FACILITATING ADOPTION OF ALTERNATIVES TO METHYL BROMIDE IN CALIFORNIA STRAWBERRIES

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Summary. The goal of this project was to facilitate the adoption of practical alternatives to methyl bromide (MB) for California strawberries. Our project tested and demonstrated strawberry production with both fumigant and nonfumigant alternatives to MB. Work with fumigants focused on the use of barrier films such as Totally Impermeable Film (TIF) to trap fumigants such as chloropicrin (Pic) which were tested and found to be effective. Several approaches to production of strawberry without MB were demonstrated: soilless production, anaerobic soil disinfestation (ASD), heat disinfestation, solarization, biofumigants and herbicides. The raised bed trough system (RABETS) is a soilless strawberry production method frequently used in Europe. We demonstrated strawberry production using the RABETS production system. Additional work demonstrated non-fumigant methods to control key soil pests by ASD, heat (steam, solarization), mustard seed meal (MSM) and combinations of heat with mustard seed meals or fumigants. The ultimate goal of this research was to develop, assess, and demonstrate alternative fumigant and non-fumigant practices for producing strawberries without MB. Given the limitations of a 5 year project, the goals of this project were achieved.

Specific objectives and results:

1. Evaluate reduced rates of alternative fumigants applied by drip fumigation under TIF.

Field demonstration trials conducted in 2007 through 2009 with TIF barrier film found that it effectively trapped Pic and 1, 3-dichloropropene (1, 3-D). TIF was compared to standard STD film for retention of 1, 3-D + Pic at 0, 50, 100, 200, 300 and 400 pounds per acre applied by chemigation and MB+Pic at 350 pounds per acre also applied via chemigation was included as a standard. Fumigant concentrations, strawberry fruit yield and weed control were monitored. 1,3-D+Pic concentrations under TIF were 46 to 54% higher than under STD film. Higher fumigant concentrations under the TIF were correlated with higher strawberry fruit yields and better weed control than with STD film. Fumigant use regulations in Ventura County allow the application of twice as many pounds of

chloropicrin per 48-hour period where TIF is used than under a conventional 1.25 mil film (VCAC 2011).

2. Evaluate methods to produce strawberry using the RABETS system.

Substrate production field trials were conducted at Camarillo, Santa Maria, and Watsonville, CA during the course of this project. Some of the substrates evaluated were: 1) coir, 2) peat + perlite, 3) soil + amendments. The amended field soil was disinfested with steam or ASD. This study was managed by the California Strawberry Commission, collaborating researchers and growers. It is possible to achieve good yields with this system, but management of the root-zone moisture and plant nutrition requires careful monitoring during the production season.

3. Evaluate and demonstrate promising non-fumigant alternatives in the conventional raised strawberry beds. Alternatives for strawberry will include ASD, steam, and mustard seed meal (MSM).

Field trial demonstrations were conducted at Salinas, Santa Maria, Ventura and Watsonville, CA to test: 1) MSM at 3000 lbs/A, 2) steam at 70ºC for 20 min., 3) MSM + steam as above, 4) ASD, 5) ASD + MSM, 6) fumigant standard. ASD and steam were both effective alternatives, although the cost of steam application must be reduced if it is to be a practical treatment. Fruit yield in ASD, steam and MSM + steam treatments were similar to the fumigated treatments, but only the steam treatments controlled weeds.

4. Demonstrate to growers the performance of key alternative treatments so that they can make informed decisions during the transition to alternative treatments.

Grower meetings and field days were held in Salinas, Santa Maria, Watsonville, and Ventura, CA, during the 2007-12 course of this project to discuss and demonstrate alternatives to MB for strawberry. Outreach publications resulting from this study that were or will be published are listed below and the project website is available at:
(http://ucanr.org/sites/PAWMBA/Production_Projects/Strawberry/).

References

Fennimore, S.A. and H. A. Ajwa. 2011. Strawberry Yield and Weed Control Following Fumigant Application Under Impermeable Film. California Agriculture. 65:211-215.

Fennimore S.A., R. Serohijos, J.B. Samtani, H.A. Ajwa, K.V. Subbarao, F.N Martin, O. Daugovish, D. Legard, G.T. Browne, J. Muramoto, C. Shennan and K. Klonsky. Methods to facilitate the adoption of alternatives to methyl bromide soil fumigation by California strawberry growers. California Agriculture. In press.

[VCAC] Ventura County Agricultural Commissioner 2011. Fumigant Use Regulations. http://ceventura.ucdavis.edu/Com_Ag/comveg/Strawberry/Recent_Meetings/Fumigants_4_11/