

FUMIGATION GUIDELINES

Carolyn DeBuse, UCCE Farm Advisor,
Solano/Yolo Counties

Why fumigate?

When replanting a walnut orchard following an old walnut orchard you need to consider the pests and diseases that remain in the soil that may damage your new orchard. Soil fumigation can reduce or eliminate these soil pathogens, nematodes, perennial weeds, weed seeds, soil fungi and bacteria. It is basically killing the pathogenic soil ecosystem that the previous walnut orchard supported to give your new trees a chance to grow in uncontaminated soil promoting vigorous growth in their first years. Fumigation will provide an economic gain over the life of the orchard as a result of increased yields attributable to a larger tree size. If you are planting a new orchard in land that has been fallow or in field crops for two or three years, fumigation may not be needed. Talk to your farm advisor to make an informed decision.

Fumigation guidelines:

Kill and remove previous orchard roots.

The roots left in the soil from the previous orchard will harbor nematodes and pathogens allowing them to quickly invade the newly planted trees. It is imperative to kill and/or remove these roots. To kill the roots, paint freshly cut orchard tree stumps with 50ml Garlon 3A plus 100ml MorAct before the end of October. Wait at least 60 days before pushing the stumps and ripping the ground. If this method is used you do not have to cross rip your ground and hand remove all the roots. If you choose to not kill the roots, they should be removed in the traditional style of deep ripping the soil to bring roots to the surface and then hand removing them from the orchard site.

Nematode sampling: Send soil samples to a lab to determine if nematodes are present. Plan to fumigate if lesion nematode (*Pratylenchus vulnus*) is found.

Fallow for one year: If you can afford to delay planting, the site should be left fallow for at least one year between removal of the old

orchard and planting to help decrease nematode and soil pathogen populations and to dry out the soil.

Timing: Fumigation should take place after completion of soil preparation in the fallow year between August and November 1st, before 2 inches of rainfall occurs after July 1.

Soil moisture: Fumigants move 10,000 to 30,000 times faster in soil air than in soil water so it is important to dry out the soil. Moisture content at the time of application should be at or below 12-18 percent. The fallow soil should be ripped and reworked through the summer to dry the soil to a 5 foot depth. Planting Sudan grass or safflower in the spring will also help dry the soil.

Soil temperature: Fumigants work better at high soil temperatures so it is important to fumigate before the soil temperatures drop. It is recommended to fumigate before November 15th with soil temperatures above 55°F. Soil temperatures should be taken at one foot depth.

Sealing the soil: Tarping the soil is recommended following a gas fumigant like methyl bromide. Less volatile fumigants can be followed by sealing the soil with tarps or soil compaction and/or water sealing. The more completely the soil is sealed the more thoroughly the fumigant will work killing the soil pathogens and weeds. If fumigant is broadcast, follow the label recommendation of additional water to increase penetration.

Soil Aeration: Follow label recommendation for needed time to aerate the soil before planting.

Fumigation choices: To make a choice you need to consider your soil type and soil moisture. See chart of available fumigants created by Dr. Mike McKenry (2007)

Nutritional considerations: Fumigation can lower available phosphorus (P) and zinc (Zn) so monitor nutrient levels in the new trees with leaf analysis as the orchard establishes. .

For more information go to Dr. M. McKenry's website <http://www.uckac.edu/nematode/>

FUMIGANT NAME	APPLICATION AMOUNT	SOIL TYPE	SOIL MOISTURE
Methyl bromide (restricted use only)	225-350 lb/ac injected at 10 in.	any	<12-18%
1,3 Dichloropropene (Telone II)	33.7 gpa	sandy-sandy loam	<12%
1,3 Dichloropropene+ chloropicrin (Telone C-35)	49-50 gpa	sandy-sandy loam	<12%
Telone II plus Metam-sodium (Vapam HL)	Telone 33.7gpa plus Met-sod 110lb/ac incorporated in top 5 inches	sandy-sandy loam	<12%
Telone II plus chloropicrin	Telone broadcast at 33.7gpa with Pic stripped at 170lb/ac	sandy-sandy loam	<12%
Telone II plus chloropicrin	Telone 33.7gpa apply using Buessing shank at 20 in. plus 250-350 lb/ac Pic at 28 in.	silty or clay loam	<12-18%