A REJECTION PHENOMENON CAN OCCUR AS ROOT SYSTEMS MOVE INTO AN ALIEN SOIL ECOSYSTEM

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In a four-acre site almonds on nemaguard peach were removed in winter 1995 and replanted to mission almond on nemaguard peach in spring 1997. In fall 1996 four soil treatments were imposed in a randomized block design with four replicates of each. In addition to a nontreated check and a methyl bromide treatment; virgin soil (NRPS) in the amount of ½ yard per planting site was transported to sites that were nontreated or had previously received a drenching of Vapam at 250 ppm MITC in six inches water. Plant growth was monitored by collecting annual trunk diameters, pruning weights, and finally 1999 almond yields. Results are displayed in Table 1.

Compared to the nontreated, a pre-plant treatment of MB resulted in significantly greater trunk diameters in the first year but not the second. The use of ½ yard transported NRPS provided significantly larger trunk diameters in the first year unless the NRPS was transported to a site that had received a pre-plant treatment of MITC. These growth differences were also visible as vigor differences. Fruit numbers and fruit yield per tree also reflected the subjective vigor ratings. Yields were significantly less from trees having roots growing out of NRPS into the MITC-treated soil compared to trees with roots growing out of NRPS and directly into the RPS (Replant Problem Soil).

The senior author has referred to the most common component of the replant problem as a rejection phenomena (McKenry, M. V., 1999). It is manifested as slow initial growth followed in 6 months to a year by normal growth. Trees planted into ½ yard NRPS exhibit dramatic growth well into summer, then they slow for up to one year whereupon they resume fast growth. This growth lag becomes apparent by comparing tree growth in complete NRPS compared to ½ yard NRPS (McKenry, Buzo, and Dougherty, 1998). In this experiment the growth lag was accentuated even more by treating the RPS soil with MITC six months prior to transporting the NRPS to planting sites.

What is this growth lag? Why is its appearance so similar to the general replant problem? How do expanding root systems adjust to differing soil ecosystems? One reason this growth lag has not previously been described is that tree growth is most easily measured once per year rather than incrementally through the year. Of course there is also the complexity of field variability to contend with in every replant problem site. The authors do not believe this growth lag is due to residual from the Vapam but a result of the different ecosystem it produces in soil. The ecosystem following a MITC treatment must be very different from that present in NRPS. A companion paper also presented in these proceedings indicates the occurrence of a similar growth lag associated with various other combination treatments (McKenry, Buzo, Kaku, Ashcroft, 1999).

McKenry, M. V. 1999. The Replant Problem and Its Management. Catalina Publishing, 819 E. Catalina, Fresno, CA 93720.

McKenry, M. V., T. Buzo, and D. Dougherty. 1998. Growth and yield benefit of replanting into "transported non replant problem soil." Ann. Intl. Res. Conf. on Methyl Bromide Alternatives and Emissions Reductions. 35-1,3.

McKenry, M. V., T. Buzo, S. Kaku and R. Ashcroft. 1999. First-year nematode control and tree growth using treatments appropriate for buffer zones. Ann. Intl. Res. Conf. on Methyl Bromide Alternatives and Emissions Reductions (these proceedings).

Table 1. Nematode population development, and almond tree yield and growth after four pre-plant soil treatments

Treatments	Pin Nematode / 250 cm^3 soil		Trunk diameter		Yield Yr-3	
	Yr-1	Yr-2	Yr-1	Yr-2	fruit/tree	kg/tree
½ yd. NRPS (virgin soil)	4.0 n.s.	306.0 ab	3.67 a	6.58 n.s.	416 a	4.17 a
MB treated	1.3	1.0 a	3.19 b	6.25	319 ab	3.45 ab
½ yd NRPS to MITC drenched site	2.7	107.0 a	3.29 b	6.08	219 b	2.31 b
Nontreated check	12.5	680.0 b	2.90 c	5.88	268 b	2.64 b

Average of four replications. Mean separation in each column by DMRT at 5% level.

This study partially funded by the California Almond Board, California Tree Fruit Agreement, and a special cooperative grant from the USDA.