded and sold.



Growth of two varieties of azalea in methyl bromide-treated soil compared to that in untreated soil.

Growth measurements and weed counts were made periodically throughout both growing seasons. Methyl bromide and Vapam were effective in weed control, whereas Telone, a nematocide, was ineffective.

Soil samples examined for nematodes showed that although parasitic nematodes were present in the untreated blocks, no nematodes were detected in the treated soil.

Increased growth was obvious in the methyl bromide-treated blocks, but was less noticeable with all of the Vapam-treated blocks. Growth in the Telone treatments was not much better than that in the untreated controls. Height and width data for each plant collected at various intervals during both seasons, and the dollar value of each plant at harvest time were statistically analyzed.

Compared with the untreated series, only the methyl bromide treatments resulted in statistically significant differences in size of plants produced or in dollar value of the plants. There was no significant difference between the one and two pounds per 100 square feet doses of methyl bromide. The other treatments were of little value.

The source of planting stock profoundly influenced the size and dollar value of plants. Pathogen-free plants produced at Los Angeles, grown in methyl bromide-treated soil, were worth more—Hexe, 30%; Sweetheart, 37%—than the same stocks grown in untreated soil. The increase in value of grower-produced plants growing in methyl bromide-treated soil as compared with untreated soil was less—Hexe, 18%; Sweetheart, 28%. Thus, growth increased in methyl bromide-treated media, but it was greatest when pathogen-free planting stock was used.

Correlation of treatment and source of stock effects was complicated by the fact that plants of the Los Angeles-propagated stock of Hexe were worth $1.37 each at harvest, as compared with $0.92 for the grower's stock, but the opposite was true for the variety Sweetheart—Los Angeles stock, $0.74, grower's stock, $0.96. This was the result of the growth habit of the two varieties in relation to the pruning practiced. Hexe requires little trimming to shape the plant correctly before bud formation, whereas Sweetheart requires considerable pruning, and long, scraggly branches must be removed. Unfortunately, all of the plants in the experiment were pruned based on the stage of growth of the majority of the plants in the commercial range. Consequently, the large Sweetheart plants growing in methyl bromide-treated media were pruned at a stage of

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C. S. OUGH and M. A. AMERINE

Study of wines by Controlled Fermentations in specially designed equipment

Controlled fermentations in wine are under study using special equipment designed to control the temperature, pressure, type and rate of gas or gases sparged into fermenters, and rate and duration of stirring or pumping-over, and allow the submerging of red grape skins for color extraction. For critical work with various yeasts, the equipment can be sterilized under steam pressure. Control instruments record gas flows, pressures, temperatures, and carbon dioxide and oxygen content of gases. Two of these fully controlled fermenters of 25-gallon capacity have been in use for several years. Ten smaller units, each of 7-gallon capacity, are being assembled and will be fully equipped and available to enlarge the area of study within a few years.

Studies with white wines have aimed at speeding or controlling the rate of fermentation without quality decrease. These studies covered the effects of pressure, temperature, stirring and sparging with gases on rates and quality. They have disclosed that temperature control is the most successful method of controlling rate of fermentation; that pressure can be used to control fermentation rates, but will result in lower-quality wine; and that sparging with gases and stirring are not practical methods of increasing fermentation rates when used to the extent that no alcohol is lost in these treatments.

Studies with red wines have investigated the effects of various treatments on extraction of color pigments and tannins from the grape skins during fermentation. Treatments included varying temperature of fermentation or pressure, pumping juice over the skins, stirring, submerging the skins below the liquid, and preheating the juice and skins before fermentation. Mixing the juice and skins twice daily with a wooden plunger is used as a standard method for comparison of color extractions.

Color extraction has been shown to increase with increasing temperature. Pressure treatments with carbon dioxide up to 100 pounds per square inch have little effect. Stirring causes more color extraction; but, if excessive stirring is used, turbidity in the final product results and is difficult to remove. Pumping over or submerging the skins causes slightly more color extraction than the standard method. Preheating the grapes increases color extraction decidedly but decreases wine quality; and the color extracted is not stable. In general, tannin extraction closely follows the color extraction.

Further studies will explore the effects of various mixed-yeast cultures on quality, effects of different gas and pressure treatments on red color extraction, and effects of massive yeast inoculations to increase fermentation rates.

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Study on

MOSQUITO FLIGHT

A study of mosquito flight habits has been initiated at Davis. The research is aimed particularly at the principal mosquito vector of encephalitis in California. Rice fields are major sources of these mosquitoes during the summer, and evidence will be obtained on the travel of marked specimens from rice fields to large centers of population. It has been commonly supposed that the mosquitoes in question do not fly far in terms of miles, that they follow wind currents, that flight is favored by periods of high humidity, and that males have a very restricted flight range. These ideas need to be verified or disproved, and a program has been planned to accomplish this. Wind, temperature and humidity will be measured continuously after dye-marked mosquitoes, reared in rice-field areas, are liberated. Light-traps, shelter-traps, and bait-traps will be used in recovery of the insects.—*Richard M. Bohart, Dept. of Entomology, Davis.*

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growth too advanced for proper shaping. Most of the rejected plants were large, vigorous, and deep green, but their ragged, open appearance made them unsuited for market. They were considered to have no dollar value. Hexe, being more compact, was only lightly pruned, and any subsequent development was not affected.

In the first year, only the growth curves of Sweetheart produced at Los Angeles and growing in methyl bromide-treated media diverged pronouncedly from the controls. By February 7, 1958, the Sweetheart plants in the methyl bromide plots were nearly twice the size of those in the control plots. Unfortunately, they were pruned to almost the same size as the untreated series. On May 15 the plants in two series were nearly the same size, yet the Los Angeles Sweetheart plants should have been much larger. Later Los Angeles Sweetheart again became larger, but not so much larger as in the first season. Hexe and the grower-produced Sweetheart were not affected by the pruning. If the Los Angeles Sweetheart plants had been handled in accordance with their tremendously increased initial growth rate, there seems little doubt that the dollar value at harvest time would have been commensurate with that obtained from the Los Angeles stock of Hexe.

Azalea root rot, most weeds, and the parasitic nematodes are controlled by planting pathogen-free stock in soil treated with methyl bromide gas—one pound per 100 square feet. To obtain maximum benefits, however, the increase in growth obtained may necessitate a change in cultural practices.

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S. A. Sher, Department of Plant Nematology, University of California, Riverside, made the examinations of soil samples for the presence of nematodes.

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