Dilip K. Lakshman
Floral and Nursery Plants Research Unit, USDA-ARS, Beltsville, MD 20705

Biological alternatives to methyl bromide in plant disease control

With the ban of Methyl bromide (MB) in Agriculture, broad-based alternatives are increasingly sought for plant disease control. Agrochemicals provide reliable crop protection, but increasing costs, non-target effects on beneficial microflora, residual toxicity, stress to the environment and the development of pathogen resistance are problems associated with chemical pesticides. There are also diseases for which chemical control is non-existent or ineffective. As a result, alternative methods using botanical formulations and antagonistic microbes are gaining momentum as ways of controlling soilborne plant diseases, particularly in ornamental and vegetable crop production. Minimizing disease incidence and severity by application of specific antagonistic microbes is called biological control. Another emerging approach is to explore the potentials of botanical extracts for their anti-pathogenic (biorational) properties. Biocontrol organisms and biorationals are safer, potentially less costly and have minimal deleterious effects. We are investigating the breadth of disease control ability of plant extracts. We have shown that clove oil a known fungicidal, insecticidal and herbicidal agent, also act as a bacteriocide and nematocide. We have successfully controlled Ralstonia wilt of geranium and tomato by pre-plant fumigation of soil-less potting mix under growth chamber and greenhouse conditions. In addition, we have screened Streptomyces spp. from diverse geographic regions of continental US for higher chitinolytic ability and potential biocontrol properties against soilborne fungal and bacterial pathogens.