Management practices to reduce atmospheric emissions of soil fumigants, Sharon Papiernik, Scott Yates, and Robert Dungan, USDA-ARS; Scott Lesch, Wei Zheng, and Mingxin Guo, University of California-Riverside

Soil fumigants are used to control a wide variety of pests in high-value cash crops. Their high volatility requires that management practices increase containment to reduce atmospheric emissions, increase efficacy, and prevent off-site transport. Application of soil fumigants through drip irrigation systems is being investigated as a method to improve the uniformity of fumigant application. These experiments were conducted to assess the emissions and soil distribution of fumigants following drip application. The fumigant compounds, 1,3-dichloropropene (1,3-D), Vapam (a methyl isothiocyanate (MITC) precursor), and propargyl bromide (PrBr) were drip-applied to soil beds at 15 cm depth. Beds were tared with either standard 1.1 mil HDPE or a visually impermeable film (VIP), leaving the furrows bare. Cumulative fumigant emissions in these tared/bedded systems was low, amounting to <10% of the applied mass. The average air temperature during these experiments was 21 to 25°C. Cumulative emissions of MITC and 1,3-D from a sandy loam field soil were decreased by at least 90% by taping the bed with VIP rather than HDPE. A large fraction of the 1,3-D and PrBr flux was from the untapped furrows in VIP-taped plots, indicating that inhibiting volatilization from the furrow will be important in further reducing emissions in these systems. Monitoring the fumigant distribution in soil indicated that taping the bed with VIP resulted in a more effective containment of fumigant vapors compared to use of a HDPE tarp. Other factors investigated, including increasing the depth of application to 50 cm, had a relatively small effect on fumigant emission and distribution.
