Fumigant Alternatives after Methyl Bromide

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The cut flower and ornamental bulb industry relies heavily on the use of methyl bromide (MB) as a key pest management tool. Because of the broad-spectrum pest control provided by MB plus chloropicrin (Pic), hundreds of species and thousands of varieties of flowers can be grown on relatively few acres. The primary reasons for MB dominance in the marketplace include its excellent diffusion through the soil and its effective control of pathogens, nematodes and weeds.

The registered alternative fumigants to MB are Pic, 1,3-dichloropropene, and methyl isothiocyanate generators such as metam sodium, metam potassium, and Basamid (Table 1). Iodomethane (methyl iodide, Midas™) is under consideration for registration by the US EPA. Chloropicrin has been used as a pre-plant fumigant to suppress fungal pathogens in soil. The fumigant 1,3-dichloropropene is an effective nematicide that has been used in combination with chloropicrin (e.g., Telone C35 or InLine) to improve the control of soilborne fungal pathogens. Metam sodium (or metam potassium) may be used to control pathogenic fungi, nematodes, insects and weeds. Iodomethane has the potential of serving as a viable replacement for MB. When applied at an equivalent weight, IM is more effective than MB in controlling soil fungal pathogens.

Table 1. Application Rate and Activity of Fumigants.

Common Name	Trade Name	Broadcast rates/A	Activity against: Nematodes	Fungi	Weeds	Comments
Chloropicrin	TriClor MetaPicrin	15-30 gal (shank)	Fair	Excellent	Poor	Liquid that diffuses as a gas through soil. Very effective for control of soil-borne fungal pathogens and insects.
		15-22 gal (drip)	Good	Excellent	Fair†	Drip application requires an emulsifier. (1 gal = 13.7 lbs).
1,3-dichloropropene	Telone II	9-12 gal (shank)	Excellent	Poor	Fair	Liquid that diffuses as a gas through soil. Effective against nematodes and insects. Rates vary with soil texture and efficacy strongly affected by soil moisture and temperature. (1 gal = 10.1 lbs).
1,3 dichloropropene plus chloropicrin	Telone C35	28-33 gal (shank)	Excellent	Very good	Fair	Most effective for control of nematodes, fungal pathogens, and insects. (1 gal = 11.1 lbs).
	InLine	23 gal (drip)	Excellent	Excellent	Good†	InLine requires plastic mulch. (1 gal = 11.2 lbs).
Metam sodium	Vapam HL Sectagon	37.5-75 gal	Good	Good	Good	Water-soluble liquid that decomposes to a gaseous fumigant (methyl isothiocyanate). Efficacy affected by soil texture, moisture, temperature, and percent organic matter. (1 gal contains 4.26 lbs metam sodium).
Metam potassium	K-Pam HL Sectagon-K	30-60 gal	Good	Good	Good	Same as metam sodium. (1 gal contains 5.8 lbs metam potassium).
Iodomethane‡	Midas™	8-20 gal	Excellent	Very good	Excellent	Activity is similar to that of methyl bromide.

† Using higher rates or plastic mulch (especially virtually impermeable film) improves weed control.

‡ Several formulations of Midas™ (iodomethane plus chloropicrin) are under consideration for federal registration.

For control of fungal pathogens and weeds, our research found that application of these alternatives by drip fumigation is more effective than by shank injection. Also, sequential drip application of metam potassium (KPam) after chloropicrin, InLine, or Midas enhanced the efficacy of reduced rates of these alternatives. Drip fumigation with Midas (33/67) at 200 lbs/ac, chloropicrin at 200 lbs/ac, or Inline at 300 lbs/ac gave similar Ranunculus bulb yields to MB/Pic at 200 lbs/ac, and was significantly better than untreated control (Figure 1). Drip application of KPam (30 gal/ac) one week after MB/Pic, Midas, Pic, or InLine significantly increased total yields and enhanced weed control (significantly reduced little mallow and clover numbers).

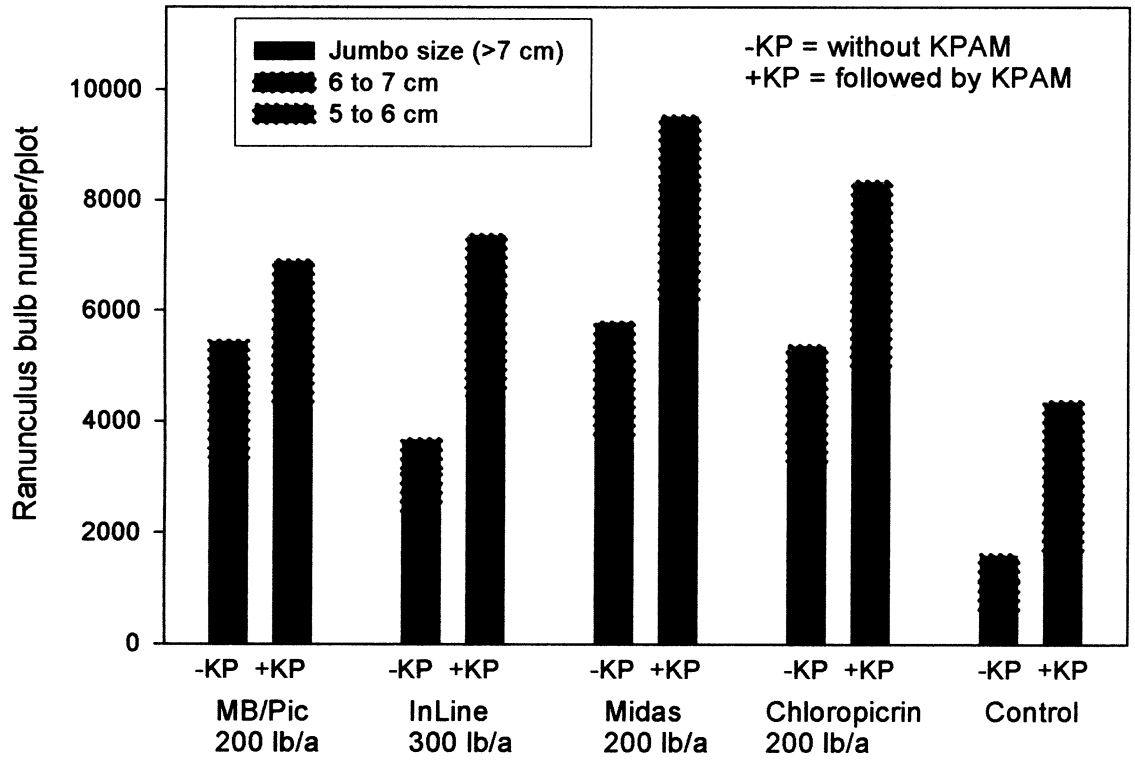

Figure 1. Ranunculus bulb yield by size class.