Cocoa beans are seeds from pods that grow on the trunk of the cacao tree. The ancients dubbed rich, calming cocoa the ‘food of the gods’. In 1753 Carl von Linnaeus translated the phrase to *Theobroma cacao* for the scientific name.***Cacao can be cultivated ONLY in a forest. The high demand for cacao means diverse forests must be protected. Chocolate makers are funding the sequencing of the cacao genome. They want trees that yield more cacao, resist pests & disease, and use water & nutrients more efficiently.*** Cacao pods are cracked open. Their beans ferment for 2-8 days then turn purple-ish brown while drying in the sun. Beans are shipped out to be roasted, crushed to cocoa powder, ground into baking nibs, or processed so the fat can be extracted for cocoa butter. Cocoa butter gives chocolate its melt-in-your-mouth ooey-gooey appeal.

Sugarbeets (*Chenopodiaceae Beta vulgaris* L.) most likely were cultivated from a wild native of the Mediterranean coast. Roots full of sucrose are cut into chips or strips & steeped in hot water. Lime juice then CO2 & filters precipitate non-sugars. Five vacuum evaporators later the solution is seeded with sugar crystals to spur full crystallization & sugar crystals are removed by centrifuge. The leftover pulp & beet tops are used as livestock feed while the sugar is sent off to make sweet treats.

Sugarcane (*Saccharum officinarum*) is an herb from the grass family that grows in semi-tropical & tropical areas. It grows 8-20 feet & is a source for sucrose sugar. The sugar is distilled by putting mashed up cane stems into hot water. This watery raw juice is spun until syrupy molasses leaks out & collected for other use. Bagasse, the leftover stem mash, is dried & burned in the factory to fuel the whole process. The remaining product is purified into sugar & ready for chocolate.

Soy (*Glycine max Merrill*) is a legume that’s been cultivated since at least 2853 B.C.. It’s one of a few plants with the complete protein (8 amino acids) humans need. About 85% of the world’s soybeans are processed into meal and oil. Soy flours & proteins are made with 2% of this meal (the rest is animal feed). Sometimes soy oil also is pressed out of crushed soybeans. Usually, hexane, a solvent, leaches out the oil from soy flakes. Lecithin & partially hydrogenated oil are created from soy & used in snacks. The oil adds moisture & the lecithin keeps cocoa butter from separating from the other ingredients in chocolate.

Nuts come from trees in the Order Fagales. Nuts are actually dried ovaries (shells) with a seed inside. True nuts are both the tree’s seeds and fruits combined. Hazels, chestnuts and pecans are true nuts. Almonds, cashews, coconuts & macadamias are seeds, NOT nuts because they can be removed from their plants’ fruits. Peanuts are legumes which are seeds inside of pods.
Barley (Hordeum vulgare) is a starchy cereal grain that grows in wet or dry conditions. Most barley seed heads have exactly two or six rows of grain. Harvested barley grains are soaked in water to germinate & then quickly kiln-dried. This creates malted barley for use in food, beverages, & chocolate.

Ethiopian barley is special because for 1,000s of years different families grew only their own seed stocks. This created many divergent lines. These many different specialized barley lines could be crossbred to create major improvements in barley crops around the world.

Corn (Zea mays) is a grass. Each kernel of corn has fiber, protein, oil & starch. Starch is a long carbohydrate called a polysaccharide, which is a chain of glucose molecules. To make corn syrup, enzymes are added to corn starch. This becomes a syrupy mixture of glucose, dextrose and maltose.

Bt corn: Bacillus thuringiensis (Bt) is a bacteria found naturally in soil. A gene taken from Bt bacteria is inserted in the corn gene to make a protein that that grows in the corn plant’s cells. The protein dissolves the stomach of the corn borer & the borer dies. This helps protect the corn plant from insect invasion.

Wheat (genus Triticum) is a grass that produces cereal grains. Grains are the plant’s dry, edible seeds. There are 1,000s of types of wheat. Three types (hard, soft & durum) are used the most. The amount of protein in the wheat gluten determines its category. Gluten is the substance that remains when starch is washed out of wheat grains.

Wheat is crossbred worldwide for cultivars that have high quality nutrients, winter & drought hardiness, straw strength, yield and disease resistance. Wheat also is bred to match the milling process used to make a specific flour. Wheat flour helps chocolate bars hold the gooey stuff together.

Grass, grain, tree or legume? Categorize each ingredient. Then dig up more facts to find at least three more plants to fit each category.

More teaching ideas: www.aspb.org/education/

Oil palm (Elaeis guineensis) is the only fruit to make 2 kinds of oil. Luaric palm kernel oil comes from the pit at the fruit’s core. Palm oil is extracted from the mesocarp, the fruit’s flesh. Palm oil gives chocolate some of its moist density.

Oil palm trees grow best in forests with a tall canopy & diverse ecosystems. In the right conditions, these trees can live for 25 years. Oil palm is used in many foods as well as cosmetics & biofuels. Different industries are striving to support the forests that sustain oil palms.


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