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These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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1. Control of mustards in wheat - Timely treatment is important

Too often producers do not notice mustard weeds in their wheat fields until the mustards start to bloom in the spring. As a result, producers often do not think about control until that time. Although it is still possible to get some control at that time with herbicides, mustards are much more difficult to control at that stage and often have already reduced wheat yields by then.

To minimize yield losses, mustards should be controlled by late winter or very early spring, before the stems begin to elongate, or bolt (Figure 1). If mustards are present in the fall, they can be controlled by a variety of active ingredients. You can look for products containing Group 2 herbicides such as chlorsulfuron (Glean, others), metsulfuron (Ally, others), triasulfuron (Amber, others), propoxycarbazone (Olympus, others) or pyroxsulam (PowerFlex, others), and premixes of thifensulfuron plus tribenuron (Affinity and others). Most ALS-inhibiting herbicides control winter annual mustards very well, although there are populations of bushy wall flower (treacle mustard) and flixweed in Kansas that are ALS-resistant and cannot be controlled by these products. Alternative herbicides will be needed to control these populations.

Group 27 herbicides like pyrasulfotole (Huskie) or bicyclopyrone (Talinor) can be used to control ALS-resistant mustards, Other options to control ALS-resistant mustards are Group 4 herbicides like 2,4-D and MCPA. Dicamba and fluroxypyr (Starane, others) are not very effective for mustard control. Quelex, a premix of halauxifen (Group 4) and florasulam (Group 2) is also labeled for mustard control.

Group 27 and Group 4 herbicides have little to no residual activity, thus will only control weeds that have emerged and are actively growing. This means that applying them with fertilizer in January or February when weeds are dormant will not provide good mustard control. application when weeds are dormant may not provide good control. In addition, Special care should be taken to ensure 2,4-D is not applied before wheat is fully tillered to avoid reducing tillering.

In the late winter or early spring, blue mustard is perhaps the most difficult of the winter annual broadleaf weeds to control because it bolts very early. To be effective on blue mustard, herbicides typically need to be applied in late February or early March. Blue mustard is more difficult to control than tansy mustard with 2,4-D because blue mustard has often already bolted by the time 2,4-D can be safely applied to wheat. Thus, 2,4-D often is applied too late to be effective on blue mustard.

Figure 1. Effect of timing of blue mustard control in wheat: K-State research, 2014. Photos by Dallas Peterson, K-State Research and Extension.

Flixweed and tansy mustard should be treated when they are no larger than two to three inches across and two to three inches tall. As these plants become larger, the control decreases dramatically. Ester formulations of 2,4-D and MCPA are more effective on tansy mustard and flixweed than amine formulations. Field pennycress is easier to control than tansy mustard or flixweed. Herbicide applications made before the pennycress bolts are usually effective.

Crop rotation with corn, grain sorghum, soybeans, cotton, or sunflowers is a good way of managing mustards as long as they are controlled in the spring prior to producing seed. Crop rotation will usually result in a gradual reduction of mustard populations in the future as the seedbank in the soil decreases.

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The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements.

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2. Check terraces now for needed repairs and maintenance

The weeks between harvest and when snow flies can be a good time to evaluate and perform maintenance on terraces. In Kansas, over 9 million acres of land is protected by more than 290,000 miles of terraces, making Kansas #2 in the U.S. for this soil and water conservation practice. To accomplish the goal of erosion control and water savings, terraces must have adequate capacity, ridge height, and channel width.

Without adequate capacity to carry water, terraces will be overtopped by runoff in a heavy storm. Overtopping causes erosion of the terrace ridge, terrace back slope, and lower terraces and may result in severe gullies. Terraces are typically designed to handle runoff from a 1-in-10-year storm. The rainfall amounts for such a storm are approximately five inches for eastern Kansas, four inches for central, and three inches for western Kansas during a 24-hour period.

Terraces need regular maintenance to function for a long life. Erosion by water, wind, and tillage wears the ridge down and deposits sediment in the channel, decreasing the effective ridge height, and channel capacity. The amount of capacity loss depends on the type and number of tillage operations, topography, soil properties, crop residue, and precipitation. Terrace maintenance restores capacity by removing sediment from the channel and rebuilding ridge height.

Typically, more frequent maintenance is required for steep slopes and/or highly erodible soils. Annual maintenance is necessary for intense tillage operations and heavy rainfall runoff. Less frequent maintenance is often adequate with high residue levels or where lower rainfall occurs and runoff intensity is low.

Check for needed repairs

Terraces degrade naturally by erosion and sediment, and can be damaged by machinery, animals, settling, and erosion. Check terraces and terrace outlets regularly (at least annually) for needed repairs. The best time to check is after rains, when erosion, sedimentation, and unevenness in elevation are easiest to spot. Specific items to note are overtopping, low or narrow terrace ridges, water ponding in the channel, terrace outlets, erosion, and sediment clogging near waterway or pipe outlets.

Reshaping the terrace

Terrace maintenance can be done with virtually any equipment that efficiently moves soil. Common tools include those that turn soil laterally, such as a moldboard plow, disk plow, one-way, terracing blade (pull-type grader), or 3-point ridging disk (terracing disk, etc.); those that convey or throw soil (belt terracer, scraper, whirlwind terracer, etc.); and those that push or drag soil (dozer blade, straight-wheeled blade, 3-point blade, etc.).

This article discusses procedures for the common plow. For other equipment, get advice from manufacturers, other users (contractor), or experiment to find what works best.

The primary objective in reshaping the terrace is to move soil from the channel to the ridge. Work done on the terrace back slope or cut slope above the channel may help maintain or improve shape but does little to add significant ridge height or channel capacity. Because of improved efficiency, a

two-way (rollover) plow is ideal for terrace maintenance. It can usually achieve the desired shape with fewer passes than the conventional plow. Turn the soil in one direction to counteract erosion or turn it in either direction to clear the channel or raise and widen the terrace ridge.

The number of passes required for maintenance depends on the size of the tool, the depth of operation, travel speed (which controls distance of throw), and the amount of soil moved. The plow throws soil further at higher speeds, so a minimum ground speed of 5 mph in loose soil is suggested, but 6 mph or more is better.

Maintenance controls terrace shape. Assess what needs to be done before beginning maintenance. Compare the existing cross-section shape with the desired shape and size, and determine where soil should be removed and where it should be placed for the desired result. Back furrows are placed where more soil is needed, while dead furrows are located where soil needs to be removed. In this way, passes or sets of passes with the equipment are located to achieve the desired results.

Terrace dimensions can be changed by carefully planned placement of back furrows and dead furrows. Large changes in dimension and shape require several sets of passes with the tools or earthmoving equipment. Plan the terrace cross-section shape and size and terrace slope segment length to fit current and future tillage, planting, and harvesting equipment size.

The number of rounds or passes with maintenance equipment depends on the beginning shape of the terrace, size of equipment, and the desired size and shape. If in doubt, make more passes rather than stop too soon. Remember, the loose soil will settle a lot.

Plowing the ridge. The terrace ridge is raised and widened by plowing up from both sides as shown in Figure 1. When a 2-way plow is used, plow just the front slope from the channel to the ridge. Plowing the backslope makes it steeper.

Figure 1. Double back furrow. Arrow indicates the back furrows meeting on the top of the ridge. Image from K-State Research and Extension.

The back furrows are placed on top of the ridge, and the dead furrows are placed at the desired center of the channel and at the toe or beyond on the backslope. Avoid making a depression on the backslope by varying where the dead furrow is placed. Plowing the ridge is recommended for maintaining or adding ridge height. To make the ridge wider and not so sharply peaked, the back furrows should come together, but not overlap and make additional rounds. Correct a narrow-

peaked ridge resulting from too few passes by moving the plow over only one or two bottom widths with each pass. This process requires many more rounds.

To make the terraces slopes long enough to fit equipment, always leave dead furrow the desired distance from the ridge. For the three-segment shape, locate the back and dead furrows in the same place each year, keeping the cross-section uniform in size and shape. Vary the back furrow and dead furrow locations each time to maintain the rounded shape of the channel and ridge for the large smooth section.

Plowing the channel. Sometimes even when the ridge is large enough, the channel can have inadequate capacity. To enlarge and widen the terrace channel, plow out to both sides as shown in Figure 2.

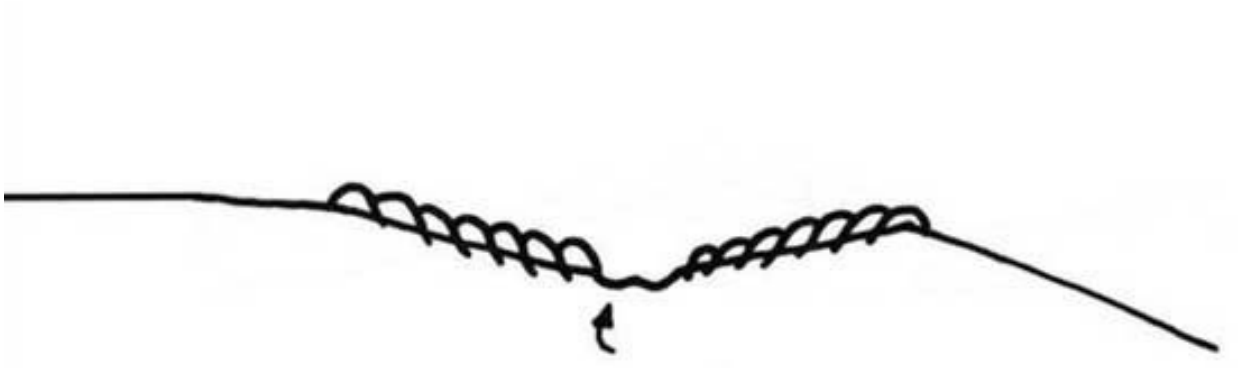

Figure 2. Enlarging and widening the terrace channel. Arrow indicates the two dead furrows meeting at the center of the channel. Image from K-State Research and Extension.

Back furrows are placed on the ridge and on the uphill cut-slope side the same distance from the desired center of the channel. Begin at a distance equal to that from ridge to desired channel center. A double side-by-side dead furrow should result at the desired channel center. Locate the plow back furrow on the ridge and the dead furrows in the desired channel bottom to achieve and maintain the desired shape. Vary the back furrow location to avoid leaving a large ridge on the cut slope.

Plowing out the channel periodically is recommended for steeper slopes to help maintain adequate channel capacity. Alternating between plowing the channel out and plowing the up from one time to the next is a good practice.

Consider conservation agriculture practices to increase terrace life

When silt bars and sediment deposits accumulate frequently in a terrace channel, excessive erosion is the cause. A change in tillage and cropping practices is needed to correct this cause. Adding cover crops to a system, switching to no-till or conservation tillage, and using crop rotations that retain crop residue will reduce erosion substantially. This will reduce the frequency of terrace maintenance needs. Many no-till producers find terrace systems require little maintenance. Although runoff still occurs, there is very little soil movement in a no-till system. Remember, terraces are there to help in extreme weather events, and terraces prevent gullies and are only a part of an overall erosion control plan. Conservation farming methods, especially retaining crop residue or using cover crops, compliments erosion control structures and has been shown to be both economically and environmentally sound.

For more information, refer to publication Terrace Maintenance, C-709 available online at:
http://www.ksre.ksu.edu/bookstore/pubs/C709.pdf

Another great resource is this KSRE YouTube video: Basics of Terrace Maintenance:
http://youtu.be/CcolTeP9QRA

Additional sources for technical information include your local USDA-Natural Resources Conservation Service and County Conservation District offices.

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3. World of Weeds - Henbit

One weed species the Extension weed science team sees frequently during fall field work is henbit, and farmers are likely noticing it as well. This World of Weeds feature will discuss this plant from the mint family.

Ecology of henbit

Henbit (*Lamium amplexicaule*) is a winter annual that emerges in fall or early spring. Emergence is greatest when soil temperatures are about 60 to 70°F.

Henbit originated in Europe and can be found throughout most of the world, except the tropics. It occurs throughout the United States, including all of Kansas, although it is more common in eastern Kansas. It grows in a variety of habitats, including lawns, gardens, rights-of-way, pastures, and fields.

Henbit is frequently observed in fallow fields (Figure 1) and in winter wheat or winter canola fields. Even though henbit generally does not reduce crop yields, it can interfere with planting operations for summer crops and can be host to soybean cyst nematodes, plant pathogens, spider mites, and ear worms. There are some reports of toxicity to sheep, horses, and cattle in Australia, but no reports have been confirmed in the US.

Figure 1. Henbit growing in a fallow field. Photo by Dallas Peterson, K-State Research and

Extension.

Identification of henbit

Round cotyledons, 0.1 to 0.5 inches long, have a notch where they attach to hairy petioles (Figure 2). Seedling stems are initially green, but become maroon as the plant ages. The first true leaves are heart-shaped and oppositely arranged with fine hairs on the upper surface and along the veins of the lower surface. First leaves are attached to the stem by petioles, but as the plant matures, leaves are sessile, meaning they are directly attached to the stem. Upper leaves have rounded teeth along the margins and encircle the stem (the genus name *amplexicaule* comes from the Latin word meaning "embracing the stem"). Upper leaves are often closer together on the stem than lower leaves. The upper surface of both young and mature leaves has prominent veins and fine hairs and appears crinkled.

Figure 2. Henbit seedlings. Photo by Sarah Lancaster, K-State Research and Extension.

One identifying feature of mints is that mature stems are square, which is the case for henbit. Mature stems are 4 to 16 inches long and have sparse hairs. Stems will form adventitious roots at lower nodes that are in contact with the soil.

Showy lavender flowers are most abundant in the spring (Figure 3). They have a distinct shape consisting of a long tube and a flared 'hood' at the end. They are produced in whorls near the top of the plant.

Four egg-shaped seeds 1. 5 to 2 mm long are produced in each fruit. Seeds are three-sided and brown with white spots. Each plant can produce over 2,000 seeds that generally remain viable for about 5 years, but can live up to 25 years in the soil.

Figure 3. Henbit flower. Photo by Sarah Lancaster, K-State Research and Extension.

Purple deadnettle is a similar species that occurs in parts of Kansas. It can be distinguished from

henbit by triangular upper leaves that are maroon in color. Purple deadnettle is not found in western Kansas and is more likely to be found in shaded areas.

Management

Henbit is easily controlled by herbicides during fall and very early spring. Residual herbicides will prevent emerge through the spring. Research conducted in Louisiana suggest that flumioxazin (Valor, others) or S-metolachlor (Dual products, others) applied in the fall can provide henbit control henbit through early spring. In wheat, henbit can be controlled by chlorsulfron (Glean, others) and metsulfuron (Ally, others) applied before henbit starts to bloom. ALS-resistant henbit was reported in Kansas in 2014, so pyrasulfotole (Huskie) may result in better control in some fields. Fall applications of 2,4-D did not provide good henbit control in studies conducted in Kansas during 2006.

Some non-chemical control options include tillage in late fall or early spring, after plants have emerged. Early fall tillage, before emergence, may increase germination. Increased plant populations can be used to suppress henbit in wheat.

References

Hill et al. 2014; Woolam et al. 2018

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements.

For more information, see 2021 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland, K-State publication SRP-1162.

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4. Save the Date for the 2022 Corn Schools

The Department of Agronomy and K-State Research and Extension, in partnership with Kansas Corn, are planning to host several Corn Schools in 2022. Please save the date for the location nearest you. Details on speakers and topics will be coming soon. Stay tuned to future eUpdates for more information!

2022 Kansas Corn Schools

- **January 7 – Oakley**
- **January 14 – Salina**
- **January 18 – Parsons**
- **February 3 – Virtual**
- **February 24 – Hiawatha**

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