Horticulture, the source of valuable commodities, has influenced world affairs since antiquity.

- Ancient wars fought over agricultural resources and territory
- Age of Exploration brought about by search for spices
- Major tropical products such as sugar, tea, and bananas have had major impact on slavery and colonialism
Collecting Honey from Hives

Collection of sap from sugar palm

Collection of sap from sugar maple and evaporation in North America

Sweet Sap from Sugar Palm and Maple

Sugarcane (*Saccharum officinarum*, Poaceae)

Most important source of sucrose
Cheapest energy food
Crop of the humid tropical lowlands but grows well in savanna climate
Sugar Mill, Ponte Nova, Brazil, 1963

Sugar Mill, Ponte Nova, Brazil, 1963

Sugar Mill, Ponte Nova, Brazil, 1963
Saccharum species

*S. officinarum* (2n=80):
- Thick-stemmed (“noble”) canes from New Guinea

*S. sinense* (2n=118):
- Thin-stemmed hardy canes from China

*S. barberi* (2n=variable)
- Thin-stemmed hardy canes from India

*S. spontaneum*
- Wild canes of southeast Asia; important in breeding

*S. robustum*
- Deeply penetrating roots, disease and drought resistant

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Sugar Cane

<table>
<thead>
<tr>
<th>World Production</th>
<th>1000 MT</th>
<th>Chief countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>1,254,857</td>
<td>South Africa (23,896), Egypt (15,620), Mauritius (5,500)</td>
</tr>
<tr>
<td>Africa</td>
<td>87,504</td>
<td>Mexico (49,500), Cuba (35,000), US (31,571)</td>
</tr>
<tr>
<td>North America</td>
<td>164,056</td>
<td>Brazil (339,136), Colombia (33,400), Argentina (15,000)</td>
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<tr>
<td>South America</td>
<td>421,303</td>
<td>India (286,000), China (79,700), Thailand (49,070)</td>
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<tr>
<td>Asia</td>
<td>547,001</td>
<td>Spain (80), Portugal (4)</td>
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<tr>
<td>Europe</td>
<td>84</td>
<td>Australia (31,039), Fuji (3,500), Papua New Guinea (367)</td>
</tr>
<tr>
<td>Oceania</td>
<td>34,909</td>
<td></td>
</tr>
</tbody>
</table>

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Sugarcane History

Cultivated in India in 400 BCE
- Sugarcane cultivation technology carried to China and Arabia
- Crusades brought sugarcane cultivation to Europe
- Introduced to Madeira and Azores in 1420
- Columbus took sugar to New World in 1493
- 1791, Captain Bligh transported *S. officinarum* (noble canes) from Tahiti to Jamaica
- Plantation agriculture first developed in the Azores and spread to the New World
Arab expansion of sugar production in the Middle Ages (blue line)

Sugar Manufacture

Extraction of sugar in Sicily, 1584

Production of sugar in Venice

Characteristics of Plantation Agriculture

Commercial production
Large scale (relatively) usually considered larger than 80 hectares (200 acres)
Central management
Capital intensive—often including transportation and shipping
Labor intensive—but changing with agricultural revolution, especially machine harvest and herbicides
Combination of agricultural-industrial enterprise
Tendency toward monoculture
Continuous year-round production
Plantation economy tied to industrial economy of the world
Sugar production in Havana, Cuba 19th century

Origins of Plantation System

Started in Brazil with settlement of northeast (Bahia and Recife) in the 16th century

Gold was original aim, but none in area, so sugar production was adopted

Sugarcane technology from Madeira, Azores, and Capo Verde

Large Land Grants (Capitanias) were established along the coast, 150 miles wide and as far West as could be controlled

Grantee had power over inhabitants

Tremendous demand for sugar in Europe (rum in demand in England but excluded from Europe which had brandy from wine)

Original plan was for exploitation of Indian labor, but diseases decimated local populations and Indians made poor slaves

The solution was the use of Black African slaves purchased from slave traders along the African coast where Portuguese had colonies

Plantation system based on African slavery soon spread to the entire Caribbean

“Sugar Islands” became the source of tremendous wealth in the 17th and 18th centuries
Slavery has been present in one form or another for all of recorded history
Commonly mentioned in the bible
Slaves were considered property, a shameful episode in human history, now universally condemned
Slavery still exists in various forms

Slave capture

Slave trade source of great wealth for Britain and New England
Slave ships would pick up slaves in Africa and sell them in the Americas
On the return voyage they would return with sugar or rum
All manufactured goods came from England and were transported in British ships
Sugar industry reached its greatest heights in Jamaica.

In 1655, when Jamaica was taken from the Spanish by the British, there were 3000 black slaves.

In 1800 there were 300,000 black slaves.

Most of increase due to imports as rate of natural increase was low, not even sufficient to maintain the population until emancipation.

System collapsed in the 1800s:

Slave uprisings

End of slave trade and emancipation (1830 in England)

End to mercantile protection (sugar beet became competition)

Inefficiencies of the system due to fact that system run by foreign managers

Low prices due to competition from beet sugar.

Processing Beet Sugar Early 20th Century:

- Washing, cooling, and preserving
- Pressing through filter press
- Evaporation
- Centrifugation
- Adding raffinate
- Malting
- Boiling under vacuum
- Second centrifugation
- Caking in vac
- Shooting sugar load
- Blending
- Aeration of excess liquid
- Packaging & shipping
Slavery and the United States

The slave system part of American history, especially in the South
Attempts to prohibit slavery in the constitution failed but a date certain provided for ending the slave trade
The South got the 3/5 rule: slaves were counted as three-fifths of a person, to determine congressional representation, a shameful decision.

By 1790 slavery was declining institution in America because sugar not well suited to the US, but revived with the invention of the cotton gin by Eli Whitney (1794) which made cotton profitable as a plantation crop
Cotton became the ideal plantation crop in the deep South following the model of sugarcane
Slavery did not take hold in the North because it was unsuitable for small farms; objected to by white working class because it brought down the price of labor

The political situation in the US was largely affected by the slave situation
Senate was split between Northern and Southern interests
South wanted low tariffs because they were buyers of goods, and demanded protection for slavery
The North wanted tariffs to protect their industry, and wanted to exclude slavery from new states; abolitionists were against slavery on moral grounds
The House soon passed to Northern control because of population increases in the North but the equal representation of states in the Senate made the expansion of slave states critical to the South.
In the early 1800s the Missouri Compromise (a deal struck by Henry Clay and Daniel Webster) accepted slavery in the South and excluded it in the North (based on the Mason-Dixon line)

However, Manifest Destiny policy sought to expand US borders to the Pacific bringing in scores of new States. The issue of whether new states would be “slave” or “free” was politically vital to the South because introduction of free states would eliminate political control of the senate and doom slavery.

The election of Abraham Lincoln, who vowed not to disturb slavery in the South but was adamant against its expansion, brought secession and the Civil War.

The question of slavery was decided by the sword.