RESEARCH TRENDS ON ALTERNATIVES TO METHYL BROMIDE FOR STRAWBERRIES AND TOMATOES

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The Methyl Bromide Alternatives Outreach (MBAO), in cooperation with the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA), sponsors annual research conferences that attract hundreds of academic researchers, growers, chemical manufacturing firms, firms manufacturing other agricultural products, and government regulators. This diverse group meets to share research results and exchange information about experiences with alternatives to methyl bromide.

This presentation summarizes research on strawberries and tomatoes presented at the MBAO annual conferences from 1999 to 2004. It highlights the research findings on the likely alternatives to methyl bromide, their advantages and disadvantages, and some of the remaining impediments to the adoption of likely alternatives. While many of the studies highlight the effectiveness of alternatives, there are limitations that preclude the assumption that the alternatives are technically feasible on a commercial scale. Studies are typically conducted on test plots under research conditions and not on a commercial scale; alternatives are frequently tested on plots that were previously treated with methyl bromide; the pest pressure on test plots may be significantly different than those encountered on a commercial scale; and there are few multi-year studies developing a history of effectiveness over the years.

Strawberries: California growers produce more than 80% of the strawberries in the United States. Florida is second, producing about 12% of the fresh market strawberries. Some of the general findings from the research on strawberries include the following:

- Telone and chloropicrin, either alone or followed by Basamid or metam sodium, gave yields equal to or better than those achieved with methyl bromide.
- In most of the studies using Telone in California and Florida, yields were at least comparable to those achieved with methyl bromide.
- Although chloropicrin alone does not control weeds as well as methyl bromide does, research indicates that yields are equivalent to methyl bromide when followed by a herbicide.
- Of studies on the use of metam sodium, equivalent yields were most often found when combined with or following other pesticides.
- Iodomethane, alone or combined with chloropicrin, gave comparable or better yields in both California and Florida in most of the studies that reported yields.

- Dazomet, used in conjunction with Telone or chloropicrin, gave yields comparable to those achieved with methyl bromide.
- Studies on propargyl bromide, DiTera combined with metam sodium and chloropicrin, Enzone combined with dazomet and chloropicrin or with metam sodium and chloropicrin, and Fosthiazate when combined with metam sodium and chloropicrin EC, indicated that they provided yields comparable to those achieved with methyl bromide.
- Studies indicate that using VIF often increases yields compared to polyethylene film, although at a higher cost and with more difficult application.

Tomatoes: Methyl bromide is primarily used on tomatoes in Florida, Georgia, South Carolina, and North Carolina, and in small quantities in a few other states. Some of the major findings of the body of research presented on tomatoes include the following:

- Most studies with metam sodium alone or with Telone reported yields equivalent to or better than those achieved with methyl bromide.
- Telone + chloropicrin was the subject of many studies, and yields were generally as high as or higher than those achieved with methyl bromide.
- Iodomethane, not yet registered, is a promising alternative to methyl bromide, and in combination with chloropicrin has produced yields comparable to or better than those achieved with methyl bromide.
- Propylene oxide provides control equivalent to methyl bromide for nematodes and the weed nutsedge.

Barriers to the adoption of alternatives: These include potential decreases in yield, increases in costs, delays in harvesting, loss of revenues, and adverse health and environmental effects. Some alternatives require a longer waiting period between pesticide application and planting. Regulatory use restrictions because of potential health and environmental effects, such as Telone caps in California and use of personal protective gear in the hot climate of Florida, can also limit the adoption of some of the alternatives. The shallow depth of soil to groundwater in Florida also creates the potential for aquifer pollution. Additional challenges with adopting alternatives, especially for small growers, are the costs and learning curve associated with new production methods.

In summary, recent research presented at MBAO has focused on minimization of the amounts of pesticides used, efficacy of mixtures, use of alternative films, optimal sequence of pesticide application, and methods of application.