

## **APPLICATION OF METAM SODIUM IS THE KEY TO EFFECTIVE PEST CONTROL**

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Washington Bulb Company's major effort is the production of ornamental Iris, Daffodils, Tulips and other ornamental bulbs. The development of the soil fumigator was essential to allow the company to continue production in the Skagit Valley of Western Washington. The increased demand on suitable and available land has limited the acreage available for bulb production. This, combined with the loss of several pesticides for the control of weeds and diseases, required a change in previous practices. With the use of metam sodium fumigation we have been able to maintain our previous rotation, even with the loss of soil pesticides, without reducing production or increasing soil pest problems.

Metam sodium is known to us to be an excellent soil biocide for control of nematodes, diseases perennial weeds and weed seed. The limited diffusion of metam sodium combined with commercially available fumigation equipment prevented us from placing metam sodium in the soil in a manner that would allow treatment of the soil profile to a depth of 18 inches - "need to get dagger to the pest". This fumigator was our best effort to accomplish proper placement of metam sodium in the soil. The equipment is in a continuous state of modification to improve efficacy of metam sodium.

The metam sodium fumigator was developed for the express purpose of management of soil-borne pests, weeds, diseases and nematodes. The fumigator was designed to apply metam sodium at three levels in the soil. Metam sodium is sprayed in horizontal layers 15, 9 and 3 inches below the soil surface. Each level is applied through a separate spray blade. The 15-inch level is applied with 8-16-inch spray blades, each equipped with a single spray tip. The 9-inch level is applied with 3-4 foot spray blades, each equipped with three spray tips. The 3-inch level has 8-18 inch spray blades. To achieve adequate control of pests in the surface 6 inches of soil the metam sodium sprayed at the 3-inch level is incorporated into the surface 6 inches with a rotary tiller equipped with C shaped blades. The soil is compacted with 3 rollers 1) bar roller, 2) spiral roller both attached to the tiller and 3) a smooth tagalong tire roller.

The prime use of our fumigator is not to achieve the level of control obtained with methyl bromide-chloropicrin under tarp, but to effectively control soil pests to a level assuring economically viable production of ornamental bulbs and rotation crops. Initial trials with the fumigator were made in 1998 in a field infested with nematodes, soil-borne diseases and Equisetum. The field has a history of crop failures when planted to green peas. Following fumigation with 55 gallons of 42 percent metam sodium equally divided between the three soil depths, nematode and Equisetum control was excellent and yields were normal (Table 1).

A trial was established in the fall of 1999 to determine the efficacy of metam sodium applied with our fumigator to methyl bromide-chloropicrin and combinations of Telone C-35 and metam sodium. The methyl bromide-chloropicrin and C-35 treatments and all plastic tarp treatments were applied by TriDent Agricultural Chemical. All of the plastic mulched treatments were equal for weed control, free of weeds 30 days after fumigation. The non-treated plots averaged 966 weeds per square meter and metam sodium with no plastic averaged four weeds per square meter. Metam sodium at 66 gallons per acre, 22 gallons at each level, was equal to the other treatments with respect to pest control. Bulb yields were statistically equal for all fumigant treatments. The non-treated total bulb weight was 1694 grams and the total bulb weights for the fumigated plots ranged from 2,014 to 2,510 (Table 2).

The results of application of metam sodium in three horizontal spray levels below the soil surface has achieved the objectives for which it was developed: (1) control of nematodes and soil-borne diseases, (2) reduction in reservoir of weed seeds, (3) suppression of perennial weeds and (4) bulb yields equal or superior to those obtained with extended rotations. With the addition of a polyethylene mulch the 3-level metam fumigation is equal to methyl bromide-chloropicrin.

- Use of metam sodium applied with the 3-level spray equipment has allowed Washington Bulb to maintain their 5-year rotation with out detectable loss in yield or quality of bulbs.
- Metam sodium treatment is comparable to yield and bulb quality in land not previously planted to ornamental bulbs.
- Efficacy of metam sodium is a function of application. Proper application results in excellent efficacy.

Table 1  
Effect of Fumigation with 55 Gallons/Acre on Growth of Peas

Treatment	Cysts/gram	Stand	Pod Wt	Yield
Metam- 42%	38	31.7	518	6380
Control	915	31.7	5	60

Data average of four replications. Cysts, number white cysts recovered per gram of roots. Pod weight from 6.6 feet of row. Yield as pounds per acre were calculated on percent of the pod weight that are peas.

Table 2  
Effect of Soil Fumigants on Weed Control and Yield of Tulip Bulbs

Treatment	Rate/Ac	Weeds m <sup>2</sup>	Yield < 9cm	Yield > 9cm	Total Yield
Control	0	866	342 c	1353 c	1695 c
Metam	66 gal	4	579 a	1932 a	2511 a
Metam Tarp	66 gal	0	486 abc	1804 a	2290 ab
Metam/C35	44/22 gal	2	381 bc	1634 bc	2105 bc
Metam/C35 Tarp	44/22 gal	0	553 a	1725 a	2278 ab
MBr-Pic (50-50)	350 lbs	0	487 abc	1884 a	2370 ab

Data average of three replications- Yields in grams from 2 meters of row.

Metam applied at three levels, 22 gallons each level

Metam/C36 Metam 44 gpa surface 6 inches and 22 gap Telone C35 injected 10-12 inches on 12-inch centers

MBr-Pic, Methyl bromide + chloropicrin (50-50) injected 10-12 inches deep on 12-inch centers

Tarp refers to area covered with polyethylene plastic at time of application