2026 SASES Crops Contest

Purdue University

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Contest Overview

The contest will be divided into four sections, totalling 200 points as follows:

Agronomic Quiz (50 points)
Math Practical (50 points)
Lab Practical (50 points)
Plant and Seed Identification (50 points)

30 minutes will be given to complete each exam. Each exam will have tiebreaker questions totalling 5 points. They will only be scored in the event of a tie.

Agronomic Quiz

This section will consist of 25 written multiple-choice exam questions worth 2 points each for a total of 50 points. Both general and specific questions will be asked on production of major US grain and forage crops.

Topics may include:

- Crop production statistics (major world and U.S. crops) and distribution of US crop production
- Crop classification terms (botanical, growth habit, crop utilization, etc.)
- Crop physiology, growth, and development
- Crop quality and quality evaluation, including typical levels for important quality factors in various grain and forage crops
- Seed and plant morphology and anatomy
- Plant breeding and genetics, including biotechnology and genetic engineering tools and applications
- Seed industry/technology (seed quality, seed certification, testing, processing, treatment, intellectual property rights, etc.)
- Planting (cultivar selection, seeding equipment, planting practices, seed treatment, seeding dates, replanting decisions, etc.)
- Pest problems and pest control (insects, diseases, and weeds, biology/life cycle of major crop pests)
- Herbicide management (classification of herbicides, crop injury symptoms, managing herbicide resistance, herbicide programs, application timing terminology and strategies)
- Pest management alternatives (cultural and biological control practices, IPM principles, pest scouting and monitoring, role of beneficials, etc.)
- Pesticide use and management (pesticide stewardship, safety, restrictions, formulations, adjuvants, trade/common names of major pesticides, etc.)

- Harvesting and storage of grain and forage crops and crop products
- Management of forage crops, including harvest factors and effects on forage quality, comparison of tame pasture systems (grasses, legumes, mixtures), native range management, evaluating forage quality (protein, NDF, ADF, TDN), grazing management, cutting schedules
- Cropping systems and crop rotations
- Climate and crop environment (light, temperature, and moisture effects on plants, weather and weather patterns, earth's energy balance, climate change, global temperature and CO2 levels)
- Weather and climate effects on crop production and management decisions
- Basic soil properties (physical, chemical, and biological)
- Soil fertility (nutrient availability, nutrient movement, factors affecting nutrient loss, plant needs for nutrients, soil pH, organic matter, etc.)
- Nutrient management (soil testing, soil test reports/recommendations, fertilizers and fertilization, fertilizer application and nutrient stewardship, four R's - source, rate, timing, placement)
- Managing soil pH, lime and liming, description and management of saline and sodic soils
- 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, variable rate technology, guidance, row and boom control, grid sampling, field mapping, sensing technology, UAS technology, NDVI mapping, etc.)
- Managing temperature (effects of cover and tillage on soil temperature, frost prevention, snow and ice)
- Biofuels and biomass production for bioenergy
- Carbon management in agriculture (greenhouse gases, carbon sequestration, carbon
- credits)

Math Practical

This section will include agronomic mathematical questions. It will be scored out of a total of 50 points. Answers must be rounded as specified and given in the correct units.

Topics may include:

- 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; Converting units involving area to corresponding metric units, 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 set distance traveled or by turning the drive wheel a certain number of revolutions; Seeding rates, plant population, and percent seed emergence calculations; Calculating PLS and 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, harvest efficiency)
- Irrigation (application rate for given GPM and area covered, convert gallons to acre-inches)
- Tillage and field operations (time required, field efficiency, cost per acre, labor and fuel costs)
- 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)
- Weed competition (seeds/acre, yield loss, spread of resistant weed seed)
- Yield determination and adjustment for % moisture
- Forage quality (protein content, NDF, ADF, TDN, relative feed value)
- Livestock rations (combining forages, grains, and supplements to target protein levels - Pierson square)
- Heat units/growing degree days

Lab Practical

This section will consist of 25 questions, 2 points each. Stations will have photos or physical materials including plants, fertilizers, pesticide labels, insect and disease samples, etc. Stations may require identification, interpretation, calculation, or evaluation of the display material to answer correctly. Identification lists are attached below.

Topics may include:

- Identify common crop diseases and symptoms (see attached list, to be provided during contest)
- Identify common crop insects and damage (see attached list, to be provided during contest)
- Identify common cropping equipment (see attached list, to be provided during contest)
- Identify/describe common crop production and soil management practices from photos, illustrations, or displays.
- Evaluate various crop production or soil health problems from photos, illustrations, or displays.
- Identify specific plant and seed structures, crop growth stages, or developmental characteristics on plant samples or photos.
- 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.
- Read/interpret information from a commercial seed bag (germination, purity, seed size, noxious weeds, variety or hybrid identification, genetically modified traits, refuge requirements, seed treatments applied, recommended seeding rates, planter adjustments, recognize classes of pedigreed seed from standard color of tags, etc.).
- Interpret information on insecticide, fungicide, or herbicide labels, including composition of active ingredients, common/chemical names, formulation, agricultural use requirements, precautionary statements, environmental restrictions, and recommended rates/application requirements for use on specific crops and/or soils.
- Describe common fertilizer carriers (major nutrient supplied, typical analysis, common name) and interpret information on a fertilizer bag.
- Recognize common pesticide formulations and 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 agricultural lime, inoculum, seed treatments, soil amendments, etc.
- Use a soil textural triangle to name soil textural class.

- Determine soil texture by feel, distinguish between types of soil structure, relate soil color to properties.
- Interpret information found in soil test report.
- Identify stored/processed crop products and common livestock feed crop ingredients (silage type, hay type, alfalfa pellets/cines, soybean meal, cottonseed meal/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) from which they are made.
- Evaluate crop quality by ranking two or more samples of hay, silage, seed, cotton. Give typical levels for quality factors in grain/forage crops (protein content, oil content, etc.).
- Write commercial grade and determining factors for market grain samples given quality factors and official FGIS grain standard tables.
- Interpret data from tables or graphs (i.e. analyze a variety trial based on LSD mean comparison statistic, select proper spray nozzle tip for given conditions from manufacturer's spraying equipment manual, read a calibration nomograph for a sprayer or planter, interpret crop yield response to different input levels, determine economic threshold from pest counts vs yield response)

Plant and Seed Identification

This section will consist of 25 plant and seed specimens for identification. Each sample will be worth 2 points totalling 50 points. Identification lists are attached below.

- 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.
- A hand magnifying lens will be allowed.

	Cultivated Crops	
001	wheat	p v s
002	barley	p v s
003	rye	p v s
004	oat	p v s
005	rice	p v s
006	corn	p v s
007	grain sorghum	p v s
008	soybean	p v s
009	fieldbean	p v s
010	cowpea	p v s
011	field pea	p v s
012	peanut	p v s
013	canola	p v s
014	cotton	p v s
015	flax	p v s
016	safflower	p v s
017	sesame	p v s
018	potato	p v
019	sugar beet	p v s
020	tobacco	p v s
021	sunflower	p v s
	Forage Grasses	
022	bermudagrass	p v s
023	Kentucky bluegrass	p v s
024	orchardgrass	p v s
025	perennial ryegrass	p v s
026	reed canarygrass	p v s
027	smooth bromegrass	p v s
028	switchgrass	p v s
029	tall fescue	p v s
030	timothy	p s

	Forage Legumes	
031	alfalfa	p v
032	sweetclover	p v
033	white clover	p v
034	red clover	p v
035	birdsfoot trefoil	p v
	Weeds	
036	barnyardgrass	p v
037	Canada thistle	p v
038	common lambsquarters	p v
039	common cocklebur	p v
040	common ragweed	p v
041	curly dock	p v
042	downy brome	p v
043	eastern black nightshade	p v
044	field pennycress	p v
045	field bindweed	p v
046	giant ragweed	p v
047	giant foxtail	p v
048	green foxtail	p v
049	henbit	p v
050	horseweed (marestail)	p v
051	jimsonweed	p v
052	johnsongrass	p v
053	jointed goatgrass	p v
054	kochia	p v
055	large crabgrass	p v
056	morningglory	p v
057	musk thistle	p v
058	palmer amaranth	p v
059	Pennsylvania	p v

	smartweed	
060	prickly sida	p v
061	quackgrass	p v
062	redroot pigweed	p v
063	Russian thistle	p v
064	shepherd’s purse	p v
065	perennial sowthistle	p v
066	purslane	p v
067	velvetleaf	p v
068	venice mallow	p v
069	waterhemp	p v
070	wild buckwheat	p v
071	wild mustard	p v
072	wild oat	p v
073	wild sunflower	p v
074	yellow foxtail	p v
075	yellow nutsedge	p v

Code:
(p) flowering to mature stage plant
(v) vegetative plant
(s) seed

Insect Identification List

Code:
(A) adult stage
(L) larval stage

Alfalfa

01. Alfalfa weevil (A, L)
02. Pea aphid (A)
03. Potato leaf hopper (A)

Cotton

04. Boll weevil (A)
05. Cotton bollworm (L)
06. Lygus bug (A)

Corn

07. Corn leaf aphid (A)
08. European corn borer (A, L)
09. Southwestern corn borer (L)
10. Corn earworm (L)
11. Corn rootworm (L)
12. Northern corn rootworm (A)
13. Southern corn rootworm (A)
14. Western corn rootworm (A)

Soybean

15. Stinkbug (A)
16. Soybean cyst nematode (A)
17. Bean leaf beetle (A)

Sorghum

18. Chinch bug (A)
19. Greenbug (A)

Miscellaneous

20. Black cutworm (L)
21. Blister beetle (A)
22. Colorado potato beetle
23. Hessian fly (L)
24. Fall armyworm (L)
25. Wireworm (L)

Disease Identification List

Small Grains

01. Powdery mildew
02. Stem rust
03. Leaf rust
04. Loose smut
05. Ergot

Corn

06. Charcoal rot
07. Common corn smut
08. Ear rot
09. Fusarium stalk rot
10. Gibberella stalk rot
11. Goss's wilt
12. Gray leaf spot
13. Northern corn leaf blight

Soybean

14. Bacterial blight
15. Brown stem rot
16. Pod and stem rot
17. Phytophthora root rot
18. White mold (Sclerotinia)

Cotton

19. Bacterial blight
20. Verticillium wilt

Sorghum

21. Charcoalrot
22. Gray leafspot
23. Maize dwarf mosaic

Alfalfa

24. Bacterial wilt
25. Leaf spot

Equipment Identification List

01. anhydrous ammonia applicator
02. bale wrapper
03. bermudagrass sprigger
04. broadcast fertilizer spreader
05. chisel plow
06. combine yield monitor system
07. cotton picker
08. cultipacker seeder
09. drainage tile installation system
10. field cultivator
11. field sprayer
12. forage chopper
13. grain combine
14. grain drill
15. hay baler
16. hay rake
17. moldboard plow
18. peanut digger/shaker
19. rod weeder
20. rotary hoe
21. rotary mower
22. rotary tiller
23. row crop cultivator
24. row crop planter
25. self-unloading forage wagon
26. soil probe
27. spiketooth harrow
28. subsoiler
29. swather/windrower
30. tandem disk