USENSAMUEL

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ELECTRICAL ENGINEERING AFE 201

Maize

Maize has become a staple food in many parts of the world,withthetotalproductionofmaizesurpassingthat 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,andsweetcorn.[5]Sugar-richvarietiescalledsweet corn are usually grown for human consumptionas

kernels, while field corn varieties are used for animal feed, various corn-based human food uses (including grindingintocornmeal 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 otherbiofuels.

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 whitecorn

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,andpithcontentsinthetotalweightofstalks 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 75percent.

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 thattheir

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 beskipped.

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 thepast.

Chemical Control

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

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 fieldwhere 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 resultingin

poor germination andstunted

seedlings

Insecticide, tillage, control of winter

weeds

Cutworms Girdlingof stalk at soil surface Avoid plantingcorn on sodor weedy

land, selectedBt hybrids,

insecticides

Sugarcane beetles Burrow intostalk above base of roots Plant early anddo not plant corn

after sod

Billbugs Chew intostalk andcause budleaves

to wilt anddie

Crop rotation,weed removalin and

around corn field, insecticides

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Corn | earworms | Feed | on | leaves | in | whorl |
| and on | ear |  |  |  |  |  |

tissue near ear tip

Insecticides, selectedBt 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 intocorn

seedling Crop rotation andearly planting,

selectedBt hybrids,insecticides

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

intoa plant) andcry proteins.In a nutshell, there are Bt traits for above‐ground pests andBt 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, proteinsCry1F andCry1Ab).
* Optimum Leptra (events TC1507,MON810, and MIR162,proteinsCry1F, Cry1Ab andVip3Aa20).
* YieldGard CB (event MON810, protein Cry1Ab).
* GenuityVT Double Pro(event MON89034, proteins Cry1A.105 andCry2Ab2).
* Agrisure Artesian3010A (event Bt11, protein Cry1Ab).
* Agrisure GT/CB/LL (event Bt11, protein Cry1Ab).
* Agrisure Viptera 3110 (events MIR162 and Bt11, proteinsVip3Aa20 andCry1Ab).
* Agrisure Viptera 3220 (events MIR162, TC1507, proteinsVip3Aa20, Cry1Ab andCry1F)
* PowerCore (events MON89034 and TC1507, proteins Cry1A.105, Cry2Ab2, andCry1F)

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

seedlingandwhorl stage is greater in Herculex I, which providesgood early season

control of cutworms, lesser corn

stalk borer, andfall armyworm. YieldGard CB and AgrisureCB/LL have fairactivity for corn earworm infestations in

corn ears, whereascontrol withHerculex I is poor.