INFLUENCE OF MIDAS 50:50 AND MIDAS 98:2 ON STRAWBERRY PLASTICULTURE YIELDS IN NORTH CAROLINA

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At NC State University we have been investigating various iodomethane formulations and rates since the year 2000. In this 2008-2009 study at Central Crops Research Station in Clayton, NC (USDA hardiness Zone 7b, lat. 35°7' N, long. 78°5' E), we investigated the performance of Midas 50:50 (4 rates) compared to Midas 98:2 (5 rates), we also included 2 fumigant treatments with methyl bromide 50:50 for comparison to Midas. A VIF barrier film (Pliant Blockade) was used to increase the efficacy of fumigant.

Materials and Methods: The broadcast rates for Midas 98:2 were 60, 70, 80, and 90 and 100 lb/A (30, 35, 40 and 45 lb/A in-the-bed, respectively). The broadcast rates of Midas 50:50 were 120 lb/A, 140 lb/A, and 160 lb/A. Methyl bromide/chloropicrin was evaluated at 175 and 240 lb/A broadcast. The treatments were shank applied with a Symmetry Unit, and this allowed us to achieve very accurate calibrations of Midas 98:2.

Table 1. Marketable strawberry yield data (lbs/A), Clayton, NC (2008-2009)

Trt. No	Treatment	broadcast/A	Market Yd/A	Significance[1]
6	Midas 50:50	100	23390	a
2	Midas 98:2	70	22918	ab
7	Midas 50:50	120	22476	ab
3	Midas 98:2	80	22399	ab
5	Midas 98:2	100	22362	ab
4	Midas 98:2	90	22308	ab
1	Midas 98:2	60	21719	abc
9	Midas 50:50	160	21322	bcd
8	Midas 50:50	140	20138	cd
10	MeBr 50:50	175	19757	cde
11	MeBr 50:50	240	19476	de
12	UTC	none	18021	e

[1] Means with the same letter are not significantly different ($P<0.01$)

and 180 lb/A (60, 70, 80, and 90 lb/A in-the-bed, respectively), and this required 3.30, 3.85, 4.40 and 4.95 lb product per 100 linear ft of bed. Methyl bromide 50:50 at 175 lb/A required about 4.82 lb per 100 linear ft of bed. The greatly reduced volume of Midas compared to Methyl Bromide required a smaller flow meter, and the equipment of Mitchell Wrenn's (custom fumigator) had 0.79 MBR CAP GAL/MIN flow meter capacity. To improve application efficiency we opted to use orifice plates, and these were provided by Arysta representative Bob Kreger, who was at the test site on the date of fumigation (9/20/07). Calibrations for Midas 50:50 were reliable and within 10% of the goal, but calibrations with Midas 98:2 proved to be far more difficult with our existing fumigation equipment (this is he reason why the Symmetry Unit was used in fall 2008), and so the results with Midas 98:2 should be viewed as preliminary data (the study was essentially repeated in fall 2008 using the Symmetry equipment from Florida).

All the plots were seeded with yellow nutsedge nutlets at 20 nutlets/square ft prior to fumigation, except for treatment no. 14. . Fertilization (N at 60 lb/A, P at 50 lb/A and K at 60 lb/A) was applied before fumigation in all plots. The experimental designs used was randomized complete block designs with four replications, and individual fumigated plots were 80 ft in length and then these were cutback to 40 ft in length 2 weeks following fumigation. The center 20 ft were used for harvest data collection in spring 2008. There were 56 plots in total.

On 10/11/07 each 20 ft raised bed was planted with two rows of plants, staggered 12" apart within each row (total of 40 plugs per plot). The variety was Chandler, and the source of plugs was Aaron's Creek in Buffalo Jct., VA (their source of tips was from Prince Edward Island – Westech).

Row covers were purchased for this study in case of any severe freeze protection requirements (whenever temperatures below – 9 ^{o}C are forecasted), but the winter was relatively mild and plant growth was excellent. In the early spring we relied on the row covers for for frost control of blossoms, and there was only one occasion when sprinkling on top of the covers was needed. Blossom losses to cold weather were very minimal.

In the spring 2008, plants were harvested two times each week from mid- April through the end of May (usually 14 harvests). Berries were field picked and graded (less than 10 g are considered culls, and also any misshapen fruit, or berries infected with gray mold were also considered culls). At each harvest, total weights, cull weights and marketable fruit weight was recorded and 25 berry weights are for calculation of average berry weight. All data was recorded by Rocco Schiavone, Research Associate.

Results and Economic Implications. Total and marketable yields were significantly greater for fumigated soil than the untreated control treatments (No. 12-14). Midas 50:50 at the 180 lb/A broadcast rate with standard plastic, and Midas 50:50 at the 120 lb/A broadcast rate with VIF had the highest yields in the study, but were not significantly different from methyl bromide at 175 lb/A with VIF (Table 2). It is very interesting that the lower rate of Midas 50:50 (120 lb/A with VIF) was significantly higher in total and marketable yield than Midas 50:50 at the 140 and 160 rates with VIF (Table 2). Also, the 180 lb/A rate (with VIF) was 7,272 lb/A *lower* in marketable yield than the 120 lb/A rate of Midas 50:50 (with VIF).

The 120 lb/acre broadcast rate of Midas 50:50 would indicate that only 60 lb/acre of this product would be required for shank treatment in-the-bed in North Carolina, where a 5' row center is standard and the plastic mulch covered beds occupy 50% of an acre. The total cost for Midas fumigation at this rate (120 broadcast) is $1,123/acre ($540 for fumigant and $583 for VIF). This estimate of $1,123/acre assumes a cost of $583 for VIF plastic/A (3.6 rolls 2,400 ft at $162/roll), and that Midas 50:50 is priced at $9.00/lb ($9 x 60 = $540). There is little economic difference between the use of Midas 50:50 at 120 lb/A with VIF and Midas 50:50 at 180 lb/A with standard film. The total cost for Midas 50:50 at the 180 lb/A broadcast rate (90 lb for strip fume x $9/lb = $810) with standard plastic use is about $1076/acre, or about $47 less than using Midas 50:50 at the 120 broadcast rate with VIF.

The control with VIF (No. 13) produced a marketable yield of 17,545 lb/A, or about 60% of the yield of the M50:50@120lb VIF treatment (29,255 lb/A). This would have led to a per acre loss in revenues of approximately $11,710/acre, assuming an average berry price of $1.00/lb. The most recent enterprise budget for the NC Strawberry Plasticulture system (October 2008) assumes a price of $1.00/lb for pick-your-own and $1.50 for ready pick. Thus, the net benefit of using Midas 50:50 at 120 lb/A with VIF could easily exceed $10,000 per acre in extra profits for the grower compared to no fumigation. This much economic benefit from fumigation would not likely be observed on sites where good crop rotation is possible, but on sites where rotation is not possible, a serious crop reduction may occur for growers who do not fumigate. The soil at Clayton Central Crops,

where this trial was conducted, is a Norfolk sandy loam, and it has had 3 years of continuous strawberries (including the 2007-2008 season).

Table 2. Total yield, marketable yield, berry size, crown number, root vigor and percent root discoloration of Chandler plug plants grown with 2 Midas formulations at multiple rates, Central Crops Research Station, Clayton, NC 2007-2008.

Treatment No., Product, rate,.[z] & film	Total yield (lb/acre)	Marketable yd (lb/acre)	Berry size (g)	Crown no.	Root Vigor[w]	% Root Discolor
11. M50:50@180lb Std.	31,409 a [x]	29,584 a	17.7	5.8	3.9	26.2 c
05. M50:50@120lb VIF	31,216 a	29,255 a	17.6	5.3	3.2	45.0 abc
09. MeBr 50:50@175lb VIF	28,298 ab	26,560 ab	18.2	4.4	3.6	35.0 bc
06. M50:50@140 lb VIF	27,003 bc	25,227 bc	18.0	4.5	3.5	41.3 bc
07. M50:50@160 lb VIF	26,130 bcd	24,451 bcd	18.2	3.8	3.5	36.3 bc
03. M98:2@ 80 lb VIF	25,615 bcde	23,723 bcde	16.6	5.4	3.8	47.5 abc
04. M98:2 @ 90 lb VIF	24,005 cdef	22,195 cdef	16.9	4.1	2.7	70.0 ab
01. M98:2 @ 60 lb VIF	23,699 cdef	22,015 cdef	16.5	4.3	3.4	53.8 abc
08. M50:50@180 lb VIF	23,343 cdef	21,979 cdef	18.2	3.6	3.3	50.0 abc
02. M98:2 @ 70 lb VIF	23,105 def	21,351 def	16.1	5.1	3.0	57.5 abc
10. M98:2@ 90 lb Std.[z]	22,374 efg	20,717 efg	16.2	4.5	2.8	47.5 abc
14. Control Std. plastic	21,343 fg	19,882 fg	15.8	4.2	3.2	55.0 abc
13. Control VIF	19,149 gh	17,545 gh	15.7	3.7	2.4	78.8 a
12. Control VIF no nutgrass	17,017 h	15,877 h	17.8	3.2	2.2	68.5 ab

[z] broadcast rate/acre[y]

[y] This is a subjective vigor rating are how big/extensive the root system is (5=good) (1=poor)

[x] Means with the same letter are not significantly different ($P < 0.05$)

[w] This is a subjective rating of the % of the root system affected/discolored.