ORCHARD REPLANT ALTERNATIVES FOR MB IGNORE DEEPER PATHOGENS

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In Federal Register Vol. 78, No. 105, May 31, 2013 page 32648, USEPA indicated that while no single alternative is effective for all pest problems, numerous field trials indicate alternatives to MB are effective. Their conclusion was that transitioning to the alternatives was feasible without substantial losses.

In a separate document USEPA provided usually one sentence or two of analysis as to how their conclusion was reached along with the scientific source from which data were obtained. Perusal of the citations reveals that the bulk of the articles were published for recent annual proceedings of the methyl bromide alternatives conference but a few were drawn from UC Pest management Guidelines, California commodity board reports or County newsletters. There was only a single article cited in this EPA analysis having scientific peer review. Following the USEPA analysis the August 29, 2013 issue of California Agriculture, a refereed publication, provided greater documentation of the fact nematodes were seldom present in the fields that were studied. In addition, USEPA concluded that studies involving *Armillaria mellea* fungus were absent across the literature and it too must not be damaging enough to warrant use of MB as a critical need. Avoidance of the importance of deep-dwelling pathogens when discussing orchard replant problems is a clever way to ignore the primary economic benefit of MB, particularly where medium to fine textured soils are the farmlands. Their avoidance provides USEPA the opportunity to avoid numerous refereed publications that describe and quantify fumigant movement, the impact of shorter half-lives of the alternatives, the value of broadcast fumigations compared to strip or spot fumigations and most importantly the impact of higher soil moisture content on fumigant dispersal. Note that only one of the cited orchard replant studies actually involved nematode presence. That same project is the only one where soil moisture contents were determined ahead of the fumigation and that point ignored by USEPA. All soil fumigants are impacted by high soil moisture content but especially the alternatives to MB.

At the 2013 MBAO conference I will provide photographs indicating that fumigant delivery to 12 feet in deep-dried sandy loam soil is possible to achieve with MB spot treatments coupled with additional fumigant at the field surface. Satellite photos taken 35 years after the experiment are now available and *Armillaria mellea* remains absent where we treated. The required pounds/treated acre of Telone or chloropicrin to accomplish this task are not now legal in California. In a second setting involving *A. mellea* the depth of needed control was 6 feet using half the MB application rate as needed above. We now have satellite photos from 32 years after treatment and again at this site we completely eradicated *A. mellea* damage while halting its further spread across the field. In two other field sites, one with published photos we show that attention to soil moisture content and depth of old roots are essential for MB to control *A. mellea* even in sandy loam fields. Near Santa Maria, CA in 1989 we drenched double the legal application rate of Vapam into a sand dune infested with *A. mellea* but A.mellea returned to the young replants in one year.

In 1999 this PI initiated a walnut replant trial. Nematodes, *Pratylenchus vulnus*, were present to 13 feet deep in this sandy clay loam soil which was uniform in texture to 13 feet. At fumigation time the soil was less than 14% soil moisture content throughout the surface five feet. MB with tarp at 400 lb/acre broadcast provided 99.99% nematode control to 6 feet deep. At 14% soil moisture content we knew we needed to apply at least 500 lb/acre Telone II and eventually the treatment provided 99.99% control to 4 ½ feet deep within an 11 foot wide planting strip. Metam sodium was drenched in 7 acre inches of water and liberated ca. 330 lb. MITC/ acre as a broadcast treatment that provided 99.9% nematode control to 4 foot deep. Walnuts were planted on two rootstocks which provided an internal control involving a modicum of nematode resistance. Yields collected in the 8th, 9th and 10th years reveal significant yield reductions associated with MITC in each of three years and significant yield reductions associated with strip applications of Telone II appearing in the 9th and 10th years.

USEPA claims that the orchard replant group shows no significant yield benefits associated with MB compared to Telone. Deep-dwelling soil pathogens and the reduced fuming value of USEPA proposed alternatives especially in medium to fine textured soils have been quantified over and over and the data confirmed here. USEPA claims there are alternatives but their search was not thorough. They did not select articles that received peer review and did not choose data associated with deep dwelling pests, especially nematodes.