# The Impact of Metam Sodium on Nutsedge Control Provided by Dimethyl Disulfide

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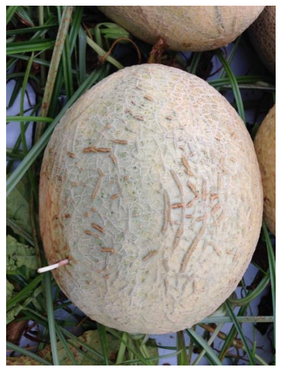
## Abstract:

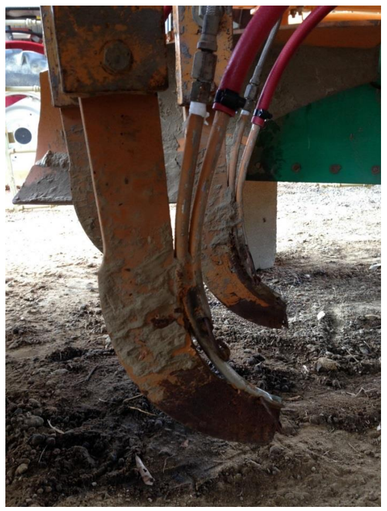
Many vegetable producers utilize soil fumigants to manage soil-borne pests such as weeds, nematodes, and diseases. Since the phase out of methyl bromide there has been a continual search for strategies to improve the flexibility and efficacy of currently available fumigants. One of the more recently registered soil fumigants in the United States, dimethyl disulfide (DMDS), has shown good efficacy on a broad spectrum of soil-borne pests when mixed with chloropicrin (Pic). This combination has been deployed on substantial acreage in Florida in recent years. There are efforts in registering DMDS globally, including Mexico and the European Union. However, the combination of DMDS and Pic has some limitations on a global scale because of the restrictions on Pic use in a number of countries. For this reason research was conducted to investigate combinations of DMDS with metam sodium (MS) for efficacy on soil-borne pests. Two rates of MS (40 and 50 gal $ac^{-1}$) were used alone or in combination with a single rate of DMDS (34 gal $ac^{-1}$) and compared with a non-treated control and a mixture of DMDS and Pic (40 gal $ac^{-1}$). All fumigants were applied in raised beds covered with totally impermeable film mulch. When DMDS and MS were applied alone, nutsedge populations were not significantly different than the non-treated control. When DMDS and MS were applied in combination, nutsedge populations were significantly lower than the non-treated control and similar to the DMDS Pic mixture. These data indicate that the combination of DMDS and MS may be an effective alternative to DMDS Pic in regions where Pic use is prohibited or limited in availability.



Left: Athena cantaloupe; Right: Nutsedge issues in plastic mulched field.

## Introduction:

- Despite decades of research on alternatives to soil fumigation with methyl bromide an ideal solution has still not been found
    - Many of the shortcomings are due to the chemical properties of alternative fumigants
- Totally impermeable film (TIF) has been shown to improve fumigant performance even with reduced use rates
- Dimethyl disulfide (Paladin®) has been registered for several years and has been shown to be a good to excellent broad spectrum fumigant when tank mixed with chloropicrin.
- Though the efficacy has been proven problems remain
- Paladin has a strong garlic/sulfur odor
- The use of TIF is mandated in Florida with Paladin
- The use of chloropicrin is limited globally because of its previous use in gas warfare



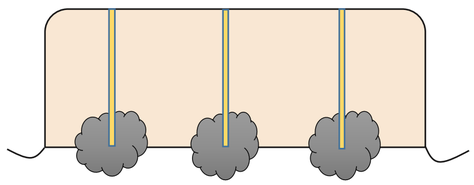


Figure 1: DMDS and DMDS+Pic treatments were injected at 8-in depth.

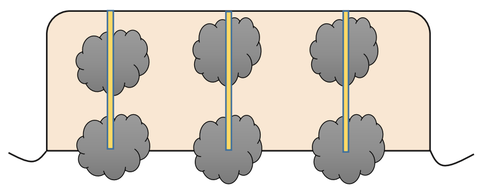


Figure 2: Treatments including MS and DMDS were injected via two separate tubes (located at depths of 4-in and 8-in, respectively) on each shank.

## Material and Methods:

- UF IFAS North Florida Research and Education Center in Quincy, FL
- Norfolk loamy fine sand with pH 5.8
- Beds 8 inch tall and 30 inch wide
- Fumigants were shank applied with three back-swept shanks
- Fumigant delivered at either 8 inch (DMDS and DMDS+Pic; Figure 1) or 4 inch (MS; Figure 2)
- Fumigant applied March 10, 2016
- Plots covered with 1.25 mil black Berry TIF
- Athena cantaloupe transplanted April 8, 2016

- Nutsedge shoots emerged through the plastic were counted on May 18 and June 10, 2016
- Cantaloupe fruit were harvested on June 9, 14, and 21, 2016
- ANOVA was performed using Proc Glimmix in SAS and means separation with Tukey's

## Objective:

To determine if the addition of metam sodium to dimethyl disulfide through co-application would maintain or improve its performance on nutsedge.

## Results:

Impact of Metam Sodium (MS) Application on the Nutsedge Control Provided by Dimethyl Disulfide (DMDS) During Spring 2016 in Quincy, FL

| | Nutsedge shoots / $ft^2$ | | | |
|---|---|---|---|---|
| Treatment | 60 Day | 90 Day | Cantaloupe Yield (lb/a) | Average fruit weight (lb) |
| 40 Gal/a DMDS:Pic 79:21 | 0.4 c | 0.7 c | 77985 a | 5.2 ns |
| 34 Gal/a DMDS + 40 Gal/a MS | 0.9 bc | 1.0 c | 73968 ab | 5.0 |
| 34 Gal/a DMDS + 50 Gal/a MS | 1.0 bc | 1.2 bc | 72429 ab | 4.8 |
| 34 Gal/a DMDS | 3.1 ab | 3.4 ab | 58234 bc | 4.9 |
| Non-Treated Control | 3.6 a | 4.8 a | 57744 c | 4.8 |
| 40 Gal/a MS | 3.6 a | 4.1 a | 55411 c | 4.8 |
| 50 Gal/a MS | 3.6 a | 3.9 a | 52565 c | 4.6 |

## Conclusion:

- This is an advanced fumigation system which would require multiple fumigant tanks and dual metering systems
- However, there is clearly benefit of using metam sodium with dimethyl disulfide in areas where the use of chloropicrin is prohibited
- 2017 data to be discussed at Methyl Bromide Alternative Outreach meeting (November, 2017).