Pre-Plant Fumigation Pays

Roger Duncan, Pomology Farm Advisor, UC Cooperative Extension, Stanislaus County

In October 2000, we initiated a pre-plant fumigation trial with grower, Norman Kline, to study the effects of various pre-plant fumigants and post-plant treatments on a replanted Loadel cling peach orchard. During the early years of the orchard's life, we monitored tree growth, yield, nematode dynamics, soil microbial changes, plant and soil nutrition, and other aspects of orchard and soil "health". The bottom line was that fumigation paid huge dividends during the first two harvests and there was no substitute for preplant fumigation. Fumigation increased gross per acre income by $4127 (methyl bromide), $1806 (Telone® II) or $2102 (Vapam®) over unfumigated trees during the first two harvests. Telone® treated trees started out slow for some reason, but grew very well after the first year. Post-plant nematicides like Nemacur® and Enzone® reduced nematodes in unfumigated areas for a few months after each application but it was difficult to see significant plant responses, even in unfumigated areas. This shows that there is more to the replant problem than just nematodes. Microbial and kelp-based products injected through the drip system each year did not change the microbial makeup of the soil, nor did they have any effect on nematodes, tree growth, nutrition, yield or anything we measured. Placing black polyethylene film down the herbicide strip reduced ring and root lesion nematodes and increased plant growth for the first few years. However, this practice is probably impractical and was no longer effective after the trees got large and produced shade. The only effective & practical post-plant treatments in this trial were foliar micronutrient sprays and frequent, small nitrogen applications. Only the unfumigated trees responded to the fertilizer treatments. There was no measurable response when foliar sprays were applied to "healthy" fumigated trees.

Do Unfumigated Trees Eventually Catch Up? I sometimes hear people say that fumigation may not be worth the cost in the long run because unfumigated trees will eventually "catch up" to fumigated trees, especially in peach orchards where trees are pruned heavily and maintained at a given height. This does not make sense because any money lost in the early years can never be made up, even if unfumigated trees finally produce yields equivalent to fumigated trees. Since the project officially ended two years ago, Norman has done a great job bringing the unfumigated trees into full production with proper irrigation and fertility practices, including periodic foliar micronutrient sprays and fall lo-biuret urea sprays. Amazingly, there has been no bacterial canker in this orchard and the unfumigated trees look good. Now that the orchard is in its 6th-leaf and growing well, I wanted to see if the unfumigated trees really did catch up. Yield data are shown in the table below. These data show that even though the unfumigated trees look good, they still produced 4.9 – 7.1 tons per acre less than fumigated trees this year.

Fumigation Treatment	2006 Tons per Acre (6th leaf)	Cumulative Yield 3rd, 4th & 6th leaf	Cumulative Gross Income	Increase in Income Over Unfumigated*
Unfumigated	13.8	25.2	$7280	--
Vapam	18.7	37.7	$10,852	$3572
Telone II	20.9	38.9	$11,216	$3936
Methyl bromide	18.7	45.1	$12,877	$5597

*Guestimating a price of $300 per ton for Loadels in 2006, including premium in 2006.