Experiments on girdling olive trees were conducted during the 1949 season in orchards in Tulare, Madera, Solano, Butte, Glenn, and Tehama counties. As information becomes available, it seems girdling may be most useful in increasing yields with vigorous olive trees which bloom heavily but fail to set fruit. In such cases, girdling is effective because it apparently reduces the number of nonfruitful staminate flowers and increases the number of fruit-producing perfect flowers.

Girdling may benefit orchards that are not alternate-bearers—but produce a fairly uniform crop each year—by raising the level of production. Trees which tend strongly toward alternate bearing are not expected to be benefited by girdling. If they are girdled just before the on year it will be likely to promote the undesirable tendency toward overbearing. Girdling just before the off year is of no value because in such cases, the lack of a crop is due usually to the lack of a sufficient amount of bloom. Flower clusters are normally developed in the bud during the previous summer, so girdling in the winter can be of no value in increasing the number of perfect flowers, because no flower clusters are present within the bud. A better approach for overcoming alternate-bearing in olives is early thinning of the overloaded trees during the on year.

Experiments so far have indicated that closely planted, weakly growing trees with a limited leaf area will not respond to girdling. Vigorously growing trees with a heavy leaf area—and amply supplied with nitrogen and water—are the ones which have had their yields increased markedly by girdling.

Girdle in February

Preliminary tests made several years ago showed no benefits when girdling was done during or immediately preceding the blooming period.

All tests since that time have indicated that the practice is most effective when done during the winter months, especially in February.

Girdling done in March has not been effective. As the flower parts of the olive begin to develop in the bud during March, girdling done some time previously, in mid-February, presumably causes an increase in the carbohydrate supply available to the flowers and results, therefore, in the production of greater numbers of flowers of the fruit-producing type.

The girdling cut provides a temporary dam, lasting about six weeks, which blocks the normal downward movement of carbohydrates that are manufactured in the leaves. This increased amount of carbohydrates remains in the top of the tree during the period of flower-bud development and becomes available for the nutrition of the developing flowers.

Care Against Olive Knot

Many olive orchards in California have the disease, Olive Knot, and it was believed that the organism would become established in the girdling cuts. To learn whether it would be possible to prevent this, tests were made in a Sevillano orchard in Corning which was heavily infected with Olive Knot.

When the cuts were covered immediately after girdling with an asphalt emulsion grafting compound only, they became almost 100% infected with the disease, although the cuts healed over fairly rapidly.

When a paste, prepared from powdered Bordeaux mixture, was used directly on the cuts, which then were covered with the asphalt emulsion grafting compound, no infection became established. However, the Bordeaux paste applied directly on the tree tissues was so toxic that there was considerable injury, and healing of the cuts required several months.

Mixing the asphalt emulsion compound, 1 part, with Bordeaux paste, 1 part, and covering the cuts with this mixture gave fairly good results. No infection became established in the girdling cuts, but there was an appreciable amount of injury to the tree tissues. Perhaps a mixture of 2 parts of the asphalt emulsion compound to 1 part Bordeaux paste would be more satisfactory.

The best method tried, from the standpoint of freedom from infection and non-toxicity, was to cover the girdling cuts first with hot grafting wax, then with Bordeaux paste, and finally with the asphalt emulsion grafting compound. Healing of the cuts was excellent and no infection appeared.

Yields

As an example of the results obtained in a case where girdling was beneficial, the data from a test orchard at Corning are given. Yields and size grades for the 1948 and 1949 crops were secured from girdled and nongirdled trees in five plots in a fairly vigorous 35-year-old Sevillano orchard.

In Plot 1 the trees were girdled preceding the 1948 crop only. In 1948 these trees—girdled on October 15, 1947—averaged 147 pounds per tree in comparison with 127 pounds per tree for nongirdled trees. In 1949 the yield from these trees was not significantly different from the check trees—indicating that there is no holdover effect of girdling from one year to the next.

In Plot 2 the trees were girdled preceding the 1948 and the 1949 crops. In 1948 these trees—girdled on December 15, 1947—averaged 173 pounds per tree in comparison with 127 pounds for the check trees. The 1949 yields were 123 pounds per tree against 28 pounds for adjacent check trees.

In Plot 3 the trees were girdled also preceding the 1948 and the 1949 crops. In 1948 these trees—girdled on February 15, 1948—yielded 193 pounds per tree as compared to 127 pounds for check trees. The 1949 yields were 96 pounds per tree in comparison with 28 pounds for the check trees.

The trees in Plot 4 were girdled pre-

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DWARFING
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are very sensitive to cold and at Riverside
have shown more damage from cold than
any of the other combinations. Fruit pro-
duced on this stock is very low in acid and
has a tendency to be somewhat insipid.
The stock itself is very susceptible to gum-
mosis. It is questionable if this stock has
sufficient merit to warrant its usage in
California.

The Cuban Shaddock produces sub-
standard sized trees. Marsh grapefruit
trees on this stock after 14 years of age
are 70% as large as trees 17 years old on
sweet root. They produced as much fruit
in the first 10 years as the trees on sweet
root, but in the last six years have yielded
only 71% as much. Washington Navel
oranges on this stock at 14 years of age
are 45% as large as 17-year-old trees on
sweet root. Production for the first 10
years is about the same as on sweet root,
but in the last six years has dropped to
80% of the check trees. Eureka lemons
on this stock in 1947 were 48% as large
as trees on sweet root which were three
years older. They produced 66% as much
fruit for the first 10-year period as trees
on sweet root, but this was offset easily by the greatly in-
creased yields.

Using the yield records and size grades,
and computing on an acre basis from the
15 girdled trees in this test orchard the
increase in gross return in 1949 over non-
girdled trees would amount to approxi-
mately $620 per acre at 50 trees per acre.

Girdling of olive trees is not recom-
ended at present for use as a general
practice but it may be worthwhile to try—
in an experimental manner—on a limited
number of trees in orchards which have
a habit of blooming heavily but failing to
set good crops.

Under such conditions the following suggestions are made:

1. The primary scaffold branches
should be girdled about the middle of Feb-
uary, with one or two branches on each
tree left ungirdled to supply the roots
with carbohydrates until the girdling cuts
heal over.

2. Girdling cuts are made most easily
with a grape-girdling knife in areas with
smooth bark. The soft bark should be re-
moved down to the hard inner wood in a
strip, not to exceed one fourth inch in
width, completely around the branch.

3. The cuts should be covered immedi-
ately with either hot grafting wax or with
an asphalt emulsion grafting compound.

In orchards infected with Olive Knot pro-
vision should be made to prevent infec-
tion starting in the cuts. Also the girdling
knives should be dipped after each cut in
a disinfectant to prevent spread of the
disease.

4. To determine accurately whether the
girdling has been beneficial it is desirable
to obtain yield records during harvest
from the girdled trees and from adjacent
trees of comparable size.

INJECTIONS
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tity of dilute acid soluble phosphorus
and potassium in this soil is very low and
correlates well with the low phosphorus
and potassium content of the leaves.

Lemon orchards with the leaf spotting
referred to here have been noted in parts
of Santa Barbara, Ventura, Tulare, and
San Diego counties. More recent analyses
show that the leaves obtained from these
same areas are also very low in phos-
phorus.

Appropos of leaf analysis as a diagnostic
tool, it can be stated that so far, responses
to tree injection of phosphorus and po-
tassium have been obtained only where
exceedingly low levels of these elements
were found in the leaves. Previous tree
injection work using mono-calcium phos-
phate and di-potassium phosphate in Ven-
tura, Orange, and Riverside counties failed to produce response in trees having
phosphorus and potassium levels con-
sidered adequate by current standards.

This is the first time in California that
citrus trees in the field—with leaves of a
known low phosphorus and potassium
content—have responded to phosphate
and potassium treatment.

This response of citrus to phosphorus
in southern California is of interest in the
light of previous failures of many field
trials with citrus to show responses from
these elements.

It remains for future work to determine
whether the response of lemons to phos-
phorus and potassium injections reported
in this article can be duplicated by soil
treatments.

It seems certain, based on the extensive
leaf analysis surveys and soil studies of
phosphate and potash in citrus groves
made previously, that many groves are
amply supplied with these constituents.

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