IMPACT OF CHLOROPICRIN ON THE SOIL PERSISTNECE OF DIMETHYL DISULFIDE

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Introduction

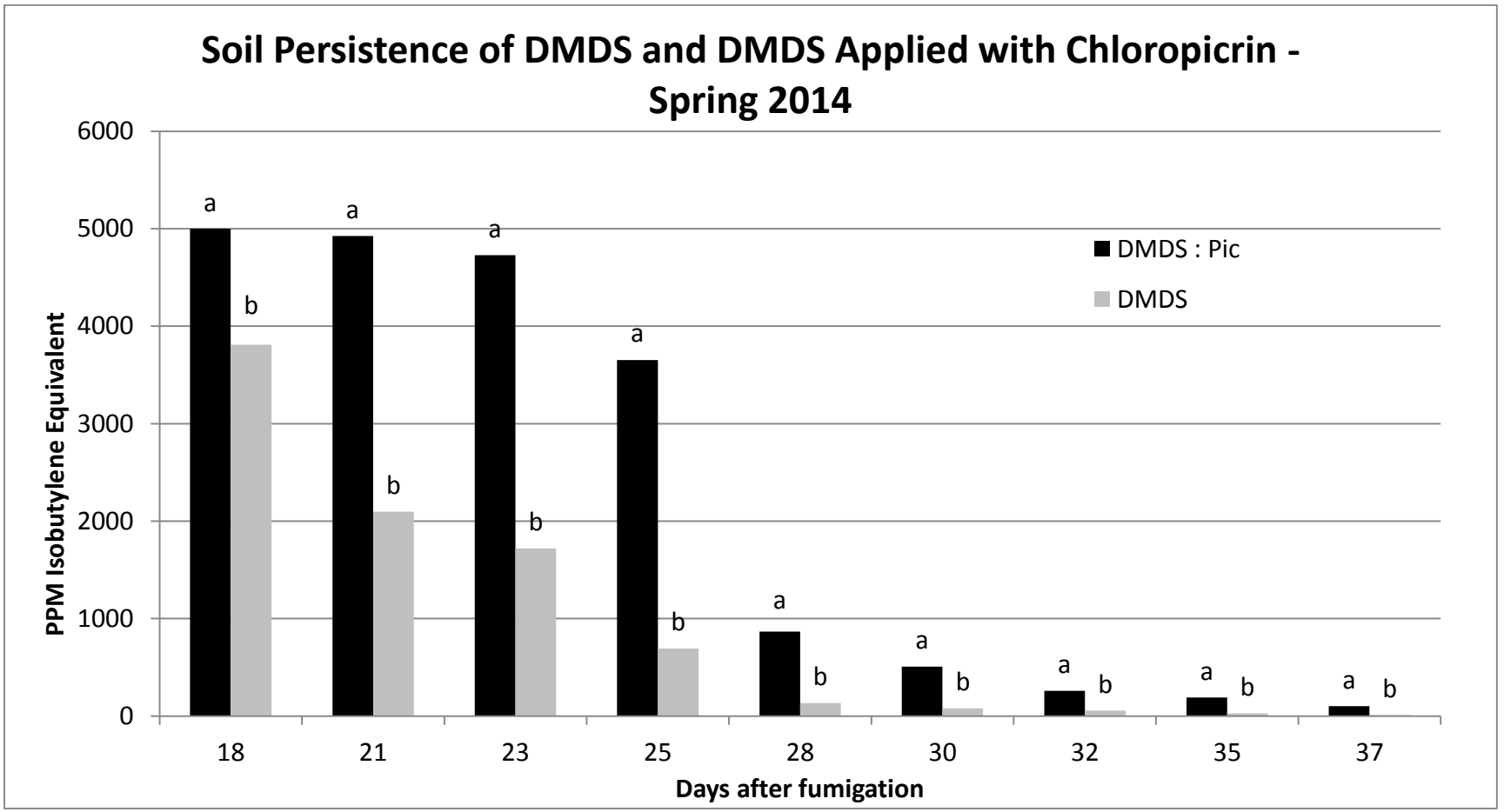
Applying pre-plant soil fumigation is a commonly used practice in plasticulture to control some weed species, nematodes, and pathogenic fungi that can cause damage to high value crops such as cut flowers and vegetables. Since the phasing out of methyl bromide, growers have been seeking an alternative that has similar broad spectrum efficacy. Dimethyl disulfide (DMDS) alone or combined with chloropicrin (Pic) has proven to be effective against pathogens and has the potential to become a widely used pre-plant soil fumigant. One drawback to DMDS is its long soil persistence and odor. This research was initiated to determine the effect of Pic on DMDS soil persistence and the impact of repeated DMDS and Pic applications on soil microbial communities.

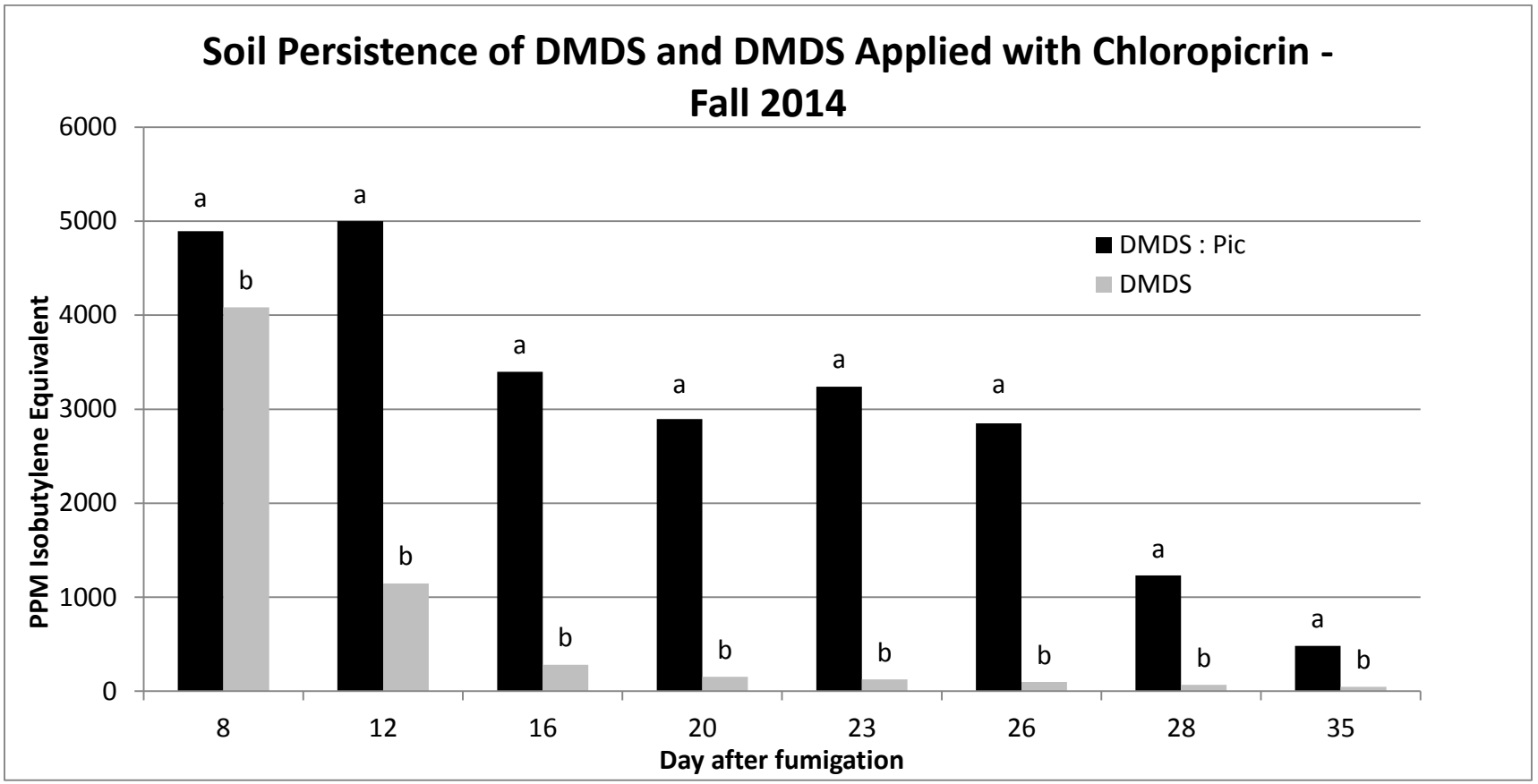
Materials and methods

Treatments in this experiment were arranged in a randomized block design with four replications. The treatments used were 34 gallons per acre of pure DMDS and 40 gallons per acre of a 79:21 w/w formulation of DMDS plus chloropicrin. Treatments were shank applied using a single row combination bed press with three back swept shanks. Beds were 30 inches wide and 8 inches tall. Experimental plots were four rows wide and 100 feet long. Soil fumigant concentration was measured with a hand held photoionization detector (MiniRAE 3000) used to measure volatile organic compounds in the soil air. Each plot was sampled eight times per sampling date. The experiment was performed successively with treatments being applied in the same area. Experiments were initiated on May 19 and July 23, 2014.

Results

The results show that the addition of chloropicrin significantly increases the soil persistence of DMDS when compared to pure DMDS under TIF mulch. Dissipation of pure DMDS during the fall application was quicker than the spring application. Soil temperatures during plant back for the two applications differed by less than 10%. These changes in soil persistence may be due to shifts in the soil microbial community which could have long term impacts on DMDS performance. The dissipation curve exhibited by DMDS plus Pic in the fall is not typical of this mixture. It is unclear if this trend is a result of the sequential applications and a shift in the soil microbial community.


Soil Persistence of DMDS and DMDS Applied with Chloropicrin - Spring 2014
PPM Isobutylene Equivalent
6000
5000
4000
3000
2000
1000
0
a
b
18
21
23
25
28
30
32
35
37
Days after fumigation
DMDS : Pic
DMDS


Soil Persistence of DMDS and DMDS Applied with Chloropicrin - Fall 2014
PPM Isobutylene Equivalent
6000
5000
4000
3000
2000
1000
0
a
b
a
b
a
b
a
b
a
b
a
b
a
b
a
b
8
12
16
20
23
26
28
35
Day after fumigation
DMDS : Pic
DMDS