AGRIBIO

PROPOSED EVENT CATEGORY: Life, Personal, and Social Sciences

PROPOSED EVENT DIVISION: Division C (Grades 9-12).

1. **DESCRIPTION:** Teams will assess their understanding of agricultural systems, their impact on the surrounding ecologic systems, and the biological influences on agriculture

   A TEAM OF UP TO: 2

   EYE PROTECTION: No eye protection required

   IMPOUND: No

   APPROXIMATE TIME/EVENT TIME: 50 minutes

2. **EVENT PARAMETERS:**
   a. Each team may bring four 8.5x11 sheets of paper that can contain information on both sides from any source to use during competition as well as two standalone non-graphing, non-programmable calculators. These sheets of paper can be laminated or placed in sheet protectors, but are not to be removed during the exam
3. **THE COMPETITION:**
   a. Each section should constitute approximately 1/3rd of the exam.
   b. Participants will be given a series of questions pertaining to both rural and urban agriculture, styles of agriculture and their impacts, genetic tendencies of major crops, and how agriculture affects surrounding food webs. Data interpretation in all forms, including tables, graphs, and charts, may be used. Case studies may be used to provide scenarios for teams to answer questions and draw inferences from. Topics concerning aquaculture and livestock will not be addressed. Questions may be multiple choice, matching, short answer, fill in the blank (with an appropriate word bank), or long response. Although it is not recommended, the exam may be formatted to include stations. Since eye protection is not allowed, physical samples and testing is not recommended.

   Part I: Staple Crops and Plant Science

   c. Participants should display knowledge of the common diseases and predators, reproductive cycle, life cycle, general biology, anatomy and physiology, and agricultural techniques associated with wheat, maize, rice, cotton, soybeans, sugarcane, tobacco, and coffee
      i. Regional and State Level ONLY: Participants should be familiar with the above information pertaining to their state fruit, if applicable (the list is under 'a' of "recommended resources"). If a state does not have an official fruit, this section should be omitted.
   d. Participants should be familiar with the structure and function of plant organs and their unique organelles, as well differentiating between bryophytes, angiosperms, and gymnosperms. Vascular systems, including the tissues and cells that compose these systems, photosynthetic processes, and plant reproduction methods may be tested on. Agricultural events (i.e. Green Revolution) are fair game

   Part II: Ecology and Soil Science

   e. Participants may be assessed on the following areas: soil chemistry, soil composition, the use of GIS within soil science, soil physics, the interaction between water and soil, soil layers, food webs, energy pyramids, chemical cycling, nutrient cycling, population dynamics, the impacts of microorganisms on soil health, erosion techniques and soil minerology.

   Part III: Agricultural Science

   f. Participants will be assessed on their knowledge on the different types of agricultural practices (i.e. monoculture, crop terracing, etc.) and their impact on the surrounding areas, the benefits and drawbacks for each method, fertilizer use, integrated pest management (IPM) and the organisms involved, pesticide

use and its effects, including the impacts and history of DDT in agriculture. The dynamics of hydroponics and the roles pollinators play in agricultural systems may also be included.

g. Participants will be assessed on the influence of genetics on crop yields, including significant experiments (i.e. Mendel, Shull, McClintock, etc.) as well as important scientific bases of plant genetics (i.e gene guns, CRISPR Cas-9 in crops, the Golden Rice field trial, etc.)

4. **SAMPLE TASKS/QUESTIONS:**
   a. Participants should be able to apply Darcy's Law to the movement of water within soil
   b. Teams should be able to identify and distinguish between a monocot and a dicot based on root, stem, and leaf characteristics
   c. Teams should be able to identify what an NPK ratio is and how to calculate it
   d. Given a soil texture triangle, teams should be able to identify soil types based on sand, silt, and clay content
   e. Competitors should be able to describe how soil acidification impacts crop growth and yields
   f. Participants should be able to describe how George Harrison Shull's experiment mimicked Gregor Mendel's
   g. Teams may be asked to identify the soil characteristics that would increase carbon sequestration in soil
   h. Participants should be able to provide a detailed description of the nitrogen cycle
5. **SCORING:**
   a. The team with the highest score at the conclusion of the exam wins
   b. In the event of a tie, individual question(s) may be identified as tiebreakers. These question(s) should be denoted to teams during the exam.
6. **RECOMMENDED RESOURCES**
   a. https://www.netstate.com/states/tables/state_fruit.htm
   b. https://www.irri.org/our-work/outcome-themes/developing-environmentally-sustainable-solutions-rice-systems
   c. http://www.fao.org/3/I9527EN/i9527en.PDF
   d. https://www.ctc-n.org/technology-library/agriculture-and-forestry/increasing-crop-resilience-and-productivity/terracing
   e. https://www.ams.usda.gov/sites/default/files/media/2016%20Hydroponic%20Task%20Force%20Report.PDF
   f. https://extension.psu.edu/how-to-calculate-a-fertilizer-ratio
   g. https://www.epa.gov/sites/production/files/2015-09/documents/nitrification_1.pdf
   h. https://uclageo.com/CEE220/Section1.2.php