Issue 871

K-STATE
Research and Extension

Extension Agronomy

eUpdate

09/02/2021

These e-Updates are a regular weekly item from K-State Extension Agronomy and Kathy Gehl, Agronomy eUpdate 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 Kathy Gehl, 785-532-3354 kgehl@ksu.edu, or Dalas Peterson, Extension Agronomy State Leader and Weed Management Specialist 785-532-0405 dpeterso@ksu.edu.

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1. Tips for fall planting of alfalfa

Kansas has 568,324 acres of alfalfa, which is a very important leguminous crop for dairy and livestock industry in the state. Alfalfa hayfields are help to supply forage that is highly digestible and high in protein. Late summer and early fall are often the best times to plant alfalfa in Kansas due to less weed pressure than spring planting.

Figure 1. Alfalfa seedlings. Photo by Doohong Min, K-State Research and Extension.

Available moisture at planting is crucial for alfalfa establishment, but too much moisture can increase seedling disease incidence and reduce alfalfa nodulation and nitrogen fixation.

If soil moisture is available, growers in northwest Kansas can plant as early as August 10. Optimum sowing date occurs later as we move towards southeast Kansas, where growers can plant until midto late-September. In other parts of Kansas, the optimal planting time is late August or early September. Producers just need to plant early enough to have three to five trifoliate leaves before the first frost.

Alfalfa is a four to five-year, or longer, investment, and therefore it is crucial to ensure proper establishment. Some producers shy away from alfalfa because of its high establishment cost and risk of stand failure. In the long run, however, it's relatively inexpensive if amortized over the life of the crop.

If managed properly and given favorable weather conditions, dryland alfalfa can produce 3 to 6 dry matter tons of forage per acre per year. Irrigated fields can produce 6 to 8 dry matter tons per acre per year or more.

When sowing alfalfa, producers should keep the following in mind:

Soil test and correct soil acidity. Alfalfa grows best in well-drained soils with a pH of 6.5 to 7.5 and does not tolerate low soil pH. If the soil is acidic, add lime to raise soil pH to 6.8 before planting. Ensuring appropriate soil pH levels before planting is essential, especially as lime is relatively immobile in the soil profile and the field will not be worked for the next 3-5 years. Remember, after spread, lime takes a few weeks in the soils to react and increase the pH.

Soil test and meet fertilization needs. Apply the needed phosphorus (P) and potassium (K) amounts according to soil test recommendations. Phosphorus fertilizer will be required if soil test P levels are below 25 ppm, and potassium fertilizer will be required if soil K levels are below 120 ppm. Even soils that test higher than these thresholds may need additional fertilizer. Small amounts of nitrogen fertilizer (15 to 20 lb/acre) as a starter at planting are beneficial for alfalfa establishment. In some fields, sulfur can also bring some yield benefits.

Plant certified, inoculated seed. Ensuring the correct *Rhizobium* inoculation is crucial for alfalfa seedlings to fix available soil nitrogen to meet the needs of growing alfalfa for optimum production.

Plant in firm, moist soil. A firm seedbed ensures good seed-soil contact; therefore, use a press wheel with the drill to firm the soil over the planted seed. No-till planting in small-grains stubble will usually provide a good seedbed.

Don't plant too deeply. Plant one-fourth to one-half inch deep on medium- and fine-textured soils and three-fourths inch deep on sandy soils. Don't plant deeper than 10 times the seed diameter.

Use the right seeding rate. Plant 8 to12 pounds of seed per acre on dryland in western Kansas, 12 to15 pounds per acre on irrigated medium- to fine-textured soils, 15 to 20 pounds per acre on irrigated sandy soils, and 12 to 15 pounds per acre on dryland in central and eastern Kansas.

Check for herbicide carryover that could damage the new alfalfa crop – especially when planting alfalfa no-till into corn or grain sorghum stubble. In areas where row crops were drought-stressed and removed for silage, that sets up a great seedbed for alfalfa but may still bring a risk of herbicide damage.

Choose pest-resistant varieties. Resistance to phytophthora root rot, bacterial wilt, fusarium wilt, verticillium wilt, anthracnose, the pea aphid, and the spotted alfalfa aphid is essential. Some varieties are resistant to even more diseases and insects, which could contribute to reducing costs.

Purchase alfalfa varieties with a fall dormancy rating ranging from 4 - 6 for Kansas. Fall dormancy relates to how soon an alfalfa variety will stop growing in the fall and how early it will begin growing in the spring or late winter. Simply put, it would be better not buy a variety with fall dormancy of 9-10, which can be more suitable for California and regions where alfalfa can keep growing year-round under irrigation.

More information about growing alfalfa in Kansas can be found in the *Alfalfa Production Handbook*. That information also is available on the web at: www.ksre.ksu.edu/bookstore/pubs/c683.pdf

Also see *Alfalfa Growth and Development*, available on the web at:
https://www.bookstore.ksre.ksu.edu/pubs/MF3348.pdf

Figure 2. Early bloom alfalfa. Photo by Doohong Min, K-State Research and Extension.

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2. Cover crop response to herbicides

As we head into September, some producers are thinking about seeding winter cover crops in fields currently planted to corn. The successful establishment of winter cover crops is influenced by several factors that are discussed in a previous eUpdate (*New cover crop factsheet discusses planting cereal rye after corn harvest ahead of soybean* - https://bookstore.ksre.ksu.edu/pubs/MF3504.pdf). This article will provide some additional details about cover crop responses to various herbicides.

Cover crop response to herbicides will be influenced by a number of factors, including biological and biochemical characteristics of the plant, chemical characteristics of the herbicide, and weather conditions since herbicide application. Table 1 summarizes the response of selected cover crops to selected herbicides. For simplicity, no herbicide premixes are included in the list. The responses are cautious/conservative estimates based on published field research, herbicide labels, and a recent publication from the Take Action campaign. A field bioassay is the most reliable method to determine crop response to potential herbicide residues.

Table 1. Likelihood of injury to selected cover crops when planted in the fall after a spring application of selected corn herbicides. Green = injury unlikely; Yellow = injury possible; Red = injury likely.

Herbicide	**Cereal rye**	**Wheat**	**Red clover**	**Hairy vetch**	**Radish**
Atrazine	Yellow	Yellow	Yellow	Yellow	Yellow
Balance Flexx, (isoxafluotle)	Yellow	Yellow	Yellow	Yellow	Red
Callisto (mesotrione)	Green	Yellow	Red	Yellow	Yellow
Dual II Magnum (S-metolachlor)	Green	Yellow	Green	Green	Green
Harness (acetochlor)	Green	Yellow	Yellow	Green	Green
Outlook (dimethenamid-P)	Yellow	Yellow	Yellow	Yellow	Yellow
Prowl H20 (pendimethalin)	Yellow	Yellow	Red	Yellow	Yellow
Sharpen (saflufenacil)	Green	Green	Yellow	Yellow	Red
Valor (flumioxazin)	Yellow	Yellow	Yellow	Yellow	Yellow
Zidua (pyrasulfoxone)	Green	Yellow	Yellow	Green	Yellow

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current and update use requirements.

References

Brooker, et al., 2020; Cornelius and Bradley, 2017; Palhano, et al., 2018; Price, et al., 2020; Rector, et al., 2020; Wallace, et al., 2017

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3. New research examines tillering impacts on corn yields

Precipitation is a key limiting factor for corn production, particularly in western Kansas. Management strategies, such as reduced plant populations, are commonly used to match crop demands with environmental resource supply. However, these low plant populations encourage the development of secondary vegetative shoots (tillers or "suckers") when paired with favorable growing conditions (Figure 1).

Figure 1. Corn plant at development stage V7 with two healthy tillers in a 10,000 plant per acre population in Goodland, KS. Photo by Rachel Veenstra, K-State Research and Extension.

Modern corn breeding efforts have resulted in hybrids requiring greater plant populations to achieve yield potential in favorable environments, while subsequently reducing tiller development; however, tillering potential still exists in modern corn hybrids. Corn tillering is a form of plant adaptation to the growing conditions (environmental plasticity). Depending on the hybrid and environmental factors such as light intensity, soil fertility, available water, and temperature, tillers develop early in the growing season.

Historically, corn tillers have been viewed negatively by agronomists and producers, although research studies have presented conflicting results about yield impacts. Few studies have evaluated the direct impact of tiller removal on corn yields, particularly concerning current commercial hybrids and regions with similar climates to Kansas.

New research study in Kansas

With support from Corteva Agriscience and the Kansas Corn Commission, this study included 10 field locations across Kansas in 2019 and 2020 (Figure 2). These sites included a mix of limited irrigation, rainfed, and dryland moisture management strategies. To explore the yield effect of corn tillers, three plant populations (10,000; 17,000; and 24,000 plants per acre), two hybrids (P0657AM and P0805AM), and two tiller removal treatments (tillers intact and tillers removed at development stage V10, tenth-leaf) were tested.

Grain yields, tiller numbers, and environmental conditions were evaluated to understand how each site, density, and hybrid responded to tillering.

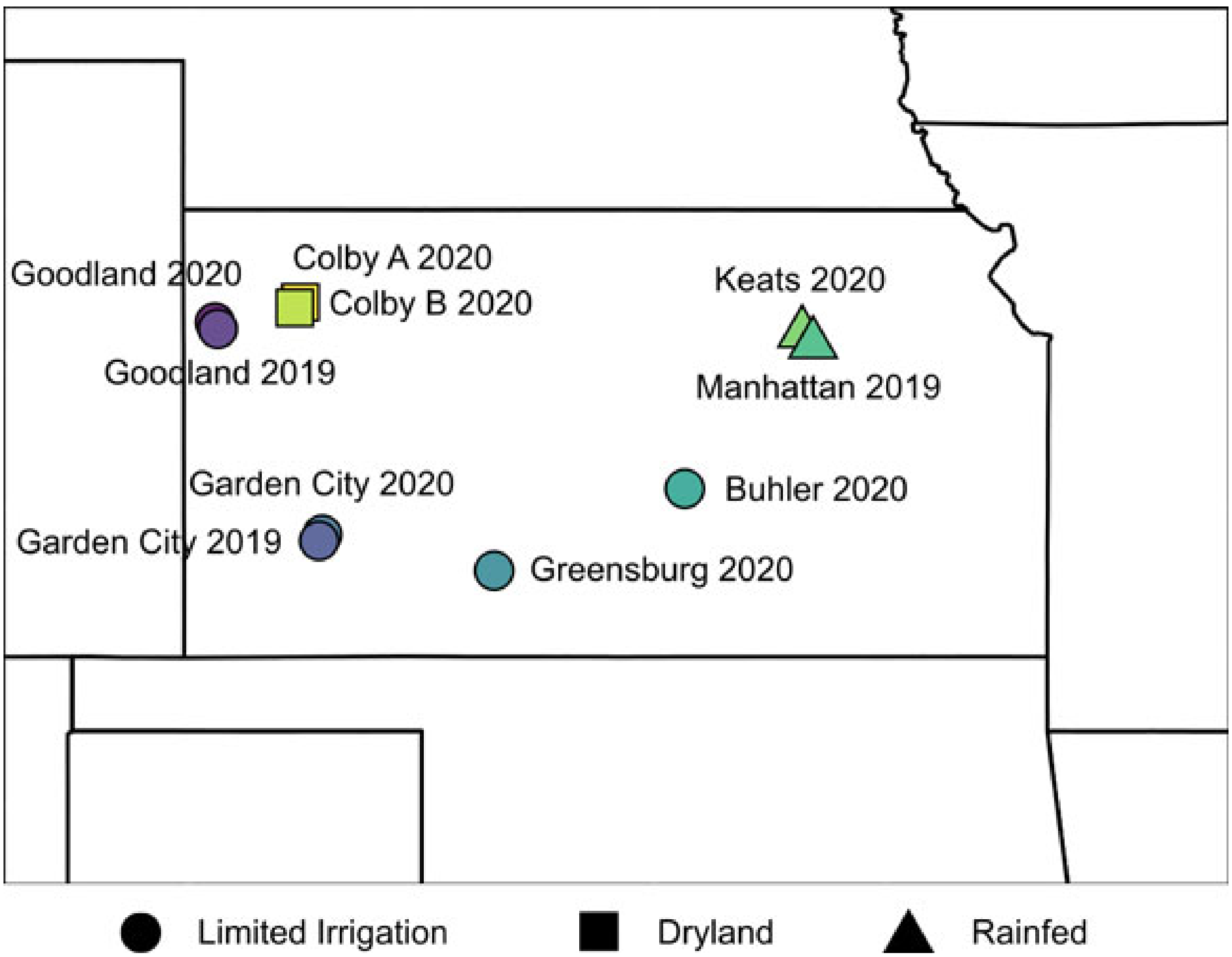

Figure 2. Field study locations. Site-years are shown by colored symbols and labeled by location and year; shapes of symbols indicate moisture management. Map by Rachel Veenstra, K-State Research and Extension.

Key outcomes

Tillering did not reduce grain yield in the environments and plant populations tested. In favorable conditions, corn tillers were able to compensate for a reduction in plant density. In all cases, plant density had to be increased to maximize attainable yield in each location (Figure 2).

Key environmental factors increasing positive yield impacts of tillers were favorable soil properties (particularly high organic matter and clay content) and high photothermal-quotient values (influenced by lower temperatures and higher solar radiation) during early corn growth stages (see publication linked below).

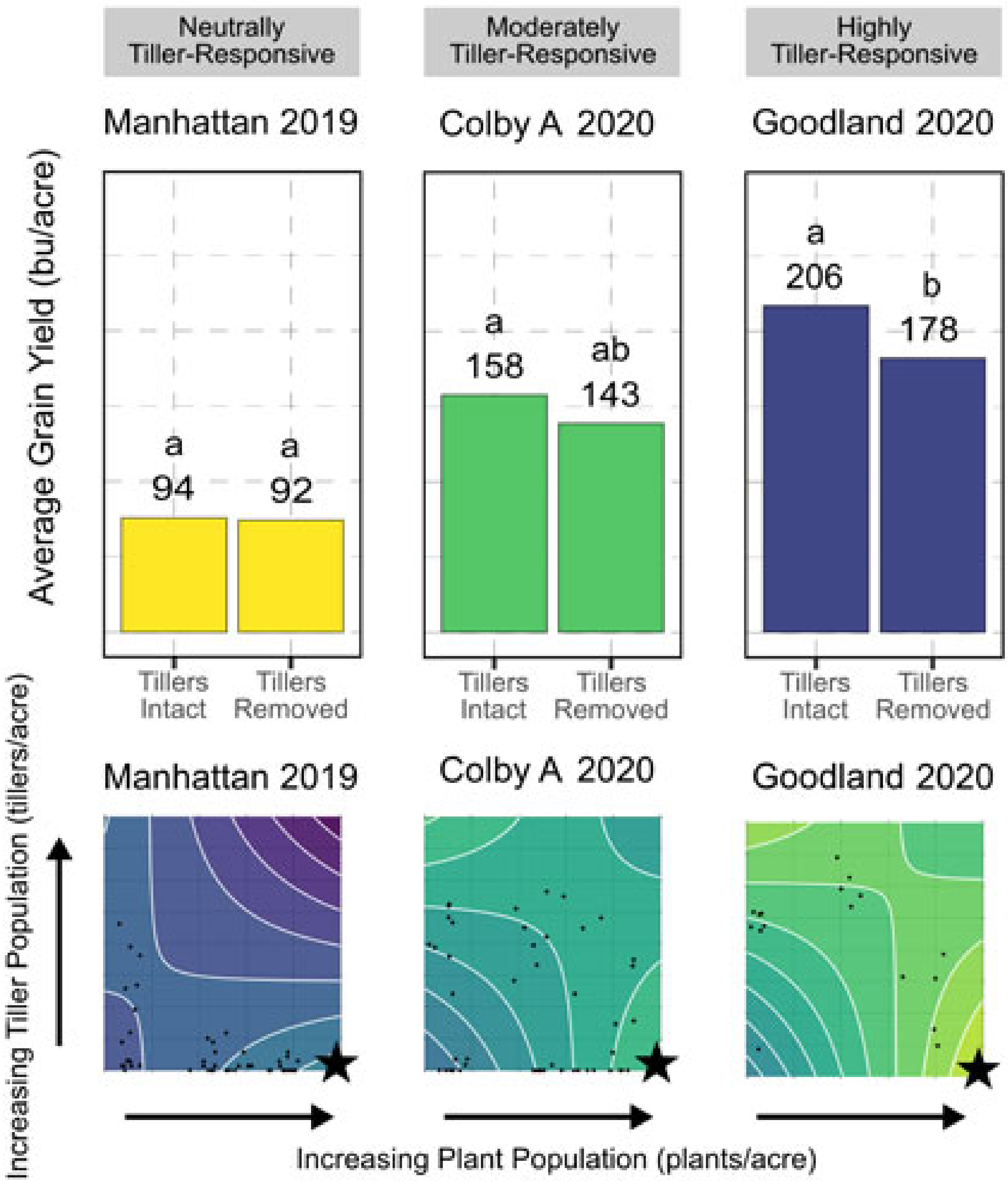

Figure 3. Top row: Yields with tillers intact and tillers removed for three example site-years. Letters indicate statistical significance of differences. Bottom row: Modeled impacts of plant population (x-axis) and tiller population (y-axis) on yields for same site-years. Color gradient

indicates yield levels, with dark colors representing lower yields and bright colors showing higher yields. The highest predicted yield in each site-year is indicated with a black star.

Summary

Regardless of location, plant density, or yield level for the hybrids tested, tillers did not reduce corn yields. Yield gain from corn tillers is less reliable than increasing plant populations; however, tillers show new potential in this study both as a method of salvaging an unexpected surplus of resources in a good year with below-optimal plant populations, and also as a new factor to consider in replant, hybrid selection, and population management decisions. Tillering could be a useful corn trait in some environmental scenarios experienced in the unpredictable Kansas climate.

This research is also summarized, along with additional graphics, in a new publication from K-State Research and Extension – MF3571 "Tillering Impacts on Corn Yields". It is available online at: https://bookstore.ksre.ksu.edu/pubs/MF3571.pdf

Financial support provided for this research was provided by Corteva Agriscience, the Kansas Corn Commission, and Kansas State University

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4. 2021 Kansas Soybean Yield and Value Contests

The Kansas Soybean Association is calling all soybean farmers in Kansas to enter their competitive soybean crop into the Kansas Soybean Yield Contest by December 1.

Aside from recognition for high-yielding soybeans, participants are eligible for monetary awards. The Kansas Soybean Commission sponsors a prize for the top three finishers in each district, as well as an additional $1,000 for the overall dryland and irrigated winners and any entries that top the 114.3 bushel-per-acre record. The prize amounts per district are first place receives $300, second will earn $200, and third will receive $100.

Districts are determined by region, tillage method and irrigation status, with a total of 18 districts in consideration. No-till on the Plains supplies additional awards in the no-till categories. Farmers may enter multiple categories, but only one entry per field.

Eligible fields must consist of at least five contiguous acres as verified by the Farm Service Agency, GPS printout or manual measurement. A non-relative witness, either Kansas State Research and Extension personnel or a specified designee, must be present at harvest and should ensure that the combine grain hopper is empty prior to harvest. Official elevator-scale tickets with moisture percentage and foreign matter included must accompany entries to be considered.

The statewide Kansas Soybean Value Contest that analyzes protein, oil and other soybean qualities is also open for entries. Entrants submit 20-ounce samples, which are evaluated by Ag Processing, Inc. to determine the value. Monetary awards are also given to the three highest-value entries. Farmers may enter both the yield and value contests.

Results of the contests will be shared January 12, 2022, at the Kansas Soybean Expo during the luncheon portion of the event.

A full guide of contest rules and regulations are available at kansassoybeans.org/contests, as well as a newly-available online entry form.

Questions may be directed to the Kansas Soybean office by phone at 877-KS-SOYBEAN (877-577-6923) or to local KSRE offices.

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5. World of Weeds - Prickly sida

Conversations at a farmer meeting recently turned to the prevalence of prickly sida (also called teaweed) in some fields in southern Kansas (Figure 1). This month's article will share some information about this weed and its management.

Figure 1. Prickly sida infestation in soybeans. Photo by Sarah Lancaster, K-State Research and Extension.

Ecology of Prickly sida

Prickly sida (*Sida spinosa)* is a warm-season annual plant in the mallow family, which is the same family as cotton, velvetleaf, and other plants found in Kansas. It can be found in fields, pastures, and roadsides in all but the western-most counties of Kansas. Prickly sida is native to North America.

Prickly sida emerges throughout the spring and summer. Germination of fresh seed was greatest after 15 days at 100/77 °F compared to lower temperatures evaluated. Wet/dry cycles over the next 112 days increase germination compared to seeds that were kept moist. Chilling for 30 days did not increase germination.

Identification

Prickly sida seedlings have two heart-shaped cotyledons with a small notch in the tip of each. The first true leaves are egg-shaped to triangular, but more mature leaves are lance-shaped to oval (Figure 2). Prickly sida can be distinguished from velvetleaf seedlings by the presence of soft, dense hairs on velvetleaf leaves. Hophornbeam copperleaf is also similar but seedlings have opposite leaves. Mature leaves are about 3/4 to 2 inches long by 1/3 to 3/4-inch-wide with serrate margins and prominent veins on the underside. Leaves are alternately arranged on the stem.

Figure 2. Prickly sida seedling with egg-shaped leaves (left) and mature plant with lance-shaped leaves (right). Photos by Sarah Lancaster, K-State Research and Extension.

Stems are typically 7 to 40 inches tall with many branches (Figure 3). There are short, spine-like projections called stipules at the base of each petiole beginning with the third leaf. Petioles are about half as long as the leaf.

Figure 3. Mature prickly side plants have many branches. Photo by Sarah Lancaster, K-State Research and Extension.

Yellow flowers form at the base of each petiole throughout the summer. Flowers have five petals and may occur alone or in clusters. When flowers mature, they form a capsule-like fruit with five parts. Each part has a single seed. Each capsule has two sharp spines on the top.

Management

Research conducted in Kansas during 1969 and 1970 suggests that prickly sida reduces soybean yield by about 10% if it emerges within 10 days of planting. Prickly sida that emerged later was less competitive. Similarly, cotton yields were only reduced by season-long interference of 64 plants per 40 feet (the greatest density studied) in experiments conducted in Mississippi during 1973 and 1974.

Recently published research conducted in Louisiana reported that prickly sida control was 89 to 95%

approximately 1 month after planting when glyphosate was applied at planting alone or with Envive (Valor + Classic + Harmony). By 2 months after planting, glyphosate-based post-emergence herbicide applications resulted in prickly sida control ranging from 86 to 79% for glyphosate only applications at planting and 89 to 86% for glyphosate + Envive. Other herbicides that are effective on prickly sida include sulfentrazone, metribuzin, Basagran, Cobra, and Liberty. Group 2 resistance was reported in prickly sida from Georgia in 1993.

The use of trade names is for clarity to readers and does not imply endorsement of a particular product, nor does exclusion imply non-approval. Always consult the herbicide label for the most current use requirements. For more information, see 2021 Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland, K-State publication SRP-1162.

References

Baskin & Baskin, 1984; Chandler, 1977; Eaton, Russ, & Feltner, 1976; Copes, Miller, Godara, & Griffin, 2021

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