



Introduction to Corn Production

In Manitoba, field corn is grown for grain for human and livestock products, and as silage for animal feed. Manitoba corn production goes to supply the ethanol industry, mostly to Minnedosa, the distillery at Gimli, and to the feed industry. Corn silage is fed to dairy and beef cattle.

Adaptability to Manitoba

The three main climatic variables that affect adaptation in Manitoba are day length, temperature (both head and frost-free period), and rainfall. Day length and temperature affect development, i.e., flowering and maturity; and temperature and rainfall affect growth, i.e., yield.

Corn Heat Units (CHU)

Corn Heat Units are better than calendar days for measuring time between stages because, in warmer regions, more CHU are accumulated per day so that corn develops faster per day than in cooler regions.

When calculating the CHU for each day for corn, there are several considerations:

- Day and night temperatures are treated separately
- No growth is assumed to occur with night temperatures below 4.4°C or day temperatures below 10°C
- Maximum growth occurs at 30°C and decreases with higher temperatures

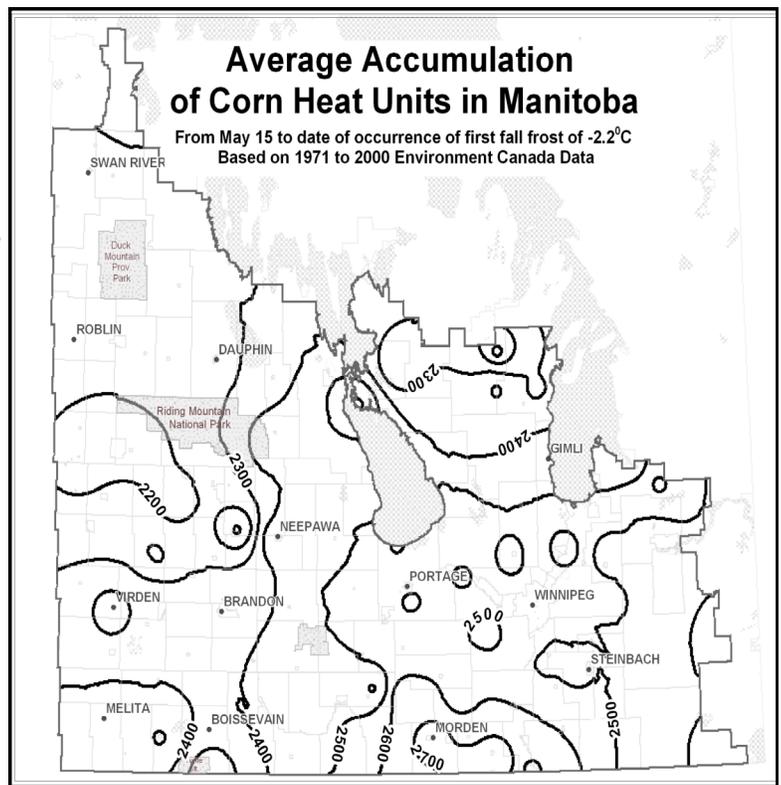
CHU for each day are calculated by the formula:

$$CHU = \frac{1.8 (T_{min} - 4.4) + 3.3 (T_{max} - 10) - 0.082(T_{max} - 10)^2}{2}$$

where: T_{min} = Daily minimum temperature (°C)

and: T_{max} = Daily maximum temperature (°C).

FIGURE 1. Average accumulation of corn heat units in Manitoba



The development of each plant is controlled by its genetic make-up and how these genes react to the environment in which the plant is growing. This is why it is critical to correctly match the corn heat unit rating of the hybrid with the CHU rating of the farm. If the hybrid's rating is too high, then maturity may not be reached.

Water Use by Corn

Corn requires increasing amounts of water as the season progresses. In an average year, a 120 bu/ac corn crop uses about 21 inches. Corn takes up and evaporates through its leaves about 350 litres of water for every kilogram of dry matter that is produced. Weekly corn water use is presented in Figure 2. Peak water use is during the reproductive phases of silking and pollination.

Comparison between water use of cereal, bean and corn crops are illustrated in Figure 3.

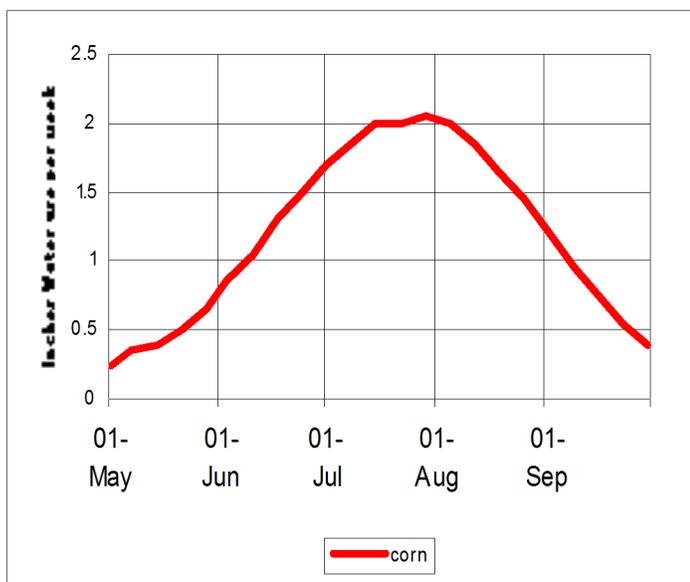


FIGURE 2. Weekly corn water use

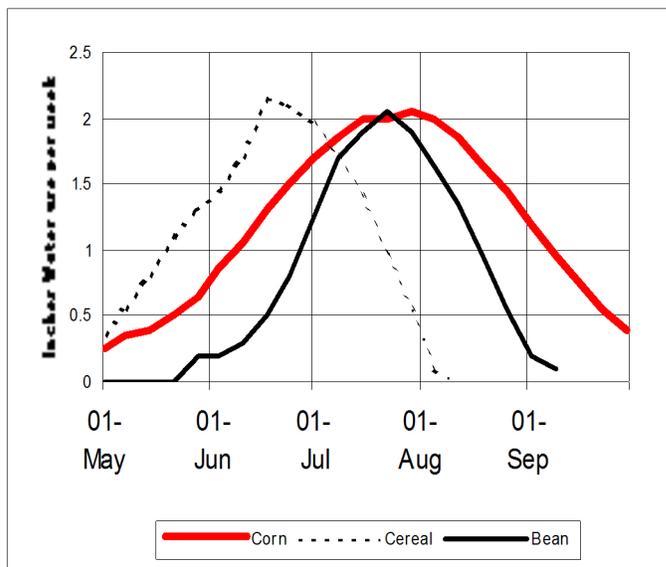


FIGURE 3. Weekly water use by corn, cereal and bean crops

The amount and distribution of rainfall in Manitoba is generally suited to corn production. Problems can arise each year in specific areas where rainfall patterns influence corn yields.

A water shortage occurring at any time during the year can cause yield decreases. Drought stress early in the growing season can reduce growth, thereby affecting the photosynthetic area. Drought during pollination may decrease yields by affecting silk elongation. If water stress occurs during grain filling, kernels may abort or not fill out, reducing yield and quality.

Moisture stress is the greatest problem on coarse-textured (sandy) soils, while excess moisture is a more common problem on fine-textured, compacted or poorly drained soils.