

SUSTAINABILITY SPECIALTY CERTIFIED CROP ADVISER EXAM

PERFORMANCE OBJECTIVES **The American Society of Agronomy** **Certified Crop Adviser Program**



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FOREWORD

The Certified Crop Adviser (CCA) program is predicated on the concept that there is a basic set of knowledge and experience that one must know in order to provide sound advice to producers. The role of the CCA in agricultural production and their relationship to producers has grown over the life of the certification program and continues to grow alongside ever-evolving agricultural standards and practices, which include economic, environmental, and social considerations. With that in mind in 2015, the CCA program, with support from the United Soybean Board, undertook development of a Sustainability Specialty to meet the growing demand for information and advice from producers facing requests to utilize and document sustainable practices. This document is the second generation of the program, updated to reflect the dynamic and fluid character that surrounds sustainability in agriculture and the practices such as soil health, carbon sequestration, and regenerative agriculture that support this overarching concept.

The purpose of implementing a Sustainability Specialty is to utilize CCAs to help farmers/producers to become better acquainted with and adopt/enhance/implement sustainability concepts, stewardship, and best management practices within their operations. CCAs are the single best influencers to work with local producers and help them adopt more sustainable crop production practices that will satisfy the future demands of the food industry and address demands from consumers for safe food, while protecting the environment and preserving natural resources.

Performance Objectives (POs) are the heart of the CCA Program. They outline the basic knowledge and skills required by individuals providing advice to crop producers. Like all CCA POs, the Sustainability Specialty POs are also dynamic, and are upgraded as the needs evolve to ensure that the POs reflect the state of the practice. This helps to ensure that the CCA Sustainability Specialty remains a viable and useful tool that recognizes the high level of competence displayed by those who choose to earn this credential.

The POs for the Sustainability Specialty are divided into four Proficiency Areas that echo the main areas that a CCA provides advice in: Nutrient Management, Soil and Water Management, Pest Management, and Crop Management. Each Proficiency Area contains three Competency Areas, which identify needed knowledge and skill areas. These are the same for each of the four Proficiency Areas and are People and Society, Planet and Environment, and Profits and Economics. Within each Competency Area are specific POs which describe the knowledge needed to demonstrate competency. All of the questions on the Sustainability Specialty Exam are based directly on these POs.

The Sustainability Specialty Exam Committee gratefully acknowledges the work of previous volunteers in originally developing this specialty.

The American Society of Agronomy
Certified Crop Adviser Program
Sustainability Specialty Exam Committee

SUSTAINABILITY AND NUTRIENT MANAGEMENT

Competency Area 1. People and Society

1. Given a source of manure, its composition, and potential uses within an area, understand ramifications to society including:
 - a. smell/odor/nuisance, animal units, type of livestock
 - a. waterways – water quality
 - b. recreation
 - c. pathogens
2. Be able to explain items to consider with fertilizer use and storage facilities either retail or farmer owned, for example
 - a. the use of anhydrous near populated areas (gas).
 - b. liquid containment (risk to surface and/or groundwater and/or adjoining property)
 - c. dry product (movement by water and/or dust)
3. If provided information on a supply chain for inputs, identify the types of issues that may arise such as that may impact the local economy/society, but not limited to
 - a. storage
 - b. transportation
 - c. farm management practices including 4Rs, tillage and crop rotation
 - d. local economy impacts – inputs, labor, environmental impacts as related to the economy
 - e. infrastructure needs
 - f. alternative choices within the supply chain
 - g. recreational value and local economy
 - h. equity issues (access to loans, fair pay, etc.)
4. Be able to list ways in which components of regenerative ag and sustainability benefit society.
5. Understand how changes to farming systems using management practices encompassing regenerative ag and sustainability principles may have economic or societal impacts due to those changes.
6. Be able to distinguish differences in impact of various nutrient materials on the carbon cycle.

Competency Area 2. Planet and Environment

1. Using soil type, N and P inputs, and environment, identify the best practice that should be followed to protect water sources.

2. Identify the forms of biosolids that are readily available for transport with water and soil and their potential for impacting the environment. List opportunities with managing wastes for the farmer and the community.
3. Evaluate manure/biosolids salt levels vs crop growth stage to minimize risk of crop injury.
4. Identify the mechanisms causing movement of nitrogen and phosphorus off agricultural fields and mitigation methods to alleviate their movement.
5. Given a scenario including tile drainage, soil type, and environmental conditions, identify risk factors that are involved in nutrient movement, soil movement, pathogen movement, and subsequent offsite movement impacting downstream water quality and how to mitigate these risk factors.
6. Given a situation about applying manure in a given environment, identify the best practice methods that should be used to prevent runoff.
7. Identify aspects of the carbon nitrogen ratio and its impact on the plant and soil environment.
8. Identify how organic matter is a source for nutrients.
9. Given a soil map and soil information, identify the variability of yield potential across the field that would be expected. Identify practices that would maximize the ROI across the field.
10. Given a scenario including a description of a landscape and federal and local regulations, identify how to minimize or prevent drinking water quality problems.

Competency Area 3. Profits and Economics

1. Given data including commodity price, fertilizer cost, soil test result, and yield response curve and profit, identify the amount of fertilizer that should be used.
2. Given a scenario including environmental variables, environmental concerns, profit requirements and portions of a science- and data-driven nutrient management plan, identify which action to take to achieve a stated goal.
3. Given a scenario including a source, transportation costs, application/equipment costs, application rate, environmental concerns etc., identify the anticipated ROI and liability of applying the nutrient.

4. Given a scenario, a specific government program and the disruption of base, identify the action that should be taken as it relates to the value of the land.
5. Identify the effect on employment and community cash flow based on where and how inputs are purchased. For example: Local supplier vs larger cooperative vs direct to farm.
6. Identify the variables that can affect market channels in agriculture.
7. Given a market situation, identify the market resiliency that will affect the community.
8. Identify factors that affect market channel communication situations.

SUSTAINABILITY AND SOIL AND WATER MANAGEMENT

Competency Area 1. People (Society)

1. Given information about a specific situation, identify the risk mitigation action that should be taken to protect soil and water resources.
2. Given information about a farm that is marketing their products because it is produced regeneratively, identify how this will impact the marketing with the public.
3. Given a risk mitigation scenario, identify the risk, the level of risk including financial liability, public opinion, or threat of a boycott.
4. Given soil characteristics and environment data, identify the erosion issues that should be considered as it relates to sustainability and soil and water management.
5. Given information about marginal lands, identify what needs to be considered if it is or is not use for crop production.
6. Given a situation where a Conservation Reserve Program (CRP) is used, identify pros and cons that can occur.
7. Identify the mechanisms for carbon sequestration and how to manage for carbon sequestration.
8. Identify the greenhouse gasses, their characteristics, and how they behave in the environment.
9. Given a farming practice, identify how it affects greenhouse gasses.

10. Identify how the farming operation can minimize their impact to the local community.
11. Given information including a producer, farming information, various audiences, water, and erosion information, identify the concern of each audience member (farmer, people downstream, etc.) at various stages of time and distance.

Competency Area 2. Planet and Environment

1. Given a situation including a producer, farming information/cropping, nutrients and erosion information, sediment loads, and watershed information, identify the downstream impacts both environmental and audiences (local community, local farm, gulf, etc.)
2. Given a situation including soil characteristics and cropping systems make recommendations regarding,
 - a. irrigation strategies
 - b. evaporation
 - c. infiltration rate
 - d. leaching impacts
 - e. nutrient loss and efficiency
 - f. water use efficiency
 - g. groundwater quality impacts
 - h. surface water quality impacts
 - i. salt management
3. Given information about water, identify the cumulative effects of the water based on time and distance.
4. Given information including a producer, farming information, and erosion information, identify the sources and impact of airborne particles.
5. Given information, identify sources, factors affecting the emission rates of greenhouse gasses, and best management practices to reduce greenhouse gasses.
6. Given information, identify the best management practices to improve microbial activity/soil biological activity.
7. Given information, identify the best management practices to increase soil organic matter.

8. Given information, identify the best management practices to sustain or improve soil structure and decrease compaction.
9. Given information including an overall multi-year farm management plan, a map, remote sensing, or GIS, identify areas that are conducive to preservation next generation, carbon sequestration/release, or native habitat preservation and the methods that should be used to achieve this.

Competency Area 3. Profits (Economics)

1. Given information for a farmland conversion, identify issues that will make it profitable or not (for example: ecosystem service markets, short- versus long-term conservation impacts, conservation financial support (government funding), and field management efficiencies).

SUSTAINABILITY AND PEST MANAGEMENT

Competency Area 1. People (Society)

1. Given information including a part of a specialty production contract, identify the impact of a given part of the contract (for example: storage space for product, drying floor or air flow, equipment, bins, description of farm, what fits into a rotation, contamination, genetic makeup of product, pest damage, resistance, and cross species transmission).
2. Using the pesticide label provided, identify the correct personal protective equipment (PPE) that is required
3. Explain the purposes for withholding periods and why they differ.
4. Identify human health risks associated with pesticide choice
 - a. surface/groundwater contamination (e.g., glyphosate vs atrazine).
 - b. atmospheric contamination (e.g., insecticides).
 - c. storage and storage facilities.
 - d. food safety.

Competency Area 2. Planet (Environment)

1. Given a farming situation and pesticide information, identify the impact on the farm and surrounding environment, and the any action(s) that need to be considered for sustainability of water, air, and species of concern.

2. Given information about an application of a pesticide, identify the impact on the soil biological activity and how long the soil and or crops will be impacted (half-life).
3. Understand and manage the effects of pesticides on non-target plants and potentially beneficial organisms (e.g., pollinators).
4. Understand pesticides considerations for efficacy and environmental risks are affected by
 - a. soil characteristics
 - b. proximity to drainage ways
 - c. application methods and timing
 - d. weather conditions
 - e. future cropping choices

Competency Area 3. Profits (Economics)

1. Give information including best management practices and profits, identify the cultural, biological, and chemical pest management option that will meet the needs of the of the producer, fit in the supply chain objectives, and market expectations. (Examples: seed production contracts, crop set asides for genetic purity, etc.).
2. Understand the implications and liability of off-label application.

SUSTAINABILITY AND CROP MANAGEMENT

Competency Area 1. People (Society)

1. Using the regulations provided associated with the workforce and/or PPE, be able to determine the best sustainable practices concerning labor protection and corresponding equipment.
2. Given a farming scenario including market channel customer requirements about sustainability, identify the most effective best management practices to meet those requirements considering the following.
 - a. tillage reduction
 - b. cover crop usage
 - c. crop rotation
 - d. reduction in pesticide usage
 - e. nutrient management
 - f. ground water/surface runoff management

- g. crop genetics
 - h. employee safety
 - i. environmental stewardship
 - j. pesticide choices (OMRI-approved or other)
3. Understand contract specific requirements and implications for
 - a. organic
 - b. non-GMO
 - c. specialty crop production
 - d. seed production
 4. Identify things that growers can do to influence adoption of policies related to sustainability; i.e., agritourism, agrieducation.

Competency Area 2. Plant and Environment

1. Given information including water needs, irrigation options, crop selection, etc., identify how to address the water needs in the situation including, but not limited to
 - a. water use efficiency.
 - b. corn vs. a small grain crop,
 - c. growing season length,
 - d. peak/necessary water usage needs,
 - e. time period
 - f. salt tolerance and management.
2. Identify the characteristics, pros, and cons of various types of irrigation.
3. Evaluate best management practices that have the smallest carbon footprint.
4. Evaluate best management practices for soil and crop management in a sustainable/regenerative system.

Competency Area 3. Profits and Economics

1. Provided a situation, identify actions that could be taken to positively affect profits with sustainability.
2. Evaluate best management practices that can be used to address a buyer's concerns in a sustainable/regenerative farming system.

3. Given a farming scenario, identify marketing opportunities that could fit within the farming operation.
4. Given consumer product expectations, identify how the following affect both buyers and growers:
 - a. pricing
 - b. competition
 - c. transportation
 - d. market availability
 - e. labor
5. Given a farming scenario including equipment costs and marketing contracts, identify options or actions with changes in premium payments and market sustainability requirements.
6. If provided information on a supply chain, identify the types of issues that may arise such as, but not limited to:
 - a. storage
 - b. transportation
 - c. crop rotation
 - d. tillage
 - e. inputs
 - f. labor
 - g. markets