**NACTA 2017 Crops Contest**

Hosting Institution

**Date and Time:**

**Location:**

**Contest Coordinator:**

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**CONTEST RULES**

1. All contestants and non-competing participants must be currently enrolled in a two-year or a four-year institution and pursuing an undergraduate degree with a major or minor in agriculture. Two-year and four-year teams will evaluate the same contest components.
2. A school may enter one team and its members must be designated prior to the start of the contest. A team will consist of four contestants, with scores of all four team members summed for the team score. All team members are also eligible for individual awards.
3. Schools may enter official contestants to compete for individual awards. A competing individual may not compete in this contest if he/she has participated as a scored, official contestant in a NACTA Crops Contest in any previous year in the same division. If he/she previously competed in the two-year college division, he/she may compete once with a four-year college team.
4. Schools may enter non-competing participants who wish to experience the contest. Non-competing participants are not eligible for individual awards and their scores will not contribute to team scores. The same entry fee is required for official contestants and non-competing participants.
5. No communication with contestants or anyone else except superintendents will be permitted once the contest has started. Coaches may not communicate with a team or individuals until the contest is finished. No cell phones, text messaging, or conferring during the contest will be allowed. Contestants observed in violation of this WILL be disqualified from the competition.
6. Contestants must bring a #2 lead pencil and should bring a hand-held calculator and clipboard into the contest. If the calculator is programmable it must be cleared of all stored programs. No device capable of sending or receiving wireless messages may be used as a calculator. A hand held magnifying lens may be used in identification and on the lab practical. All other material necessary will be provided. Contestants may not bring notes or reference material of any kind. A list for plant and seed identification, machinery, insects, and diseases will be provided.
7. Awards will be presented in both two-year college and four-year college divisions. Both team and individual awards will be presented for the overall contest. Awards will also be given for the four individual components of the contest.

# CONTEST ADMINISTRATION

The superintendents will be responsible for preparation of all contest materials, setting up the contest, providing the official keys for scoring, and overseeing the contest operation and scoring of papers. Room supervisors will be assigned to each of the four sections of the contest and will be responsible for the operation and conduct of each section. Coaches may be asked to help grade the math practical during and after the contest.

1. Tie Breakers. Ties for both teams and individual contestants will be broken using the following contest sections:
   1. First – lab practical scores
   2. Second – plant and seed identification scores
   3. Third – math practical scores
   4. Fourth – agronomic quiz scores
2. Announcements made at the coaches meeting or on the contest day will take precedent over the previously published rules.

# NACTA CROPS CONTEST DESCRIPTION

The contest will be divided into four areas with 600 total points as follows:

1. Agronomic Quiz (150 points)
2. Math Practical (150 points)
3. Lab Practical (150 points)
4. Plant and Seed Identification (150 points)

One hour will be allowed for completion of each section. Additional descriptions and specific rules for each section of the contest follow and will be considered official for the contest.

# AGRONOMIC QUIZ

This section will consist of 75 written multiple-choice exam questions worth 2 points each for a total of 150 points. Both general and specific questions will be asked on production of major US grain and forage crops. The International Certified Crop Adviser (ICCA) Performance Objectives will provide an excellent outline of potential topics. They are available from the American Society of Agronomy, 5585 Guilford Road, Madison, WI 53711-5801 (608-273-8080) or online at: <https://www.certifiedcropadviser.org/exams/icca-performance-objectives>

Topics may include:

* Crop production statistics (major world and U.S. crops) and distribution of US crops
* Crop classification terms (botanical, growth habit, crop utilization, etc.)
* Crop physiology, growth, and development
* Crop quality and quality evaluation, including typical levels for quality factors in various grain and forage crops
* Plant morphology and anatomy
* Plant breeding and genetics, including biotechnology and genetic engineering tools and applications
* Seed industry/technology (seed quality, certification, testing, processing, treatment, intellectual property rights, etc.)
* Planting (cultivar selection, seeding equipment, planting practices, seeding dates, replanting decisions, etc.)
* Pest problems and pest control (insects, diseases, and weeds, biology/life cycle of major crop pests)
* Pest management alternatives (IPM principles, pest scouting and monitoring, role of beneficial insects, etc.)
* Pesticide use (pesticide stewardship, safety, restrictions, formulations, trade/common names of major pesticides)
* Harvesting and storage of grain and forage crops and crop products
* Management of forage crops, including harvest factors and effects on forage quality
* Cropping systems and crop rotations
* Crop environment (light, temperature, and moisture effects on plants)
* Basic soil properties (physical, chemical, and biological)
* Soil fertility (nutrient availability, nutrient movement, plant needs for nutrients, soil pH, organic matter, etc.)
* Nutrient management (soil testing, soil test reports/recommendations, fertilizers and fertilization, liming, etc.)
* Soil water management (irrigation, drainage, erosion, leaching, evapotranspiration, conservation, etc.)
* Tillage and residue management (tillage systems, seedbed preparation, tillage tool selection, etc.)
* Site specific management concepts (GPS, GIS, VRT, grid sampling, field mapping, sensing technology)
* Weather and climatic effects on crop production and management decisions
* Biofuels and biomass production for bioenergy
* Carbon management in agriculture (greenhouse gases, carbon sequestration, carbon credits, global warming)

# MATH PRACTICAL

This section will include mathematical problems related to agronomy. It will be scored on the basis of 150 total points. Answers must be rounded off and given in correct units as specified in the problem. Critical information will be given except for commonly known conversion factors. Possible types of problems are listed below:

* Area conversion calculations (Estimate per acre yield from harvest strips or small plots; Calculate areas and yields from irregularly shaped fields; Area covered and time required for given capacity and delivery rate of fertilizer/chemical applicator; Time to complete tillage/harvest operation given area of field, width of equipment, and speed of travel; Obtaining material and cost estimates for fencing materials for given field size, etc.)
* Pesticide application (Calibrate broadcast or band application given number of nozzles, nozzle spacing, output from one or more nozzles, and distance traveled or intended speed of travel; Find amount of chemical formulation to add to a spray tank to meet product or active ingredient label recommendations given tank size and delivery rate; Calculate costs of pesticide application, etc.)
* Fertilizer/lime application (Spreader calibration given amount delivered in a distance traveled or by turning the drive wheel; Fertilizer application rates given carrier analysis and recommended rates in elemental or oxide form or replacement of nutrients removed by the crop; Prepare bulk blends from given rates and available carriers; Calculate costs of fertilizer/lime application; Compare costs of different fertilizers/lime sources)
* Seeding/Planting (Calibration of row planter or grain drill given amount of seed delivered in a distance traveled or by turning the drive wheel a certain number of revolutions; Seeding rates, plant population, and percent seed emergence calculations; Adjusting seeding rates and comparing costs based on PLS)
* Volume calculations (tank capacity, storage volume for hay, grain bin, or silo)
* Unit conversions (English to metric units and vice versa)
* Concentration (ppm, %)
* Harvest (estimating harvest losses, harvest speed, area covered)
* Irrigation (application rate for given PSI and GPM, convert gallons to acre-inches)
* Labor requirements (hours/acre)
* Pasture carrying capacity (stocking rates based on animal units)
* Soil erosion loss equation
* Soil physical properties (bulk density, % soil moisture, water retention in profile):
* Plant breeding (heritability, % homozygosity, expected genotypic and phenotypic ratios from a cross)
* Water usage (day, season, species differences)

# LAB PRACTICAL

This section will consist of 75 stations worth 2 points each for a total of 150 points. Each station will have photographs or actual samples of various plant materials, fertilizers, pesticides, seed samples, data tables, equipment, insects, diseases, etc. along with specific questions which will require identification, interpretation, calculation, or evaluation of the display material to answer correctly. These stations will represent activities commonly completed in laboratories or field trips in crop production and soil management courses. For example, contestants may have to:

* Identify common crop diseases and disease symptoms (see attached list – copy of list will be provided during contest)
* Identify common crop insects and insect damage (see attached list – copy of list will be provided during contest)
* Identify common field machinery and other agronomic equipment (see attached list – copy of list will be provided during contest)
* Recognize classes of pedigreed seed from standard seed tags and interpret information from a seed bag (germination, purity, seed size, noxious weeds, variety or hybrid identification, genetically modified traits, refuge requirements, treatments applied, recommended seeding rates, planter adjustments, etc.)
* Write the commercial grade and grade determining factors for market grain samples given various quality factors and official FGIS grain standards tables
* Identify specific plant and seed structures, crop growth stages, or developmental characteristics on fresh or pressed plant samples
* Recognize common nutrient deficiency symptoms (N, P, K, S, Fe) on both dicot and grass crops
* Recognize common herbicide injury symptoms on weeds and crops
* Use a soil textural triangle to name soil textural class
* Determine soil texture by feel, distinguish different types of soil structure, relate soil color to soil properties
* Interpret information found in a soil survey or on a soil test report
* Recognize common fertilizer carriers (major nutrient supplied, typical analysis, common name)
* Interpret information on a fertilizer bag or pesticide label
* Recognize common pesticide formulations and their standard abbreviations
* Determine proper sprayer nozzle tip size and type, screens, pressure, etc. for pesticide applications
* Identify and explain the purpose of items such as ag lime, inoculum, seed treatments, soil amendments, etc.
* Identify stored or processed crop products and common livestock feed ingredients made from crops (silage as to type, hay as to type, alfalfa pellets and cubes, soybean meal, cottonseed meal and hulls, wheat bran, corn meal, beet pulp, dried distillers grains, flaked or ground grains, etc.)
* Match various food and/or industrial products with the crops (or classes of a crop) from which they are made.
* Evaluate crop quality by ranking two or more samples of hay, silage, seed, or cotton.
* Interpret data from tables or graphs (analyze a variety trial based on the LSD mean comparison statistic, select the proper spray nozzle tip for given conditions from a
* manufacturer’s spraying equipment manual, read a calibration monograph for a sprayer or planter, interpret crop yield response to different input levels, determine economic threshold from pest counts vs. yield response given control costs, etc.)
* Evaluate various crop production problems from photos, illustrations, or displays.
* Identify or describe common crop production and soil management practices from photos or slides.

# CROP AND WEED PLANT AND SEED IDENTIFICATION

1. A total of 75 specimens will be identified in a one-hour time limit. Each sample will be worth 2 points for a total of 150 points. Contestants may move at will among unoccupied stations during the contest, but must stand directly in front of the specimen being viewed and only one contestant may examine a specimen at a time.
2. Crop and weed plants will be shown either as fresh or dried and pressed samples. All seed samples will be mature. Seed may be shown either hulled, or where typical, within surrounding hulls, burs or pods (e.g. wild buckwheat, peanut, Korean lespedeza, rice, etc.).
3. Crop and weed identification materials will be selected from the attached identification list. Items are marked with a (p) for plants that may be shown in the flowering to mature plant stage, (v) for plants that may be shown in the vegetative stage, and (s) if seed identification is required. (The final ten plants and/or seeds on the list were added by the host school.)
4. Plants and seeds will be identified by common name as given on the official identification list provided each contestant. Contestants must fill in bubbles corresponding to the identification code for the specimen as given on the list provided.
5. Hand magnifying lenses will be allowed.
6. Sample specimens may not be moved from their stations. Live plant specimens may be touched carefully to aid in identification, but must not be broken or damaged by the contestant or disqualification may result. Dried, pressed plant specimens cannot be touched. Seeds may be rearranged in their place but may not be removed from their container.

# PLANT AND SEED IDENTIFICATION LIST

CODE: (p) flowering to mature plant (live or mount); (v) vegetative plant (live); (s) seed

**Cultivated Crops Cultivated Crops (cont.)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 001 | p | v |  | wheat | 043 | p | v | s | flax |
| 002 |  |  | s | hard red winter wheat | 044 | p | v | s | safflower |
| 003 |  |  | s | hard red spring wheat | 045 | p | v | s | sesame |
| 004 |  |  | s | soft red winter wheat | 046 | p | v |  | potato |
| 005 |  |  | s | soft white wheat | 047 | p | v | s | common buckwheat |
| 006 |  |  | s | hard white wheat | 048 | p | v | s | crambe |
| 007 |  |  | s | durum wheat | 049 | p | v | s | lentil |
| 008 | p | v |  | barley | 050 | p | v | s | sugarbeet |
| 009 |  |  | s | six-rowed barley | 051 | p | v | s | tobacco |
| 010 |  |  | s | two-rowed barley | 052 | p | v |  | sunflower |
| 011 | p | v | s | rye | 053 |  |  | s | confectionary sunflower |
| 012 | p | v | s | oat | 054 |  |  | s | oilseed sunflower |
| 013 p s triticale **Forage Grasses** | | | | | | | | | |
| 014 | p | v | s | rice | 055 | p |  | s | big bluestem |
| 015 | p | v |  | corn | 056 | p |  | s | little bluestem |
| 016 |  |  | s | dent corn | 057 | p |  |  | blue grama |
| 017 |  |  | s | flint corn | 058 | p |  |  | sideoats grama |
| 018 |  |  | s | sweet corn | 059 | p |  | s | buffalograss |
| 019 |  |  | s | pop corn | 060 | p |  | s | Indiangrass |
| 020 | p | v | s | grain sorghum | 061 | p |  | s | switchgrass |
| 021 |  |  | s | sudangrass | 062 | p | v | s | Kentucky bluegrass |
| 022 | p |  | s | foxtail millet | 063 | p | v | s | orchardgrass |
| 023 | p |  | s | proso millet | 064 | p | v | s | tall fescue |
| 024 | p |  | s | pearl millet | 065 | p | v | s | smooth bromegrass |
| 025 | p | v | s | soybean | 066 | p | v | s | bermudagrass |
| 026 | p | v |  | fieldbean | 067 | p | v | s | perennial ryegrass |
| 027 |  |  | s | great northern fieldbean | 068 | p | v | s | reed canarygrass |
| 028 |  |  | s | red kidney fieldbean | 069 | p | v | s | timothy |
| 029 |  |  | s | pinto fieldbean | 070 | p | v | s | crested wheatgrass |
| 030 s navy fieldbean **Forage Legumes** | | | | | | | | | |
| 031 |  |  | s | black turtle fieldbean | 071 | p | v | s | alfalfa |
| 032 | p | v |  | cowpea | 072 | p | v | s | sweetclover |
| 033 |  |  | s | blackeye cowpea | 073 | p | v | s | red clover |
| 034 |  |  | s | purplehull cowpea | 074 | p | v | s | white clover |
| 035 | p | v | s | fieldpea | 075 | p | v | s | crimson clover |
| 036 |  |  | s | Austrian winter fieldpea | 076 | p | v | s | arrowleaf clover |
| 037 | p | v | s | peanut | 077 | p | v | s | alsike clover |
| 038 | p | v | s | green mungbean | 078 | p | v | s | Korean lespedeza |
| 039 | p | v | s | guar | 079 | p | v | s | birdsfoot trefoil |
| 040 | p | v | s | canola | 080 | p | v | s | crownvetch |
| 041 | p | v | s | cotton | 081 | p | v | s | hairy vetch |
| 042 | p | v | s | castor |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Weeds Weeds (cont.)** | | | | | | | | | |
| 082 | p | v | s | barnyardgrass | 121 | p | v | s | puncturevine |
| 083 | p |  | s | blackseed plantain | 122 | p | v | s | quackgrass |
| 084 | p |  | s | buckhorn plantain | 123 | p | v | s | redroot pigweed |
| 085 | p | v | s | buffalobur | 124 | p |  | s | rescuegrass |
| 086 | p | v | s | Canada thistle | 125 | p | v | s | Russian thistle |
| 087 | p |  | s | cheat | 126 | p |  | s | shepherdspurse |
| 088 | p | v | s | chickweed | 127 | p | v | s | sicklepod |
| 089 | p | v | s | cocklebur | 128 | p |  |  | silverleaf nightshade |
| 090 | p | v | s | common lambsquarters | 129 | p |  | s | spotted knapweed |
| 091 | p | v | s | common ragweed | 130 | p | v | s | tall morningglory |
| 092 | p | v | s | curly dock | 131 | p | v |  | tall waterhemp |
| 093 | p | v | s | dandelion | 132 | p | v | s | velvetleaf |
| 094 | p | v | s | dodder | 133 | p | v | s | Venice mallow |
| 095 | p | v | s | downy brome | 134 | p | v | s | wild carrot |
| 096 | p |  | s | eastern black nightshade | 135 | p | v | s | wild buckwheat |
| 097 | p | v | s | field bindweed | 136 |  |  | s | wild mustard |
| 098 | p |  | s | field pennycress | 137 | p |  | s | wild oat |
| 099 | p |  | s | field sandbur | 138 | p |  | s | wild sunflower |
| 100 | p | v |  | giant foxtail | 139 | p | v | s | yellow foxtail |
| 101 | p | v | s | giant ragweed | 140 | p | v |  | yellow nutsedge |
| 102 p s goosegrass **Additional Selections** | | | | | | | | | |
| 103 | p |  | s | greenflower pepperweed | 141 | p | v |  | biennial wormwood |
| 104 | p |  | s | green foxtail | 142 | p | v | s | black medic |
| 105 | p |  |  | hedge bindweed | 143 | p |  |  | bristly foxtail |
| 106 | p | v | s | henbit | 144 | p | v | s | common burdock |
| 107 | p |  | s | hoary cress | 145 | p | v |  | common mallow |
| 108 | p |  | s | horsenettle | 146 | p |  |  | foxtail barley |
| 109 | p | v |  | horseweed | 147 | p | v | s | oxeye daisy |
| 110 | p | v | s | jimsonweed | 148 | p | v |  | pineappleweed |
| 111 | p |  | s | johnsongrass | 149 | p |  | s | red sorrel |
| 112 | p |  | s | jointed goatgrass | 150 | p | v | s | white campion |
| 113 | p | v | s | kochia |  |  |  |  |  |
| 114 | p |  | s | leafy spurge |  |  |  |  |  |
| 115 | p | v | s | large crabgrass |  |  |  |  |  |
| 116 | p | v | s | musk thistle |  |  |  |  |  |
| 117 | p | v |  | Palmer amaranth |  |  |  |  |  |
| 118 | p |  | s | Pennsylvania smartweed |  |  |  |  |  |
| 119 | p | v | s | perennial sowthistle |  |  |  |  |  |
| 120 | p | v | s | prickly sida |  |  |  |  |  |

# CROP DISEASE IDENTIFICATION LIST (on lab practical)

Samples followed by (s) will be shown on seed only

**Small Grains Cotton**

1. powdery mildew 024 bacterial blight (shown on any small grain) 025 Verticillium wilt
2. stem rust **Peanut**

(shown on wheat or oat) 026 Cercospora leaf spot

1. leaf rust 027 Sclerotinia blight

(shown on wheat or oat) **Sorghum**

1. loose smut 028 charcoal rot

(shown on wheat, barley, or oat) 029 gray leaf spot

1. barley yellow dwarf mosaic 030 maize dwarf mosaic (shown on wheat or barley) **Alfalfa**
2. ergot 031 bacterial wilt

(shown on any small grain head or seed) 032 leaf spot

1. black point of wheat (s) 033 Phytopthora root rot
2. common bunt (s) **Additional Selections**
3. wheat scab (s) 034 Cercospora leaf spot (sugarbeet)

**Corn** 035 Goss’s wilt (corn)

1. common corn smut 036 Rhizoctonia (sugarbeet)
2. ear rot 037 sudden death syndrome (soybean)
3. gray leaf spot 038 tan spot (wheat)
4. northern corn leaf blight
5. southern corn leaf blight
6. Gibberella stalk rot
7. Fusarium stalk rot

**Soybean**

1. bacterial blight
2. brown stem rot
3. Phytopthora root rot
4. pod and stem rot
5. bean pod mottle (s)
6. purple stain (s)
7. Asian rust

# NACTA INSECT IDENTIFICATION LIST (on lab practical)

# CODE: (a) adult stage; (l) larval stage

**Alfalfa Stored Grain**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 001 | a | l | alfalfa weevil | 025 | a |  | granary weevil |
| 002 | a |  | blue alfalfa aphid | 026 | a |  | sawtoothed grain beetle |
| 003 | a |  | pea aphid | 027 | a |  | lesser grain borer |
| 004 | a |  | spotted alfalfa aphid | 028 | a |  | red flour beetle |
| 005 | a |  | potato leaf hopper | 029 | a | l | Indian meal moth |
| **Cotton Miscellaneous** | | | | | | | |
| 006 | a |  | boll weevil | 030 |  | l | black cutworm |
| 007 |  | l | cotton bollworm | 031 | a |  | blister beetle |
| 008 | a |  | lygus bug | 032 | a | l | Colorado potato beetle |
| **Corn** |  |  |  | 033 |  | l | fall armyworm |
| 009 | a | l | European corn borer | 034 | a |  | grasshopper |
| 010 |  | l | Southwestern corn borer | 035 | a |  | spider mite |
| 011 |  | l | corn earworm | 036 | a |  | thrips |
| 012 |  | l | corn rootworm | 037 | a | l | white grub |
| 013 | a |  | northern corn rootworm | 038 |  | l | wireworm |
| 014 a southern corn rootworm **Beneficials** | | | | | | | |
| 015 a | |  | western corn rootworm | 039 | a | l | lady beetle |
| **Soybean** | |  |  | 040 | a |  | lacewing |
| 016 a | |  | green stinkbug | 041 | a |  | parasitic wasp |
| 017 a soybean cyst nematode **Additional Selections** | | | | | | | |
| 018 l | | | green cloverworm | 042 | a |  | bird cherry oat aphid (small grains) |
| 019 a | |  | bean leaf beetle | 043 | a |  | flea beetle (canola) |
| **Sorghum** | | |  | 044 | a |  | Japanese beetle (soybean) |
| 020 a | |  | chinch bug | 045 | a |  | soybean aphid (soybean) |
| 021 a | |  | corn leaf aphid | 046 |  | l | wheat midge (small grains) |
| **Small Grains** | | | |  |  |  |  |
| 022 | a |  | greenbug |  |  |  |  |
| 023 | a |  | Russian wheat aphid |  |  |  |  |
| 024 |  | l | Hessian fly |  |  |  |  |

# NACTA EQUIPMENT IDENTIFICATION LIST (on lab practical)

|  |  |  |  |
| --- | --- | --- | --- |
| 001 | anhydrous ammonia applicator | 025 | laser land plane |
| 002 | bale wrapper | 026 | moldboard plow |
| 003 | bermudagrass sprigger | 027 | offset disk |
| 004 | Boerner divider | 028 | peanut digger/shaker |
| 005 | broadcast fertilizer spreader | 029 | rod weeder |
| 006 | broadcast seeder | 030 | rotary hoe |
| 007 | Carter dockage tester | 031 | rotary mower |
| 008 | chisel plow | 032 | rotary tiller |
| 009 | combine yield monitor system | 033 | row crop cultivator |
| 010 | cotton picker | 034 | row crop planter |
| 011 | cultipacker seeder | 035 | self unloading forage wagon |
| 012 | drainage tile installation system | 036 | soil probe |
| 013 | field cultivator | 037 | spiketooth harrow |
| 014 | field sprayer | 038 | subsoiler |
| 015 | forage chopper | 039 | swather/windrower |
| 016 | forage probe | 040 | tandem disk |
| 017 | global positioning system | 041 | variable rate control system |
| 018 | grain combine | 042 | Winchester bushel weight apparatus |
| 019 | grain drill | **Additional Selections** | |
| 020 | grain moisture tester | 043 | air seeder |
| 021 | grain trier | 044 | continuous flow grain dryer |
| 022 | hay baler | 045 | disk-chisel |
| 023 | hay moisture tester | 046 | grain cart |
| 024 | hay rake | 047 | rotary ditcher |