

CROPS CAREER DEVELOPMENT EVENT

Revised 7/2020

1. The CDE shall consist of four parts with the following point values:

A. Identification	75 samples @ 4 points each	300 points
B. Grain Grading	3 samples @ 50 points each	150 points
C. Management Test	50 multiple choice questions @ 6 points	300 points
D. Practicums	3 practicums @ 50 points each	<u>150 points</u>
	Possible individual total	900 points

2. Time allowed:

A. Identification -	45 seconds per sample	60 minutes
B. Grain Grading -	6 minutes per sample	18 minutes
C. Practicums -	12 minutes per sample	30 minutes
D. Management Test -	1.2 minutes per question	<u>60 minutes</u>
	Total Time Involved	180 minutes

3. Each contestant will work individually and be scored individually. A team will consist of four members. The scores for the top three-team members will be the team's score. The contestant may take clipboard, hand lens, forceps, pencils, and grading book into the CDE. Calculators may be used during the CDE. Only information pertinent to Grain Grading may be in the grading book. Grain grading books may not be used in any way during Practicums or Identification.

4. Practicums will be rotated the following years:

Odd Years – Soils, Insects, Seed Analysis

Even Years - Pesticide, Fertilizer, Varietal Trials

5. Scoring: Computerized scoring will be used in the Identification and Management sections of the CDE. Hand scoring will continue to be used in the Grain Grading and Practicums sections of the CDE.

6. Official Dress or appropriate FFA attire is required. Refer to Rule 1-A-5 on page 1.1. Individuals not in official dress will have a deduction of up to 45 points subtracted from their score.

7. Management Test Rotation: The following rotation of crops has been developed for use in the Management Test section of the CDE.

2020-2021	Soybean and Wheat
2021-2022	Corn and Oats
2022-2023	Soybean and Barley
2023-2024	Corn and Alfalfa

See suggested references listed after exam section

Plant, Seed, Insect, and Disease Identification: Seventy-five samples will be displayed at random (no groups labeled) with 45 seconds allowed for each sample. Six points will be allowed for each sample. Using the computerized identification score sheets, participants will fill in the number of the specimen to be identified in the appropriate computer blank. Students will be given a complete listing of all samples with assigned numbers to be used during the CDE.

a. CROP PLANTS & SEEDS

- | | |
|---------------------------|------------------------|
| Annual Canarygrass (P-S) | Lupine (P-S) |
| Buckwheat (P-S) | Oat (P-S) |
| Canola (P-S) | Popcorn (S) |
| Corn (P) | Proso millet (P-S) |
| Dent corn (S) | Rye (P-S) |
| Durum wheat (S) | Six-rowed barley (P-S) |
| Fieldbean** (P-S) | Soybean (P-S) |
| Fieldpea (P-S) | Sunflower* (P-S) |
| Flax (P-S) | Sugar beet (P-S) |
| Flint corn (S) | Sweet corn (S) |
| Foxtail millet (P-S) | Triticale (P-S) |
| Grain sorghum (P-S) | Wild rice (S) |
| Hard red spring wheat (S) | Wheat (P) |
| Hard red winter wheat (S) | |

(P-S) – Both plant and Seed; (P) – Plant only; (S) – Seed only

* May include confectionery type or oil type.

** May include any of the following: lima, navy, pinto, or red kidney.

b. FORAGE SEEDS & PLANTS

- | | |
|--------------------|------------------|
| Alfalfa | Reed canarygrass |
| Alsike clover | Smooth brome |
| Birdsfoot trefoil | Sudan grass |
| Crownvetch | Sweetclover |
| Kentucky bluegrass | Tall fescue |
| Orchardgrass | Timothy |
| Red clover | White clover |

c. WEED PLANTS and SEEDS

NOXIOUS WEEDS & PROHIBITED WEED SEEDS

- | | |
|---------------------------|---------------------------------|
| Bull thistle (Plant only) | Perennial sowthistle |
| Canada thistle | Plumeless thistle (Plant only) |
| Field bindweed | Purple loosestrife (Plant only) |
| Hoary cress (Seed only) | Spotted Knapweed |
| Leafy spurge | |
| Musk thistle | |

Note: Poison ivy is not included because of its potentially hazardous properties.

Note: Hemp is not included as it is illegal to possess a plant specimen.

OTHER WEED PLANTS & RESTRICTED WEED SEEDS

Buckhorn plantain (Seed only)	Hoary alyssum
Dodder (Seed only)	Horsenettle (Seed only)
Eastern black nightshade	Quackgrass
Field pennycress (Seed only)	Wild mustard
Giant foxtail	Wild radish (Seed)

only) **OTHER WEED PLANTS & WEED**

SEEDS/COMMON

Barnyardgrass	Prickly smartweed
Common burdock	Redroot pigweed
Common cocklebur	Russian thistle
Common lambsquarters	Shepherds purse
Common ragweed	Swamp smartweed (Plant only)
Curly dock	Velvetleaf
Dandelion	Water Hemp
Downy brome	White campion
Dragonhead mint	Wild buckwheat
Giant ragweed	Wild oats
Green foxtail	Wild proso millet
Hedge bindweed (Plant only)	Wild sunflower
Kochia	Wooly Cupgrass
Large crabgrass	Yellow foxtail
Pennsylvania smartweed	Yellow nutsedge (plant only)

d. **PLANT DISEASES** (These will be labeled "Disease")

Loose smut*	Corn smut
Phytophthora root rot**	Eyespot
Brown stem rot	Nitrogen deficiency
Ergot	Phosphorous deficiency
Leaf rust***	Potassium deficiency
Bacterial blight	Black stem rust*
Bacterial wilt on alfalfa	Crown rust on oats
Pod and stem blight	Goss Wilt
Northern leaf blight	Gray leaf
spot Southern leaf Blight	

* Occurs in oats, barley, and wheat, but plant need not be identified.

** Occurs in both soybean and alfalfa.

*** Occurs in several grasses, eg. wheat and orchardgrass.

e. **INSECT IDENTIFICATION** (These will be labeled "Insects" and will be accompanied by plants showing damage symptoms)

European corn borer	Wheat stem maggot
Corn earworm	Grasshopper
Corn rootworm	Potato leafhopper
Alfalfa weevil	Wireworm
Black cutworm	White grub
Aphid	Spider mite
Asian lady beetle	

Crop Identification Sheet

Contestant Name _____ Contestant No. _____

Crop Plants & Seeds

- ____ 101 Annual Canarygrass
- ____ 102 Barley, Six-Rowed
- ____ 103 Buckwheat
- ____ 104 Canola
- ____ 105 Corn (P)
- ____ 106 Corn, dent (S)
- ____ 107 Corn, flint (S)
- ____ 108 Corn, pop (S)
- ____ 109 Corn, sweet (S)
- ____ 110 Fieldbean
- ____ 111 Fieldpea
- ____ 112 Flax
- ____ 113 Grain Sorghum
- ____ 114 Lupine
- ____ 115 Millet, foxtail
- ____ 116 Millet, proso
- ____ 117 Oat
- ____ 118 Rye
- ____ 119 Soybean
- ____ 120 Sugar beet
- ____ 121 Sunflower
- ____ 122 Triticale
- ____ 123 Wheat (P)
- ____ 124 Wheat, durum (S)
- ____ 125 Wheat, hard red spring (S)
- ____ 126 Wheat, hard red winter (S)
- ____ 127 Wild rice (S)

Forage, Seeds and Plants

- ____ 201 Alfalfa
- ____ 202 Alsike clover
- ____ 203 Birdsfoot trefoil
- ____ 204 Crownvetch
- ____ 205 Kentucky Bluegrass
- ____ 206 Orchard grass
- ____ 207 Red clover
- ____ 208 Reed Canarygrass
- ____ 209 Smooth Brome
- ____ 210 Sudan grass
- ____ 211 Sweet clover
- ____ 212 Tall fescue
- ____ 213 Timothy
- ____ 214 White Clover

P= plant only

S= seed only

Noxious and Prohibited Weeds

- ____ 301 Bull thistle (P)
- ____ 302 Canada thistle
- ____ 303 Field bindweed
- ____ 304 Hoary cress (S)
- ____ 305 Leafy spurge
- ____ 306 Musk thistle
- ____ 307 Perennial Sowthistle
- ____ 308 Plumeless thistle (P)
- ____ 309 Purple loosestrife (P)
- ____ 310 Spotted knapweed

Other and Restricted Weeds

- ____ 401 Buckhorn plantain (S)
- ____ 402 Dodder (S)
- ____ 403 Eastern black nightshade
- ____ 404 Field pennycress (S)
- ____ 405 Giant Foxtail
- ____ 406 Hoary alyssum
- ____ 407 Horsenettle (S)
- ____ 408 Quackgrass
- ____ 409 Wild mustard
- ____ 410 Wild radish (S)

Other and Common Weeds

- ____ 501 Barnyardgrass
- ____ 502 Common burdock
- ____ 503 Common cocklebur
- ____ 504 Common lambsquarter
- ____ 505 Common ragweed
- ____ 506 Curly dock
- ____ 507 Dandelion
- ____ 508 Downy brome
- ____ 509 Dragonhead mint
- ____ 510 Giant ragweed
- ____ 511 Green foxtail
- ____ 512 Hedge bindweed (P)
- ____ 513 Kochia
- ____ 514 Large Crabgrass
- ____ 515 Pennsylvania smartweed
- ____ 516 Prickly smartweed
- ____ 517 Redroot pigweed
- ____ 518 Russian thistle
- ____ 519 Shepherds purse
- ____ 520 Swamp smartweed (P)
- ____ 521 Velvetleaf

- ____ 522 Water hemp
- ____ 523 White campion
- ____ 524 Wild buckwheat
- ____ 525 Wild oats
- ____ 526 Wild proso millet
- ____ 527 Wild sunflower
- ____ 528 Woolly cupgrass
- ____ 529 Yellow foxtail
- ____ 530 Yellow nutsedge (P)

Plant Diseases and Deficiencies

- ____ 601 Bacterial blight
- ____ 602 Bacterial wilt on alfalfa
- ____ 603 Black stem rust
- ____ 604 Brown stem rot
- ____ 605 Corn smut
- ____ 606 Crown rust on oats
- ____ 607 Ergot
- ____ 608 Eyespot
- ____ 609 Goss wilt
- ____ 610 Grey leaf spot
- ____ 611 Leaf rust
- ____ 612 Loose smut
- ____ 613 Nitrogen deficiency
- ____ 614 Northern leaf blight
- ____ 615 Phosphorous deficiency
- ____ 616 Phytophthora root rot
- ____ 617 Pod and stem blight
- ____ 618 Potassium deficiency
- ____ 619 Southern leaf blight

Insects

- ____ 701 Alfalfa Weevil
- ____ 702 Aphid
- ____ 703 Asian lady beetle
- ____ 704 Black cutworm
- ____ 705 Corn earworm
- ____ 706 Corn rootworm
- ____ 707 European corn borer
- ____ 708 Grasshopper
- ____ 709 Spider mite
- ____ 710 Potato leafhopper
- ____ 711 Wheat stem maggot
- ____ 712 White grub
- ____ 713 Wireworm

B. Grain Grading

- a. The grading of grain will be based upon the “Official United States Standards of Grain” handbook. Contestants are expected to bring their own handbooks for the CDE. Students may prepare their handbooks for the contest by highlighting, underlining, tabbing, or marking specific information for use in the contest. Extra copies will be available only upon special request before the CDE. The latest revision for each grain will be used. It is the responsibility of each coach to provide contestants with correct revisions of the standards. The “Official United States Standards of Grain” may be obtained from the USDA website at <http://www.gipsa.usda.gov/fgis/standproc/usstands.html>.
- b. Grain Grading will include market classes of Hard Red Spring Wheat, Hard Red Winter Wheat, Durum Wheat, Six-rowed Barley, Oat, Yellow Soybean, Rye, and Yellow, White, or Mixed Corn. Three samples will be graded with 6 minutes allowed for 1 sample at each location.
- c. The following special grades may be used in the CDE and should be listed in the order indicated, when applicable, in the writing of the grade designation:
 - a. Wheat - Ergoty, Garlicky, Infested, Light Smutty, and Smutty and Treated. All special grades should follow the crop name.
 - b. Barley – Blighted, Ergoty, Garlicky, and Infested. All special grades should follow the crop name.
 - c. Oat - Extra-heavy, Heavy (precedes crop name), Bright, Ergoty, Garlicky, Infested, Smutty, and Thin. Bright, Extra Heavy, and Heavy special grades should precede the crop name. All other special grades should follow the crop name.
 - d. Rye - Plump (precedes crop name), Ergoty, Infested, Light Garlicky, Garlicky, Light Smutty, and Smutty. Plump should precede the crop name. All other special grades should follow the crop name.
 - e. Corn – Infested, Flint, Flint & Dent, and Waxy. All special grades should follow the crop name.
 - f. Soybean – Garlicky, Infested, and Purple Mottled & Stained. All special grades should follow the crop name.
- d. Dockage - Dockage is the material removed from wheat, barley, and rye with the appropriate and properly adjusted dockage machine before the grade is determined. The word “dockage” with the appropriate percent becomes a part of the complete grade designation.

Example: U.S. No. 2 Dark Northern Spring Wheat,
Dockage 2.6% Grading factor(s) - Test weight per
bushel.

d. Grading Factors - A grading factor is a reason why a grain is graded down. A grain which grades U.S. No. 1 has no grading factors and none shall be given. A grain that grades U.S. No. 2, or lower, must have a factor or factors showing why it grades down. Only the factor or factors that bring it down to a certain grade shall be stated. Information which tends to raise the grade of a grain such as Extra-heavy in oat, is not listed as a grading factor.

f. Grading will be done on three samples of grain allowing 6 minutes per sample. Each grain sample will contain a card showing pertinent information that if used in conjunction with observations of the grain is sufficient to determine the grade and grading factors of the sample.

g. Scoring system - each sample is worth 50 points as follows:

a. Grade correct (20 points)	<u>deduction</u>
1. Missed by 1 grade	- 5
2. Missed by 2 grades	-15
3. Missed by 3 grades	-20
b. Class or subclass correct (15 points)	
1. Corn	
Incorrect class	-15
2. Wheat	
Correct class but incorrect subclass	- 5
Incorrect class	-15
3. Barley (10 points)	
Incorrect class (Six-rowed barley, Barley)	- 5
Incorrect subclass (Blue malting, Malting, Barley)	- 5
4. Rye and Oat	
Incorrect crop	-15
c. Factors correct (15 points)	
1. None correct	-15
2. 2 factors with 1 incorrect	- 5
3. 3 factors with 1 incorrect	- 3
4. 3 factors with 2 incorrect	-10

When 1 factor is required and the student writes 2, score as for 2. When 2 factors are required and the student writes 3, score as for 3.

d. Special grades such as extra heavy, heavy, tough, garlicky, etc.	
1. If incorrect	- 3
2. Dockage missing where required	- 3
e. Wrongly written grade	- 1

Example: (Correct) U.S. No. 2 Heavy Oat
 (Incorrect) U.S. No. 2 Oat, Heavy

Official Grade Grading Form

Crops Contest:
 Grain Grading Problem # _____

Student Name _____

Contestant Number _____

FFA Chapter _____

Crop: _____

Information	Number or Percent	Grading Factor	Grade			
Test Weight						
Moisture						
Dockage						
Other Factors:						

Final Grade: _____

Grading Factors: _____

Official Grade Grading Form

Grade Grading Example
 Grain Grading Problem # 2
 Student Name Joe Joel
 Contestant Number 1A
 FFA Chapter Anytown
 Crop: Durum Wheat

Information	Number or Percent	Grading Factor	Grade			
Test Weight	57.3 lbs.	T. W.	3			
Moisture	11.20%					
Dockage	3.80%	Dockage				
Other Factors:						
Heat Damaged Kernels	0.40%	H.D. K.	3			
Shrunken & Broken Kernels	2.95%	Defects				
Hard vitreous kernels	68%	Subclass	Amber	Durum	Wheat	
Weevils	6					
Sprout damage	2.30%	D.K	2	2.3 +.4	=2.7	
Triticale	0.70%	F.M.	4	.7+.9+.6	=2.2	
Buckwheat	0.90%	F.M.				
Hard red spring wheat	2.80%	Con.Clas.	1			
Giant foxtail	0.60%	F.M.				
Ergot	0.06%	Ergoty				
Defects Total= DK(tot)+FM+S&BK	2.7+2.2+2.95	= 6.85	3			

Final Grade: U. S. No. 4 Amber Durum Wheat, Ergoty, Dockage 3.8%

Grading Factors:

Foreign Material

C. Agronomic Quiz: Fifty (50) questions covering the following topics will be included on the agronomic quiz.

a. MORPHOLOGY AND GROWTH OF AGRONOMIC PLANTS.

- 1) Plant parts.
- 2) How plants grow (germination, emergence, stem and leaf development, pollination, fertilization, seed formation, etc.)
- 3) Growth staging.
- 4) Physiology - photosynthesis, respiration, and other plant processes.

b. PRODUCTION PRACTICES

- 1) Seedbed preparation.
- 2) Fertility.
- 3) Weed control - cultural and chemical.
- 4) Population, seeding rates, planting time.
- 5) Row spacing.
- 6) Inoculation, seed treatment
- 7) Crop rotations.

c. HARVESTING AND STORAGE PRACTICES.

d. CROP QUALITY - GRAIN AND FORAGES.

e. MARKETING.

- 1) Simple problems such as determining approximate price for grain delivered, given local prices, grain moisture, moisture discount rate, heat and other damage factors, etc.

f. INTEGRATED PEST MANAGEMENT

- 1) Insect control.
- 2) Disease control.
- 3) Weed control.

g. PRACTICAL MATHEMATICAL CONCEPTS

- 1) Determination of acreage.
- 2) Weights and measures.
- 3) Calibration of equipment
- 4) Heat units (Growing Degree Days)

h. AGRONOMIC TERMS - basic vocabulary.

D. Suggested Sources for Reference

It is evident that a given body of knowledge must be provided students participating in this segment of the crops contest. The following sources are recommended for use during given years to best prepare students. Most of the questions that make up the Agronomic Quiz will be derived from these publications.

Soybeans	<u>Modern Soybean Production</u> by Aldrich, Scott, and Leng
Barley	<u>Crop Production</u> by Delroit, Greub, and Ahlgren <u>Growth and Development Guide for Spring Barley</u> by PM Anderson, EA Oelke, and SR Simmons, AG-FO-2548, Agricultural Extension Service, University of Minnesota
Alfalfa	<u>Profitable Alfalfa Management</u> by Land-O-Lakes <u>Alfalfa Management Guide</u> (available as a downloadable pdf at https://www.agronomy.org/publications/alfalfa)
Wheat	<u>High-Yield Management for Small Grains</u> , Union Carbide*
Corn	<u>Modern Corn Production</u> by Aldrich, Scott, and Leng <u>Profitable Corn and Milo Management</u> by Land-O-Lakes <u>South Dakota corn production handbook</u> . http://pubstorage.sdstate.edu/AgBio_Publications/articles/EC929.pdf
Oats	<u>A Guide to Quality Oat Production</u> by L.L. Hardman and D.D. Stuthman, AG-BU-2019, Agricultural Extension Service, University of Minnesota <u>How an Oat Plant Develops</u> , Bulletin 645, October 1976, Agricultural Experiment Station, Brookings <u>Small Grains Field Guide</u> . MI-07488 Wiersma, J. Minnesota Extension Service, University of Minnesota 2001
General Small Grain Guide	<u>Profitable Small Grain Production</u> , AG-FO-2900, 1986, Minnesota Extension Service, University of Minnesota

MR-07314 Minnesota Varietal Trials Results (Current year)<http://www.extension.umn.edu/units/dc/>
Tables, etc. should be utilized in the contest

* Write for free copy to:
Union Carbide Agricultural Products
Company, Inc. P.O. Box 12014
TW Alexander Drive
Research Triangle Park, NC 27709

D. Practicums

1. Soils Practicum

- a. Identify the USDA land capability classes and answer problem solving questions related to various classes.
- b. Analyze soil survey maps in regards to: Locating specific sites
Suggesting the uses of soil in that spot
Identifying drainage situation.

2. Insects

- a. Practicum may include insect identification, life cycles, mouth parts and economic impact of.

3. Seed Analysis

- a. A sample will be analyzed (large seeded crop). Six minutes will be allowed for the sample.
- b. The samples will be selected from the following crops:
Wheat, rye, oat, barley, flax, and soybean
- c. Seed quantities before the addition of impurities will be 100 grams for soybean, 50 grams for small grains, and 20 grams for flax.
- d. The contestant must answer the ten questions provided for the seeds mixed with the base sample. The classification shall be (a) Other crops and/or varieties, (b) Prohibited Weeds, (c) Restricted Weeds, and (d) Common Weeds. (See attached official form)
- e. No less than six seeds of any one impurity shall be added to a sample. Only impurities listed on the identification list may be used.
- f. Scoring System. The total score per sample shall be 50 points (5 points per question).
- g. Special rules for specific crops:
 - 1) Wheat - base material shall be any pure sample of Hard Red Spring or durum.
 - a) Wheat types as admixtures in other wheats and other crops where permissible need only be identified as hard red wheat and durum wheat.
 - 2) Oat – base material shall be any pure sample of white oat (White oat includes white and yellow oat).
 - a) Gray oat, black oat, and hull-less oat varieties will not be used as admixtures in oat samples or other crops.
 - b) White and yellow oat shall not be intermixed.
 - c) Any cultivated oat found as an admixture in other crop samples need only be identified as oat.

3) Rye - base material shall be any pure sample of rye. Rye used as an admixture in other crops will be identified as rye. Rye varieties or types will not be mixed in rye samples. Triticale will not be mixed with rye.

4) Flax - base material shall be any pure sample of brown flax. Admixtures of flax seed in flax seed sample will be identified only by color (yellow in brown) but will be identified only as flax when found in other crop samples.

5) Barley - base material shall be any pure sample of six-rowed, white aleuronic barley.

a) Two-rowed and sixed-rowed barley will not be mixed.

b) Barley when found as an admixture in any other crop sample, need be identified only as barley.

6) Soybean - base material shall be any pure variety of soybean.

a) Variety impurities must be distinctly different in hilum color and need only be identified as other variety.

h. Example questions for the seed analysis practicum are on page 7.13.

4. **Fertilizer** – Calculating amounts of different analysis fertilizer for specific nutrient recommendations and applications.

5. **Pesticide** - Students will receive a field scout report. They will prepare a written recommendation or answer questions to respond to the report. The student will be provided with the information necessary for the problem.

Reference: Cultural and Chemical Weed Control in Field Crops--2003 BU-03157 (or current version) Producer/Author: Gunsolus, J.; Durgan, B.; Becker, R. <http://www.extension.umn.edu/units/dc/>

6. **Varietal Trials** – Students will make recommendations or answer questions based on the information in the current edition of Minnesota Varietal Trials Result.

Reference: MR-07314 Minnesota Varietal Trials Results MR-07314 (Current Issue) <http://www.extension.umn.edu/units/dc/>

Contestant Name _____ Contestant No. _____

PROPOSED SEED ANALYSIS PRACTICUM

Answer the following questions about the sample. Put your answers on the answer sheet provided. 5 points per question (50 points Total)

1. Identify the base sample
 - a. Six-rowed barley
 - b. Flax
 - c. Oats
 - d. Hard Red Spring wheat
 - e. Durum wheat
2. An add mixture is:
 - a. Buckwheat
 - b. Flax
 - c. Dodder
 - d. Rye
 - e. None of the above
3. An add mixture is:
 - a. Field bindweed
 - b. Large crabgrass
 - c. Field pennycress
 - d. Millet
 - e. Hoary alyssum
4. An add mixture is:
 - a. Oats
 - b. Wild oats
 - c. Both of these
 - d. None of these
5. An add mixture is:
 - a. Common ragweed
 - b. Dandelion
 - c. Barnyardgrass
 - d. Green foxtail
 - e. None of these
6. How many other crops are in the sample?
 - a. None
 - b. Two
 - c. Three
 - d. Four
 - e. Five
7. An add mixture is:
 - a. Curly dock
 - b. Dragonhead mint
 - c. Giant foxtail
 - d. Redroot pigweed
 - e. None of the above
8. How many Prohibited weeds are in the sample?
 - a. None
 - b. Two
 - c. Three
 - d. Four
 - e. Five
9. How many Restricted weeds are in the sample?
 - a. None
 - b. Two
 - c. Three
 - d. Four
10. An add mixture is:
 - a. Wild buckwheat
 - b. Shepherds purse
 - c. Horsenettle
 - d. Durum wheat
 - e. Wild mustard