

# Extension Ag Update



Providing education and research support to the agricultural industry  
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## **Controlling Weed Seeds in the Soil Seedbank**

*Adam S. Davis, Brian J. Schutte, James Iannuzzi, and Karen A. Renner*  
*Weed Science 2008 56:676–684*

Mechanical methods offer alternatives to reducing weed seedbank persistence. Research by Davis and others, reports that the destruction of weed seed as well as natural predation are viable options to reduce weed populations. Common lambsquarters, field pennycress, giant foxtail, kochia, velvetleaf, and yellow foxtail seeds were evaluated for their persistence in the soil. They examined the chemical and physical properties of seed coats for defense mechanisms. The article “Chemical and Physical Defense of Weed Seeds in Relation to Soil Seedbank Persistence” was published in [Weed Science](#).

Their research results indicated that as seed persistence increased, chemical protection decreased. Therefore, physical damage was an important control mechanism. It only took a bit of damage to the seed coat of these highly persistent weed to kill the seeds because they lacked the ability to protect themselves from fungi and bacteria infections. Researchers suggest that the use of harvest machinery be looked at again as a way to cause this damage. A method that was historically used, prior to herbicides.

Another mechanical approach supported by this study was encouraging predators, such as arthropods, which play an important role in the destruction of weed seeds. They consume or damage weed seeds by piercing the seed coats, which allows bacteria or fungi to enter the seeds.

They concluded that mechanical methods of managing weed seedbanks through harvest machinery and predators are alternatives to herbicides

## **RESEARCH RESULTS**

### **Long-term impacts of compaction**

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Farmers know that agricultural equipment can cause compaction in no-till crop fields, but Ohio State University researchers have found that, depending on soil type, compaction can be severe and persist for years. Based on 20 years of compaction

studies at various locations in Ohio, just one year of harvest traffic on clay soils can reduce corn yields by as much as 40 percent, and the impacts from compaction can persist for as long as eight years. The research, "Axle-Load Impacts on Hydraulic Properties and Corn Yield in No-Till Clay and Silt Loam," has been published in the November/December issue of Agronomy Journal.

"This is one of the few long-term compaction studies in the nation. We know that equipment causes compaction, but we wanted to know how long that compaction lasts and how severe it really is," said Rattan Lal, an Ohio State University soil scientist with the Ohio Agricultural Research and Development Center. "What we've learned is that it's better to take steps to prevent compaction rather than run into the difficulties associated with compaction and struggle to try to eliminate it."

Lal and his colleagues made a one-time distribution with a single axle 20-ton grain cart and a single axle 10-ton grain cart across fields with two types of soils: clay and silt loam, and then measured how long it took for the fields to recover from the effects of compaction. While compaction from clay soils persisted for years, silt loam soils escaped serious compaction problems. "Unlike silt loam soils, clay soils drain poorly and don't respond to the freezing and thawing process during winter, so compaction tends to persist more and its impact on crop growth and yield is much more severe," said Lal.

Lal said farmers can reduce the compaction hazard through a variety of methods:

- Practicing minimal tillage techniques, such as chisel plowing or subsoiling.
- Relying on soil critters, such as earthworms, to break up the soil through natural processes. The study found that compaction can have an impact on earthworm populations, decreasing numbers 70 percent in clay soils and 50 percent in silt loam soils.
- Growing a cover crop, such as alfalfa, that has a taproot system and can extend deep into the soil. Research Lal conducted in Africa using pigeon peas, a type of taproot plant, showed compaction was eliminated within two years.
- Leaving crop residue in the field. The residue acts as a buffer to dissipate any wheeled traffic.
- Using dual-axle instead of single-axle equipment and wider tires to distribute weight.
- Practicing controlled traffic -- a method whereby all farm equipment is the same width so that traffic is confined to specific paths year after year, and the remainder of the soil is untouched.
- Planting or harvesting crops only under ideal environmental conditions. Lal's compaction research also found that working in fields during rainy conditions increased the severity of compaction.

Lal plans to continue the long-term compaction study, compacting the soil every year and then implementing various control techniques to determine which one would work best. Compaction can have a number of impacts on the soil and the plants growing in it. Compaction destroys the soil structure and causes erosion by keeping water out. It

prevents plant roots from penetrating deep into the soil, and traps carbon dioxide while preventing oxygen from reaching plant roots. The result suffocates the plant either killing the plant or impacting yield performance.

### **Global Climate Impact on Illinois**

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Extreme weather, drought, heavy rainfall and increasing temperatures are a fact of life in many parts of the U.S. as a result of human-induced climate change, researchers report today in a new assessment. These and other changes will continue and likely increase in intensity into the future, the scientists found.

Researchers representing 13 U.S. government science agencies, major universities and research institutes produced the study, "Global Climate Change Impacts in the United States." Commissioned in 2007, it is the most comprehensive report to date on national climate change, offering the latest information on rising temperatures, heavy downpours, extreme weather, sea level changes and other results of climate change in the U.S.

The 190-page report is a product of the interagency U.S. Global Change Research Program, led by the National Oceanic and Atmospheric Administration. It is written in accessible language, intended to better inform members of the public and policymakers about the social, environmental and economic costs of climate change. It focuses on effects by region and details how the nation's transportation, agriculture, health, water and energy sectors will be affected in the future.

Don Wuebbles, the Harry E. Preble Professor of [Atmospheric Sciences](#) at the University of Illinois and a contributor to the assessment, outlined the current and predicted effects of climate change in the U.S. Midwest. "We well recognize that Earth's climate varies naturally and has been warmer and cooler in the past," Wuebbles said. "But we also know that the climate changes we are experiencing today are largely the result of human activities."

Average temperatures have risen in the Midwest in recent decades, Wuebbles said, especially in winter. The growing season has been extended by one week. Heavy downpours are now twice as frequent as they were a century ago, he said, and the Midwest has experienced two record-breaking floods in the past 15 years.

These trends are expected to continue into the future, Wuebbles said. Average annual temperatures are expected to increase by about 2 degrees Fahrenheit over the next few decades, and by as much as 7 to 10 degrees by the end of the century, he said, with more warming projected for summer than winter.

Precipitation is expected to increase in the winter and spring, while summer precipitation will likely decline. "More of the precipitation is likely to occur during heavier events," Wuebbles said. As temperatures and humidity increases, heat waves, reduced air quality and insect-borne diseases are more likely to occur. Pollen production and the growth of fungi will also be stimulated, he said. Heavy downpours can overload drainage systems and water treatment facilities, increasing the risk of waterborne diseases, he said.

The Great Lakes, which contain 20 percent of the planet's fresh surface water, will also be affected by the changing climate, Wuebbles said. Depending on the extent of climate change, average water levels in the Great Lakes could drop by as much as 2 feet in this century, he said. This would affect beaches, coastal ecosystems, fish populations, dredging requirements and shipping.

Some of the effects of the changing climate are inevitable and will require human and animal populations to adapt, Wuebbles said. Other effects can be mitigated by limiting future emissions of carbon dioxide and other greenhouse gases that contribute to climate change, he said. University of Illinois atmospheric sciences emeritus professor John Walsh and University of Illinois research associate Katharine Hayhoe, who is also a geosciences professor at Texas Tech University, were among the scientists who contributed to the report.

The full report, "Global Climate Change Impacts in the United States" is available <http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts>

## **RESOURCES TO CONSIDER**

Publications Plus –*University of Illinois Agricultural and Horticultural Publications*  
Call 1-800-345-6087 or order on the web [www.PublicationsPlus.uiuc.edu](http://www.PublicationsPlus.uiuc.edu)  
It's a one-stop shop for a current catalog of research-based information (Mastercard and VISA accepted)

### **Forest Trees of Illinois**

<https://pubsplus.uiuc.edu/C1396.html>

The book provides a comprehensive overview of almost 150 native and introduced tree species that are found in Illinois. Species are presented by common and scientific name. Descriptions include detailed information on growth form, bark, leaves, twigs, buds, flowers, fruit, wood, uses, habitat, range, and distinguishing features. Each description is illustrated with a photo of the bark, drawings of leaves, twigs, and fruit, and an Illinois range map.

### **Planting Winter Rye after Corn Silage: Managing for Forage**

[ipcm.wisc.edu/Publications/tabid/54/Default.aspx](http://ipcm.wisc.edu/Publications/tabid/54/Default.aspx)

*Jim Stute, Kevin Shelley, Dwight Mueller, and Tim Wood*

This factsheet offers guidelines for utilizing this cropping rotation.

### **Grassland: Quietness and Strength for a New American Agriculture**

[https://portal.sciencesocieties.org/Purchase/ProductDetail.aspx?Product\\_code=f0ac0629-5619-de11-958b-0013210e308e](https://portal.sciencesocieties.org/Purchase/ProductDetail.aspx?Product_code=f0ac0629-5619-de11-958b-0013210e308e)

This book was written to increase our awareness of the vital role grass and grassland plants have in ensuring a sustainable future for American agriculture. Published by the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, the book's content is geared toward agriculturists, students, the public, and policy makers. The book stresses the importance of developing sustainable agriculture in order to maintain the capacity of our planet to sustain life, and to explain that humans are capable of diminishing this capacity.

## **Emerging Market Opportunities for Small-Scale Producers.**

[www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5076556&acct=wdmgeninfo](http://www.ams.usda.gov/AMSV1.0/getfile?dDocName=STELPRDC5076556&acct=wdmgeninfo)

This overview of markets was released by the U. S. Department of Agriculture's (USDA) Agricultural Marketing Service (AMS) from the 2008 USDA Partners Meeting: Emerging Market Opportunities for Small-Scale Producers. It gives insights from industry insiders on what it takes to work successfully with produce buyers. The report describes novel ways for small farmers to establish more lucrative and stable markets by selling their crops directly to supermarkets, institutional foodservice establishments, and specialty distributors.

## **INTERNET RESOURCES**

### **Research, Education, and Economics Information System (REEIS)**

[www.reeis.usda.gov/portal/page?\\_pageid=193,1&\\_dad=portal&\\_schema=PORTAL](http://www.reeis.usda.gov/portal/page?_pageid=193,1&_dad=portal&_schema=PORTAL)

This is the source of information on the research, education and extension programs, projects and activities of the U. S. Department of Agriculture (USDA) and its partner institutions. The latest version adds additional data sources, opens data to Google Search and provides for extended data analysis. REEIS offers information ranging from agricultural and forestry research projects, to state accomplishment reports, statistics on funding, publications, institutions, faculties and students.

### **Fire and Grazing**

[www.nrem.iastate.edu/research/patchburn/index.html](http://www.nrem.iastate.edu/research/patchburn/index.html)

A new Web site in Iowa State's Department of Natural Resource Ecology and Management explores restoration of the fire-grazing interaction from which the North American prairie ecosystem evolved. Called patch-burn grazing, fire is applied to discrete portions of the landscape and grazers focus their activities on recently burned patches while avoiding unburned areas. The Leopold Center Ecology Initiative supports several projects related to this approach.

### **State Law Clearinghouse**

<http://nationalaglawcenter.org/reporter/clearinghouse/>

Within the last month, Right-To-Farm, Climate Change, and Biofuels statutory citations, bringing the total to eight statutory compilations.

### **Pricing Forages in the Field**

<https://www.extension.iastate.edu/agdm/crops/html/a1-65.html>

This site includes a method for estimating corn silage value

## **EDUCATIONAL OPPORTUNITIES**

### **University of Illinois Agriculture Events**

New programs are being confirmed every day. Keep in touch with your Extension Office for programs addressing the topics that interest you and are offered in your County. To find your county's website go to: <http://web.extension.uiuc.edu/state/findoffice.html>

### **Statewide University of Illinois Extension Calendar Website**

<http://web.extension.uiuc.edu/state/calendar.cfm>

To search for programs throughout the state, check out Extension's searchable calendar. Search by location, topic or date to find a program of your interest.

## **AG FACTS**

- “only 23 percent of Iowa farmers plan on retiring, and 30 percent say they never will”
- “for every 10 farmers that want to get into farming, only one is getting out”
- “more than 70 percent haven’t identified a successor despite the high interest in the occupation, because for many, farming is more than simply a career. It’s a lifestyle that retirement will completely disrupt”

Source: “Iowa Farmers Business and Transfer Plans” (PM 2074) by Ethan Epley, Michael Duffy and John Baker of the Beginning Farmer Center at Iowa State University, Iowa State University Extension Online Store, <https://www.extension.iastate.edu/store/> or (515) 294-5247.

## About the Ag Update Newsletter

The Ag Update Newsletter is a bi-monthly newsletter providing education and research support to the agricultural industry. Current and past issues may be found at the following website <http://www.urbanext.illinois.edu/agupdate>

Contact your county Extension office and request to be put on their agricultural mailing list to receive the local agricultural newsletter and notices about upcoming agricultural events near you. To find your counties location, phone and website go to: <http://web.extension.uiuc.edu/state/findoffice.html>

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