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2013 Walnut Blight Management

Richard P. Buchner, UC Farm Advisor-Tehama County

The Section 18 allowing the use of Manzate fungicide for walnut blight control was issued February 7, 2013 effective March 1, 2013 to July 15, 2013 for Butte, Calaveras, Colusa, Glenn, Merced, Monterey, Placer, Sacramento, San Benito, San Joaquin, Santa Clara, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo and Yuba counties. New for 2013 is the addition of Monterey County. Applications may only be made upon a written recommendation by a licensed pest control advisor or local Farm Advisor documenting the weather is favorable for disease development and/or copper resistant disease is present. Manzate must be tank mixed with a fixed copper product registered for use on walnut in California. The Section 18 allows ground application in a minimum of 100 gallons per acre and air application in a minimum of 10 gallons per acre.

Copper tank mixed with Manzate is currently the best available choice for walnut blight management. Walnut Blight resistance to copper alone is very common in California walnut growing areas. Dr. Jim Adaskaveg at UC Riverside collected blighted walnuts from 39 orchards in 10 counties for a total of 296 isolates. Copper resistance was widespread but all isolates were sensitive to Mancozeb, suggesting that copper tank mixed with Manzate remains an effective treatment (2012 Walnut Research Reports pp 309-328).

For the past 2-3 years we have been monitoring 1) the amount of bacterial inocolum in dormant buds, 2) spray programs and 3) the percent of walnut blight damage for 30 orchards in Butte and Tehama counties. Seven Chandler, six Howard, two Hartley, one Tulare, and one Vina orchard all had very good walnut blight control. The initial inoculum levels were low and each spray program protected the crop. In contrast, five Chandler, five Howard, two Vina, and one Ashley orchard had poor to very poor walnut blight control. We observed the following possibilities when evaluating why we had walnut blight control failures.

1) First spray timing too late.

2) Walnut blight bacterial population increased in dormant buds resulting in high initial disease pressure.

Save the Date!

Walnut Husk Fly Monitoring and Control Field Meeting
Wednesday, May 15, 2013
2:30-4:00 p.m.
Rio Oso, CA
Details in April/May "Orchard Notes"

3) Material rates too low.

4) Poor spray coverage both by air and ground.

5) Using a weak material in high blight potential orchards.

6) Not tank mixing with Manzate.

7) Dense tree canopies.

So how do we improve walnut blight control in 2013? Spray rates vary by copper formulation. Our experience still suggests that any good quality copper will provide good control. Under heavy blight pressure, high label rates are a good idea. The Manzate rate is set by the Section 18 and should be included with the copper for optimum blight control. If blight control was poor last year it is very likely that bacterial populations are building, making blight control even more difficult. Making the first spray application at forty percent prayer stage and a second application 7-10 days later is the basis for good disease control. If you want to be more conservative apply the first application at 20 percent prayer stage and that is fine, but either way, the early sprays are critical for success. Additional sprays will be necessary with high inoculum levels and wet weather. Good coverage is essential for walnut blight control. Spray materials have to cover walnut tissue with an adequate amount of spray material to protect the green tissue. It is very likely that so called half spray programs are leaving the door wide open for walnut blight bacteria to prosper, increase populations and destroy walnuts. In addition, the half spray-sub lethal exposure approach is an excellent way to continue to select for resistance to the only effective spray program we have for walnut blight. Finally, where we have had serious blight damage, it has taken 2 years with a perfect spray program to beat the disease back down. All of the walnut blight research is viewable at http://walnutresearch.ucdavis.edu .

Spacing Walnuts for Optimum Light Interception and Production

Bruce Lampinen, Walnut and Almond Specialist, UC Davis
Janine Hasey, UC Farm Advisor, Sutter/Yuba/Colusa Counties

There are many considerations before planting a walnut orchard. One of the most important is determining the orchard design system and following that, the difficult decision of determining tree spacing (distance between trees within a row) and row spacing (distance between rows). A planting design should provide the tree canopy with maximum exposure to sunlight and allow ease of equipment operation. This article provides information to help you with the first decision - whether to plant in a standard spaced or hedgerow configuration, and secondly, walnut spacings to consider for optimum production.

How we quantify canopy light interception

Using a second generation ATV Mule equipped with a light bar for measuring midday photosynthetically active radiation (PAR), infrared thermometers, a GPS antenna, and a datalogger, we can drive down rows in mid-summer to measure canopy light interception. At harvest, we pick up and weigh all nuts from the same area driven down with the light bar. From this we can correlate percent midday PAR (light) interception with yield in tons/acre. The predominate variety in this multi-year study has been Chandler but some Tulare, Howard, Forde, and Gillet were also measured. The majority of orchards in the study have been on Paradox rootstock.

How canopy light interception relates to yield

- Walnut limbs need 30-45 minutes of direct sunlight to keep lower wood productive.
- The upper limit for yield (potential production) is 0.05 in-shell tons/acre (or 100 in-shell pounds) for each 1% of total midday PAR light intercepted
- The fastest growing orchards can increase by 10 percent per year in light interception reaching about 90 percent cover by the ninth year.
- Yield appears to peak at about 10-12 years of age and then gradually decrease.

How tree spacing influences canopy development and yield potential

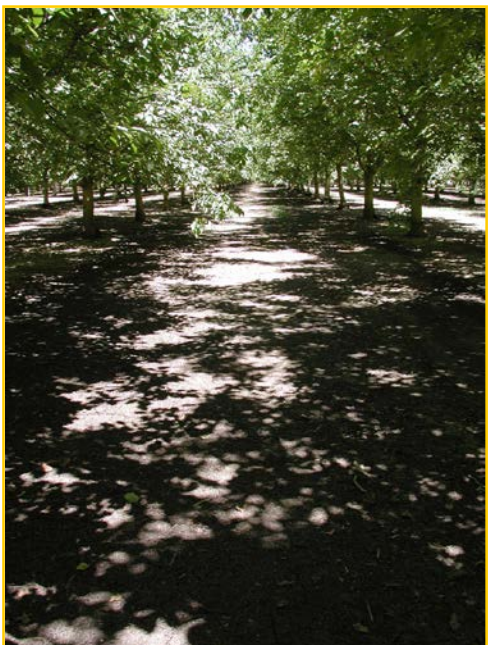
- Light interception continues to increase with increasing tree density.
- Yield tends to peak at 65-80 trees/acre.
- Standard spaced orchards have about 80-85 % light interception which results in a mature orchard yield potential close to 4 tons/acre.
- Most walnut hedgerows have 65-75% light interception which would suggest a yield potential of 3.2 to 3.7 tons/acre. Since vegetative growth is stimulated in response to hedging, yield is slightly less than light interception would suggest. Hedgerow orchards actually produce about 0.5 ton/acre less so yield potential is about 2.7-3.2 tons/acre.
- Optimum tree spacing appears to be in a standard square or offset square spacing design at about 56-75 trees per acre (e.g. 25' x 25' = 70 trees/acre, 28' x 28' = 56 trees/acre).
- Remember, when determining optimum walnut tree spacing, always consider soil type, rootstock, variety vigor and growth habit, and management style/design system (e.g. closer spacing is recommended if planting walnuts on more marginal soil or if using black rootstock).

How we can use this information

Chandler, a vigorous variety, predominates in the walnut industry. In this canopy light interception and yield study and a previous study in the 1990s comparing hedging intervals in a Chandler hedgerow, results indicated that it takes 3-4 years to redevelop the complexity of branching that existed before hedging. Therefore, production will be lost for the first few years after hedging Chandler and other varieties. We recommend planting Chandler in a standard spaced orchard for long-term maximum yields (e.g. a minimum spacing on poorer soils would be 25 ft. x 25 ft. with wider spacing on better soils). If a hedgerow design is still desired, then consider Howard, which is a less vigorous, smaller tree than is Chandler.

~45% midday light interception

~70% midday light interception



~90% midday light interception

All photos by Bruce Lampinen.

Guidelines for Handling Potted Walnut Clonal Rootstock Plants

Janine Hasey, UC Farm Advisor Sutter/Yuba/Colusa counties

The standard walnut rootstocks are seedling Paradox and seedling black. Seedling Paradox has greater vigor but is highly susceptible to crown gall disease caused by *Agrobacterium tumefaciens* compared to northern California black rootstock. Because of this susceptibility, many growers have opted to use the black rootstock, which has less trouble with crown gall in spite of the lower vigor. Both of these rootstocks are propagated from seed so genetic variation exists in all seedling orchards. The alternative to seedling rootstock is clonal Paradox rootstock which is gaining in popularity. These rootstocks are micropropagated in a lab and then potted using a soilless potting medium. Because they are clones, they all have the same genetic constitution but variation can occur among individuals from their interaction with the environment. Clonal rootstocks at this time are sold as potted unbudded rootstock or as nursery field grown rootstock, grafted or budded trees. The focus of this article is handling potted clonal rootstock plants that are directly planted in the orchard. For handling bare root walnut nursery trees, see the fall 2012 issue of this newsletter at: http://cesutter.ucanr.edu/newsletters/Sacramento_Valley_Walnut_News44408.pdf

Handling Potted/Containerized Walnut Clones

This is a different way of handling rootstock. There are more planting time options than with bare root trees but with that, there are more things to consider. Potential planting times depending on the stage of the potted plant are as follows:

- Green - actively growing May 15 - June 1
- Not actively growing September - October
- Dormant November - March 1

Potted walnuts are easy to plant but the grower becomes the nursery. Hydration/irrigation must be watched very carefully. If planted in late fall or the dormant season, trees are subject to dehydration that makes them more susceptible to winter freeze damage unless it rains or you can irrigate. If planting dormant trees, it's often best to plant in late February or early March after hard freezes are less likely. When planted in late spring, careful attention to irrigation is critical.

Irrigation: The first month after planting, the potting medium surrounding the roots cannot dry out until the roots have grown out into the soil. Once roots are out in the soil, keeping the potting medium hydrated is not quite as critical. Low volume drip systems work well or any irrigation system with directed water as long as it is applied with short, frequent irrigation intervals to keep the potting medium and the growing root system wet during the season.

Budding or grafting: If irrigated properly, potted trees should grow well and attain adequate growth to fall bud trees in August. If not or for trees that don't take the bud, they can be budded or grafted the following spring. There are several nurseries that supply potted clonal rootstocks. To be successful, work with your supplier and educate yourself on this somewhat new and different way of planting a walnut orchard.

Available Clonal Rootstocks

Clonal Paradox rootstocks provide options in selecting a rootstock to manage site specific problems or issues in orchards. The clonal Paradox rootstocks available are 'Vlach', 'RX1', and 'VX211'. Although long-term field trials and grower plantings are still limited, these rootstocks have been performing well based on data and observations to date. 'RX1' has moderate resistance to Phytophthora, 'VX211' has some tree tolerance to lesion nematode, and 'RX1' and 'Vlach' clonal rootstocks have low to moderate resistance to crown gall. Research is underway to develop hybrid walnut rootstocks with desirable vigor as well as good resistance to soilborne pathogens.

Photo 1. Planting an actively growing containerized 'RX1' rootstock.

Photo 2. Placing a grow tube and bamboo stake over the rootstock.

Photo 3. Watering clonal rootstock right after planting. Actively growing potted clones should be planted May 15 to June 1.

All photos by Janine Hasey.

New Walnut Variety 'Solano' Released

Chuck Leslie, UC Davis Walnut Improvement Program, Dept. of Plant Sciences

The UC Davis Walnut Breeding Program has recently released a new walnut variety, 'Solano'. This variety harvests early-mid season with light colored kernels, high yield, large nuts, and solid attractive shells. 'Solano' has leafing, flowering, and harvest dates that are very similar to 'Vina' but 'Solano' has better kernel color and tree structure and should be of particular interest to growers in the Sacramento Valley.

'Solano' produces large, uniform, oval-shaped nuts with good appearance, solid seals and shells, and easy removal of halves. Nuts average 14.6 grams with 8.0 g kernels and 55% kernel weight. The kernels have very good color, averaging 93% light and extra light and 54.8 RLI in trials. The shell and seal strength is clearly sufficient for use as an in-shell nut if desired.

'Solano' is precocious, 100% laterally fruitful, and has exhibited excellent yields in campus and grower trials. Known as selection 'UC95-011-16' prior to its release, 'Solano' originated as a seedling from a 1995 cross of 'Tulare' sibling 'UC67-13', used for quality, and the variety 'Chico' used for yield. It has been evaluated as a selection in regional blocks in Butte, Yolo and Fresno Counties and in grower trials in Tehama, Butte, Sutter, and Yolo counties. Grower feedback has been very positive.

'Solano' leafs out a week later than 'Payne', 'Serr', or 'Ashley' with a protandrous bloom habit (the catkins shed before the female bloom). It harvests ahead of 'Tulare or 'Howard' and more than two weeks before 'Chandler'. 'Solano's' timing is similar to 'Vina' but has a more easily managed canopy, better kernel quality and larger nuts. Canopy structure in grower trials has been upright and without evidence of limb breakage to date. Tree size at maturity is expected to be similar to Chandler and overlapping pollen sources include 'Tulare', 'Chandler' and 'Howard'.

Due to its later leafing date and male-first bloom habit, this variety will have less exposure to spring rain than another recently released variety, 'Ivanhoe', and is therefore anticipated to be less susceptible to blight

and more suitable for planting in the Sacramento Valley. ‘Solano’ is now commercially available and can be ordered from any licensed nursery.