USDA PROGRAM TO EVALUATE PROPARGYL BROMIDE AS A SOIL PREPLANT FUMIGANT

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USDA and US EPA are committed to assisting registrants make promising methyl bromide (MeBr) alternatives available to U.S. growers. Propargyl Bromide (PrBr) is a promising alternative fumigant that has not been studied for nearly 50 years. In 1999 USDA initiated research to evaluate PrBr as a MeBr alternative.

In 1957, Dow Chemical Co. was granted a patent for propargyl bromide as a soil fumigant. The material was used as a fumigant in combination with MeBr and chloropicrin for a short time. It was taken off the market due to unstable handling characteristics (it can be explosive under some conditions). The patent has now expired. In 1996, the chemist who held the original patent contacted USDA suggesting that PrBr could be a viable MeBr alternative. In 1999, a chemical manufacturer, Albemarle, expressed interest in the material, and confidence that they could create a formulation that is safe for shipping, handling and application.

USDA decided in the fall of 1999 to evaluate the efficacy and environmental fate of the chemical used as a soil fumigant. An initiative was developed involving scientists from USDA-ARS in Calif. and Florida, Univ. of Calif., Univ. of Florida, and USDA-IR-4 to evaluate efficacy of PrBr against selected pathogens and pests and the response of several crops. Two ARS labs (Riverside and Fresno) were assigned to determine chemical and environmental characteristics of the material that affect its transport and environmental fate in the soil and atmosphere. The scientists, their affiliation, and role in the initiative, are:

- Tom Trout, Agricultural Engineer, USDA-ARS, Fresno, CA; Initiative coordinator
- Husein Ajwa, Soil Chemist, USDA-ARS, Fresno. CA; efficacy (dose response, strawberries), distribution and fate in the soil, drip application
- Frank Martin, Soil Ecologist, USDA-ARS, Salinas, CA; efficacy: pythium and trichoderma
- Carolee Bull, Plant Pathologist, USDA-ARS, Salinas, CA: efficacy: bacteria
- Greg Browne, Soil Pathologist, USDA-ARS, Davis, CA; efficacy: phytophthora
- Krishna Subbarao, Soil Pathologist, Univ of Calif., Salinas, CA; efficacy: verticillium and fusarium
- Steve Fennimore, Weed Scientist, U.C., Salinas, CA; efficacy: weeds
- Sally Schneider, Nematologist, USDA-ARS, Fresno, CA; efficacy: nematodes, grapes, nurseries, phytotoxicity

- Clyde Elmore, Weed Scientist, U.C. Davis; efficacy: weeds, floriculture
- Jim MacDonald, Plant Pathologist, U.C. Davis; efficacy: fungal pathogens, floriculture
- Becky Westerdahl, Nematologist, U.C. Davis; efficacy, nematodes, carrot
- California Strawberry Comm., Watsonville, CA; efficacy, strawberries
- Scott Yates, Soil Scientist, USDA-ARS, Riverside, CA; transport, environmental fate
- Sharon Papiernik, Soil Scientist, USDA-ARS, Riverside, CA; transport, environmental fate
- Joe Noling, Univ. of Florida, Lake Alfred, FL; efficacy, nematodes, tomato
- Erin Rosskopf, Plant Pathologist, USDA-ARS, Ft. Pierce, FL; efficacy, verticillium, tomato
- Jack Norton, USDA-IR-4, Florida, efficacy, tomato

Preliminary field efficacy trials were carried out in 2000. These included small plot studies on strawberry, tomato, carrot, and grape nursery, and microplot studies of tomato and flowers. These initial studies indicated good efficacy against soil pathogens at rates about ¼ to ½ those presently used with MeBr. Initial studies have also been completed on the chemical characteristics of PrBr, its degradation in the soil, and transport through plastic films. The results of several of these studies are summarized in presentations in this conference authored by the scientists listed above.

In those initial field studies, a toluene (20%) formulation of PrBr was used. Albemarle has now developed a formulation in which the stabilizers are expected to be biologically inert. The field and microplot studies are being repeated this year with this new formulation, including small plot studies on strawberries (four locations) grapes and grape nursery stock, and carrots in California and on tomato in Florida, and microplot studies with cut flowers in California and tomato in Florida. We will determine yield and quality of production, safe plant back times (phytotoxicity), and efficacy against the relevant pests and pathogens. Applications have been made by both shank and drip irrigation. Additional studies underway will determine dose response against target pests and soil distribution of fumigants under field conditions.

This research effort is unique in the breadth and diversity of researchers and organizations participating. In most cases, the scientists combined this PrBr work with other ongoing studies, resulting in both cost efficiency and synergism. Funding provided by USDA over two years totaled about $1.3 million. This initiative is expected to be competed by fall of 2002