SOIL FUMIGANT AND HERBICIDE COMBINATIONS FOR CALADIUM

James P. Gilreath
IFAS, University of Florida
Gulf Coast Research and Education Center
Bradenton, FL 34203

Robert McSorley
Dept. of Nematology and Entomology
Gainesville, FL 32611

Robert J. McGovern
Gulf Coast Research and Education Center
Bradenton, FL 34203

Greater than 95% of the world s production of caladium tubers occurs in a small geographical area near Lake Placid, Florida. Most of the production is on muck or high organic matter soils. Soilborne pest control is a major problem for producers. Results of soil fumigant experiments have varied over the years with some studies showing a response to fumigation and others indicating that fumigation did not have an effect. Regardless of research results, growers feel they have experienced improved tuber production when soil was fumigated. Methyl bromide is the fumigant of choice and is relied upon to control soilborne diseases, nematodes, and weeds and to kill caladium propagules which remain in the soil from previous crops.

To find a suitable alternative to methyl bromide as a soil fumigant in caladium tuber production, a study was initiated on a commercial farm near Lake Placid, FL during the 1998 crop season to assess the efficacy of selected soilborne pest control programs consisting of combinations of soil fumigants and herbicides. The test area was located on a sandy muck soil south of Lake Placid, FL. The cultivar grown was Red Frill which is a very popular strap leaf type of caladium. Like most commercial tuber farms in the area, the test area had been fumigated with methyl bromide for several years prior to test initiation. Treatments were applied to 50 ft long by 22 ft wide plots which were arranged in a randomized complete block design and replicated 6 times. Each plot contained 5 beds. Fumigant treatments evaluated consisted of 1) no fumigant; 2) methyl bromide / chloropicrin (90/10 %) at 450 lbs./acre; 3) 1,3-dichloropropene (1,3-D) / chloropicrin (83/17%) (Telone C-17) at 35 gal./acre; and 4) 75 gal. of metham (Sectagon) per acre + 200 lbs. of chloropicrin (pic) per acre. Metolachlor herbicide (8 lbs./acre) was applied at planting to plots treated with 1,3-D or metham. All fumigant treated plots, including the methyl bromide plots, received an over the top application of oryzalin 7 weeks after planting. The nontreated control received no fumigant or herbicide during the course of this experiment. The soil was plowed about 4 inches deep 14 days after application and caladium tuber chips were planted on 3 June 1998, 27 days after fumigant application. Plots were hand weeded five times during the season.

Plant vigor was higher in methyl bromide treated plots on 30 July, but by 6 October plants in areas treated with 1,3-D + chloropicrin were just as vigorous as those where methyl bromide had

been applied. Early control of weeds was good with those treatments which received metolachlor, but methyl bromide allowed an early infestation of crabgrass and pigweed, indicating that it would have benefited from application of metolachlor at planting and suggesting that loss of methyl bromide from the upper 2 inches of the soil may have been too rapid for good weed control in this test. Purslane was controlled well with all chemical treatments at this time. Total number of weed plants was reduced by all fumigant/herbicide treatments with no difference among these treatments in spite of the fact that crabgrass and pigweed control with methyl bromide was not different from that observed in plots which received no fumigant or herbicide. Weed control did not differ among fumigant treatments for the duration of the experiment once all plots were treated with Oryzalin in midsummer. Hand weeding alone did not control weeds as well as herbicide plus fumigant.

No root-knot nematodes were recovered from plots treated with any of the fumigants. *Fusarium* was detected in tubers prior to planting at an incidence of 100%, whereas *Pythium* was not detected at this time . There were no significant differences among treatments for incidence of any disease organism in the single plant sampling in August. *Pythium, Fusarium* and *Rhizoctonia* were observed on roots at this time. Although plants growing in methyl bromide treated soil had no *Pythium* associated with their roots, they did have *Fusarium* and *Rhizoctonia* at incidences as high as any other treatment, including the nontreated control. When the tubers were inspected and sampled for disease organisms after harvest, *Erwinia, Pythium* and *Rhizoctonia* were found in most of the tubers. Soil fumigation had no effect on incidence of these organisms in the tubers at harvest. *Fusarium* was present in all of the tubers sampled and there was no difference in the severity of the tuber rot associated with *Fusarium*.

There was no difference in tuber production for any size grade, except jumbo, where significantly more tubers were produced in plots treated with 1,3-D + chloropicrin with metolachlor at planting followed by oryzalin in mid summer (Table 5). Chloropicrin + 1,3-D out produced all other fumigants for jumbos and there were no differences in jumbo production between methyl bromide or metham + chloropicrin or where no fumigant or herbicide was applied. There was no difference in the production index with any treatment.

Results of this research suggest that 1,3-D + chloropicrin (83/17%) at 35 gal/acre may be a viable replacement for methyl bromide when combined with metolachlor herbicide at planting followed by a midsummer application of oryzalin. Furthermore, it was observed that even methyl bromide would have benefitted from application of metolachlor at planting to control early weed emergence and growth, especially that of crabgrass and pigweed. This work is being continued in an effort to determine the long term effects of these fumigant/herbicide combinations on pest control and tuber production.