RESULTS FROM THE 2001-02 USDA IR-4 MBA FIELD TRIALS IN CALIFORNIA STRAWBERRIES

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The field trials reported herein are part of a project of the USDA's IR-4 Program which began in 1998, to identify alternatives to methyl bromide for preplant soil fumigation in strawberries. During the 2001-02 strawberry growing season, four trials were conducted, two in California (Oxnard, Ventura Co., and Salinas, Monterey Co.) and two in Florida (Plant City, Hillsborough Co., and GCREC, Bradenton). The California trials were carried out by Plant Sciences, Inc. and the Florida trials were conducted by Dr. Jim Gilreath, University of Florida. The report herein summarizes the materials / methods and results from the two California field experiments.

Lists of the treatments evaluated at each of the two field trial sites are provided in Table 1. Product names, target rates and application methods are outlined for each material tested. Several of the treatments comprise two or more products, applied separately or in combination. These combination treatments were designed in an effort to control the broad spectrum of soilborne pests, pathogens and weed seeds that are currently controlled by the industry standard, methyl bromide/chloropicrin (mb/pic). Each treatment was replicated four times in a randomized complete block design. The replicate plot size was a single bed x 150 ft. long (64 inch centers in the Oxnard test, 48 inch centers in the Salinas test). The strawberry cultivars utilized in these tests were Camarosa (Oxnard) and Diamante (Salinas).

Over the course of each field trial, treatments were evaluated for their effects on the following variables: (1) strawberry plant growth and vigor (using vigor ratings and plant diameter measurements), (2) control of weeds (utilizing both seeded and indigenous populations of various weed species), and (3) strawberry marketable and cull fruit yields. Results from the marketable fruit yield evaluations will be highlighted in this presentation.

The season total marketable fruit yields from the two Ca trials (preliminary data through the end of July 2002 are provided for the Salinas trial) are reported in Table 1, along with results from the statistical analyses of these data (ANOVA, DMRT @ $P \leq 0.05$). In the Oxnard trial, both of the mb/pic industry standard treatments (bed-shank and flat-fume shank) significantly outyielded the Untreated Control (UTC), and the flat-fume treatment significantly outyielded the bed-shank treatment. Treatments which resulted in a mean yield statistically comparable to both of the mb/pic standard treatments were as follows: iodomethane / chloropicrin (50/50 at 400 lbs), chloropicrin EC alone (300 lbs), Telone C35 (32 gals), and the combination of metam sodium + chloropicrin EC +

DiTera DF (37.5 gals, 200 lbs and 12 lbs, respectively). Additional treatments that produced a yield statistically comparable to the mb/pic bed-shank standard only were as follows: metam sodium + Enzone + chloropicrin EC (37.5 gals, 150 gals, and 120 lbs, respectively), metam sodium alone (applied either as a single drip application at 75 gals, or as a split application of 45 gals followed by 30 gals one week later), metam sodium + chloropicrin EC + Fosthiazate 500EC (37.5 gals, 200 or 240 lbs, and 4.5 lbs ai, respectively) and Basamid + Telone C35 + chloropicrin EC (200 lbs, 10 gals, and 200 lbs, respectively). All rates noted above are given in quantities of product (or active ingredient, in the case of Fosthiazate) per treated acre. In the combination treatments mentioned above, metam sodium was used strictly for weed control on the bed-tops; the compound was applied as a broadcast spray in 1000 gallons of water carrier per treated acre, just prior to application of the polyethylene bed mulch.

Fruit yield data collected from the Salinas field trial through the end of July 2002 follow trends similar to those observed at the Oxnard test. The mb/pic bed-shank industry standard treatment significantly outyielded the UTC, producing a mean yield that was 56% greater than that of the UTC. Treatments which produced a marketable fruit yield comparable to that of the mb/pic standard were as follows: iodomethane / chloropicrin (50/50 at 400 lbs), chloropicrin EC alone (300 lbs), InLine (32 gals), the combination of metam sodium + chloropicrin EC + Fosthiazate 500EC (37.5 gals, 200 or 240 lbs, and 4.5 lbs ai, respectively), and the combination of Basamid + InLine + chloropicrin EC (200 lbs, 10 gals, and 200 lbs, respectively).

Table 1. Treatment descriptions (products, rates and application methods) and mean marketable fruit yields from the 2001-02 IR-4 MBA California strawberry field trials.

TRT No.	PRODUCT(S)	RATE [1]	APPLICATION METHOD	MARKETABLE YIELD [12] OXNARD TRIAL		MARKETABLE YIELD [12] SALINAS TRIAL	
1	Iodomethane / Chloropicrin (50/50)	400 lbs	Drip [2]	2985	abc	3683	a
2	Metam Sodium + Enzone + Chloropicrin EC	37.5 gals 150 gals 120 lbs	Broadcast spray over bed top [3] Drip [2 4] Drip [2 4]	2370	fg	2484	c
3	Metam Sodium + HM 0122 + Chloropicrin EC	37.5 gals 150 gals 120 lbs	Broadcast spray over bed top [3] Drip [2 4] Drip [2 4]	2637	c-f	2936	bc
4	Chloropicrin EC	300 lbs	Drip [2]	2859	abc	3850	a
5	InLine / Telone C35 [5]	32 gals	Drip [2]	3015	ab	3921	a
6	Metam Sodium (single appl)	75 gals	Drip [2 6]	2449	d-g	2819	bc
7	Metam Sodium (split appl)	45 / 30 gals	Drip [2 6]	2402	efg	2763	bc
10	Metam Sodium + PlantPro 45	37.5 gals 150 gals	Broadcast spray over bed top [3] Drip [2 7]	2036	h	2842	bc
11	Metam Sodium + PlantPro 20EC	37.5 gals 18 gals	Broadcast spray over bed top [3] Drip [2 7]	2137	gh	2779	bc
12	Metam Sodium + PlantPro 20EC	37.5 gals 36 gals	Broadcast spray over bed top [3] Drip [2 7]	1985	h	2720	bc
13	Metam Sodium + Chloropicrin EC + Fosthiazate 500 EC	37.5 gals 200 lbs 4.5 lbs ai	Broadcast spray over bed top [3] Drip [2] Drip [2]	2485	def	3815	a
14	Metam Sodium + Chloropicrin EC + Fosthiazate 500 EC	37.5 gals 240 lbs 4.5 lbs ai	Broadcast spray over bed top [3] Drip [2] Drip [2]	2641	c-f	3894	a
15	Metam Sodium + Chloropicrin EC + DiTera DF	37.5 gals 200 lbs 12 lbs	Broadcast spray over bed top [3] Drip [2] Drip [8]	2850	abc	---	---
17	Basamid + InLine / Telone C35 [5] + Chloropicrin EC	200 lbs 10 gals 200 lbs	Broadcast / incorp. [9] Drip [2 4] Drip [2 4]	2796	bcd	4182	a
18	Propozone	30 gals	Bed-shank [10]	---	---	3070	b
19	Multiguard FFA	47.3 gals	Drip [2]	---	---	2536	bc
20	Multiguard FFA	71.0 gals	Drip [2]	---	---	2609	bc
21	Multiguard FFA Plus	47.3 gals	Drip [2]	---	---	2582	bc
22	Methyl Bromide / Chloropicrin (67 / 33)	350 lbs	Bed-shank [11]	2746	b-e	4163	a
23	Methyl Bromide / Chloropicrin (67 / 33)	350 lbs	Flat-fume shank [11]	3185	a	---	---
24	Untreated Control	---	----	1813	h	2666	bc

[1] Rates are given in quantities of product per treated acre, except for Fosthiazate which is given in lbs ai per treated acre.

[2] Drip-applied Iodomethane / Chloropicrin (50/50), Enzone, Chloropicrin EC, HM 0122, InLine, Fosthiazate, Multiguard FFA and Multiguard FFA Plus were applied using a water carrier volume of 2.0". Metam Sodium (MS) was applied using 2.5" of water for the single application in Trt. #6; for the MS split application (Trt. #7), 1.5" were used for the first application and 1.0" was used for the second application. PlantPro 45 and PlantPro 20EC were applied using 1.5" of water carrier, and each of these applications were immediately followed by a 0.5" flush. All drip applications were made using 2 drip lines per bed in Oxnard, and a single line per bed in Salinas.

[3] Metam sodium was used strictly for bed-top weed control, and was applied as a bed-top broadcast spray using 1000 gpa of water carrier. Treated beds were tarped immediately following application.

[4] Enzone and Chloropicrin EC (Trt. #2) were injected separately and simultaneously; HM 0122 and Chloropicrin EC (Trt. #3) were applied in the same manner, as were InLine and Chloropicrin (Trt. #17).

[5] Non-emulsified Telone C-35 was inadvertently drip-applied (instead of InLine) at the Oxnard trial; InLine was used at the Salinas trial.

[6] One week post-application, the polyethylene bed mulch was punched, and 1" water "washes" were applied at weekly intervals thereafter, beginning one week after bed-punching. A total of four post-application "washes" were made for Trt. #6, three "washes" for Trt. #7.

[7] PlantPro 45 was mixed 1:1 with water prior to injection and PlantPro 20EC was mixed 1:4 (PP:water). One-inch "washes" were applied at 1, 2 and 3-weeks post-application, for each of the PlantPro 45 and PlantPro 20EC applications.

[8] Two DiTera applications were made, the first 1-day and the second three weeks post-transplanting. The applications were made using 1.0" and 0.4" water, respectively.

[9] Basamid was applied to the bed-top using a hand-held granular applicator and incorporated with 1" of water.

[10] Propozone was applied at the Salinas trial using 2 shanks per bed, approximately 8" deep and 8" apart.

[11] Methyl bromide / Chloropicrin was bed-shanked at 350 lbs per treated acre (two shanks per bed, ~12" deep at Oxnard and ~8" deep at Salinas) at both trials; data were also collected from the growers' mb/pic flat-fumed ground (Trt. #23) at the Oxnard trial.

[12] Marketable fruit yield means within a column followed by the same letter are not significantly different (DMRT, $p \leq 0.05$). Yields given for the Salinas trial are totals through the end of July 2002. Treatments without yield means were not included at that particular trial site.