# NEW TACTICS FOR REPLANTING JUGLANS USING 'STARVE AND SWITCH' STRATEGY

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Specific tools for replanting of perennials such as Vitis and Prunus without soil fumigation have previously received attention at MBAO.org. The strategy (S&S) has been to starve the previous soil ecosystem by killing previous root systems followed by switching to a rootstock of very different parentage. Our best example with Vitis is painting of recently cut grape trunks with glyphosate in February-March followed by one full year of fallow and then planting 10-17A, a rootstock of very different parentage plus broad nematode resistance.

With Prunus we have demonstrated the value of summer / fall treatments with glyphosate followed by a full year of fallow. But, of 65 potential Prunus rootstocks examined only Hansen 536 has been useful as a rootstock to switch to. It is of parentage different enough from Nemaguard but in sandy soils is too good of a host for *Mesocriconema xenoplax,* thus soil treatments are still a necessity for sandiest soils when Hansen 536 is replanted after Nemaguard.

Major research efforts have been underway with Juglans rootstocks since 1992, specifically in response to the Montreal Protocol. In grower orchards rootstocks are currently either Northern California Black walnut, *Juglans hindsii*, or paradox hybrid seedlings, *Juglans regia x Juglans hindsii*. These rootstocks provide no resistance to *Meloidogyne* spp, *Pratylenchus vulnus* or *M. xenoplax*. Seventy-five percent of California's 275,000 acres of walnuts orchards are located on medium to fine textured soils where 330lb/acre of fumigant is less than adequate as they provide one-two years of nematode relief rather than the 6 years of relief from nematodes and the replant problem provided by MB. Benefits of MB were associated with its greater dispersal through medium to fine textured soils. The S&S strategy can now be accompanied with a larger toolbox of tactics.

**Walnut rootstocks** offering nematode resistance and/or tolerance to root rejection (general replant problem) were unavailable in 1992. Today there is VX211, a cloned paradox hybrid offering tolerance to nematodes based on a single resistance mechanism within root tips coupled with extra vigor imparted to scions. VX211 provides a useful rootstock 'switch' when following Black walnut but not following Paradox hybrid. There is also great interest in specific seedlings of *J. cathayensis* because of the three years of excellent nematode resistance some offer plus complete avoidance of the replant problem if at least one year of fallow occurs prior to replanting. At ten years after planting some J.cat seedlings do provide among the lowest nematode populations but their nematode tolerance is not yet quantified and their reduced vigor would likely be accepted only in close-planted orchards.

**Garlon herbicide** painted to cut tree trunks after their final harvest result in root systems 99.5% free of eggs and adult nematodes within 9 months. This treatment hastens root kill enough that ease of pulling deep shanks through the field is noticeable during preparation for replanting within one year. These nematode reductions are not due to the herbicide per se' but likely due to release of various toxic polyphenols as cell walls are disrupted, a situation that does not occur in Prunus or Vitis roots. It is also notable that switching to a very different rootstock is more beneficial to tree growth than use of Garlon to completely kill old roots so more field trials are needed. Once *P. vulnus* is absent from root tissues any fumigant or non-fumigant has improved opportunity to sanitize soil especially if the chemical is less attractive to soil particles and live organic materials within.

**A new biocide,** recently identified, can be drenched through soil with water. It is almost completely without fuming action and has a brief half-life. More extensive studies with this product are underway specifically with tree site treatments prior to replanting the vigorous VX211 or less vigorous J.cat rootstocks.

**Foliar-applied spirotetramat** has the ability to reach and persist longest within root tips. This product is effective in walnuts and may be useful for those sites where 'starve and switch' is the strategy but some of the above tactics are less than adequate. This product has value once new root system development is well underway but does not by itself replace soil fumigation.