

Soil-Biodegradable Mulches: *Workshop*

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Presenter Notes

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Synopsis:

Strawberry cultivation utilizes about 845 pounds of field plastic per acre per year in California.

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Use of Polyethylene (PE) Mulch in Strawberry Production

This workshop series provides slide presentations on soil-biodegradable mulches (BDMs). These notes provide additional information for presenters. Numbers in the text correspond to the slides in each presentation. Information in this document was summarized from publications listed in the Reference section.

1. This presentation provides information on the use of polyethylene (PE) mulch in agriculture, plastic use in California berries especially strawberry, and problems with PE waste management, PE mulch recycling, removal and disposal.
2. U.S. agriculture uses approximately 1 billion pounds of plastics annually in the form of mulch, irrigation tubing, ditch lining, animal fencing, fumigation tarp and many more.



3. Globally, annual projected growth rate in the plastic mulch film market is 7.4% between 2018-2026 and the estimated value was about \$4.3 billion film market in 2019. Plastic mulch use in North America was 115,000 metric ton in 2016 and the estimated use in 2020 is 126,400 metric ton. Use of PE mulch increases the length of the growing season, increases yields, reduces herbicide use and hand weeding, increases water use efficiency, and helps manage some diseases and insect pests.
4. The graph (Fig. 1) shows the amount of field plastic produced in CA crops as pounds per acre per year. Field plastic includes drip tape, hoop house plastic, and mulch and fumigation tarp. The greatest field plastic production is about 845 lbs/acre/year, from strawberry cultivation (drip tape, and mulch and fumigation tarp), followed by cane berry cultivation that produces about 550 lbs of field plastic per acre per year from drip tape, hoop house, and mulch and fumigation tarp.
5. There are 32,000 acres of strawberry in California, and most growers use bed plastic; it is rare not to use plastic mulch in this system. About 80% of the 6,000 acres of caneberries grown in CA use plastic tunnel covers. Both systems use plastic extensively in other aspects of production, like irrigation, row covers, shade cloth and more. This results in lots and lots and lots of plastic.
6. Tunnel plastic is usually 6 mil (or greater) thick, and has been in use since 1990's to provide partial shade for plants, keep production safe from rain, and enhance yield. Bed plastic, which is usually 1.25 to 1.5 mil thick, has many colors, widths, and formulations (e.g. TIF, perforated, etc.) to meet specific crop requirements. It is used to manage bed temperatures, keep fruit clean and dry, manage fumigation and anaerobic soil disinfestation (ASD). Other examples of plastic use in CA berry production includes weed mats, shade covers, and plastic pots for substrates. Drip tape has many thicknesses and formulations.
7. A survey of strawberry growers in 6 states including CA, identified the pros and cons of PE mulch. The majority of respondents mentioned weed control followed by cleaner berries as the primary benefits of PE mulch. Removal of PE mulch followed

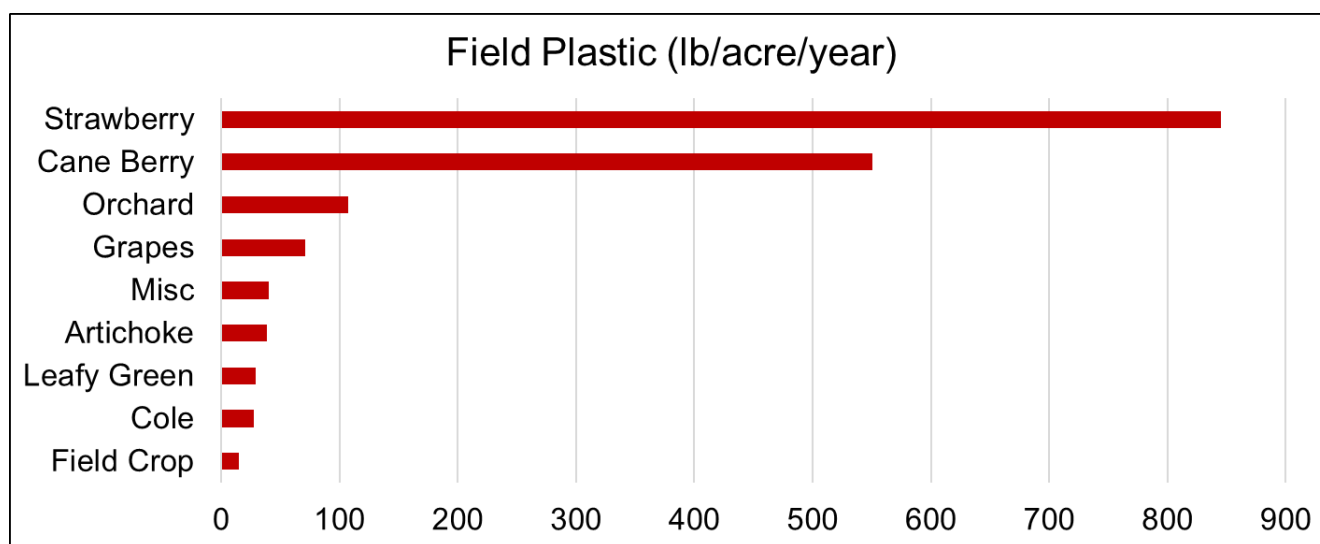


Figure 1. Field plastic (lb/acre/year) in CA crops.

by its disposal were the major negatives of PE mulch (Table 1).

8. Problems with PE waste management include 1) costs of removal and disposal at the end of each season, 2) PE mulch is not biodegradable, 3) plastic removal also removes topsoil (up to 1,000 lbs of topsoil/acre, and 4) the remaining PE fragments in the field can pollute the soil and surrounding environment.
9. Problems with recycling PE mulch are 1) soil and plant debris adheres to the mulch, adding up to 70% by weight, 2) soil is expensive to haul, 3) soil can abrade the recycling equipment, 4) once removed, the soil then needs to be disposed, 5) there are

many blends of resins in PE plastic mulch like, color, layers, additives making it difficult to use it in a recycled product, 6) when oil prices go down, it reduces the recycled plastic market, and 7) most people do not *preferentially* purchase recycled product.

10. PE mulch removal and disposal are difficult. Breakage makes complete removal difficult. Bank (riparian) surveys show that mulch pieces, including microplastics, are found in river and ditch drainages. Water carries these plastic remnants to the ocean. Responsible disposal is through the regional waste management facility.

Table 1. Pros and cons of using PE mulch, as identified by a survey of strawberry growers in 6 states.

Pros	Cons
Weed control (68%)	Removal (40%)
Cleaner berries (28%)	Disposal (26%)
Moisture retention (15%)	Purchase/removal/disposal costs (16%)
Earlier production (10%)	Product integrity (tears and deterioration in field (9%)
Ease of use (9%)	Runner-related problems (8%)
Increased soil temperature (8%)	Poor plant health and fruit quality (7%)
	Animal damage (5%)
	Excessive heat (5%)
	Poor weed control (5%)



11. Deer and other animals can break plastic when they step on it. Plastic ditch linings commonly fail because plastic is not strong enough to endure water and sediment

scouring. Since ditch liner is in a water pathway, fragments can be carried to the ocean.

Resources

These information resources provide background information and additional information to help you have a more thorough understanding of this topic. We encourage presenters to view each one so as to be better prepared for your presentation.

Plastic Mulch in Fruit and Vegetable Production: Challenges for Disposal

https://ag.tennessee.edu/biodegradablemulch/Documents/Plastic_Mulch_in_Fruit_and_Vegetable_Production_12_20factsheet.pdf

Polyethylene and Biodegradable Plastic Mulches for Strawberry Production in the United States: Experiences and Opinions of Growers in Three Regions

<https://journals.ashs.org/horttech/view/journals/horttech/29/5/article-p619.xml>

Mulch Calculator

<https://ag.tennessee.edu/biodegradablemulch/Documents/Chen-Mulch-calculator-introduction.pdf>

