ACHIEVABLE YIELD IN A COMMERCIAL FRESH CARROT PRODUCTION FIELD IN CALIFORNIA

J. 0. Becker[1]*, H. D. Ohr[2], M.E. McGiffen, Jr.[3], C. Hutchinson[1], and J.J. Sims[2]
Departments of 'Nematology, 2PIant Pathology and 3Botany & Plant Sciences, University of California, Riverside, CA 92521

Soil fumigation is critical to fresh carrot production in California. It is often required to reduce root-knot nematode populations sufficiently to maintain profitable levels of production. Telone II is the preferred material for nematode control but the total amount of Telone II applied in California is legally limited. There is also limit per township which leads to shortages in carrot production areas. In addition to metam sodium, methyl bromide (MBr) has been available until now under Section 18 permit for non-tarped use. However, the application period has recently been severely restricted.

We have identified methyl iodide (MI) as a potential substitute for MBr in soil fumigation (1). In contrast to the light-stable MBr, MI decomposes rapidly in fight, which results in a very short residence time in the atmosphere. It is therefore unlikely to reach the stratosphere to react with ozone. In laboratory and microplot studies, MI was as effective or even more effective than MBr at equivalent molar rates against a wide range of fungal pathogens, plant parasitic nematodes and weeds (2,3). Both MBr and MI are currently being tested in grower's fields to allow a more realistic comparison of their efficacy.

One field experiment was conducted in the spring of 1996 in a carrot field at Buena Vista Farms in Bakersfield. Potatoes had been planted in this field in the previous season, which resulted in a tremendous build-up of root-knot nematodes *(Meloidogyne incognita).* Fumigants were applied approximately two weeks before seeding. Telone II was applied at 12 gal/acre (122 lbs/acre) by a commercial applicator according to the current standard practice. MBr (100 and 200 lbs/acre) and MI (150 and 300 lbs/acre) were applied by hot gas injection under 4 mil polyethylene tarp. This method was used to allow precise application rates in relatively small plots of 20 feet in length. The trial design was a randomized complete block with four replications.

Root-knot nematode populations were below detection level in all three fumigant treatments two weeks after seeding. During the first two months carrots growing in fumigated plots were obviously more vigorous than in the non-treated check. At harvest, carrots from the non-treated plots showed the characteristic symptoms of root-knot nematode damage such as forking of the tap root, stubbing, and galls on feeder roots. In the absence of

an effective nematicide treatment this level of nematode infestation would have resulted in an almost complete economic loss. Telone II treatment was as effective against root-knot nematodes as the other fumigants. However, the number of marketable carrots almost doubled in plots treated with 200 lbs MBr or 150 lbs MI compared to the Telone II plots. Number of marketable carrots and the total fresh weight were highest in plots treated with 300 lbs MI.

In summary this trial supports previous data that MI can be a more effective fumigant than MBr. Various yield parameters did not significantly differ between plots treated with 150 lbs MI and 200 lbs MBr. More surprising is the extent of the yield response with the broadspectrum fumigants compared to Telone IL Although the nematicide successfully suppressed the target pest, other biological factors were present which limited the yield to only about 40% of its potential. This observation is significant because it supports reports that many US crops have the potential to routinely produce 15-25% more yield without increasing water or fertilizer supply if constraints on root health can be alleviated (4).

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