

## ON-FARM RESEARCH TO IMPLEMENT MB ALTERNATIVES: AN AREA WIDE INITIATIVE

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Methyl bromide-dependent plasticulture crop production has been an integral part of large and small farm operations throughout the Southeastern United States (SEUS). Farm owners and managers know the need to explore and implement alternative soilborne pest management programs to limit crop losses with the current phase out of methyl bromide, according to the Montreal Protocol. We have in place an experienced interdisciplinary and multi-state team to develop an integrated research, education, and extension program to help plasticulture growers implement alternative fumigants or farm management systems. Advances in alternative options have been facilitated by strong cooperation amongst Grower Association organizations, individual growers, private consultants, custom applicators, University/USDA-ARS and Cooperative Extension personnel, and national industry and scientific experts. A primary limitation to adoption, aside from economic and efficacy considerations, is grower experience and comfort level with implementing alternatives, primarily fumigants, in a site-specific manner. Recently, an Area-wide Pest Management Project for Methyl Bromide Alternatives has been implemented to “foster effective transitions to MB alternatives in key southeastern and western U.S. crop systems.” The projects goal is to “involve multidisciplinary teams, working with growers, to conduct large-scale commercial field trials comparing standard treatments with MB to the best available alternatives”. We seek to work with growers to implement alternatives in vegetable and strawberry production systems to aggressively expand on-farm research (OFR) and demonstrations, educate growers and agricultural agents, and explore viable tactic-based or IPM-based alternatives for long-term economic and environmental benefit.

This report highlights work with strawberries. We have provided input for a consortium of stakeholders that sought Critical Use Nominations (CUN). The consortium for strawberries in the 2008 CUNs included Alabama, Arkansas, Georgia, Illinois, Kentucky, Louisiana, Maryland, Mississippi, Missouri, New Jersey, North Carolina, Ohio, South Carolina, Tennessee, and Virginia representing 5,523 acres (2235 ha). The majority of the enterprises tend to have limited acreages that are essential to farm viability, where the average strawberry area is about 5 acres (Sydorovych et al. 2006). Multiple on-farm-research work has been done in the region from 2005-2007 (Table 1).

In the 2006-2007 and 2007-2008 trials, standard protocols were adopted according to an area-wide plan. Standard protocols (a portion of which were

implemented in the 2006-2007 season and all in the 2007-2008 season) include: evaluation of mulch transfer coefficients (particularly VIF mulch) prior to and after bed formation; bulk density, moisture content and nematode populations of soil; total volatile organic compounds of soils under the mulch at 5 days after fumigation; calibration of application rates; and measurement of multiple environmental parameters such as soil moisture fluctuations, air, soil, and soil-under-mulch temperatures, rainfall, relative humidity and wind speed & direction.

We will highlight one on-farm experiment to illustrate a typical trial. This grower knows his land and pest pressure well and plants strawberries on the same land every other year in rotation with vegetables. In his experience, and documented through NCSU labs, the primary soilborne problems include fungi that cause black root rot (primarily *Pythium* and *Rhizoctonia* sp) and winter annual weeds with very low nutsedge pressure. In the absence of fumigation and based on multiple previous OFR at this site, crop yield was 20 to 30% less as compared to yields on MB-treated land. Therefore, given modest pest pressure combined with crop rotation, the grower requested a trial to look at reduced fumigation rates under virtually impermeable film (VIF) compared to MB full rate under standard polyethylene film.

The trial was located in central NC (P-NC1) and the grower allocated 8% of his strawberry planting to the alternatives trial. Treatments were applied on 8 Aug 2006 and included (broadcast rates/43560 sq ft treated area) MB 400 lbs standard polyethylene film and 200 lbs under VIF (Cadillac, Cadillac Corp.), Telone-C35 17.5 gal (196 lb) under VIF and Chloropicrin Plus (75%) 128 lbs under VIF. (This is not an extension recommendation applicable to all strawberry farms where pest pressure and agronomic practices differ– it was a grower driven choice for treatments to research). The grower's equipment was used for applications, with some minor modifications such as the addition of a flow meter and exchanging orifice plates. The trial was set up as a randomized complete block design with 4 replications in rows 360 ft long. Bare root strawberry plants cv. Chandler were field set early Oct. Whole plant samples, to document root rot incidence, dry weight gain of roots, crowns, foliage and reproductive tissues, were collected the day of planting, 19 Dec-06, 4 Apr-07 at full bloom and 4 Jun-07 at termination. The grower managed all agronomic inputs and documented all yields according to the replicated RCB design. Marketable yield was collected every 4-7 days for 8 weeks.

**RESULTS:** Installation, management, and harvesting proceeded well. Whole plant harvests demonstrated that all treatments generated equivalent plant growth and root rot incidence (data not shown). Similar rates of dry weight accumulation also resulted in equivalent yields for all treatments (Figure 1). Cumulative yield for each harvest date were similar for all treatments. Final yields were 96% for MB applied at half rate under VIF, 99% for Telone-C35 using 17.gal/A under VIF, and 99% for Chloropicrin Plus using 128 lb/A under VIF as compared to the

high rate (400 lb/A) of MB under standard film. These values were not significantly different (P=0.05).

Table 1: On-Farm Research Or Demonstrations to Collect On-Farm Data and Enable Growers to Transition.

Year and Location	Telone -C35 <sup>x</sup>	Metam sodium	Pic	Other or combinations	control	Design <sup>w</sup>
<b>2004-05</b>						
N GA <sup>z</sup>				T-C35+ms	MB	RCBD, 4reps
SE VA	x		x		MB, non	RCBD, 3reps <sup>w</sup>
E NC	x		x		MB	RCBD, 3reps
<b>2005-06</b>						
E. NC	x		x		MB	RCBD, 3reps <sup>w</sup>
2006-07 <sup>y</sup>						
E NC	x			Pic+ms(drip)	MB	RCBD, 4reps
P NC1	x		x		MB	RCBD, 4reps
P NC2				ms+TC35; ms+pic	MB, non	RCBD, 3reps
WP NC	x 1 rep	x 1 rep	x 1 rep	ms+Tc35; ms+pic	MB	RCBD, 5 reps
<b>2007-08</b>						
P SC	x			Midas 2 film types	MB	RCDB, 3reps
E NC				Pic+1,3-D (60:40) InLine	MB	RCDB, 4reps
P NC	x +Goal	x +Goal		Pic+1,3-D (60:40)	MB, non	RCDB, 3reps

<sup>z</sup> N-north, SE–southeast, E-east, W-west, P-piedmont (central); Georgia (GA), Virginia (VA), South Carolina (SC), North Carolina (NC).

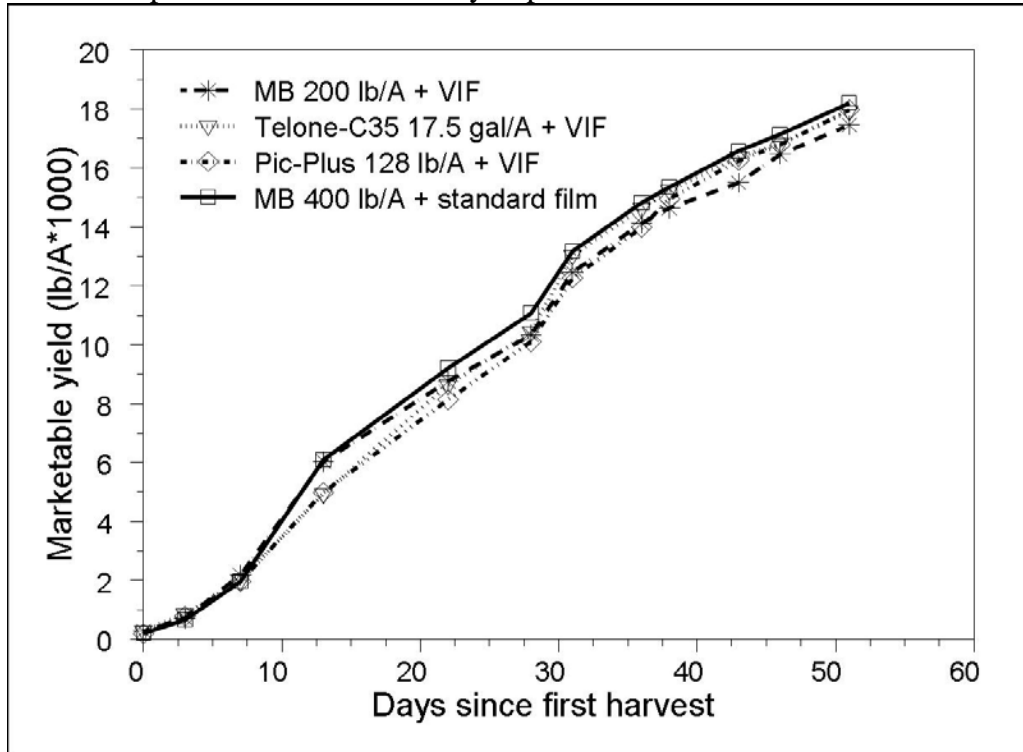
<sup>y</sup> 2006-2008 trials are part of the Area Wide Program.

<sup>x</sup> Fumigant broadcast rates are Telone-C35 28-35 gal/A; metam sodium (ms) 35-70 gal/A; Pic 100-150 lb/A, MB (67:33 or 50:50) 200-400 lb/A. Several trials included virtually impermeable film and often included reduced rates (50-75%) of MB or alternative fumigants.

<sup>w</sup> The MB and/or the non-fumigated (non) treatment was not replicated.

The 2004-05 data has been reported previously (Driver et al. 2005).

Figure 1: Cumulative strawberry yield of standard methyl bromide treatment using standard film compared to reduced rates of methyl bromide, Telone-C35 and Chloropicrin Plus under virtually impermeable film.



#### References:

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