Horticulture

Mulch? Tomatoes prefer red

Gardeners are encouraged to mulch their plants to reduce weed growth and moisture loss in the surrounding soil. Some experts recommend mulching with whatever is least expensive in your area, such as wood chips, straw or shredded newspapers. Others recommend opaque plastic for its ability to collect and retain heat, often a benefit to tender seedlings set out in the cool spring. But gardeners may find it most profitable to focus on the color of their mulch, rather than what it's made from, according to scientists at Clemson (S.C.) University and the U.S. Department of Agriculture's Coastal Plains Soil and Water Conservation Research Center in Florence, S.C. Their preliminary work indicates that the color of the light a mulch reflects back onto a growing plant can significantly affect its growth.

Early work by USDA's Patrick G. Hunt and Michael J. Kasperbauer showed that by affecting phytochrome, a color-sensitive substance, even five minutes of colored light at the end of the day could alter the shape and size of a plant. For example, Hunt says such brief exposures to red light (600- to 700-nanometer wavelength) left soybeans, wheat and peas more spindly and smaller-rooted than plants exposed to far-red light (700 to 770 nm) at day's end.

The next logical step was to see how the color of the soil — or the mulch covering it — might affect seasonal growth. "To our surprise," Hunt says, in experiments with tomatoes last year, "the red mulch gave us larger fruit and even increased the total number of fruit." Relative to black mulch, it improved yields 20 percent. This year's surprise, he says, is how well white mulch appears to be improving bell pepper and potato production over yields in sandy (light-colored) soil and plots mulched with straw painted yellow, red or blue. It suggests, he says, that each plant may have its own preferred color.

Moreover, he adds, since the photochrome chemistry these mulches appear to be affecting can be temperature sensitive, similar plants grown under different seasonal conditions — hotter summers or longer days — may require some spectral fine-tuning to yield comparable results. Finally, he notes that his preliminary studies have focused only on changes in yields and morphological factors like stem length. Still to be studied is whether changes in reflected spectra will alter characteristics like taste, shelf life or susceptibility to blights.

Higher yields from small-potted plants

Small pots tend to stunt growing plants, much as drought does. But new work at the Agriculture Department's Plant Stress Laboratory in Beltsville, Md., indicates that unlike drought-related stunting, the stunting from root-restricting small pots is not caused by decreased photosynthesis. In fact, given adequate water and nutrition, root-restricted plants conduct comparable photosynthesis and even offer higher yields per volume of soil than nonstressed plants in large pots.

Donald T. Krizek and his colleagues found that they could get the same number of mature, ripe fruits per plant from tomatoes grown in 3 1/2-inch pots (with 450 cubic centimeters volume) as from tomatoes grown in 11-inch pots (with 13,500 cc volume). While the size of the tomatoes differed — about 5 grams (dry weight) per fruit in the small pots versus 8 g per fruit in the larger ones — roughly three times as many small-potted tomatoes could be grown in the space of a single large-potted plant. So, on a total-yield-per-space basis, the small pots were almost twice as efficient at producing tomatoes, Krizek notes. The trick is to see that the small-potted plants get adequate water and nutrition. His are watered and fed three to six times daily with a microprocessor-driven system. A report on the work will appear this fall in the JOURNAL OF THE AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE.

Science & Society

Export controls and research results

The controversy over government controls on the publication of research results for the sake of preventing Soviet acquisition of military technology started off as a highly charged argument about freedom and national security. It appeared to pit heavy-handed bureaucrats against bewildered academic scientists. During the last year, however, the situation has become quieter and less confused (SN: 10/19/85, p.248). "We have reached a reasonably stable state," says political scientist David A. Wilson of the University of California at Los Angeles. Wilson directed the Export Controls Information Project for the Department of Defense-University Forum, an advisory body to the Department of Defense, and the Association of American Universities (AAU), based in Washington, D.C.

The project has produced a set of publications explaining present government policy on national security and export controls as it affects university research. The AAU has started to distribute the documents to universities and scientific societies. The publications, says Wilson, "are designed to reduce confusion about these complicated and sensitive matters and to assist institutions in responding appropriately in the event questions arise during the normal course of research project development or implementation."

The current set of laws and regulations governing export controls strongly endorses the idea of open, unencumbered fundamental research. This legal regime, says Wilson, "permits us to operate with the expectation that there will be virtually no extraordinary controls or constraints." Whatever controls a researcher may be asked to accept are negotiated before the research begins and should be clearly stated in any contract between the researcher's university and the government agency involved.

Nevertheless, several export-control issues have not yet been resolved. The government task force responsible for deciding how to handle foreign access to supercomputers can't reach an agreement on the issue (SN: 3/22/86, p.185). The Export Administration Regulations, after two years, are still in draft form. Government officials may seek further revisions in the International Traffic in Arms Regulations. The debate over setting security standards for unclassified but "sensitive" data in computer data bases continues (SN: 5/16/87, p.314).

That's why the AAU is distributing the regulations and related documents in a loose-leaf, three-ring binder, says AAU's John C. Crowley. Although the situation is now less volatile, it can still change.

Trouble with EPA's radwaste rules

The federal government's program to dispose of highly radioactive nuclear waste continues to suffer setbacks. Last week, a federal appeals court ruled that the Environmental Protection Agency (EPA) must alter its standards regulating the amount of radioactivity emitted from a radioactive-waste repository (SN: 8/24/85, p.119). The ruling responds to a suit filed by four states and three environmental groups.

The court's three-judge panel agreed with the plaintiffs that EPA did not take the Safe Drinking Water Act sufficiently into consideration when setting its standards. The rules would allow drinking water near a repository to be contaminated with radioactivity at levels higher than the agency allows under the act. EPA must rewrite the rules or explain the apparent inconsistency. EPA officials have not yet decided whether to ask for a rehearing by the full court.

Meanwhile, Congress is considering more than 30 bills proposing to delay, abandon or change the repository program established under the 1982 Nuclear Waste Policy Act. The Department of Energy has also backed down on postponing its quest for a second repository site (SN: 6/7/86. p.359).