Dealing With Extreme Weather (published 2026-04-18)
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Agriculture departments at universities have been studying the effects of weather extremes on livestock and agriculture. Since 2023, the university of Tennessee has been working to develop strategies using organic vegetable growing. One method has been growing vegetables planted between rows of black locust and honey locust trees. These trees are very good at fixing nitrogen in the soil due to their link with symbiotic bacteria in their roots. This is beneficial to the vegetables that are planted in the rows between the trees. The trees provide dappled shading that reduces the excess heat without negatively affecting the vegetables. The trees also lessen evaporation, wind velocity and the impact of heavy rains.

The US Department of Agriculture and university agriculture departments, including Tennessee, Colorado State, University of Minnesota, Cornell and Pennsylvania are integrating artificial intelligence, soil science and forestry to reduce the amount of carbon expelled into the atmosphere. They have identified strategies to increase and retain carbon levels in the soil, while boosting the economic output of agriculture and forestry. This includes using winter cover crops, eliminating rototilling, and supporting diversity of plants in fields. It has been shown that rotating livestock through multiple, small pastures (paddocks) gives the areas not being grazed adequate rest periods. This rest reduces the need for synthetic fertilizer, improves soil organic matters, increases biodiversity, and strengthens root systems which then absorb and hold more carbon.

A US government supported analytic research paper published in January 2024 showed that using the climate-smart policies supported by the research at university agriculture and forestry departments can be very effective. If followed, these practices could help cut net carbon emissions from forests and farmland by 72 percent by 2035 compared to levels in 2021.

Based on the information resulting from the US Department of Agriculture and the university agriculture and forestry departments, we as homeowners, can promote carbon storage and protect those vegetables that are impacted by excessive heat. Many varieties of tomatoes and peppers will stop flowering when the temperature is approaching 90F. This can be reduced by covering the tomato plant during the time when temperatures are that high with a shade cloth with 30% to 50% density. That can reduce heat stress but still let light through for photosynthetic activity. Using compost rather than synthetic fertilizer reduces carbon expansion and supports the soil fungi and bacteria that assist the roots to absorb necessary nutrients.

Another way to protect vegetables from heat is to have a thick layer of straw, wood chips or leaves which help keep soil cool and reduces water evaporation. When not growing vegetables in your garden, plant a cover crop such as clover, fava beans or Austrian winter peas which reduces carbon loss and adds nitrogen to the soil. If you leave the roots in the soil by cutting the plants at ground level when planting desired vegetables, nitrogen from the cover crop will benefit the vegetables. Leaving the cut cover drop on the soil after cutting it in the spring will reduce water loss, and as it decays adds organic matter to the soil.

Resources

"Climate Smart Agriculture," https://bess.tennessee.edu/climate-smart-agriculture/

"Climate Smart Agriculture and Forestry," https://www.farmers.gov/conservation/climate-smart

"Climate Resilient Gardening," https://extension.umd.edu/resource/sustainable-gardening-solutions-climate-change/

"Excessive Heat and Your Garden," https://ucanr.edu/sites/default/files/2020-02/320213.pdf

"Protecting Your Garden Vegetables From Heat Stress," https://www.udel.edu/academics/colleges/canr/cooperative-extension/trending/protecting-garden-veg-from-heat-stress/

"Cover Crops for Climate Resilience," https://www.climatehubs.usda.gov/hubs/international/topic/cover-crops-climate-resilience

"Harnessing the Land Sector to Achieve U.S. Climate Goals," https://www.americaisallin.com/sites/default/files/2024-01/America%20Is%20All%20In%20Report%20-%20Harnessing%20The%20Land%20Sector%20%28Jan%202024%29.pdf

How do I ask a question?
If you have questions for the Master Gardeners, submit them to us on our website at www.netmga.net. Click the link at the top of the page, "ASK A MASTER GARDENER" to send in your question. Questions that are not answered in this column will receive a response from a Master Gardener to the contact information you provide.

The Master Gardener Program is offered by the University of Tennessee Extension. The purpose of the Master Gardener program is to train people as horticultural-educated volunteers. These volunteers work in partnership with the local Extension office in their counties to expand educational outreach, providing home gardeners with researched-based information.