



K-STATE
Research and Extension

Extension Agronomy

eUpdate

02/26/2016

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, Jim Shroyer, Crop Production Specialist 785-532-0397 jshroyer@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Preemergence herbicide programs for corn

There are several preplant and preemergence residual herbicides available for corn. These herbicide programs are key to managing glyphosate-resistant and other difficult-to-control weeds.

It is important to use multiple modes of action when selecting herbicides. To assist growers, we have included in this article a reference number in parentheses to the herbicide's mode of action. For example, the reference number herbicide mode of action for glyphosate is No. 9, and will be referred to in this article as "glyphosate (9)." There is a key to all herbicide modes of action at the end of this article. When there are two or more numbers in parentheses, it means the active ingredients in a product have different modes of action. Also, if a herbicide is mentioned more than once in a paragraph, we include the reference number only after the first mention of the product in that paragraph.

Also, it is important to change herbicide programs from time to time so that you do not get hooked on any single herbicide program year after year. Thus, it's important to know the strengths and weaknesses of each product in terms of the spectrum of weeds controlled. A table summarizing weed species response to various corn herbicides can be found on pages 24-26 of *2016 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland* (SRP 1126). See: <http://www.ksre.ksu.edu/bookstore/pubs/chemweedguide.pdf>

For burndown applications in a no-till system on emerged grass and broadleaf weeds, an application of glyphosate (9) and a product containing dicamba (4) or 2,4-D (4) may be critical. The choice between 2,4-D and dicamba will depend on weed species present. Dicamba products will be more effective on kochia and marestail. 2,4-D is more effective on winter annual mustards. The use of preemergence herbicides, applied just before or following planting, often provides control of weeds for several weeks. This can greatly improve the effectiveness of a postemergence herbicide application, and gives the producer more leeway on post application timing.

Categories of soil-applied residual herbicides for corn

Soil-applied residual herbicides for corn can be grouped into several basic categories.

Acetamides (15) and acetamide (15) /atrazine (5) premixes. The main acetamide (15) products used in corn include acetochlor, S-metolachlor, metolachlor, dimethamid-P, pyroxasulfone, and many premix products containing one of these active ingredients. In general, these products are very effective in controlling annual grasses (except shattercane and Johnsongrass) and small-seeded broadleaf weeds such as pigweeds. They are much less effective in controlling small-seeded kochia or large-seeded broadleaf weeds such as cocklebur, devilsclaw, morningglory, sunflower, and velvetleaf. An exception are those products containing pyroxasulfone – Zidua (15), Anthem (15, 14), and Anthem ATZ (15, 14, 5). These products have activity on kochia and the large-seeded velvetleaf. There have been no cases of weed populations in Kansas developing resistance to the acetamides to date.

The acetamide products are most effective when applied with atrazine. Several atrazine (5) /acetamide (15) premixes are available and should be used instead of acetamides alone unless atrazine is not allowed. These premixes generally fit into two groups: products with a reduced atrazine rate (1 lb or less / acre) and products with a full atrazine rate (1 to 2 lb/acre). Soil type, soil pH, and organic matter will determine whether the reduced- or full-rate atrazine product is used. In past years, often because of cost, reduced rates of these products were applied to help manage heavy

summer annual grass pressure, then followed up with a good postemergence herbicide program. With the increased occurrence of glyphosate- and other herbicide-resistant weeds, it is essential to use the full rates of these products in conjunction with a POST program.

HPPD-inhibitors (27). Examples of HPPD-inhibitors are isoxaflutole (e.g. Balance Flexx (27), Corvus (27, 2), and Prequel (27, 2)) and mesotrione (e.g. Callisto (27), Callisto Xtra (27, 5), Acuron (27, 15, 5), Lexar EZ (27, 15, 5), Lumax EZ (27, 15, 5), Acuron Flexi (27, 15), Zemax (27, 15). These products either contain atrazine or should be applied with atrazine, and are excellent on kochia, pigweeds, velvetleaf, and many other broadleaf weeds.

Acuron (27, 15, 5), Lexar EZ (27, 15, 5), Lumax EZ (27, 15, 5), and Corvus (17, 2)+atrazine (5) will provide the best control of grass weeds. Corvus will also control shattercane. Balance Flexx has activity on shattercane but is less consistent than Corvus. Prequel has a low rate of Balance mixed with Resolve and will not provide the same level of residual weed control as Acuron, Lexar EZ, Lumax EZ, Balance Flexx, or Corvus used at full rates. Keep in mind, products containing Balance should not be applied to coarse-textured soils when the water table is less than 25 feet below the soil surface. Balance Flexx does not provide adequate control of sunflower. Corvus will be much better than Balance Flexx on sunflower, provided the sunflower is not ALS-resistant. Herbicides containing clopyralid (4) such as Hornet (4, 2), Resicore (15, 4, 27), TripleFlex II (15, 4, 2), or Surestart II (15, 4, 2) will provide very good control of sunflower.

A new herbicide from Syngenta called Acuron contains Lumax EZ (27, 15, 5) + bicyclopyrone (27). Bicyclopyrone is an HPPD-inhibitor herbicide that enhances large-seeded broadleaf weed control and also has grass activity. Acuron (27, 15, 5) has enhanced control of giant ragweed, common ragweed, common cocklebur, and velvetleaf, along with improved morningglory control over Lumax EZ. An herbicide just registered in 2016 is called Acuron Flexi (27, 15) which is basically Acuron without atrazine. Acuron Flexi (27, 15) and Zemax (27, 15) which is basically Lumax without atrazine (5) were developed for areas where atrazine generally isn't used or is prohibited. Without the atrazine (5), less broadleaf weed control is expected.

Triazine (5). Atrazine (5) is a common component of many preplant and preemergence herbicide premixes for corn. Where weed pressure is light, a March application of atrazine with crop-oil concentrate and 2,4-D (4) or dicamba (4) can control winter annual weeds such as mustards and marestail and provide control of most germinating weeds up to planting. If kochia is the key target, 0.5 to 1.0 lb/acre atrazine (5) with a pint of dicamba (4) applied in late February to early March can provide excellent control of germinating kochia. It is essential to add glyphosate (9) to the mix if winter annual grasses are present. In a premix with other herbicides, atrazine adds burndown control of newly emerged grasses and broadleaf weeds present near planting time, as well as some residual control of small-seeded broadleaf weeds such as pigweeds and kochia (except for triazine-resistant populations). Unless your situation prohibits atrazine use, always apply atrazine (5) with HPPD-inhibitor (27) and acetamide (15) herbicides.

PPO-inhibitors (14). Examples of PPO-inhibitors include flumioxazin (e.g. Valor (14), Fierce (14, 15), and saflufenacil (Sharpen (14), Verdict (14, 15). Valor or Fierce must be applied 7 to 30 days before corn planting in a no-till system. These herbicides provide excellent control of pigweeds; however, they are marginal on kochia. Fierce will provide improved control of velvetleaf compared to that from Valor. The addition of atrazine (5) will enhance kochia, pigweed, velvetleaf, and morningglory control, provided the populations are not triazine-resistant. Sharpen and Verdict have excellent activity on pigweeds, kochia, and large-seeded broadleaf weeds. However, the length of residual

activity can be shorter than other preemergence products when all are compared at full rates. This will depend on the rates of Sharpen and Verdict used. Approximately 7 to 10 days of residual can be expected per 1 oz of Sharpen and 5 oz of Verdict.

ALS-inhibitors (2). Examples of ALS-inhibitors for use as a soil-applied herbicide for corn include flumetsulam, Python (2); and Hornet (2, 4), a premix of flumetsulam (2) and clopyralid (4). Both herbicides have broadleaf activity only. These products are strong on large-seeded broadleaf weeds such as cocklebur, sunflower, and velvetleaf, or the small-seeded common lambsquarters. Adding Hornet to a full rate of an acetamide (15) /atrazine (5) mix as a premerge treatment will control the annual grasses and add considerably to large-seeded broadleaf weed control. These three-way premixes, acetochlor (15)+chlopyralid (4)+flumetsulam (2), include SureStart II (15, 4, 2) and TripleFlex II (15, 4, 2). Sunflower appears to be most sensitive to Hornet (2, 4), followed closely by cocklebur and velvetleaf. Morningglory is less sensitive. Resicore (15, 4, 27) is a new herbicide from Dow and is a premix of acetochlor (15)+chlopyralid (4)+ mesotrione (27). This product contains 3 modes of action as did SureStart II and TripleFlex II, only the ALS-inhibitor (2) has been replaced with an HPPD-inhibitor (27).

An additional ALS-inhibiting (2) herbicide from DuPont is called Resolve (rimsulfuron, 2). Rimsulfuron (2) is also a component in Prequel (2, 27), Instigate (2, 27), Basis (2), and Basis Blend (2), which was previously mentioned. Additional products containing rimsulfuron include Harrow (2) and Crusher (2). Resolve will provide short residual control of grass and broadleaf weeds and should be used as a setup herbicide with a good postemergence weed control program. If ALS-resistant broadleaf weeds are present, these ALS-containing herbicides often will be less effective.

Key to herbicide mode of action reference numbers

The Weed Science Society of America has developed a numbered classification system based on the herbicide site of action to assist farmers and applicators in selecting herbicides with different sites of action. Most herbicide labels now prominently display the herbicide classification number at the beginning of the label. Herbicide premixes that contain multiple active ingredients with different sites of action will have all sites of action numbers listed. The following list – from K-State’s [2016 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland](#), SRP 1126 -- presents herbicides by mode of action, chemical family, and the WSSA herbicide site of action number (in parentheses).

Amino Acid Inhibitors

ALS-AHAS inhibitors (2):

Imidazolinone family - Arsenal, Plateau, Pursuit, Raptor, Scepter, Contain, Beyond

Sulfonylurea family - Accent, Affinity, Ally, Amber, Basis, Beacon, Cimarron, Classic, Crusher, Escort, Express, Finesse, Glean, Harmony SG, Harmony Extra, Harrow, Maverick, Oust, Peak, Permit, Spirit, Steadfast, Synchrony, Telar

Triazolopyrimidine family - Python, FirstRate, PowerFlex

Sulfonylaminocarbonyl-triazolinone family - Olympus, Osprey, thiencazone

EPSP inhibitors (9):

Amino acid derivative family - glyphosate, Roundup, Touchdown, and others

Auxins-synthetic (4)

Benzoic acid family - Dicamba, Banvel, Clarity, DiFlexx, Status, Vision, and others

Phenoxy family - 2,4-D, 2,4-DB, MCPA, MCPP, 2,4-DP

Carboxylic acid family - Tordon, Stinger, Remedy, Garlon, Starane, Milestone, Trycera

Quinoline carboxylic acid - Facet L, Paramount, Quinstar GT, Quinstar 4L

Auxin Transport Inhibitor (19)

Semicarbazone family - diflufenzopyr

Cell Membrane Disrupters

Bipyridilium family (22) - Gramoxone, Diquat

Diphenylether family (14) - Ultra Blazer, Cobra, Phoenix, Reflex, Flexstar, ET, Vida, Dawn, Rhythm

N-Phenylphthalimide family (14) - Encompass, Resource, Valor

Aryl-Triazinone family (14) - Cadet, Spartan, Aim

Pyrimidinedione family (14) - Sharpen, Kixor

Lipid Synthesis Inhibitors (1)

Aryloxyphenoxypropionate family - Fusilade DX, Assure II, Fusion, Targa

Cyclohexanedione family - Poast, Poast Plus, Select, Volunteer, Section, Arrow, Tapout

Phenylpyrazolin family - Axial

Nitrogen Metabolism Inhibitors (10)

Organophosphorus family - Liberty

Photosynthetic Inhibitors

Triazine family (5) - atrazine, metribuzin, Princep, Evik, Pramitol

Phenylurea family (7) - Lorox, Karmex, Spike

Uracil family (5) - Sinbar, Hyvar

Nitrile family (6) - Buctril, Moxy, Bromox, Brox

Benzothiadiazole family (6) - Basagran

Pigment Inhibitors

Isoxazolidinone family (13) - Command

Isoxazole family (27) - Balance, Huskie

Triketone family (27) - Callisto, Impact, Laudis

Seedling Growth Inhibitors

Thiocarbamate family (8) - Eradicane, Eptam

Acetamide family (15) - Dual II Magnum, Define, Outlook, Propel, Surpass, Harness, Degree, Topnotch, Warrant

Pyrazole family (15) - Zidua, Anthem

Dinitroaniline family (3) - Treflan, Trust, Prowl, Acumen, Sonalan, Balan

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2. Spring oats for forage production or as early spring cover crop

Spring oats have become popular as a fall or winter cover crop in Kansas. But they have other uses as well. When planted in late February or early March, cattle producers have found spring oats to provide excellent spring pasture and hay. They can also be planted about this time of year as a cover crop ahead of soybeans, sorghum, or a summer annual forage. In this situation, spring oats could be used either strictly as a cover crop, or as a combination cover crop/forage crop by grazing to capture some immediate economic benefit.



Figure 1. Sorghum growing in the residue from a small grain/winter pea cover crop. This illustrates the type of ground cover that can be generated with an ungrazed small grain cover crop. Photo by Kraig Roozeboom, K-State Research and Extension.

In either case, the key is planting as early as possible – any time now provided the soil isn't too wet. If planning to leave oat residue in place for no-till planting of the next crop, be sure to terminate the oats before heading -- definitely before seed set. The more mature the oat crop is at termination, the longer-lasting the residue will be. Immature, vegetative oat residue will break down very rapidly. If planting a grass crop such as sorghum or a summer annual grass forage, consider banding nitrogen fertilizer or applying dry fertilizer. Broadcast applications of liquid fertilizer will likely be tied up in the oat residue, especially if it consists of a thick layer of relatively mature oat plants.

One caution: If you intend to follow the oats with a no-till summer crop, be aware that animal traffic

might cause problems for the no-till seedbed, especially if the oats are grazed when the soil is wet.

If used as an early spring cover crop with some grazing, spring oats can provide some extra income. If used as a pure forage crop with reasonable fertilizer inputs, spring oats can provide an excellent bridge for producers short on available pasture in April and May until perennial pasture or summer annual forage production becomes available.

Oat pasture should be treated the same as winter wheat pasture in terms of stocking rates and time to initiate grazing. Spring-planted oats can produce 1,500 to 2,000 lbs dry forage per acre if fertilized with about 75 lbs N /acre. Oat pasture should be treated the same as winter wheat pasture in terms of stocking rates and time to initiate grazing. Grazing should not be initiated before a well-established rooting system that provides good anchorage of young plants to the soil, which generally occurs when plants are 6 inches tall or more. One acre of spring-planted oats can provide about 60 days of grazing to a 750 lbs animal at a 1.5 animal/acre stocking rate.

Since grain production of oats is not practical or recommended under grazing, producers should treat oat pasture as a graze-out program or remove it when ready for the next crop. Oats are easily controlled by a variety of herbicides, such as glyphosate and atrazine. The length of effective grazing is a function of stocking rate, weather, and subsequent cropping plans. Rotational grazing may extend the window for effective pasture production. Oat pasture is also being used successfully in sheep production.

Properly stored, oat hay also provides a high-quality feed source. Studies at the South Central Experiment Field near Hutchinson indicate hay yields on a dry weight basis of three to five tons per acre are typical under average weather conditions. The average yield across 20 varieties at the Experiment Field was four tons per acre. Hay yield was determined at late milk/early dough stage, with an average moisture content of 60%.

These hay yields were obtained with 75 lbs/acre of nitrogen (N) applied preplant and an additional 50 lbs/acre N broadcast approximately six weeks after emergence. Lower total N rates will result in adequate forage production, especially hay. However, to maximize grazing opportunities, it is important to supply adequate N.

For hay, late boot to early heading is the optimal timing to balance quantity with quality considerations. Harvested at the dough stage, hay should have an approximate total digestible nutrients (TDN) of 56% with 10% protein, both on a dry basis. A nitrate test is recommended. Prussic acid levels should not be a concern.

Silage is another option for spring oats. Oats should be harvested for silage from late milk through early dough stages. Expect silage with a TDN of approximately 60% and 9% protein on a dry weight basis.

Finally, oats in Kansas may be planted for grain with expected yields of 50 or more bushels per acre most years. However, typical growing conditions during grain fill normally result in low test weights, making the grain unsuitable for food use. Grain from oats is acceptable as livestock feed; however, a market should be identified prior to planting because few markets exist locally.

Cultural practices

Before planting oats, check the herbicide history of the desired field. Oats are especially sensitive to triazine herbicides. Also, if producers are planting oats for pasture and are considering applying an herbicide for weed control, carefully check the pesticide label for grazing restrictions.

The optimal planting date depends on location. In southeast Kansas, the optimal date ranges from February 20 to March 15. In northwest Kansas, the optimal date is from the first week of March through the end of March. For most of the state, planting is recommended from late February through the mid-March, and should not be considered later than April 10. If planted after the optimal planting range, grain production will be limited most years. Adequate pasture is practical with later planting, but it is necessary to plant as early as possible to maximize pasture production potential.

It is important to ensure good seed quality, aiming for a minimum 85% germination to ensure adequate stand. Oat should be drilled at a seeding rate of 100 to 120 lbs per acre. Under good soil moisture or irrigation, rates can be pushed up to three bushels per acre for grazing. It is not recommended to cut down on seeding rate because spring tillering might be limited and oat forage yield may, in some cases, heavily rely on the production of main tillers.

When grown for hay or silage, fertility recommendations are similar to those for grain production: 75 to 125 lbs N per acre. When planted for grazing, an additional 30 lbs N per acre is recommended. Seeding depth can be as deep as 1.5 inches, but often depths of $\frac{1}{2}$ to $\frac{3}{4}$ inch will increase the rate of emergence, stand establishment, and forage production potential. Oat seedlings are less vigorous than wheat and can experience difficulties emerging at deeper planting depths, especially after crusting rains.

Oats may be successfully planted no-till, however, growth and vigor are typically greater when pre-plant tillage is used. No-till is more successful in fields that have been under no-till for a period of years, and riskier in "opportunistic" no-till situations. In either case, a fine, firm seedbed is necessary for optimal production.

To facilitate planting and maximize forage production, winter annual weeds should be controlled either mechanically or with a burndown herbicide prior to planting. Weed control is best achieved through a good stand with rapid growth. Before using any herbicides consult the label.

Availability of seed from K-State Foundation Seed

K-State Foundation Seed has foundation seed of the spring oats variety "Jim" for sale. Plant Variety Protection has expired on Jim, so foundation seed is available for general use. Jim is often used as a forage-type spring oat, although it is primarily a grain variety. About 800 bushels are currently available from Foundation Seed. For pricing information, see: <http://www.agronomy.k-state.edu/services/ks-foundation-seed/price-list.html>

For more information on spring oat production in Kansas, see K-State publication MF-1072, *Small Grain Cereals for Forage* at: <http://www.bookstore.ksre.ksu.edu/pubs/mf1072.pdf>

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3. Winter/spring fertilization of tall fescue and smooth brome grass pastures and hayfields

Much of the nitrogen (N) applied to tall fescue and smooth brome grass hay meadows and pastures goes on in January or February in eastern Kansas, but there is still time to apply it now. The amount and timing of N depends on whether the field is hayed or grazed; how much, if any N was applied in the fall; the price of N and hay; and the growing conditions since last fall.

While January and February is normally the driest time of the year, there is still adequate moisture most years to move the N down into the root zone and stimulate early season growth of tall fescue and smooth brome grass.



Figure 1. Grazing tall fescue pasture. Photo by Lyle Lomas, K-State Research and Extension.

N for hay

Normal N fertilization rates for established fescue and brome grass hay fields are 90 to 120 pounds actual N per acre, or about 30 pounds of N per ton of expected yield. A summary of K-State N response data shows that across nearly 100 experiments, the average yields for unfertilized brome and fescue was 1.35 tons of hay per acre, while maximum yields averaged 3.15 tons of hay with 140 pounds of N.

N Rate (lbs N/acre)	Hay Yield (tons dry matter/acre)	Hay Yield Increase From 20 pounds N (tons dry matter/acre)
0	1.35	-----
20	1.80	0.45
40	2.20	0.40
60	2.52	0.32
80	2.78	0.26
100	2.97	0.19
120	3.10	0.13
140	3.15	0.05
160	3.14	-0.01

Doing some simple cost-and-return calculations, using \$60 per ton as the value of the hay produced and \$0.50 per pound of N, the normal rates of N mentioned above (90 to 120 lbs/acre) are appropriate to maximize profit in most years. It will be important to watch both hay price and N costs, however, as both can be volatile. Hay price varies considerably with weather and supply, and N prices can move substantially from year to year.

One issue these calculations don't consider is hay quality. Protein levels will be increased at the higher N fertilizer rates, assuming timely harvest. So in cases where producers are relying on high-quality hay as their primary protein source, they will want to push N rates to the upper end of the recommended range.

Another consideration is when N is applied. While most growers apply all the N and any needed P and K for hay production in a single application in the spring, research in Kansas has shown that applying all the fertilizer in the fall will normally result in slightly higher yields, though the protein values will normally be slightly lower. Fall applications of N and P stimulate root growth and produce more tiller buds, resulting in more stems the following spring.

N for pasture

Under normal conditions, tall fescue and smooth bromegrass pastures that are grazed in both spring and fall should receive about 100 pounds total N per acre, with 60% applied in the winter or early spring and 40% of the N along with any needed P and K in late August or early September. So producers should plan on applying 60 to 70 lbs N per acre in late winter or early spring, starting as early as January in southeast Kansas or February in the central and northern parts of the state.

P and K fertilization

Both smooth bromegrass and fescue are efficient users of soil P and K. One of the reasons for this is the dense root system -- two to three times more roots per unit of soil volume than corn or soybeans. As a result these crops can grow and thrive at lower soil test levels than other crops commonly grown in Kansas. But both smooth bromegrass and fescue do remove about 12 pounds of P₂O₅ and 40 pounds of K₂O per ton of hay, which will lower soil test values. Thus, these grasses will respond to

P and K fertilization on soils with low or very low soil test levels. Recent work in northeast Kansas has shown response to applied P at soil test levels below 12-15 ppm. P and K application rates should be based on soil tests, as with most crops.

In any type of fertilizer management program for tall fescue and smooth bromegrass, whether for hay production or grazing, needed phosphorus and potash should be applied in the late summer or fall for best results, along with a light application of N. Research with smooth bromegrass and fescue production has shown that fall applications of N and P, while these cool-season grasses are still actively growing, will help the grass develop a good root system for the winter, and develop buds for new tillers the next spring. P and K applied in late winter or early spring won't provide the same benefits.

One option for hay production not widely used is to apply all the N, P and K needed for the following year in late fall, rather than early spring. Research has shown that the yields from a late- fall application are actually higher than from an early spring application, but the protein levels in the hay are slightly lower (a dilution of the N due to higher biomass production). The increased production from a late fall application is due to the stimulation of root growth and production of additional tiller buds.

Other considerations

One additional nutrient producers should be aware of for tall fescue and smooth bromegrass pastures or hayfields is sulfur (S). If the pasture or hayfield is receiving adequate nutrients and precipitation, but is dropping off in production, it could be deficient in S. Sulfur deficiency will cause a general reduction in forage production long before it results in visual deficiency symptoms. An application of S to a tall fescue or smooth bromegrass pasture or hayfield that is deficient in S can result in forage yield increases of as much as 500 to 800 lbs per acre.

Sulfur is taken up by plants as sulfate. If a sulfur application is needed to correct a deficiency in a growing crop, a sulfate-S source should be used, such as ammonium sulfate or gypsum. Elemental sulfur sources can be used if applied far enough in advance of crop uptake needs to allow soil organisms to oxidize the S to sulfate. This will normally take several weeks to months, depending on soil temperature and moisture.

To determine whether P, K, S, and lime are needed on tall fescue and smooth bromegrass fields, producers should consider soil sampling. The best time to sample is in the fall, prior to fertilizer application. Samples for a P and K soil test should be taken to a 6-inch depth. A profile S test to a depth of 24 inches should be used to evaluate S needs.

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4. First hollow stem update: February 26, 2016

Cattle should be removed from wheat pastures when the crop reaches first hollow stem (FHS).

Grazing past this stage can severely affect wheat yields (for a full explanation, please refer to

Agronomy eUpdate article "[Optimal time to remove cattle from wheat pastures: First hollow stem](#)" in the Feb. 5, 2016 issue).

Despite the warm temperatures observed the week of Feb. 20-26 in most of the wheat growing regions of Kansas, most varieties in our replicated trial near Hutchinson still have not reached FHS. Many varieties are still in the early stages of stem elongation (Fig. 1).



Figure 1. This stem has barely any visible elongated hollow stem, and is still far from FHS. Photo by Romulo Lollato, K-State Research and Extension.

The average length of hollow stem is reported in Table 1. As of Feb. 26, the more advanced varieties have between 0.41 and 0.52 cm of hollow stem and therefore are not yet at FHS, which occurs at 1.5 cm (about a half-inch). More advanced varieties are WB4303, WB-Redhawk, WB4458, Overley, Gallagher, WB-Cedar, and 1863; but none has yet reached FHS.

From a FHS perspective, producers grazing wheat in the south central region of Kansas do not have to worry about removing cattle from wheat pastures at this point, but are encouraged to check for FHS in their own fields. Reports from Jeff Edwards, former Oklahoma State University Small Grains Extension Specialist, indicate that several varieties had already reached FHS on February 23 at Stillwater, north-central Oklahoma. Thus, producers near the southern board of Kansas who currently have cattle on wheat and intend to harvest the crop for grain are encouraged to check for FHS from a non-grazed area of their fields on the next few days.

Table 1. Length of hollow stem measured on Feb. 23, 2016 of 23 wheat varieties sown Sept. 26, 2015 near Hutchinson. The critical FHS length for purposes of cattle removal is 1.5 cm.

Variety	Hollow stem length cm
1863	0.41
Bentley	0.31
Danby	0.33
Doublestop CL Plus	0.31
Duster	0.31
Everest	0.35
Gallagher	0.42
KanMark	0.38
LCS Chrome	0.29
LCS Mint	0.27
LCS Pistol	0.35
LCS Wizard	0.34
Overley	0.43
Ruby Lee	0.38
SY Flint	0.34
SY Wolf	0.35
T158	0.30
TAM 114	0.33
WB4303	0.52
WB4458	0.45
WB-Cedar	0.41
WB-Grainfield	0.39
WB-Redhawk	0.48
Variety	P < 0.01
LSD (0.05)	0.11

The intention of this report to is provide producers a weekly update on first hollow stem of different wheat varieties in the current growing season. Producers should use this information as a guide, but it is extremely important to monitor FHS from an ungrazed portion of each individual wheat pasture to take the decision of removing cattle from wheat pastures.

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5. Agricultural Mobile Apps: A review and update of economics apps

This article provides a review and update of some of the current “economics apps” for agriculture.

This section presents apps that can assist farmers in checking the price of the grain, estimating fertilizer and total production costs, computing annual leases, and checking general grain commodity prices at the exchange market and also at different local grain elevators, among several other features.

While these apps can often help you make quick decisions, always make sure to check with your crop consultants, Extension agents, and Extension specialists (Agricultural Economists, Dept. of Agricultural Economics).

Stay tuned for more in this series of annual reviews and updates on Ag-Apps from our KSUCROPS Crop Production team (led by Dr. Ciampitti) and the K-State Department of Agronomy! More updated lists of Ag-Apps will be included in the next several editions of the Agronomy eUpdates.

NOTE: These apps are all available as of the time this article is published. Alterations or changes in availability could occur, affecting the ability to access these apps.

For this series of articles, we have grouped Ag-Apps into the following 10 classifications:

- **ID Apps:** For identification purposes (weeds, insects, diseases, and nutrients)
- **CALC Apps:** For calculating purposes (nutrient removal calculations, tank mixes, volume to spray, etc.)
- **SCOUT Apps:** For scouting purposes or for geo-positioning (soil sampling, recording notes, soil types, etc.).
- **ECON Apps:** For checking grain prices, market evolutions, fertilizer price trends, news and finances.
- **GUIDE Apps:** For diagnosing crop production issues in the field, primarily related to field guides (crop management: insect, disease, weed, and more).
- **LIVESTOCK Apps:** Apps related to the animal side, nutrition, health, and information on markets.
- **IRRIGATION Apps:** Apps related to field crop irrigation and water application.
- **MACHINERY Apps:** Apps for associated with agricultural equipment preparation, inventory, providing information of the machine.
- **GAG Apps:** GAG (general Ag-Apps) for general use, weather-related, for meetings, for reading magazines, among several other Apps’ properties.
- **NON-AG Apps:** For general use from e-readers to calculators, email, calendar, picture editing, and more.

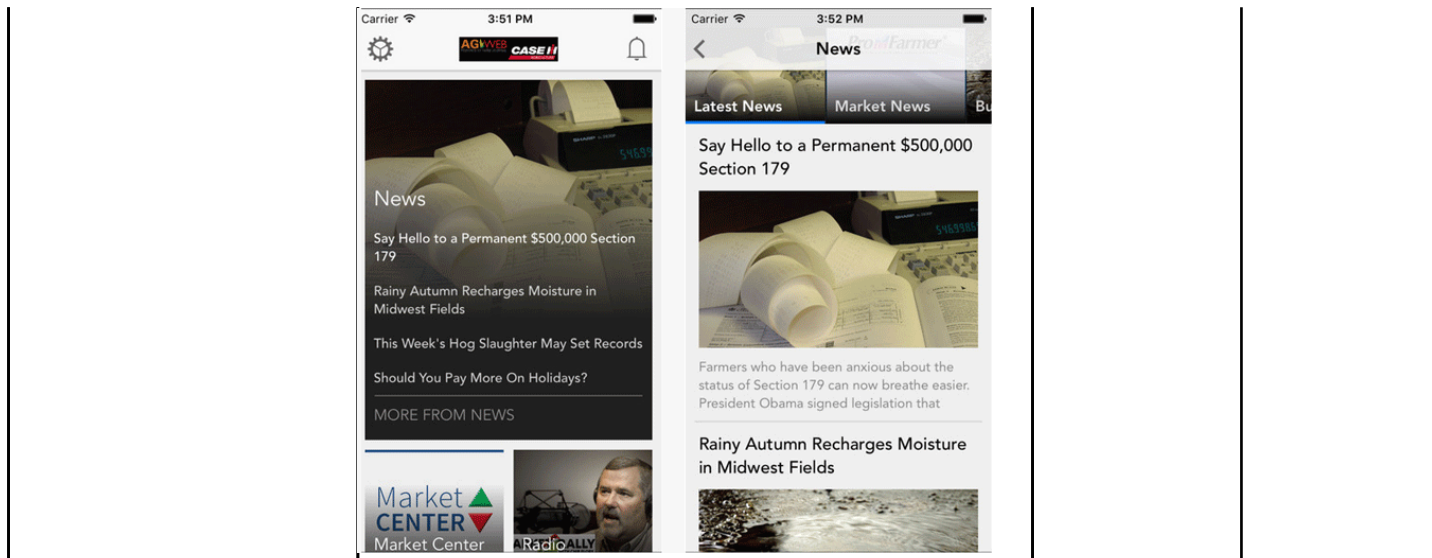
4. Economics Apps

These apps are primarily utilized for checking grain prices, market evolutions, fertilizer price trends,

MOBILE AGRICULTURAL APPS – REVIEW from KSUCROPS ©Kansas State University


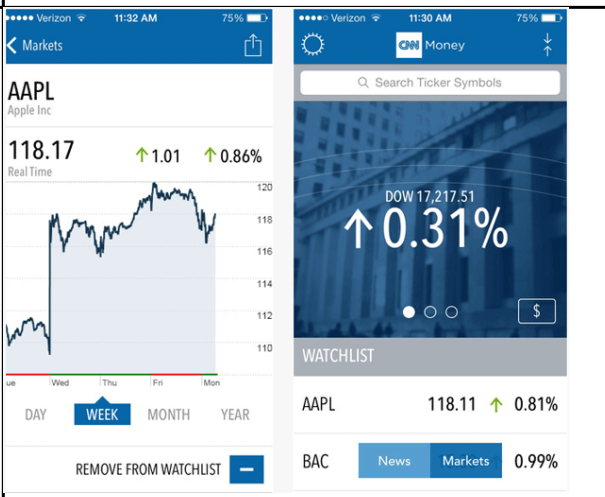

Economics Apps

Name of App and Source	Picture	Brief description and cost
<p>CHS – Grain Trading</p>  <p>Telvent DTN, LLC</p>		<p>This app is the solution for producers to receive the price of grain. You will be able to make, manage, and monitor your offers to sell.</p> <p>FREE</p>
<p>Crop Cost</p>  <p>Texas AgriLife Extension Service</p>		<p>Crop Cost is designed to help agricultural producers calculate the cost of production per crop unit, assisting them in executing a successful marketing plan.</p> <p>FREE</p>
<p>AgWeb News & Markets</p>  <p>Farm Journal, Inc.</p>		<p>Get the latest agribusiness news and advice. Read ag management news, farm business blogs and articles from one trusted source.</p> <p>FREE</p>



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Economics Apps

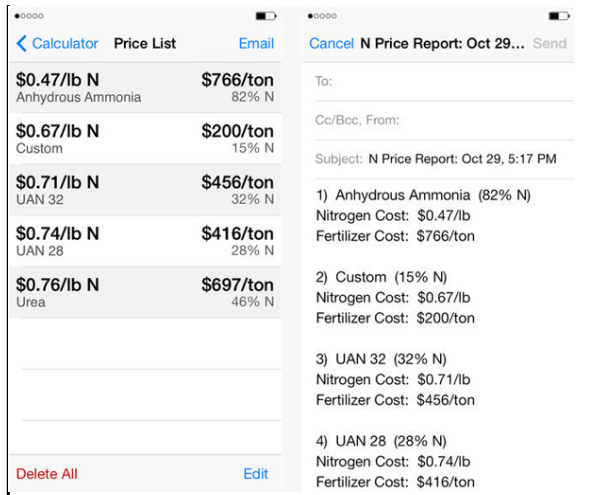
Name of App and Source	Picture	Brief description and	cost
<p>CNN Money</p>  <p>CNNMoney.com</p>		<p>Keep up with real-time changes to stocks and funds with a personalized Watchlist. Access the latest business news, key market trends and analysis.</p> <p>FREE</p>	
<p>N Price Calculator</p>  <p>Univ. of Wisconsin Nutrient</p>		<p>This app allows you to compare the price of various forms of nitrogen fertilizer products in terms of their price per pound of nitrogen.</p> <p>FREE</p>	

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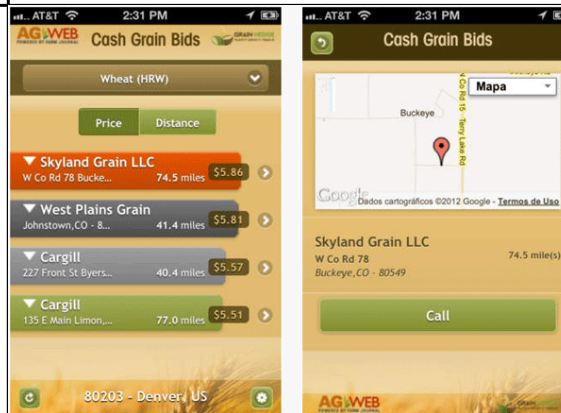
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and Pest Management Program



Cash Grain Bids

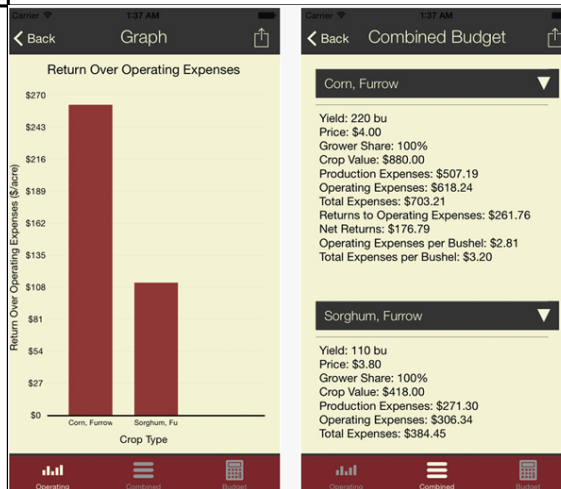


See what your local grain elevators are paying. Simply input your ZIP code to find out cash bids and basis levels in your area. Get bids from not one, but five elevators closest to you.

FREE

Farm Journal, Inc.

CE Budgets



This app assists producers and other agricultural stakeholders in evaluating expected costs and returns for the upcoming field crop production year.

FREE

University of Arkansas

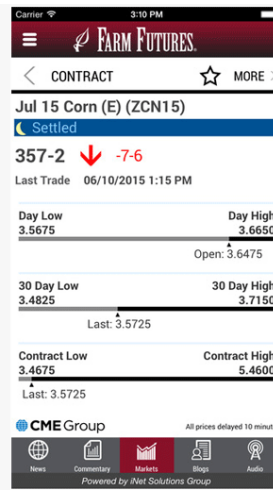
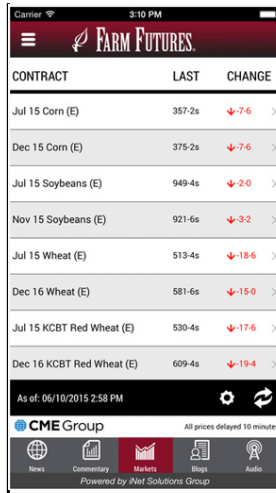
Farm Futures

This app features enhanced user-customized markets, market commentary, news and audio updates every business day.

FREE



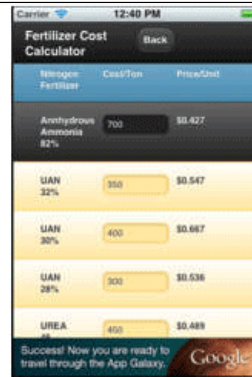
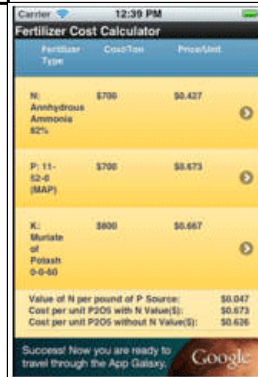
iNet Solutions Group



Fertilizer Cost



Smith Farm Apps



This app estimates the value of Nitrogen per unit of Phosphorus source, along with the cost per unit of P2O5 with or without the Nitrogen value.

FREE

MOBILE AGRICULTURAL APPS – REVIEW from KSUCROPS ©Kansas State University

Economics Apps

Name of App and Source	Picture	Brief description and	cost
AGDirect Mobile 		This app computes finance and lease quotes, including annual and semiannual payments. FREE	

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Farm Credit Services of America

Date	Principal	Interest	Balance
4/30/15	\$640.12	\$179.56	\$2,901.88
4/30/16	\$672.57	\$147.11	\$2,229.30
4/30/17	\$706.67	\$113.01	\$1,522.63
4/30/18	\$742.49	\$77.19	\$780.14
4/30/19	\$780.14	\$39.55	\$0.00

Name	New Quote 2	New Quote
Quote Type	Purchase	Purchase
Commencement Date	4/30/14	4/30/14
Finance Amount	\$3,542	\$3,542
Cash Discount	\$0	\$0
Interest Rate	5%	5%
Term (Months)	60	36
Payment Frequency	Annual	Annual
First Payment Date	4/30/15	4/30/15
Payment Amount	\$820	\$1,302
Trade Equity	\$0	\$0
Down Payment	\$0	\$0
Cost to Own	\$4,098	\$3,907
Total Interest Paid	\$556	\$365
Total Principal Paid	\$3,542	\$3,542
Number of Payments	5	3
Taxes	\$0	\$0

CVA Coop



MONTH	CASH BID	BASES
FEB13	721-0	10
MAR13	\$7.31	10
APR13	\$7.20	-2
JUL13	\$7.13	0
OCT13	\$5.33	-43

Gothenburg (February 8, 10:49 AM CST)

38° CLEAR

HIGH 52° LOW 30° WIND 16 HUMIDITY 64%

DAY	TEMP	WIND
FRIDAY	52/30	13 MPH
SATURDAY	48/28	20 MPH
SUNDAY	34/21	25 MPH
MONDAY	37/16	10 MPH

The CVA Coop app brings you real-time cash bid and futures prices, in addition to updated weather and the latest agricultural news.

FREE

Central Valley Ag

DTN/The Progressive Farmer



Weather: Mostly Cloudy, 71°F

2 PM 3 PM 4 PM 5 PM 6 PM

RECENT DTN WEBINARS

Feeder Perspective

The Friends You Know

COMPETITIVE BEEF

Livestock

This app meets your information needs with access to award-winning agriculture news, commodity market data, and industry-specific weather intelligence.

FREE

Telvent DTN, LLC

Each of the next six issues of the eUpdate will feature another classification of Ag-Apps from our KSUCROPS Crop Production team and the K-State Department of Agronomy!

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6. Wildfire Awareness Week in Kansas: Feb. 22-27

Kansas State University, K-State Research and Extension, and the Kansas Forest Service are all represented on the Kansas Interagency Wildfire Council (KIWC). KIWC consists of federal and state agencies with a focus on wildfires, their impacts, and prevention. For the second year, Governor Sam Brownback has signed a proclamation from KIWC designating February 22-27, 2016 as Wildfire Awareness Week in Kansas.

In 2015, 5,945 wildfires were reported in Kansas resulting in 21 injuries and nearly \$4.9 million in property loss and damage. These fires burned approximately 187,000 acres. Kansas averages around 6,000 wildfires totaling 150,000 acres each year. A majority of these fires occur in the spring and are the result of human activities.

During Wildfire Awareness Week, KIWC and first responders remind all Kansas citizens to exercise safe, responsible behavior when conducting outdoor burning, now and during the coming season. Over 80% of first responders are volunteers. Some extra vigilance from those who do any kind of burning goes a long way to reducing the occurrence of wild land fire, the resulting injuries and property loss, and the demand on those volunteers.

For additional information:

On the KIWC, visit www.twitter.com/wildfireKS

In protecting yourself against wildfires, visit www.firewise.org/wildfire-preparedness/

About safe burning practices, visit http://www.kansasforests.org/fire_management/

Weather forecasts, visit your local National Weather Service page www.weather.gov

Real-time weather observations, visit www.mesonet.ksu.edu

Christopher Redmond, Weather Data Library

christopherredmond@ksu.edu

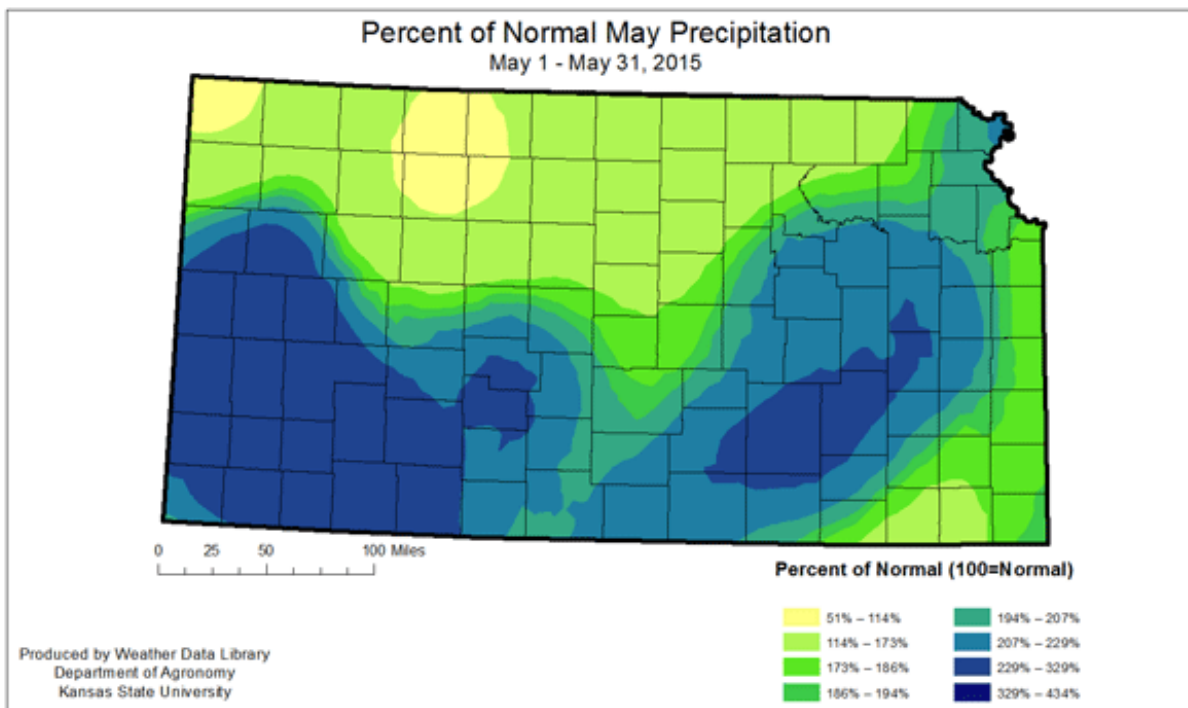
Mary Knapp, Weather Data Library

mknapp@ksu.edu

Spring is the optimal time for many people to do prescribed burns across Kansas, especially in the Flint Hills. It invigorates grass/crop growth, reduces noxious weeds, and eliminates the pile up of excessive dead material. These dead foliage and organic materials, often called fuels, that have accumulated on the surface can be variable from season to season. If an area of land is never burned, fuels will simply pile up on the ground over the years, often falling over with weight of winter wind and snow.

These fuels can accumulate over just a one-year period as well, in some years more so than others. In the Flint Hills, grasses, weeds, and other “one hour” fuels are warm-season plants and exhibit their growth from spring to summer. They get the name “one hour” fuels because that is how fast they can dry out and “cure.”

In 2015, a significant amount of such dead vegetative fuel was produced across most of Kansas. Near record rains in May and June brought flooding to much of Kansas, especially southern portions of the state. These rains saturated the soil and provided a large source of moisture for plant growth. Above-average temperatures during the summer utilized the abundant moisture and provided extensive growth of perennial grasses and weeds. In addition, a warm and nearly snowless winter this year for much of Kansas wasn't able to knock these tall fuels down. Although we have had some winds, they mostly haven't been accompanied by rains or snow/ice events, and thus haven't been successful in knocking down these fuels, either. Therefore, last year's aggressive plant growth remains vertical. Vertical fuels are much more susceptible to drying out rapidly and are a very efficient fire carrier. When fuels fall down and lay horizontally, they act as a sponge since they are packed more tightly, and hold moisture.



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Figure 1. May rains were above normal for most of the state in 2015, especially in the southwest and central part of the state.

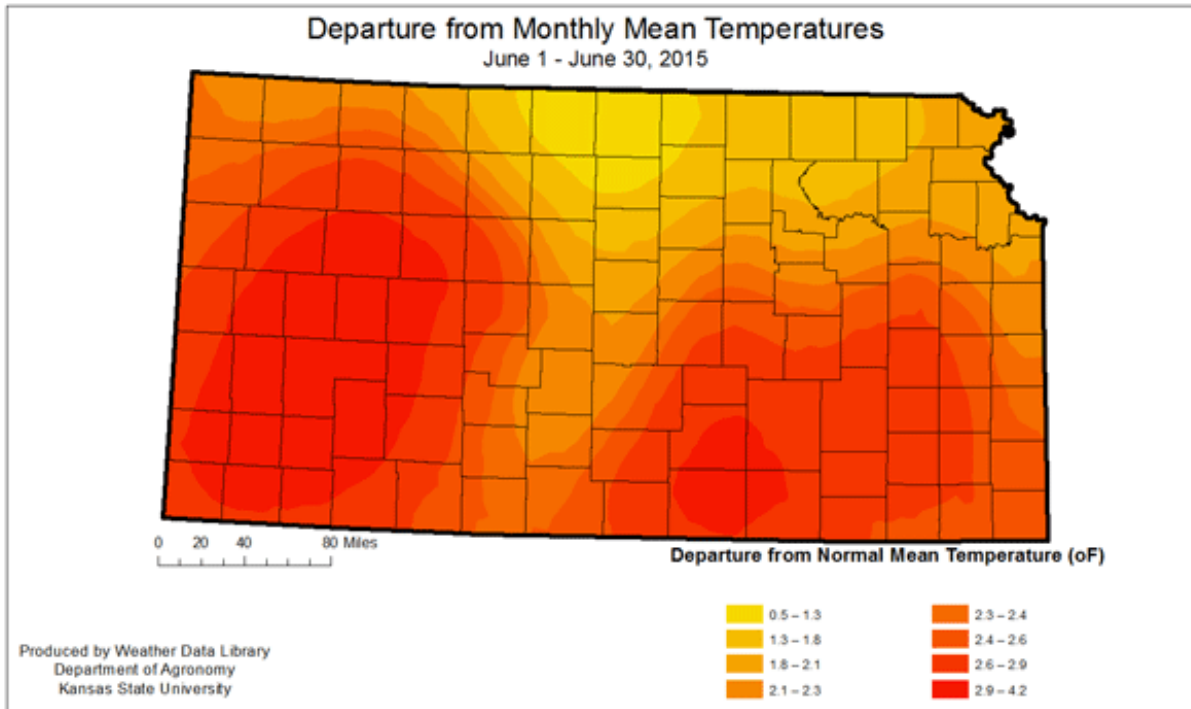


Figure 2. June temperatures were above normal statewide, aiding in widespread plant growth in 2015.

What does this mean for spring burning in Kansas this year? Fire managers will need to be extra vigilant when planning prescribed fires in the region. Several methods can be used to anticipate the impact of this fuel load, such as:

- Make larger fire breaks around the prescribed region.
- Eliminate tall grasses around structures/trees that may aid in carrying fire.
- Anticipate increased fire behavior and increased potential for spotting.
- Be extra thorough with mop-up operations.

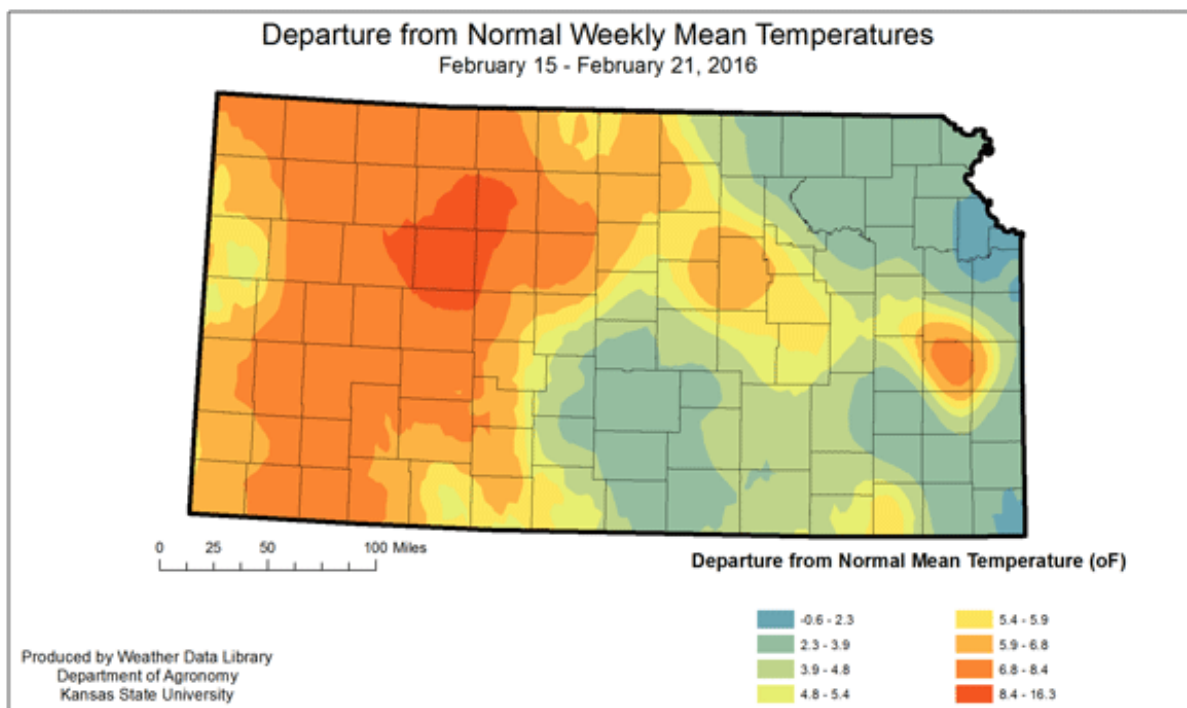
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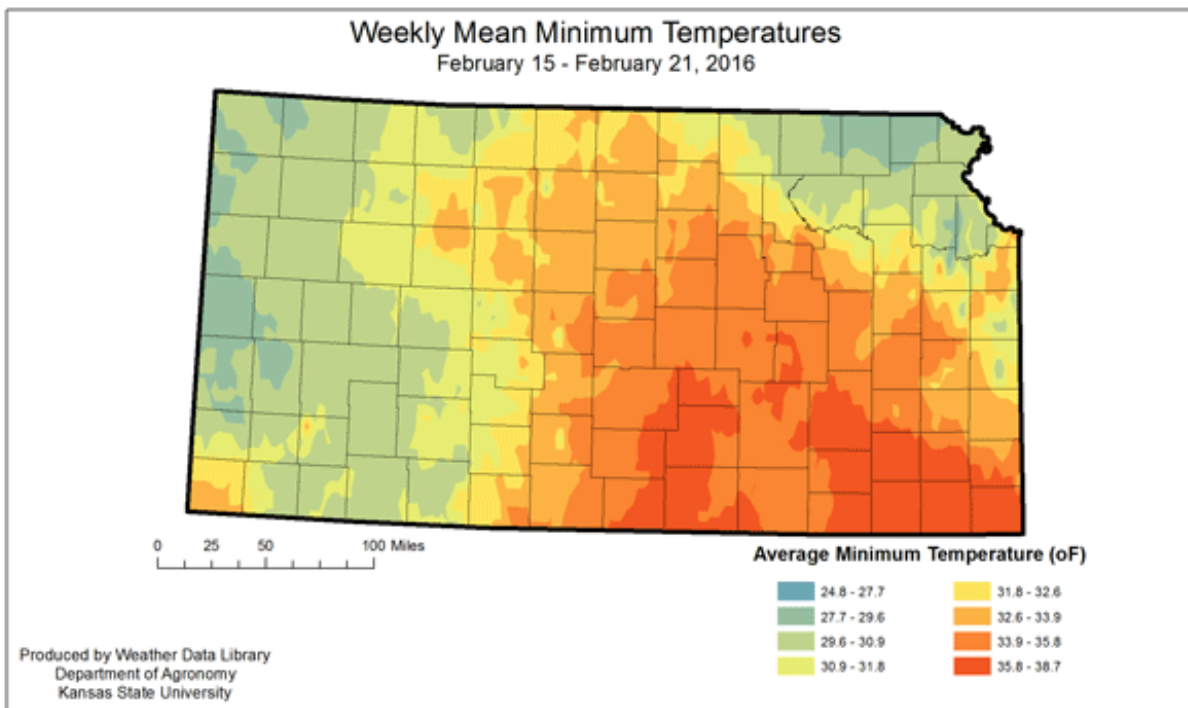
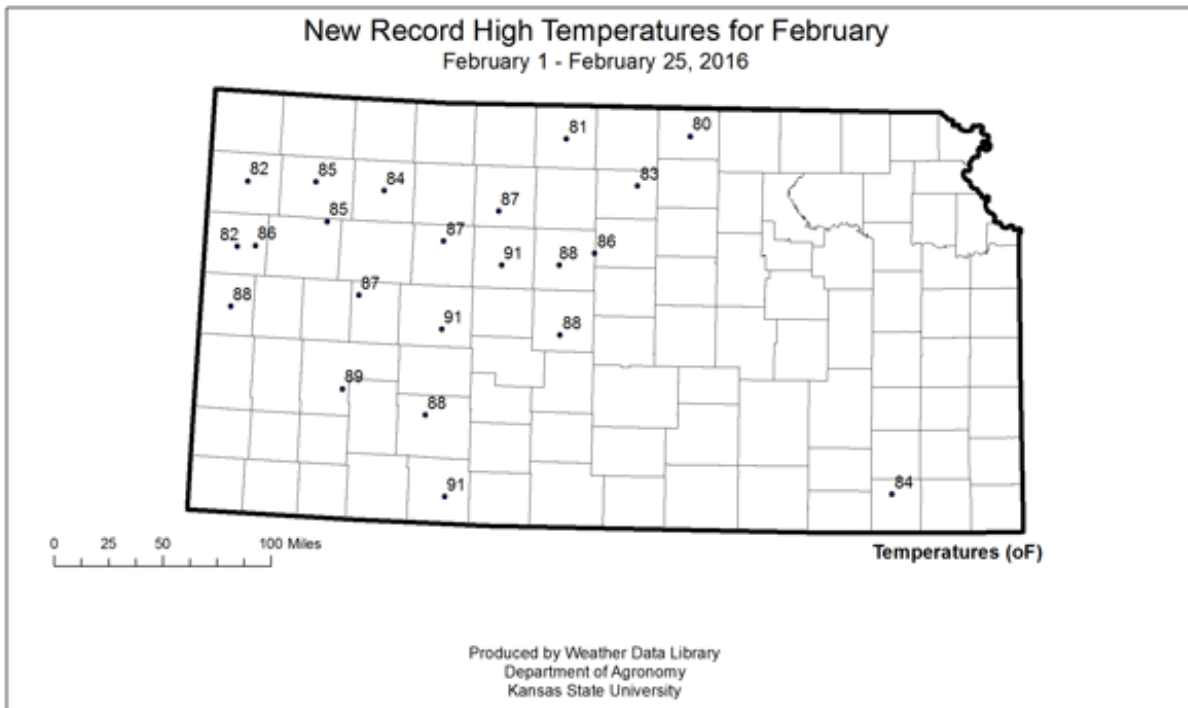
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8. How warm did it get the week of Feb. 15-21?

The week of February 15-21 was unusually warm, with statewide temperatures averaging 5.1 degrees F warmer than normal. The western regions had the highest maximum temperatures, with readings in several locations reaching 90 degrees F and above. Those high temperatures, coupled with very low humidity, produced an increased drying stress on the crop.

In the eastern areas of the state, the departures from normal were not as great. High temperatures reached the 70s. However, the unusually warm minimum temperatures for the day featured more prominently in the overall warmth. Where the average minimum temperatures were above freezing, the wheat is more likely to break dormancy. Wheat in these regions may be more at risk for freeze damage when cold temperatures return.





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9. Comparative Vegetation Condition Report: February 16 - 22

The weekly Vegetation Condition Report maps below can be a valuable tool for making crop selection and marketing decisions.

The objective of these reports is to provide users with a means of assessing the relative condition of crops and grassland. The maps can be used to assess current plant growth rates, as well as comparisons to the previous year and relative to the 27-year average. The report is used by individual farmers and ranchers, the commodities market, and political leaders for assessing factors such as production potential and drought impact across their state.

The Vegetation Condition Report (VCR) maps were originally developed by Dr. Kevin Price, K-State professor emeritus of agronomy and geography. His pioneering work in this area is gratefully acknowledged.

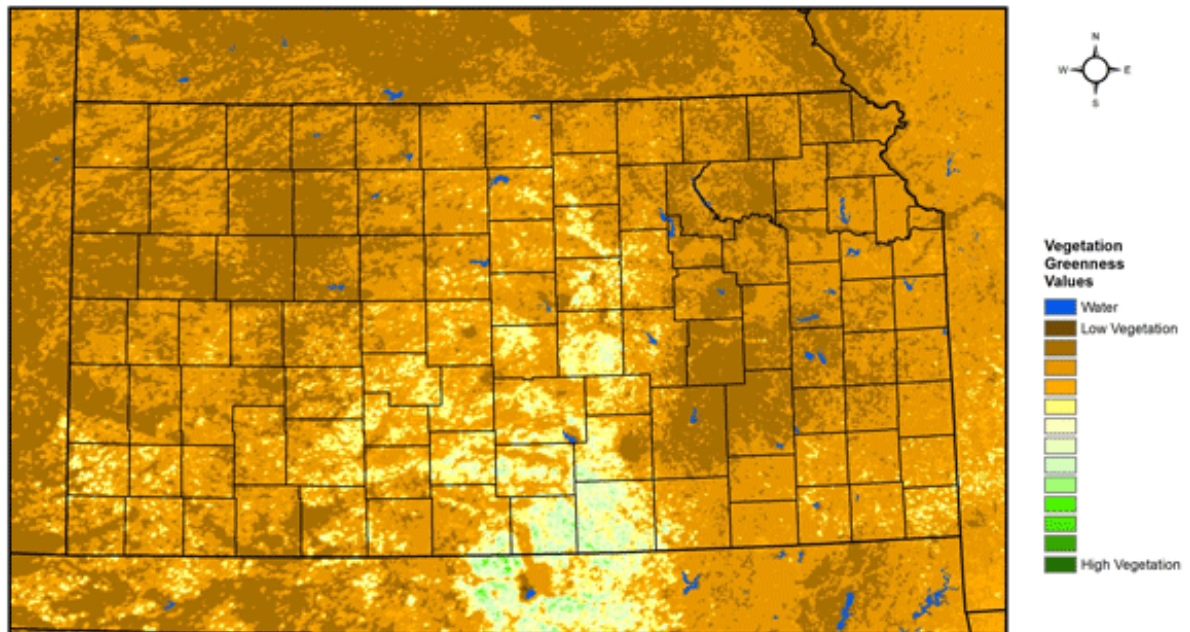
The maps have recently been revised, using newer technology and enhanced sources of data. Dr. Nan An, Imaging Scientist, collaborated with Dr. Antonio Ray Asebedo, assistant professor and lab director of the Precision Agriculture Lab in the Department of Agronomy at Kansas State University, on the new VCR development. Multiple improvements have been made, such as new image processing algorithms with new remotely sensed data from EROS Data Center.

These improvements increase sensitivity for capturing more variability in plant biomass and photosynthetic capacity. However, the same format as the previous versions of the VCR maps was retained, thus allowing the transition to be as seamless as possible for the end user. For this spring, it was decided not to incorporate the snow cover data, which had been used in past years. However, this feature will be added back at a later date. In addition, production of the Corn Belt maps has been stopped, as the continental U.S. maps will provide the same data for these areas. Dr. Asebedo and Dr. An will continue development and improvement of the VCRs and other advanced maps.

The maps in this issue of the newsletter show the current state of photosynthetic activity in Kansas, and the continental U.S., with comments from Mary Knapp, assistant state climatologist:

Kansas Vegetation Condition

Period 08: 02/16/2016 - 02/22/2016



0 25 50 100 150 200 Miles
Nan An, Imaging Scientist, an_198317@hotmail.com
Antonio Ray Asebedo, Assistant Professor, ara4747@ksu.edu



Figure 1. The Vegetation Condition Report for Kansas for February 16 –22 from K-State’s Precision Agriculture Laboratory shows that the area of highest biomass production continues to spread north and west from Harper and Sumner counties. The warmer-than-average temperatures, particularly warmer lows, have accelerated biomass development in this area. In the Northwest Division, the very low vegetative activity is less prominent than last week. The impacts of the early February snow in that area continue to fade as temperatures warm.

Kansas Vegetation Condition Comparison Late-February 2016 compared to the Late-February 2015

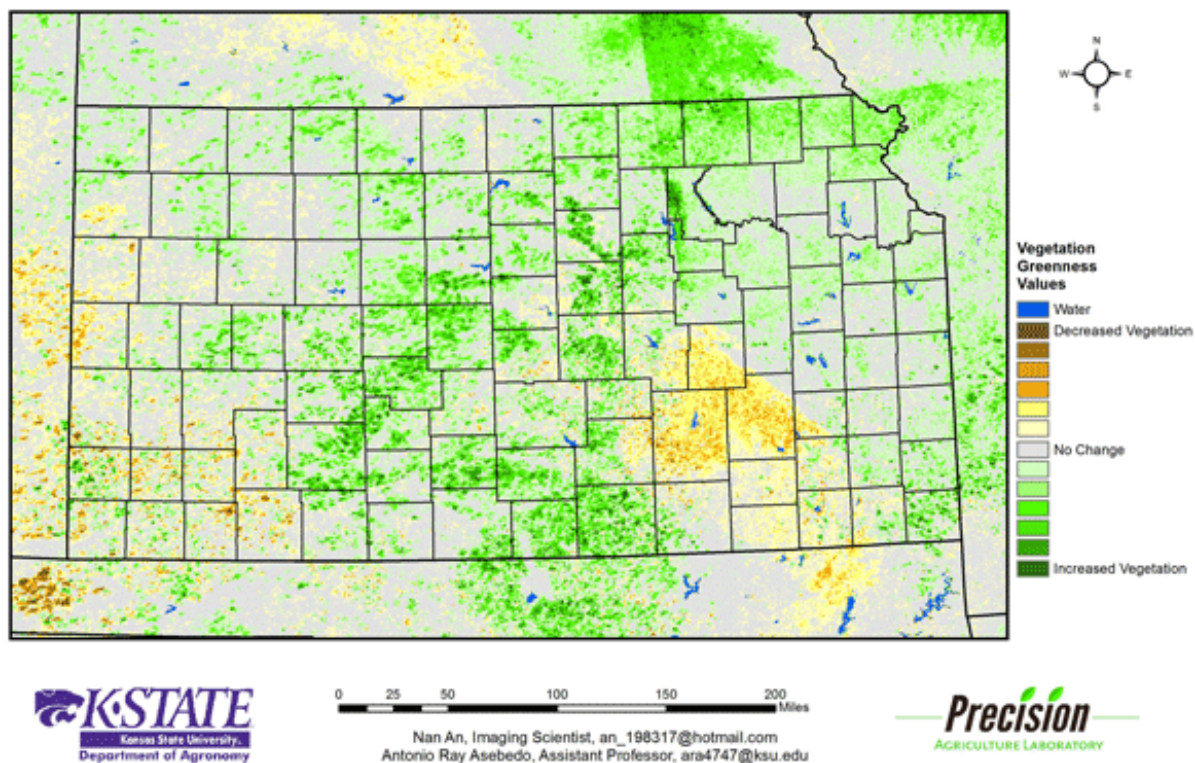


Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for February 16 –22 from K-State’s Precision Agriculture Laboratory shows much of the state with higher photosynthetic activity. There is a pocket of lower activity in the Chase, Butler, and Greenwood counties, which had higher production at this time last year.

Kansas Vegetation Condition Comparison
Late-February 2016 compared to the 27-Year Average for Late-February

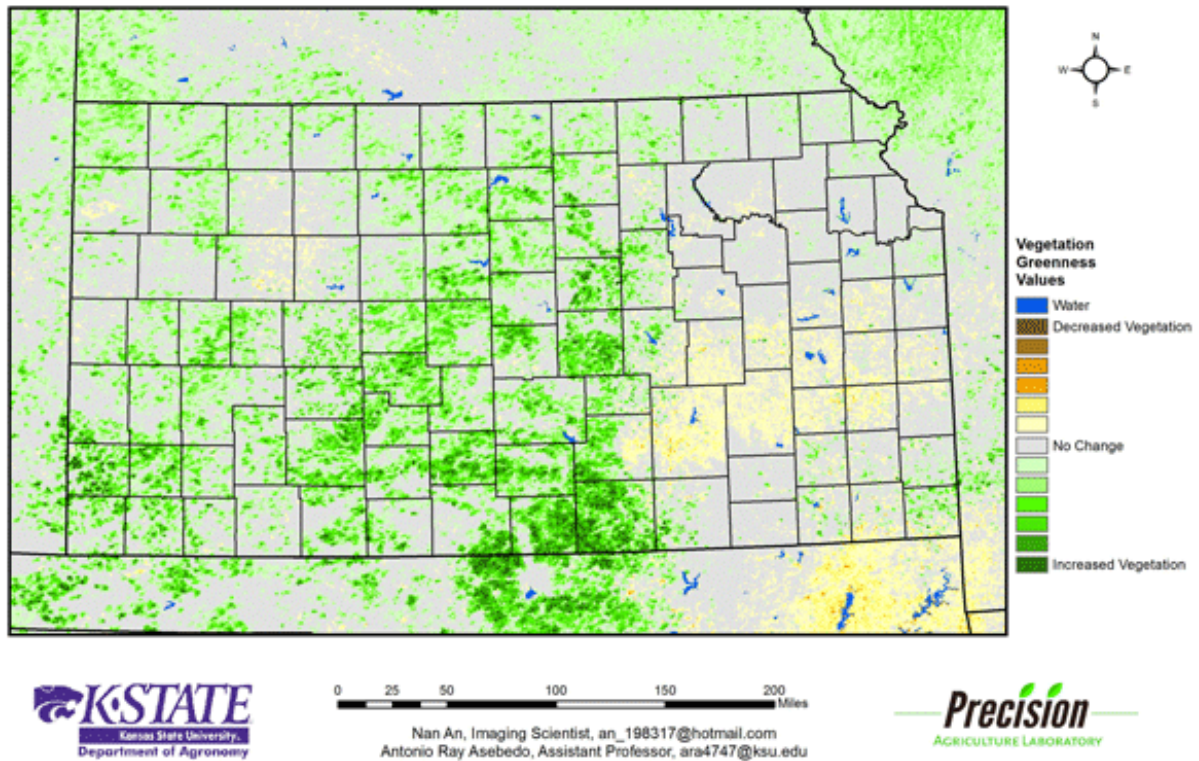


Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for February 16 –22 from K-State's Precision Agriculture Laboratory shows that the area of above-average photosynthetic activity continues to increase. The largest areas are in central and south central Kansas. Temperatures continue above normal across the state, with the warmest departures in the southwest.

Continental U.S. Vegetation Condition

Period 08: 02/16/2016 - 02/22/2016

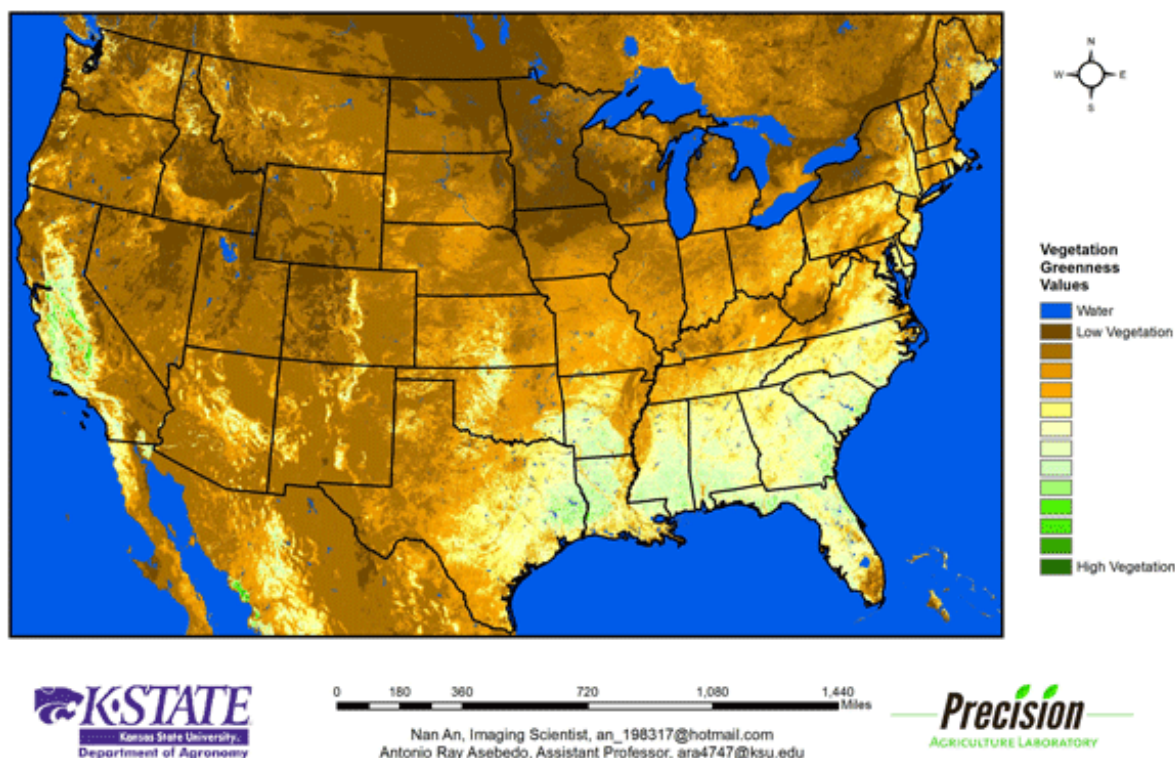


Figure 4. The Vegetation Condition Report for the U.S for February 16 –22 from K-State’s Precision Agriculture Laboratory shows that the highest photosynthetic activity is in the Deep South, where favorable temperatures continue. Continued lack of vegetative activity in the Pacific Northwest is actually positive as it indicates a substantial snowpack. In central California, some of the winter snow is being lost to higher-than-average temperatures. Lingering impacts of the December flooding are still visible in the reduced vegetative activity in the lower Mississippi River Valley, although the impacts are less than last week.

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Continental U.S. Vegetation Condition Comparison
Late-February 2016 Compared to Late-February 2015

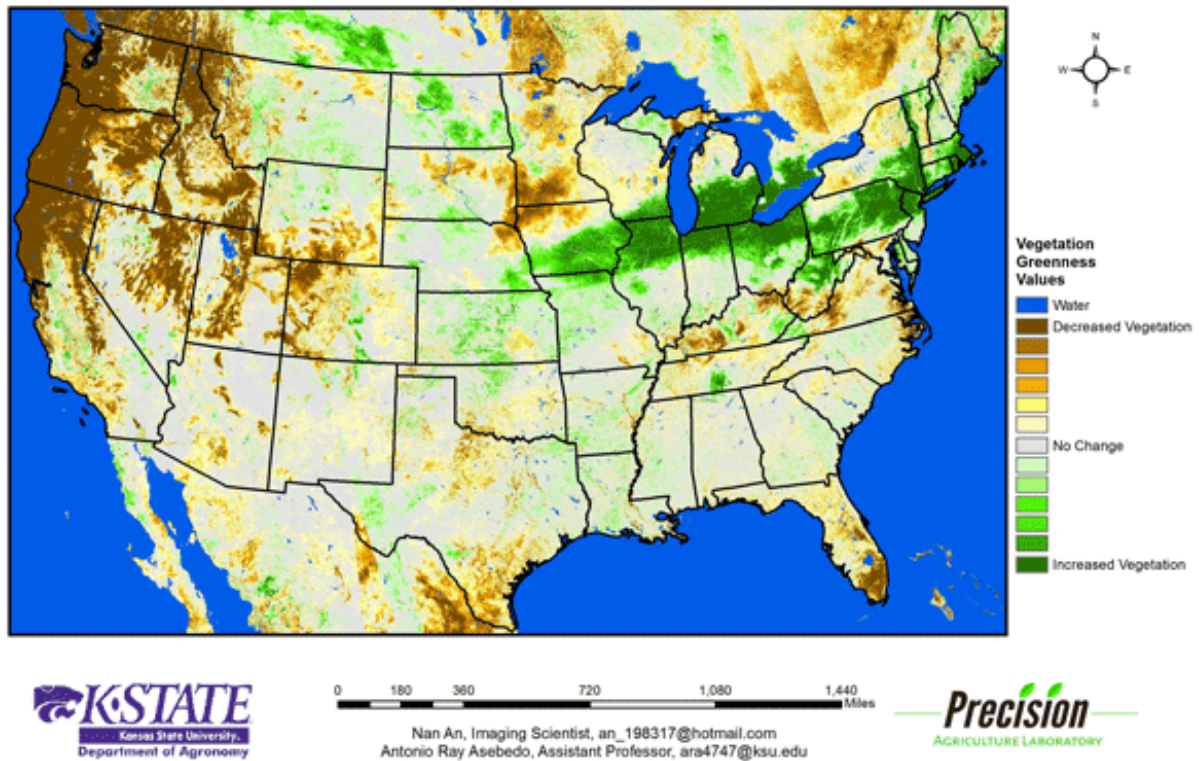


Figure 5. The U.S. comparison to last year at this time for the period February 16 – 22 from K-State’s Precision Agriculture Laboratory shows that lower NDVI values are most evident from the Pacific Northwest to the Central Rockies while much higher NDVI values are visible in the Great Lakes region. Snow continues to be the major influence on both. The Great Lakes area continues to have a low-snow season, while the Pacific Northwest has a higher snow pack than last year. Impacts from the most recent snowstorms won’t be visible until next week.

Continental U.S. Vegetation Condition Comparison
Late-February 2016 Compared to 27-year Average for Late-February

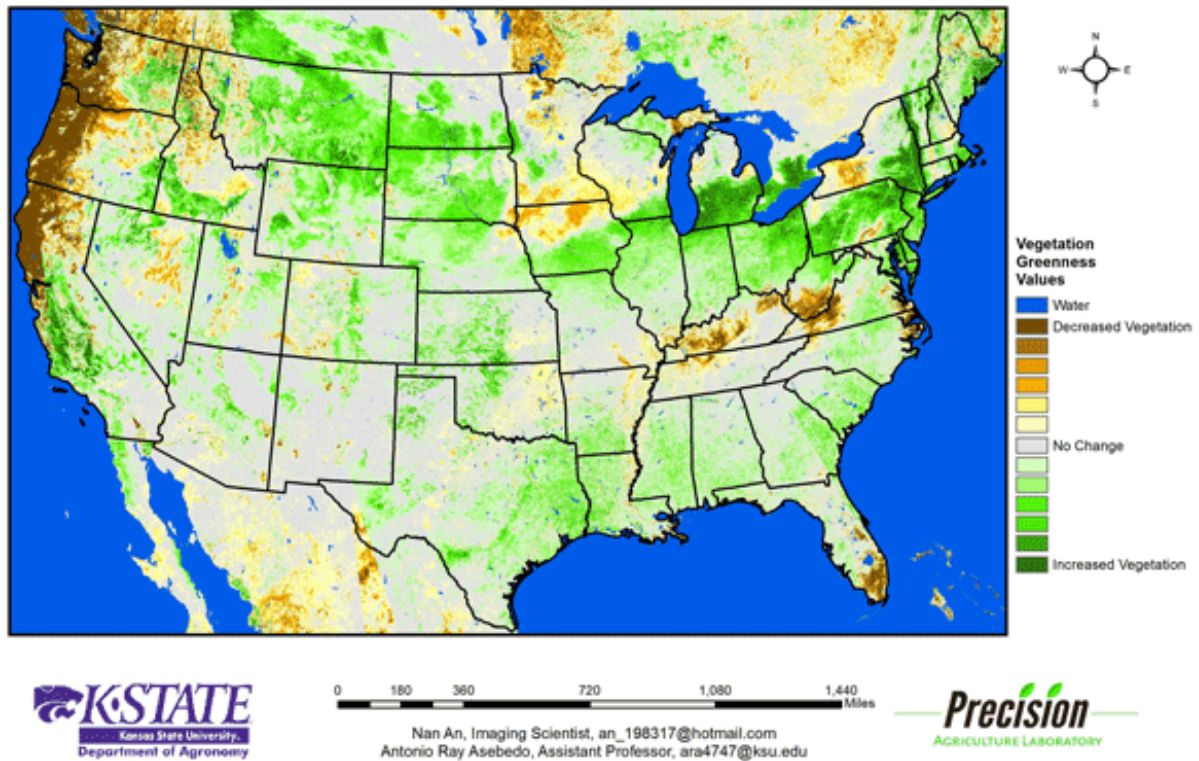


Figure 6. The U.S. comparison to the 27-year average for the period February 16 – 22 from K-State’s Precision Agriculture Laboratory shows below-average photosynthetic activity along the Pacific Northwest and in Virginia. Decreases in both of these areas are due largely to lingering impacts from snow events. The February 14th storm in the Mid-Atlantic region left up to 10 inches of snow in the area. The above-average vegetative activity in eastern Montana and North Dakota is of concern. Snow pack in these areas is below average and abnormally dry conditions continue to expand in the region. Warmer-than-average winter temperatures in the region are also spurring plant development.

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Nan An, Imaging Scientist
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