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05/21/2021

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. Sorghum management considerations: Planting practices

The most critical planting practices affecting yields in sorghum are: row spacing, row arrangement, seeding rate/plant population, planting date, and hybrid maturity.

Sorghum plants can compensate and adjust to diverse environmental conditions through modifications in the number of tillers, head size, and final seed weight. For sorghum, the final number of seeds per head is the plant component that varies the most; and thus has more room for adjustment than the other plant components (seed weight and number of tillers).

Seeding rates and plant populations

Sorghum population recommendations range from a desired stand of 23,000 to more than 100,000 plants per acre depending on annual rainfall Table 1:

Table 1. Grain sorghum recommended seeding rate, plant population and row spacing at different average annual rainfall.
Source: https://www.bookstore.ksre.ksu.edu/pubs/MF3046.pdf

Avg. Annual Rainfall (inches)	Seeding rate (x 1,000 seeds/acre)*	Recommended Plant Population (x 1,000 plants/acre)	Within-row Seed Spacing (70% emergence)		
			10-inch rows	20-inch rows	30-inch rows
< 20	30-35	23-27	21-18	10-9	7-6
20 to 26	35-64	25-45	18-10	9-5	6-3
26 to 32	50-80	35-55	13-8	6-4	4-3
> 32	70-125	50-90	9-5	4-2	3-2
Irrigated	110-150	80-110	5-4	3-2	2-1

* Assuming 70% field emergence.

Because of sorghum's ability to respond to the environment, final stands can vary at least 25 percent from the values listed above, depending on expected growing conditions, without significantly affecting yields. Lower seeding rates minimize risk of crop failure in dry environments. Sorghum can compensate for good growing conditions by adding tillers and adjusting head size, but yields can be reduced in a dry year if populations are too high. For a high-yielding environment (>150 bu/acre), under narrow rows, high plant populations can be a critical factor for improving sorghum yields.

Higher seeding rates also should be used when planting late. Increase rates by 15-20 percent if planting in late-June or later. Late planting will restrict the time that sorghum plants will have in the season for producing productive tillers, thus decreasing the plants' ability to compensate for inadequate stands.

Recent research in Kansas has confirmed these long-term recommendations. In these studies, sorghum yields were maximized at 25,000 plants per acre (optimum between 20,000 to 30,000 plants per acre) in western Kansas at 17 inches annual precipitation; 40,000 in central Kansas at 30 inches annual precipitation; and 50,000 in eastern Kansas at 32 inches annual precipitation. For western Kansas, final stands of about 20,000 to 30,000 plants per acre can attain yields of 60 to 80 bushels per acre or more. For central and eastern Kansas, final stands of 50,000 to 70,000 plants per acre can maximize yields, with the final objective of having 1 to 1.5 heads per plant.

Having more than the recommended number of plants per acre results in fewer fertile and productive tillers and thinner stems, which will reduce yield in the drier environments and increase susceptibility to drought. On the other side, thin stands can compensate for better-than-expected growing conditions somewhat by producing more and/or larger heads. However, under high-yielding environments, a higher final plant population will be needed to increase yields as much as possible (Table 1).

Planting date

A summary of research data performed in the last several years has confirmed that the optimum planting date for maximizing yields will be around early June (Figure 1). Still, the decision related to the optimum planting date should be timed so plants have the best possible chance of avoiding hot, dry weather at the flowering stage, but can still have sufficient time to mature before the first frost.

Planting date has some effect on seeding rates. Sorghum will tiller more readily in cool temperatures and less readily under warm conditions. As a result, later plantings in warmer weather should be on the high side of the recommended range of seeding rates for each environment since there will be less tillering. The potential for greater tillering with earlier planting dates makes sorghum yields more stable when planted in May and early June compared to late June or July plantings.

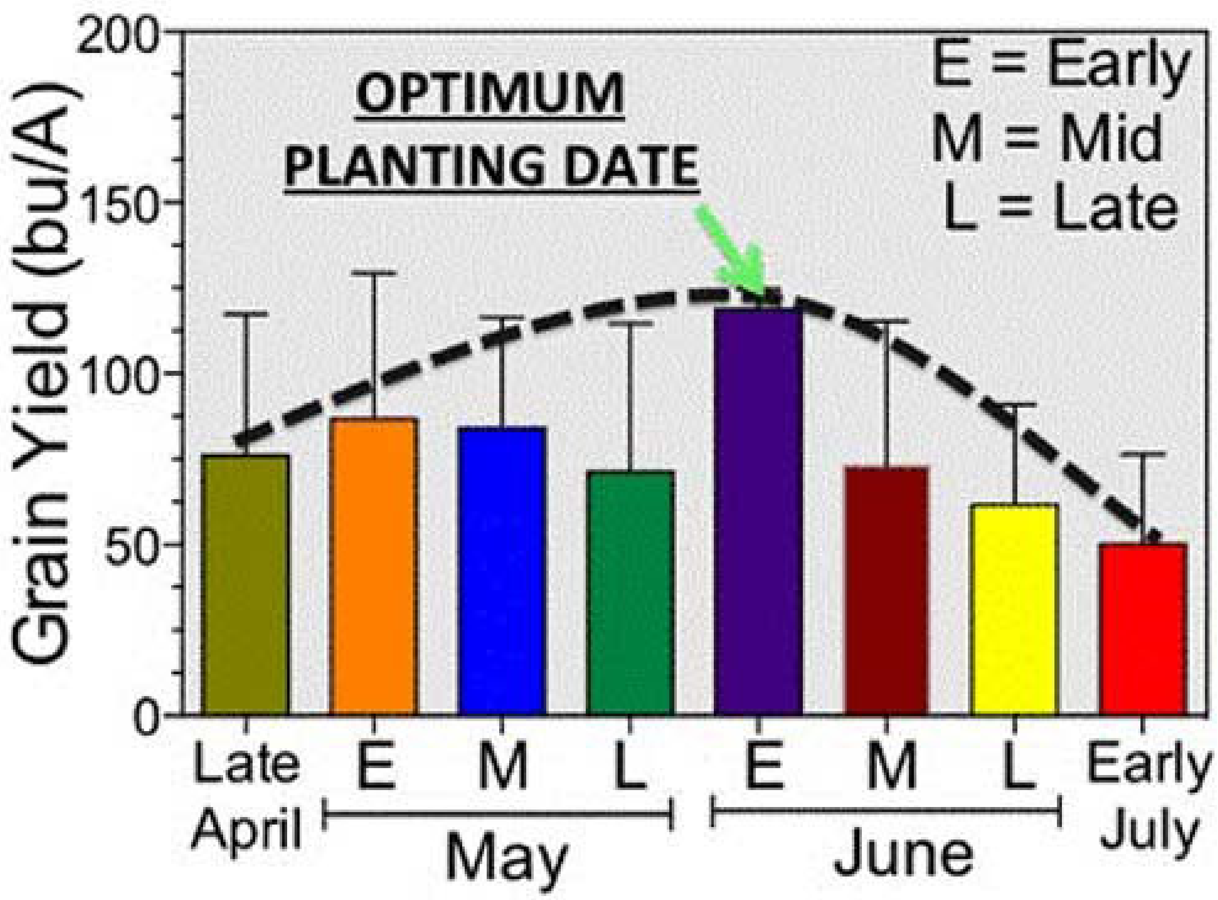

Figure 1. Planting date effect on final sorghum yields (Tribune/ Hutchinson/ Manhattan, Vanderlip; Scandia 1994-96, Gordon; St. John 1993-95, Martin and Vanderlip; Columbus 2000/03, Kelley). From Sorghum: State of the Art and Future Perspectives**, Agronomy Monographs 58, 2016, chapter "Genotype × Environment × Management Interactions: US Sorghum Cropping Systems" doi:10.2134/agronmonogr58.2014.0067, Ignacio A. Ciampitti and P.V.V. Prasad (Eds).**

Planting depth

Seed placement is also a critical factor when planting sorghum. Optimum seed placement for sorghum is about 1-2 inches deep. Shallower or deeper planting depths can affect the time between planting and emergence, affecting early-season plant uniformity.

Row spacing

The other factor that can influence yield is row spacing. A response to narrow row spacing is expected under superior growing environments, when water is a non-limiting factor. Narrow rows increase early light interception, provide faster canopy closure, reduce evaporation losses, can improve suppression of late-emerging weeds, and maximize yields.

The comparison between wide (30-inch) vs. narrow (15-inch) row spacing shows a close relationship, with an overall yield benefit of 4 bushels per acre with narrow rows. In addition, narrow rows out yielded wide rows in 71 percent of all observations evaluated (Figure 2). A more consistent response to narrow rows was documented when yields were above 70 bushels per acre, with a greater chance of having higher yields when using narrow rows, but the response is not always consistent. Under low-yielding environments, conventional (30-inch) wide row spacing is the best alternative.

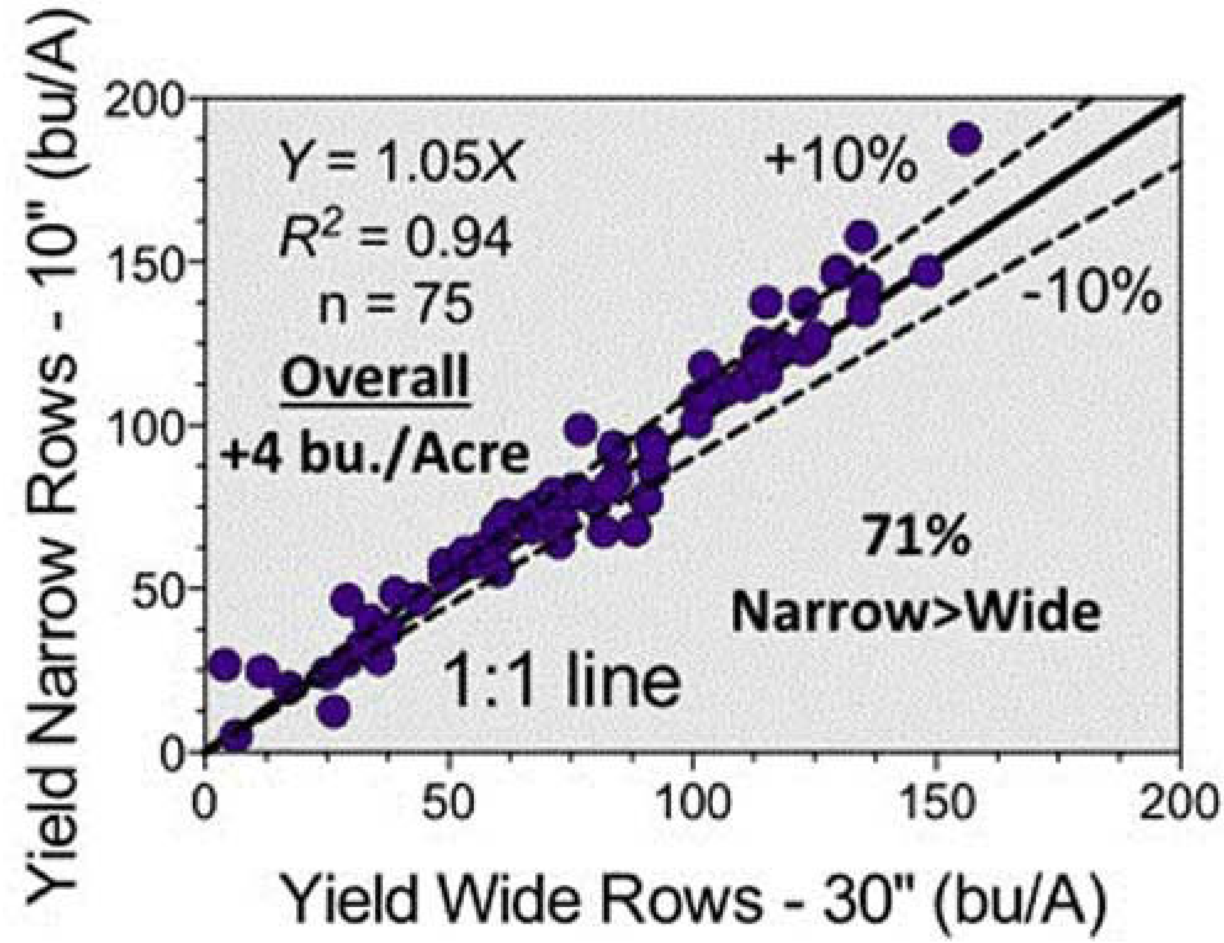

Figure 2. Yield in narrow rows versus yield in wide rows. From a total number of 75 observations, 71% had a greater yield in narrow as compared to wide row spacing.

Should populations be adjusted with narrow rows?

Research results indicate that the population producing the greatest yield doesn't change with different row spacing, but the magnitude of response to population potentially can be greater with narrower row spacing in high-yielding environments.

Planting date seems to have an interaction with row spacing. Over three years at the North Central Experiment Field, there was essentially no difference in yield between 15- and 30-inch rows for late-May plantings, but there was a 10-bushel yield advantage for 15-inch rows for late June plantings. A similar response was observed at Manhattan in 2009 when no difference in row spacing was observed for the May planting, but 10-inch rows had an 11-bushel/acre yield advantage over 30-inch rows with the June planting. In all cases, yields were less with the June planting, but the June plantings at Belleville and Manhattan averaged more than 115 bushels/acre.

Hybrid selection

The selection of sorghum hybrids should be based not only on maturity, but also on other traits such as resistance to pests, stalk strength, head exsertion, seeding vigor, and overall performance. The selection of a sorghum hybrid based on its maturity should be strictly related to the planting date, expected duration of the growing season, and the probability the hybrid will mature before the first freeze event. Shorter-season hybrids might be a better fit for late planting dates (mid-June to July depending on the regions); while a longer-season hybrid is recommended when planting time is early and the duration of the growing season is maximized. The goal is to plant a hybrid maturity at each particular site/environment (weather and soil type) so the plants can bloom in favorable conditions, and have adequate grain fill duration before the first fall freeze occurs.

Summary

- Determine your desired population based on average rainfall and expected growing conditions. There is no need to go overboard.
- Make sure you plant enough seed for your desired plant population. About 65-70 percent field germination is a good general rule to use.
- Think about using narrower row spacing to close the canopy sooner and potentially capture greater yields in yield environments of 70 bushels per acre or more.
- Planting data and hybrid selection are tied together and are related to the conditions experienced by sorghum plants during the late summer. Think about this before deciding your planting time and selecting a hybrid.

Suggested Resources from K-State Research and Extension

"Kansas Sorghum Management" MF3046
https://bookstore.ksre.ksu.edu/pubs/MF3046.pdf

"Narrow-row Grain Sorghum Production in Kansas" MF2388
https://bookstore.ksre.ksu.edu/pubs/MF2388.pdf

"2020 Kansas Performance Tests with Grain Sorghum Hybrids" SRP1161
https://www.bookstore.ksre.ksu.edu/pubs/SRP1161.pdf

"Sorghum Growth and Development" poster
https://bookstore.ksre.ksu.edu/pubs/MF3234.pdf

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2. 2021 Kansas wheat plot tours

After over a year of virtual events, the Department of Agronomy and K-State Research and Extension will host several face-to-face winter wheat variety plot tours in different regions of the state, starting May 10 and going into April. Make plans to attend a plot tour near you to see and learn about the newest available and upcoming wheat varieties, their agronomics, and disease reactions. A preliminary list of plot tour locations, dates, times, and directions is provided below. Stay tuned to the eUpdate in the coming weeks as this list is updated.

Plot	Agent	Date	Time	Directions
Marion	Rickey Roberts	5/21	8:00 AM	Hillsboro plot is located on Hwy 56 about two miles E of town on South side of road where the large grain holding facility was built
McPherson	Shad Marston	5/21	11:00 AM	Patrick plot Marquette. North East side of intersection Marquette & Hwy 4
McPherson	Shad Marston	5/21	3:00 PM	Inman plot; 4th Ave and Cheyenne, quarter mile east.
McPherson	Shad Marston	5/21	1:00 PM	Galle plot, Moundrige: 1/4 mile north of intersection 23rd Ave and Cheyenne
Marion	Rickey Roberts	5/24	8:00 AM	The Tampa plot cooperator is John Hajek. Plot is located on 320th just East of Old Mill Rd intersection, North side of the road.
Lorraine	Craig Dinkel	5/24	11:00 AM	From Lorraine, go south 1 mile on 10th road, then 3 miles west on avenue W. Plot is located on the intersection of Ave W & 7th road
Barton Co	Stacy Campbell	5/25	8:30 AM	On the ground across from the Expo. Center 2.5 miles W. of Great Bend on W. Barton Co. Rd
Ellis Co	Stacy Campbell	5/25	6:00 PM	From I-70 take Victoria exit, go N. 2.5 miles on Cathedral Rd. turn W. onto Fairground Rd. go 1 mile, turn S. onto 330th Ave. about ¼ mile on E. side of road
Post Rock - Smith	Sandra Wick	5/26	10:00 AM	1/4 mile S of Smith Center right on Hwy. 281 on the west side of the highway.
Post Rock - Jewell	Sandra Wick	5/26	10:30 AM	Off of highway 14 in Jewell then east on Hwy 28 to 230 Road (4 mi.), then north ¾ mi. on the east side of the road.
Post Rock - Osborne	Sandra Wick	5/26	1:30 PM	Off of highway 24, south on “Sale Barn Road” or 115th Avenue about ¼ mile on the west side.
Post Rock - Lincoln	Sandra Wick	5/26	1:30 PM	½ mile west of Barnard to 240th Road and then ½ mile north on the east side.
Post Rock - Mitchell	Sandra Wick	5/26	4:30 PM	10 miles south of Beloit on 14, 8 miles east on S road, plots are on the south side of the road
Riley	Greg McClure	5/26	6:30 PM	14401 Bodaville Rd, Randolph, Ks. From Randolph – 4.2 miles west on Green-Randolph

				Road, turn north on County Road 875 and continue for about 11 miles, then turn east on Bodaville Rd. The Fancy Creek Church is at the corner of Ober Road (875) and Bodaville Rd. The plot is ½ mile east on Bodaville Rd.
Walnut Creek - Rush	Chris Long	5/27	8:00 AM	from LaCrosse, go 7 miles west on Hwy 4, then continue another 1 1/2 miles on Road L, on south side
Walnut Creek - Ness	Chris Long	5/27	11:00 AM	from Ness City, go 7 miles south on Hwy 283 to 60 Rd, west 7 miles to L Rd, south 1 1/4 lines on east side
Walnut Creek - Lane	Chris Long	5/27	5:00 PM	from Dighton, go west on 96 for about 7 miles, turn south, go 2 miles, turn west 1/4 mile, on south side of road
Mentor	Jay Wisbey	5/28	8:30 AM	Mentor Location just West of Town (Mentor) on the Northside of the road. 38.74031909188133, -97.60479299765356
Solomon	Jay Wisbey	5/28	11:00 AM	Tom and Pat Ryan Plot: Take old 40 highway West of Solomon then south on N Gypsum Valley Road 2.5 Miles just over the river bridge on the East side of the road.
Minneapolis	Jay Wisbey	5/28	2:30 PM	From Minneapolis, take 106 HWY south just past the Salt creek bridge and go west 2 miles to 90th road. North ¼ of a mile west of his irrigation circle.
Edwards Co	Marty Gleason	6/1	12:00 PM	From Offerle, 9 1/2 miles north on 20th avenue. Plots are north of intersection with I road.
River Valley - Stunkle	Rebecca Zach	6/1	3:30 PM	From Palmer, 5 miles south on Liberty road, then 5 1/2 miles east on Parallel/County Line road, plots on the south side of the intersection of County line Rd and Quivira Rd.
River Valley - Ohlde	Rebecca Zach	6/1	5:30 PM	From Linn, go northeast about 3.5 miles on 15 until intersection with 9, turn west on 10th road for a mile until Prairie Rd., go north about 1/2 mile. Plots on the west side of the road.
Pawnee	Kyle Grant	6/1	6:00 PM	From Larned go K-19 South to Zook Blacktop east 5 or 6 miles to 70 Ave than north 1 ¼ miles.
River Valley - Belleville	Rebecca Zach	6/2	1:00 PM	2 miles west of Belleville, on the north side of the road at the KSU experiment field.
River Valley - Peyton Frybarger	Rebecca Zach	6/2	4:00 PM	2330 Elm Road, Munden, KS
River Valley - Polansky	Rebecca Zach	6/2	6:00 PM	2 miles west of Belleville on 36, 1.25 miles south on 15. Plot is on the west side of the road.
Kingman	Kallie Turner	6/3	9:00 AM	7681 SW 80th Avenue, Kingman KS. Plot is on the north side.

Phillips-Rooks	Cody Miller	6/3	TBD	From Phillipsburg- Travel North on HWY 183 to E. Osage, Turn East and travel about 1/16 of a mile. Plot is on the South side of the road
Phillips-Rooks	Cody Miller	6/3	TBD	From Stockton- Travel North on HWY 183 to E. Road, Turn East and travel to 21 Road. The plot is on E. Road about ½ a mile East of 21 Road on the North Side of the Road. (If you get to Riffels mailbox you have gone too far.)
Abilene	Rickey Roberts	TBD	TBD	The third plot is with Steve Hoover. That plot is located on Hwy 15 N of Abilene at the intersection of Hwy 15 & 18.
Ford Co - Dodge City	Andrea Burns	TBD	TBD	Highway 50 Bypass & 116 Road Across from Koch Nitrogen Plant, Dodge City
Thomas Co	Emily Bennigsdorf	TBD	TBD	Solomon Creek Farms located 4 1/2 miles south of Levant/I-70 Interchange on County Road 11
Sunflower	Jeanne Faulk Jones	TBD	TBD	TBD
Sunflower	Jeanne Faulk Jones	TBD	TBD	TBD
Sunflower	Jeanne Faulk Jones	TBD	TBD	TBD
Sunflower	Jeanne Faulk Jones	TBD	TBD	TBD
Twin Creeks	Keith VanSkike	TBD	TBD	From Dresden, KS travel South on 23 then at the #9 and 23 intersection go east on #9 to 2000th Road on the North side of the road. GPS: 39.568082, -100.36731
Twin Creeks	Keith VanSkike	TBD	TBD	Travel on HWY 36 west of Oberlin, KS about 2.5 miles. GPS coordinates: 39.828330, -100.584228
River Valley - LeClair	Rebecca Zach	NA	NA	From Clifton, 6 1/4 miles north on Eagle road, plots on the west side of the road north of 6th.
Barber Co (Isabel)	Justin Goodno	Virtual	Virtual	Intersection of Main St and Hwy 42 on Isabel.
Barber Co (Kiowa)	Justin Goodno	Virtual	Virtual	HYW 281 / HWY 2 intersection on the north side of Molz shop and grain bins.
Wild West District	Ron Honig	NA	NA	SE 17-31-34. Go 6 miles NE of Hugoton on Hwy 56 to Rd V (County RD 16), then east 12 miles to Rd B, then 5 miles north and then 1/2 mile east on field road.

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3. K-State Insect Diagnostics Program accepts digital images for insect identification

The Insect Diagnostics Program is currently accepting identification requests of digital images using this Online Identification Request Form. Providing clear photos and filling out as much information as possible in the form will help our specialists make accurate determinations and aid in providing more information about the specimen as well as appropriate control recommendations if applicable. The goal of the Insect Diagnostic Laboratory is to provide a prompt yet accurate diagnosis of insects and insect related problems.

Before submitting your form along with photos, here are a few tips for photographing specimens you would like to be identified.

Types of photos for different insects

When possible, three images should be submitted. For most arthropods, an image of the top (dorsal) of the animal is most crucial; many insects can be identified with this image alone. Some require other views:

- For most larvae (caterpillars, grubs, maggots) side and bottom (ventral) views are important as well as the head capsule.
- Beetles should be shown with top, bottom, and head (front) views.
- Butterflies and moths should have clear views of wings both above and below.
- Spiders should have top (body) and front (head) views with a visible arrangement of their eyes.

Fill the frame

Aim to get as close to the subject as possible while still ensuring that it is in focus. Cropping a photo afterwards can be an acceptable way of enlarging your subject depending on the camera you are using.

In general, specimens that are less than 5 mm (1/4 inch) are too small to be identified from images using common digital equipment even if zooming in or cropping. Use judgment on specimens that are small but larger than 5 mm.

Lighting

Be sure the subject is well lit. Avoid casting a shadow over it as you take the photo. Good lighting is essential for observing true coloration and other important physical aspects of an insect. Good lighting will also help to get the subject in focus more easily.

Focus

Blurry or out of focus, subjects usually cannot be identified with certainty. Active specimens can be slowed down by placing them in a freezer or refrigerator for a short time before taking pictures. This will reduce the chances of capturing a blurry photo of the specimen due to movement.

Living Subjects

Pictures of live specimens are preferable. Many caterpillars and soft-bodied insects lose their natural color or become dark when they die. Additionally, identification manuals use color patterns to help distinguish different species, colors on adult specimens can fade when they die. Responses will be transmitted using the contact info you provide on the form. One to five business days may be required to make an identification. Depending on time of the year and complexity of the problem, more time may be needed. Please visit the Insect Diagnostics website for more information at: https://entomology.k-state.edu/extension/diagnostician/

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4. World of Weeds: Tumble windmillgrass

Tumble windmillgrass (*Chloris verticillata*), also called windmillgrass is this month's World of Weeds feature. Questions have been coming in about how to manage this grass as it can be difficult to control with herbicides once it becomes established in no-till fields.

Ecology of windmillgrass

Tumble windmill grass is native to the United States. It can be found throughout Kansas and is also present in much of the central and southern plains, as well as the Corn Belt and northeastern U.S. It is a warm-season perennial that has historically been a problem in turfgrass, but it has invaded no-till crop fields. It can be found in pastures and rangeland, but is rarely considered a serious problem in those areas. It can be found in all soil types but tends to grow better in sandier soils.

The plant gets its common name from the inflorescence, which detaches to become a tumbleweed. Tumble windmillgrass does hybridize with related species, which may result in some variation in plant features.

Identification

The leaves of tumble windmillgrass are folded and very narrow, about 0.02 to 0.2 inches wide and 0.04 to 0.6 inches long. Mature leaves are generally hairless. The ligule is a short fringed membrane and there are hairs around the ligule. The margins of the leaf sheath do not touch and have wispy hairs along the margins. Also, the margins of the leaf sheath tend to be lighter in color than the rest of the leaf sheath (Figure 1).

Figure 1. Tumble windmillgrass leaf sheath and collar region. Photo by Sarah Lancaster, K-State Research and Extension.

Tumble windmillgrass stems are very flat and grow low to the ground (Figure 2). The flowering stalks are typically 3 to 16 inches tall. The inflorescence is a composed of 6 to 20 branches that occur in 2 to 4 whorls. Each branch 1.5 to 6 inches long. Spikelets are 0.08 to 0.2 inches long with two awns, each about 0.1 to 0.4 inches long. Tumblewindmill grass spreads by seeds, as well as stolons (Figure 3). It has a shallow fibrous root system, with most of the root mass less than 4 inches deep.

Figure 2. Tumble windmillgrass growing in a thin stand of smooth bromegrass. Photo by Sarah Lancaster, K-State Research and Extension.

Figure 3. Tumble windmillgrass rhizomes in a no-till field. Photo by Sarah Lancaster, K-State Research and Extension.

Management

There is limited research regarding management of tumble windmillgrass in agronomic crops. In field studies conducted at K-State during the early 2000's, pre-emergence application of atrazine with acetochlor, dimethenamid, S-metolachlor, and isoxaflutole provided excellent control of recently-seeded tumble windmillgrass. Glyphosate, which is generally very effective on grasses, and Group 2 herbicides like quizalofop (Assure II, others) and clethodim (Select Max, others) were effective on seedling tumble windmillgrass, but did not control established plants well. Laboratory studies conducted to complement that field work indicated the cause of poor control by herbicides is that very little herbicide moved out of the treated leaf once plants are tillered. Shallow roots also contribute to poor control because they result in stressed plants that do not easily absorb herbicides during hot, dry conditions. Shallow roots are advantageous when using tillage to control tumble windmillgrass.

In recent studies at K-State, one summer tillage event with a sweep plow effectively controlled tumble windmillgrass one month after tillage, with no effect on soil aggregates or soil organic carbon. The difficulty of controlling established stands means that scouting is an especially important component of managing tumble windmillgrass in order to control it before seedlings become established.

References:

Obour et al. 2021; Hennigh et al. 2005

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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.

5. 2020 National Winter Canola Variety Trial results

The results of the 2020 National Winter Canola Variety Trial (NWCVT) are now available online at https://bookstore.ksre.ksu.edu/pubs/SRP1164.pdf. The objectives of the NWCVT are to evaluate the performance of released and experimental varieties, determine where these varieties are best adapted, and increase the visibility of winter canola across the United States. Breeders, marketers, and producers use data collected from the trials to make informed variety selections. The NWCVT is planted at locations in the Great Plains, Northern Plains, Midwest, and Southeast.

Seed for the NWCVT was distributed to 31 test sites in 18 states for the 2019–2020 growing season. The locations receiving seed are illustrated on the map on the front cover (Figure 1). See the back cover for a listing of participating cooperators. Of the 24 entries, 10 are commercial and 14 are experimental. These entries were provided by eight seed suppliers. All entries in the trial were treated with insecticide and fungicide seed treatments to control insects and seedling diseases through the late fall and early winter months.

In general, the 2019–2020 growing season was marked by dry conditions that made establishment especially difficult. Temperatures were moderate but winter kill was a factor where plant size was too small for overwintering. Spring weather including severe storms and late freezes negatively impacted the crop at the reproductive stage.

Nine harvested test sites in six states are included in this report: Fruita, CO; Vincennes, IN; Belleville, Garden City, and Manhattan, KS; Clovis, NM; Chickasha and Lahoma, OK; and Alburgh, VT. Nineteen locations were not harvested because of poor stand establishment, winterkill, or spring weather. A handful of locations were abandoned because of operational restrictions as a result of the COVID-19 pandemic. A new cooperator in 2019–2020 was Moccasin, MT.

Acknowledgments

This work was funded in part by the fees paid by seed suppliers, the United States Department of Agriculture National Institute of Food and Agriculture Supplemental and Alternative Crops Competitive Grants Program, and the Kansas Agricultural Experiment Station. The project would like to extend sincere gratitude to former assistant scientist, Scott Dooley, for his dedication and 10 years of service to supporting all NWCVT activities. Sincere appreciation is expressed to all participating researchers and seed suppliers who have a vested interest in expanding winter canola acres and increasing production in the United States.

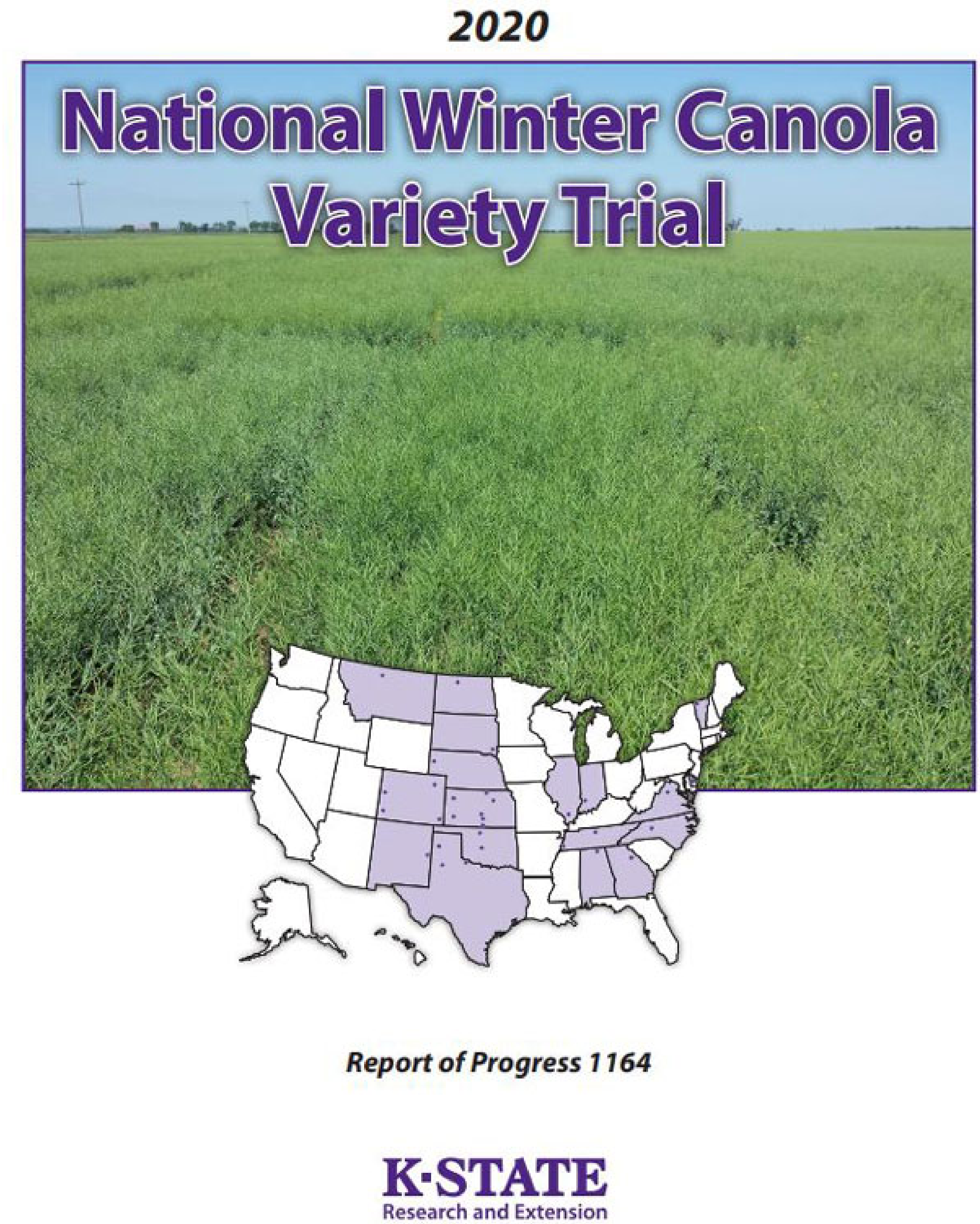

Figure 1. Front cover of the 2020 National Winter Canola Variety Trial Report of Progress 1164.

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