Methyl Bromide Alternatives
FY 2003 National Program 308 Annual Report

Introduction

The Methyl Bromide Alternatives National Program encompasses research to determine alternatives to methyl bromide, which is being phased out as a result of indications that it negatively impacts the stratospheric ozone layer. Methyl bromide is an extremely important pesticide in the United States, as well as the rest of the world. It is used to rid the soil of pests before crops are planted and on postharvest commodities to kill pests in order to protect product quality. Preplant use controls soilborne pathogens, nematodes, insects, and weeds. Postharvest use kills insects and other arthropods. It also includes quarantine treatment, which prevents accidental introduction of organisms into areas where they did not previously exist.

Alternatives must be found so that the United States can continue economically viable production systems that permit the Country's agriculture to maintain its role in domestic and international trade. Quarantine treatments are currently exempted from the phaseout, thus the primary focus of research has been on preplant and postharvest uses. Much of the Nation's domestic food production, such as fruits, nuts, and vegetables, will be severely impacted if suitable alternatives, which, in the case of chemicals, can be registered for use by the U.S. Environmental Protection Agency, are not found.

Selected Accomplishments by Component

Component I. Alternatives to Methyl Bromide for Preplant Soil Fumigation

Methyl bromide alternatives provide control of parasitic nematodes in California. The use of the soil fumigant methyl bromide will be phased out by the year 2005. Methyl bromide has been used by the tree, vine, and rose nurseries to control soilborne pathogens, pests, and weeds in compliance with California regulations governing certified nurseries. ARS scientists at the Water Management Research Unit, Parlier, California, found that several treatments including 1, 3 dichloropropene, chloropicrin, and iodomethane provided similar control of parasitic nematodes as methyl bromide down to a depth of 5 feet. This work may benefit nurseries by leading to the California Department of Food and Agriculture's approval of new soil treatment practices for use in certification.

New apparatus will enable safer application of soil fumigants. The loss of methyl bromide as a soil fumigant will result in serious disease and pest problems in fields and reduce crop yield for many commodities including strawberry, pepper, and tomato. Many alternatives to methyl bromide face regulatory issues regarding worker exposure to pesticides in the field. ARS scientists at the Subtropical Plant Pathology Research Unit, Fort Pierce, Florida, conducted field

tests of a new apparatus that will allow growers to apply fumigants after workers have vacated the fields. This will eliminate many of the regulatory problems regarding worker exposure and will allow fumigation under previously established plastic mulched beds without the use of a more costly drip irrigation system.

Nematode resistant cover crops provide higher tomato yield. The loss of methyl bromide as a soil fumigant will result in serious disease and pest problems in fields, and reduce crop yield for many commodities including strawberry, pepper and tomato. ARS scientists at the Sustainable Agricultural Systems Laboratory, Beltsville, Maryland, have conducted a field study that evaluated nematode resistant cover crops' ability to suppress the nematode population in tomato cropping system. They found that these cover crops provide tomato yields equivalent to or greater than treatments using methyl bromide at significantly lower costs.

Component II. Alternatives to Methyl Bromide for Postharvest Fumigation

Quarantine research allows shipment of peaches and nectarines to Chile without fumigation. Walnut husk fly is a pest of peaches and nectarines in the United States and the subject of quarantine in many countries of the world, including Chile. A pest-free period and the poor host-status of stone fruits for attack by walnut husk fly were developed through research by ARS scientists at Parlier, California. In April 2003, the government of Chile declared shipments of peaches and nectarines as free of walnut husk fly based on this research. A new additional market to South America, currently valued at $13 million annually, is now available for stone fruits exported from California.

Parasitic wasp shows promise in helping control the Olive Fruit Fly. The Olive Fruit Fly was recently introduced into California and has destroyed some coastal olive industries and threatens much of the olive industry in California. Cage tests and small releases of the parasitic wasp *Psytallia* cf. *concolor*, reared by USDA-APHIS, PPQ and Moscamed in Guatemala, were conducted in 6 regions of California to determine the effect of biological control on olive fruit fly. Results of these tests by ARS scientists in Parlier, California, show that 39 percent of the susceptible olive fruit fly larvae were killed when the wasp completed its life cycle in the host. This biological control agent has great potential for economical control of the pest in California.

Hawaii-produced sweet potatoes exported to the Unites States Mainland with an irradiation treatment. Sweet potato in Hawaii is host to West Indian sweet potato weevil and sweet potato vine borer, pests that are quarantined on the Unites States Mainland. Although methyl bromide (MB) treatment is effective and is accepted as a quarantine treatment, the Montreal Protocol mandated phase-out makes its continued use uncertain for even quarantine uses, currently exempt from the phase-out. Also, MB fumigation is not readily available in the part of Hawaii where the sweet potatoes are grown. ARS scientists in Hilo, Hawaii, working with Hawaii Pride, LLC, a local quarantine irradiation facility, developed dose/mortality data for the two pests, which allowed for the approval of radiation at 400 gray dose as an accepted quarantine treatment for sweet potatoes for the Unites States Mainland. This action helps increase the agricultural diversity in Hawaii following the decline of its sugar and pineapple industries.