A SYSTEMS-BASED APPROACH TO DEVELOPING NON-CHEMICAL ALTERNATIVES TO FUMIGATION FOR FLORIDA

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The search for a fumigant alternative to methyl bromide has focused on identifying of a 'drop-in' replacement consisting of the preplant application of a single chemical or chemical combination to disinfest soil. Studies on non-fumigant alternatives conducted at the USDA, ARS U.S. Horticultural Research Laboratory have indicated that input-substitution is not a sustainable approach for developing nonchemical alternatives to soil fumigation. Because the modes of action of non-chemical systems are biologically-based, they require time for beneficial soil microbial communities to become established and resilient to environmental or anthropogenic disturbances. Furthermore, differential interactions between nonchemical alternatives and their target pests are often observed, making it difficult to establish broad generalizations regarding their role in pest control. For example, the beneficial effects of cover cropping can be lost if the choice of organic amendments supports rather than suppresses the growth of pathogens that can live as saprophytes on poorly decomposed plant residues. Rather than focusing on controlling specific soilborne pests through the substitution of nonchemical inputs for chemical inputs, a systems-based approach targeting resident microbial complexes and the adoption of long-term farm management plans involving crop rotation was emphasized. Examples of knowledge gaps and research requirements will be presented.