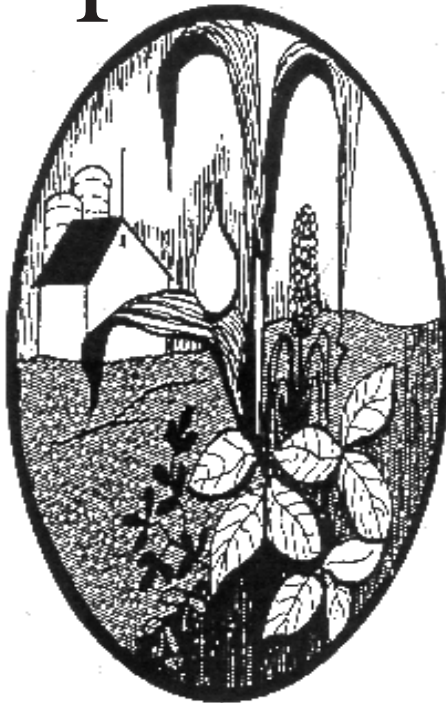


2002
National Invitational
Crops Contest



Purdue University
West Lafayette, Indiana



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Qualifications, Rules & Policies

1. Contestants must be 4-H or FFA members who have competed in or were eligible for the most recent state level crops or agronomy contest. Students who have been a member of a past first place National Invitational Crops Contest team or National FFA Agronomy CDE are no longer eligible to be a member of a team.
2. Each state may be represented by no more than 5 teams unless there is a tie. Ideally the teams representing a state would be the top 5 teams from state competition. In the event there is(are) a tie(s) within a state's top 5 team places, all teams possessing a score amongst the top five scores are eligible. If a state allows multiple teams from one school, only one team per school is allowed in the contest and the sixth place team will then be invited, etc.
3. Teams will consist of 4 members. The scores of the top 3 team members will be combined for a team score. Therefore a 3 member team can participate. States may not mix teams to form a state-wide super team (i.e. select highest scoring contestants from different schools to comprise a team). Coaches are permitted to substitute students due to illness, work conflicts, etc.
4. Contestants are required to bring and use clipboards. Contestants are allowed to bring and use magnifying lenses. Answer sheets, ID-179 pocket guides (used for exam), grain grading information sheets & booklets are provided at the practice and official contest. Contestants must bring other items used in the contest like #2 pencils, calculators, etc.
5. Ties in all award categories will be broken by the highest identification section score. If the tie remains unbroken the crop quality and utilization section will be used. The last resort will use the exam section scores.
6. Coaches may only participate on one team for the coach and team combined category. In the unlikely event that a school has two eligible teams, the coach must make the decision at registration.
7. No answer sheets will be released from the official contest. Answer sheets will not be taken from contestants at the practice contest and answer keys will be provided for the practice and official contest. Scores and rankings will be provided for the official contest only.

Contest Guidelines

The contest consists of three sections: identification, crop quality and utilization, and an agronomy exam. The "identification" and "crop quality & utilization" sections are further divided into subsections. The following pages provide details of the 3 sections:

I. Identification:

This section of the contest is divided into 3 subsections totaling 450 points: plant id, seed id, and plant disease or damage id. The following describes each subsection.

A. Plant ID

1. Weeds and crops will not be separated but identified as one unit. No notes or references are allowed during the contest for plant identification.
2. The official list of plants used in the contest are listed on the sample blue colored answer sheet in Appendix A.
3. Twenty-five plants (6 points each) will be identified for a total of 150 possible points.
4. Plants will be exhibited as dry mounts and when possible as live plants.
5. The Weed Science Society of America web site <http://piked2.agn.uiuc.edu/wssa/> is an excellent resource.

B. Seed ID

1. Weeds and crops will not be separated but identified as one unit. No notes or references are allowed in the contest for seed identification.
2. The official list of seeds used in the contest are listed on the sample yellow colored answer sheet in Appendix A.
3. Twenty-five seeds (6 points each) will be identified for a total of 150 possible points.
4. Seeds will be contained within plastic boxes or bags.

C. Plant/Seed Disease or Damage ID

1. The official list of plant diseases or damages used in the contest are listed on the sample pink colored answer sheet in Appendix A.
2. On the back side of the pink answer sheet, there are 10 herbicides listed that may be used to show plant injury from herbicides. Plants listed in the table may be sprayed with herbicides from this list. Contestants will select the response that identifies the mode of action group of the herbicide on the answer sheet when herbicide injury is determined.
3. References may be provided by the contest coordinators in this sub-section of the Identification Section for selected problems.
4. Twenty-five plant diseases or damages with optional data will be provided. Insect damages will have a specimen of the damaging insect provided. Each will be worth 6 points for a total of 150 possible points.
5. Plants may be live, dry mounts or pictures. Important information may accompany the plant on a card (e.g. Iron deficient corn plant with card that states "soil pH 7.9").
6. An excellent reference for this topic is found on a Purdue web page with following address: <http://www.btny.purdue.edu/Extension/Weeds/HerbInj/InjuryHerb1.html>

II. Grain Quality and Utilization

This section of the contest is divided into 3 subsections: 1) Grain grading, 2) discount schedules, and 3) Seed Analysis . The following will describe each subsection.

A. Grain Grading

While most of the participants in this contest will not become grain inspectors, it is important to know how quality and pricing determination occurs on grain. Grain makes up an important part of food products, home products, overseas exports and our overall economy. In this contest, corn, soybeans and wheat will be graded. Standards have also been developed for barley, oats, rye, sorghum, flax, other wheat classes, triticale, sunflower, and mixed grains. Grain price quotations from local or regional elevators and markets are quoted on the radio, television, and newsprint. Most corn market reports are for "U.S. No. 2 Yellow Corn" while most soybean market reports are for "U.S. No. 1 Yellow Soybeans."

Grain Grading is comprised of a set of rules and standards adapted by the Federal Grain Inspection Service (FGIS). The FGIS is one of the agencies within the United States Department of Agriculture (USDA). A set of standards is necessary for buying and selling grain so that both the buyer and seller can determine a fair market price. Using the standards enables a grain grader to complete the certificate found below. This is a copy of the actual form used by a grain inspector.

**U.S. GRAIN STANDARDS ACT
OFFICIAL GRAIN INSPECTION CERTIFICATE
OFFICIAL SAMPLE LOT INSPECTION**

WN 0027194

_____ (ISSUED AT)					_____ (DATE OF SERVICE)				
I certify that I am licensed or authorized under the United States Grain Standards Act (7 U.S.C. 71 et seq.) to inspect the kind of grain covered by this certificate and that on the above date the following identified grain was inspected under the Act with the following results:									
<input type="checkbox"/> IN	<input checked="" type="checkbox"/> OUT	<input type="checkbox"/> LOCAL	<input type="checkbox"/> ORIGINAL INSPECTION	<input type="checkbox"/> REINSPECTION					
QUANTITY (This is Not A Weight Certificate) <input checked="" type="checkbox"/> CARLOT					METHOD OF SAMPLING <input type="checkbox"/> PROBE <input type="checkbox"/> PELICAN <input type="checkbox"/> MECHANICAL (DIVERTER)			DATE SAMPLED	
LOCATION					IDENTIFICATION OF CARRIER				
GRADE AND KIND U.S. No.									
TEST WEIGHT PER BUSHEL	MOISTURE	HEAT DAMAGED KERNELS	% DAMAGED KERNELS (TOTAL)	FOREIGN MATERIAL	SPLITS	BROKEN CORN AND FOREIGN MATERIAL	SHRUNKEN AND BROKEN KERNELS	DEFECTS (TOTAL)	SOUND OATS
LBS.	%	%	%	%	%	%	%	%	
TOP _____ FEET SAMPLED. BOTTOM NOT SAMPLED					REMARKS				
<input type="checkbox"/> STOWAGE AREA EXAMINED									
<input type="checkbox"/> STOWAGE AREA NOT EXAMINED									
NAME OR SIGNATURE _____									

The information on the grain certificate allows one to know the quality status of a grain lot in a railroad car, semi-trailer, or barge, etc. For the purpose of this contest, the white grain grading answer sheet in Appendix A will be used in the same manner as the inspection certificate.

Contestants (except coaches) will work in teams and not actually complete the entire grain grading process since equipment for so many contestants would be impossible. Teams will be given a problem sheet with test weight, moisture and other pertinent information. Stations will be set up with separations from particular cuts. Teams need to determine what the separations indicate by completing the white grain grading answer sheet. Therefore contestants do not pick the samples. In order to determine whether or not a kernel is damaged, teams will be allowed to use the Oklahoma State Publications Corn, Soybean, Wheat Kernel Damage (#216, #215, #213, respectively) during the contest. The procedure for writing the correct grade is as follows:

U.S. (No. 1, 2, 3, 4, 5 or Sample Grade), Class, Special Grade(s). When a sample is found to be graded Sample Grade, the "No." is crossed out on the inspection form and the words "Sample Grade" are written. When more than one special grade is present, they are placed in alphabetical order unless otherwise specified. In wheat, dockage is always written last.

The information about corn, soybean, and wheat grading in Appendix B is adapted from GIPSA (Grain Inspection, Packers, & Stockyard Administration formerly FGIS "Federal Grain Inspection Service") standards and will be provided to the contestants for use during the contest. Contestants may also use the Oklahoma State Kernel Damage Extension publications during this section of the contest. "NOTE: DO NOT USE THE GRADING STANDARDS IN THE OKLAHOMA PUBLICATIONS. USE ONLY THE GREEN SHEET OF GRADING TABLES PROVIDED FOR APPLYING GRADES TO GRAIN. UPDATES MAY HAVE OCCURRED SINCE THESE OSU PUBLICATIONS WERE PRINTED.

Eight points will be awarded for each correctly written grade line. A total of twelve points (divided evenly by the number of grading factors or certificate boxes required) will be awarded for correctly written numbers in the grading factor and other certificate boxes. Twelve points will be divided evenly for each comment required within a "Remarks" section. Three problems at 32 points each produce a total possible of 96 grain grading points.

Summary of Grain Grading Points

Gradeline:	Corn and Soybeans	Class	3 points
		Grade	3 points
		Special Grade	2 points
<hr/>	Wheat	Class	2 points
		Grade	2 points
		Special Grade	2 points
		Dockage	2 points

There will be no negative score awarded on any given problem. Contestant completion of non-required factor boxes (second line) information will have one point deducted per box if information is incorrect.

B. Discount Schedules

When undesirable qualities are found in grain, the seller is “discounted” or penalized in the price he or she receives for the grain. Grain buyers have discount schedules to penalize grain that has undesirable qualities. There are many different types of discount schedules that have been developed. For this contest, we will use the discount schedules provided in Appendix B used by The Andersons grain terminal in Dunkirk, IN. This information will be attached to the grain grading information that is used in the contest.

Contestants will complete the discount schedules for the same 3 samples that were used in grain grading. Each discount schedule problem will be worth 18 points to be evenly divided for each discountable factor. The total discount will make up the difference. Therefore a contestant may receive a total possible score of 54 points from discount schedule problems. The discount schedule and grain grading total 150 points (50 points for each of three problems).

e.g.	Yellow Corn			
	Test Weight	52 lbs	- \$.02	4 pts
	Moisture	16%	- \$.02	4 pts
	Foreign material	3.2%	- \$.01	4 pts
	2 Live weevils		- \$.08	4 pts
	<hr/>			
	Total		-\$.13	2 pts

C. Seed Quality

Refer To National FFA Agronomy CDE for more information.

III. Agronomy Exam

A 50 question multiple choice exam will comprise this section. Each question is worth 6 points for a total of 300 possible points. The instructional objectives and possible reference materials are found in Appendix C and D respectively.

IV. Soil Evaluation/Fertilizers

Refer To National FFA Agronomy CDE for more information.

Scoring Summary of Entire Contest

	<u>Points</u>
Identification	450
25 weed and crop plant samples (6 pts each)	150
25 weed and crop seed samples (6 pts each)	150
25 plant diseases, nutrient deficiencies (6 pts each) or damages	150
Grain Quality and Utilization	250
3 grain grading and discount schedule problems	150
4 Seed Analysis	100
Agronomic Exam	
50 multiple choice questions (3 pts each)	150
Soil Evaluation/Fertilizer	150
TOTAL POSSIBLE SCORE	1000

Appendix

A

Answer Sheets for

**plant,
seed, and
disease & damage id
(exam answer sheet will be on machine scored form)**

PLANT ID

Place the number of the correct plant in the proper sample blank.

Crops / Prairie Grasses

- | | | |
|------------------------|------------------------|----------------------------|
| 1. Alfalfa | 39. Switchgrass | 74. Ivyleaf morningglory |
| 2. Alsike clover | 40. Tall fescue | 75. Jerusalem artichoke |
| 3. Barley | 41. Timothy | 76. Jimsonweed |
| 4. Bermudagrass | 42. White clover | 77. Johnsongrass |
| 5. Big bluestem | 43. Wheat | 78. Knotweed |
| 6. Birdsfoot trefoil | | 79. Lambsquarter |
| 7. Blue grama | <u>Weed</u> | 80. Musk thistle |
| 8. Buckwheat | | 81. Oxeye daisy |
| 9. Buffalograss | 44. Barnyardgrass | 82. Pennsylvania smartweed |
| 10. Canada bluegrass | 45. Bitter wintercress | 83. Pennycress |
| 11. Canola | 46. Black nightshade | 84. Quackgrass |
| 12. Cotton | 47. Buckhorn plantain | 85. Rough/Redroot pigweed |
| 13. Crimson clover | 48. Bull thistle | 86. Shattercane |
| 14. Crownvetch | 49. Bur cucumber | 87. Shepardspurse |
| 15. Corn | 50. Canada thistle | 88. Tall waterhemp |
| 16. Flax | 51. Cheat | 89. Trumpet creeper |
| 17. Grain sorghum | 52. Chickweed | 90. Velvetleaf |
| 18. Hairy vetch | 53. Cocklebur | 91. Wild carrot |
| 19. Indiangrass | 54. Common milkweed | 92. Wild garlic |
| 20. Kentucky bluegrass | 55. Common plantain | 93. Woolly cupgrass |
| 21. Korean lespedeza | 56. Common purslane | 94. Yellow foxtail |
| 22. Little bluestem | 57. Common ragweed | 95. Yellow nutsedge |
| 23. Oats | 58. Corncockle | |
| 24. Orchardgrass | 59. Crabgrass | 1. _____ |
| 25. Pearl millet | 60. Common burdock | 2. _____ |
| 26. Red clover | 61. Curly dock | 3. _____ |
| 27. Reed canarygrass | 62. Dandelion | 4. _____ |
| 28. Rice | 63. Downy brome grass | 5. _____ |
| 29. Rye | 64. Fall panicum | 6. _____ |
| 30. Ryegrass | 65. Field bindweed | 7. _____ |
| 31. Sand lovegrass | 66. Giant foxtail | 8. _____ |
| 32. Sericea lespedeza | 67. Giant ragweed | 9. _____ |
| 33. Side-oats grama | 68. Green foxtail | 10. _____ |
| 34. Smooth brome grass | 69. Hedge bindweed | 11. _____ |
| 35. Soybean | 70. Hemp dogbane | 12. _____ |
| 36. Sudangrass | 71. Henbit | 13. _____ |
| 37. Sunflower | 72. Horsenettle | |
| 38. Sweetclover | 73. Ironweed | 14. _____ |
| | | 15. _____ |
| | | 16. _____ |
| | | 17. _____ |
| | | 18. _____ |
| | | 19. _____ |
| | | 20. _____ |
| | | 21. _____ |
| | | 22. _____ |
| | | 23. _____ |
| | | 24. _____ |
| | | 25. _____ |

SEED ID

Place the number of the correct seed in the proper sample blank.

Crops

1. Alfalfa
2. Alsike clover
3. Barley
4. Big bluestem
5. Birdsfoot trefoil
6. Buckwheat
7. Canola
8. Cotton
9. Crimson clover
10. Crownvetch
11. Dent corn
12. Durum wheat
13. Flax
14. Grain sorghum
15. Hairy vetch
16. Hard red winter wheat
17. Kentucky bluegrass
18. Korean lespedeza
19. Oats
20. Orchardgrass
21. Pearl millet
22. Popcorn
23. Red clover
24. Redtop
25. Reed canarygrass
26. Rice
27. Rye
28. Ryegrass
29. Smooth brome grass
30. Soft red winter wheat
31. Soybean
32. Sudangrass
33. Sunflower
34. Sweetclover
35. Sweet corn
36. Switchgrass
37. Tall fescue

38. Timothy
39. Triticale
40. White clover
41. White wheat

Weeds

- | | | |
|----------------------------|-----|-------|
| 42. Barnyardgrass | 1. | _____ |
| 43. Bitter wintercress | 2. | _____ |
| 44. Buckhorn plantain | 3. | _____ |
| 45. Canada thistle | 4. | _____ |
| 46. Cheat | 5. | _____ |
| 47. Chickweed | 6. | _____ |
| 48. Cocklebur | 7. | _____ |
| 49. Common milkweed | 8. | _____ |
| 50. Common plantain | 9. | _____ |
| 51. Common ragweed | 10. | _____ |
| 52. Corncockle | 11. | _____ |
| 53. Crabgrass | 12. | _____ |
| 54. Curly dock | 13. | _____ |
| 55. Dandelion | 14. | _____ |
| 56. Downy brome grass | 15. | _____ |
| 57. Fall panicum | 16. | _____ |
| 58. Field bindweed | 17. | _____ |
| 59. Giant foxtail | 18. | _____ |
| 60. Giant ragweed | 19. | _____ |
| 61. Henbit | 20. | _____ |
| 62. Horsenettle | 21. | _____ |
| 63. Jimsonweed | 22. | _____ |
| 64. Johnsongrass | 23. | _____ |
| 65. Lambsquarter | 24. | _____ |
| 66. Morningglory | 25. | _____ |
| 67. Oxeye daisy | | |
| 68. Pennsylvania smartweed | | |
| 69. Pennycress | | |
| 70. Rough/Redroot pigweed | | |
| 71. Wild carrot | | |

Plant/Seed Disease and Damage

Place the correct number of the problem in proper sample blank.

Corn Diseases

1. Anthracnose leaf blight
2. Anthracnose stalk rot
3. Diplodia ear rot
4. Fusarium ear rot
5. Gibberella ear rot
6. Gibberella stalk rot
7. Gray leaf spot
8. Northern corn leaf blight
9. Northern corn leaf spot
10. Smut
11. Southern corn leaf blight
12. Stewart's disease-leaf blight phase

Soybean Diseases

13. Bacterial leaf blight
14. Brown stem rot
15. Charcoal rot
16. Phytophthora root rot
17. Pod and stem blight
18. Rhizoctonia - root rot stage
19. Rhizoctonia - seedling stage
20. Sclerotinia stem rot
21. Septoria brown spot
22. Soybean cyst nematode

Small Grain Diseases

23. Ergot
24. Head scab
25. Loose smut
26. Mildew
27. Rust
28. Septoria

Alfalfa Diseases

29. Anthracnose
30. Fusarium wilt
31. Phytophthora root rot
32. Sclerotinia
33. Verticillium wilt

Nutrient Deficiencies

34. Boron
35. Magnesium
36. Manganese
37. Molybdenum
38. Nitrogen
39. Phosphorus
40. Potassium
41. Zinc

Herbicide Injury

42. Amino acid inhibitor
43. Cell growth inhibitor
44. Cell membrane disrupter
45. Growing point disintegrator
46. Growth regulator
47. Photosynthetic inhibitor
48. Pigment inhibitor

General Insect Damages

49. Alfalfa plant bug - adult
50. Alfalfa weevil
51. Army worm - larvae
52. Army worm adult
53. Bean leaf beetle
54. Black cutworm - adult
55. Black cutworm - larvae
56. Corn leaf aphid
57. Corn rootworm larvae
58. European corn borer - adult
59. European corn borer - larvae
60. Granary weevil - adult
61. Japanese beetle - adult
62. Meadow spittlebug
63. Mexican bean beetle - adult
64. Mexican bean beetle - larvae
65. Northern corn rootworm - adult
66. Potato leafhopper
67. Rice weevil - adult
68. Saw-toothed grain weevil - adult
69. Southern corn rootworm - adult
70. Western corn rootworm - adult

Sample

- | | |
|-----------|-----------|
| 1. _____ | 14. _____ |
| 2. _____ | 15. _____ |
| 3. _____ | 16. _____ |
| 4. _____ | 17. _____ |
| 5. _____ | 18. _____ |
| 6. _____ | 19. _____ |
| 7. _____ | 20. _____ |
| 8. _____ | 21. _____ |
| 9. _____ | 22. _____ |
| 10. _____ | 23. _____ |
| 11. _____ | 24. _____ |
| 12. _____ | 25. _____ |
| 13. _____ | |

Herbicide Information

Herbicide Identification

One of the objectives of identification is to train contestants to identify field problems such as herbicide injury. Any of these herbicides may be used to demonstrate herbicide injury. The table at the bottom of the page rates the control the herbicide may have on certain plants. These plants may be planted and sprayed with these herbicides and used in the contest.

1. ACCENT: Post emergence application on corn. For grass control, some broadleaf activity. Leaves grass carcasses. Amino acid inhibitor.
2. AATREX (atrazine): Post emergence application on corn. For broadleaf control. No effect on grasses. Photosynthetic inhibitor.
3. BANVEL: Post emergence application on corn. For broadleaf control. No grass control. Causes wilting and cupping of the leaves. Growth regulator.
4. DUAL: Pre-emergence application on corn or soybeans. For control of small seeded broadleaves. May cause buggy whipping if corn is injured. Cell growth inhibitor.
5. BLAZER: Post emergence application on soybeans. Burns foliage on broadleaves. No control of grasses. Can sometimes burn soybeans. Cell membrane disruptor.
6. COMMAND: Pre-plant incorporated application on soybean. Turns grasses and velvetleaf white. Pigment inhibitor.
7. POAST PLUS: Post emergence application on soybean. For grass control. Causes black shoots when pulled out of the whorl. Growing point disintegrator.
8. CLASSIC: Post emergence application on soybean. For broadleaf control. Causes purple veins. Amino acid inhibitor.
9. GRAMOXONE EXTRA (paraquat): Contact herbicide. Kills foliage. Cell membrane disruptor.
10. ROUNDUP: Contact herbicide. Causes yellowing then death to any plant that comes into contact with spray. Amino acid inhibitor.

	Corn	Soybean	Y. nutsedge	Foxtail	Pigweed	Lambsquarter
Accent	—	fair	poor	excellent	good	poor
atrazine	—	excellent	fair	fair	excellent	excellent
Banvel	—	good	poor	poor	good	good
Dual	—	—	good	excellent	good	fair
Blazer	poor	—	poor	fair	excellent	poor
Command	poor	—	poor	excellent	poor	good
Poast Plus	excellent	—	poor	excellent	poor	poor
Classic	poor	—	fair	poor	excellent	poor
paraquat	*	*	*	*	*	*
Roundup	*	*	*	*	*	*

* Contact herbicide which controls all indicated.

Data for this table courtesy of Dr. Mark Loux, Weed Specialist, Ohio State Extension.

Appendix

B

Included in this Appendix

Answer Sheet
Corn grading
Soybean grading
Wheat grading
Grain grading table
Flow chart of sample divisions
(commonly called separations)
Discount schedules

Grain Grading Answer Sheet

Complete the appropriate spaces. You must complete the information that affects the grade and kind. Extra information placed must be correct or points will be deducted (e.g. if a sample is found to be “U.S. No. 3 Yellow Corn” you do not have to state factors that would have made it “U.S. No. 2 Yellow Corn”). Extra, correctly stated factors that did not determine the grade will not be penalized. Grain inspectors provide extra information “upon request” that does not affect the grade designation. For “U.S. Sample Grade” place an “X” through “No.” and immediately write “Sample Grade.” Remember: Don’t confuse “Broken Corn and Foreign Material” and “Foreign Material.”

GRADE AND KIND U.S. No.								
TEST WEIGHT PER BUSHEL	MOISTURE	HEAT DAMAGED KERNELS	DAMAGED KERNELS (TOTAL)	FOREIGN MATERIAL	SPLITS	BROKEN CORN AND FOREIGN MATERIAL	SHRUNKEN AND BROKEN KERNELS	DEFECTS (TOTAL)
LBS.	%	%	%	%	%	%	%	%
Sample #1					REMARKS			

GRADE AND KIND U.S. No.								
TEST WEIGHT PER BUSHEL	MOISTURE	HEAT DAMAGED KERNELS	DAMAGED KERNELS (TOTAL)	FOREIGN MATERIAL	SPLITS	BROKEN CORN AND FOREIGN MATERIAL	SHRUNKEN AND BROKEN KERNELS	DEFECTS (TOTAL)
LBS.	%	%	%	%	%	%	%	%
Sample #2					REMARKS			

GRADE AND KIND U.S. No.								
TEST WEIGHT PER BUSHEL	MOISTURE	HEAT DAMAGED KERNELS	DAMAGED KERNELS (TOTAL)	FOREIGN MATERIAL	SPLITS	BROKEN CORN AND FOREIGN MATERIAL	SHRUNKEN AND BROKEN KERNELS	DEFECTS (TOTAL)
LBS.	%	%	%	%	%	%	%	%
Sample #3					REMARKS			

GRADE AND KIND U.S. No.								
TEST WEIGHT PER BUSHEL	MOISTURE	HEAT DAMAGED KERNELS	DAMAGED KERNELS (TOTAL)	FOREIGN MATERIAL	SPLITS	BROKEN CORN AND FOREIGN MATERIAL	SHRUNKEN AND BROKEN KERNELS	DEFECTS (TOTAL)
LBS.	%	%	%	%	%	%	%	%
Sample #4					REMARKS			

THIS COLUMN IS NOT SCORED AND IS PROVIDED AS A WORKSHEET.

Discounts

List each factor to be discounted, the amount of discount, and total to be discounted per bushel. This column is scored.

<p>Sample #1</p> <p>Test wt. _____ Shru & Brkn _____</p> <p>Moisture _____ BC and FM _____</p> <p>Odor _____ Heat Damage _____</p> <p>_____</p>	<p>Sample #1</p> <p>_____</p> <p>Total \$.</p>
<p>Sample #2</p> <p>Test wt. _____ Shru & Brkn _____</p> <p>Moisture _____ BC and FM _____</p> <p>Odor _____ Heat Damage _____</p> <p>_____</p>	<p>Sample #2</p> <p>_____</p> <p>Total \$.</p>
<p>Sample #3</p> <p>Test wt. _____ Shru & Brkn _____</p> <p>Moisture _____ BC and FM _____</p> <p>Odor _____ Heat Damage _____</p> <p>_____</p>	<p>Sample #3</p> <p>_____</p> <p>Total \$.</p>

CORN GRADING

Corn is defined as any grain which consists of 50 percent or more of whole kernels of shelled dent corn and/or flint corn. It may not contain more than 10 percent of other grains for which grading standards have been established. If it does not meet these standards, the lot is considered mixed grain. However, in this contest there will be no mixed grain so any grain other than dent or flint corn is foreign material. Pop corn and sweet corn in corn grading are foreign material.

Class and damaged kernels are determined after the removal of foreign material. All percentages shall be determined on the grain as a whole.

The first step is to determine the correct class. There are three classes of corn:

Yellow Corn - Yellow-kerneled corn can not contain more than 5 percent corn of other colors. Yellow kernels with a slight tinge of red are considered yellow corn.

White Corn - White-kerneled corn that does not contain more than 2 percent corn of other colors. White corn with a slight tinge of pink is white corn.

Mixed Corn - Corn that does not meet the color requirements of white or yellow corn.

When completing the grain inspection certificate (answer sheet) record the percent of each corn (class) from greatest to least in percentage to nearest tenth within the "Remarks" section.

Examples of class determination:

<u>Problem</u>	<u>Correct class</u>
1. 95% yellow corn = 5% white corn	Yellow Corn
2. 98% white corn = 2% yellow corn	White Corn
3. 96% yellow corn = 4% white corn	Yellow Corn
4. 89% yellow corn = 11% white corn	Mixed Corn

Moisture - is not a grading factor in commercial grain; nevertheless, a loss of quality in stored corn hinges largely on the amount of moisture present in the grain. Moisture is an important factor in most discount schedules. Moisture is recorded on the grain certificate (answer sheet) to the nearest tenth of a percent. (e.g. 16.27% recorded as 16.3%).

Factors used in determining the grade are as follows:

Test Weight - The amount of weight the grain must have to make up a bushel. Good quality corn of low moisture content can be expected to have a good test weight. Record test weight by rounding to the nearest tenth of a pound. Example 52.34 lbs/bu is recorded as 52.3 lbs/bu.

Broken Corn and Foreign Material - This factor is normally determined by the use of a sieve; broken corn and all matter other than corn that pass through a sieve having round openings 12/64th of an inch in diameter, and all matter other than corn that remain on the sieve after screening are included in this factor. Sweet corn and pop corn are forms of foreign material in corn grading. Soybeans not passing through the sieve would be an example of foreign material as well as wheat or oats that would drop through the screen. Rodent excreta and stones are also part of Broken Corn and Foreign Material. Do not enter this percentage in the foreign material column on the answer sheet. There is a column for Broken Corn and Foreign Material. Record to nearest tenth of a percent.

Heat-damaged Kernels - Heat damaged corn is severely discolored (brown to black) either from external heating, such as improper drying, or from heating as a result of excessive moisture in storage and spoilage. This differs from slightly damaged by heat in that severe heat damage discolors the entire kernel. Slightly damaged corn shows some discoloration (light to dark tan) and therefore is not as severely damaged. The two are not added together to determine heat damaged kernels. See description for Damaged Kernels (Total). Use the publication "Corn Kernel Damage" (#216 O.S.U.) to help you make this determination. Record heat damage to the nearest tenth of a percent.

Damaged Kernels (Total) - This factor includes all types of damage found in corn. Darkening of the germ is one of the first indicators of corn declining in quality or that the amount of damage is increasing. Damaged Kernels (Total) includes: mold damage, heat damage, sprout damage, frost damage, badly ground-damaged, badly weather-damaged, some forms of insect damage, and kernels that have become slightly discolored from heat. Note that the percent of heat damage is added to other types of damage to obtain the percent of Damaged Kernels (Total). Use the publication "Corn Kernel Damage" (#216 O.S.U.) to help you make these determinations. Record Damage Kernels (Total) to the nearest tenth of a percent.

Stones - A total weight of the stones exceeds 0.1 percent of the 1000 gram sample weight, the sample must be graded "U.S. Sample Grade". Cinders are considered Stones. When applicable, record "stones" in the "Remarks" section of the certificate.

Musty, Sour or Heating - A sample in any of these conditions is "U.S. Sample Grade". These conditions include mold smell, fermentation, pig pen smell, etc. Record the applicable words in the "Remarks" section of the grading certificate.

Commercially Objectionable Foreign Odor - If the corn carries an odor which does not normally occur in grain and which, for this reason, would render the corn unfit for its normal commercial use, then it is graded "U.S. Sample Grade". This includes animal hides, decaying animal or vegetable parts, fertilizer, skunk, smoke, strong weed, oil, etc. Record the words "Commercially Objectionable Foreign Odor" in the "Remarks" section of the certificate.

Distinctly Low Quality - The Federal Grain Inspection Service reserves the use of this term to describe corn when it is obviously of inferior quality and the existing grading factors or guidelines do not accurately reflect the inferior condition. Grain Inspectors are advised to use all available information to determine whether corn is of Distinctly Low Quality. When a sampler is collecting corn from a rail car, he/she can notice whether the grain also includes two or more large stones, pieces of glass, pieces of concrete, sticks of lumber, or scrap metal or debris which are visible to the sampler but are too large to enter the sampling device, such as a grain probe. To illustrate, corn is described as containing "plywood scraps". From information above, the corn would be designated: Distinctly Low Quality (Plywood scraps). This grading factor should not be confused with the other conditions which can also cause corn to be "Sample Grade", such as animal filth, cocklebur, crotalaria seed, etc. Here, the contestant would compare limits shown in the corn grading table under Sample Grade. Example: 0.3% animal filth. Since this quantity exceeds the 0.2% allowable, then the grading factor would be: Animal Filth. A quantity as 0.3%, or 3 per 500 gm., to follow "Animal Filth" is not required. Record the words "Distinctly Low Quality" and the reason(s) in the "Remarks" section of the certificate.

Special factors, special grade requirements, and special grade designations are as follows:

Flint - Corn of any class which consists of 95 percent or more of flint corn; flint corn is graded and designated according to the grade requirements of the standards applicable to such corn if it were not flint, and the word "Flint" is added to and made a part of the grade designation, immediately following the class name.

Flint and Dent - Corn of any class which consists of a mixture of flint and dent corn containing more than 5 percent but less than 95 percent of flint corn; flint and dent corn are graded and designated

according to the grade requirements of the standards applicable to such corn if it were not flint and dent, and the words "Flint and Dent" and the approximate percentage of flint corn are added to and made a part of the grade designation immediately following the special grade. Example: U.S. No. 3 Yellow Corn, Flint and Dent, Flint Corn 27%.

Infested - Any corn sample 1-1/4 quarts or 1000 gm. that contains two or more live weevils, one live weevil and 5 or more other live insects injurious to stored grain, or 10 or more other live insects injurious to stored grain is considered infested. Infested corn is graded and designated according to the grade requirements of the standards applicable to such corn if it was not infested. The word "Infested" is added to and made a part of the grade designation.

Waxy Corn - Corn that consists of 95% or more waxy corn. When applicable, this special grade will be last within the grade designation.

Special grades are conditions which should be noted but do not affect the numerical grade. The special grades "Flint" and "Flint and Dent" denote amounts of flint corn in the sample. Flint corn is a different subspecies of corn with hard starch rather than soft starch as in dent corn. Infested is the condition of live weevils or grain-damaging insects in the grain.

SOYBEAN GRADING

Soybeans are any grain that consists of 50 percent or more of whole or broken soybeans which will not pass readily through an 8/64 sieve and not more than 10 percent of other grains for which grading standards have been established. Class, splits, damaged kernels are determined after foreign material is removed. Soybeans are divided into the following two classes:

Yellow Soybeans - Soybeans that have a yellow seed coat and are yellow in cross-section. Up to 10 percent of other colors are allowed in yellow soybeans.

Mixed Soybeans - Any mixture of soybeans that does not meet the requirements of yellow soybeans. See Soybeans of Other Colors. For Mixed Soybeans, record the percentage of yellow soybeans and soybeans of other colors to the nearest tenth in the "Remarks" section of the certificate.

Moisture - The moisture content of soybean seed is extremely important but it is no longer used as a grading factor. Loss of quality of stored seed hinges largely on the amount of moisture present in the sample. Moisture is an important factor in most discount schedules. Record moisture to the nearest tenth of a percent.

Factors considered in determining the grade of soybeans are as follows:

Test Weight - Good quality seed of low moisture content can be expected to have a good test weight. Record test weight in whole and half pounds disregarding fractions of a half pound. In other words, round down to the nearest half pound. Example 56.78 lbs/bu is recorded as 56.5 lbs/bu. and 56.27 lbs/bu is recorded as 56.0 lbs/bu.

Splits - Any soybean having more than 1/4 of the seed missing is considered a split. This factor includes only sound splits - those free from damage. See Damaged Kernels (Total) below. Splits are determined on a portion of approximately 125 grams after the removal of all foreign material. Splits are recorded to the nearest tenth of a percent. (e.g. 16.26% is recorded as 16.3%).

Damaged Kernels (Total) - This factor includes all types of damage found in whole and pieces of soybeans. Damaged Kernels (Total) includes the following: heat damage, sprout damage, frost damage, immature seed, ground-damage, mold damage, insect damage, and seeds that have become slightly discolored by heat, etc. Note that the percentage of heat damage is added to the percentage of other types of damage to obtain the percentage of Damaged Kernels (Total). Stink bug stung kernels are

considered damaged kernels at the rate of 1/4 of actual total percentage of stung kernels (e.g. 12 grams is considered as 3 grams of damage). Use the publication "Soybean Kernel Damage" (#215 O.S.U.) to help you make these determinations. Record Damage Kernels (Total) to the nearest tenth of a percent.

Heat-damaged Kernels - Soybeans that are severely discolored (black or dark brown) either from external heating, such as improper drying, or from heating as a result of excess moisture and spoiling. Almost all heat damage is the result of storing grain too wet. Use the publication "Soybean Kernel Damage" (#215 O.S.U.) to help you make this determination. Record Heat-damaged Kernels to the nearest tenth of a percent.

Coarse Foreign Material - This includes kernels of corn, cockleburs, sticks, stalks, etc that do not pass through an 8/64 inch sieve. This test is made on 1000 grams. This percentage must be added to Fine Foreign Material. The sum of the two foreign materials is recorded to nearest tenth of a percent.

Fine Foreign Material - This includes anything such as rodent excreta and stones that pass through an 8/64 inch sieve including soybeans and pieces of soybeans plus all matter other than soybeans that remain on the sieve after sieving. This test is made on 125 grams. This percentage must be added to Coarse Foreign Material. The sum of the two foreign materials is recorded to nearest tenth of a percent.

Soybeans of Other Colors - These colors serve as a grading factor in yellow soybean. When soybeans of other colors (black, brown, and bicolored) occur in quantities of 10 percent or less, the percentage is a factor in determining the grade of yellow soybeans. When other colors exceed 10 percent, the sample is then classified as Mixed Soybeans. Percentages of other colors are not listed as part of the grade designation for Mixed Soybeans but are included in the "Remarks" section as previously indicated.

Stones - If four or more stones are present in a sample of 1-1/4 quarts (1000 gm.) and the total weight of stones exceeds 0.1 percent of the sample weight, the sample must be graded "U.S. Sample Grade." Cinders are considered Stones.

Distinctly Low Quality - The description as shown for corn applies to the presence of such conditions in soybeans.

Heating - The description for corn also applies to the presence of this condition in soybeans.

Cumulative Total - If a cumulative total of 11 or more sample grade factors (e.g. 3 stones + 2 animal filth + 6 unknown = 4 or more sample grade factors) are found, the sample is graded "U.S. Sample Grade." These factors include any combination of animal filth, castor beans, crotalaria seeds, glass, stones, and any unknown foreign substance. When applicable, record "cumulative total of 11 or more sample grade factors" in the "Remarks" section.

Special factors, special grade requirements, and special grade designations are as follows:

Purple Mottled or Stained - Soybean samples which appear to be purple mottled, stained or discolored by dirt or dirt-like substances may be considered "Purple Mottled or Stained." This determination is made on 400 grams. A sufficient amount of discolored or stained soybean to match or exceed a 4 x 6 inch interpretive line print photo is necessary to apply this special grade. Poke weed stains do not apply and can be determined by washing the soybean with a 0.1 N HCl test. For contest purposes a print will be available and/or the information will be provided with the grain grading problem. When applicable "Purple Mottled or Stained" is added to and made part of the grade designation on the certificate.

Garlicky - Soybeans that contain five or more green garlic bulblets or an equivalent of dry bulblets in 1000 grams are considered garlicky. Garlicky soybeans are graded and designated according to the grade requirements of the standards applicable to such soybeans if they were not garlicky and the word "Garlicky" is added to and made part of the grade designation. Three dry bulblets are equal to one green bulblet. A garlic odor is not a basis for "Garlicky."

Infested - Soybeans which contain two or more live weevils, one live weevil and five or more other live insects injurious to stored grain, or 10 or more other live insects injurious to stored grain in the sample are considered "Infested." Infested soybeans are graded and designated according to the grade requirements of the standards applicable to such soybeans if they were not infested. The word "Infested" is added to and made part of the grade designation.

The special grades "Garlicky", "Infested" and "Purple Mottled and Stained" do not affect the numerical grade. They are treated similarly to the special grades which are applicable to corn.

WHEAT GRADING

Wheat is any grain of common wheat, club wheat, and durum wheat, which before the removal of dockage, consists of 50 percent or more of these wheats and not more than 10 percent of other grains for which standards have been established and which, after the removal of dockage, contains 50 percent or more of whole kernels of one or more of these wheats. Wheat is divided into the following eight classes: Durum Wheat, Hard Red Spring Wheat, Hard Red Winter Wheat, Soft Red Winter Wheat, Hard White Wheat, Soft White Wheat, Unclassed Wheat, and Mixed Wheat. The following discussion will describe the sub-classes (in italics) of these eight Wheat classes (bold print).

Durum Wheat: All varieties of white (amber) durum wheat. (3 sub-classes) (Record to nearest tenth of a percent the hard and vitreous kernels of amber color in "Remarks" section)

Hard Amber Durum Wheat- is durum wheat with 75% or more of hard and vitreous kernels of amber color.

Amber Durum Wheat- is durum wheat with 60-74.9% of hard and vitreous kernels of amber color.

Durum Wheat- is durum wheat with less than 60 percent of hard and vitreous kernels of amber color.

Hard Red Spring Wheat: All varieties of hard red spring wheat (3 sub-classes) (Record to nearest tenth of a percent the dark, hard and vitreous kernels in "Remarks" section)

Dark Northern Spring Wheat- is hard red spring wheat with 75% or more of dark, hard, and vitreous kernels.

Northern Spring Wheat- is hard red spring wheat with 25-74.9% of dark, hard, and vitreous kernels.

Red Spring Wheat- is hard red spring wheat with less than 25% of dark, hard, and vitreous kernels.

Hard Red Winter Wheat: All varieties of hard red winter wheat. (No sub-classes).

Soft Red Winter Wheat: All varieties of soft red winter wheat. (No sub-classes).

Hard White Wheat: All hard endosperm white wheat varieties. (No sub-classes).

Soft White Wheat: All soft endosperm white wheat varieties. (3 sub-classes)

Soft White Wheat- is soft endosperm white wheat varieties containing not more than 10% White Club Wheat.

White Club Wheat- is soft endosperm white club wheat containing not more than 10% of other soft white wheat. Record to the nearest tenth of a percent the amount of "other soft white wheat" in the "Remarks" section.

Western White Wheat- is soft White Wheat containing more than 10% White Club Wheat and

more than 10% of other soft white wheat. Record the percentage of “other soft white wheat” rounded to the nearest tenth percent of White Club Wheat is recorded in the “Remarks” section.

Unclassed Wheat: Any variety of wheat which is not classifiable under other criteria provided in the wheat standards. No sub-classes). (Examples: red durum wheat or any other wheat which is red or white in color. The color and other characteristics which describe the wheat in addition to the percentage rounded to the nearest tenth percent are recorded in the “Remarks” box on the certificate.

Mixed Wheat: Any mixture which consists of less than 90% of one class and more than 10% of one other class, or a combination of classes which meet the definition of wheat. The name and percentage of the classes that comprise the mixture in order from greatest to least are recorded in the “Remarks” box of the certificate. These percentages are rounded to the nearest tenth of a percent.

The grade designation for wheat should be written as follows: U.S. No. (or Sample Grade), sub-class (class only where sub-classes do not exist), special grades when applicable (alphabetical order) and finally “Dockage” and the percentage thereof. The following are some examples of writing a wheat grade:

US No. 3 White Club Wheat, Infested, Light Smutty, Dockage 3.4%

US Sample Grade Soft Red Winter Wheat, Dockage 2.1%

At the contest, the contestant should be able to visually distinguish between classes (i.e. soft red winter wheat vs durum wheat). However special information will be provided that will help the contestant determine the appropriate sub-class (i.e. the hard endosperm or vitreous content of durum wheat). For contest purposes, we will avoid having any sample that would be determined mixed wheat.

Basis of Determination

Each determination of dockage, moisture, temperature, odor, garlic, live weevils or other insects injurious to stored grain, and distinctly low quality completed on the grain as received when taken from an incoming truck, rail car, etc. All other “tests” are conducted after dockage has been removed. Moisture is recorded to the nearest tenth of a percent (e.g. 17.34 is recorded as 17.3%).

Dockage - The word “dockage” means weed seed, weed stems, chaff, straw, grain other than wheat, sand, soil, and any other material other than wheat, that can be removed readily from the wheat by the use of appropriate sieves and cleaning devices. Also, the underdeveloped, shriveled, and small pieces of wheat kernels removed in properly separating the material other than wheat plus that which cannot be recovered by properly re-screening or re-cleaning is also a part of dockage. Determination of dockage is made in the initial sieving. Shrunken and broken kernels and foreign material are determined after the dockage has been removed. The percent dockage is rounded and reported to the nearest tenth percent. Dockage is determined from a 1,000 gram sample and is expressed as a percentage.

Factors to be considered in determining the grade of all wheat classes are as follows:

Foreign Material - Foreign material refers to all matter other than wheat, including stones, that is not separated from the wheat in the proper removal of dockage. Record to the nearest tenth of a percent.

Damaged Kernels (Total) - This factor includes all types of damage found in wheat. It is very inclusive in that kernels and pieces of kernels of wheat plus other grains are also affected. Damaged Kernels (Total) means heat-damaged, sprouted, frosted, badly ground-damaged, badly weather-damaged, moldy, diseased, or otherwise materially damaged. Note that the percentage of heat damage is added to become a part of the Damaged Kernels (Total). Damaged Kernels (Total) are recorded to the nearest tenth of a percent. Use the “Wheat Kernel Damage” publication #L-213 from O.S.U. to help you make these determinations.

Heat-damaged Kernels - Refers to kernels and pieces of kernels of wheat and other grains that have been “severely” discolored or damaged by heat. This damage may result from external heating, such

as improper drying, or from heating as a result of excess moisture and spoilage. Heat-damaged kernels are reported to the nearest tenth of a percent. Use the "Wheat Kernel Damage" publication #L-213 from O.S.U. to help you make this determination.

Other Grains - Other grains as used in this discussion are rye, oats, corn, grain sorghum, barley, flax, emmer, spelt, einkorn, polish wheat, poulard wheat, cultivated buckwheat, and soybeans. These grains are also considered foreign material, even when damaged.

Insect Damaged Wheat Kernels - Wheat is determined to be U.S. Sample Grade when 32 or more insect damaged kernels per 100 grams are found. This is up to a 3 stage process. For simplicity in the contest, the number of kernels per 100 gram will be given. Do not confuse insect chewed with insect damage. When applicable, include in the "Remarks" section of the certificate "Sample Grade Due to Insect Damaged Kernels."

Contrasting Classes - A contrasting class in soft red winter wheat is durum wheat. Soft red winter wheat flour is especially suited for cake mixes while flour from durum wheat is required for spaghetti production. Thus, there is a "contrast" in use. Each wheat has its own "Contrasting Classes." Record in "Remarks" area of certificate "Contrasting Classes" and state to the nearest tenth of a percent. The table below identifies each class of wheat and its contrasting classes.

Contrasting Classes in Wheat

Class	Contrasting Classes
Hard Red Winter and Hard Red Spring Wheat	Durum, Hard White, Soft White, and Unclassed Wheat
Durum Wheat	Hard Red Spring, Hard Red Winter, Soft Red Winter, Hard White, Soft White, and Unclassed Wheat
Soft Red Winter Wheat	Durum and Unclassed Wheat
Hard White and Soft White Wheat	Durum, Hard Red Winter, Hard Red Spring, Soft Red Winter, and Unclassed Wheat

Wheat of Other Classes (Total) - This factor spotlights the presence of other wheats in a sample. Some mixtures may be of minor importance. For example, if a soft red winter wheat contained 8% hard red winter wheat, the flour from such a mixture might be acceptable, but not the most desirable for cake mixes when compared to flour from 100% soft red winter wheat. Wheat of Other Classes (Total) also includes percent of Contrasting Classes. State "Wheat of other classes" (Total to nearest tenth of a percent) in the "Remarks" section of the certificate.

Distinctly Low Quality - The description as shown for corn applies to the presence of such conditions in wheat. Large pieces of concrete, metal, glass, etc. are the bottom line in assigning "Sample Grade" to wheat.

Shrunken and Broken Kernels - These are kernels and pieces of kernels of wheat and other matter that will pass readily through a .064 x 3/8 inch oblong hole sieve after the dockage has been removed. Record to the nearest tenth of a percent.

Stones and Glass - If four or more stones are present in a sample of 1-1/4 quarts (1,000 gm.) or the total weight of the stones exceeds 0.1 percent of the sample weight, the sample must be graded "U.S. Sample Grade". Cinders are considered Stones. Wheat will be graded "U.S. Sample Grade" when one or more pieces of glass are found per 1000 grams. Record "Stones" or "Glass" respectively, when applicable in the "Remarks" section of the certificate.

Cumulative Total - If a cumulative total of 4 or more sample grade factors (e.g. 3 stones + 1 animal filth + 1 unknown = 4 or more sample grade factors) are found, the sample is graded "U.S. Sample Grade." Record "cumulative total of 4 or more sample grade factors" in the "Remarks" section.

Defects (Total) - This factor is determined by adding the percentages of Damaged Kernels (Total), Foreign Material, Shrunken and Broken Kernels.

Test Weight - Good quality wheat of low moisture content can be expected to have a good test weight. The weight per bushel is expressed to the nearest tenth of a pound. For example, 60.18 is reported as 60.2 lbs.

Special factors, special grade requirements, and special grade designations are as follows:

Smutty - There are two special grades of smutty wheat — Light Smutty and Smutty.

Light Smutty - Applies to wheat with a smutty odor, or when wheat contains more than 5 smut balls in 250 grams of grain; the term “Light Smutty” is added to and made part of the grade designation.

Smutty - Applies to wheat that contains 31 or more smut balls per 250 gram sample; the word “Smutty” is added to and made part of the grade designation.

Garlicky - Wheat that contains three or more green garlic bulblets or an equivalent of dry bulblets in a 1000-gram sample; the word “Garlicky” is added to and made part of the grade designation. Three dry or partly dry bulblets equal 1 green garlic bulblet. Garlic odor is not a basis for “Garlicky.”

Infested - Wheat that is infested with two or more live weevils, one live weevil and one or more other insects injurious to stored grain, or two or more other insects injurious to stored grain in a 1-1/4 quart (1,000 gm.) sample is considered infested. Wheat that is infested is graded and designated according to the grade requirements of the standards applicable to such wheat if it were not infested. The word “Infested” is added to and made part of the grade designation.

Ergoty - Wheat that contains more than 0.05 percent per 1000 grams ergot is considered Ergoty. Ergoty wheat is graded and designated according to the grade requirements of the standards applicable if it were not “Ergoty”. The word “Ergoty” is added to and made part of the grade designation. Note that ergot also fits the definition of foreign material in wheat and must be included as such.

Treated Wheat - Wheat that has been scoured, limed, washed, sulphured or treated with a substance such that the grade designation alone does not truly describe its quality. Wheat that is “Treated” will have the words “Treated (treatment(s))” as part of the grade designation (e.g. U.S. No. 1 Soft White Wheat, Treated (limed), Dockage 0.4%).

These six special grades and dockage are treated similarly to the special grades in corn and soybeans in that they do not affect the numerical grade, but they are written as a part of the grade designation following the class.

Grades and Grade Requirements

§ 810.404 Grades and grade requirements for corn.

Grade	Minimum test weight per bushel (pounds)	Maximum limits of:		
		Damaged kernels		Broken corn and foreign material (percent)
		Heat damaged kernels (percent)	Total (percent)	
U.S. No. 1	56.0	0.1	3.0	2.0
U.S. No. 2	54.0	0.2	5.0	3.0
U.S. No. 3	52.0	0.5	7.0	4.0
U.S. No. 4	49.0	1.0	10.0	5.0
U.S. No. 5	46.0	3.0	15.0	7.0

U.S. Sample Grade
U.S. Sample grade is corn that:

(a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or

(b) Contains stones with an aggregate weight in excess of 0.1 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (*Crotalaria* spp.), 2 or more castor beans (*Ricinus communis* L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cockleburrs (*Xanthium* spp.), or similar seeds singly or in combination, or animal filth in excess of 0.20 percent in 1,000 grams; or

(c) Has a musty, sour, or commercially objectionable foreign odor; or

(d) Is heating or otherwise of distinctly low quality.

§ 810.1604 Grades and grade requirements for soybeans

Grading factors	Grades U. S. Nos.			
	1	2	3	4
Minimum test weight per bushel	56.0	54.0	52.0	49.0
Maximum percent limits of				
Damaged kernels				
Heat (part of total)	0.2	0.5	1.0	3.0
Total	2.0	3.0	5.0	8.0
Foreign material	1.0	2.0	3.0	5.0
Splits	10.0	20.0	30.0	40.0
Soybeans of other colors ^{1/}	1.0	2.0	5.0	10.0
Maximum count limits of				
Other materials				
Animal filth	9	9	9	9
Castor beans	1	1	1	1
Crotalaria seeds	2	2	2	2
Glass	0	0	0	0
Stones ^{2/}	3	3	3	3
Unknown foreign substance	3	3	3	3
Total ^{3/}	10	10	10	10

U.S. Sample grade are soybeans that:

(a) Do not meet the requirements for U.S. Nos. 1, 2, 3, or 4; or

(b) Have a musty, sour, or commercially objectionable foreign odor (except garlic odor); or

(c) Are heating or otherwise of distinctly low quality.

^{1/} Disregard for Mixed soybeans.

^{2/} Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, and unknown foreign substances. The weight of stones is not applicable for total other material.

Wheat

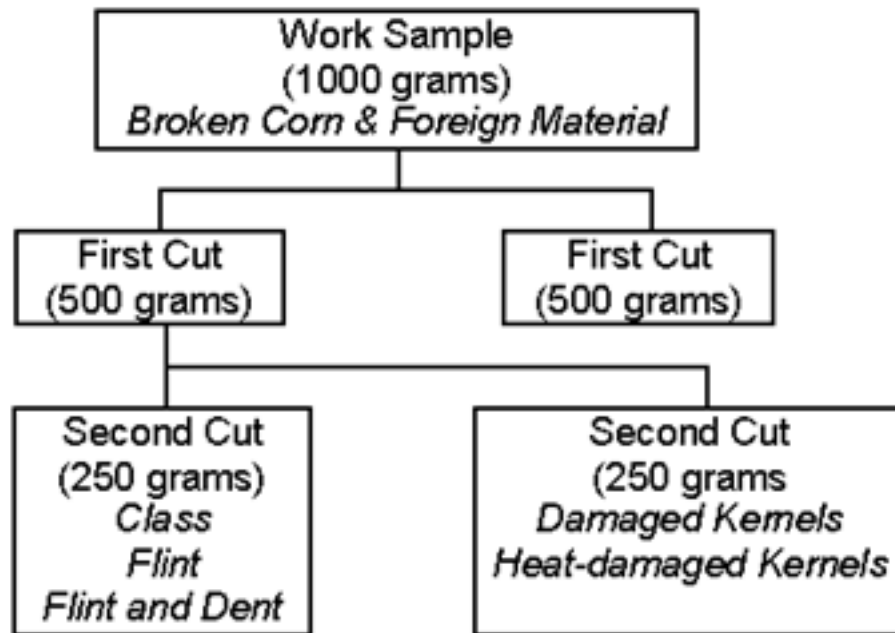
Grades and Grade Requirements

§ 810.2204 Grades and grade requirements for wheat.

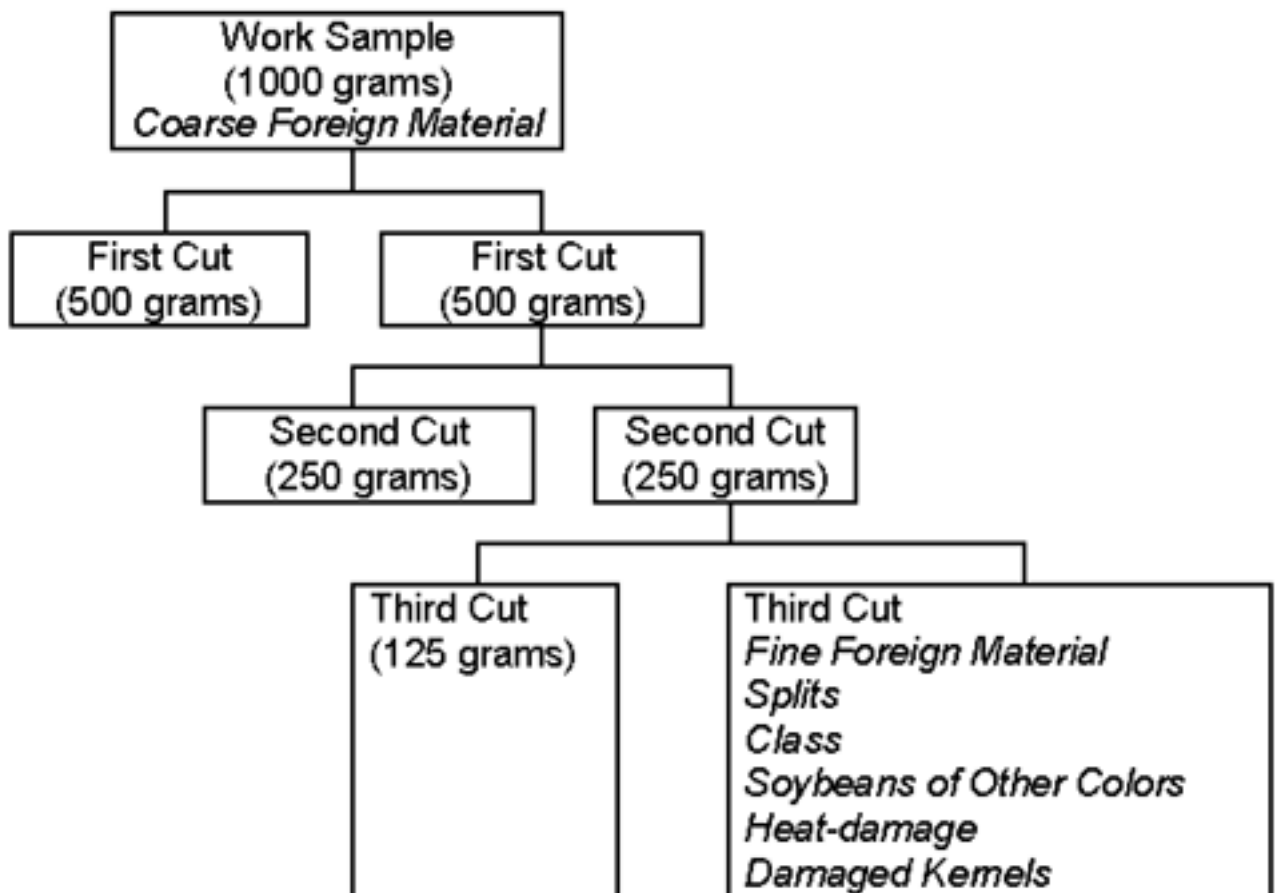
(a) Grades and grade requirements for all classes of wheat, except Mixed wheat.

Grading factors	Grades U.S. Nos.				
	1	2	3	4	5
Minimum pound limits of:					
Test weight per bushel					
Hard Red Spring wheat or White Club wheat	58.0	57.0	55.0	53.0	50.0
All other classes and subclasses	60.0	58.0	56.0	54.0	51.0
Maximum percent limits of:					
Defects:					
Damaged kernels					
Heat (part of total)	0.2	0.2	0.5	1.0	3.0
Total	2.0	4.0	7.0	10.0	15.0
Foreign material	0.4	0.7	1.3	3.0	5.0
Shrunken and broken kernels	3.0	5.0	8.0	12.0	20.0
Total ^{1/}	3.0	5.0	8.0	12.0	20.0
Wheat of other classes: ^{2/}					
Contrasting classes	1.0	2.0	3.0	10.0	10.0
Total ^{2/}	3.0	5.0	10.0	10.0	10.0
Stones	0.1	0.1	0.1	0.1	0.1
Maximum count limits of:					
Other material:					
Animal filth	1	1	1	1	1
Castor beans	1	1	1	1	1
Crotalaria seeds	2	2	2	2	2
Glass	0	0	0	0	0
Stones	3	3	3	3	3
Unknown foreign substances	3	3	3	3	3
Total ^{3/}	4	4	4	4	4
Insect-damaged kernels in 100 grams	31	31	31	31	31
U.S. Sample grade is Wheat that:					
(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, or 5; or					
(b) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor) or					
(c) Is heating or of distinctly low quality.					
^{1/} Includes damaged kernels (total), foreign material, shrunken and broken kernels.					
^{2/} Unclassed wheat of any grade may contain not more than 10.0 percent of wheat of other classes.					
^{3/} Includes contrasting classes.					
^{4/} Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance.					

Flow Chart Illustrating the Progression of Corn Separations

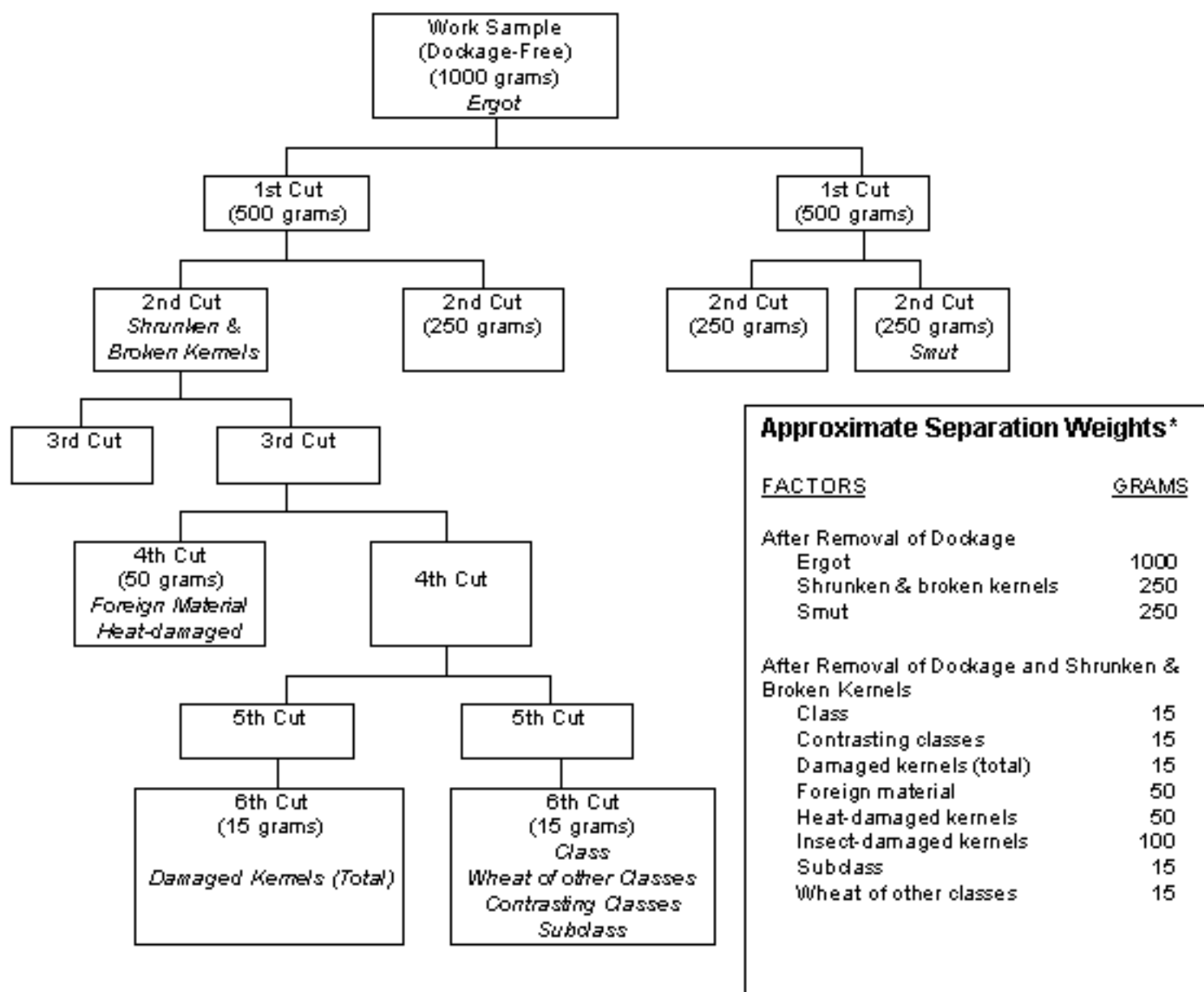


Flow Chart Illustrating the Progression of Soybean Separations



Separation weights on these charts are approximate, but will be used in the context.

Flow Chart Illustrating the Progression of Wheat Separations



Appendix

C

Agronomy Exam Objectives

Agronomy Exam Objectives

To successfully complete the multiple choice test related to corn and soybeans, the contestant will be able to:

1. Assess fertility needs and make nutrient recommendations for corn and soybeans using tables.
2. Calculate fertilizer needs and costs to satisfy a specific nutrient problem.
3. Diagnose fertility, pest, compaction, and disease problems related to specific field situations.
4. Calculate general insecticide and herbicide needs for a specific field situation or problem.
5. Calculate area, length and volume measurements related to agriculture.
6. Explain how crop residue is measured by the Natural Resources Conservation Service and why it is measured after planting.
7. Define any tillage system and discuss current tillage trends.
8. Identify the herbicide mode of action group most likely responsible for specific herbicide injury symptoms.
9. Determine procedures for diagnosing crop production problems in a field.
10. Recommend nozzle tips that would be best suited for spraying in a specific field situation.
11. Explain and readily use any given pesticide label.
12. Determine the growth stage of a corn or soybean plant.
13. Define a soybean relative maturity group and predict what would happen if a variety is planted outside its recommended maturity range (e.g. move group II to southern Indiana).
14. Explain the effect and use of temperature developmental units for agriculture.
15. Use current weather information to calculate growing degree days.
16. Consult tables and charts to obtain information from reference materials.

17. Use corn and soybean moisture conversions to calculate actual pounds per bushel.
18. Define the cation exchange capacity of a soil and state the two factors that influence the cation exchange capacity of a soil.
19. Complete the process necessary to submit plant, soil or insect samples to a lab in order to reduce sampling error (often the largest source of error).
20. Contrast features of conventional versus reduced tillage systems related to weed control, earthworm populations, temperature, moisture, and soil erosion.

To successfully complete the portion of the multiple choice test pertaining to wheat, the contestant will be able to:

1. List varietal characteristics important in wheat variety selection.
2. Schedule a nitrogen fertility program for optimum wheat production.
3. Use tables and soil test information to determine nitrogen, phosphorous, and potassium needs.
4. Schedule a fertility program for double-cropping no-till soybeans following wheat.
5. State factors that affect the planting date of wheat.
6. Identify when it is appropriate to plant seed from your own bin.
7. Suggest the proper seeding depth and soil conditions for ideal wheat growth.
8. State the typical seeding rate and plant population of soft red winter wheat.
9. State two conditions that lead to lodging (falling over) of wheat.

To successfully complete the portion of the multiple choice test related to forages, the contestant will be able to:

1. List 3 reasons a pure stand is advantageous over a mixed stand.
2. List 5 reasons a mixture is advantageous over a pure stand.
3. Contrast the suitability of Alfalfa, Timothy, Smooth brome grass, and Orchardgrass to a 3 vs. 4 cutting system.
4. Contrast the suitability of Alsike clover, Red clover, White clover, Alfalfa, Reed canarygrass, Tall fescue, Switchgrass, Big bluestem, Indiangrass, Orchardgrass, and Smooth brome grass to various levels of soil drainage and fertility.
5. State the benefits of legume-renovated pastures.
6. Describe the common problems encountered when renovating pastures.
7. State the steps required to achieve successful pasture renovation.
8. Describe the effect of improper liming, phosphorus and potassium fertilization in Alfalfa.
9. Determine factors that lead to heaving of tap rooted plants such as Alfalfa.

10. Identify alfalfa weevil, potato leafhopper, grasshoppers, anthracose, phytophthora root rot, fusarium wilt and bacterial wilt.

In order to complete the portion of the multiple choice test pertaining to plant physiology, the contestant will be able to:

1. Differentiate the three (3) major components: pericarp, endosperm, and embryo in a grass caryopsis (grain kernel).
2. Distinguish between hypogeal and epigeal emergence.
3. Determine differences in root systems, stems, and leaf structures between dicot and monocot plants.
4. Compare and contrast specialized stems such as rhizomes, tubers, stolons, corms, bulbs, culms and stalks in growth location and physical appearance.
5. Label a diagram of the external features of a Red clover, Alfalfa, and grass leaf.
6. Label the parts of a basic flower, a legume flower, and a grass flower.
7. Differentiate between the spike, raceme, panicle, or head types of inflorescences.
8. Compare and contrast crop physiology or species with the climate throughout the United States.
9. Differentiate between the broadleaf, grass, or sedge characteristics.
10. Discuss the three plant life cycles related to growth, season, longevity, and vulnerability.

In order to complete the portion of the multiple choice test related to grain grading, the contestant will be able to:

1. Recognize the usual grade of market quotes and where market quotes may be obtained.
2. List the grains for which standards have been established.
3. Explain procedures used in determining grades for corn, soybeans and wheat.
4. Discuss the purpose of GIPSA and explain the acronym.
5. Discuss the anatomy of a kernel or seed in terms of grain quality and class.

Appendix

D

Index to Appendix D

List of possible references
Order form for the Alfalfa Analyst Publication
Order form for University of Illinois Disease, Damage
and Insect Photos

Possible Contest Reference Materials to Order in Advance For Study

1. Corn Kernel Damage #216 (contestants will be provided and can use during contest)
 Contact: Kim Anderson, Extension Agriculture Economics, Oklahoma State University
 (405) 744-6082
 Cost: \$0.75
2. Soybean Kernel Damage #215 (contestants will be provided and can use during contest)
 Contact & Cost: same as (1)
3. Wheat Kernel Damage #213 (contestants will be provided and can use during contest)
 Contact & Cost: same as (1)
4. Corn & Soybean Field Guide ID-179 (these will be distributed at registration)
5. Wheat Production and Fertilization in Indiana AY-244
6. Forage Selection and Seeding Guide for Indiana AY-253
7. Improving Pastures by Renovation AY-251
8. Estimating Crop Residue Cover AY-269

 4-8 Contact: Purdue University Cooperative Extension Service
 Agricultural Media Distribution Center
 301 South 2nd Street
 Lafayette, IN 47905
 phone: 765-494-6794
9. Alfalfa Analyst
 Contact: Order blank attached
10. Color Picture Sheets
 Assorted Crop Disease Symptoms
 Assorted Herbicide Injuries
 Crop and Weed Id

 Illinois Vocational Agriculture Service
 University of Illinois
 College of Agriculture
 1401 S. Maryland Dr.
 Urbana, IL 61801
 (217) 333-3871
11. Iowa State University
 515-294-5247
 How a Corn Plant Develops #48
 How a Soybean Plant Develops #53

Continuation of Resources

12. The Ohio State University
614-292-1607
Ohio Agronomy Guide #472
13. University of Minnesota
612-625-8173
Herbicide Mode of Action and Injury Symptoms #377
14. Michigan State University
517-355-0240
Common Weed Seedlings of the North Central #607

Note: Contact your local cooperative extension service office to see what is available for reference in your state. Please share knowledge of reference sources with other states and contest coordinator's as there are several additions that could be made to this list. Hundreds of internet web sites provide useful resources.


ALFALFA COUNCIL

Alfalfa Council publications are available from:

Alfalfa Council
 10920 Ambassador Dr. #302
 Kansas City, MO 64153
Phone: (816) 891-0579 **Fax:** (816) 891-7162
E-Mail: Alfalfa Council

Quantity	Materials	Price
<input type="checkbox"/>	Alfalfa Analyst (revised)	\$2.00 each
<input type="checkbox"/>	Alfalfa for Dairy Animals (revised)	\$.35 each
<input type="checkbox"/>	Alfalfa Hay Quality	\$.35 each
<input type="checkbox"/>	Alfalfa: The High Quality Hay for Horses	\$.35 each
<input type="checkbox"/>	Buying and Selling Alfalfa Hay	\$.35 each
<input type="checkbox"/>	Establishing Alfalfa Stands	\$.35 each
<input type="checkbox"/>	How an Alfalfa Plant Develops	\$2.50 each
<input type="checkbox"/>	Making Quality Alfalfa Hay in Less Time, With Fewer Risks	\$.35 each
<input type="checkbox"/>	Manage the Alfalfa Weevil to Improve Alfalfa Yield and Quality	\$.35 each
<input type="checkbox"/>	Alfalfa in the South	\$.35 each
<input type="checkbox"/>	Western Alfalfa Seed Production Story - video	\$30.00/set
<input type="checkbox"/>	Annual Symposium Proceedings	\$10.00/copy
<input type="checkbox"/>	2nd National Alfalfa Grazing Conference Proceedings	\$10.00/copy
<input type="checkbox"/>	Alfalfa Varieties (current year only)	\$.25 each
<input type="checkbox"/>	Packet of all Printed Materials (except Symposium Proceedings)	\$8.00/packet

Handling Costs	Please note that:
25 items or less \$ 3.00	<ul style="list-style-type: none"> • Items ordered in quantities over 1,000 receive a 50% discount • Actual cost will be billed for foreign and express shipments • Acceptable types of payment include the following: Cash, International Money Orders, Postal Money Orders, or Checks in U.S. funds drawn on U.S. banks
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ITCS Agronomy Diseases and Pests Picture Sheets

- X798.02 Stored Grain Insects \$.45
- X798.03 Grain Molds and Vertebrate Storage Pests \$.45
- X798.30 Corn Insects- Above Ground \$.45
- X798.31 Corn Insects- Below Ground \$.45
- X798.40 Soybean Insects \$.45
- X799.30 Corn Diseases I \$.45
- X799.31 Corn Diseases II \$.45
- X799.32 Corn Diseases III \$.45
- X799.33 Corn Diseases IV \$.45
- X799.34 Corn Diseases V \$.45
- X799.35 Sorghum Diseases I \$.45
- X799.36 Sorghum Diseases II \$.45
- X799.40 Soybean Diseases I \$.45
- X799.41 Soybean Diseases II \$.45
- X799.50 Alfalfa Diseases I \$.45
- X799.51 Alfalfa Diseases II \$.45
- X799.60 Clover Diseases I \$.45
- X799.61 Clover Diseases II \$.45
- X799.62 Forage Grass Diseases I \$.45
- X799.70 Wheat Diseases I \$.45
- X799.71 Wheat Diseases II \$.45
- X799.80 Oat Diseases \$.45
- X799.81 Barley and Rye Diseases \$.45
- X898.01 Field Crop Weeds \$.45
- X899.01 Corn Herbicide Injury I \$.45
- X899.02 Corn Herbicide Injury II \$.45
- X899.06 Soybean Herbicide Injury I \$.45
- X899.07 Soybean Herbicide Injury II \$.45
- X899.16 Injury Symptoms from Selected Herbicides \$.45
- X899.17 Herbicide Injury-Meristematic Inhibitors I \$.45
- X899.18 Herbicide Injury-Meristematic Inhibitors II \$.45
- X899.19 Herbicide Injury-Plant Growth Regulators & Pigment Inhibitors \$.45
- X899.20 Herbicide Injury-Photosynthetic Inhibitors & Contact Herbicides \$.45