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ELECTRICAL ENGINEERING

AFE 201

Corn

Maize has become a staple food in many parts of the world, with the total production of maize surpassing that of wheat or rice. However, little of this maize is consumed directly by humans: most is used for corn ethanol, animal feed and other maize products, such as corn starch and corn syrup.[4] The six major types of maize are dent corn, flint corn, pod corn, popcorn, flour corn, and sweet corn.[5] Sugar-rich varieties called sweet corn are usually grown for human consumption as kernels, while field corn varieties are used for animal feed, various corn-based human food uses (including grinding

into cornmeal or masa, pressing into corn oil, and fermentation and distillation into alcoholic beverages like bourbon whiskey), and as chemical feedstocks. Maize is also used in making ethanol and other biofuels.

Importance of corn

Corn is the second most plentiful cereal grown for human consumption, and many cultures around the world have lived on this grain. Corn is a versatile crop, and everything on a corn plant is useable. No part of the corn is wasted.

The husk of the corn is traditionally used in making tamales. The kernels are ground into food. The stalks become animal food and the corn silks are used for medicinal teas.

Food products made from corn include corn oil, corn meal, corn syrup and even bourbon. The most important refined corn products are corn sweeteners, which last year accounted for more than 56% of the national nutritive sweeteners market. One cup of raw white corn has about 130 calories, 2 grams of fat, 5 grams of protein, 29 grams of carbohydrates and 4 grams of fiber with no cholesterol.

These “everyday things” are made with corn: protective sealing bands, gypsum dry wall, warmish, spark plugs, adhesives, toothpaste, aspirin, diapers, coated paper products and more. Scientists continue to find more uses for corn including fuel-efficient tires, food and beverage

containers, carpet tiles and candy wrappers.

Consumption

Corn is a major commodity and is used throughout the world. According to USDA-FAS, since 1990 global corn consumption has increased 116%, from 473 million metric tons to just over 1 billion metric tons. This represents an annual average increase of 3% per year.

While the overall trend in corn consumption is quite strong, it is perhaps more interesting to look at how consumption has changed in various countries around the world.

In table 1 we show domestic corn consumption for the 10 largest corn consuming nations as of 2016. By far, the

two largest are the United States and China. These two countries alone accounted for 54% of the world's corn consumption. If one adds up the domestic consumption of the remaining countries in the table, their total is roughly equal to that of the number two ranked country, China.

Table 1. Total Domestic Corn Consumption and Consumption Growth in the Ten Largest Corn Consuming Countries as of 2016.

Choice of land

Millions of farm acres are set to go unplanted with corn this spring as persistent wet weather leaves U.S. farmers facing an agonizing choice: whether or not to risk trying

to raise a crop.

Stem Quality of Crop

In gramineous plants, corn stalk is thick and strong; it is about 0.8–3 m long and 2–4.5 cm wide (diameter) with obvious nodes and internodes. An acre of soil can produce 400–500 kg of dry corn stalks. Corn stalks are composed mainly of leaves and stems, the latter consisting of cortex and pith. Large amounts of pith in the stem is one of the characteristics of corn stalks. The leaf, cortex, and pith contents in the total weight of stalks are 40%, 35%, and 15%, respectively.

Time of Planting

Corn is a tender, warm-season annual that is best planted after the soil temperature reaches 60°F, usually 2 or 3

weeks after the last frost in spring. Corn requires 60 to 100 frost-free days to reach harvest depending upon variety and the amount of heat during the growing season. Corn grows best in air temperatures from 60° to 95°F. Corn planted in cold, wet soil is unlikely to germinate. Corn seed germinates in 10 to 14 days at 75°F, but the rate of germination may reach only 75 percent. Start corn indoors 2 to 3 weeks before the last frost in spring for transplanting 2 to 3 weeks after the last frost. If your season is long enough, plant successive crops every two to three weeks.

Method of Planting

Starting corn seeds indoors is not recommended. It's best to start them directly in the garden so that their

roots aren't disturbed due to transplanting.

Plant seeds 1.5 to 2 inches deep and 4 to 6 inches apart.

Rows should be spaced 30 to 36 inches apart.

You may choose to fertilize at planting time; corn is meant to grow rapidly. If you are confident that the soil is adequate, this can be skipped.

Water well at planting time.

Plant Population

One factor that greatly influences corn yields is plant population. Determining the correct plant population may take some effort, however, it is a critical factor that every corn grower needs to get right in order to maximize yields.

Recent research performed by universities and seed

companies has determined that that yields increase significantly as populations are increased up to a point of 34,000 seeds per acre. In general, yields begin to level off at planting rates around rates 36,000 seeds per acre. Recent studies have also determined that even in low yield environments planting rates of 31,000 seeds per acre maximize yield and economic return. In very productive, 250 bushels per acre yield environments, research results show that higher populations (38,000+ seeds per acre) maximize yields. Breeding and advances in genetics have improved the modern corn plant's ability to yield at higher populations when compared to corn hybrids from the past.

Chemical Control

Grain yield reductions and losses in grain quality due to insect pests are a constant problem in the Southeast.

Control options include cultural practices to prevent or avoid injury, transgenic Bt corn, at-planting insecticides

(including seed treatments), and foliar insecticides. Insect pressure varies greatly from field to field. Decisions

concerning pest management options should

therefore be made in careful consideration
of the history of insect

problems in each field where corn is to
be planted.

Major insect pests of corn in South Carolina.

Insect Description of feeding habit Methods of control

Wireworms Feed on planted kernels resulting in

poor germination and stunted

seedlings

Insecticide, tillage, control of winter

weeds

Cutworms Girdling of stalk at soil surface

Avoid planting corn on sod or weedy

land, selected Bt hybrids,

insecticides

**Sugarcane beetles Burrow into stalk above
base of roots Plant early and do not
plant corn**

after sod

Billbugs Chew into stalk and cause bud leaves

to wilt and die

Crop rotation, weed removal in and

around corn field, insecticides

Corn earworms Feed on leaves in whorl
and on ear

tissue near ear tip

Insecticides, selected Bt hybrids,

plant early

Fall armyworms May feed on all above
ground parts

of corn plant

Bt hybrid, insecticides, plant and

harvest early, control grassy weeds

Lesser cornstalk borers Tunnel into corn

seedling Crop rotation and early planting,

selected Bt hybrids, insecticides

Several types of Bt corn are available,
each characterized by an 'event' (i.e. a
successful insertion of the genetic package

into a plant) and cry proteins. In a nutshell,
there are Bt traits for above-ground pests
and Bt traits for rootworms. Please

refer to table below for efficacy of available

products.

Bt traits for above-ground pests.

- Herculex I (event TC1507, protein Cry1F).

- Optimum Intrasect (events TC1507 and MON810, proteins Cry1F and Cry1Ab).

- Optimum Leptra (events TC1507, MON810, and MIR162, proteins Cry1F, Cry1Ab and Vip3Aa20).

- YieldGard CB (event MON810, protein Cry1Ab).

- GenuityVT Double Pro (event MON89034, proteins Cry1A.105 and Cry2Ab2).

- Agrisure Artesian 3010A (event Bt11, protein Cry1Ab).

- Agrisure GT/CB/LL (event Bt11, protein Cry1Ab).

- Agrisure Viptera 3110 (events MIR162 and Bt11, proteins Vip3Aa20 and Cry1Ab).

- Agrisure Viptera 3220 (events MIR162, TC1507, proteins Vip3Aa20, Cry1Ab and Cry1F)

- PowerCore (events MON89034 and TC1507, proteins Cry1A.105, Cry2Ab2, and Cry1F)

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All products provide excellent control of stalk borers (European corn borer, southern cornstalk borer). The activity in

seedling and whorl stage is greater in Herculex I, which provides good early season control of cutworms, lesser corn

stalk borer, and fall armyworm. YieldGard CB and Agrisure CB/LL have fair activity for corn earworm infestations in

corn ears, whereas control with Herculex I is poor.