

EFFECTS OF METHYL BROMIDE ALTERNATIVE FUMIGANTS ON TARGET AND NON-TARGET ORGANISMS IN SOIL

Sadikshya R. Dangi^{1,2,*}, James Gerik¹, and Husein Ajwa²

¹Water Management Research Unit, USDA-ARS, Parlier, CA 93648, USA.

²Department of Plant Sciences, University of California, Davis, CA 95616, USA.

Several high-value crop producers in California rely heavily on soil fumigants to control soil borne pathogens, nematodes, weeds and insects. Fumigants with broad biocidal activity can affect both target and non-target soil organisms. Microorganisms in soil are crucial in sustaining the health of natural and agricultural soil systems and significantly contribute to nutrient cycling, organic matter decomposition, plant nutrient uptake, maintenance of soil structure. Hence, it is very important for them to recover after treatment with fumigants for the development of healthy soils. Studies on whole microbial community structure under methyl bromide alternative fumigants on ornamental plants are rare. Therefore, the objectives of this study are to determine the efficacy of lowest rates of fumigants on both target (*Pythium* spp. and *Fusarium oxysporum*) and non-target organisms (gram positive bacteria, gram negative bacteria, fungi, Arbuscular Mycorrhizal Fungi (AMF), actinomycetes and protozoa) in soil and to compare these organisms in fumigated vs. non-fumigated control sites.

Materials and Methods

The study was conducted on a commercial calla lily farm near Moss Landing, California. The plots were 500 feet long and consisted 72 inches wide raised beds. The main plots were fumigated with either InLine (1, 3-D 60.8%, Pic 33.3%) or Pic-Chlor 60 EC (Pic 56.7%, 1, 3-D 37.1%) or left untreated. Both fumigants were applied at three rates: 20, 17 and 14 gallons per acre. The fumigants were applied on 18 and 19 May 2011. The main plots were divided into four sub-plots. One week after the initial fumigation the sub-plots were fumigated with one of four rates of K-Pam: 0, 28, 34 or 40 gallons per acre. The beds were seeded with 15 lines of calla lily on 16 June 2011. Soil samples were collected from four points in each bed on 7 June 2011 from 0-5 and 5-30 cm depths. The top 0-5 cm was collected with a trowel and 5-15 cm was collected with 1 inch diameter soil cores. Samples for phospholipid fatty acid (PLFA) analysis were placed in sealed plastic bags, stored on ice immediately after collection, and then returned to the laboratory where they were placed at -20°C freezer until analyzed. Samples were also collected for the determination of *Fusarium oxysporum* and *Pythium* spp. populations using dilution plating on Komada's medium and P₅ARP medium. A multivariate method (canonical discriminant analysis) will be used to compare soil microbial communities from the different concentrations/fumigants and to determine similarity among microbial communities under different rates of fumigants. Results will be discussed.