

**INDIANA FFA ORGANIZATION**  
**AGRONOMY EVALUATION CAREER DEVELOPMENT EVENT**

***OBJECTIVES AND ACADEMIC CROSSWALKS***  
***CREATED – SEPTEMBER 2004***

## **DESCRIPTION**

The Agronomy Career Development Event teaches students how to identify plant specimens for both crop and weeds; seed specimens for both crop and weed; analysis grain samples, and determine the best management practices for growing agronomic crops in Indiana.

## **OBJECTIVES**

1. Students will be able to identify 25 plant and 25 seed specimens.
2. Students will be able to determine plant pathogens such as insect damage, plant diseases, disorders, and damages.
3. Students will be able to recognize the different types of USDA classifications for corn, soybeans, and wheat through analysis of different grain samples.
4. Students will be proficient in general agronomic knowledge such as plant physiology; pasture management, tillage systems, fertilization and weed control.
5. Students will improve in academic areas, particularly in the area of science, math, and English.

For more information on the Indiana FFA Agronomy Career Development Event rules and guidelines visit [www.four-h.purdue.edu/download/judging/handbook.pdf](http://www.four-h.purdue.edu/download/judging/handbook.pdf)

*Science Standards – Earth Science*

<b>Principle</b>	<b>Academic Standards</b>	<b>Agronomy Career Development Event Practicum</b>
<b>The Earth</b>	<p><u>ES.1.12</u> Describe the role of photosynthetic plants in changing the Earth’s atmosphere.</p> <p><u>ES.1.10</u> Recognize and describe that the earth sciences address planet-wide interacting systems, including the oceans, the air, the solid earth, and life on Earth, as well as interactions with the Solar System.</p>	<ul style="list-style-type: none"><li>• Understand the role of photosynthesis and how it effects plant growth</li><li>• Understand the role of soil and how it affects plant growth.</li><li>• Explain how Cation Exchange Capacity effects plant growth</li></ul>

*Science Standards – Biology*

<b>Principle</b>	<b>Academic Standards</b>	<b>Agronomy Career Development Event Practicum</b>
<b>Developmental &amp; Organismal Biology</b>	<p><u>B.1.15</u> Understand and explain that, in biological systems, structure and function must be considered together.</p> <p><u>B.1.19</u> Recognize and describe that metabolism consists of the production, modification, transport, and exchange of materials that are required for the maintenance of life.</p>	<ul style="list-style-type: none"><li>• Compare and contrast specialized stems and stalk growth location and physical appearance.</li><li>• Determine differences in root systems, stems, and leaf structures between dicot and monocot plants.</li><li>• Use table and soil test information to determine nitrogen, phosphorous, and potassium needs.</li><li>• Distinguish between hypogeal and epigeal emergence.</li><li>• Differentiate the three major components: pericarp, endosperm, and embryo in a grass caryopsis</li></ul>

<p><b>Evolution</b></p>	<p><u>B.1.31</u> Describe how natural selection provides the following mechanism for evolution: Some variation in heritable characteristics exists within every species, and some of these characteristics give individuals an advantage over others in surviving and reproducing. Understand that the advantaged offspring, in turn, are more likely than others to survive and reproduce. Also understand that the proportion of individuals in the population that have advantageous characteristics will increase.</p> <p><u>B.1.34</u> Explain that evolution builds on what already exists, so the more variety there is, the more there can be in the future. Recognize, however, that evolution does not necessitate long-term progress in some set direction.</p>	<ul style="list-style-type: none"> <li>• Determine the external features of a Red Clover, Alfalfa, and grass leaf</li> <li>• Determine the parts of a basic flower, a legume flower, and a grass flower.</li> <li>• Define a soybean relative maturity group and predict what would happen if a variety is planted outside its recommended maturity range.</li> <li>• Identify the herbicide mode of action group most likely responsible for specific herbicide injury and how pathogens become resistant to herbicides.</li> </ul>
<p><b>Ecology</b></p>	<p><u>B.1.37</u> Explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle the residue of dead organic materials. Recognize, therefore, that human activities and technology can change the flow and reduce the fertility of the land.</p> <p><u>B.1.38</u> Understand and explain the significance of the introduction of species, such as zebra mussels, into American waterways, and describe the consequent harm to native species and the environment in general.</p> <p><u>B.1.39</u> Describe how ecosystems can be reasonably stable over hundreds or thousands of years. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.</p> <p><u>B.1.41</u> Recognize that and describe how human beings are part of the Earth’s ecosystems. Note that human activities can,</p>	<ul style="list-style-type: none"> <li>• Contract features of conventional versus reduced tillage systems related to temperature, moisture, and soil erosion.</li> <li>• Diagnose fertility, pest compactions, and disease problems related to specific field situations.</li> <li>• Determine how weeds and pest influence crops yields.</li> <li>• Identify the herbicide mode of action group most likely responsible for specific herbicide injury.</li> <li>• State two conditions that lead to lodging of wheat.</li> <li>• Describe the effect of improper</li> </ul>

	<p>deliberately or inadvertently, alter the equilibrium in ecosystems.</p> <p><u>B.1.43</u> Understand that and describe how organisms are influenced by a particular combination of living and non-living components of the environment.</p> <p><u>B.1.44</u> Describe the flow of matter, nutrients, and energy within ecosystems.</p> <p><u>B.1.45</u> Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of the way organisms develop within ecosystems.</p> <p><u>B.1.46</u> Recognize and describe that a great diversity of species increases the chance that at least some living things will survive in the face of large changes in the environment.</p>	<p>liming, phosphorous and potassium fertilization in Alfalfa.</p> <ul style="list-style-type: none"><li>• Explain how weed pressure effects crop yields.</li><li>• Identify the herbicide mode of action group most likely responsible for specific herbicide injury and how pathogens become resistant to herbicides.</li></ul>
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## *Science Standards – Chemistry*

<b>Principle</b>	<b>Academic Standards</b>	<b>Agronomy Career Development Event Practicum</b>
<b>Properties of Matter</b>	<u>C.1.5</u> Describe solutions in appropriate concentration units (be able to calculate these units), such as molarity, percent by mass or volume, parts per million (ppm), or parts per billion (ppb).	<ul style="list-style-type: none"><li>• Calculate insecticide and herbicide needs for a specific field situation.</li><li>• Recommend nozzle tips that would be best suited for spraying in a specific field situation.</li><li>• Calculate fertilizer needs and cost to satisfy a specific nutrient requirement.</li></ul>
<b>Nature of Chemical Change</b>	<u>C.1.16</u> Calculate the percent composition by mass of a compound or mixture when given the formula.	<ul style="list-style-type: none"><li>• Grain Analysis</li><li>• Use corn and soybean moisture conversions to calculate actual pounds per bushel.</li></ul>

## *Science Standards – Environment Science, Advanced*

<b>Principle</b>	<b>Academic Standards</b>	<b>Agronomy Career Development Event Practicum</b>
Environmental Systems	<p><u>Env.1.2</u> Understand and describe that if a disaster, such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.</p> <p><u>Env.1.4</u> Understand and explain that human beings are part of the Earth’s ecosystems, and give examples of how human activities can, deliberately or inadvertently, alter ecosystems.</p> <p><u>Env.1.5</u> Explain how the size and rate of growth of the human population in any location is affected by economic, political, religious, technological, and environmental factors, some of which are influenced by the size and rate of growth of the population.</p> <p><u>Env.1.6</u> Describe and give examples about how the decisions of one generation both provide and limit the range of possibilities open to the next generation.</p> <p><u>Env.1.10</u> Identify and measure biological, chemical, and physical factors within an ecosystem.</p> <p><u>Env.1.12</u> Explain the process of succession, both primary and secondary, in terrestrial and aquatic ecosystems.</p>	<ul style="list-style-type: none"> <li>• Explain how different type of tillage systems effect crop growth and yields</li> <li>• Explain how crop residue is measured and what role crop residue plays in making environmental sound management practices.</li> <li>• Understand the relationship between farming and succession and that the way to control succession is through best management practices.</li> <li>• Understand how a management decisions effects environmental factors, yields, and the economic value of the crop.</li> </ul>
Flow of Matter & Energy	<p><u>Env.1.14</u> Recognize and explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle organic materials from the remains of dead organisms.</p>	<ul style="list-style-type: none"> <li>• Explain the effect and use of temperature development units for agriculture.</li> <li>• Use current weather information to calculate growing degree-days.</li> <li>• Determine what make a tillage practice a reduce tillage system.</li> </ul>
Populations	<p><u>Env.1.20</u> Demonstrate how resources, such as food supply, influence populations.</p>	<ul style="list-style-type: none"> <li>• Explain the economic impact that certain pathogens have on agronomic</li> </ul>

		crops.
Natural Resources	<p><u>Env.1.23</u> Recognize and describe the role of natural resources in providing the raw materials for an industrial society.</p> <p><u>Env.1.26</u> Identify specific tools and technologies used to adapt and alter environments and natural resources in order to meet human physical and cultural needs.</p> <p><u>Env.1.27</u> Understand and describe the concept of integrated natural resource management and the values of managing natural resources as an ecological unit.</p> <p><u>Env.1.28</u> Understand and describe the concept and the importance of natural and human recycling in conserving our natural resources.</p>	<ul style="list-style-type: none"> <li>• Explain how different type of tillage systems effect crop growth and yields</li> <li>• Explain how crop residue is measured and what role crop residue plays in making environmental sound management practices.</li> <li>• Describe Best Management Practices for a given situation.</li> </ul>
Environment Hazards	<p><u>Env.1.30</u> Describe how agricultural technology requires trade-offs between increased production and environmental harm and between efficient production and social values.</p> <p><u>Env.1.35</u> Compare and contrast the beneficial and harmful effects of an environmental stressor, such as herbicides and pesticides, on plants and animals. Give examples of secondary effects on other environmental components.</p>	<ul style="list-style-type: none"> <li>• Identify the herbicide mode of action group most likely responsible for specific herbicide injury.</li> <li>• Explain how different type of tillage systems effect crop growth and yields</li> <li>• Explain how crop residue is measured and what role crop residue plays in making environmental sound management practices.</li> </ul>

*MATH STANDARDS – ALGEBRA*

<b>Principle</b>	<b>Academic Standards</b>	<b>Agronomy Career Development Event Practicum</b>
<b>Operations with Real Numbers</b>	<p><u>A1.1.5</u> Use dimensional (unit) analysis to organize conversions and computations.            Example: Convert 5 miles per hour to feet per second.</p>	<ul style="list-style-type: none"> <li>• Calculate insecticide and herbicide needs for a specific field situation.</li> <li>• Recommend nozzle tips that would be best suited for spraying in a specific field situation.</li> <li>• Calculate fertilizer needs and cost to satisfy a specific nutrient requirement.</li> <li>• Use corn and soybean moisture conversions to calculate actual pounds per bushel.</li> </ul>
<b>Linear Equations &amp; Inequalities</b>	<p><u>A1.2.1</u> Solve linear equations.            Example: Solve the equation <math>7a + 2 = 5a - 3a + 8</math>.  <u>A1.2.2</u> Solve equations and formulas for a specified variable.            Example: Solve the equation <math>q = 4p - 11</math> for <math>p</math>.  <u>A1.2.6</u> Solve word problems that involve linear equations, formulas, and inequalities.            Example: You are selling tickets for a play that cost \$3 each. You want to sell at least \$50 worth. Write and solve an inequality for the number of tickets you must sell.</p>	<ul style="list-style-type: none"> <li>• Calculate insecticide and herbicide needs for a specific field situation.</li> <li>• Recommend nozzle tips that would be best suited for spraying in a specific field situation.</li> <li>• Calculate fertilizer needs and cost to satisfy a specific nutrient requirement.</li> <li>• Use corn and soybean moisture conversions to calculate actual pounds per bushel.</li> </ul>
<b>Relations &amp; Functions</b>	<p><u>A1.3.2</u> Interpret a graph representing a given situation.            Example: Jessica is riding a bicycle. The graph below shows her speed as it relates to the time she has spent riding. Describe what might have happened to account for such a graph.</p>	<ul style="list-style-type: none"> <li>• Assess fertility needs and make a nutrient recommendation for corn and soybean using tables.</li> <li>• Consult tables and carts to obtain information from reference materials.</li> </ul>

		<ul style="list-style-type: none"> <li>• Use table and soil test information to determine nitrogen, phosphorous, and potassium needs.</li> </ul>
<p><b>Mathematical Reasoning &amp; Problem Solving</b></p>	<p><u>A1.9.1</u> Use a variety of problem solving strategies, such as drawing a diagram, making a chart, guess-and check, solving a simpler problem, writing an equation, and working backwards.</p> <p>Example: Fran has scored 16, 23, and 30 points in her last three games. How many points must she score in the next game so that her four game average does not fall below 20 points?</p>	<ul style="list-style-type: none"> <li>• Calculate insecticide and herbicide needs for a specific field situation.</li> <li>• Recommend nozzle tips that would be best suited for spraying in a specific field situation.</li> <li>• Calculate fertilizer needs and cost to satisfy a specific nutrient requirement.</li> <li>• Use corn and soybean moisture conversions to calculate actual pounds per bushel.</li> </ul>

*Math Standards – Geometry*

<b>Principle</b>	<b>Academic Standards</b>	<b>Agronomy Career Development Event Practicum</b>
<b>Polygons</b>	<p><u>G.2.5</u> Find and use measures of sides, perimeters, and areas of polygons, and relate these measures to each other using formulas.            Example: A rectangle of area 360 square yards is ten times as long as it is wide. Find its length and width.</p>	<ul style="list-style-type: none"> <li>• Calculate area, length, and volume measurements related to agriculture.</li> </ul>
<b>Quadrilaterals</b>	<p><u>G.3.3</u> Find and use measures of sides, perimeters, and areas of quadrilaterals, and relate these measures to each other using formulas.            Example: A section of roof is a trapezoid with length 4 m at the ridge and 6 m at the gutter. The shortest distance from ridge to gutter is 3 m. Construct a model using a computer draw program showing how to find the area of this section of roof.</p>	<ul style="list-style-type: none"> <li>• Calculate area, length, and volume measurements related to agriculture.</li> </ul>
<b>Triangles</b>	<p><u>G.4.7</u> Find and use measures of sides, perimeters, and areas of triangles, and relate these measures to each other using formulas.            Example: The gable end of a house is a triangle 20 feet long and 13 feet high. Find its area.</p>	<ul style="list-style-type: none"> <li>• Calculate area, length, and volume measurements related to agriculture.</li> </ul>
<b>Circles</b>	<p><u>G.6.7</u> Define, find, and use measures of circumference, arc length, and areas of circles and sectors. Use these measures to solve problems.            Example: Which will give you more: three 6-inch pizzas or two 8-inch pizzas? Explain your answer.</p>	<ul style="list-style-type: none"> <li>• Calculate area, length, and volume measurements related to agriculture.</li> </ul>
<b>Mathematical Reasoning &amp; Problem Solving</b>	<p><u>G.8.1</u> Use a variety of problem-solving strategies, such as drawing a diagram, making a chart, guess-and-check, solving a simpler problem, writing an equation, and working backwards.            Example: How far does the tip of the minute hand of a clock move in 20 minutes if the tip is 4 inches from the center of the clock?</p>	<ul style="list-style-type: none"> <li>• Calculate insecticide and herbicide needs for a specific field situation.</li> <li>• Recommend nozzle tips that would be best suited for spraying in a specific field situation.</li> <li>• Calculate fertilizer needs and cost to satisfy a specific nutrient requirement.</li> </ul>

		<ul style="list-style-type: none"><li>• Use corn and soybean moisture conversions to calculate actual pounds per bushel.</li></ul>
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*English Standards*

<b>Principle</b>	<b>Academic Standards</b>	<b>Agronomy Career Development Event Practicum</b>
<b>Research and Technology</b>	9.4.6 Synthesize information from multiple sources, including almanacs, microfiche, news sources, in-depth field studies, speeches, journals, technical documents, and Internet sources.	<ul style="list-style-type: none"> <li>• Students must research and derive answers from several sources.</li> <li>• Consult tables and charts to obtain information from reference materials.</li> </ul>
<b>Manuscript Form</b>	<p>9.6.3 Produce legible work that shows accurate spelling and correct use of the conventions of punctuation and capitalization.</p> <p>10.6.3 Produce legible work that shows accurate spelling and correct use of the conventions of punctuation and capitalization.</p> <p>11.6.2 Produce writing that shows accurate spelling and correct punctuation and capitalization.</p> <p>12.6.2 Produce writing that shows accurate spelling and correct punctuation and capitalization.</p>	<ul style="list-style-type: none"> <li>• Students must maintain proper spelling and punctuation of weed and plant names.</li> </ul>

*Social Studies – Economics*

<b>Principle</b>	<b>Academic Standards</b>	<b>Agronomy Career Development Event</b>
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		<b>Practicum</b>
<b>Market Structures</b>	E.3.6 Demonstrate how firms determine price and output through marginal analysis.	<ul style="list-style-type: none"><li>• Recognize the usual grade of market quotes and where market quotes may be obtained.</li><li>• Explain procedures used in determining grades for corn, soybeans, and wheat.</li><li>• State the top 3 grain crops and their quantity that Indiana contributes to the marker place.</li></ul>