FIELD VALIDATION OF METHYL BROMIDE ALTERNATIVES

John Mirusso, Mirusso Fumigation & Equipment, Delray Beach, FL
Dan Chellemi*, USDA, ARS, Fort Pierce, FL
Jerry Nance, Dow AgroSciences, Winter Haven, FL

Three large-scale field trials were conducted on commercial farms during the 2001/2002 growing season to validate the use of chemical alternatives to methyl bromide for soil disinfestation. Alternatives were applied to 245 acres (98 ha) and accounted for 28% of the total acreage under production at the three sites. The remaining acreage was treated with a 67:33 mixture of methyl bromide:chloropicrin. Several areas within each trial were being treated with chemical alternatives for the second or third consecutive year.

Methyl bromide alternatives included chloropicrin, a 61:35 mixture of 1,3-dichloropropene:chloropicrin (Telone C35), and the herbicides pebulate (Tillam), napropamide (Devrinol) and/or trifluralin (Treflan). Telone C35 was broadcast applied at 20 gallons per acre (187 l per ha) using a deep placement coulter system (Yetter 30" Avenger, Yetter Farm Equipment, Colchester, IL). The fumigant was applied at a depth of 10 inches (25 cm) using injection knifes placed 12 inches (30 cm) apart. Chloropicrin was shank applied to soil during preparation of the planting beds at a rate of 120 lbs/acre (134 kg/ha). Herbicide applications consisted of a combination of Devrinol and Treflan applied at 2.0 and 0.5 lbs/acre (2.2 and 0.6 kg per ha) active ingredient, respectively, for both tomato and pepper production. A combination of Tillam and Treflan applied at 3.0 and 0.5 lbs/acre (3.4 kg and 0.6 kg per ha) active ingredient, respectively, was also evaluated for tomato production. Herbicides were applied with 45 gal/acre (420 l/ha) of water several days in advance of the Telone C35 application. The soil was disked and sealed with a roller immediately after herbicide application to conserve moisture and to provide a barrier to reduce emission of the herbicides and Telone C35.

Pepper or tomato cultivars were transplanted into treated areas and managed under standard production practices. Fields treated with methyl bromide:chloropicrin and the chemical alternatives were monitored for the control of soilborne diseases, plant parasitic nematodes and weed pests over the duration of the crop. Assessments were also made for plant vigor prior to harvest. Plant diseases observed in the field included Fusarium crown rot and Fusarium wilt of tomato, Sclerotinia blight of tomato and pepper, Pythium root rot of pepper, and Phytophthora blight of pepper. The combined incidence of disease was less that 1% in fields treated with methyl bromide:chloropicrin or the chemical alternatives. Weeds observed emerging through the plant hole or the plastic mulch were black nightshade (*Solanum nigrum*), yellow and purple nutsedge (*Cyperus esculentus* and *C. rotundus*), common ragweed (*Ambrosia artemissifolia*), and several pigweed species (*Amaranthus* species). Weed counts were less that one per 30 feet (10 m) of row in fields treated with methyl bromide:chloropicrin or the chemical alternatives. Root gall ratings revealed no differences between methyl:bromide chloropicrin and the chemical alternatives for nematode control. Phytotoxicty to the pepper or tomato crop from herbicides or Telone C35 was not observed. In areas that were being treated with

alternatives to methyl bromide for the second or third consectutive year, no differences in pest control was observed when compared to areas treated with alternatives for the first time or areas fumigated with methyl bromide:chloropicrin.

In summary, the chemical alternatives used in this study provided levels of disease, nematode, and weed control similar to soil fumigation with methyl bromide:chloropicrin without causing injury to the plants. No evidence of a breakdown in the effectiveness of alternatives was observed in areas that had been treated for the second or third consecutive season, indicating that long term control can be achieved using the chemical alternatives. The size of the field trials and the efficiency in which the alternatives were applied demonstrate that it is feasible to adopt chemical alternatives to methyl bromide without causing major disruptions in the commercial production practices. However, these trials reflect the culmination of experience gained from years of cooperative efforts with the growers to evaluate the chemical alternatives and their success is based upon the continued refinement of the application procedures.

Mention of a trademark, warranty, proprietary product, or vendor does not constitute a guarantee by the United States Department of Agriculture and does not imply its approval to the exclusion of other products or vendors that may also be suitable.