USDA Agricultural Research Service Programs in California on Preharvest/Soils and Postharvest Methyl Bromide Alternatives

Preharvest/Soil

The overall goal of USDA-ARS preharvest/soil research on alternatives to methyl bromide (MB) is to develop and refine integrated soilborne pest management. The integrated strategies will be based on improved understanding of soilborne pests, emphasis on biological strategies, and developments and improvements in application technology for alternative chemicals, fumigants, and biological control agents.

In California, USDA-ARS preharvest/soil research on MB alternatives utilizes four locations (Davis, Fresno, Riverside, and Salinas) and nine scientists. In addition, USDA-ARS support MB alternatives research with five Univerity of California cooperators. The preharvest/soil research is directed towards strawberries, deciduous fruit and nut crops, vegetables, grapes, and ornamentals.

Specific research needs have been identified for integrated soilborne pest management. As a foundation, USDA-ARS will investigate basic biology of soilborne pests and pathogens; integrated strategies will rely upon knowledge of microbial ecology and etiology and methods of pathogen detection in soil. Research on control methods will focus on host plant resistance (genetic and induced), plant responses to methyl bromide alternatives, cultural practices, biocontrol, and application technology for chemical and biological materials. Determine effects of soil physical, chemical, and biological parameters on the fate and transport of MB alternatives including emissions and leaching. The research will involve extensive interdisciplinary collaboration and highlight integration of methods.

Postharvest

The postharvest research program of the USDA, Agricultural Research Service in California is located at the Horticultural Crops Research Laboratory, Fresno. A significant portion of the program is dedicated to the development of alternatives to the use of methyl bromide for control of stored-product and quarantine insects pests and determination of phytotoxicity and decay of fresh commodities limiting the successful application of efficacious quarantine treatments. Scientists representing entomology and the plant sciences are involved full or part time with this research. Emphasis of the research is on fresh fruits and vegetables and dried fruit and nut pests.

Specific research areas for the development of alternatives include new chemicals or modifications of existing uses, physical treatments, and controlled atmospheres alone or in combination, methods to reduce methyl bromide emissions such as combination treatments (e.g. with carbon dioxide), methyl bromide trapping, recycling, and the use of biological control agents such as parasitoids and insect pathogens. Physical treatments (heat or cold) are also being investigated for stored product and quarantine treatments. A significant portion of the research involves determining effects on quality and market life of alternatives under development. Host plant relations and host plant resistance (either natural or engineered) are also being investigated as to their feasibility in meeting needs for protection against stored-product or quarantine insects. Basic biology is a strong component that provides opportunities to develop less rigid stored-product and quarantine treatments. Studies on host range and host relations as well as pest phenology provide data that may allow development of pest free periods, pest free zones or a reduction in the severity or frequency of application of proposed alternatives. Predictive models, detection and sorting systems will soon be investigated for both stored-product and quarantine pests. Systems approaches and combination treatments may be developed in situations where single treatments are not possible because of single treatment efficacy problems. The economics of potential methyl bromide alternatives will also be investigated as they impact on time of treatment, postharvest handling procedures, quality and market life.