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

   A. Identification - 75 samples, 4 points each 300
   B. Grain Grading - 3 samples, 50 points each 150
   C. Management Test - 50 Multiple choice questions 300
   D. Practicums - 3 practicums, 50 points each 150

   Possible individual total 900

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 60 minutes

   Total Time Involved 180 minutes

3. Each contestant will work individually and will be scored individually. A team will consist of four members. The scores for the top three team members will be added to obtain the team score. The contestant may take clipboard, hand lens, forceps, pencils, and grading book into the CDE. Calculators may also be used during the CDE. Only information pertinent to Grain Grading may be in the grading book. Grain grading books will 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 utilized in the Identification and Management sections of the CDE. Hand scoring will continue to be utilized 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.
   - 2018-2019  Soybean and Barley
   - 2019-2020  Corn and Alfalfa
   - 2020-2021  Soybean and Wheat
   - 2021-2022  Corn and Oats

See suggested references listed after exam section
A. **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)
- Buckwheat (P-S)
- Canola (P-S)
- Corn (P)
- Dent corn (S)
- Durum wheat (S)
- Field bean** (P-S)
- Field pea (P-S)
- Flax (P-S)
- Flint corn (S)
- Foxtail millet (P-S)
- Grain sorghum (P-S)
- Hard red spring wheat (S)
- Hard red winter wheat (S)
- Lupine (P-S)
- Oat (P-S)
- Popcorn (S)
- Proso millet (P-S)
- Rye (P-S)
- Six-rowed barley (P-S)
- Soybean (P-S)
- Sunflower* (P-S)
- Sugar beet (P-S)
- Sweet corn (S)
- Sudan grass (P-S)
- Triticale (P-S)
- Wild rice (S)
- Wheat (P)

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

**c. WEED PLANTS and SEEDS**

**NOXIOUS WEEDS & PROHIBITED WEED SEEDS**

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

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  Sheperds 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)

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.

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

**Crop Plants & Seeds**

<table>
<thead>
<tr>
<th>No.</th>
<th>Plant Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Annual Canarygrass</td>
</tr>
<tr>
<td>102</td>
<td>Barley, Six-Rowed</td>
</tr>
<tr>
<td>103</td>
<td>Buckwheat</td>
</tr>
<tr>
<td>104</td>
<td>Canola</td>
</tr>
<tr>
<td>105</td>
<td>Corn (P)</td>
</tr>
<tr>
<td>106</td>
<td>Corn, dent (S)</td>
</tr>
<tr>
<td>107</td>
<td>Corn, flint (S)</td>
</tr>
<tr>
<td>108</td>
<td>Corn, pop (S)</td>
</tr>
<tr>
<td>109</td>
<td>Corn, sweet (S)</td>
</tr>
<tr>
<td>110</td>
<td>Fieldbean</td>
</tr>
<tr>
<td>111</td>
<td>Fieldpea</td>
</tr>
<tr>
<td>112</td>
<td>Flax</td>
</tr>
<tr>
<td>113</td>
<td>Grain Sorghum</td>
</tr>
<tr>
<td>114</td>
<td>Lupine</td>
</tr>
<tr>
<td>115</td>
<td>Millet, foxtail</td>
</tr>
<tr>
<td>116</td>
<td>Millet, proso</td>
</tr>
<tr>
<td>117</td>
<td>Oat</td>
</tr>
<tr>
<td>118</td>
<td>Rye</td>
</tr>
<tr>
<td>119</td>
<td>Soybean</td>
</tr>
<tr>
<td>120</td>
<td>Sugar beet</td>
</tr>
<tr>
<td>121</td>
<td>Sunflower</td>
</tr>
<tr>
<td>122</td>
<td>Triticale</td>
</tr>
<tr>
<td>123</td>
<td>Wheat (P)</td>
</tr>
<tr>
<td>124</td>
<td>Wheat, durum (S)</td>
</tr>
<tr>
<td>125</td>
<td>Wheat, hard red spring (S)</td>
</tr>
<tr>
<td>126</td>
<td>Wheat, hard red winter (S)</td>
</tr>
<tr>
<td>127</td>
<td>Wild rice (S)</td>
</tr>
</tbody>
</table>

**Forage, Seeds and Plants**

<table>
<thead>
<tr>
<th>No.</th>
<th>Plant Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Alfalfa</td>
</tr>
<tr>
<td>202</td>
<td>Alsike clover</td>
</tr>
<tr>
<td>203</td>
<td>Birdsfoot trefoil</td>
</tr>
<tr>
<td>204</td>
<td>Crownvetch</td>
</tr>
<tr>
<td>205</td>
<td>Kentucky Bluegrass</td>
</tr>
<tr>
<td>206</td>
<td>Orchard grass</td>
</tr>
<tr>
<td>207</td>
<td>Red clover</td>
</tr>
<tr>
<td>208</td>
<td>Reed Canarygrass</td>
</tr>
<tr>
<td>209</td>
<td>Smooth Brome</td>
</tr>
<tr>
<td>210</td>
<td>Sudan grass</td>
</tr>
<tr>
<td>211</td>
<td>Sweet clover</td>
</tr>
<tr>
<td>212</td>
<td>Tall fescue</td>
</tr>
<tr>
<td>213</td>
<td>Timothy</td>
</tr>
<tr>
<td>214</td>
<td>White Clover</td>
</tr>
</tbody>
</table>

P= plant only  
S= seed only

**Noxious and Prohibited Weeds**

<table>
<thead>
<tr>
<th>No.</th>
<th>Plant Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>301</td>
<td>Bull thistle (P)</td>
</tr>
<tr>
<td>302</td>
<td>Canada thistle</td>
</tr>
<tr>
<td>303</td>
<td>Field bindweed</td>
</tr>
<tr>
<td>304</td>
<td>Hoary cress (S)</td>
</tr>
<tr>
<td>305</td>
<td>Leafy spurge</td>
</tr>
<tr>
<td>306</td>
<td>Musk thistle</td>
</tr>
<tr>
<td>307</td>
<td>Perennial Sowthistle</td>
</tr>
<tr>
<td>308</td>
<td>Plumeless thistle (P)</td>
</tr>
<tr>
<td>309</td>
<td>Purple loosestrife (P)</td>
</tr>
<tr>
<td>310</td>
<td>Spotted knapweed</td>
</tr>
</tbody>
</table>

**Other and Restricted Weeds**

<table>
<thead>
<tr>
<th>No.</th>
<th>Plant Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>Buckhorn plantain (S)</td>
</tr>
<tr>
<td>402</td>
<td>Dodder (S)</td>
</tr>
<tr>
<td>403</td>
<td>Eastern black nightshade</td>
</tr>
<tr>
<td>404</td>
<td>Field pennycress (S)</td>
</tr>
<tr>
<td>405</td>
<td>Giant Foxtail</td>
</tr>
<tr>
<td>406</td>
<td>Hoary alyssum</td>
</tr>
<tr>
<td>407</td>
<td>Horserenettle (S)</td>
</tr>
<tr>
<td>408</td>
<td>Quackgrass</td>
</tr>
<tr>
<td>409</td>
<td>Wild mustard</td>
</tr>
<tr>
<td>410</td>
<td>Wild radish (S)</td>
</tr>
</tbody>
</table>

**Other and Common Weeds**

<table>
<thead>
<tr>
<th>No.</th>
<th>Plant Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>501</td>
<td>Barnyardgrass</td>
</tr>
<tr>
<td>502</td>
<td>Common burdock</td>
</tr>
<tr>
<td>503</td>
<td>Common cocklebur</td>
</tr>
<tr>
<td>504</td>
<td>Common lambsquarter</td>
</tr>
<tr>
<td>505</td>
<td>Common ragweed</td>
</tr>
<tr>
<td>506</td>
<td>Curly dock</td>
</tr>
<tr>
<td>507</td>
<td>Dandelion</td>
</tr>
<tr>
<td>508</td>
<td>Downy brome</td>
</tr>
<tr>
<td>509</td>
<td>Dragonhead mint</td>
</tr>
<tr>
<td>510</td>
<td>Giant ragweed</td>
</tr>
<tr>
<td>511</td>
<td>Green foxtail</td>
</tr>
<tr>
<td>512</td>
<td>Hedge bindweed (P)</td>
</tr>
<tr>
<td>513</td>
<td>Kochia</td>
</tr>
<tr>
<td>514</td>
<td>Large Crabgrass</td>
</tr>
<tr>
<td>515</td>
<td>Pennsylvania smartweed</td>
</tr>
<tr>
<td>516</td>
<td>Prickly smartweed</td>
</tr>
<tr>
<td>517</td>
<td>Redroot pigweed</td>
</tr>
<tr>
<td>518</td>
<td>Russian thistle</td>
</tr>
<tr>
<td>519</td>
<td>Shepherds purse</td>
</tr>
<tr>
<td>520</td>
<td>Swamp smartweed (P)</td>
</tr>
<tr>
<td>521</td>
<td>Velvetleaf</td>
</tr>
</tbody>
</table>

**Plant Diseases and Deficiencies**

<table>
<thead>
<tr>
<th>No.</th>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>601</td>
<td>Bacterial blight</td>
</tr>
<tr>
<td>602</td>
<td>Bacterial wilt on alfalfa</td>
</tr>
<tr>
<td>603</td>
<td>Black stem rust</td>
</tr>
<tr>
<td>604</td>
<td>Brown stem rot</td>
</tr>
<tr>
<td>605</td>
<td>Corn smut</td>
</tr>
<tr>
<td>606</td>
<td>Crown rust on oats</td>
</tr>
<tr>
<td>607</td>
<td>Ergot</td>
</tr>
<tr>
<td>608</td>
<td>Eyespot</td>
</tr>
<tr>
<td>609</td>
<td>Goss wilt</td>
</tr>
<tr>
<td>610</td>
<td>Grey leaf spot</td>
</tr>
<tr>
<td>611</td>
<td>Leaf rust</td>
</tr>
<tr>
<td>612</td>
<td>Loose smut</td>
</tr>
<tr>
<td>613</td>
<td>Nitrogen deficiency</td>
</tr>
<tr>
<td>614</td>
<td>Northern leaf blight</td>
</tr>
<tr>
<td>615</td>
<td>Phosphorous deficiency</td>
</tr>
<tr>
<td>616</td>
<td>Phytophora root rot</td>
</tr>
<tr>
<td>617</td>
<td>Pod and stem blight</td>
</tr>
<tr>
<td>618</td>
<td>Potassium deficiency</td>
</tr>
<tr>
<td>619</td>
<td>Southern leaf blight</td>
</tr>
</tbody>
</table>

**Insects**

<table>
<thead>
<tr>
<th>No.</th>
<th>Insect</th>
</tr>
</thead>
<tbody>
<tr>
<td>701</td>
<td>Alfalfa Weevil</td>
</tr>
<tr>
<td>702</td>
<td>Aphid</td>
</tr>
<tr>
<td>703</td>
<td>Asian lady beetle</td>
</tr>
<tr>
<td>704</td>
<td>Black cutworm</td>
</tr>
<tr>
<td>705</td>
<td>Corn earworm</td>
</tr>
<tr>
<td>706</td>
<td>Corn rootworm</td>
</tr>
<tr>
<td>707</td>
<td>European corn borer</td>
</tr>
<tr>
<td>708</td>
<td>Grasshopper</td>
</tr>
<tr>
<td>709</td>
<td>Spider mite</td>
</tr>
<tr>
<td>710</td>
<td>Potato leafhopper</td>
</tr>
<tr>
<td>711</td>
<td>Wheat stem maggot</td>
</tr>
<tr>
<td>712</td>
<td>White grub</td>
</tr>
<tr>
<td>713</td>
<td>Wireworm</td>
</tr>
</tbody>
</table>

Contestant Name:  
Contestant No.:  

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

<table>
<thead>
<tr>
<th>Grade correct (20 points)</th>
<th>deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Missed by 1 grade</td>
<td>- 5</td>
</tr>
<tr>
<td>2. Missed by 2 grades</td>
<td>-15</td>
</tr>
<tr>
<td>3. Missed by 3 grades</td>
<td>-20</td>
</tr>
</tbody>
</table>

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: ____________________________

<table>
<thead>
<tr>
<th>Information</th>
<th>Number or Percent</th>
<th>Grading Factor</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moisture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dockage</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Other Factors:**

Final Grade: ____________________________________________________________

Grading Factors:

___________________________________________________________

___________________________________________________________

___________________________________________________________

___________________________________________________________
### Grade Grading Example

**Crops Contest:**  
Grain Grading Problem # 2

**Student Name:** Joe Joel

**Contestant Number:** 1A

**FFA Chapter:** Anytown

**Crop:** Durum Wheat

<table>
<thead>
<tr>
<th>Information</th>
<th>Number or Percent</th>
<th>Grading Factor</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Weight</td>
<td>57.3 lbs.</td>
<td>T. W.</td>
<td>3</td>
</tr>
<tr>
<td>Moisture</td>
<td>11.20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dockage</td>
<td>3.80% Dockage</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other Factors:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat Damaged Kernels</td>
<td>0.40% H.D. K.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Shrunken &amp; Broken Kernels</td>
<td>2.95% Defects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard vitreous kernels</td>
<td>68% Subclass Amber Durum Wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weevils</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprout damage</td>
<td>2.30% D.K</td>
<td>2 2.3 + .4 = 2.7</td>
<td></td>
</tr>
<tr>
<td>Triticale</td>
<td>0.70% F.M.</td>
<td>4 .7 + .9 + .6 = 2.2</td>
<td></td>
</tr>
<tr>
<td>Buckwheat</td>
<td>0.90% F.M.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard red spring wheat</td>
<td>2.80% Con.Cl.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Giant foxtail</td>
<td>0.60% F.M.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ergot</td>
<td>0.06% Ergoty</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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**
Modern Soybean Production by Aldrich, Scott, and Leng

**Barley**
Crop Production by Delroit, Greub, and Ahlgren
Growth and Development Guide for Spring Barley by PM Anderson, EA Oelke, and SR Simmons, AG-FO-2548, Agricultural Extension Service, University of Minnesota

**Alfalfa**
Profitable Alfalfa Management by Land-O-Lakes
Alfalfa Management Guide (available as a downloadable pdf at https://www.agronomy.org/publications/alfalfa)

**Wheat**
High-Yield Management for Small Grains, Union Carbide*

**Corn**
Modern Corn Production by Aldrich, Scott, and Leng
Profitable Corn and Milo Management by Land-O-Lakes

**Oats**
How an Oat Plant Develops, Bulletin 645, October 1976, Agricultural Experiment Station, Brookings

**General Small Grain Guide**
Profitable Small Grain Production, 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.
7.12

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/
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