

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-cash-value 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 subsurface 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 tarped with either standard 1-mil HDPE or a virtually impermeable film (VIF), leaving the furrows bare. Cumulative fumigant emissions in these tarped bedded systems was low, amounting to <10% of the applied mass. The average air temperature during these experiments was 12 to 15°C. Cumulative emissions of MITC and 1,3-D from a sandy loam field soil were decreased by at least 80% by tarping the bed with VIF rather than HDPE. A large fraction of the 1,3-D and PrBr flux was from the untarped furrows in VIF-tarped 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 tarping the bed with VIF 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 30 cm, had a relatively small effect on fumigant emissions and distribution.

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