Introduction by

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The more than 320 million Americans alive today depend on plants for our food, clothing, shelter, medicine, and other critical resources. Plants are vital in today’s world just as they were in the lives of the founders of this great nation. Modern agriculture is the cornerstone of human survival and has played extremely important roles in economics, power dynamics, land use, and cultures worldwide. Interpreting the story of agriculture and showcasing its techniques and the crops upon which human life is sustained are critical aspects of teaching people about the usefulness of plants to the wellbeing of humankind. Botanical gardens are ideally situated to bring the fascinating story of American agriculture to the public — a critical need given the lack of exposure to agricultural environments for most Americans today and the great challenges that lie ahead in successfully feeding our growing populations. Based on a meeting of the nation’s leading agricultural and botanical educators organized by the U.S. Botanic Garden, American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, this document lays out a series of educational narratives that could be utilized by the U.S. Botanic Garden, and other institutions, to connect plants and people through presentation of the American agricultural experience.

Horse-drawn reaper, Circa 1837
America’s Evolving Success Story—
American Success is Predicated on Agriculture

Growing a Nation, Nourishing a Nation
America’s “founding farmers” were passionate about agriculture and saw it as integral to building a strong, healthy nation. George Washington believed “Nothing... would contribute more to the welfare of these States, than the proper management of our Lands;” similarly Thomas Jefferson wrote “Agriculture is our wisest pursuit, because it will in the end contribute most to real wealth, good morals & happiness.”

When Washington and Jefferson shared these thoughts just after the founding of our nation, 93 percent of Americans were farmers. These early American farmers experimented with food and fiber crops to meet the demands of a growing nation. Farmers today follow these same basic tenets — they continue to test and expand the limits of agriculture. However, with less than 2 percent of Americans working in production agriculture today, most Americans have all but lost their connection to this essential enterprise. Our Founding Fathers, especially Presidents Washington, Jefferson and Monroe, believed the establishment of a federal botanical garden was critical to our burgeoning nation based on their appreciation of the importance of plants to our well-being. Today, with so few Americans in contact with modern agriculture, the role of botanical gardens in educating the public about agriculture’s importance is perhaps even more pronounced than in the earliest years of our country’s founding.

200 years ago, a vast majority of Americans worked in agriculture; today, less than 2 percent do.
Agriculture and America’s Defining Moments

Even when exploring the history of America’s most significant events, agriculture is a central element. Starting with the basic causes of our country’s founding, the American narrative has been driven by farms, farming communities, and agricultural consumers. The British stance on taxing the colonies’ exported agricultural products led, in part, to the American Revolution. America’s Civil War was similarly driven by agricultural concerns; the North wanted to preserve the Union and the authority of the Federal government to govern the states, and the South wanted to preserve state independence and a slave-dependent agricultural economy based on cotton, tobacco, rice, and other crops. Though the South was more dependent on agriculture, the North also understood its critical importance to the nation. In 1862, a few years before the war’s end, President Lincoln formed the Department of Agriculture to “acquire and to diffuse... useful information on... agriculture.” America rebuilt the agricultural systems that were decimated by the Civil War, and by the early 20th century, at the start of the world wars, the United States was managing domestic food surpluses when global food shortages arose. Our allies and their soldiers overseas were starving, and America responded with massive food aid: an important determinant of allied victory. After the Japanese struck Pearl Harbor, a poster read, “Food Will Win the War and Write the Peace,” illustrating...
the importance of agriculture and food production in America’s ascent to the status of superpower.

**Astounding Technological Advancement**
The American agriculture story is a great case study of the virtues of technology; it exemplifies progress, knowledge application, and the ability of technology to increase efficiency. Human ingenuity, technological advances, and both public and private research continue to stimulate America’s agricultural enterprise. Over time, production has steadily increased while labor needs have greatly decreased. Before mechanization, a farmer could harvest 100 bushels of corn a day; today a farmer operating a combine can harvest 7,200 bushels a day! These advances freed farm labor to transition the U.S. to a manufacturing and modern service-based economy, thereby raising living standards across the country. However, modern agriculture has come with some costs including increased chemical and energy inputs, environmental degradation, and unique labor challenges. And yet, agriculture continues to improve and progress, leveraging sustainable technologies and advances in genetics to combine production gains with decreased environmental impacts.

Before mechanization, a farmer could harvest 100 bushels of corn a day; today a farmer operating a combine can harvest 7,200 bushels a day!
From Plant to Plate: America’s Cornucopia Relies on Vast and Diverse Systems of Agricultural Production

Tapestries on a Vast Landscape
Sometimes when driving in the country, where silos and barns dot the rolling hills and corn or wheat sways in the wind, it is easy to idealize agricultural work and overlook the sheer complexity of and requirements for producing healthy plants and food. Each geographic zone is endowed with differing soil quality and composition, climate patterns, geology, and available water resources. These variables—individually and collectively—determine the profitability and efficiency of crop production in each area. They explain why the United States is an agricultural mosaic, with different regions suitable for different crops; Florida is known for citrus and strawberries; California grows a medley of fruits, vegetables, and nuts; and the Midwest produces corn and soy for the world. The environmental requirements of plants are often invisible to the public who see a cornucopia of food in their local market and may not think about the origins of that food and the seasonality of its production. Educating people about agriculture connects them to the plants and people who grow our food.

Moving Plants from Field to Plate
All food plants originated in the wild and were selected for some beneficial, aesthetic, or delicious attribute. The original plants may
have been dug from a prairie, had cuttings taken in a forest, or had seeds collected in a swamp. These were planted and cared for, and often bred with other individuals that had different characteristics of interest (maybe bigger or tastier fruits). Once a plant has a set of desirable qualities, it may be introduced into larger scale production. Its seeds are planted, and the seedlings harvest light, water, air, and soil nutrients. If the right plant has been chosen for the location, provided the necessary nutrients, and tended to properly, a viable crop may be produced.

However, as gardening hobbyists know, sometimes best intentions are met with failure. Disease, poor soils, weather, and many other factors can disrupt plant growth before a crop is even produced. Once a crop is harvested, the farmer still must determine how to get the product to consumers before spoilage occurs. Every part of the plant-to-plate process is complicated, and all parts of the system have to operate effectively and efficiently. We cultivate plants because they use energy from the sun to convert air, water, and minerals in the soil into the food we need to power the human body. As our populations have increased and diversified, so have our tastes. With the help of science and technology, farms are producing a greater diversity of food, fiber, and fuel to

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* Photo Courtesy U.S. Farm Security Administration

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1906: Pure Food & Drug Act passes requiring clean agricultural goods

1914: WORLD WAR I

1914: WWI creates an American agricultural explosion to meet the need to feed the world

1920: Smith-Level Extension Act passes and sets up national extension service

1929: The Great Depression begins

1920-1932: Crop prices fall; severe drought and floods wreak havoc on America’s farm lands

1960: 1 farmer supplied food for 25.8 people at home and abroad

Today: 1 farmer supplies food for 144 people at home and abroad
meet a growing and savvier consumer base using fewer employees and fewer inputs.

**Plants ARE the Food Supply**

Scientists’ understanding of plant-based nutrition is advancing and consumers want healthy food choices. The public’s growing curiosity about food and healthy eating has led to a learning resurgence in cooking, with home chefs developing tastes for diverse ingredients. The United States Department of Agriculture devised the MyPlate icon (formerly the Food Pyramid) to help Americans choose their food wisely. With a glance at the plate that is nearly filled by “vegetables,” “fruits,” and “grains,” one sees the importance of plants in our lives and the great diversity of agricultural products that find their way onto our tables. Even the animal products on the plate are derived from plants; all domesticated farm animals are raised on plant-intensive or exclusively plant-based diets. Aside from seafood, virtually everything in the American food supply comes from plants grown on farms. Getting that message to the American public is an important step in helping them understand the importance of plants in their daily lives and the complexity of our agricultural system.

Thank a honey bee today! Bees pollinate more than 100 agricultural crops in the U.S. and contribute to more than $15 billion worth of crops every year.
Choosing Our Future—
American Well-Being Will Require Agricultural Success

**Tomorrow’s Agricultural History**
Agriculture’s future will be as amazing as its history. The United Nations predicts the world’s population will reach 9.6 billion by 2050—a daunting challenge indeed for the agricultural community who will need to more than double food production—and many are thinking about how to feed, clothe, and fuel people around the globe. In the United States and elsewhere, several factors complicate the necessity to further intensify agricultural practice. Issues include environmental concerns, such as topsoil depletion, groundwater and soil pollution, loss of biodiversity, global climate change, and drought, as well as socioeconomic challenges such as farm labor concerns and the migration of the workforce to urban areas. As fewer people interact directly with agriculture, an infusion of agricultural education will be needed, especially in urban areas, to cultivate an informed citizenry. There are exciting movements afoot in agriculture. Farmers and scientists recognize the need to increase the sustainability of the agricultural enterprise, and they are working to increase productivity and food access while decreasing inputs, environmental degradation, and the land area needed for farming. This is being done primarily through

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*Photo Courtesy U.S.D.A.*

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The world must achieve a “great balancing act” in order to sustainably feed 9.6 billion people by 2050.

- Required increase in food calories to feed 9.6 billion people by 2050

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*Photo Courtesy U.S.D.A.*
Farmers can use computerized systems to help them chart the different soils and moisture on their farmland to decide what crops to plant, what seeds to use, and how much fertilizer to apply.

The development of improved crop plant varieties that can be cultivated in formerly unplantable lands, require less fertilizer, produce more food, and withstand pests, diseases and greater climate variability. Agriculture is becoming an increasingly holistic, interdisciplinary endeavor that simultaneously manages environmental health, economic prosperity, and social and economic health. Systemic approaches need many players including farmers, scientists, engineers, NGOs, multinational companies, consumers, and government entities. Complicated problems often require a great variety of solutions, which in this case may include stronger alignment between agriculture and ecological processes, advanced technologies, improved transport, genetic improvements, and increased public awareness and interest in agriculture. Most likely, solutions will incorporate a mixture of strategies generated by diverse stakeholders that will be appropriate for each farm’s location. The goal is improving yields and farmers’ profits and reducing the negative environmental impact of farming, while also reconnecting the public with food production.

The future is now, and today’s students—whether interested in technology, social issues, or plant sciences—can contribute knowledge gained from a range of disciplines to the agricultural challenge of feeding a growing population while safeguarding the health of the planet.
Plants Make Our Lives Possible—
We Must Improve Public Education About Agriculture

What Will You Do to Make a Difference?
Because we will always need food, timber, medicine, clothing, and plant-based fuel, we need to care and learn about the agricultural production system. Losing awareness of our connection to and dependence on plants and the agricultural system that provides them is detrimental to our ability to choose our future paths wisely and to ensuring the sharpest minds are advancing agriculture.

All sectors of society need to learn about agriculture and sustainability—and there is no time like the present given the public’s growing interest in gardening, food, and urban agriculture. With the decrease in plant science education at colleges and universities nationwide, botanical and horticultural organizations have become crucial centers for botanical education. Accordingly, they are ideally equipped to display and interpret agriculture and crop food plants, and are well-suited to initiate public discourse about the growing need to produce more food to feed the human population. Public gardens, like farms, dot the country and they have the knowledge needed to grow crop plants so that visitors can experience and begin to understand agricultural ecosystems. K-12 educators can also play a critical role by taking students on field trips to botanic gardens that present agriculture. Gardens’ interpretive exhibits about crop plants are powerful tools for teaching American history and environmental science through an agricultural lens. Public gardens in the United States welcome more than 100 million visitors every year, presenting hundreds of thousands of opportunities to connect people to plants, agriculture and our food system.

Public Gardens Can Lead the Way
If public gardens lead the charge in agricultural education for the general public, people from around the country will have opportunities to learn about our nation’s heritage, agricultural practices, environmental stewardship, and sustainable food practices. Best of all, they will be thinking about the challenge of their lifetime—feeding, clothing, housing, healing, and fueling our growing population—and considering how each of us can make a difference. Furthermore, public gardens will serve as a shining example for other institutions to engage an excited citizenry in the wonders of agriculture, thereby realizing the full vision of our Founding Fathers to create national cultural institutions that fully elucidate the relationships between plants and human well-being.
The U.S. Botanic Garden thanks individuals from the following institutions for contributing to the creation of this document.

American Society of Agronomy
Auburn University
Chicago Botanic Garden
Colorado State University
Crop Science Society of America
Donald Danforth Plant Science Center
Missouri Botanical Garden
National 4-H
National Center for Appropriate Technology
National FFA Organization
North Carolina State University
Oklahoma State University
Soil Science Society of America
St. Louis University
The Land Institute
The World Food Prize Foundation
U.S. Agency for International Development
Architect of the Capitol
U.S. Department of Agriculture – Agricultural Research Service
U.S. Department of Agriculture – National Institute of Food and Agriculture
University of Florida
University of Illinois
University of Minnesota Duluth
University of Nebraska
University of Washington