Food for the Future is a collaborative effort between the Florida 4-H Program and the University of Florida Agronomy Department. This curriculum is the outreach education portion of a USDA grant titled "Enhancing Leaf Spot Resistance in Peanut" and was developed to help address the well-documented need for science literacy education for United States youth as well as the need for future plant breeders and scientists to address the needs of a growing world population with fewer resources and decreasing farmland.

The objectives of this curriculum include the following:

1. Increase knowledge and importance of the field of plant breeding on a global scale
2. Increase awareness about careers related to the field of plant breeding
3. Improve attitudes and aspirations towards careers in science in general, and plant breeding specifically
4. Provide opportunities to learn life skills and 4-H science abilities while learning about the field of plant breeding
5. Engage youth in experiential and inquiry-based activities while teaching subject matter related to plant breeding and basic genetics.

Content:

- Science and technology content based on the National Science Education Standards and the Florida Sunshine State Standards for Education
- 4-H Science Abilities (30 skills and abilities essential for scientific literacy)

Context:

- The Essential Elements of Positive Youth Development, fundamental to 4-H:
  - Mastering life challenges
  - Cultivating independence
  - Developing a sense of belonging within a group
  - Sharing a spirit of generosity towards others
- Reliance on trained, caring adult staff and volunteers as mentors, coaches, and facilitators.
- Perspective that youth are partners and resources in their own development
- Inquiry-based, hands-on, experiential approach to learning

Delivery:

These lessons are designed for multiple delivery modes, including: club, classroom, afterschool, or camp settings. Throughout this curriculum, youth are encouraged to make connections to careers related to the field of plant breeding.

The target age for this curriculum are eleven to thirteen year olds (middle school age). Resent research has shown that career aspirations in 8th grade are a more significant predictor of the likelihood of a youth to pursue a science degree than academic performance in math and science in the eighth grade.

This age group has unique learning characteristics with specific implications for facilitators. The following table lists some of these characteristics, but remember that not all characteristics will be observed in all youth at the same age. This information is provided to help you as you begin working with this age group.

General Characteristics of 11-13 year olds	**Prompts for Facilitators**
Restless and active, with periods of fatigue	Emphasize active learning; provide time for processing and reflection
Like group activities	Emphasize group learning experiences and support a sense of belonging
Interested in sports and active games	Encourage fun and active learning experiences (limit lecture)
Need guidance from adults to stay on task in order to achieve best performance; desire to be independent, but still want and need parent's help (even if they don't admit it)	Work closely with youth to mentor and foster a sense of leadership and to provide a positive role model for learning and fun
Admire and imitate older boys and girls	Utilize teen leaders to help facilitate and serve as positive role models
Have interests that can change rapidly, jumping from one thing to another	Plan a variety of experiences during a single meeting or lesson. Use the activities as a main theme for the entire meeting or lesson and try to relate all the activities back to that theme to help embed the concepts taught
Beginning to think about what they want to do when they grow up	Provide plenty of examples of potential career opportunities during learning. Help them make the connection between careers that are available, and what the requirements are in order for them to pursue that career
Self-conscious and sensitive	Focus on developing individual strengths and provide opportunities for them to use their abilities and interests
Curious	Encourage questions and serve as a resource. Help them find answers in the library and online
Prefer to be in groups similar to themselves	Encourage the importance of similarities but also the value of differences within groups; relate how working with different people is important to their future career and personal lives

Facilitator Tips:

Think Safety- promote an environment that is inclusive where youth feel safe to have a voice and openly share ideas and questions. Remember to also account for physical safety issues including fire exits and traffic flow in the room. Provide plenty of space for group activities.

Be Prepared- read through each lesson in advance and make sure you have all of the necessary supplies. Visuals are also important, and move outside whenever possible. If the space allows, designate a wall or white board as a "Wonder Wall." This wall is a place to write down questions,

terms, and concepts as youth discover them. Any questions left at the end of the lesson can become homework for the next session.

Provide Consistent Expectations for Behavior- practice active listening and model good communication by making eye contact and speaking clearly. Set ground rules and expectations for behavior at the beginning of the session.

Engage Youth- youth learn best when they are actively engaged. Take advantage of their natural curiosity to explore new science concepts and terms. Remember that if you show enthusiasm, they will be more likely to mirror that enthusiasm.

Develop Scientists- use scientific terms as often as possible, such as "test, prediction, and record." Remind youth that science is part of our everyday lives, and that without plant breeders, we might not have our favorite foods, or even medicines that we or our loved ones need in order to be healthy.

Limit Your Talking- 4-H is about learning-by-doing. Alternate instruction with hands on activity; a good rule of thumb is one hands on activity for every 10 minutes of talking.

Encourage Career Exploration- use every opportunity to make the connections to careers in plant breeding. The National Plant Breeder's Association has a list of careers associated with this field of science at http://plantbreeders.org.

Be Relevant- help youth make the connection between what they are learning and how it relates to the real world. The processing questions at the end of each lesson can help make those connections. Make sure you leave enough time to process each lesson.

Use Additional Resources- the companion website to this curriculum, http://foodforthefuture.edu has additional resources to enhance learning. Audio files

This curriculum utilizes the Experiential Learning Model. 4-H Youth Development relies heavily upon the five steps of the experiential learning model to teach life skills. The sequential steps of the model help youth identify what they have learned from a 4-H experience or activity and to apply that learning to other experiences or situations. The experiential learning process engages the learners in all phases of the activity, resulting in the ability to generalize this learning to new situations. The experiential learning model by Kolb (1984) and modified by 4-H includes five specific steps:

1. Participant(s) **experience** the activity--perform or do it.

2. Participant(s) **share** the experience by describing what happened.

3. Participant(s) **process** the experience to determine what was most important and identify common themes.

4. Participant(s) **generalize** from the experience and relate it to their daily lives.

5. Participant(s) **apply** what they learned to a new situation

When this model is used, youth both experience and process the activity. They learn from thoughts and ideas about the experience. Each step contributes to their learning.

Providing an experience alone does not create experiential learning. Experiences lead to learning if the participant understands what happened, sees patterns of observations, generalizes from those observations and understands how to use the generalization again in a new situation. Advantages for facilitators using the experiential learning process in group settings include:

- being able to assess youth's knowledge of or experiences with a subject and building upon it
- serving as a coach using a variety of methods to involve youth in the experience
- learning together with youth in a cooperative way

Benefits for youth participating in the experiential learning process, no matter what their individual learning style, include:

- learning from each other by sharing knowledge and skills
- working together, sharing information and evaluating themselves and others
- taking responsibility for their own learning
- relating experiences to their own lives