In Missouri, the most common weeds that emerge in the fall or winter include cheat, downy brome, annual ryegrass, wild garlic, wild onion, field pennycress, chickweed, henbit, horseweed (marestail), prickly lettuce, shepherd’s-purse and wild buckwheat. Summer annual weeds present in wheat could include common lambsquarters, common ragweed, giant ragweed, redroot/smooth pigweed, smartweed and velvetleaf (see page 15 for Weed Identification).

**CULTURAL WEED CONTROL PRACTICES**

Establishing and maintaining a competitive wheat stand is one of the best techniques for minimizing yield loss due to weed interference. A seeding rate that results in 30 to 35 wheat seedlings per square foot is ideal for achieving optimum yields and limiting weed infestations. Applying nitrogen at recommended rates and timings (see fertility management) can promote tillering of wheat and limit the presence of weeds that affect harvest efficiency.

Crop rotation can be used to reduce weed populations. Infestation levels of wild garlic, chickweed and henbit tend to be lower following corn than following soybean, because the atrazine used in corn provides late-season, soil-residual activity on these weeds. Thus, a rotation of corn/wheat/double-crop soybean would be more favorable for managing these weeds than a soybean/wheat/soybean rotation.

Managing weeds in the fall before planting wheat, either with tillage or with burndown herbicides, is beneficial for controlling winter annual weeds. The benefits of these practices are greater.
No herbicides are labeled for application when the wheat is in the early-boot to soft-dough stage. Application during this time would result in sterility, poor grain fill and reduced yield.

Postemergence herbicides are usually most effective when applied to weeds that are actively growing. Winter annual broadleaf weeds are most susceptible when in the rosette stage of growth in the fall or early spring. Winter annual weeds that have bolted and produced the flowering stalk are more herbicide tolerant than younger weeds. Only a handful of herbicides are registered for the control of broadleaf weeds in winter wheat grown in Missouri.

Phenoxy herbicides, such as 2,4-D and MCPA, control a number of annual broadleaf weeds and are the least expensive of these herbicides to use. However, proper application timing of the growth-regulating herbicides 2,4-D, MCPA and Banvel is critical to avoid crop injury and possible yield losses. These herbicides can cause substantial crop injury and yield loss in small grains if applied before tillering begins or after development of the grain heads has begun.

The exact time at which grain heads begin developing is not easy to determine, but this event always precedes stem elongation. The occurrence of stem elongation easily can be detected by the appearance of the first node or “joint” above the soil surface, which is commonly referred to as the “jointing stage.” Pinch a wheat plant stem at the base between the thumb and forefinger and slide your fingers up the stem. The presence of a node or joint will be felt as a hard bump about an inch above the soil surface. Slicing the stem lengthwise with a sharp knife will reveal a cross section of the hollow stem and solid node.
Occasionally, late-season, harvest-aid treatments are needed to burn back weed vegetation to improve harvest efficiency. These treatments should be applied no earlier than the hard-dough stage of wheat so they do not interfere with wheat grain fill.

There are three products labeled for this use: 2,4-D, Banvel/Clarity and glyphosate (Roundup/others). Keep in mind that if these treatments are needed, it is likely that the weeds are 2 feet or more in height and that the upper limit of the labeled rate will be required for effective control. Also, each product will have unique feed, forage, grazing and rotational crop restrictions. These restrictions include the following:

- If you are planning to double-crop soybean or sunflower after the wheat, do not use Banvel/Clarity, because herbicide residues remaining in the soil will not allow effective establishment of the crop.
- If you have underseeded legumes, all products will cause various degrees of injury to the underseeded legumes, with Banvel/Clarity causing the most severe injury.
- Double-crop soybean can be planted after use of 2,4-D, but the label requires a waiting period of 14-30 days before planting.

Other restrictions relate to feed, forage and grazing. Consult the manufacturer’s label or MU publication MP 575 for more information.
The weeds most commonly treated in Missouri wheat are henbit, chickweed, wild garlic and cheat/downy brome (Figures 13-16). Care should be taken to avoid repeated use of herbicides with the same mode of action for these weeds. In addition, weed management in other crops using different modes of action or cultural practices will slow or minimize the development of herbicide resistance in these weeds.

Herbicide-resistant wheat

At this time, there are no documented cases of herbicide-resistant weeds in Missouri wheat, although horseweed is suspected of resistance. Herbicide-resistant populations of the following weeds occur in adjacent states in wheat-production areas (Table 4).

Table 4. Weeds with known herbicide-resistant populations in wheat-producing adjacent states.

<table>
<thead>
<tr>
<th>Weed</th>
<th>State</th>
<th>Herbicide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial ryegrass</td>
<td>Arkansas</td>
<td>Diclofop (Hoelon)</td>
</tr>
<tr>
<td>Kochia</td>
<td>Illinois, Nebraska, Kansas</td>
<td>Thifensulfuron (Harmony, Harmony Extra)</td>
</tr>
<tr>
<td>Kochia</td>
<td>Nebraska</td>
<td>Dicamba (Banvel/Clarity)</td>
</tr>
<tr>
<td>Kochia</td>
<td>Kansas</td>
<td>Metribuzin (Sencor)</td>
</tr>
</tbody>
</table>

The weeds most commonly treated in Missouri wheat are henbit, chickweed, wild garlic and cheat/downy brome (Figures 13-16). Care should be taken to avoid repeated use of herbicides with the same mode of action for these weeds. In addition, weed management in other crops using different modes of action or cultural practices will slow or minimize the development of herbicide resistance in these weeds.

Herbicide-resistant wheat

Corn and soybean varieties with tolerance for nonselective herbicides became commercially available in the mid-1990s. In 2002, wheat varieties with tolerance for a specific imidazolinone herbicide (imazamox) became commercially available. The imidazolinone-resistant varieties are currently being developed and marketed by BASF under the trade name of ClearField. The trade name of the herbicide labeled for use in ClearField wheat is Beyond. Beyond can be applied in the fall or spring from the third-leaf stage of wheat until jointing. Beyond will control ryegrass, bromegrass and many winter annual weeds. Although seed supply is somewhat limited, more varieties will become available each year. Consult your seed dealer to find a variety suited to your growing conditions.
WEED IDENTIFICATION

Left: Downy brome. Similar to cheat, especially in seedling stage, but less pubescent as it matures. Sheath of both is closed to near the top of the collar. Annual.


Right: Wild garlic. Bulbous perennial. Emerges in early spring and dies back in late spring. Leaves are hollow, lack hair and have a strong odor. Perennial.

Left: Wild onion. Flowers similar to wild garlic except that the leaves are flattened and not hollow. Perennial.

Middle: Star-of-Bethlehem. Similar in appearance to wild onion and wild garlic, though no odor. Leaves are grooved and dark green with a prominent white midrib. Perennial.

Right: Dandelion. Leaf margins are irregular, toothed or wavy with deep lobes. Contains a milky sap. Flower is large and yellow. Perennial.

Left: Field pennycress. Leaves along stem lack hair and petioles. Lobes at base. Small white flowers (4 petals). Fruit is flat and round. Annual.

Middle: Common chickweed. Some petioles hairy; others smooth. Upper stem has no petioles. Leaves smooth, light green. White flowers (5 petals) similar to mouseear. Perennial.

Right: Mouseear chickweed. Small leaves lack petioles and are hairy. Flowers white (5 petals). Perennial.
Left: **Horseweed.** Erect, columnar appearance. Stems and leaves covered with dense hairs. Leaves lack petioles and are long and narrow. Annual.

Middle: **Prickly lettuce.** Basal rosette of bluish green leaves, fine prickles. Prominent midrib, row of spines, milky sap. Annual/biennial.

Right: **Shepherd’s-purse.** Leaves deep and irregular cut in rosette stage. Later, take an arrow shape. Small, white flowers (4 petals). Annual.

Left: **Wild buckwheat.** Leaves alternate (pointed tips and basal lobes directed backward). Flower greenish white or purple spotted. Annual.

Middle: **Wild mustard.** Leaves rough and variable. Lower leaves irregular lobed margins and petioles. Flowers yellow clusters (4 petals). Annual.

Right: **Common lambsquarters.** Young plant has small linear cotyledons. First true leaves opposite; later leaves alternate. Annual.

Left: **Common ragweed.** Cotyledons are small spatulas. First true leaves appear lobed and opposite. Later, true leaves appear highly dissected. Annual.

Middle: **Giant ragweed.** Spatula-shaped cotyledons, larger than common ragweed. First true leaves opposite but larger and 3-lobed. Annual.


Left: **Pennsylvania smartweed.** Cotyledons about 3 times as long as wide, with dark red emerging hypocotyl. First true leaves alternate. Annual.

Middle: **Velvetleaf.** One heart-shaped and round cotyledon. Both softly hairy. First true leaves alternate, hairy. Leaves heart shaped. Annual.

Right: **Henbit.** Pinkish purple. Square stem; upper leaves appear to encircle stem. Rarely over 12 inches. Annual.