THE RECAPTURE AND REUSE OF METHYL BROMIDE ON ACTIVATED CARBON

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Abstract.

Following its use in postharvest chamber fumigations, methyl bromide (MB) can be captured by passing the ventilation effluent through a column of activated carbon. The captured MB can then potentially be reused for pre-plant soil fumigation by burying the activated carbon (AC) in the ground and allowing the MB to off-gas (i.e., depurate). The reuse of MB containing carbon in this manner would reduce the total amount of MB released into the stratosphere and increase the carbon content of the soil, however, an understanding of the factors that affect the kinetics and equilibrium dynamics of MB release from the AC is critical toward successful application(s). In a preliminary series of batch isotherms, the headspace concentration of MB above soil / AC mixtures was examined as a function of soil moisture content, soil characteristics, and type of carbon. These results will be used to better understand how changes in equilibrium affect the kinetics of MB release from AC into the surrounding soil margins.

Presentation Summary.

The purpose of this work is to examine the viability of using methyl bromide impregnated carbon for pre-plant soil fumigations. This would allow for a value added use of "spent" activated carbon as well as a technical benefit, as a slow release of MB from the buried substart yields CTs lethal toward subterranean pests.

In this work, five different types of activated carbons, including four made from locally sourced agricultural byproducts, were impregnated with methyl bromide to a concentration of ~10mg MB / g AC. A small amount of AC was then placed in headspace vials and the headspace concentration of MB was measured before and after the addition of soil. The change in the ratio of MB in the gas phase relative to the solid phase was measured for each and the effect of soil characteristics such as moisture content, particle size, organic matter content, and pH on the release of methyl bromide from the carbon was studied. This data will be used, along with MB depuration rates from AC in soil, to inform treatment methodology in pilot-scale and field studies.