

## Mulching and Slugs

This anecdotal account is "part zero" in a several-part series that will summarize the results of the mulching research that VABF has conducted during 1993-95 with funding from the U. S. Department of Agriculture's Sustainable Agriculture Research and Education (SARE) program. Part One will appear in the next issue, by which time I will have had time to analyze data and reflect on some of the things I learned through working with growers and doing library research at Virginia Tech.

For the first four seasons at Windswept Farm, we found that using hay or straw mulch kept our clay-loam soil in good tilth and fed the earthworms and soil microflora. The constant input and breakdown of organic matter, plus the mixing and aerating action of large nightcrawlers, seemed to be all our fertile soil needed to stay healthy. Last winter, I read at least a dozen research reports dating from as far back as the 1920s in which mainstream soil scientists showed that hay, straw or other organic mulches can dramatically reduce soil erosion and compaction, prevent heavy rains from sealing the soil surface, maintain or improve soil organic matter, and promote the "crumb structure" that makes soil soft and conducive to crop growth.

So mulching is a good thing, right? Usually. I ran across one report by the famous soil scientist William Albrecht that hay mulch can sometimes worsen soil tilth as well as tie up some nutrients. Meanwhile, last fall and this spring our soil rather suddenly changed from crumbly and loose to sticky, compacted and airless. As rain increased from adequate in May to torrential in June (10 inches), the mulch seemed to aggravate waterlogging. Slugs proliferated — not only the small, squishy, gray slugs that we've always had — but also hundreds of large (2-inch), tough, voracious brown slugs that may eat at ground level, forage three feet up snap pea vines or burrow six inches into the soil. A simple experiment confirmed that brassicas in a mulch of green hay attracted about twice as many slugs as the same crops in bare soil. Many of our spring crops were seriously damaged.

So, in wet weather, omit the mulch, right? We tried that. Violent downpours and hail pounded the last little bit of tilth out of the exposed soil. The sun eventually came out and turned the soil into bricks. Some crops had a hard time, and the earthworms fled, but not the slugs. This new brown species can cross dry ground in broad daylight, taking cover only as the temperature approaches 85 degrees. We tried wood ash, limestone, oyster shells and even a brand diatomaceous earth specifically labeled for slugs, but the brown slugs crawled unharmed through these materials to get at our seedlings.

We finally got around to doing the right thing, which was to find out why our soil lost its tilth in the first place. We sent a soil sample to Carl Luebben, a soil scientist with a strong background in sustainable farming. He found a mineral imbalance: way too much potassium relative to calcium, and slight shortages of phosphorus and boron. The calcium-potassium imbalance alone could explain why the soil became sticky and poorly aerated. These conditions led to anaerobic decay of organic matter, which can

produce certain substances that attract slugs. We discontinued all use of wood ash (too much potassium), and applied rock phosphate, calcitic limestone and a little borax.

Already, soil structure is beginning to improve, but we want to take steps to prevent this imbalance from happening again. Grass hay is high in potassium, and heavy applications each year might contribute to the problems we had, so we decided to go easy with it and look for alternative materials that have more calcium, such as legume hay or aged oak sawdust. We had not yet gathered any when it got really dry in August, so we have been irrigating and adding a light mulch of the grass hay on hand. It takes far less hay (1 to 3 tons per acre; ground barely covered, up to 1.5 inches deep) to protect the soil surface and conserve moisture than it does to control weeds (5 to 15 tons per acre; roughly 3 to 9 inches deep). Light mulching may also be appropriate in wet weather, as it helps protect the soil from surface sealing and erosion, and helps prevent some diseases by reducing soil splash onto crop foliage and fruit.

But we still had those big brown slugs chomping our seedlings, even after a month of heat and drought. As a last resort we set up beer traps. The reason I was so reluctant to try this well-known folk remedy is that in past years it failed on the small gray slugs, which seem to be teetotalers on our farm. All we caught were ground beetles, spiders, earthworms and other beneficial organisms. However, this time we found the Achilles heel of the big brown slug: a few ounces of Milwaukee's Best (the cheapest brew we could find) in an 8-ounce plastic food container set with the rim at ground level, and a "roof" of wood set about 1/2 inch above the top of the dish. The next morning we found up to 25 slugs per trap and reduced seedling losses. We're still learning how many traps per 100 square foot bed, and how many nights' trapping are needed to deplete slug populations to acceptable levels. I have heard that slugs are sometimes selective regarding brand of beer (usually preferring the cheap kinds, best after they have gone flat). So if the beer you are using doesn't seem to be working, try another brand — perhaps Milwaukee's Best if you're dealing with the large brown slugs.

Some mulching materials may actually deter slugs. Several growers have mentioned to me that pine needles repel slugs sufficiently to protect crops, and a neighbor who uses fresh sawdust as mulch had virtually no slugs this year. (However, fresh sawdust may inhibit the growth of some crops, depending on soil conditions and the tree species from which the sawdust came — try it on a small area first). There was also a report a few years ago in the periodical *Horideas* that dried quackgrass may be somewhat toxic to slugs, enough to offer some degree of control.

Mark Schonbeck  
Tekiah Community

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