AGRONOMY
Dr. Kevin Donnelly - Coordinator
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2nd Floor Foyer, Throckmorton Hall
Monday, May 6, 2019
Registration: 12:30 – 1:00 p.m.
Contest: 1:15 – 4:15 p.m.

Complete rules, practice materials, old contest examples, and reference information is available under the "K-12 Youth and Educators" icon on the Department of Agronomy homepage (www.agronomy.ksu.edu).

The three high individual scores out of four contestants will be used for the team total score. The contest will consist of four major sections as follows:

Group A. Identification
Classes 1, 2, 3. Identification of weeds and crops, plants, or seeds. 100 total samples.

Group B. Grain Grading and Seed Analysis
Classes 4, 5, 6. Three Grain Grading samples chosen from the following crops: wheat, grain sorghum, corn, and soybean.
Classes 7, 8, 9. Three Seed Analysis samples chosen from the following crops: wheat, alfalfa, oat, grain sorghum, soybean, barley and rye.

Group C. Agronomic Quiz and Calculations
Class 10. A general knowledge quiz consisting of 30 multiple choice questions, plus 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, bromegrass, 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 to best management practices for preserving environmental quality, water quality, soil conservation, and sustainability.

Group D. Soils, Fertilizers, Crops, and Herbicides Practicum
Class 11. A general knowledge practicum consisting of 37 stations where students will perform simple analyses or answer questions such as: determine soil texture by feel; interpret herbicide, seed, and/or fertilizer labels; answer questions from publications such as a Soil Survey Report, Weed Control Handbook, Crop Planting Guide, or Crop Variety Trial reports; write or interpret legal land descriptions; interpret soil test recommendation reports; identify insects, diseases, and common agronomic equipment; identify weeds in the vegetative stage; identify common fertilizer carriers, ag lime, inoculum, etc.; name common nutrient deficiencies shown on crop plants (N, P, K, S, Fe); identify the crop from which various feed ingredients are made (ie. soybean meal, wheat bran, alfalfa pellets); identify growth stages of major crop plants (corn, wheat, sorghum, soybean); name common plant structures (on seeds, seedlings, roots, stems, leaves, or flowers).

Kansas State Career Development Events in Agriculture

Agronomy Event
2019

Rules and Regulations

General Information

Event Coordinator

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Updates for 2019

1. The event will again consist of four parts, 40 minutes each, scored as follows:

Part	Class			
1	1 - 3	Crop and Weed Identification	100 samples	300 points
2	4 - 6	Grain Grading	3 samples	150 points
	7 - 9	Seed Analysis	3 samples	150 points
3	10	Agronomic Quiz/Calculations	30 questions/6 calculations	150 points
4	11	Practicum	37 stations	150 points
		TOTAL		900 points

2. Rule Book Editorial Changes and Additions.

   No major changes for 2019.

3. Identification

   There are no changes to the identification list for 2019.

4. Grain Grading

   No new changes for 2019. Additional information on rounding and basis of determination was added two years ago to the grain grading section for each crop.

   If you need the most current copy of the grain grading standards, check the "Official US Standards" at https://www.gipsa.usda.gov/fgis/usstandards.aspx. Click on the standards for each crop.

   Students should also have access to the "General Provisions" chapter of the "Official US Standards" and can add that to their grain grading handbooks taken into the contest. The General Provisions can be found by clicking on the icon just above the individual crop standards on the above website.

5. Seed Analysis

   There are no changes in rules for seed analysis for 2019.

6. Agronomic Quiz/Calculations

   The Agronomic Quiz will again be a general knowledge quiz, primarily focused on crop science but also including questions about weed science and soils, including soil conservation and water quality.

7. Practicum

   There will be 37 stations again for 2019. Each station will be worth 4 points. The list of diseases, insects, equipment, and vegetative stage weeds will be the same for 2018.

Resource Materials

Old agronomic quiz keys and photos of lab practicals 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.	

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.gipsa.usda.gov/fgis/elearning.aspx. 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.

General Rules

1. Teams will consist of four members, with the highest three scores counted for the team total. Teams must participate in their appropriate District Agronomy Event to be eligible to participate in the State Agronomy Event.

2. No communication with anyone other than officials will be permitted while the event is underway.

3. No cell phones, smart phones, iPads, or other personal digital devices will be allowed in the contest rooms. If anyone has a cell phone ring during the contest, he/she will be disqualified and removed from the contest.

4. Magnifying glass, forceps, writing boards, pencil or pen, electronic calculator, handbooks for grain grading, and a seed analysis picking board not to exceed 9" x 12" in size, are the only items that may be taken into the event by the contestant. Calculators must be battery operated, non-programmable, and silent. Cell phones, smart phones or iPads cannot be used as calculators.

5. Information concerning identification of seeds, pictures of grains for classing, etc. may not be included in Grain Grading books used by contestants. Grain Grading books may be used only when contestants are doing the Grain Grading portion of the contest (not during seed analysis or seed and plant identification).

6 Infraction of rules will be followed by penalties varying from taking off points to dismissal from the event.

7. Legible writing is important and the judges will consider this factor in determining scores. Correct spelling is encouraged. Selling may be used to break tie scores.

8. Tie scores for individual rankings and awards will be broken by: first, seed analysis total points; second, grain grading total points; and third, identification total points.

   Tie scores for team rankings and awards will be broken similarly using team total points by section: first, seed analysis; second, grain grading; and third, identification.

Identification – Classes 1 - 3

Identification of grain crop plants and/or seeds; forage crop plants or seeds; weed plants or seeds.

1. 100 samples will be identified in 3 classes of 33 or 34 samples each. A total of 40 minutes are allowed to identify the 100 samples (average of 13 minutes for each class). 300 points total, 3 points per sample.

2. All event samples will come from the official identification list.

3. Samples will be identified on a multiple choice basis and recorded on an answer sheet (see examples below).

4. Correct spelling and proper names will be used for the choices listed; however, all choices will not necessarily be from the official identification list.

Examples:

_____ 1. (A) barley (B) rye (C) hard red winter wheat (D) hard white wheat   (E) durum wheat
_____ 2. (A) sumac sorgo (B) shattercane (C) sudangrass (D) orange sorgo (E) johnsongrass
_____ 3. (A) downy brome (B) smooth bromegrass (C) quackgrass (D) cheat (E) jointed goatgrass

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

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

Grain Crops (GC)

GC-1	Karl 92 wheat	(b)	GC-11	barley		
GC-2	Jagger wheat	(b)	GC-12	rye		
GC-3	Trego wheat	(b)	GC-13	rice	(s)	
GC-4	hard red winter wheat	(s)	GC-14	sunflower	(s)	
GC-5	hard red spring wheat	(s)	GC-15	soybean	(s)	
GC-6	soft red winter wheat	(s)	GC-16	cotton	(s)	
GC-7	hard white wheat	(s)	GC-17	grain sorghum		
GC-8	soft white wheat	(s)	GC-18	dent corn	(s)	
GC-9	durum wheat	(s)	GC-19	pop corn	(s)	
GC-10	oat		GC-20	canola	(s)	

Forage Crops (FC)

FC-22	orange sorgo	(s)	FC-33	switchgrass	(p)
FC-23	sumac sorgo	(s)	FC-34	Indiangrass	(p)
FC-24	sudangrass	(s)	FC-35	sand lovegrass	(p)
FC-25	foxtail millet		FC-36	blue grama	(p)
FC-26	tall fescue		FC-37	sideoats grama	(p)
FC-27	Kentucky bluegrass		FC-38	sweetclover	
FC-28	orchardgrass		FC-39	red clover	
FC-29	smooth bromegrass		FC-40	alfalfa	
FC-30	buffalograss		FC-41	white clover	
FC-31	big bluestem	(p)	FC-42	birdsfoot trefoil	
FC-32	little bluestem	(p)	FC-43	Korean lespedeza	

Noxious Weeds* (NW)

NW-1	quackgrass		Elymus repens
NW-2	hoary cress	(p)	Cardaria draba
NW-3	musk thistle	(p)	Carduus nutans
NW-4			
NW-5	Canada thistle		Cirsium arvense
NW-6	field bindweed		Convolvulus arvensis
NW-7			
NW-8	johnsongrass		Sorghum halepense
NW-9	sericea lespedeza	(p)	Lespedeza cuneata
NW-10	bull thistle	(p)	Cirsium vulgare
	hogpotato**		Hoffmanseggia glauca
	leafy spurge**		Euphorbia esula
	Texas blueweed **		Helianthus ciliaris
	kudzu **		Pueraria lobata
	multiflora rose **		Rosa multiflora
	Russian knapweed **		Acroptilon repens
	woollyleaf bursage **		Ambrosia grayi

*   Scientific name is given to make sure the proper species is used.
**   Will not be used in the event.

Restricted Weeds (RW)

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

Common Weeds (CW)

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

Grain Grading - Classes 4-6

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 GIPSA Federal Grain Inspection Service website at https://www.gipsa.usda.gov/fgis/usstandards.aspx. Click on each crop to print out the standards.

1. Three samples will be graded in 20 minutes. 150 points total (50 points per sample).

2. Samples are 8 ½ x 11 inch cards with a grain base sample, given card factors, and mounted visual factors. An example of a grain grading sample is included at the end of this section.

3. Samples will be selected from corn, sorghum, soybeans, or wheat.

4. Students must visually determine class, subclass, damage(s), foreign material, other grains, and splits. All other grading factors, including special grades and non-table sample grade factors, will be given as card factors on the grain grading cards.

5. Contestants will examine given factors and visual factors on the grain grading card and give the complete grade designation and grade determining factors. No factors are listed for grade U.S. No. 1.

    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

6. 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.

7. 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. Determined by inspection of base sample or from visual factors.
        b. Special grade - Infested
        c. Sweet corn and pop corn in corn are foreign material and may be shown on cards.
        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 percents 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

    a.   Class - Yellow, Mixed. Determined by inspection of base sample or from visual factors.
    b.   Specials grades – Garlicky, Infested, Purple Mottled or Stained.
    c.   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.
    d.   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

    a.   Class - Hard Red Winter, Soft Red Winter, Hard Red Spring, Hard White, and Mixed. Determined by inspection of base sample or from visual factors. (Durum wheat will not be used as a base sample, but may be shown as a visual factor on the card which may affect contrasting classes and/or wheat of other classes in determining the numerical grade for other classes and/or determining mixed class.
    b.   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 as a card factor.)
    c.   Special grades - Ergoty, Garlicky, Infested, Light Smutty, Smutty.
    d.   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%.
    e.   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.
    f.   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.
    g.   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.
    h.   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.

8. 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 as card factors on the grading card. Any live insects in the samples are unintended and should be disregarded.

9. 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.

10. Only dockage-free grain will be used for the base samples, but dockage removed may be given as a card factor.

11. 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) x 100 = 0.14478%, rounded to tenths => 0.1% (not sample grade).

12. Scoring system

    A. Grade

        a. Correct = 18 points
        b. 1 grade off (i.e. No. 3 if key has No. 2) = 12 points
        c. 2 grades off (i.e. No. 4 if key has No. 2) = 6 points
        d. 3 grades off (i.e. No. 5 if key has No. 2) = 0 points

    B. Class

        a. Corn, sorghum, soybean, soft red winter wheat, hard red winter wheat, and hard white wheat
            I.   Correct = 12 points
            II. Incorrect = 0 points

    C. Subclass

        a. Hard red spring wheat only
            I.   Class and subclass correct = 12 points
            II.   Class correct but subclass incorrect = 6 points
            III. Class incorrect = 0 points

    D. Special grades

        a. Deduct 5 points for each special grade (including dockage) omitted and for each listed but not on the key. Wrong number for dockage, including an incorrectly rounded number, will be deducted the full 5 points.

        b. Special grades should be listed in alphabetical order as shown in Rules 7.A.b, 7.B.b, 7.C.b, and 7.D.c. Deduct 1 point if not in correct order.

E.   Wrongly written

  a. Deduct 1 point for each grade, special grade, or dockage wrongly written (ie. Red Winter for Hard Red Winter, 2.1% Dockage for Dockage 2.1%, leaving off "U.S." or "No." in the grade line, using "#" instead of No., leaving out the word "Grade" for U.S. Sample Grade, misspelled words, etc.) Maximum deduction of 2 points per sample for writing errors in the grade box.

  b. Deduct 1 point for each determining factor wrongly written (ie. Foreign for Foreign Material, Shrunken for Shrunken and Broken Kernels, misspelled words, etc.). Official FGIS abbreviations may be used, but if so must be exactly correct or a writing deduction will be taken. Maximum deduction of 2 points per sample for writing errors in the determining factors box.

F.   Determining factors

  a. No factor (U.S. No. 1)
    I. None listed = 20 points
    II. One or more factors listed = 0 points
  b. One factor
    I. Correct = 20 points
    II. Incorrect = 0 points
  c. Two factors
    I. Correct = 20 points
    II. 1 incorrect = 10 points
    III. 2 incorrect = 0 points
  d. Three factors
    I. Correct = 20 points
    II. 1 incorrect = 14 points
    III. 2 incorrect = 7 points
    IV. 3 incorrect = 0 points
  e. Four factors
    I. Correct = 20 points
    II. 1 incorrect = 15 points
    III. 2 incorrect = 10 points
    IV. 3 incorrect = 5 points
    V. 4 incorrect = 0 points

G.   Extra determining factors

  a. When the number of factors listed by the contestant exceeds the number on the key, scoring is on the basis of the number listed by the contestant; e.g. If the contestant lists three factors, of which two are correct, and the key only lists two factors, the contestant is given 14 points.

13. 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 June, 2008)

Seed Analysis - Classes 7-9

Contestants will find and identify crop and weed seeds in a base sample of a common crop.

1.   Three samples will be analyzed in 20 minutes. 150 points total (50 points per sample).

2.   The samples will be selected from the following crops: alfalfa, grain sorghum, wheat, oat, barley, rye, and soybean. The seed quantities before the addition of impurities will be 5 grams of alfalfa; 30 grams of grain sorghum, oat, wheat, barley, and rye; and 65 grams of soybean.

3.   Contestants can use forceps, flat-sided sticks, magnifying lenses, and one seed analysis picking board to aid in seed analysis separations. Seed analysis boards must not exceed 9 x 12 inches.

4.   Admixtures will be named according to common names as in the identification list except as indicated in rule number seven, special rules for specific crops.

5.   The contestant must classify all seeds mixed with the base sample. The seeds will be classified as either (a) other crops and/or varieties, (b) noxious weeds, (c) restricted weeds, or (d) common weeds.

6.   No less than three seeds of any one impurity will be added to a sample. All crop and weed seeds must be mature. Only impurities listed as permissible on the identification list may be used.

7.   Special rules for specific crops

   A.   Wheat - Base material will be any pure sample of wheat.
      a.   Hard red spring or soft red winter wheats will not be used as mixtures in hard red winter wheat. Two or more red wheats will not be used as admixtures in the same sample or another crop.
      b.   Wheat types used as admixtures in other crops will be identified only as red wheat, white wheat, and durum wheat.

   B.   Oat - Base material will be any pure sample of white or yellow oat.
      a.   Gray, black and hulled oat will not be used as admixtures in oat or other crop samples.
      b.   White and yellow oat will not be intermixed.
      c.   Any cultivated oat found as an admixture in other crop samples will be identified only as oat.

   C.   Grain sorghum - Base material will be any pure sample of yellow or white grain sorghum.
      a.   Sudangrass and shattercane must be shown in the glumes.

   D.   Alfalfa - Base material will be any pure sample of alfalfa.
      a.   Sweetclover will not be used as an admixture in alfalfa.

   E.   Soybean - Base material will be any yellow soybean variety.
      a.   Varietal mixtures will not be used.

8. Seed Analysis Scoring system

A. The total score per sample will be 50 points.

B. The following points will be allotted for proper classification of each impurity: other crops and/or varieties 1, noxious weeds 3, restricted weeds 2, and common weeds 1. The deduction will be according to the category where it belongs rather than where the contestant has placed it.

C. The remaining points will be allotted equally, or approximately so, for the proper identification of the impurities. The term approximately is used to allow scoring in whole points. Subtract the total points allotted to classification from 50 and divide the remainder by the number of impurities present. Drop decimal if result is 0.5 or less, round up if more than 0.5.

D. When less than four impurities are present, no more than 12 points (total for classification and identification) will be allotted to each. This allows a maximum deduction of 12 points for any impurity not identified. In a sample with 0-3 impurities, other crops and/or varieties = 10 points, noxious weeds = 12 points, restricted weeds = 11 points, and common weeds = 10 points.

E. The contestant who names an impurity which is not present will be penalized approximately one-half of the points allotted to the proper identification only of an impurity present. Subtract the total points allotted to classification from 50 and divide the remainder by the number of impurities present as in part C above. Divide that result by 2. Drop decimal if result is 0.5 or less, round up if more than 0.5.

F. If a contestant calls an impurity in a sample which contains none, 12 points will be deducted, giving a score of 38 points. Two impurities in a pure sample will cause a loss of 24 points, etc.

G. Example:

Sample with 10 admixtures:
3 crops, 2 prohibited noxious, 4 restricted noxious, and 1 common weed.

$(3 \times 1) + (2 \times 3) + (4 \times 2) + (1 \times 1) = 18$ points for classification

$50 - 18 = 32$ $32 / 10 = 3.2$ drop decimal to 3 for correct identification

Divide by 2 for extras: $3.2 / 2 = 1.6$ round up to 2 for extras added

Crops   - 4
Prohibited Weeds - 6
Restricted Weeds - 5
Common Weeds - 4

Extras   - 2

Agronomic Quiz and Calculations - Class 10

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, bromegrass, 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.

Students will have 40 minutes to complete the quiz and calculations.

Example Questions:

 a   1.   The growth habit of corn is: a) summer annual   b) winter annual   c) perennial   d) biennial.

 c   2.   The wheat variety brought to Kansas by Mennonites in 1874 that began our wheat Industry was:
            a) Newton   b) Pawnee   c) Turkey   d) Karl   e) Crimean.

 a   3.   The test weight per bushel for soybeans is: a) 60   b) 56   c) 50   d) 48   pounds.

AGRONOMIC CALCULATIONS:

Each participant will also perform six agronomic calculations and provide the correct solution (including correct units and rounded as requested) or select the correct multiple choice solution. 30 points total,
5 points each.

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), seeding rate (0.1 pound), etc. Work must be shown to allow contest graders to evaluate for correct procedures for "rounded" answers.

Examples:

    1.   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

    2.   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

    3.   "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.

    4.   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

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REFERENCES:

This list of references is not intended to be inclusive. Other sources may be utilized and teachers are encouraged to us 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 Plant Development Publications.

Class 11 - Practicum

A general knowledge practicum consisting of 37 stations where students will perform simple analyses or answer questions such as: determine soil texture by feel; interpret herbicide, seed, and/or fertilizer labels; answer questions from publications such as a *Soil Survey Report*, *Weed Control Handbook*, *Crop Planting Guide*, or *Crop Variety Trial* reports; write or interpret legal land descriptions; interpret soil test recommendation reports; identify insects, diseases, and common agronomic equipment; identify weeds in the vegetative stage; identify common fertilizer carriers, ag lime, inoculum, etc.; name common nutrient deficiencies shown on crop plants (N, P, K, S, Fe); identify the crop from which various feed ingredients are made (ie. soybean meal, wheat bran, alfalfa pellets); identify growth stages of major crop plants (corn, wheat, sorghum, soybean); name common plant structures (on seeds, seedlings, roots, stems, leaves, or flowers). Students will have 40 minutes to complete the Practicum.

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.)

Identify important DISEASES, from the following list (plants or pictures).

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

Identify important INSECTS from the following list (preserved specimens or pictures).
(a = adult, l = larvae)

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

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

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

Identify EQUIPMENT AND MACHINERY commonly used in crop production from the following list (pictures, models, actual items)

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

Example Grain Grading Card:

Kansas State Career Development Events in Agriculture
FFA CDE Agronomy Event
Grain Grading

Sorghum   **5**   _____

Crop   Sample Number   Event

Base Sample   Visual Factors

0.5% →

3.5% →

Card Factors

Moisture = 13.5%
Test Weight per Bushel = 51.5 lbs
40.2 g dockage 1015 g sample
Broken Kernels = 6.5%
Machine Separated Foreign Material = 0.3%

5 cockleburs, 5 rodent pellets and 2 stones weighing
1.8 g in 1015 g base sample

1 live weevil and 6 other insects injurious to stored
grain found in base sample

Appearance – Distinctly Discolored
Odor - Natural

1.25% →

4.0% →

Example Seed Analysis Answer Sheet and Scoring System:

Kansas State Career Development Events in Agriculture
FFA CDE Agronomy Event
Seed Analysis

Contestant No. _____   Total Score _____

Sample No.   7   Sample Name: Soybeans

A. Other Crops and/or Varieties **-7**	C. Restricted Noxious Weeds **-8**
- 1 foxtail millet - 6	- 2 horsenettle - 6
- 1 Korean lespedeza - 6	
B. Prohibited Noxious Weeds **-9**	D. Common Weeds **-7**
- 3 Canada thistle - 6	- 1 green foxtail - 6
- 3 hoary cress - 6	

EXTRAS   -3

50 points possible
minus 11 classification points (noted before each admixture name)
Remainder for identification of admixtures = 39 points

Identification points = 39/6 admixtures = 6.5 (drop decimal to 6 for identification of each admixture)

Deduct ½ of the identification points for each admixture for any extra admixtures listed but not in sample
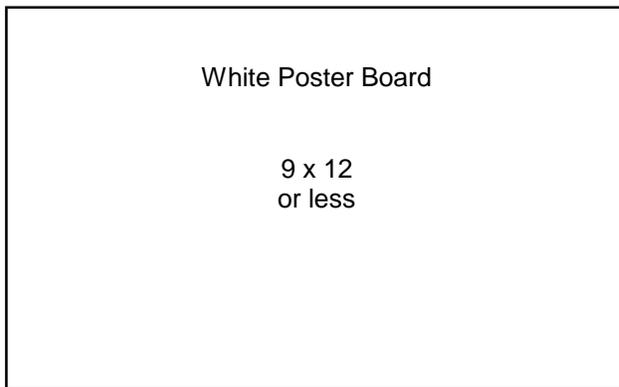   Extras = 6.5/2 = 3.3 (drop decimal to 3 for extras)

Seed Analysis Picking Board

You may wish to construct a small board (9 in x 12 in or smaller) on which to separate the seed analysis samples. You can bring one board per team.

Materials needed:

       Heavy, white poster board
       Cardboard for edging
       Glue or Tape (clear scotch, strapping, or adhesive)

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┌──────────────────────────────┐
│                              │
│      White Poster Board      │          ←    Use glue or tape too
│                              │               hold cardboard edge
│            9 x 12            │               on the board
│            or less          │
│                              │
│                              │
│                              │
└──────────────────────────────┘

              ↑

A pour spout can be made by filling
a gap with a removable piece of cardboard
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