# Ungrafted Vineyard Rootstock

## eradication of unproductive rootstock vines by treatment with chemicals tested in Sonoma and Santa Clara counties

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**Approximately** 30% of the 450,000 acres of vineyards in California are—necessarily—on rootstock resistant to certain soil pests.

One difficulty in the management of such vineyards is the removal of rootstocks which failed to respond to budding or grafting or where the fruiting top died or was broken off by implements. These untopped rootstock vines usually bear no fruit but grow vigorously and compete keenly with adjacent producing vines for nutrients and moisture.

Some vineyards in California have from 1%–10%—or even more—of their stand as untopped rootstock vines that are worthless and cause increased operating expenses by their profuse growth arising at or below the surface of the soil. Also, they must be pruned and cultivated the same as the productive vines with which they compete.

Observations made on vine spacing trials in coastal nonirrigated vineyards indicate that competition—for soil moisture and nutrients—between the individual vines is a limiting factor in the vigor of growth and production of fruit. Neither wider spacing at the time of planting nor the removal of alternate vines in rows of closely spaced mature blocks has resulted in permanent yield reduction. Consequently, the removal of untopped rootstock vines from a planting should make more nutrients and moisture available to producing vines and result in increased yields.

Preliminary tests conducted on grapevines in the experimental vineyard at Davis in 1955 were designed to determine the vine-killing action of a large number of chemicals toxic to plants. To be satisfactory as a vine killer in commercial vineyards a chemical must cause a rapid and complete kill of the treated vine but must neither affect the adjacent vines nor leave lasting toxic residues in the soil. Furthermore, the chemical should be inexpensive and easy to apply.

On the basis of screening tests Shell DD—1, 3 dichloropropene; 1, 2 dichloropropane mixture; Vapam 4S—sodium N-methyl dithiocarbamate; and carbon bisulfide—$CS_2$ were selected in the spring of 1956 for the trials in commercial vineyards.

### Field Tests

One trial was located in a vineyard northwest of Santa Rosa in Sonoma County. The soil, mapped as Fresno loam, is of a light, loose nature and underlaid by a shallow hardpan. Approximately 50% of the stand was composed of untopped, mature, vigorous Rupestris St. George rootstock vines. The vines were growing close to the soil surface with a profusion of suckers. Application of the chemicals was made on May 22.

A second trial was located in a vineyard on the east side of Santa Clara Valley, four miles southeast of the town of Evergreen. About 3% of this planting was composed of very large, untopped, Rupestris St. George rootstock vines. The soil in this vineyard is Yolo gravelly loam, of a loose structure but fairly heavy. Application of the chemicals was made on May 21.

The rates of application of the chemicals to the vines are listed in the table on the next page. Shell DD and carbon bisulfide were applied to the vines with a manual soil injector, having an 8″ probe. The total amount per vine was applied in four separate shots spaced uniformly around the vine. The chemicals were placed well below the soil surface and close against the trunk of the rootstock. The Vapam was diluted in a pail with three gallons of water and applied in a shallow trench close to and entirely around the base of the vine.

The reaction of the vines to the treatments was nearly the same in both trials. At the lower rates only partial kills were obtained. However, when either 200 cc—cubic centimeters—or more of Shell DD was injected into the soil or 150 cc or more of Vapam diluted with water was trenched around the vine, complete kills were obtained. Carbon bisulfide—regardless of rate of application—gave erratic performance. Soil injection of undiluted Vapam looks promising, but the larger amount needed to completely kill vines would be expensive. The application by soil injection of small volumes of diluted Vapam does not appear sufficiently effective.

Shell DD applied to a small or young rootstock vine in from six to eight shots—of 25 cc each—spaced evenly around the vine, should result in complete kill. Larger plants might require 8–12 shots of 25 cc per vine spaced evenly around the trunk. Young vines should be readily killed with 150 cc of Vapam, but older vines—depending upon their size—probably would require from 200 to 300 cc.

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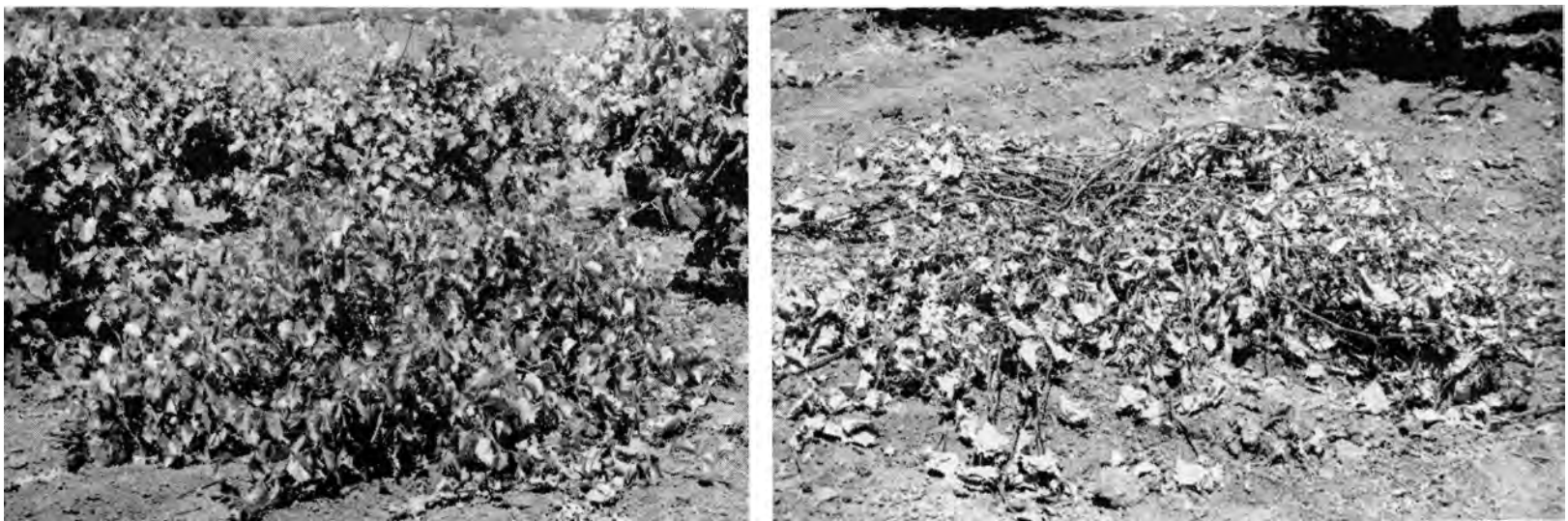
***Left*—Rupestris St. George rootstock vine as it appears in many commercial vineyards. *Right*—DD treated St. George vine two weeks after treatment. Note the severe wilting and dead shoots.**



# Improved Oat Variety

## resistant to drought, shattering and stem rust, the new Indio shows promise

Coit A. Suneson

**Indio**—the first oat variety developed for California by using the backcrossing techniques of plant breeding—has definite advantages over other varieties, and further improvements are under way.

In breeding Indio, the basic characters of the Palestine variety—an Indian type oat—were utilized. Introduced from Australia in 1932 the unique earliness, short straw, shattering resistance, and productivity under drought stress of the Palestine were quickly recognized. Equally obvious were its extreme susceptibility to stem rust and poor test weight. These defects precluded the wide use of Palestine after it was released in 1940.

The oat varieties Kanota, California Red, and Palestine are all susceptible to stem rust but despite stem rust injury and low test weight, Palestine produced 28% higher average grain yields than Kanota, and 34% more than California Red during the 1934–1956 period at Davis. Statewide tests from Imperial to Tehama counties showed similar average differences in yield. How much the yields were reduced by stem rust is not known, but stem rust was present in test fields at Davis in 16 of the past 35 years. In eight recent comparisons between Indio—resistant—and Palestine—susceptible—involving various rust levels and interacting weather stresses, the maximum reduction from stem rust was 73% and the mean yield reduction was 38%. Indio and Palestine have produced almost identical yields when there was no stem rust injury. Hence, Indio with its stem rust resistance, and one pound advantage in test weight over Palestine, is a notable advance toward production security and improved quality. Resistance to crown rust was added also.

Indio is a sixth hybrid, cycle selection isolated, in the fifth generation following the last cross of the Victoria-Richland and Fulghum hybrid with variety Palestine. Indio was developed principally in summer grown rust testing nurseries during the years 1940–1955.

In contrast to the principal oat varieties of the world—adapted to cool, humid, and comparatively wind-free climates—the Indio oat has unusual resistance to drought, shattering and stem rust.

Indio has its limitations but improvements are under way. It will winterkill at temperatures of 20°F–22°F and consequently should not be grown at high elevations. Severe injury from Yellow-Dwarf virus may occur in late-sown fields. Lodging is likely, particularly in thick sown stands.

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*Indio is a product of cooperative investigations by the University of California and the U.S.D.A.*

*The above progress report is based on Research Project No. 176.*

## ROOTSTOCK

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In determining the proper material to use and the best manner of application, the soil type, its looseness and ability to absorb water are important considerations. A readily available supply of water is necessary for the best use of Vapam, but with soils that absorb water easily, only a small amount of trenching is needed. The application of Shell DD requires the use of a mechanical injector and because most models have only one-half gallon reservoirs, frequent refillings are necessary.

The number of rootstocks to be killed per acre and their size should be considered but the removal of nonbearing vines should return the expense of treatment—within a few seasons—through increased yields.

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**The Effect of Three Chemicals Used to Eradicate Mature St. George Rootstock**

| Chemical | Rate/vine | How applied | Average kill on 5 vines | | Remarks |
|---|---|---|---|---|---|
| | | | Sonoma County | Santa Clara County | |
| Shell DD | 50 cc | Soil injection | 45% | 40% | Small vines were 100% killed |
| Shell DD | 100 cc | Soil injection | 95% | 98% | Small portions of large vines escaped |
| Shell DD | 200 cc | Soil injection | 100% | 99% | 1 weak shoot survived on one large vine |
| Shell DD | 400 cc | Soil injection | 100% | 100% | Thorough and rapid kill |
| $CS_2$ | 100 cc | Soil injection | 5% | 10% | Some yellowing, slight killing |
| $CS_2$ | 200 cc | Soil injection | 5% | 30% | Some dead shoots, much yellowing |
| $CS_2$ | 400 cc | Soil injection | 95% | 20% | One vine killed, several severely injured, much yellowing on large vines |
| Vapam-4S | 75 cc/3 gal. water | Trenched around vine | 60% | 50% | Some yellowing, small vines dead |
| Vapam-4S | 150 cc/3 gal. water | Trenched around vine | 100% | 99% | One weak, yellowed shoot alive on one vine |
| Vapam-4S | 300 cc/3 gal. water | Trenched around vine | 100% | 100% | Rapid and complete kill of large vines |
| Vapam-4S | 75 cc | Soil injection | ...* | 100% | Medium and small vines completely killed |
| Vapam-4S | 150 cc | Soil injection | ... | 80% | Large vines partially killed, much yellowing; complete kill on small vines |
| Vapam-4S | 300 cc | Soil injection | ... | 100% | Large vines killed rapidly and completely |
| Vapam-4S | diluted 1:6 in water—200 cc applied | Soil injection | 40% | ... | All vines yellow, none completely killed |
| Vapam-4S | diluted 1:6 400 cc | Soil injection | 65% | ... | Partial kill, much yellowing |
| Vapam-4S | diluted 1:6 800 cc | Soil injection | 80% | ... | One vine only slightly injured, three completely killed |
| Vapam-4S | diluted 1:12 800 cc | Soil injection | 85% | ... | 4 vines entirely dead, one vine very yellow |

* This treatment was not used in both locations.