ALTERNATIVES TO METHYL BROMIDE FOR NEMATODE CONTROL IN ORNAMENTAL CROPS

Nancy Kokalis-Burelle* and Erin N. Rosskopf
USDA, ARS, U.S. Horticultural Research Lab, Ft. Pierce, FL

Nematode control options for production of in-ground ornamental crops are extremely limited. Ornamental production has different obstacles to nematode control and chemical application than raised-bed vegetable production. These challenges include a need for flat fumigation, lack of labeled herbicides, fixed structures such as shade houses, unknown levels of susceptibility of ornamental varieties to common and new species of root-knot nematodes (*Meloidogyne*), and proximity to developed areas which impacts fumigant buffer zone requirements.

Research was conducted in cooperation with ornamental growers in East and Central Florida, and at the USDA, ARS experimental farm in Ft. Pierce, FL beginning in 2004. Researched ornamental crops include celosia, sunflowers, delphinium, snapdragon, dianthus, and caladium. Trials assessed the effects of alternative chemical fumigants, non-fumigant methods, biological control, and plant varieties on weed, pathogen, and parasitic nematode populations and resulting disease. Fumigants tested were methyl iodide (98:2 and 50:50 formulations), and dimethyl disulfide (79:21 formulation), while physical and cultural control methods investigated included steam and anaerobic soil disinfestations (ASD). Fumigant and non-fumigant control methods were compared to methyl bromide. New research on nonchemical options includes newly developed formulations and application methods of the nematode biological control agent *Pasteuria penetrans.* Application methods being investigated include transplant, seed treatment, and drip applications. In addition to chemical, cultural, and physical nematode control measures, assessment of caladium varieties for susceptibility to infestation by common and new species of root-knot nematodes is being conducted.

A better understanding of the ability of nematodes to reproduce on weeds will also become increasingly important as growers transition from broad-spectrum fumigants. Observations from field trials on soil fumigants resulted in isolation of *M. arenaria* from cheeseweed mallow (*Malva parviflora*), a newly reported natural host for *M. arenaria.* Studies were undertaken to determine the host status of several weeds to the three predominant species of root-knot nematodes in Florida, *Meloidogyne incognita, M. arenaria,* and *M. javanica*. *Portulaca oleracea* and *Amaranthus americana* were found to support the most juveniles (J_2) of all three *Meloidogyne* species, and also had the highest number of eggs/g root for all three species. Although *P. oleracea* supported very high numbers of J_2 in roots, galling was moderate to low for all three species. Low levels of apparent galling combined with high egg production, may increase the potential for *P. oleracea* to affect populations of these nematode species to an unexpected degree.