

Seven Plants that Changed the World
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Introduction: Plants have truly changed the world. Their cultivation and processing have been responsible for the creation of colossal wealth and unimaginable human misery. In today's pre-packaged world, relatively few people are aware of where certain products come from and fewer still know of their remarkable history. Each of the 7 plants we will discuss today are linked to the development and expansion of empires. As far as the British were concerned, her colonies only existed to provide raw materials for her needs.

*Have students write down what 7 plants they believe will be revealed in today's presentation. Compile the lists and then discuss the following in order of popularity.

1. **Smoking Tobacco: (*Nicotiana tabacum*)** One of the most valuable export crops of the New World. Member of the Solanaceae family (kin to the petunia, tomato, peppers, potato, eggplant and nightshade/Belladonna). An annual. Used ceremonially by Mayan civilization as early as 1500 BC—used during negotiations and in spiritual association. Given to Christopher Columbus in 1492 by native Carib Indians-- he threw it overboard. Originally from the West Indies and indigenous to the USA, successful cultivation was fundamental in the colonies' survival. First cultivated in Virginia in **1612**—labor intensive, robbed the soil of nutrients. Quickly spread throughout Europe and Asia as an imported crop. Became a social fixture/fashion by 1600—introduced to England by Sir John Hawkins (slave trader). Predominately used by sailors. Cigarette industry: primitive cigarettes were rolled and smoked, ground as snuff, smoked in pipes, chewed, eaten, drunk as an infusion, rubbed on the body and administered as an enema. Said to cure as many as 36 ailments, including cancer and bad breath! These plants contain nicotine and should be considered poisonous—no part should be ingested by people or animals. King James denounced it, taxed it and that led to smuggling it. Used as currency for a while. Today, a universal market! Prince Albert made snuff fashionable in 1824. The match was invented in 1827. Philip Morris was the first to open a tobacco shop in England in 1847.

In the garden, ornamental *Nicotiana glauca* (having winged petioles on the leaves) is a white night-flowering heirloom plant from the 1800s featuring large, fragrant trumpets of star shaped flowers that attract butterflies and hummingbirds. Produces a basal rosette of oval dark-green leaves about 16" across. Will self-seed. Newer *Nicotiana glauca* *sylvestris*, (referring to its native woodland habitat) with brightly colored flowers was popular during Victorian times. There are over 60 species of *Nicotiana*, most native to tropical South America (Brazil, Argentina and Bolivia). Grown as annuals. Most species plants can reach up to 5 feet in height—may need to be staked. Have soft, oval, quite large leaves (up to 10" long), slightly sticky. Today's hybrids offer smaller, more compact plants, up to 12 or 18 inches in height, with abundant flowers blooming all summer (Domino strain grows 12-15" and has upward facing flowers, Nicki strain is 15-18" tall. Sensation strain is up to 4 feet tall). Now available in red, pink, purple, green and

yellow—many are self-cleaning (Seen at Lowes in reds and Floral Tree Gardens in white and green). *Nicotiana obtusifolia* or Desert Tobacco is poisonous and should not be eaten but was smoked by Native Americans. Grows in Texas as upright, herbaceous shrub. *Nicotiana rustica* or Aztec Tobacco was considered a sacred herb and used for medicinal purposes. *Nicotiana attenuata* or Coyote Tobacco is also an herb with fuzzy, velvety leaves. *Nicotiana langsdorffii* features a green flower. In 2009 *Nicotiana* was named “Plant of the Year” by the National Garden Bureau They prefer full sun and average, well-drained soil. Can be easily started from seed, but the seeds are very tiny and may need to be mixed with sand to spread—need light to germinate so sow on the soil surface and water lightly. Many will self-seed but they can also be started indoors. Named in 1793 by Linnaeus for Frenchman Jean Nicot, ambassador to Portugal from 1559-1561 who brought powdered tobacco to France to cure the Queen’s son of migraine headaches.

(* show seed packet, show plants)

2. Sugar Cane (*Saccharum spp* syn Erianthus): This is one of the world’s most indulgent and unnecessary crops! “The reed that gives honey without the bees”. A very large perennial grass in the family Poaceae grown to maturity in 12 months. It was grown in Asia (native to China, India and Southeast Asia) and on the Pacific islands for 5000 years. Originally brought to and grown in the Caribbean (Hispanola/St Kitts/ Barbados) on plantations. Labor intensive and sustained by slavery—this was the first place where slaves were used. Its pulp has been used to make paper but the sweet juice of *S. officinarum* is the commercial source of sugar. Its processing costs were prohibitive such that only royalty, aristocrats and the higher clergy could afford to use it. Used to impress others. The process included harvesting by hand, stripping off the leaves, taking the canes to the mill, running the canes through the rollers to extract the brownish liquid, boiling the liquid, evaporating it to crude crystallized sugar: 1 gallon of juice yielded 1 pound of sugar. The liquid molasses was further distilled into RUM. Now all this is mechanized and sugar cane is grown in Cuba and Louisiana. Only recently has this plant come to ornamental grass status—growing in a clump up to 10 feet tall with upright long, slender green to bluish green leaves. Blooms with fluffy, whitish, nodding flower plumes in early fall. Now available with showy colored leaves and canes. Needs full sun and regular water as well as fertile, well draining soil. Sometimes grown in place of Bamboo. To plant, lay a stalk in a furrow...it will sprout at each node or divide the rhizomes.

* Show dried Cane, Show Louisiana cane sugar packets, allow tasting.

Gradually the **sugar beet** *Beta vulgaris* (a biennial root crop not dependent on tropical temperature) dominated the European market and the ending of slavery threatened the sugar cane market. Beets need cool weather to perform and take about 50 days from sowing to harvest. The greens are also edible.

Replaced now by corn syrup: Corn syrup and fructose. So what about those alternative fuels? Have you noticed the price of **corn** (and, the price of eggs, the price of chickens, etc.)? Many cattle ranchers are selling off their cows because the price of corn is going up as a result of the search for alternative fuels. Corn has male and female flowers on each stalk. The tassels on the corn are the male flower parts producing pollen and they form at the top of the stalk, while the

silk (elongated stigma) is the female flower parts. Each pollinated silk will result in a kernel of corn, forming the ear we eat. As we traveled to Chicago, we saw miles and miles of corn...talk about monotony! Discuss the dangers of monoculture. Discuss the dangers of genetically engineering corn.

3. Cotton: *Gossypium tomentosum*, an annual member of the Hibiscus/Mallow family (*Malvaceae*). Cotton is known to have been cultivated in Mexico as early as 5000BC and in Judea in 480 BC—one of the oldest cultivated plants-- and was yellower than that of Egypt. Spinning and weaving were known to the women of the Holy Land who brought what they spun for service in the Temple. No doubt the Jews knew cotton when they were captives in Persia. It has been found to be part of the raiments of mummies. First cultivated in Asia and the Arab world, but. First hand-spun in India. One of four natural raw products used for textiles and fabric: flax for linen, wool and silk. It was lightweight, washable and absorbent. No evidence exists of specialty cotton plantations in America before 1800 although it was first grown in the American colonies in 1607. The colonies used slavery to sustain its production-- One of the key causes of the American Civil War. America began supplying Britain with raw cotton in 1794. First cultivated in Tennessee and spread to GA, AL, LA and MS by 1820. Slavery was outlawed by the British in **1807** so America began to “breed” its own slaves until the Civil War. The war disrupted cotton production so much that the plantations were moved to India. India depended on child labor to sustain the industry. Cotton is named for region in which it is grown “Sea Island” cotton is from GA and SC. Calico, a cotton fabric, comes from Calicut, India; ‘**muslin**’ from Mosul in Asiatic Turkey and ‘nankeen’ from Nanjing (short fiber brown cotton). Highest quality cotton is grown in a coastal location (South Carolina or Georgia) because the fibers are much longer and softer, resulting in a finer yarn and a silky quality of cloth.

Cotton was a big factor in the **Industrial Revolution**: A spinning machine to help weave the threads was invented in 1738. A spinning jenny that could spin 8 threads at once was invented in 1764. About ten years later (1775) a machine was invented to card, draw and rove the cotton. Another ten years passed before the first steam driven mills were in place (1785) and in 1794 Eli Whitney (1765-1825) lived in Savannah and invented the cotton gin to process the cotton pod—the machine removed seeds from the fibers (lint) 50 times faster than a person could do by hand.

There is a native wild cotton that grows in FL—*G.hirsutum*, which is on the threatened listing. Grows in deep, humus-rich soil needing full sun. Requires a water regime equal to 4 inches per month for the first 3 months followed by a dry spell during harvest. The shrubby bush that bears the cotton grows about 60 inches tall-- 4-6 feet tall-- and has creamy yellow or pink flowers in summer with deeply, palmately lobed, coarse green leaves. Cotton “bolls” are sharp edged seed capsules filled with seeds and cotton lint. Boll Weevil eradication of infested plants is a state wide regulated mandate #5B-52.001. Non-commercial cotton shall not be produced in the eradication zone except by written permission issued by the Division of Plant Industry director and for research purposes only—cotton can be destroyed without compensation.

(*Show cotton bolls—have students dig the seed out. Show muslin cotton)

4. **Tea (*Camellia sinensis*):** Member of the *Theaceae* family and kin to ornamental Camellias. Native to Japan/China. Known as far back as 2737 BC. Cultivated in the 3rd century AD in Sichuan Province. China's national drink in the Tang dynasty 610-906AD. IN China tea drinking was elevated to an art form: the Tea Ceremony with the Geishas at the tea houses. The Arabs had tea by 850 AD. It was the East India Trading Company that had a monopoly on the Tea exports from China through the port of Canton. It was originally financed by silver bullions but was later financed by opium which led to a mass addiction of the Chinese population by 1906 and led to 2 Opium wars. Tea was a luxury item England by 1652. It was sold in apothecary shops and kept at home in a locked caddy. The used tea dregs from the rich were resold and re-steeped by the poor. The afternoon tea with scones and crumpets became fashionable as did Tea Gardens. Chinese porcelain, later known as 'china', was used as ballast on ships since the tea was lightweight. This led to the British pottery of Josiah Wedgwood. Note that the Chinese tea cups don't have handles and the British cups do...that's because the Chinese drink their tea cooler and the British drink their tea hotter. Tea was soon taxed which led to smuggling. So British decided to establish its own tea plantations: Tea made its arrival in SC in **1741**. The first species of camellia to enter the United States was the tea plant. Tea growing was attempted in both Savannah and Charleston but was a failure at both locations due to insufficient capital and other complications—tea seeds have a short vitality period and didn't last the trip. In India plantations were established in 1850: Tea is named for the region of India where it is grown—Darjeeling from the north, Assam tea, Ceylon tea, etc. You are aware of the name Robert or Thomas Twining...he was the Chairman of London Tea Dealers. You remember the events in 1793 led by Samuel Adams in Boston Harbor? The first iced tea was invented in 1904 at the St. Louis World's Fair. The first tea bag was invented in 1908 as a sample bag. After 1910 in America we had Tea Dances at the Ritz in NY and ladies wore tea length dresses. (omit this paragraph if needed)** *C. japonica* (a single red variety) was imported from England by John Stevens of Hoboken, NJ. They became popular as greenhouse plants. In early 1800s, the camellia collections of the South were begun. Magnolia Gardens and Middleton Place of Charleston, SC became famous for their camellia collections begun in the 1830s. Camellia pioneer of the West was James Warren of Sacramento who had plants shipped to Sacramento in 1852. In 1920, Sacramento was named "Camellia City". After Civil War, camellia interest waned but took on new life after the turn of the century. Camellia Shows became popular in the 1930s. ** "Tea Camellia". The world's tea comes from this species grown mainly in plantations in highlands of tropical Asia, southern China and Japan and recently in other parts of the world (India) where the climate is suitably mild and humid—rainfall in excess of 40 inches. Bushes take between 3 and 5 years to mature during which time they are trained into a fan shape and kept flat in a 'plucking plateau'-- Grown for tea, plants are trimmed to about 4 feet and flowers rarely seen. Tender new shoots (the top 2 leaves and a bud) are plucked/harvested by hand every 7 to 14 days (depending on altitude),

and dried/'withered' in different ways to give black or green tea. The leaf is then cut or crushed into particles, fermented/oxidized and dried again. The leaf particles are then graded by passing them through wire mesh, weighed, packed and then sent to selling brokers. Normally a shrub about 6-10 feet (if left to grow unchecked can reach 65 feet tall) with thin serrated leaves and a rather insignificant creamy-white bloom with a hint of lemon yellow about 1" wide, borne on curved stalks from leaf axils—blooms in winter. *C. sinensis* var. *assamica* or "Assam Tea" grown in India and Sri Lanka with larger leaves and more vigorous growth.

* (Take tour and show the different camellia species in the shade garden, including Thea.)

- 5. Poppies (*Papaver somniferum*)** (sleep inducing)—given this name by Linnaeus in 1753). Called the "Plant of Joy". Do you remember the scene from "Wizard of Oz"? An herbaceous, mostly annual, cool season plant in the family *Papaveraceae*, needing full sun and moderate water. **Opium!** Contains alkaloids such as morphine, codeine and thebaine which can relieve pain and induce euphoria. Further processed/boiled into heroin. Native to Greece, southeastern Europe and western Asia...sometimes considered a weed. In India 'Bengal Opium' poppy cultivation is north and west of Calcutta in the Hooghly Valley and on the western side of India near Bombay you find 'Malwa Opium'. Also grown commercially in China, Pakistan, Iran, Turkey, Afghanistan and Central and South America, both licit and illicit. The poppy spring flower is fragile with a span of 4- 8 inches in colors of red, white, purple and violet, single and double, some with fringed petals. The poppy requires temperatures between 45 and 73 degrees. It grows best on mountains with elevation of 3000 ft above sea level. It needs nutrient rich, moist soil with annual rainfall of 36". So, it can't be grown here! Plants grow to 4 feet tall. Opium is collected from the skin of the unripe, green seed pod. The milky white liquid oozes out, coagulates and oxidizes into a brown gum and is rolled into balls and collected by cheap labor. Remember we said that the British traded opium for tea and that led to mass addiction in China. Opium was outlawed in China which led to smuggling and in 1840 the first Opium War was begun. This war resulted in China having to give the port of Hong Kong to the British along with other concessions (The Nanjing Treaty-1842). The Second Opium War was fought from 1856-1860. **Poppy seeds** with a mild, nutty taste, are popular in curries, breads, pastries and baked goods or crushed to make cooking oil. One good thing to come from the use of Opium was the invention of the hypodermic syringe by Alexander Wood in 1853—unfortunately his wife was the first person to die of an overdose! Ornamental Poppies are grown at home and used in roadside plantings.

(* Show poppy pods.)

- 6. Quinine (*Cinchona officinalis*)** An evergreen tree to 50-65 feet tall from Andean highlands (4900 to 9800 feet elevation) in Peru, South America. Needs copious rainfall (nearly 600 inches annually). Member of the madder family, *Rubiaceae* and kin to *Coffea*, *Gardenia*—there are about 40 species of *Cinchona* all having laurel like leaves.

Takes about 4 years to maturity, blooms similar to a lilac (borne in clusters at the end of branches), small, fragrant and yellow, white or pink. Fruits are ½ to 1 inch oblong capsules with numerous small, flat, winged seeds. First used as an herbal remedy by the native Indians in Peru. Jesuit missionaries were present in 1630 and learned of the fever reducing qualities from chewing the bark of this tree. Became known as “Jesuit Bark” and the Jesuits felled over 25,000 trees to supply the British—a monopoly. Fortunately, the tree does regenerate from the cut. But again, the British decided to grow their own on plantations in the empire. The first attempt at a plantation in India didn’t work. These trees need are tropical and so Malay, Sri Lanka, Fiji, Burma and Africa were tried. The Dutch succeeded with plants being grown in Java and producing 97% of the world’s Quinine. The British didn’t grow these trees to sell commercially, but rather used it for their own troops as a prophylactic and to treat malaria.

Many colonists in America were dying from “mal aire” or Bad Air. The swampy areas were to blame. Later they figured out that it was the mosquitoes transferring the disease/parasite. Also, the Native American Indians were dying but not the black slaves brought to America...Why not? Because the slaves had sickle cell anemia and it proved a partial immunity to malaria. Commonly thought as the “cure” for malaria but now used in cardiac drugs and many leg cramp medications. Also used to treat fevers, anemia, dyspepsia, debility and gastrointestinal disorders. The *Cinchona* has 4 alkaloid chemicals but only quinine is a febrifuge (fever reducer) which suppresses and reduces the fever characterized by malaria. Quinine is a white crystalline, bitter to the taste, but dissolves readily in alcohol but not water.

Grown on plantations where the bark is removed by beating the trunk with sticks to loosen it, then strips are peeled away with knives, rolled, rapidly dried and dispatched to the processing plant where the quinine is extracted. The trunk where the bark is removed is then ‘mossed’ (a technique invented in 1870s by William Melvor), wrapped in moss to prevent infection and encourage the bark to grow back. World harvest of bark is estimated at 10,000 metric tons converted into 500 metric tons of quinine. In 1934 a German pharmaceutical company invented a synthetic anti-malarial drug. This was good because during WWII, the Japanese took the island of Java and quinine was in shortage. But the natural herbal drug is making a strong comeback due to resistance of the parasite to the synthetic drug. We have tried to rid the world of malaria by draining low lying swampy areas and using DDT...but the mosquitoes are persistent!
(*show the medical fact sheet for Quinine sulfate, Quaalun---Show photos)

- 7. Rubber (*Hevea brassiliensis*-the Para rubber tree)** Milky sap called latex produced on trees aged 5-7 years and can be tapped for up to 30 years. A member of the Euphorbiaceae family. A tropical tree (needs temps above 70 degrees) , locally called the “weeping tree”, with smooth grey bark and small, greenish-yellow flower, palmate leaves and three lobed seed capsules. The tree can grow up to between 100 and 160 feet tall and, in the wild, only one or 2 trees are found per acre. Native to Brazil and used by the Aztecs; the Aztecs painted the sap on their feet and it created waterproof ‘boots’. Grows on the right bank of the Amazon River up to an altitude of 2500 feet but

needs at least 70 inches of rain annually. Trees are now grown on plantations, thanks again to the British not wanting to buy the product. They set up plantations in Malay and Ceylon in 1870. Now they make everything from rubber bands to gaskets to tires to hoses to balloons to raincoats. Trees are tapped every other day by cutting a 1/4inch deep groove half way round the tree. The latex is poured into a ball which is then placed over a fire to prevent mold and fermentation. Once smoked, the latex is sieved and then coagulates, it is mixed with water and a small amount of formic acid then left for up to 18 hours. The result is a spongy substance that can pass through rollers to remove the water and then is dried in smoke houses for up to a week before the sheets are ready for finishing. The sheets are passed through rollers (a calendering machine) at different thicknesses or extruded or items can be dipped in the rubber solution.

Charles Macintosh created a raincoat in 1823. Charles Goodyear stabilized rubber in 1839 by a process he called 'vulcanization'. That prevented hot rubber from melting and cold rubber from cracking. John B. Dunlop worked with Henry Ford to create the first pneumatic tire for motor transport and they appeared on every Model T produced. The two French Michelin brothers created the changeable steel supported tires in 1891. Prior to that, racing tires had to be changed every 95 miles. Now synthetic rubber popularized as a consequence of wars (Germany used it after access to rubber was cut off in WWI and then the USA used it when Japan took over much of the Southeast Asia during WWII).

(*Show photos.

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