

CALIFORNIA OLIVE COMMITTEE
PROJECT FINAL 2015 -2016 YEAR REPORT

Workgroup/Department: Olive / Plant Sciences, UC Davis

Project Year 2015- 2016 (NCE)

Anticipated Duration of Project: 10 years

Project Title:

Propagating Dwarfing Olive Rootstocks and Establishing a Long Term Orchard

Project Leaders:

Dr. John Preece: Research Leader, USDA-ARS National Clonal Germplasm Repository, UC Davis, 1 Shields Ave., Davis CA 95616, John.Preece@ars.usda.gov, (530)-752-7009

Dr. Louise Ferguson: Extension Specialist, Department of Plant Sciences, 2037 Wickson Hall, Mail Stop II, UC Davis, 1 Shields Ave., Davis CA 95616, (530) 752-0507 [Office], (559) 737-3061 [Cell], LFerguson@ucdavis.edu

Mr. Dan Flynn: University of California Olive Center, Davis CA
JDFlynn@UCDavs.edu; (530)-752-5170

Mr. James M. Jackson: Principal Superintendent, Plant Sciences Field Facility, UC Davis CA
JMjackson@ucdavis.edu; (530)-753-2173 and (530)-681-2279

Commodity: Olive Relevant AES/CE Project No.

Year Initiated: 2013 Current Funding Request: **15,096.00**

Problems and Significance:

To facilitate mechanical harvesting the newest table olive orchards are planted in hedgerows and require regular mechanical pruning to keep the trees small. Our 12 X 18' foot research planting established at Nickels Soils Laboratory in 2002 has demonstrated to us this will be difficult with the 'Manzanillo' olive cultivar. Such hedgerow 'Manzanillo' orchards designed for mechanical harvesting would be easier to maintain if they could be grafted on dwarfing rootstocks. Among those olives with promise for use as a dwarfing rootstocks are:

Nikitskaya,

Olea cuspidate

Verticillium Resistant Oblonga

Dwarf D

Little Ollie (2015 addition)

In 2013 we proposed propagating these rootstocks and testing with grafted and non-grafted own rooted 'Manzanillo' controls for their dwarfing potential with 'Manzanillo' to produce a tree that is more amenable to mechanical harvesting. The own rooted 'Manzanillos' and 'Manzanillo' grafted to 'Manzanillo' in this orchard could also serve as the next generation hedgerow trained mechanically pruned orchard for mechanical harvesting with trunk and canopy contact shakers.

In 2013 year we were awarded funding to propagate the desired rootstocks and locate a suitable orchard site for establishment of the propagated trees. Both objectives have been achieved but due to difficulty of propagation with some cultivars and difficulty in locating a site with proper infrastructure planting was in spring 2014.

Overall Progress through 7/31/2016:

This application for initial funding was for two purposes:

- I. Propagation and grafting of the rootstocks with ‘Manzanillo’ scions.**
 - a. Dr. John Preece supervised the development of specific propagation techniques for 112 each of the following olive cultivars to be used as dwarfing rootstocks; Nikitskaya, *Olea cuspidate*, Verticillium Resistant Oblonga and Dwarf D. Dwarf D proved very difficult to root as cuttings and this means that there were sufficient trees only for the closer spacing. At the wider spacing, Little Ollie, which roots easily is being tested, which adds another potential rootstock and expands the scope of the study in a logical way.
- II. Establishing the next generation olive hedgerow orchard for evaluation of mechanical harvesters.**
 - a. Field 3556, a four_ acre block located in Plant Sciences Field Facility located on the UC Davis Campus and maintained by UC Davis Plant Sciences field personnel was chosen as the planting site. This site has the added advantage of being located adjacent to oil orchards being developed by the UC Olive Center. The trees were planted in 2014. Attachment I: Field Map: 3556.
- III. Experimental Field Design:**
 - a. Split plot design with the north half of the field at spaced at 10 X 16’ and the south at 10 X 8’.
 - b. There are 4 Randomized Complete Blocks
 - c. Four different dwarfing rootstocks grafted with ‘Manzanillo’
 - d. Own rooted ‘Manzanillo’ and ‘Manzanillo’ grafted to a ‘Manzanillo’ grafting controls.
 - e. Sevillano pollinizers were planted as border rows around the perimeter of the orchard and in the middle, as a row between the wide and narrow spacing.

2015-16 Objectives:

- I. Finish grafting all rootstocks, once the 2015 plants are established: Attachment I: Field 3556 Plot Map**
- II. Collect data to study the any growth differences among the scions on the different rootstocks compared to the controls; will be done end of September**

Experimental Procedures: 2015-2016;

Complete grafting of smallest rootstocks. Based on experience gained in grafting, the final trees planted in 2015 will be sufficiently large for grafting late summer, 2016. This will be completed and will add Little Ollie as an experimental rootstock at the wider spacing.

Two scions were bark or whip grafted onto each rootstock. During 2016, the weaker of the two grafts will be pruned off to a single scion per rootstock.

The goal is to be able to dwarf the olive trees by using one or more of these rootstocks. Therefore, data will focus on measurements of vegetative vigor, including branch numbers and lengths, tree height, tree caliper of both the rootstock and scion. During 2015, there were fruit on the Manzanillo, and although it is early in the study yield data will be collected. In 2016.

Data will be analyzed using ANOVA with an LSD means separation.

Progress Summary: 2015-2016

The trees planted in 2014 were maintained and staked and grown through the summer of 2015 to allow the trees to reach sufficient size for grafting. The 'Oblonga' trees were falling over more and in more need of staking (which was done) than the others. In spring of 2015, the border rows of 'Sevillano' pollinizers were completed by planting the last 41 trees. There were insufficient trees available in 2014 to complete the border rows.

Some of the rows of dwarf olives were incomplete, therefore additional cuttings were rooted and trees produced at the National Clonal Germplasm Repository nursery. The exception is that 'Dwarf D' has proven to be extremely difficult to root to produce plants for the wider spacing portion of the study. Therefore, in addition, cuttings of 'Little Ollie' were rooted and this cultivar proved to be easy to propagate. On September 29 2015 the nursery produced plants were planted into the orchard and 'Little Ollie' replaced the originally planned 'Dwarf D' at the wider spacing. This completes the planting and also gives a fifth genetically different rootstock to test for dwarfing of olive. One of the 'Sevillano' trees died during the summer of 2015, but there were a few extra trees from the spring 2015 planting, and that tree was replaced.

Sierra Gold Nursery and staff of the National Clonal Germplasm Repository grafted the trees from September 28 – Oct. 1, 2015. This cooler time of the year was better for the grafts to heal and take. Following grafting, the orchard was sprayed with Kocide to control olive knot.

The block was pruned May 15-18, 2016. The block was rated July 20th 2016 with the following results: of the grafts done in September 28th 23 (3%) failed, and 87 rootstocks (11%) remain too small to graft, and 48 (6%) of the trees are dead or missing: Attachment I. The 3% graft failures and 11% too small in FALL 2015 will be grafted fall 2016. The 11% dead is due to squirrel damage to the irrigation lines flooding individual trees. The lines have been repaired and moved further away from the trees as they are now larger; in winter 2016 the drippers will be replaced with microsprinklers.

A few trees have produced minimal crop in 2016 so yield will be collected in September 2016.

By spring 2017 most of the trees should be large enough to demonstrate if the rootstocks have dwarfing potential and all the scions will be pruned back to an equal size to allow the Manzanillo scions to grow.

Desired Result:

At maturity the rootstocks will maintain tree size at 10 feet or less, and the trees can be harvested with trunk shakers or canopy contact harvesters. The experimental design will also allow a determination of 'Manzanillo' tree yields at a 10 X 16' and a 8 X 16' feet spacing.