1. Terrace evaluation and maintenance

Now that most of the wheat has been harvested, it’s a good time to evaluate and perform maintenance on terraces. To accomplish their purpose for erosion control and save water, 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: those that have a 10 percent chance of occurring in any one year.

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 (moldboard plow, disk plow, one-way, terracing blade or pull-type grader, 3-point ridging disk or 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.).

The primary objective 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. For other equipment, get advice from manufacturers, other users (contractor), or experiment to find what works best.

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 farther 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 earth-moving 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 two back furrows meeting on the top of the ridge.

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.

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 making changes 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. Conservation tillage and 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.

Terraces prevent gullies and are only a part of an overall erosion control plan. Conservation farming methods, especially crop residues, complements 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 at: http://www.oznet.ksu.edu/library/ageng2/c709.pdf

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

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2. Postharvest dormancy can affect germination tests on this year’s wheat seed

Some producers may be anxious this year to find out the germination percent of the wheat they harvest, to see if it will make suitable seed. If they do a home germination test too soon after harvest, they will be shocked at the low germination percent. That’s because wheat has a post-harvest dormancy requirement (some varieties more so than others). Even high quality seed will not germinate right after harvest in most cases.

There is some difference among varieties regarding how long their summer dormancy requirement is. Hard white wheats with poor sprouting tolerance, for example, have almost no summer dormancy requirement. They will germinate almost as soon as the seed is harvested. Other varieties, such as Overley, have a relatively long summer dormancy requirement, and may
not germinate well for five or six weeks after harvest unless the seed is pre-chilled. By Labor Day, all varieties will have lost their summer dormancy and should germinate unless the seed is defective in some way.

For the first several weeks after harvest, it’s important to make sure the wheat is pre-chilled before taking a germination test. Any reputable seed lab will do that on a routine basis. Here’s how to do the pre-chilling for a home germination test. (The following detailed procedure is taken, and slightly modified, from K-State Extension publication AF-82, “Seed Germination Test Methods.”)

* Place two moistened paper towels (on top of each other) on a flat surface. The towels should not have free water in them.

* Arrange fifty (50) seeds on the towels leaving approximately an inch border around the edges.

* Place two more moistened towels over the seeds.

* Make a ½ to ¾ inch fold at the bottom of the four paper towels. This will keep the seed from falling out.

* Starting on one side, loosely roll the paper towels toward the other side (like rolling up a rug) and place a rubber band around the roll(s).

Place the roll in a plastic bag. Seal, but not completely, so as to keep moisture in but still allow some air into the bag.

For newly harvested seed:
Place the bag upright in the refrigerator for 5 days and then remove and place upright at room temperature for an additional 5 to 7 days. Remove the sample from the bag and unroll the towels. Count and record the number of healthy seedlings (adequate root and shoot development).

For carryover seed, or after September 1:
Place the bag upright at room temperature for 5 to 7 days. Remove the sample from the bag and unroll the towels. Count and record the number of healthy seedlings (adequate root and shoot development).

To calculate the germination percentage: divide the number of healthy seedlings by the number of seed tested and multiply by 100.

Example: $\frac{42 \text{ healthy seedlings}}{50 \text{ seed tested}} \times 100 = 84\%$ germination

This may be repeated more times for each sample in order to obtain more accurate results, testing up to 400 seed.
If there is any question about the viability of the seed, it is well worth the $17 it costs to have the seed tested for germination by a certified seed laboratory. This is especially true in areas where there was freeze damage, severe drought, a rain delay at harvest, or scab on the wheat last year.

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3. Start early and remain vigilant in controlling volunteer wheat

Depending on the weather, there may be several flushes of volunteer wheat during the summer. In some years, it may seem like there will be little or no problem with volunteer at first. But keep watching for it all summer.

That’s because volunteer sometimes emerges more slowly than normal some years. This happened two years ago in parts of Kansas. Will there be a problem this year? One factor in delayed emergence is dry soil conditions, but that’s not the case this year in most of the state. Another factor could be high moisture content of wheat seed at the time of maturity, which could be a problem in northwest Kansas.

Research on Kentucky bluegrass has shown that the higher the moisture content of seed when it is harvested, the longer the period of postharvest dormancy. That probably applies to wheat, as well. Postharvest dormancy is that period after physiological maturity during which seed won’t germinate because of germination inhibitors within the seed. The activity of germination inhibitors gradually dissipate with time, and germination promoters become more active. This period of postharvest dormancy in wheat may last one to two months, depending on variety and environmental factors.

If there was high moisture content in the grain at maturity and for quite some time afterward, this can cause volunteer wheat seed to take longer than normal to germinate. The postharvest dormancy period is longer than usual under these conditions.

In most cases, however, volunteer may start emerging soon, if it hasn’t already. Producers sometimes question whether early flushes of volunteer need to be controlled. Volunteer which emerges soon after harvest (as occurs when heads are shattered by hail) is actually a more serious threat than later-emerging volunteer. That’s because it permits pests to move directly from maturing wheat to the new volunteer. Moisture loss is also greatest with early volunteer. Therefore, early destruction of volunteer is often beneficial. In any case, it is critical that all volunteer within a half-mile be completely dead at least two weeks prior to planting. Destroying volunteer after the new wheat emerges is too late. Give yourself enough time to have a second chance if control is incomplete.

For more information, see K-State Extension MF-1004 “Be a Good Neighbor: Control Your Volunteer” at: http://www.oznet.ksu.edu/library/crpsl2/Mf1004.pdf

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4. Correction to article on wheat stubble burning

In last week’s e-Update, No. 200, I had an article on the effects of wheat stubble burning. In that article, the values I had presented in the table for the amount of nutrients remaining in wheat stubble were slightly off. The correct values appear below.

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<th>Nutrient</th>
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These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update 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 Steve Watson, 785-532-7105 swatson@ksu.edu, or Jim Shroyer, Research and Extension Crop Production Specialist and State Extension Agronomy Leader 785-532-0397 jshroyer@ksu.edu