

Agronomy

Contact: Dr. Kevin Donnelly, kjd@ksu.edu
Location: Remote/Virtual
Contest Date: TBD

The 2021 state contest will be delivered in a virtual environment. The contest will consist of four major sections. Each section will be a separate quiz delivered on a Learning Management System. The identification section will have a 60-minute time limit, while all other components will be 45 minutes. The three high individual scores out of four contestants will be used for the team total score. Highlights of the modifications made for the virtual format are as follows:

A. Identification

Identification will consist of 100 photos of plants or seeds worth 2 points each for a total of 200 points. Samples will be identified using the master list provided on the LMS site and in these rules. Answers will be entered by typing in the **matching number** for the name from the master list. The list is in three sections: Grain Crops, Forage Crops, Weeds.

B. Grain Grading

Grain grading will be done in accordance with the Official U.S. Standards for Grain. Six grain grading problems will be presented from four possible crops: corn, soybean, wheat, sorghum. Students will determine the correct numerical grade (or sample grade), market class, special grades, dockage, and grade determining factors for each problem. Scoring will be based on a series of multiple choice questions following each problem for a total of 100 points.

C. Agronomic Quiz and Calculations

This section consists of 40 multiple choice questions worth 2 points each, plus five math problems worth 4 points each, for a total of 100 points. Quiz content will cover general agronomic topics as outlined in the rules. Math problems will relate to calculating correct rates for various inputs, harvest loss, yield estimation, and equipment calibration. The correct answer for the math problems will also be provided in a multiple choice questions.

D. Lab Practicum

This section consists of 50 questions worth 2 points each for a total of 100 points. All answers will be multiple choice. It will be a general knowledge practicum covering topics outlined in the rules, and will include diseases, insects and machinery identification from the official list in the rules. Most questions will require viewing photos, illustrations, tables or data to assess and evaluate for the answer.

Contact Information

Event Coordinator

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Resource Material

Old agronomic quiz keys and photos of lab Practicum stations from past contests are available for study on the Agronomy Department web site (www.agronomy.ksu.edu) by clicking on the “K-12 Youth and Educators” icon and selecting “Crops CDE” or by going directly to <http://www.agronomy.k-state.edu/k-12-youth-and-educators/ffa-agronomy-career-development-events.html>

Materials available from the Kansas State University Department of Agronomy. (Except for References, order by contacting the event coordinator.)

Item	Description	Price
Plant samples	Crop and weed plants each mounted with clear tape on blue 8 ½ x 11 inch cardstock.	\$1.00 each
Laminated plant samples	Same as above but laminated on blue 8 ½ x 11 inch cardstock.	\$2.00 each
Seed samples	Coin envelope containing approximately one tablespoon of seed.	\$0.75 each
Plant and Seed Identification Book	Written description of all the plants and seeds on the official list with specific identification tips. Spiral bound.	\$5.00 each
Plant and Seed Identification CD	Animated PowerPoint slides of all plants and seeds on the official list.	\$5.00 each
Grain grading sets	Set of grain grading samples from previous events.	\$8.00 per set
Seed analysis sets	Set of seed analysis samples from previous events.	\$8.00 per set
U.S. grain standards	Booklet containing the current official U.S. standards for corn, sorghum, soybean, and wheat.	\$1.50 each
References for Agronomic Quiz	Available at County Extension Offices, the KSU Extension Agronomy website, or KSU Department of Communications Publications Office, Umberger Hall, Room 24, Manhattan, KS 66506.	



General Rules

- Teams will consist of 4 members, with the highest 3 scores counted for the team total.
- No communication with anyone other than officials will be allowed during the event.
- Contestants must take all of the quizzes on a single device, with no access to a phone or any other electronic device (second computer, laptop, iPad, etc) while taking a quiz.
- The time allowed for the identification quiz will be 60 minutes. All other components will be 45 minutes. Once a contestant starts a quiz, the time will begin and there is no way to pause. The quiz will automatically end at the time limit, and any un-answered questions will be scored as incorrect.
- For the math problems, non-programmable calculators may be used. Phones or iPads cannot be used as calculators. Scratch paper may also be used
- Grain grading booklets should be used when contestants are doing the Grain Grading portion of the contest. Booklets should be printed in advance to make access easier while working the grain grading problems. Scratch paper may also be used.
- Rules infractions will incur penalties ranging from lost points to dismissal from the event.
- Tie scores for individual rankings will be broken by total points in first, lab practicum; second, agronomic quiz; third, grain grading; and fourth, identification. Tie scores for team rankings and awards will be broken similarly using team total points by section: first, lab practicum; second, agronomic quiz; third, grain grading; fourth, identification.

A. Identification

Identification of weeds and crops, shown as plants or seeds. All event samples will come from the official identification list included in these rules. Samples will be identified using the master list provided on the LMS site and in these rules.

Identification will consist of 100 photos worth 2 points each for a total of 200 points.

- Answers will be entered by typing in the matching number for the plant or seed name from the master list. Do not type the name. The list is organized into three sections: Grain Crops, Forage Crops, Weeds.
- Photos of plants will be of plants mounted on blue cards typical of practice samples.
- Photos of seeds will include close-up views for samples where a lens would normally be used to see key identification features.
- A total of 60 minutes will be allowed for identifying the 100 samples.
- Contestants must complete the identification quiz on a single device, with no access to a phone or any other electronic device (second computer, laptop, iPad, etc) while taking the quiz.



AGRONOMY FFA CDE - ANSWER LIST FOR IDENTIFICATION

Lists are arranged alphabetical within three categories: Grain Crops, Forage Crops, Weeds

Shown As: (p=plant, s=seed, b=both, blank=either plant or seed)

ID No.	Common Name	Shown As	ID No.	Common Name	Shown As
	GRAIN CROPS			WEEDS	
1	barley		43	barnyardgrass	
2	canola	(s)	44	buffalobur	
3	dent corn	(s)	45	bull thistle	(p)
4	pop corn	(s)	46	bushy wallflower	(p)
5	cotton	(s)	47	Canada thistle	
6	grain sorghum		48	cheat	
7	oat		49	common broomweed	(p)
8	rice	(s)	50	common chickweed	(p)
9	rye		51	common cocklebur	
10	soybean	(s)	52	common lambsquarters	
11	sunflower	(s)	53	common ragweed	
12	Karl 92 wheat	(b)	54	curly dock	
13	Jagger wheat	(b)	55	dodder	
14	Trego wheat	(b)	56	downy brome	
15	durum wheat	(s)	57	field bindweed	
16	hard red spring wheat	(s)	58	field pennycress	
17	hard red winter wheat	(s)	59	giant foxtail	(p)
18	hard white wheat	(s)	60	giant ragweed	
19	soft red winter wheat	(s)	61	green foxtail	
20	soft white wheat	(s)	62	henbit	(p)
	FORAGE CROPS		63	hoary cress	(p)
21	alfalfa		64	horsenettle	
22	big bluestem	(p)	65	horseweed	(p)
23	birdsfoot trefoil		66	ironweed	(p)
24	blue grama	(p)	67	johnsongrass	
25	buffalograss		68	jointed goatgrass	
26	foxtail millet		69	kochia	
27	Indiangrass	(p)	70	large crabgrass	
28	Kentucky bluegrass		71	little barley	(p)
29	Korean lespedeza		72	morningglory	
30	little bluestem	(p)	73	musk thistle	(p)
31	orange sorgo	(s)	74	Pennsylvania smartweed	
32	orchardgrass		75	prairie threeawn	(p)
33	red clover		76	prickly lettuce	(p)
34	sand lovegrass	(p)	77	prostrate knotweed	(p)
35	sideoats grama	(p)	78	puncturevine	
36	smooth bromegrass		79	quackgrass	
37	sudangrass	(s)	80	redroot pigweed	
38	sumac sorgo	(s)	81	Russian thistle	
39	sweetclover		82	sand sagebrush	(p)
40	switchgrass	(p)	83	sericea lespedeza	(p)
41	tall fescue		84	shattercane	
42	white clover		85	shepherdspurse	(p)
			86	silverleaf nightshade	(p)
			87	velvetleaf	
			88	Venice mallow	
			89	wild buckwheat	
			90	wild carrot	(p)
			91	wild onion or garlic	
			92	wild sunflower	
			93	yellow foxtail	
			94	yellow nutsedge	(p)



Kansas State Career Development Events in Agriculture: Agronomy Event Official Identification List

(p) plant or head only
(s) seed only

(b) both plant and seed together
No designation - plant or head or seed

Grain Crops (GC)

GC-1 Karl 92 wheat
GC-2 Jagger wheat (b)
GC-3 Trego wheat (b)
GC-4 hard red winter wheat (s)
GC-5 hard red spring wheat (s)
GC-6 soft red winter wheat (s)
GC-7 hard white wheat (s)
GC-8 soft white wheat (s)
GC-9 durum wheat (s)
GC-10 oat

GC-11 barley
GC-12 rye
GC-13 rice (s)
GC-14 sunflower (s)
GC-15 soybean (s)
GC-16 cotton (s)
GC-17 grain sorghum
GC-18 dent corn (s)
GC-19 pop corn (s)
GC-20 canola (s)

Forage Crops (FC)

FC-22 orange sorgo (s)
FC-23 sumac sorgo (s)
FC-24 sudangrass (s)
FC-25 foxtail millet
FC-26 tall fescue
FC-27 Kentucky bluegrass
FC-28 orchardgrass
FC-29 smooth bromegrass
FC-30 buffalograss
FC-31 big bluestem (p)
FC-32 little bluestem (p)

FC-33 switchgrass (p)
FC-34 Indiangrass (p)
FC-35 sand lovegrass (p)
FC-36 blue grama (p)
FC-37 sideoats grama (p)
FC-38 sweetclover
FC-39 red clover
FC-40 alfalfa
FC-41 white clover
FC-42 birdsfoot trefoil
FC-43 Korean lespedeza

Noxious Weeds* (NW)

NW-1 quackgrass
NW-2 hoary cress (p)
NW-3 musk thistle (p)
NW-4
NW-5 Canada thistle
NW-6 field bindweed
NW-7
NW-8 johnsongrass
NW-9 sericea lespedeza (p)
NW-10 bull thistle (p)
hogpotato**
leafy spurge**
Texas blueweed **
kudzu **
multiflora rose **
Russian knapweed **
woollyleaf bursage **

Elymus repens
Cardaria draba
Carduus nutans

Cirsium arvense
Convolvulus arvensis

Sorghum halepense
Lespedeza cuneata
Cirsium vulgare
Hoffmanseggia glauca
Euphorbia esula
Helianthus ciliaris
Pueraria lobata
Rosa multiflora
Acroptilon repens
Ambrosia grayi

* Scientific name is given to make sure the proper

** Will not be used in the event.



Restricted Weeds (RW)

RW-9 wild carrot	(p)	<i>Daucus carota</i>
RW-10 bushy wallflower	(p)	<i>Erysimum repandum</i>
RW-11 common cocklebur		<i>Xanthium strumarium</i>
RW-12 jointed goatgrass		<i>Aegilops cylindrica</i>
RW-13 wild onion or garlic		<i>Allium canadense</i> or <i>vineale</i>
RW-14 downy brome		<i>Bromus tectorum</i>
RW-15 cheat		<i>Bromus secalinus</i>
RW-16 dodder		<i>Cuscuta</i> spp.
RW-17 morningglory		<i>Ipomoea hederacea</i> or <i>purpurea</i>
RW-18 wild buckwheat		<i>Polygonum convolvulus</i>
RW-19 curly dock		<i>Rumex crispus</i>
RW-20 giant foxtail	(p)	<i>Setaria faberi</i>
RW-21 horsenettle		<i>Solanum carolinense</i>
RW-22 silverleaf nightshade	(p)	<i>Solanum elaeagnifolium</i>
RW-23 field pennycress		<i>Thlaspi arvense</i>
RW-24 velvetleaf		<i>Abutilon theophrasti</i>

Common Weeds (CW)

CW-25 redroot pigweed		<i>Amaranthus retroflexus</i>
CW-26 common ragweed		<i>Ambrosia artemisiifolia</i>
CW-27 giant ragweed		<i>Ambrosia trifida</i>
CW-28 sand sagebrush	(p)	<i>Artemisia filifolia</i>
CW-29 prairie threeawn	(p)	<i>Aristida oligantha</i>
CW-30 common lambsquarters		<i>Chenopodium album</i>
CW-31 large crabgrass		<i>Digitaria sanguinalis</i>
CW-32 barnyardgrass		<i>Echinochloa crusgalli</i>
CW-33 horseweed	(p)	<i>Conyza canadensis</i>
CW-34 shepherdspurse	(p)	<i>Capsella bursa-pastoris</i>
CW-35 common broomweed	(p)	<i>Gutierrezia dracunculoides</i>
CW-36 wild sunflower		<i>Helianthus annuus</i>
CW-37 Venice mallow		<i>Hibiscus trionum</i>
CW-38 little barley	(p)	<i>Hordeum pusillum</i>
CW-39 kochia		<i>Kochia scoparia</i>
CW-40 henbit	(p)	<i>Lamium amplexicaule</i>
CW-41 prostrate knotweed	(p)	<i>Polygonum aviculare</i>
CW-42 Pennsylvania smartweed		<i>Polygonum pensylvanicum</i>
CW-43 Russian thistle		<i>Salsola tragus</i>
CW-44 yellow foxtail		<i>Setaria pumila</i>
CW-45 green foxtail		<i>Setaria viridis</i>
CW-46 buffalobur		<i>Solanum rostratum</i>
CW-47 shattercane		<i>Sorghum bicolor</i>
CW-48 common chickweed	(p)	<i>Stellaria media</i>
CW-49 puncturevine		<i>Tribulus terrestris</i>
CW-50 ironweed	(p)	<i>Veronia</i> spp.
CW-51 prickly lettuce	(p)	<i>Lactuca serriola</i>
CW-52 yellow nutsedge	(p)	<i>Cyperus esculentus</i>



B. Grain Grading

Grain grading will be done in accordance with the Official U.S. Standards for Grain. Grain standard booklets can be ordered from the Kansas State University Department of Agronomy or printed from the USDA Federal Grain Inspection Service website at <https://www.ams.usda.gov/grades-standards/grain-standards>. Click on each crop to print out the standards. Copies of the standards for each crop will also be available on the LMS contest site.

- Six grain grading problems will be presented from four possible crops: corn, soybean, wheat, sorghum. Students will determine the correct numerical grade (or sample grade), market class, special grades, dockage if appropriate, and grade determining factors for each problem.
- All answers will be selected from a series of multiple choice questions following each problem. Points for each question will vary, with six points for questions about correct numerical grade and grade determining factors, and two points for questions about class, special grades, and dockage. There will be 100 total points from the questions in this section.
- A copy of the Grain Standards booklets should be printed in advance to make access easier while working the problems. You may use your own booklets and scratch paper.
- A total of 45 minutes will be allowed for this section.

Example

Grain:	Wheat Test weight - 57.0 lbs. Odor - Smutty Dockage - 0.34%
Card and visual factors:	Rye - 5.3% Heat damaged wheat - 3.3% Insect damaged wheat - 7.8% Dark, hard vitreous kernels - 68%
Complete grade designation:	U.S. Sample Grade Northern Spring Wheat, Light Smutty, Dockage 0.3%
Determining factor(s):	Foreign material Heat-damaged kernels

- Contestants are permitted to highlight selected information and/or add notes relative to Grain Grading as desired in their Official Grain Standards booklets. It is not permitted to add information regarding identification tips or pictures for grain classes, types of damages, etc.
- Not all classes, subclasses, and special grades included in the Official U.S. Standards for Grain will be used in the event. The following classes, subclasses, special grades and other special rules will apply to the event:

A. Corn

- a. Class - White, Yellow, or Mixed
- b. Special grade - Infested
- c. Sweet corn and pop corn in corn are foreign material
- d. When calculating stones and animal filth for sample grade, stones are rounded to tenths (standard is greater than 0.1%, thus must be more than 0.15% to round to 0.2%)

Animal filth is rounded to hundredths (standard is greater than 0.20%, thus must be more than 0.205% to round to 0.21%).

B. Sorghum

- a. Class - Sorghum. (White and Tannin sorghum classes will not be used in the contest.)
- b. Special grades - Infested, Smutty
- c. Dockage - reported in whole percentage with fractions of a percent being disregarded (i.e. 1.9% => 1% or 3.2% => 3%). If dockage drops to 0%, it is not listed.



- d. Non-grain sorghum found in grain sorghum is foreign material and may be used to determine the grade. Non-grain sorghum includes broomcorn, sorgos, sudangrass, shattercane, and johnsongrass.
- e. When calculating stones for sample grade, stones are rounded to tenths (standard is greater than 0.2%, thus must be more than 0.25% to round to 0.3%). Stones are determined **AFTER THE REMOVAL OF DOCKAGE**, so the denominator in the calculation is the base sample weight minus the weight of the dockage removed. If stones are found **IN THE DOCKAGE**, they do not count and should be ignored.
- C. Soybeans
- Class - Yellow, Mixed.
 - Specials grades – Garlicky, Infested, Purple Mottled or Stained.
 - Soybeans with more than 10% soybeans of other colors (off table) are Mixed Soybeans, not Sample Grade. This is rounded to the nearest tenth, so it must be 10.1% SBOC to for Mixed Soybeans. Soybeans of other colors is not a grading factor once the sample is classed as Mixed Soybeans.
 - When calculating stones for sample grade, stones are rounded to tenths (standard is greater than 0.1%, thus must be more than 0.15% to round to 0.2%).
- D. Wheat
- Class - Hard Red Winter, Soft Red Winter, Hard Red Spring, Hard White, and Mixed. (Durum wheat will not be used as a base sample, but may be included in the problem which may affect contrasting classes and/or wheat of other classes in determining the numerical grade for other classes and/or determining mixed class.
 - Subclass - Dark Northern Spring Wheat, Northern Spring Wheat, Red Spring Wheat. (When grading hard red spring wheat, the subclass is listed in the grade designation and not the main class. When hard red spring wheat is used as the base sample, the percentage of dark, hard and vitreous kernels will be given in the problem).
 - Special grades - Ergoty, Garlicky, Infested, Light Smutty, Smutty.
 - Dockage - rounded to the nearest 0.1 percent and stated in tenths or whole and tenths percent (i.e. 2.05% => 2.1% or 0.78% => 0.8%). If dockage is present but rounds to 0.0%, it is still listed as Dockage 0.0%.
 - Wheat with more than 10% CCL or WOCL (off table) is Mixed Wheat, not Sample Grade. This is recorded to the nearest whole number, so it must actually be 10.5% or more to round to 11%. A sample with 10.4% CCL or WOCL would still be No. 5. CCL and WOCL are not grading factors once the sample is classed as Mixed Wheat.
 - When calculating stones for sample grade, stones are rounded to tenths (standard is greater than 0.1%, thus must be more than 0.15% to round to 0.2%). Stones are determined **AFTER THE REMOVAL OF DOCKAGE**, so the denominator in the calculation is the base sample weight minus the weight of the dockage removed. If stones are found **IN THE DOCKAGE**, they do not count and should be ignored.
 - When calculating ergot for special grade, ergot is rounded to hundredths (standard is greater than 0.05%, thus must be more than 0.055% to round to 0.06%). Ergot is determined **AFTER THE REMOVAL OF DOCKAGE**, so the denominator in the calculation is the base sample weight minus the weight of the dockage removed. If ergot is found **IN THE DOCKAGE**, it does not count and should be ignored.
 - When counting smut balls for special grades, smut is determined **AFTER THE REMOVAL OF DOCKAGE**, so if smut balls are found **IN THE DOCKAGE**, they do not count and should be ignored.



- For the special grade “Infested” in all crops, live weevils (lw) will include rice weevils, granary weevils, cowpea weevils, maize weevils, and lesser grain borers. Other live insects injurious to stored grains (oli) will include Angoumois grain moth, Indian meal moth, saw-toothed grain beetle, confused flour beetle, red flour beetle, vetch bruchids and the larvae of any of these insects. Insects will be given information in the problems.
- For the special grade “Garlicky” in soybeans and wheat, 1 green garlic bulblet equals 3 dry or partly dry bulblets. Green garlic bulblets have retained all their husks. Dry or partly dry bulblets have lost all or part of their husks. If dry garlic bulblets are given, divide by 3 and add to any green garlic bulblets to get a total for comparison to the standard.
- Base sample weights for determining factors are given in the standards handbook as an approximation. For factors determined by count, if the standard states that a factor is determined “in a 1000-gram portion”, it can be actually be determined on a sample of 1000 to 1050 grams. Therefore, a soybean sample with 5 green garlic bulblets in 1045 gram base sample would be “Garlicky”. For factors determined by weight, the actual weight of the base sample should be used in the calculation. Therefore, a corn sample with 1.50 grams of stones in a 1036 gram base sample would be $(1.50 / 1036) \times 100 = 0.14478\%$, rounded to tenths => 0.1% (not sample grade).
- Reference Materials - Grain grading standards, images of stored grain insects, online eLearning tutorials (procedures), and a complete Visual Reference Library are available in the eLearning section of the GIPSA/FGIS page at <https://www.gipsa.usda.gov/fgis/elearning.aspx>. Grain Grading Publications EP95, EP96, EP97, and EP98 for corn, grain sorghum, soybeans, and wheat are available for downloading from www.ksre.ksu.edu/bookstore. (Note: sorghum table has not been updated for changes made in 2008)

C. Agronomic Quiz and Calculations

AGRONOMIC QUIZ:

A general knowledge quiz focused primarily on Crop Science but also including questions from Weed Science and Soils (including soil conservation and water quality) will be used. The quiz will consist of 30 multiple choice questions, 4 points each, 120 points total. The remaining 30 points will be from six calculation problems related to fertilizer application, seeding rates, pure live seed, plant population, harvest losses, yield estimation, sprayer calibration, etc. General knowledge questions will cover basic principles of crop production and soil management, including plant growth processes and crop development, tillage and seedbed preparation, variety selection, seeding, essential nutrients and fertilization practices, pest development and pest control (weeds, insects, diseases), water management, harvest factors and crop quality effects, and residue management. Focus will be on major grain crops (wheat, corn, sorghum, soybean, sunflowers, canola) and forages (alfalfa, fescue, brome grass, native range) grown in Kansas. Some questions will require comparison of different crops for production data (KS, USA, world), uses and products, grain or forage quality, growth habit or adaptation, critical growth stages for stress, etc. Questions may include topics related best management practices for preserving environmental quality, water quality, soil conservation, and sustainability.

Example Questions:

- a 1. The growth habit of corn is:
 - a) summer annual b) winter annual c) perennial d) biennial.
- b 2. Plants exhibiting purple coloration of lower leaves are most likely deficient in which of the following essential nutrients?
 - a) Nitrogen b) Phosphorus c) Potassium d) Iron
- d 3. The standard test weight per bushel for soybeans is:
 - a) 48 pounds b) 50 pounds c) 56 pounds d) 60 pounds.



AGRONOMIC CALCULATIONS:

Each participant will also perform five agronomic calculations and select the correct multiple choice solution, including correct units and rounded as requested.

Calculations may include pure-live seed content, seeding rate, plant population, harvest loss, fertilizer application, pesticide application, cost of active ingredients, sprayer calibrations, or other agronomic calculations.

Contestants are expected to know common measurements such as square feet/acre, oz/pint, pints/gal, bushel weights, feet/mile, etc. Formulas for sprayer calibration, row feet/acre, etc. may be given.

Answers for Agronomic Calculations will be rounded to a whole number or one or two decimals as logical and appropriate, e.g., plant population (whole number), harvest loss (0.1 bushel), sprayer nozzle delivery (0.01 gallons per minute), etc.

Examples:

- If a producer counts an average of two plants per foot of row in eight-inch drill rows, what is the plant population per acre? ANS: 130,680 plants/acre
- A producer wants to check the seeding rate of a 30-foot grain drill. In a 100-foot long test strip, 4.0 pounds of wheat is collected. What is the seeding rate in lbs/acre? ANS: 58.1 lbs/acre
- “Superstuff” pesticide is a liquid formulation that contains 40% a.i., weighs 9 lb/gal, and costs \$18.95 per gallon. What is the cost per pound of a.i.? ANS: \$5.26/pound a.i.
- If a producer finds 8 soybeans per square foot on the ground after harvest and the variety has 2500 seeds/pound, what is the field loss in bu/acre? ANS: 2.3 bu/acre

REFERENCES:

This list of references is not intended to be inclusive. Other sources may be utilized and teachers are encouraged to use the best available instructional materials.

Alfalfa, Corn, Grain Sorghum, Soybean, and Wheat Production Handbooks. Access from the KSU Agronomy Department Extension website <http://www.agronomy.ksu.edu/extension/> or from the K-State Research and Extension publications website <http://www.ksre.ksu.edu/bookstore/>

Corn, Grain Sorghum, Soybean, and Wheat Development Publications.

D. Lab Practicum

This section consists of 50 questions worth 2 points each. All answers will be multiple choice. It will be a general knowledge practicum covering a range of agronomic production and plant science topics. It will include diseases, insects and machinery identification from the official list in the rules. Most questions will require viewing photos, illustrations, tables or data to assess and evaluate for the answer. Possible topics include: interpreting herbicide, seed, and/or fertilizer labels; answering questions from tables or figures in publications such as a Soil Survey Report, Weed Control Handbook, Crop Planting Guide, or Crop Variety Trial reports; interpreting legal land descriptions; interpreting soil test recommendation reports; identifying photos of insects, diseases, and common agronomic equipment; identifying photos of weeds in the vegetative stage; identifying photos of common fertilizer carriers, ag lime, inoculum, etc.; naming common nutrient deficiencies shown on photos of crop plants (N, P, K, S, Fe); identifying photos of various feed ingredients and the crop from which they are made (ie. soybean meal, wheat bran, alfalfa pellets); identifying developmental stages of major crop plants (corn, wheat, sorghum, soybean) from photos; naming common plant structures on photos of seeds, seedlings, roots, stems, leaves, or flowers; identifying the cause of crop production issues given photos and a scenario.



Identify important DISEASES, from the following list (from photos).

1. bacterial blight of soybean
2. bacterial wilt of alfalfa
3. barley yellow dwarf virus (wheat)
4. blacktip of wheat
5. blue eye mold (corn kernel)
6. bean pod mottle virus (soybean)
7. charcoal rot of sorghum
8. corn smut
9. ergot (sorghum, wheat)
10. ear rot (corn)
11. Gibberella stalk rot (corn)
12. gray leaf spot (corn, sorghum)
13. leaf rust of wheat
14. leaf spot of alfalfa
15. loose smut of wheat
16. Northern corn leaf blight
17. Phytophthora root rot (soybean)
18. rust (corn, sorghum, soybean)
19. pod and stem rot of soybean
20. purple seed stain of soybean
21. stem rust of wheat
22. wheat scab
23. wheat streak mosaic virus (wheat)

Identify important INSECTS from the following list (from photos).

(a = adult, l = larvae)

1. alfalfa weevil (a)
2. aphids
3. bean leaf beetle
4. black cutworm (l)
5. blister beetle (a)
6. chinch bug
7. corn earworm (l)
8. corn rootworm (l and a)
9. European corn borer (l)
10. fall armyworm (l)
11. grasshopper (a)
12. green cloverworm (l)
13. lacewing (a)
14. lady beetle (a)
15. painted lady
16. stinkbug (a)

Identify VEGETATIVE stage of important WEEDS from the following list (from photos).

1. barnyardgrass
2. cheat
3. common cocklebur
4. common lambsquarters
5. common ragweed
6. wild sunflower
7. field bindweed
8. field pennycress
9. green foxtail
10. large crabgrass
11. morningglory
12. Pennsylvania smartweed
13. redroot pigweed
14. velvetleaf
15. Venice mallow
16. yellow foxtail
17. yellow nutsedge pinnate
18. tansymustard

Identify EQUIPMENT AND MACHINERY commonly used in crop production from the following list (from photos)

1. combine
2. cotton picker
3. disc
4. field cultivator
5. gauge wheel
6. GPS receiver & light bar
7. grain auger
8. grain moisture meter
9. grain storage bin/dryer
10. grain drill
11. hay baler
12. hydraulic line
13. mower
14. nozzle bodies (flood vs. flat fan)
15. row crop planter
16. plow
17. press wheel
18. rake
19. ripper
20. rotary hoe
21. soil probe
22. soil thermometer
23. sprayer
24. swather
25. tractor
26. yield monitor



Suggested Resources:

1. Kansas State Research and Extension – Crops publications available at www.ksre.ksu.edu/bookstore
2. Soil Texture by Feel Procedure - S.J. Thien, KSU Agronomy Department
3. Soil Texture Triangle
4. County Soil Survey Publications - Local NRCS or County Extension Office, or Web Soil Survey at websoilsurvey.nrcs.usda.gov
5. Most recent Chemical Weed Control Handbook. KSRE Report of Progress.
6. Kansas Crop Planting Guide – KSRE Publ. L-818.
7. Identifying Caterpillars in Corn, Sorghum, Soybeans. KSRE Publ. (Entomology Dept.)
8. How a Corn Plant Develops (SR 0048) Iowa State Univ. Extension
9. Soybean Growth and Development (PM 1945) Iowa State Univ. Extension
10. How a Sorghum Plant Develops (KSRE Publication – Agronomy Dept.)
11. High Plains Sunflower Production Handbook (KSRE – Agronomy Dept.)

Other sources of materials

Excellent Grain Grading Tutorials for each crop are available on the USDA GIPSA/FGIS website eLearning web site at <https://www.ams.usda.gov/elearning>. From there you can also link to the “Visual Reference Library” at <https://www.ams.usda.gov/book/visual-reference-images> for photos of grain damages for each crop. A copy of the full grain grading standards Handbook II for more specific details can also be accessed at <https://www.ams.usda.gov/sites/default/files/media/Book2.pdf>.

Excellent plant and seed images are available at the USDA Plants Database at www.plants.usda.gov, a searchable database for both crops and weeds. This is one of the best sites for seed photos.

Another excellent searchable database for plant and pest images is the Bugwood Center for Invasive Species site at <http://www.bugwood.org> or go directly to the image database at <https://images.bugwood.org/>. Click on Forestry Images, Invasive.org, Insect Images, or Weed Images.

Weed plants and weed seeds you collect may be identified by your County Weed Supervisor or you may send them to us for identification. If you bring the materials to the campus when you are in Manhattan, we will discuss identifying characteristics with you.



