Methyl Bromide Alternatives
National Program Annual Report: FY 2002 Program 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. EPA, are not found.

Selected Accomplishments by Component

Component I: Alternatives to Methyl Bromide for Preplant Soil Fumigation

Propargyl bromide could be an efficacious replacement for methyl bromide. The impending ban on the use of the soil fumigant methyl bromide as a pre-plant treatment has forced researchers to seek alternative products or practices to use in its place. Studies on tomato, strawberry, carrot, fruit trees, grape vines, and ornamentals determined that propargyl bromide is efficacious against most pests, including nematodes, diseases, and weeds at about 1/3 the current methyl bromide rate. ARS scientists in Fresno, California; Salinas, California; Davis, California; and Ft. Pierce, Florida, cooperated with State scientists and grower groups in coordinated studies to demonstrate that yields can be maintained to meet the supply and quality of these crops that the market demands.

Strawberry cultivars available for organic production. Organic strawberry farmers have had to extrapolate information on cultivar performance from conventional production fields where fumigation is used to control disease, which is not a sound basis for comparison. ARS scientists in Salinas, California, have completed evaluations of commercially available strawberry cultivars under strict organic production conditions to provide growers with the first technically sound information about cultivar performance under these conditions. Three cultivars were

identified as the highest performing in organic production. Working with a farm advisor and the California Cooperative Extension Service, this information has been transferred to organic strawberry growers in the region. Growers are using these results to make informed cultivar choices based on yield and quality considerations.

Chemical alternatives available to maintain commercial production practices in Florida. In the southeastern United States many high value vegetable and ornamental crops are planted in field soils fumigated with methyl bromide, a chemical that will be banned for agricultural use in 2005. Scientists in Ft. Pierce, Florida, have conducted large scale demonstration trials on commercial vegetable farms and have validated that the use of Telone 35 (65:35 mixture of 1,3-dichloropropene:chloropicrin) applied using a deep placement coulter system, in conjunction with the herbicides pebulate, napropamide and/or trifluralin provided levels of weed and disease control similar to soil fumigation with methyl bromide:chloropicrin without injury to the plants. These trials demonstrated that it is feasible to adopt chemical alternatives to methyl bromide without causing major vegetable production disruptions.

Component II: Alternatives to Methyl Bromide for Postharvest Fumigation

New heat treatment effective as a methyl bromide alternative for fresh stone fruit. Heat treatments are known to be effective to control insects in fresh fruit commodities, but they generally cause unacceptable fruit damage. ARS scientists in Parlier, California, have demonstrated that a heat treatment that combined low oxygen and high carbon dioxide did not adversely affect fruit quality and in some cases produced juicier fruit than fruit not treated. This treatment may be a useful alternative to methyl bromide fumigation for quarantine treatment of peaches and nectarines.

New quarantine treatment for Timothy hay destined for the Japanese market. Hay grown in the United States must be treated to kill Hessian fly before it can be exported to Japan. ARS scientists in Parlier, California, confirmed with large-scale commercial tests in Ellensburg, Washington, that phosphine fumigation combined with compression is efficacious against Hessian fly in large-size, polypropylene fabric-wrapped bales. Data from these tests, conducted in cooperation with the Kittitas County Timothy Hay Growers, has been submitted to Japan for approval and if approved will provide a new hay product for the Pacific Rim markets valued at $340 million annually.

Release of fruit fly parasites enhances the sterile male technique for control of melon fly. Tests conducted by ARS scientists in Hilo, Hawaii, showed that simultaneous release of the parasite *Psyttalia fletcheri* with sterile males enhanced the efficacy compared to the efficacy of either method alone. This approach may be a viable alternative to insecticidal treatments and is useful to areawide fruit fly programs worldwide.

Insect growth regulator inhibits egg hatch of Mexican fruit fly. Mexican fruit fly is a serious pest of citrus in Mexico and regularly invades the Texas Rio Grande valley each year. ARS scientists in Weslaco, Texas, demonstrated that ingestion of the insect growth regulator, lufenuron, by female fruit flies inhibited hatch of their eggs for up to 3 weeks. Lufenuron can potentially be used as an effective spray against fruit flies in integrated pest management

programs to inhibit population growth and at the same time safeguard natural enemies.