DEMONSTRATIONS ON ALTERNATIVES TO MB FOR STRAWBERRY IN SPAIN. 2004-2005 RESULTS.

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The National project INIA on alternatives to Methyl Bromide (MB) for strawberry in Huelva started a field demonstrations program in 2002. Results for 2002 and 2003 were presented in MBAO Conference (López-Aranda et al., 2002; Miranda et al., 2003).

In 2002, these field demonstrations showed very similar yields (with cv. 'Camarosa') to the standardized use of MB+pic (50-50) in the area for 1,3D-pic (Telopic^{TM}) and Dazomet (Basamid^{TM}). In contrast, soil solarization with simultaneous Metam Sodium shank-application or simultaneous biofumigation gave poorer results. In 2003, the results showed that the agronomic and morphologic response of cv. 'Camarosa' to 1,3D-pic (61-35) (Telopic^{TM}) was similar to that obtained with BM+pic (50-50), even with 50% dosage under black VIF film. The yield obtained with Dazomet (Basamid^{TM}) was a bit lower than for the other fumigants.

This program has been carried out in two private farms: Occifresa Inc. (Avitorejo, Moguer) (location 1) and Cumbres Malvinas Inc. (Malvinas, Palos de la Frontera) (location 2), in the center of very important strawberry crop areas (Eastern coast) in Huelva. The activities reported herein, corresponding to 2004 and 2005, are the last of this field scale program. Cv. 'Camarosa' was cultivated following conventional cultivation practices under large plastic tunnels. Soils of each orchard have been fumigated by MB-pic shank-application for more than 10 years.

In 2004, four field scale demonstrations were carried out on each farm: a) 1,3D-pic (61-35) (Telopic^{TM} PE) shank-applied under pre-formed beds mulched with black P.E. film (55 g/m^2 of treated area); b) 1,3D-pic (61-35) shank-applied under pre-formed beds mulched with VIF black film (30 g/m^2 of treated area) (Telopic^{TM} VIF); c) Dazomet broadcast incorporated with rotovator (70 g/m^2 and sealed with transparent P.E. film before mulching with black film) (Basamid^{TM}); d) Propylene oxide (Propozone^{TM}) shank-applied under pre-formed beds mulched with black P.E. film (68 g/m^2 of treated area).

In 2005, four different field demonstrations were carried out: a) 1,3D-pic (61-35) (Telopic™ VIF) shank-applied under pre-formed beds mulched with VIF black film (30 g/m^2 of treated area); b) Propylene oxide (Propozone™) shank-applied under pre-formed beds mulched with VIF black film (55 g/m^2 of treated area); c) DMDS+pic shank-applied under pre-formed beds mulched with VIF black film (25+25 g/m^2 of treated area) (DMDS+pic); d) prayable plastic polymers (Solartex™) + simultaneous biofumigation (800 l/ha + 3 kg/m^2 of chicken manure) (Solartex+biof.). In 2004 and 2005, standardized MB+pic (50-50) under preformed beds (40 g/m^2 of treated area), was shank applied as standard control (MB+pic PE).

Fumigations were applied on September 17, 2003 and September 15, 2004 in location 1, and September 10, 2003 and September 7, 2004 in location 2. In the case of Solartex+biofumigation (like-soil solarization) applications started on July 27, 2004 in both locations. Planting dates were October 22, 2003, and October 11, 2004 in location 1, and October 14, 2003, and October, 11, 2004 in location 2 (Table 1).

Soil samples from each demonstration and orchard were analyzed before and after treatments and at the end of the cultivation period. Fungi and phytoparasitic nematodes presence will be discussed.

Plant survival (%), just after plantation dates and at mid growing season (April 7-18, 2004 and 2005), was optimal for every demonstration and location (Table 2). Plant diameter (cm) is presented in Table 2.

Table 3 shows harvesting period (January/February to May): extra-early, early, medium and total cummulated commercial yield per plant. Average fruit size (weight) is presented in Table 3. Finally, data regarding the weeding on the top of beds are presented in Table 3 (as time of weeding and weed biomass eliminated).

The results obtained, after eight-year work (1998-2005), showed that the agronomic and morphologic response of cv. 'Camarosa' to 1,3D+pic (61-35) was similar to that obtained with BM+pic (50-50), even with reduced dosage under black VIF film. The results obtained with the application of Basamid™, Propozone™, DMDS+pic, and non-chemical like-solarization with Solartex ™ plus simultaneous biofumigation will be discussed. Several of these alternatives could represent an appropriate short and medium-term solution to MB ban in environments with low levels of lethal soil-borne strawberry pathogens, such as Huelva crop area. However, EU policy on future 1,3 dichloropropene and/or chloropicrin utilization is uncertain.

Table 1. Demonstrations. Preliminary data.

Location	Demonstration	Surface (m^2)	Application date	Planting date	Tunnel cover date
2003-2004					
Occifresa	Telopic PE	470	Sept., 17	Oct., 22	Nov., 14
	Telopic VIF	470	Sept., 17	Oct., 22	Nov., 14
	Basamid	470	Sept., 17	Oct., 22	Nov., 14
	Propozone	470	Sept., 17	Oct., 22	Nov., 14
	MB+pic PE	470	Sept., 17	Oct., 22	Nov., 14
C. Malvinas	Telopic PE	470	Sept., 10	Oct., 14	Nov., 14
	Telopic VIF	470	Sept., 10	Oct., 14	Nov., 14
	Basamid	470	Sept., 10	Oct., 14	Nov., 14
	Propozone	470	Sept., 10	Oct., 14	Nov., 14
	MB+pic PE	470	Sept., 10	Oct., 14	Nov., 14
2004-2005					
Occifresa	Telopic VIF	470	Sept., 15	Oct., 11	Nov., 8
	Propozone	470	Sept., 15	Oct., 11	Nov., 8
	DMDS+pic	470	Sept., 15	Oct., 11	Nov., 8
	Solartex+biof.	470	Jul., 27	Oct., 11	Nov., 8
	MB+pic PE	470	Sept., 15	Oct., 11	Nov., 8
C. Malvinas	Telopic VIF	470	Sept., 7	Oct., 11	Nov., 16
	Propozone	470	Sept., 7	Oct., 11	Nov., 16
	DMDS+pic	470	Sept., 7	Oct., 11	Nov., 16
	Solartex+biof.	470	Jul., 27	Oct., 11	Nov., 16
	MB+pic PE	470	Sept., 7	Oct., 11	Nov., 16

Table 2. Plant survival after re-plant, and plant diameter (1).

Location	Demonstration	Plant survival (%)		Plant diameter (cm)				
2003-2004		Nov. 1-5	Apr. 7-18	Dec. 7-15	Jan. 22-26	Feb. 24-26	Mar. 22-24	Apr. 28-29
Occifresa	Telopic PE	99.6	99.3	12.4	21.6	28.9	31.9	37.8
	Telopic VIF	99.9	99.7	14.6	23.6	29.0	31.6	37.7
	Basamid	99.7	99.3	13.6	20.3	25.0	28.2	32.0
	Propozone	99.6	99.5	15.4	23.0	28.1	31.0	35.3
	MB+pic PE	99.7	99.6	13.8	22.1	28.3	30.9	38.4
C.Malvinas	Telopic PE	99.6	99.8	25.7	32.6	37.0	39.4	41.7
	Telopic VIF	99.5	99.9	25.1	32.8	36.5	38.8	40.8
	Basamid	99.5	99.8	24.9	32.8	35.8	36.9	39.0
	Propozone	99.6	99.8	24.0	31.0	34.1	36.6	37.4
	MB+pic PE	99.4	99.8	23.9	32.0	35.1	36.5	40.0
2004-2005								
Occifresa	Telopic VIF	98.4	95.5	20.7	28.4	30.1	33.7	40.0
	Propozone	99.1	99.4	19.1	29.2	28.5	30.0	37.2
	DMDS+pic	98.6	98.3	21.7	31.7	30.3	32.8	40.7
	Solartex+biof.	98.8	98.6	15.6	23.7	23.3	26.5	35.9
	MB+pic PE	99.3	96.8	20.4	28.9	28.8	30.5	40.1
C.Malvinas	Telopic VIF	99.7	99.8	22.8	32.8	32.8	33.5	37.4
	Propozone	99.1	99.6	21.6	30.6	31.2	31.5	34.3
	DMDS+pic	99.6	99.7	23.4	34.7	34.1	33.9	36.2
	Solartex+biof.	99.6	99.5	23.5	31.3	31.7	31.8	34.2
	MB+pic PE	99.0	99.3	21.5	31.1	30.8	31.5	36.9
(1) Sampling size for diameter and leaves: 15 plants/demo/date								

Table 3. Commercial yield in g/plant. Fruit weight.Weeding on the top of raised beds.

Location	Demonstration	Commercial yield (g/plant) until end of				Fruit weight	Weeding	
2003-2004		Feb.	Mar.	Apr.	May	g/u.	Time[1]	Biomass[2]
Occifresa	Telopic PE	94	323	685	1067	29.1	9.83	25.0
	Telopic VIF	87	320	630	982	28.4	9.07	45.0
	Basamid	66	266	584	962	26.4	7.30	35.0
	Propozone	106	348	708	1053	27.4	6.40	5.0
	MB+pic PE	111	361	728	1103	27.4	6.33	5.0
C.Malvinas	Telopic PE	178	522	1142	1411	27.2	16.55	370
	Telopic VIF	174	520	1085	1334	25.5	18.25	340
	Basamid	193	546	1049	1338	25.9	11.5	160
	Propozone	152	483	986	1297	25.8	18.20	760
	MB+pic PE	190	491	1066	1336	26.7	17.95	220
2004-2005								
Occifresa	Telopic VIF	168	429	968	1330	26.1	7.25	80
	Propozone	145	361	759	1131	25.9	7.80	120
	DMDS+pic	179	542	1150	1541	27.1	6.05	15
	Solartex+biof.	118	286	649	883	23.6	12.60	585
	MB+pic PE	153	395	945	1292	26.4	7.50	255
C.Malvinas	Telopic VIF	157	369	742	962	29.0	29.25	1305
	Propozone	158	344	641	802	26.6	12.90	315
	DMDS+pic	172	368	735	905	27.5	21.75	750
	Solartex+biof.	165	352	638	736	25.9	35.75	1460
	MB+pic PE	164	366	748	964	28.6	25.05	1075

[1]Time of weeding = min/demo.; [2]Weed biomass = g/demo.

References

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