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1. **Yellow soybeans: Causes and solutions**

There have been several fields of soybeans this year that have shown various degrees of yellowing and stunting. In many cases, these fields are either on fields that have never been in soybeans before or are just coming out of CRP. The soybeans were inoculated, but either there was not enough inoculation to supply the soybeans with sufficient nitrogen or the inoculation didn’t take. Soybeans are big users of nitrogen (N), removing about 3-4 lbs of N per bushel of seed.

The photos below were taken during the period of July 27-30.

The pattern of nitrogen deficiency in this field in Barton County is somewhat patchy. The N-deficient plants are stunted, and the leaves are pale. Photos by Jim Shroyer, K-State Research and Extension.
No nodules are found on the stunted plants showing N deficiency symptoms from the field in the photo above.

Soybeans in the higher, more eroded areas of this field in Dickinson County also are extremely nitrogen deficient as of late July and have poor nodulation. In the lower areas of the field, where the soil is a little better, the beans have good growth.

If soybean plants are chlorotic and N deficient despite being inoculated, that probably indicates the inoculant has failed. There may be several causes of poor nodulation and inoculation failure that can reduce yields:
* Poor quality inoculant. The quality of commercial inoculant varies. It’s best to use a well-known brand, and one that producers have used before.

* Poor storage and handling. If the inoculant was subjected to heat or drying in storage, it may have lost some effectiveness. If a frozen inoculant was thawed too long before application (see product label), it may lose bacterial numbers.

* Fungicide seed treatments harmed the inoculant. Insecticide seed treatments tend to be the most toxic of all seed treatments to inoculants. Fungicide seed treatments can also cause problems, primarily due to the formulation or carriers used, which may inhibit bacterial growth and colonization. Using fungicides in combination with inoculants can be successful if some precautions are taken. Producers should treat the seed first and allow the seed treatment material to dry before applying the inoculant. Producers should also plant the seed as soon as possible after the inoculant is applied in order to minimize the time the inoculants are in contact with the seed treatment fungicides. Some seed treatment fungicides have specific label directions with regard to using them in conjunction with an inoculant.

* Poor seed coverage with inoculant. Liquid inoculants, or “high-stick” powder inoculants, have the best adhesion to seed. Proper application methods are critical.

For soybeans that have poor nodulation and are showing nitrogen deficiency symptoms this late in the season, the question is what, if anything, producers should do about it. Will it pay to apply N fertilizer to these fields?

There is some K-State research on late-season applications of N to soybeans, conducted on fields in Johnson, Shawnee, Reno, and Stafford counties over a 2-year period in the 1990’s by Ray Lamond, former K-State soil fertility specialist, and colleagues. These were all irrigated fields, however, with high yield potential, and were not showing N deficiency at the time of application. Lamond applied 20 and 40 pounds of N per acre to the beans at the R3 stage, using UAN, ammonium nitrate, urea, and urea + NBPT. The N increased yields at most locations. The yield increases ranged from about 6 to 10 bushels per acre – or about 5 to 10 percent. The high rate (40 lbs N/acre) of UAN caused severe leaf burn. Lamond concluded that late-season supplemental N at a rate of 20 lbs/acre should be applied to irrigation soybeans with high yield potential at the R3 growth stage.

But what about dryland soybeans that are N deficient and have lower yield potential? Nitrogen applied to N-deficient soybeans at the pod development or early pod fill stages of growth can increase yields, but there are risks:

* Leaf burn. It would be much safer to apply urea than UAN solution.
* Volatilization. Urea applied to the soil surface under warm, damp, windy conditions may volatilize if it is not worked into the soil by rainfall. This risk can be minimized by having the urea treated with Agrotain.
* Dry weather after application. If it doesn’t rain after the N application, the N may not get down into the soil in time to benefit the plants.
* Plant damage during the application process. At this time of year, making a fertilizer application with ground equipment could damage some of the plants. Whether the benefits would outweigh the amount of plant damage is a judgment call.
If producers are willing to take those risks to get a possible yield increase, what rate of N should be used? The best advice would be to apply 20-40 lbs N per acre as urea, treated with Agrotain, to N-deficient dryland soybeans as soon as possible. If drop nozzles are used, then UAN would be preferable to urea. Fertilizer can be applied as late as early pod fill and still be effective, provided rainfall or irrigation occurs soon after application.

There is no guarantee this would help yields enough to pay off, but beans that are chlorotic and stunted due to N deficiency will almost surely have very low yields.

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2. Control weeds in wheat stubble before they set seed

Because of July rainfall, many wheat fields in Kansas have rather large broadleaf and grassy weeds actively growing at this time. These weeds are utilizing moisture and nutrients that would be available for a subsequent crop. Also, it is a good idea to control these weeds before they set seed. Kochia and Russian thistle are daylength sensitive and usually begin flowering in late July and early August, and set seed shortly after that. Controlling kochia and Russian thistle now is very important to prevent seed production.

Weeds growing now in wheat stubble fields, without crop competition, set ample seed -- which will be likely to cause a problem in following crops. It is especially important to prevent this from happening on fields that will be planted to crops with limited options for weed control, such as grain sorghum, sunflower, or annual forages. Controlling broadleaf and grassy weeds that emerge throughout the season in grain sorghum or sunflower may be difficult.

If the field will be planted to Roundup Ready corn or soybeans, weed and grass seed that form now and emerge next season may be controlled with glyphosate. However, if the weeds are controlled now in the wheat stubble before they set seed, producers can use tank mixtures with glyphosate to ensure adequate control.

Producers should control weeds in wheat stubble fields by applying the full labeled rate of glyphosate with the proper rate of ammonium sulfate additive. It is also a good idea to tank mix the glyphosate with 2,4-D or dicamba (unless there is cotton in the area). Do not apply growth regulator herbicides around cotton. Tank mixes of glyphosate and either 2,4-D or dicamba will help control weeds that are difficult to control with glyphosate alone, and will help reduce chances that glyphosate-tolerant weed populations will develop.

Several have asked about the addition of atrazine for residual weed control in fallow. Although atrazine provides residual control of weeds, it is best applied later in the fall. At this time of year, atrazine residual is quite short and will not provide adequate control of fall emerged weeds/winter annuals. An application of atrazine needs to be made in the fall (late September into November), depending on the weeds being targeted. Also, keep in mind that atrazine
antagonizes glyphosate. Do not apply atrazine with reduced rates of glyphosate. Atrazine can be synergistic with Gramoxone; however, the spectrum of weeds controlled with this combination will be less than with glyphosate. An application of atrazine may limit subsequent crop selection.

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3. Maximizing production and quality of hay from summer annual forages

Many summer annual forages typically grown in Kansas may be cut multiple times. (The one exception to this rule is forage sorghums which are excellent as silage or green chop but very poor for haying or grazing.) With reasonable care, the other common summer annual forages -- sudangrass, hybrid pearl millets, and even sorghum-sudangrass hybrids -- can produce two and even three cuttings with excellent feed value.

Sudangrass and hybrid pearl millet are well suited for haying and grazing, and while they may also be ensiled or green chopped, these are less-efficient options. In order to maximize quality, hay should be cut before heads emerge. If these crops are allowed to grow until head emergence before cutting, they will produce more tonnage but feed quality will be substantially reduced.

Sorghum-sudangrass hybrids may be successfully used for hay, but they have thicker stems than sudangrass and pearl millet. As a result, it is very important to crush or crimp the stems of sorghum-sudangrass hybrids to allow for rapid drying. Sudangrass and hybrid pearl millet produce superior quality hay compared to sorghum-sudangrass hybrids as they have smaller stem diameters and their composition is typically 50% or less stem.

When planning on multiple cuttings, raise the cutter bar high enough to allow for rapid regrowth, typically six inches for sudangrass and sorghum-sudangrass hybrids and eight inches for pearl millet. To further stimulate growth and hay forage quality (protein), apply 30 pounds of nitrogen per acre after harvest. If yields are especially high, it may be advisable to apply up to 50 pounds per acre.

Finally, after baling, to insure hay quality is maintained, move bales to proper storage as soon as possible.

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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