

## METAM COMBINATIONS AS ALTERNATIVES TO METHYL BROMIDE IN US-GROWN STRAWBERRIES AND MULCHED VEGETABLES

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Combination treatments involving either metam sodium or metam potassium applied with 1, 3-dichloropropene and/or chloropicrin (PIC) have become commercially important treatments for US-produced strawberries and mulched vegetables following the phase out of methyl bromide.

Full use rates of either Vapam® HL or K-Pam® HL are most frequently used commercially. These metam-based products are commonly applied either sequentially or in the same operation in either 2 or 3-way combinations using specialized application equipment. Chloropicrin, when used alone with either metam sodium or metam potassium is commonly used at 120- 150 lbs per acre. Telone® II (1, 3-dichloropropene) is commonly used at 10-12 gallons per acre as the third component in a 3-way application with metam and chloropicrin. In some cases, Telone® C-35 (1, 3-dichloropropene + PIC) is applied in 2-way combinations with either of the metam-based products at rates commonly in the range of 20-35 gallons per acre.

### Florida and SE US Culture

In Florida and in other areas in the SE US, especially where the pest spectrum includes *Cyperus* spp. and nematodes, sequential applications have generally performed well and usually equal to what was once received from MeBr/PIC before it was phased out.

Sequential treatments that have shown promise include applying Telone® C-35 at 26 gallons product per acre broadcast ( 20 – 35 gal/ac) through a coulter system ( Yetter Rig) and leave it undisturbed (without plastic mulch) for 14 days. Vapam® HL is then applied at 75 gallons per treated acre, or K-Pam® HL is applied at 60 gallons per acre through 2 drip tapes per bed in sufficient water to assure good wetting across the bed tops. Wait 21 days and transplant through the plastic mulch.

An alternative to the above treatment is to form false beds and inject the Telone® C-35 deeply into the false beds (12 inches below grade), using 3 shanks or coulters per bed. If possible the beds are re-shaped immediately and made as firm as possible before installing 2 drip tapes per bed and laying plastic mulch. Wait 5-7 days and drip apply either Vapam® HL or K-Pam® HL as described above. Wait 21 days and transplant through the plastic mulch.

In some cases Telone® C-17 is being used in some combinations with the Vapam® HL or K-Pam® HL treatments as described above in combinations with Telone® C-35.

However, the use of Telone® C-17 versus Telone® C-35 is minimal compared to the use of Telone® C-35 since the 35% chloropicrin afforded in Telone® C-35 generally gives better results in areas with severe disease pressure characteristic to Florida and much of the SE US.

Much of the vegetable acreage in Florida is grown under seep irrigation, where drip irrigation is not a reasonable application option. In these cases, relatively new application equipment has been developed which allows precision application of either 2 or 3 fumigants, as described above. This technology is gaining wide-scale use in Florida in areas where seep irrigation prevails. Researchers at the University of Georgia have worked closely with the manufacturer of the specialized application equipment, making 2-way and 3-way applications, the preferred treatments to replace MeBr/PIC, especially for spring-planted crops. An estimated 40-60 % of the Georgia mulched vegetable acreage utilized this technology in the 2008 spring crops.

### California

In California where essentially 100% of the strawberry and mulched vegetable acreage can be irrigated by drip-irrigation, most fumigant applications are now being made almost exclusively through drip tapes. The pest spectrum in California also differs from that in Florida and the SE US. These differences generally make preferred MeBr/PIC alternative treatments and application procedures different from what is utilized in Florida and the SE US.

In California, InLine® (an emulsifiable formulation of Telone® C-35 developed for drip application) applied at 20-25 gallons product per acre or Chloropicrin EC alone at 200-400 lbs. /acre are common treatments. Neither of these treatments provides full spectrum weed control and need a weed control partner to achieve this. Good complete pest control, including most weeds has been achieved by drip-applying either InLine® or Chloropicrin EC at the above rates, waiting 5-7 days and drip applying either Vapam® HL or K-Pam® HL at 75 or 60 gallons per treated acre, respectively.

Shallow mechanical incorporation of the Vapam® HL or K-Pam® HL treatments on bed tops following in-bed shank injections of Telone® C-35 has also performed well in number of California trials.

Data will be reviewed which highlights the performance from the above treatments. The pros and the cons of these treatments in relation to MeBr/PIC will also be discussed.

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