

# Update on SARE-funded mulch research project

*Five farms participated in VABF study of black plastic film alternatives*

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In 1993, the USDA's Sustainable Agriculture Research and Education Program gave VABF a grant to conduct on-farm studies of alternatives to black plastic film mulch for tomatoes. At two sites that year, paste tomatoes mulched with either 65-lb recycled kraft paper or hay yielded as much as tomatoes mulched with plastic (see VBF Spring 1994, page 6 for details). This year, five farms participated in the project: Potomac Vegetable Farms in Loudoun County; Dayspring Farm in King and Queen County; Twin Oaks Community in Louisa County; and Windswept Farm and the Bason's farm in Floyd County. In addition to kraft paper and hay, we tried grain straw (which rots more slowly than hay and thus might keep the fruit cleaner), composted municipal yard waste (a large input of organic matter, and may help prevent crop disease), an in situ mulch of mowed rye + vetch cover crop (more feasible on larger farms than hauling hay or compost into the field), and recycled kraft paper treated with vegetable oil (lasts longer than untreated paper, and warms the soil much more). In addition, we tried oiled paper before planting, followed by hay several weeks later. Plastic and paper film mulches were laid just before planting, while the organic mulches were applied two to five weeks after planting when the soil had warmed up to about 70 degrees. Weeds were hoed out just before applying organic mulch, which was a fairly easy operation as the weeds were still small. The cover crop was tested at Dayspring Farm in the Tidewater, and was mowed just before planting, and again as needed.

In addition to crop yields, quality and earliness, and weed control by the various mulches, soil moisture and temperature were measured, and Greg Evanylo, soil scientist at Virginia Tech, is evaluating compaction, moisture infiltration and aggregate stability (a parameter related to till and biological activity). It will take another few months to get the data analyzed, so a more detailed report will appear in a future issue of VBF.

We ran into a number of problems this year, the first of which became apparent a few weeks after planting, when the participating growers called to report that weeds were growing so vigorously beneath the paper mulches that the paper was bulging up and tearing loose from the soil. We had switched to a lighter weight (40-lb) paper for the 1994 experiments because it is more economical, and a preliminary experiment in 1993 indicated that it may be sufficiently thick and durable. Using a photographic light meter, I estimated that

oiled 40-lb paper transmits about 29 percent of sunlight, while unoled paper transmits only 3 percent while dry, and 12 percent when wet from rain or dew, but even these levels seemed sufficient to allow weeds to grow. (Because the photographic meter does not respond to quite the same light spectrum as plant leaves, these figures do not exactly reflect "photosynthetically active radiation," but they give an indication of relative transparency of different film mulches). At two locations, the grower applied hay to the oiled paper about five weeks after planting, which helped suppress the weeds. At the other three locations, oiled paper was evaluated both with and without hay. Because of this problem, we established an additional experiment at Windswept Farm to compare 65-lb and 40-lb recycled kraft paper, both with and without oil. The heavier weight held up much better, and unoled 65-lb paper transmitted only about 1 percent of sunlight.

Also, whereas oiled paper let through much more light, it seemed to suppress weeds better than untreated 40-lb paper, possibly because of excessively high temperatures under the oiled paper. Another problem was that in the film mulch treatments there is always a space between crop rows that is not covered by the film, and weeds grow especially well since they get some extra rainwater running off the mulch. In 1993, we left these strips bare, which we soon regretted. In 1994, the uncovered edges of the film mulch plots were mulched with hay at the time of planting, but weeds still came through fairly heavily by midseason. However, at one site, we did not get around to applying this hay border until several weeks after planting, when we hoed the weeds (small at that point) before laying the hay. The result was much better weed control. The crops grew vigorously at all five sites, but just as the tomatoes began to ripen, the late blight swept through Floyd County, destroying the crop at one site and seriously damaging it at the other.

Meanwhile, deer descended on the Loudoun County site and devoured all the fruit in the far half of the field. So we ended up with considerably less yield data than we had hoped. However, this did not seriously alter the effects of the various mulching systems on the soil or weeds, and we will still have valuable information on these aspects of mulch performance. Also, we may have enough money left in the original grant to conduct field trials at one or two farms in 1995, to obtain additional yield and other data. Meanwhile, this winter I will be completing the survey of growers' mulching practices and issuing a report, available free to survey participants, and at cost to other interested growers.



## Worldwatch Trends

According to "Vital Signs 1994: The That Are Shaping Our Future," by Brown and others at Worldwatch:

- Global paper production has increased despite poor profitability and depressed prices output, grew 2.2 percent last year, largest rise in three years;
  - Cigarette production rose slightly to 982 cigarettes per person, although overall trend may be declining;
  - Global temperature rose slightly although it was cooler than some years of previous decade;
  - Natural resistance to pesticides continues to rise, as at least 520 insects and mites, 113 diseases and 113 weeds have become resistant to one or more pesticides meant to control them;
  - A dramatic increase in pork production in China has made it the world's largest producer of red meat. China has now joined the United States as a dominating world meat producer;
  - Carbon emissions from the burning of fossil fuels remain unchanged, with deforestation contributing an additional 1-2 billion tons;
  - Population increased slightly in 1993, with 94 percent of the increase expected in developing nations;
  - 108 million bicycles were manufactured worldwide in 1993, nearly three times as many as automobiles.
- "Vital Signs" is available from Worldwatch, 500 5th Avenue, New York, NY 10111, cloth, \$10.95 paper.

## Weed killers promote pests and disease

Weed killers create better conditions for some plant diseases and pests, concludes a report by the Danish EPA entitled "Unintentional Effects of Pesticides and Greenfly."

The investigation, which covered the weed killer isoproturon and the growth regulator ethephon, found that isoproturon is particularly popular with mildew in winter wheat. It also found that the situation deteriorated as dosage increased, with even minor dosages having a visibly encouraging effect on greenfly colonies. Both compounds seemed to have a profound effect on the reproductive rate of greenfly, particularly in barley fields.

A story on the report was published in "Danish Environment."