

Drip vs. Shank Application of Chemical Alternatives to Methyl Bromide

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Most strawberry and vegetable growers in North Carolina rely on plasticulture production systems which include soil fumigation with methyl bromide to prepare for planting. Soil fumigation contributes to control soilborne pests including pathogens, weeds, nematodes and insects. Faced with the impending loss of methyl bromide as a tool to control pests in plasticulture systems has spurred the evaluation of many chemical alternatives. These alternatives may require changes in management practices and the typical scheduling of activities for strawberry and vegetable production. New methods of application of alternative fumigants, such as drip application, show promise to improve pest control and may improve the safety and effectiveness of some soil treatments.

Telone (1,3 dichloropropene or 1,3-D), chloropicrin (CP), and metam sodium (sodium N-methyldithiocarbamate) have been targeted for research as viable alternatives to replace the standard methyl bromide (MB). Each of these alternative products has activity against a particular range of soilborne pests, eg. Telone is most effective in nematode control, but none of these has the broad spectrum of biocidal activity of MB. Combinations of these products are currently being tested, and commercially marketed as replacements for MB (example: Telone-C17, T-C35). Within the existing framework of plasticulture which includes raised-bed preparation, drip irrigation and plastic mulch, applications of chemicals for pre-plant fumigation through the drip irrigation system may be more effective than traditional shank injection.

In evaluating the feasibility of drip irrigation applications of chemicals for the control of soilborne pathogens in strawberry and vegetables, there were several potential advantages to the approach.

Advantages: 1). Economical 2). More Environmentally Friendly 3). Reduce Worker Exposure 4). Reduce Amount of Chemicals Applied 5). Effective 6). Potential in Double-Cropping Systems 7). Flexibility of Timing

With such a glowing list of advantages, why was this system not previously implemented? There are some potential problems that need to be resolved in using drip irrigation applied alternative chemicals.

Disadvantages: 1). Single vs. Double tapes 2). Depth of Tape 3). Variation in Soil Types 4). Variation in Moisture 5). Mobility through soil profile 6). Safety of Water Sources 7). Time

A group of research and extension specialists, in cooperation with industry professionals and growers in the southeastern USA have studied the effectiveness of alternatives to MB in strawberry and vegetable production. Growers have expressed tremendous interest in drip irrigation applied treatments. We will present yield results of drip vs. shank applications of alternatives in comparison to MB (67:33) in strawberry and vegetable trials.

Drip and shank applied metam sodium and Telone-C35 or Inline (drip) treatments were evaluated during the 2000-2001 strawberry season at Plymouth, NC, Clayton, NC and Vidalia, GA. Yields and quality of fruit, plant growth and root rot severity were monitored for comparison of these treatments. At these Plymouth and Clayton marketable yields of Telone-C35 shank-applied versus Inline drip-applied treatments were both equivalent to yields obtained with MB (67:33). Shank injection/ tilled applications of vapam and drip irrigation applications of vapam provided equivalent yields to MB at Plymouth and Vidalia. At Plymouth marketable yields of the treatments were as follows: T-C35 25,717 lbs/A, Inline 26,752 lbs/A, MB 24,452 lbs/A, Vapam 24,912 lbs/A, and Vapam drip 22,229 lbs/A. These treatments did not produced significantly different yields at Plymouth. In Vidalia, GA chemicals were combined for control of soilborne pathogens, nematodes and weeds. Drip application of Inline (32 gal/A) + metam sodium (75 gal/A) was compared to Telone C35 (35 gal/A) + metam sodium (75 gal/A) and MB (350 lbs/A). The Inline+metam sodium treatment yielded 22,772 lbs/A, TC35 +metam sodium 26,041 lbs/A and MB 26,421 lbs/A. Fruit yields were not significantly different for these treatments, supporting drip application as a viable option for fumigant application.

Studies are currently in progress evaluating drip applied fumigants for weed and disease control in fresh market tomato in NC. Yields and quality produced in plots using drip application of chloropicrin (130 lbs/A) with single or double drip irrigation tapes will be compared to standard rates of MB 67:33 for control of bacterial wilt at the Patterson Farm in China Grove, NC. Fumigant studies in Fletcher, NC will compare chloropicrin, telone C35, and vapam in drip vs. shank applications for the control of weeds and verticillium wilt. An update of results will be presented.