Issue 985

K-STATE Research and Extension

Extension Agronomy

eUpdate

12/07/2023

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. Mungbeans: Potential for crop diversification in Kansas

Diversifying crops in a crop rotation provides economic, environmental, and risk management benefits. One opportunity for diversification is the incorporation of mungbean as a summer crop alternative in Kansas (Figure 1). Over the last two decades, mungbean demand has significantly increased in the United States and globally, driving increases in production. This crop is primarily used for human consumption due to its protein-rich, edible seeds. Mungbeans are commonly consumed as a sprout or a grain in soups and curries throughout India and Southeast Asia.

Figure 1. Mungbean developmental stages are similar to soybean. Plant height ranges from 24-30 inches. Photo by Claire Bott, K-State Research and Extension.

Mungbean is a warm-season legume, meaning that, like soybean, it can fix atmospheric nitrogen and aid in maintaining soil health. Their seeds have high grain protein content, and the crop has a remarkable tolerance to heat and drought and a short crop duration (Figure 2). These characteristics make this crop a great candidate for double cropping after winter wheat or canola harvest. Double cropping after a winter crop can be a high-risk venture, as the available growing season is relatively short. Hot and dry conditions in July and August present a risk to germination, emergence, seed set, or grain fill, ultimately impacting final yields and economic stability. Mungbean can excel even under

these challenging conditions.

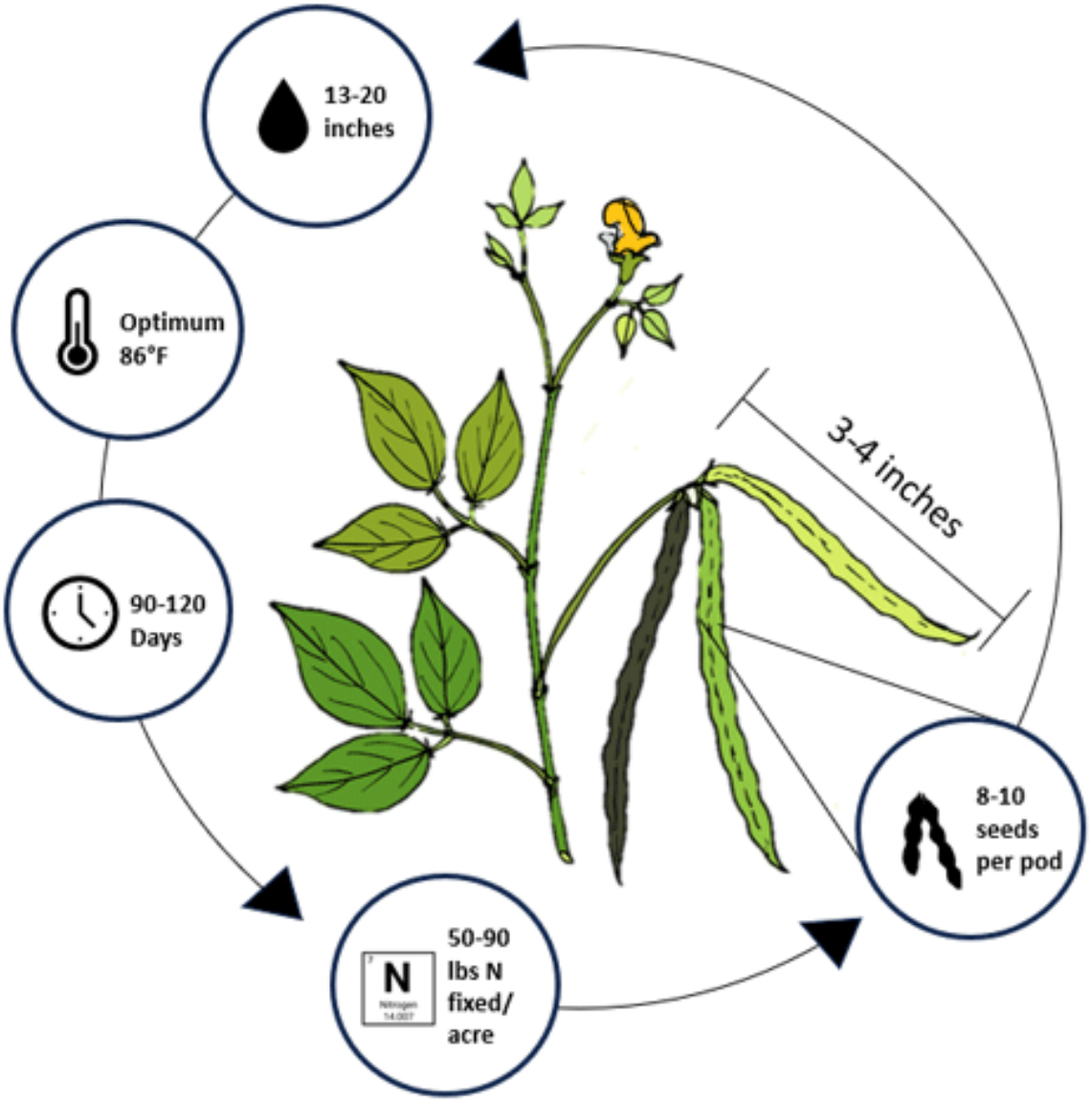

Figure 2. Growth characteristics of mungbeans. Graphic by Claire Bott, K-State Research and Extension.

However, the incorporation of a new crop in a region is a challenging process that demands the definition of several management practices. Some of the most relevant management questions are:

- When is the optimal planting window?
- What is the target plant density?
- What are the total nutrient requirements?
- What are the economic returns for this crop?

To better understand mungbean behavior under Kansas growing conditions, a study at Kansas State University investigated the effects of plant stress (shading or reduction of solar radiation) at different points of the crop's growing cycle. Preliminary results suggest that stress experienced by mungbean plants during R1 through R4 (flowering through the end of grain-filling) can significantly reduce final yield. Stresses experienced prior to reproductive stages did not significantly affect the final seed yields (Figure 3). These findings can guide management decisions such as planting date and location to avoid stressful conditions during the reproductive phases.

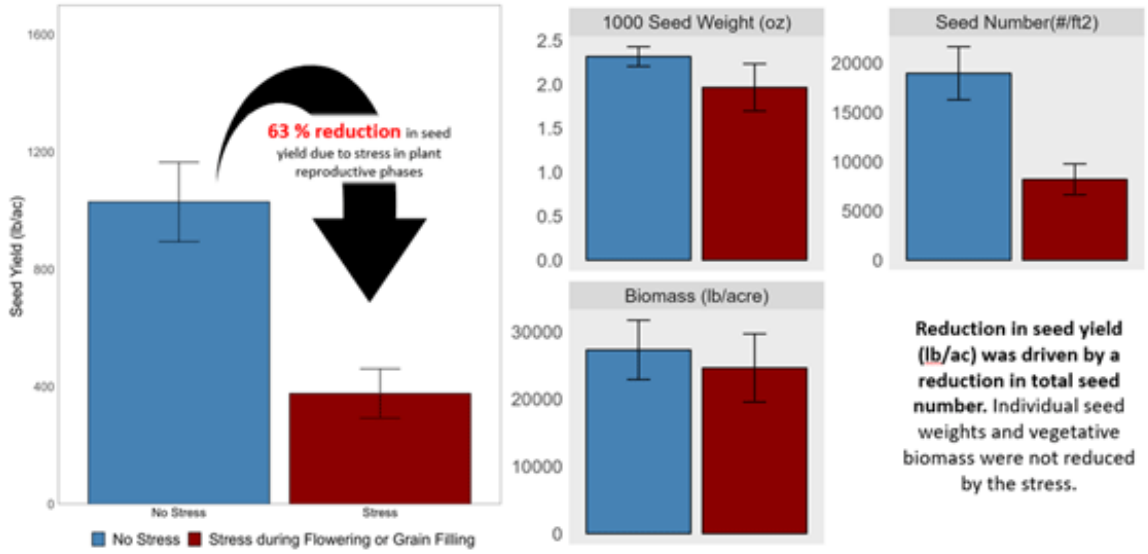

Figure 3. The effect of stress during flowering and grain filling on mungbean seed yield, seed weight, seed number, and plant biomass. Graphic by Claire Bott, K-State Research and Extension.

Mungbean has significant potential to be successfully introduced into Kansas cropping systems. The short crop duration (90-120 days), potential to be placed after harvest of a winter crop, and the overall tolerance to heat and drought are all very attractive points for the expansion of this crop. Additional research continues to answer questions about crop management and seeks to identify regions in Kansas where mungbean can benefit growers the most.

Claire Bott, Research Scholar Ciampitti Lab
cb44@ksu.edu

Victor Gimenez, Post-doctoral Fellow Ciampitti Lab

vgimenez@ksu.edu

Ana Carcedo, Post-doctoral Fellow Ciampitti Lab
carcedo@ksu.edu

Ignacio Ciampitti, Farming Systems
ciampitti@ksu.edu

2. Crabgrass could serve as an alternative cattle forage

K-State Research and Extension released a new publication this fall on using crabgrass as an alternative forage for cattle. An online version of the publication is available at https://www.bookstore.ksre.ksu.edu/pubs/MF3644.pdf, and copies can be ordered from the K-State Research and Extension Bookstore at https://bookstore.ksre.ksu.edu/

In eastern Kansas, pasture is the most important source of feed for livestock. In systems with cool-season forages, a lack of forage may occur during the summer. Because cool- and warm-season grasses have different photosynthetic mechanisms, one option to extend the grazing season is to have pastures with warm-season forage grass, such as crabgrass (*Digitaria* spp.), that produce most of the forage during hot months.

Crabgrass is a forage introduced to the United States in 1849. It is an annual species, but due to its high capacity to produce seeds, allowing reseeding, it is considered a perennial forage. Crabgrass is considered a weed by many producers, but it can be a beneficial option to feed cattle because of its high yield and palatability. Its forage quality is higher than other warm-season grasses, such as bahiagrass and bermudagrass. Crabgrass has a clump-type growth habit and, due to the presence of stolons (stems growing horizontally, which can produce roots), spreads aggressively. It can also be used as a cover crop.

Pasture Establishment

Crabgrass should be seeded in a clean area in spring when there is little chance of frost. Seeds should be drilled no deeper than ¼ inch. Seeds planted below ½ inch may result in a poor pasture stand. The seeds can also be broadcast, but it is recommended to cultipack after seeding to improve seed-soil contact and reduce loss due to a heavy rainfall.

A good stand (dense and healthy) can be achieved by seeding 4 to 6 pounds of pure live seed per acre. With adequate moisture, seed germination begins when the soil temperature reaches 55 degrees Fahrenheit. Pasture establishment can be sped up through nitrogen fertilization when the seeds have germinated and tillers are in the early stages. Nitrogen input improves tillering and, consequently, reduces runoff and controls weeds.

Weed Control

Controlling weeds is essential as weeds will compete with crabgrass for water, nutrients, and sunlight. The best way to control weeds is to stimulate growth by maintaining adequate soil fertility levels, which will result in a rapid establishment and soil cover. The faster the pasture is established, the less chance weeds have to grow. If crabgrass is growing well, shading (lack of sunlight) will limit weed emergence and development. In addition, adequate harvest management helps to control weeds by avoiding overharvesting. When the stubble heights are lower than 3 to 4 inches, the plant reserves may be compromised, reducing the capacity and the velocity of regrowth. Lower stubble height may result in thinner stands where weeds will find room to emerge.

Herbicides can also be used to control weeds in association with harvesting management. Before using any herbicide, always consult the label for application restrictions and instructions, such as recommendations about rates, timing, and grazing restrictions. Only allow grazing after the grazing restriction period has ended. These recommendations can be found in the K-State publication

Chemical Weed Control for Field Crops, Pastures, Rangeland, and Noncropland, available online at https://bookstore.ksre.ksu.edu/pubs/chemweedguide.pdf

Fertilization and Harvesting Management

Soil fertility directly affects forage production and quality. It is important to highlight that fertilization should be done based on soil test results. Thus, the first step is to take representative soil samples to support an adequate fertilization program. Contact your local extension agent for instructions about soil sampling and tests.

During the establishment phase, phosphorus is the most important nutrient. Phosphorus stimulates root development and tillering, accelerating the pasture establishment and reducing the chance of runoff, erosion, and weed infestation. In an established pasture, nitrogen is the most important nutrient as nitrogen increases forage yield and improves quality. Potassium enhances the nitrogen effect and needs to be taken into consideration in southeast Kansas, where potassium soil levels are commonly lower.

Harvest management is another factor that drives both forage production and quality. When forage plants are harvested, it stimulates the production of new leaves that have higher photosynthetic potential and nutritive value. In a rotational stocking system, the pasture should be grazed when the canopy height is not more than 12 inches to maintain high forage quality. Ideally, the best condition to graze a crabgrass pasture is when the canopy reaches 6 to 8 inches in height. At the same time, keeping the stubble height not lower than 3 to 4 inches is essential. The same recommendation can be used to define hay harvesting.

Combining fertilization and harvesting management may be an interesting option to improve forage yield and quality. A 2-year (2020 and 2021) study was conducted in Columbus, Kansas, to evaluate how five combinations between two harvest managements (harvested once or twice; H1 and H2, respectively) and three nitrogen rates (0, 100, and 200 lb/acre; N0, N100, and N200, respectively) affect the agronomic performance of two crabgrass varieties ('Mojo' and 'Quick-N-Big').

For Mojo, forage production was higher when two harvests were combined with nitrogen fertilization (100 or 200 pounds of nitrogen per acre). For the Quick-N-Big, nitrogen fertilization increased the forage production in both years regardless of the harvesting management (Figure 1a). The total digestible nutrients (TDN) varied little between treatments, with values ranging around 50% for Mojo and 51% for Quick-N-Big (Figure 1b).

In both varieties, crude protein increased when the pasture was harvested twice and was higher as more nitrogen was applied (Figure 1c). The positive effect of nitrogen fertilization and two harvests on the forage production and crude protein resulted in a higher crude protein production per acre, mainly when two harvests were combined with 200 pounds of nitrogen per acre (Figure 1d).

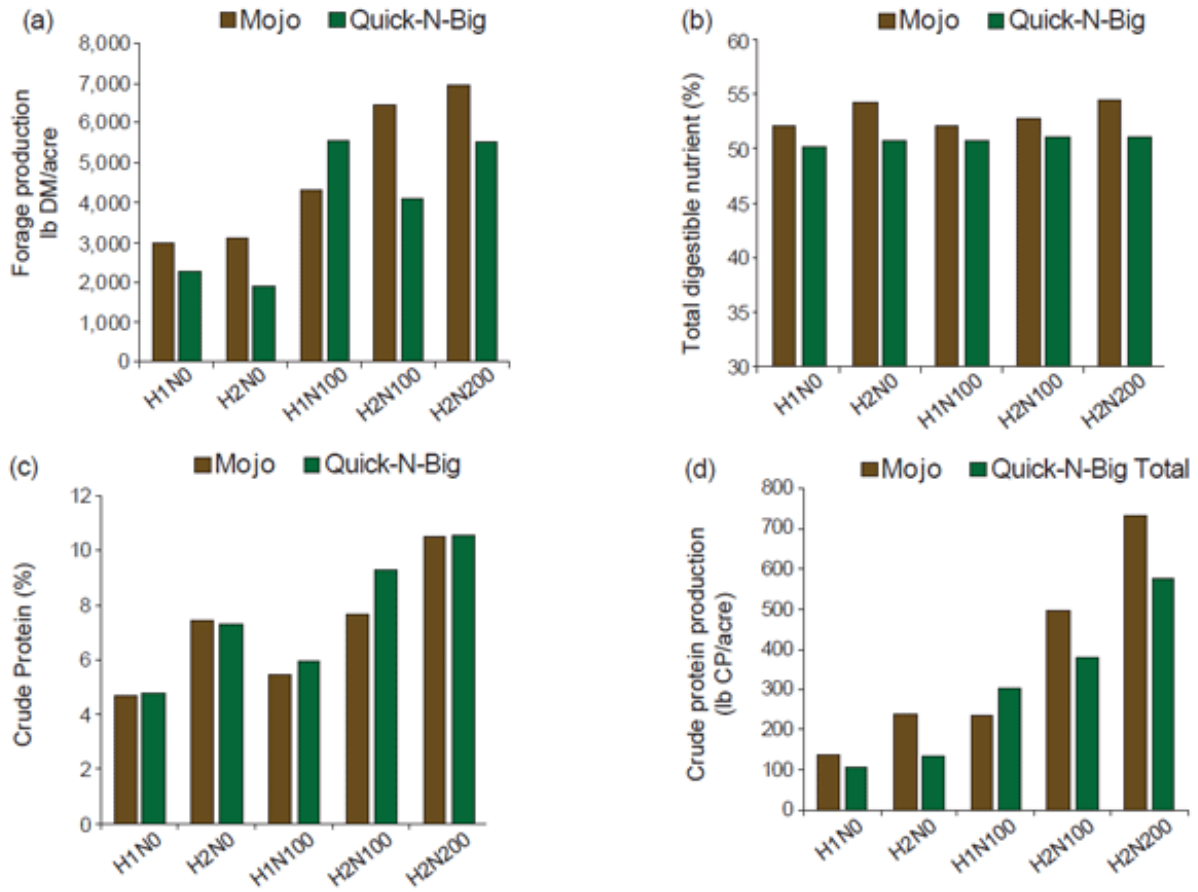

Figure 1. Effect of N fertilization and harvest management on forage production (a), total digestible nutrients (b), crude protein (c), and crude protein production (d) in 'Mojo' and 'Quick-N-Big'.

Harvesting management and nitrogen fertilization can be used to increase forage production and improve forage quality; however, fertilizer prices must be considered. Based on 2023 fertilizer prices, the best management would be applying 100 pounds of nitrogen per acre with two harvests during the growing season. Nitrogen losses from mineral fertilizers are always a concern in forage systems, and split-applying nitrogen is an alternative to increase nitrogen-use efficiency. Thus, it is safe to apply 50 pounds after each harvesting, avoiding major losses due to weather constraints. This combination resulted in the lowest cost per ton of forage produced and still had a good quality.

Bruno Pedreira, former KSU Forage and Crop Livestock Specialist
pedreira@utk.edu

Junior I. Yasuoka, Postdoctoral Researcher in Forage Systems

Dale Helwig, Extension Agent – Cherokee County, KS
dhelwig@ksu.edu

Jaymelynn Farney, Beef Systems Specialist – Parsons

jkj@ksu.edu

Gretchen Sassenrath, Cropping Systems Specialist – Parsons
gsassenrath@ksu.edu

3. K-State 2024 Chemical Weed Control Guide is now available online

One of the most popular K-State Research and Extension publications is here! This publication provides suggestions for chemical weed control in several major crops. For crops not listed, consult your local K-State Research and Extension agricultural agent.

How can I access the online version?

The online version of the 2024 K-State Chemical Weed Control Guide is available at:

https://bookstore.ksre.ksu.edu/pubs/SRP1183.pdf

You can also use the camera app on a mobile device and scan the QR code below to be directed to the Weed Control Guide.

When viewing the file in a web browser or in Adobe, bookmarks can be accessed to guide you to the first page of every section (options vary per program settings and device type).

How can I order copies?

If you would like to purchase hard copies of the 2024 Weed Control Guide, orders will be accepted and processed in January after the books are printed. Orders can be placed using this link: https://bookstore.ksre.ksu.edu/Item.aspx?catId=236&pubId=25502

Report of Progress 1183

2024 Chemical Weed Control

for Field Crops, Pastures, Rangeland, and Noncropland

K-STATE Research and Extension

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Sarah Lancaster, Extension Weed Science Specialist
slancaster@ksu.edu

Kansas State University Department of Agronomy
2004 Throckmorton Plant Sciences Center | Manhattan, KS 66506
www.agronomy.ksu.edu | www.facebook.com/KState.Agron | www.twitter.com/KStateAgron

4. K-State Corn and Soybean Schools to be held Jan. 16-19, 2024

In January 2024, look for a new format for the traditional K-State Corn and Soybean Winter Crop Schools. K-State Research and Extension, in collaboration with Kansas Corn and Kansas Soybean, has combined the schools for a whole-day program covering both crops.

Online registration is open! Please visit https://kscorn.com/schools/ and get signed up today!

2024 K-State Corn and Soybean Crop Schools

- **January 16 (Tuesday) – Parsons**
  K-State Southeast Research and Extension Center
- **January 17 (Wednesday) – Hesston**
  Agco Corporation
- **January 18 (Thursday) – Garden City**
  Corteva Agriscience Research Center
- **January 19 (Friday) – Olathe**
  John Deere Ag Marketing Center

Participant check-in will begin at 8:30 a.m. at each location, with the program starting at 9:00 a.m. The school will wrap up around 3:00 p.m. Morning refreshments and a hot lunch will be provided. CCA and Commercial Pesticide Applicator credits have been applied for. Save the date for one of the locations near you!

Each school will feature a range of region-specific topics covering corn and soybean production. The final agendas for each location will be shared in an upcoming eUpdate. Some of the topics include:

- Agronomics for corn and soybean production
- Corn and soybean disease update
- Carbon credits
- Updates from the Kansas Mesonet
- Market and policy update
- Insect pressure update
- Planter technology
- Weed control
- Soil fertility
- Irrigation for corn and soybean crops

Ignacio Ciampitti, Farming Systems
ciampitti@ksu.edu