1. Palmer amaranth control in grain sorghum

Palmer amaranth is one of the most aggressive summer broadleaf weeds in Kansas. It has been especially difficult to control in grain sorghum, where herbicide options are more limited than in corn or soybeans.

**Why Palmer amaranth is such a tough weed**

There are several factors that make Palmer amaranth so difficult to control.

* Many populations are resistant to either triazine or ALS-inhibitor herbicides, or both.
* It is an aggressive seed producer. Models have predicted that 1.2 billion seeds per acre could be produced from palmer amaranth growing in a peanut crop.
* It can keep emerging all summer long, even after soil-applied herbicides have lost their effectiveness.

Palmer amaranth has male and female plants. Female plants produce small black seed. Its seed do not remain viable in the soil as long as some large-seeded weeds such as morningglory and velvetleaf. Still, Palmer amaranth seed can remain viable in the soil for a period of a few years depending upon weather conditions and depth of seed burial. Other pigweed species are reported to have viable seed from 1 to 7 years. The drier the climate and deeper in the soil the seed is buried, the longer the seed remains viable.

**Control measures prior to planting sorghum**

In a wheat/sorghum/fallow rotation, producers should control Palmer amaranth with either tillage or glyphosate plus 2,4-D or dicamba after wheat harvest and before the Palmer amaranth goes to
seed. Glyphosate is still providing good control of Palmer amaranth in Kansas, although glyphosate-resistant populations have been found in Georgia and North Carolina.

Producers can also use tillage or glyphosate as a burndown treatment before planting grain sorghum. Although delaying sorghum planting will provide a longer window in the spring in which to control Palmer amaranth with tillage or a burndown treatment, this practice may not help much in the end. The most important consideration with grain sorghum is to make sure it has the best possible chance to mature before the first fall freeze. Delaying planting too long just to get the latest flush of Palmer amaranth with the burndown would be counterproductive many years.

### Preemergence herbicide options

Beyond these measures, producers can use either preemergence and/or postemergence herbicides for Palmer amaranth control in grain sorghum. The first line of attack is the acetamide/atrazine premix preemergence herbicide products such as Bicep II Magnum, Bicep Lite II Magnum, Guardsman Max, G-Max Lite, and Harness Xtra. Both active ingredients in these products can control Palmer amaranth under certain conditions. The most important factor is that these herbicides need to be activated by either precipitation or irrigation water to be effective. If the weeds emerge before the herbicides are activated, the treatment is less likely to provide adequate control, especially if the palmer amaranth is triazine resistant.

If the Palmer amaranth is triazine resistant, then these preemergence products in general will not be as effective. The acetamide part of these products has some activity on Palmer amaranth, but generally not enough to result in good control.

For triazine-resistant Palmer amaranth, producers can use Lumax instead of an acetamide/atrazine product as the preemergence treatment. Lumax is a premix that includes the active ingredient in Callisto, s-metolachlor, and atrazine. In eastern Kansas, producers should add an extra 0.5-1.0 lb/acre of atrazine to Lumax. This will not help with control of triazine-resistant Palmer amaranth, but it will help provide a little extra control of other broadleaf weeds. The Callisto and s-metolachlor components of Lumax have very good residual activity on triazine-resistant Palmer amaranth, if adequately activated by moisture.

If activated by moisture, Lumax should give good control for up to four weeks. If there is a lot of rain after application, the length of control may be reduced because herbicide breakdown increases and potential herbicide movement into the soil profile dilutes herbicide effectiveness. If it doesn’t rain for a few weeks after application and some Palmer amaranth plants emerge before the product is activated, Lumax can “reach back” after activation and control the emerged weeds, as long as they are very small.

### Postemergence herbicide options

Postemergence control options are also available in grain sorghum. The key to getting good control with a postemergence herbicide is to apply the herbicide when the weeds are small – no
more than 4 inches tall, if possible. It is much easier to control Palmer amaranth that is only 4 inches tall than plants that are 12 inches tall.

If the Palmer amaranth is not ALS-resistant, producers can get good postemergence control of small Palmer amaranth plants with either Peak or Ally/2,4-D. The addition of dicamba or 2,4-D to Peak will enhance control.

If the Palmer amaranth is ALS-resistant (and it’s safe to assume that most populations in Kansas are now ALS-resistant), producers still have postemergence options. They can use Aim, Buctril/atrazine, dicamba/atrazine, Priority (a premix of Aim and Permit), or Rage D-Tech (a premix of Aim and 2,4-D). Again, all of these products are best used on weeds that are 4 inches tall or less. See label for suggested adjuvants and cautions of crop stage and crop injury.

Both 2,4-D and dicamba can control small Palmer amaranth, but have little residual activity. Again there is risk of injuring sorghum plants especially when applied on sorghum NOT at the recommended growth stage. Dicamba should be applied to sorghum less than 8 inches tall (15 inches if drop nozzles are used). 2,4-D can be applied to sorghum that is 5-10 inches tall. In general, 2,4-D has is a little more likely than dicamba to cause more crop injury to grain sorghum. Our observations suggest that when Palmer amaranth plants are small, 2,4-D may be a little more effective than dicamba. When the Palmer amaranth gets 4 inches tall or larger, dicamba may have a little better activity.

Aim, Priority, and Rage D-Tech also do a very good job of controlling small Palmer amaranth plants as postemergence applications. All of these products have caused some temporary crop injury to grain sorghum (leaf burn), but the crop has recovered in tests so far and yields have not been affected. The crop injury has caused a delay in heading by a few days, which can be significant some years.

Once Palmer amaranth gets 5-6 inches tall or more, the plants become increasingly difficult to control with postemergence herbicides.

K-State has recently developed technology for developing ALS-resistant grain sorghum hybrids. These new herbicide-resistant hybrids should be useful for controlling grassy weeds, but will not help in controlling ALS-resistant Palmer amaranth in grain sorghum.

**Other management practices**

Other management practices producers can use to help control Palmer amaranth in grain sorghum include crop rotation and narrow row spacing. If Roundup-Ready corn or soybeans are planted ahead of grain sorghum, soil applied herbicides and postemergence herbicides including glyphosate can be used during the growing season to control Palmer amaranth.

If sunflowers are grown before grain sorghum, producers can use Spartan to control Palmer amaranth. No postemergence products are available to control ALS-resistant palmer amaranth in sunflowers. Express in ExpressSun sunflower and Beyond in Clearfield sunflower can control ALS-susceptible palmer amaranth.
Using narrow-row, or solid-seeded grain sorghum can provide earlier canopy and help shade out young Palmer amaranth seedlings. This practice can help control Palmer amaranth as long as the producer also has a good preemergence control program in place.

-- Curtis Thompson, Weed Management Specialist  
cthompso@ksu.edu

2. Fall/winter fertilization of smooth bromegrass pastures and hay meadows

Fertilizing smooth bromegrass in late November or December, as long as the ground is not frozen or saturated, is ideal for smooth bromegrass fields. Late fall fertilizer applications will generally lead to earlier spring green-up and greater forage production than spring fertilizer applications.

Nitrogen (N) is the most limiting nutrient for profitable smooth bromegrass production. Traditional recommendations for hay production have been to apply 40 pounds of N per ton of expected hay yield, or about 80-160 lbs N per acre to unfrozen ground, according to the field’s productive capability. Where producers are relying on high-quality hay as their primary protein source, they may want to push N rates a little higher, or be prepared to add supplemental protein to rations.

On bromegrass pastures, the recommendations have been reduced to 60-90 lbs N per acre simply because grazing is less efficient than haying in utilizing forage.

With N fertilizer costs continuing to increase and hay prices remaining fairly constant, many farmers are questioning how much, if any, N fertilizer should be applied to bromegrass this winter or next spring. To answer this question, we can look at the results of more than 100 experiments conducted in Kansas since 1975 on the response of bromegrass to spring-applied N fertilizer-- as reported in the February 29, 2008 e-Update (No. 128). A quick phone survey of northeast Kansas dealers showed the current price of urea is volatile, but ranging between $0.75 to $0.80 per pound of actual N.

The table below summarizes the response curve obtained from the data, and the hay yield increase for each 20-pound increment of N. Using $60 per ton as the value of the hay produced and $0.80 per pound for the N, the following cost-return table was generated:
<table>
<thead>
<tr>
<th>N Rate (lbs N/acre)</th>
<th>Hay yield (tons /acre)</th>
<th>Hay yield increase from each additional 20 pounds/acre N (tons /acre)</th>
<th>Return to each additional 20 pounds/acre of N (tons dry matter/acre)</th>
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</thead>
<tbody>
<tr>
<td>0</td>
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<td>-------</td>
<td>-------</td>
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<td>20</td>
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<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>160</td>
<td>3.14</td>
<td>-0.01</td>
<td>-$16.60</td>
</tr>
</tbody>
</table>

From these calculations, the appropriate N rate this fall to maximize returns looks to be between 60 and 70 pounds of N per acre -- not the 120 pounds of N normally recommended for 3-ton hay production. One issue these calculations don't consider, however, is hay quality. Protein levels will drop at the lower N fertilizer rates. So as mentioned earlier, where producers are relying on high-quality hay as their primary protein source, they may want to push N rates a little higher, or be prepared to add supplemental protein to rations.

Use soil test results to determine whether P2O5 or K2O is needed. Smooth bromegrass will respond to P2O5 in combination with N when soil test P levels are below 15-20 parts per million.

-- Dave Mengel, Soil Fertility Specialist
dmengel@ksu.edu

3. Fall and winter fertilization of tall fescue pasture

December through February is a good time to apply fertilizer to tall fescue pastures in Kansas if the ground is not saturated. The goal is to apply the fertilizer:

* Late enough in the year that it will not stimulate plant growth in late fall or early winter, when it won’t be utilized efficiently; and

* Early enough to make sure the nutrients have time to move down into the root zone before plant growth resumes early next spring.

Producers should apply about 60 to 70 lbs of nitrogen (N) per acre to tall fescue pastures that will be hayed. If the pasture will be grazed in a conventional system, cut the N rate back to about 50 to 60 lbs per acre. That’s because conventional, full-season grazing practices typically have low
efficiency – using only about 35 percent of the forage produced. If a more efficient grazing system is utilized, such as cell grazing or paddock grazing, then 60 to 70 lb/a N is recommended.

During cool or cold weather, the source of N used on tall fescue pasture is not important. In general, liquid N is not quite as efficient as dry N when broadcast onto permanent pasture because liquid N tends to get tied up a little more with the plant growth and residue on the surface. If liquid N is used on tall fescue pasture, it’s generally going to be somewhat more effective if it is dribbled on in a band. This reduces the potential for tie-up and immobilization. However, a broadcast application is useful where producers want to add a herbicide to the UAN for weed control.

P and K fertilizer rates should be based on soil tests.

-- Dave Mengel, Soil Fertility Specialist
dmengel@ksu.edu

4. Insect problems on wheat and alfalfa this fall

(Note: These articles are adapted from the Department of Entomology’s October 3, 2008 “Kansas Insect Newsletter.”)

Flea beetles in wheat

Flea beetles have been found on some wheat fields in Kansas this fall. Flea beetles are small iridescent beetles with thread-like antennae and well developed hind legs that enable them to jump from plants like fleas when approached. Adult feeding causes a characteristic 'shot-holing' of plant leaves, or whitish streaking in the case of wheat. Although established plants can recover easily from this type of damage, seedling plants are more at risk. Feeding damage may also interact with other stress factors, such as drought and cold temperatures. The cumulative effect can cause plant death.

Flea beetles may occur when wheat fields are adjacent to sorghum fields, particularly forage sorghum that is harvested earlier than grain sorghum. Since sorghum is a perennial, it can re-sprout and produce fresh growth that attracts flea beetles at a time of year when not much palatable vegetation is present. Later on, when wheat emerges in a neighboring field, it is more attractive than the sorghum and the result is an influx of beetles along the field borders.

An infestation of 3 to 5 beetles per row foot can be sufficient to kill plants, but often a strip treatment of an appropriate insecticide along border rows can be enough to avert damage, provided the problem is recognized early. Baythroid XL, Cobalt, Mustang MAX, Proaxis, and Warrior are all products registered for control of flea beetles on seedling wheat. See the K-State Wheat Insect Management Guide for more detail and always follow label instructions. Mention of brand names does not imply any endorsement of particular products.

http://www.oznet.ksu.edu/library/ENTML2/MF745.PDF

-- J.P. Michaud, Entomologist, Agricultural Research Center-Hays
jpmi@ksu.edu
Worms in wheat and alfalfa

I have received multiple calls this week concerning worms in wheat and alfalfa. Most the callers have indicated that they are finding fall armyworm larvae. However, one sample that I received contained both fall armyworm larvae and beet armyworm larvae. In some cases problems are related to volunteer wheat and other plants growing in the field prior to planting. The larvae are moving from these plants onto the emerging wheat seedlings. In other cases the larvae are coming from eggs laid directly on emerging wheat plants or on the alfalfa plants.

There are several things to think about with these situations.

* First make sure and check wheat fields regularly after planting. Watch for early signs of feeding. Small worms cause windowpane feeding where they scrape leaf material from the leaf. Alfalfa fields should also be watched carefully this time of year, especially recently planted fields as seeding plants are very susceptible to feeding injury.
* Second, proper identification can be important. Beet armyworms are often more difficult to control than fall armyworms.
* Third, if you have not planted your wheat yet, you may want to make sure that there are not worms present on volunteer wheat or other weeds prior to planting. If worms are present you may want to make sure there is a break of time between when you kill the weeds and the time you plant wheat into these areas to allow the worms to die before the planted wheat will emerge.

Most of these worm problems will disappear once there is a killing frost, so delayed planting will reduce the chance of significant injury. If problems are along field edges then sometimes replanting later in the season is an option.

For more information see the following K-State publications:

Fall Armyworm/Wheat
http://www.entomology.ksu.edu/DesktopDefault.aspx?tabindex=201&tabid=495

Fall Armyworm/Alfalfa

Beet Armyworm/Alfalfa

-- Phil Sloderbeck, Entomologist, Southwest Research-Extension Center
psloderb@ksu.edu

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