# Agricultural meteorology — where it fits

by Andrew Nadler, MAFRI

It is impossible to produce a crop without first knowing something about the climate. The weather imposes a set of constraints that every producer must acknowledge before deciding to plant.

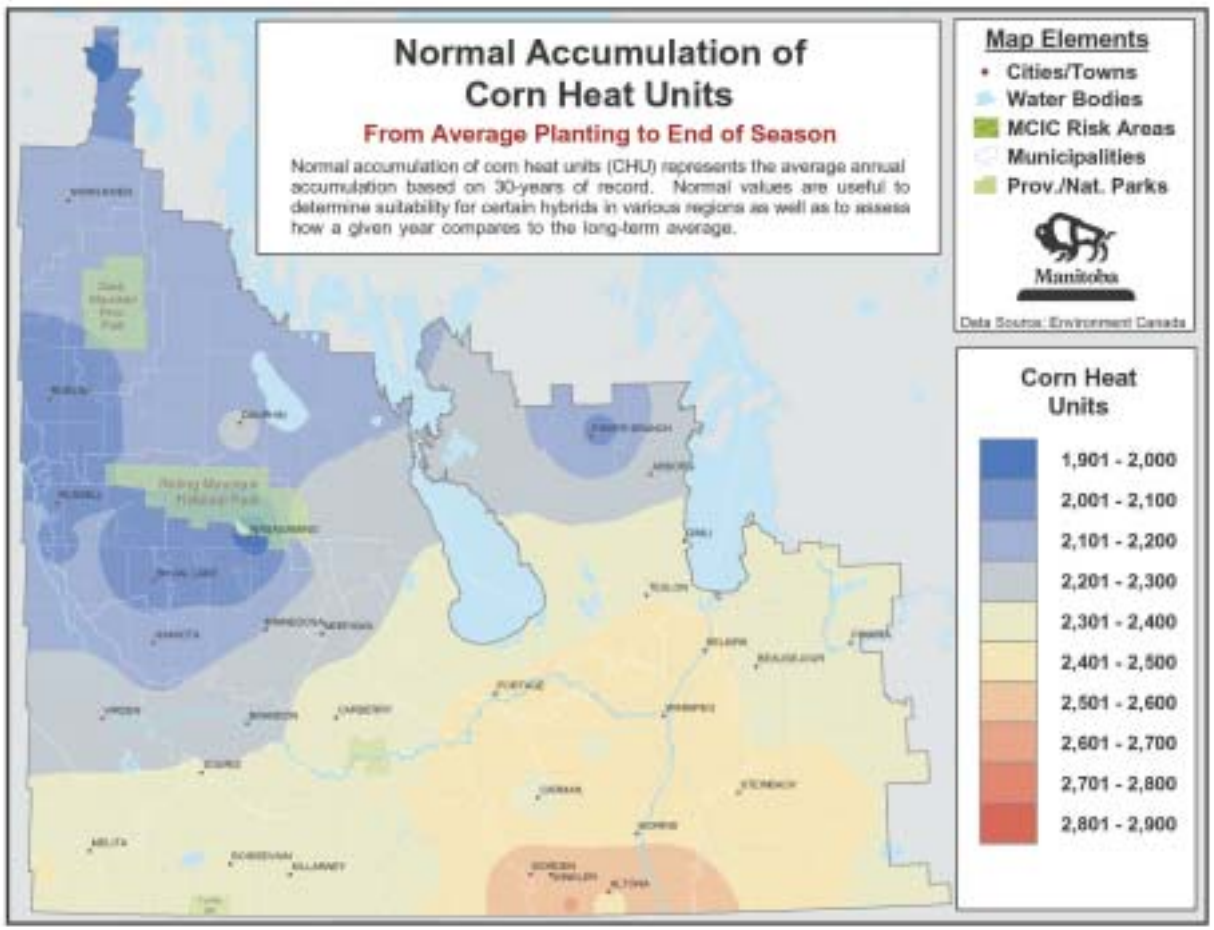
At the most basic level, knowledge of climate is accumulated from past experience telling us that summer is the best time to grow crops, which crops might have a reasonable chance of success, and that food must be stored over the winter to last until the following harvest.

Over time, it may be recognized that, although the weather is subject to variability, it will normally behave within a certain range of limits. The longer the period that climate is observed, the better indication we have of what "surprises" could be in store.

Knowing the range of this variability is a key factor for managing agricultural risk. It is one thing to plan for normal weather, but the challenge is to cope through abnormal conditions. An adequate understanding of the range of weather possibilities and good planning can allow for these risks and can increase the resilience of an operation. Certain adaptations, whether they are for drought, floods, or temperature extremes will further increase the coping range within which an operation can function. It is therefore essential when trying to adapt to the climate to know what to expect from the weather.

The next step in relating climate to agriculture is to observe the weather and the effects that it has on various phenomena. Technology has enabled the measurement and collection of massive amounts of information from soil, air, plants, and everything in between. This increasing knowledge is the most important factor when attempting to make predictions or forecasts of what may occur.

Knowing the stages of plant development and how they



relate to temperature can enable predictions of when the crop will flower or when it will be most susceptible to disease.

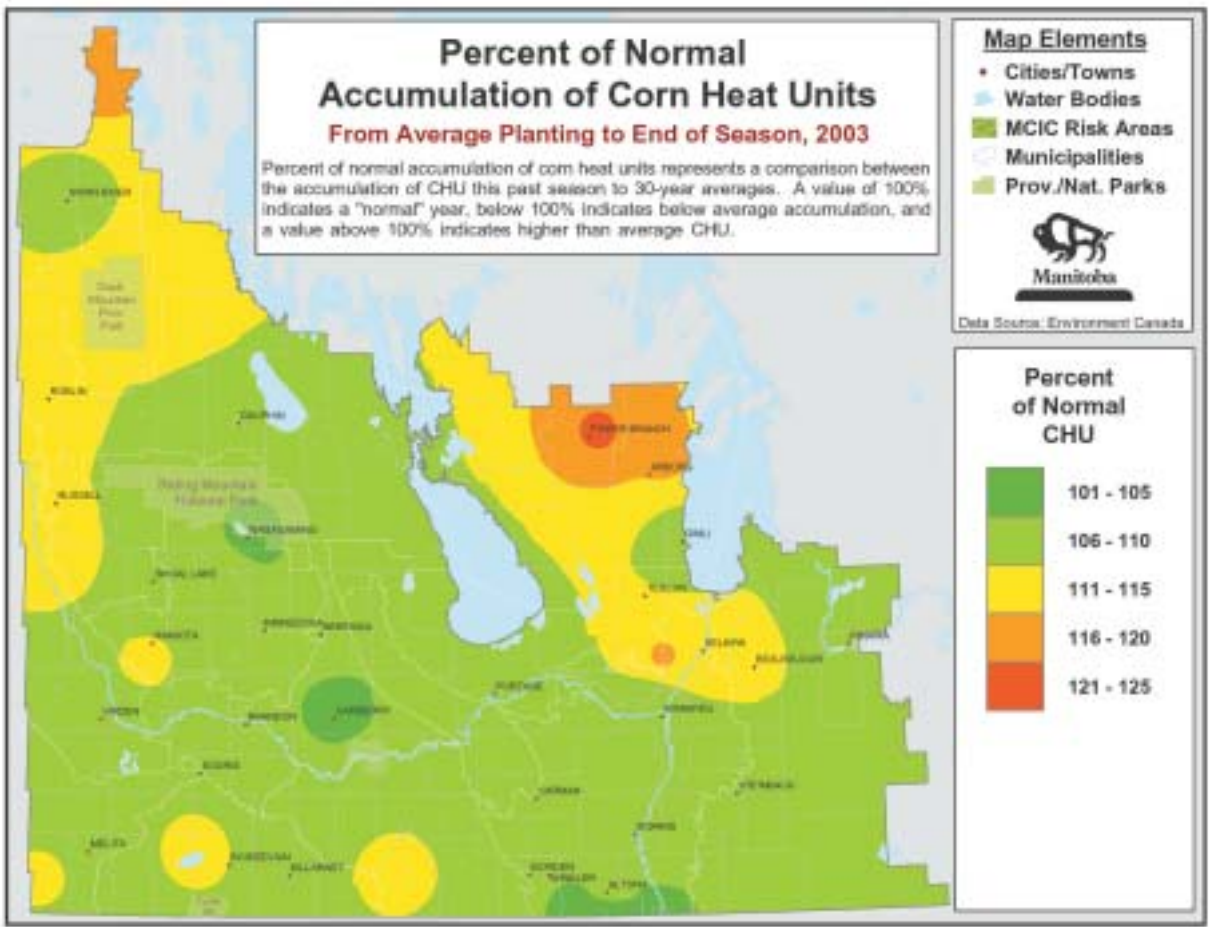
Understanding the relationship between pests and their environments can facilitate the tracking of pathogen development and forecasting of disease risk. In addition, knowing how a plant interacts with its environment can aid plant breeders to produce better performing crops.

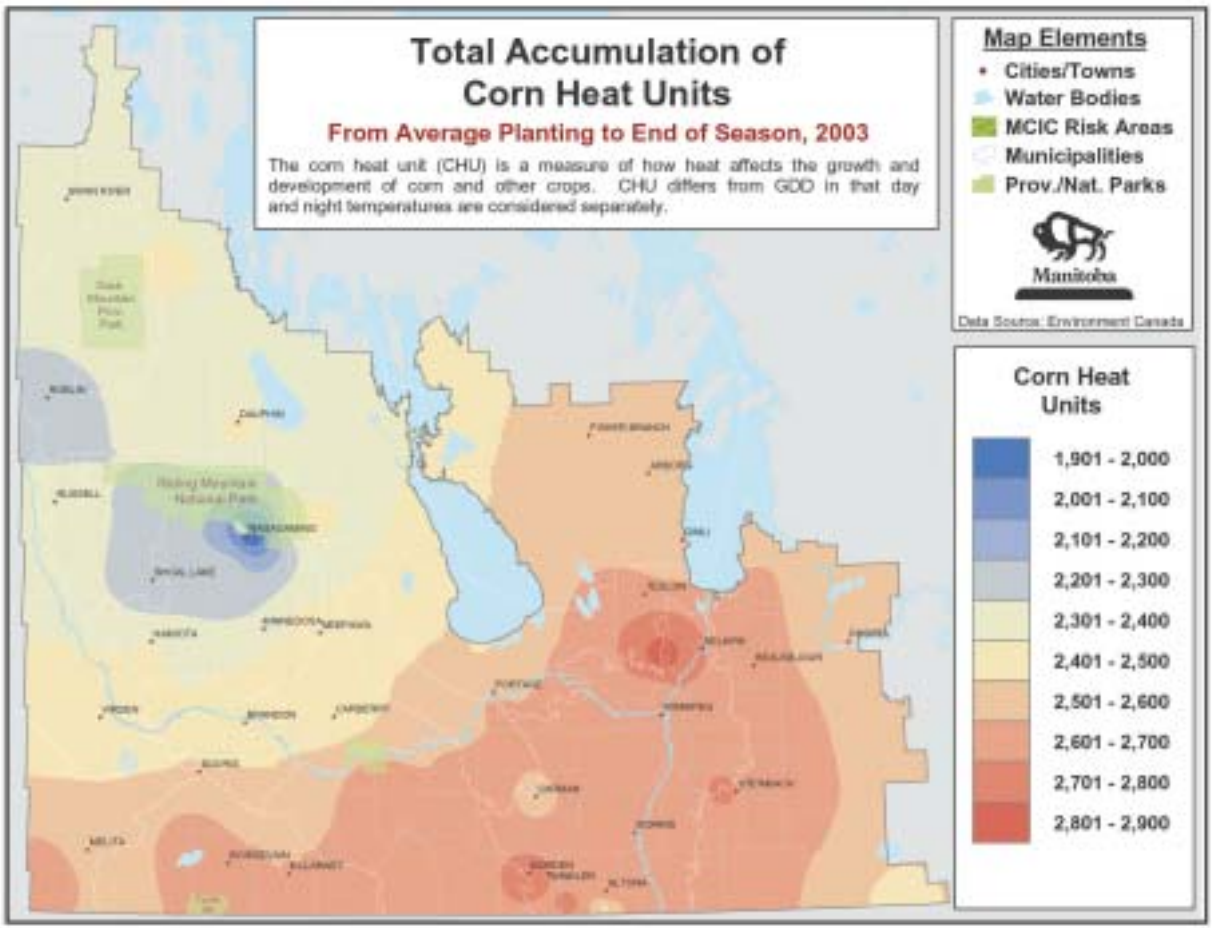
No industry depends more upon the weather than does agriculture. Agricultural meteorology focuses mainly on trying to understand the interactions between weather and production. If these interactions are adequately understood, they can assist producers to plan for and manage agronomic risk while maximizing productivity.

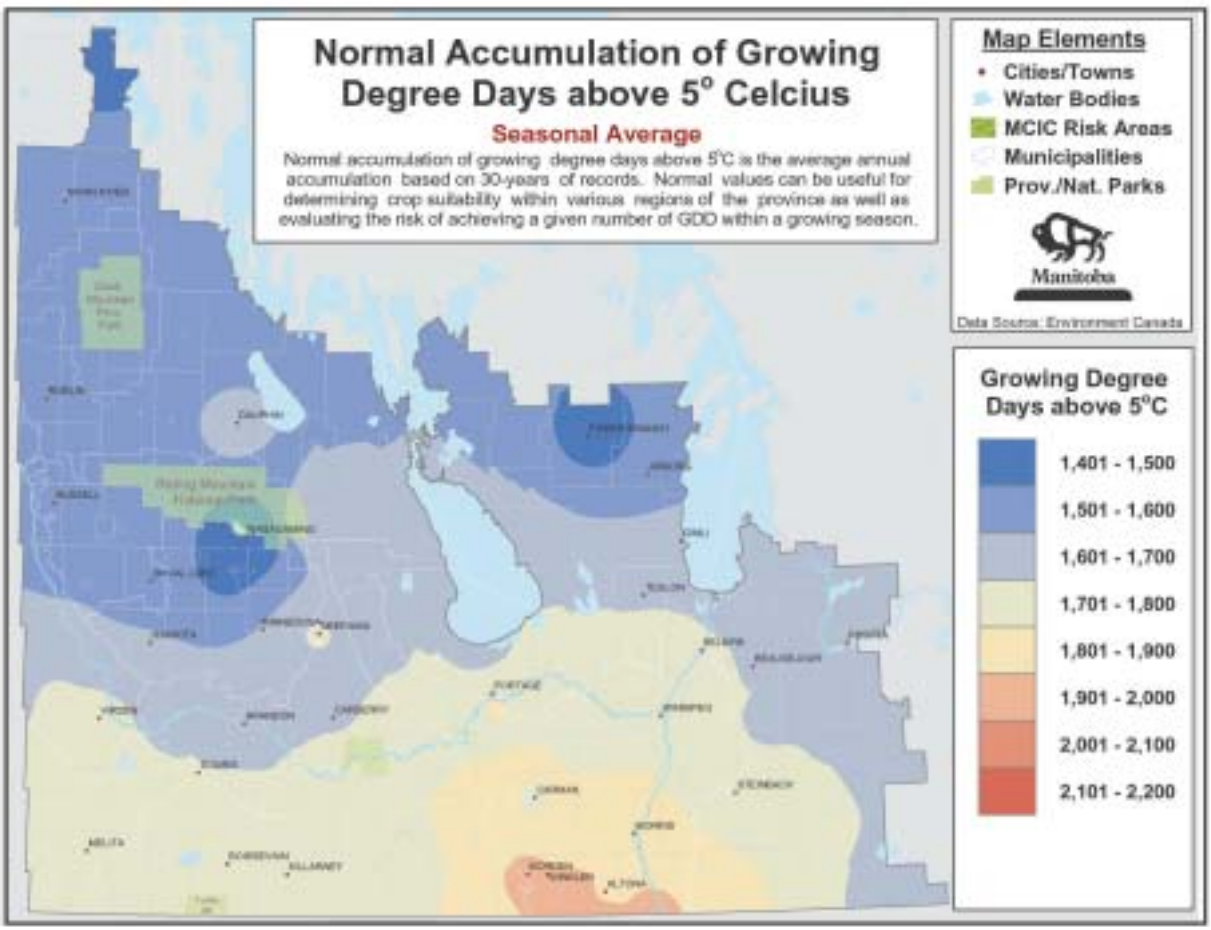
The maps in Yield Manitoba provide a "season in review" for some of the climatic variables that will likely have affected crop performance in 2003. Of course, a seasonal total of rainfall or heat units cannot adequately describe a growing season due to the different reactions to environment at different stages of crop growth as well as the distribution of rain or heat during the season.

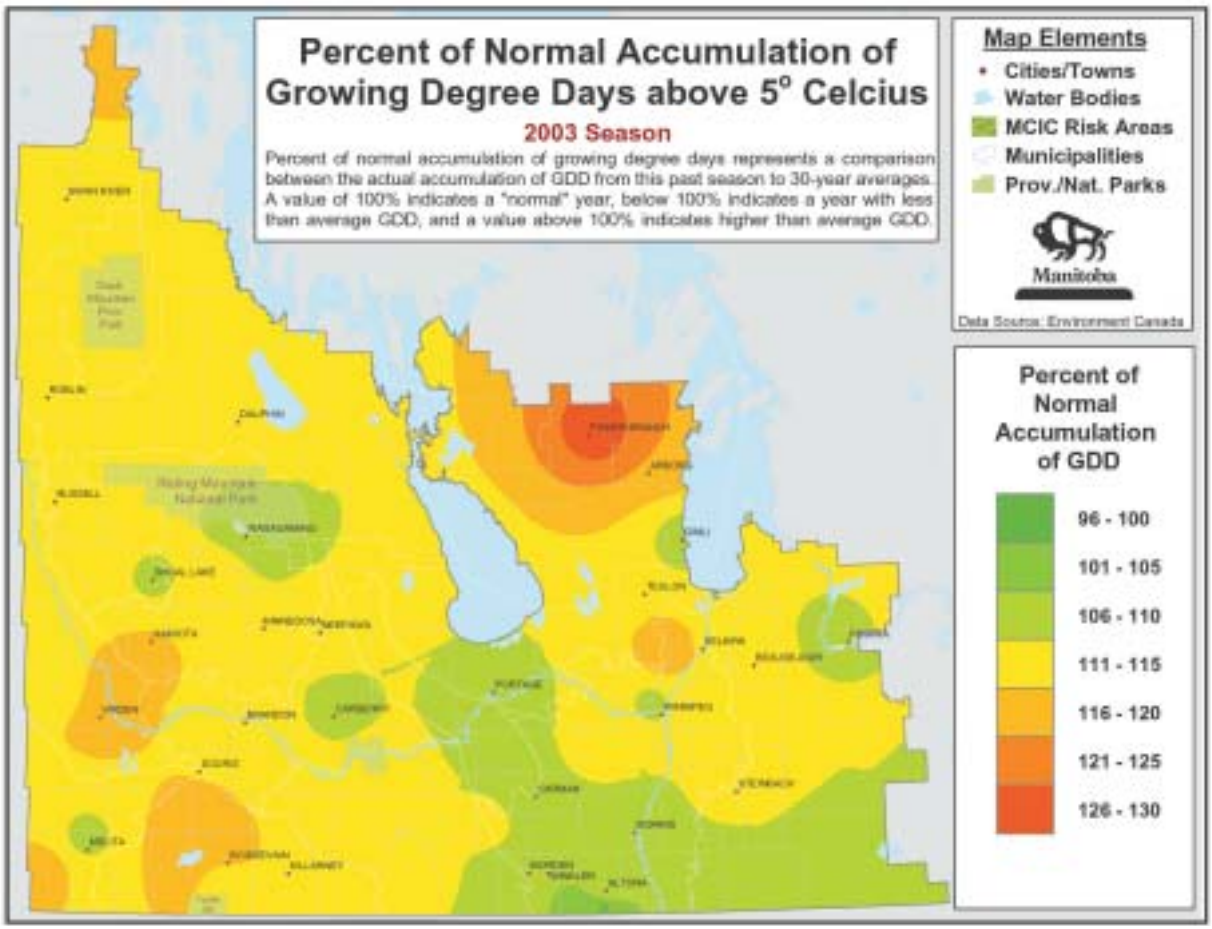
For example, drought vulnerability is more pronounced at certain stages of crop development. Therefore yields may not necessarily reflect the total extent of crop moisture deficit. Or if the map indicates that a region has received above-normal rainfall for the season, it is assumed that crops in that region fared quite well. However if all of that rain fell within a single week, most crops would not have survived. The maps show how this past season compared to what is considered "normal," which will differ significantly from one region to the next. What is considered normal at one location may be considered disastrous if it were to occur at another location, and vice-versa.

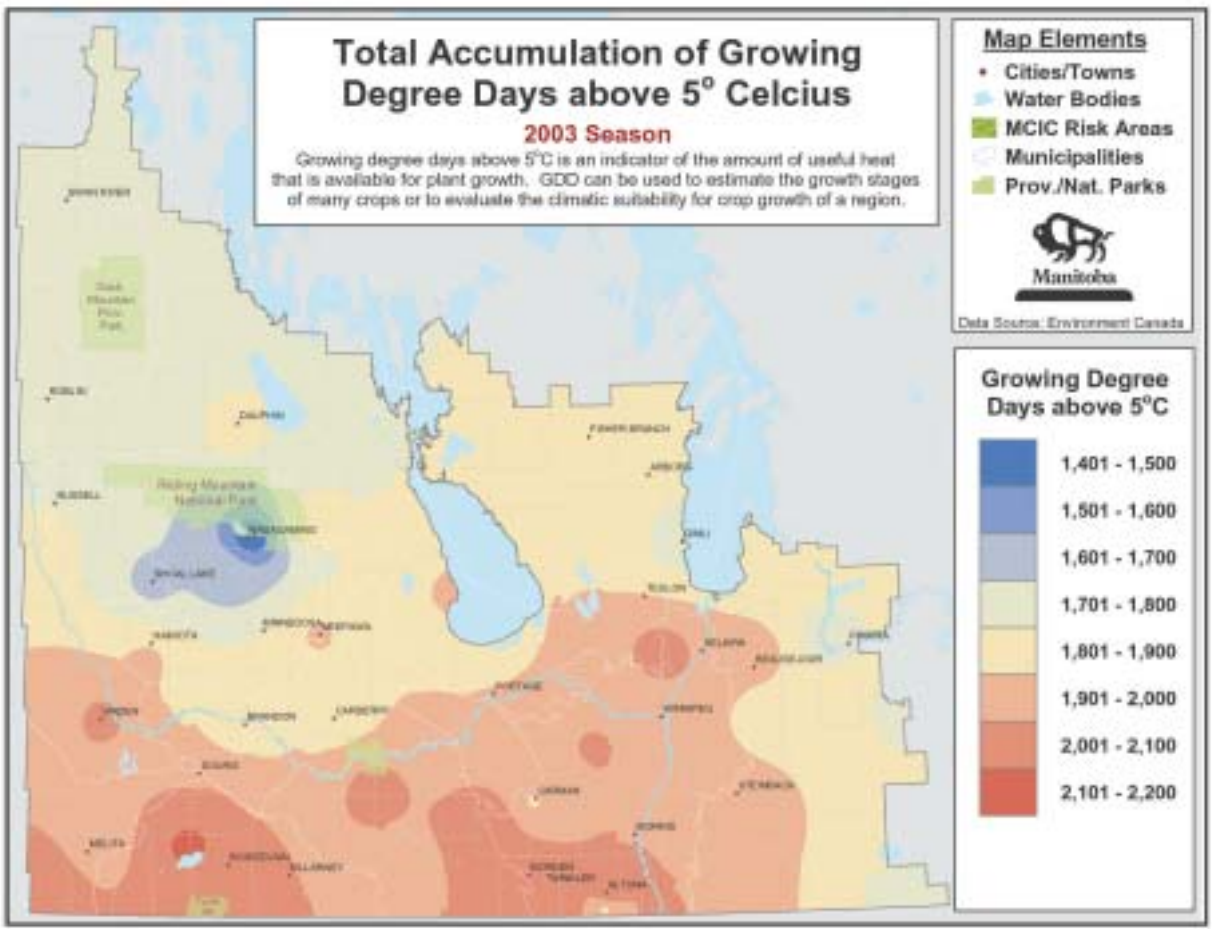
The "normals" are intended to provide producers with some insight into how the average weather or climate has behaved over the past several years within a given region. Looking ahead, we can assume that the average weather over the next few years may behave somewhat similar. It is therefore important that climate considerations play a key role in all agronomic decisions as the influence of weather will always be great.

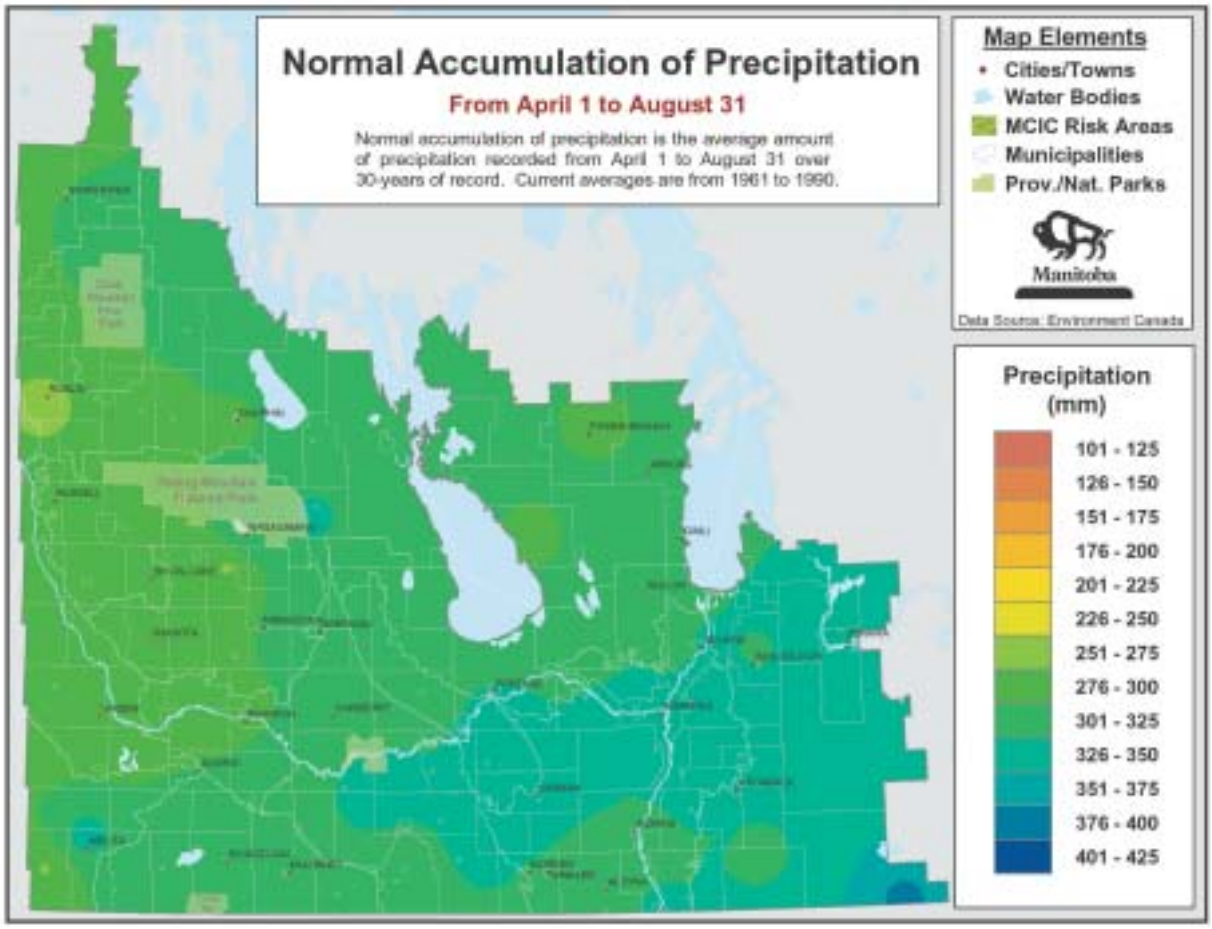


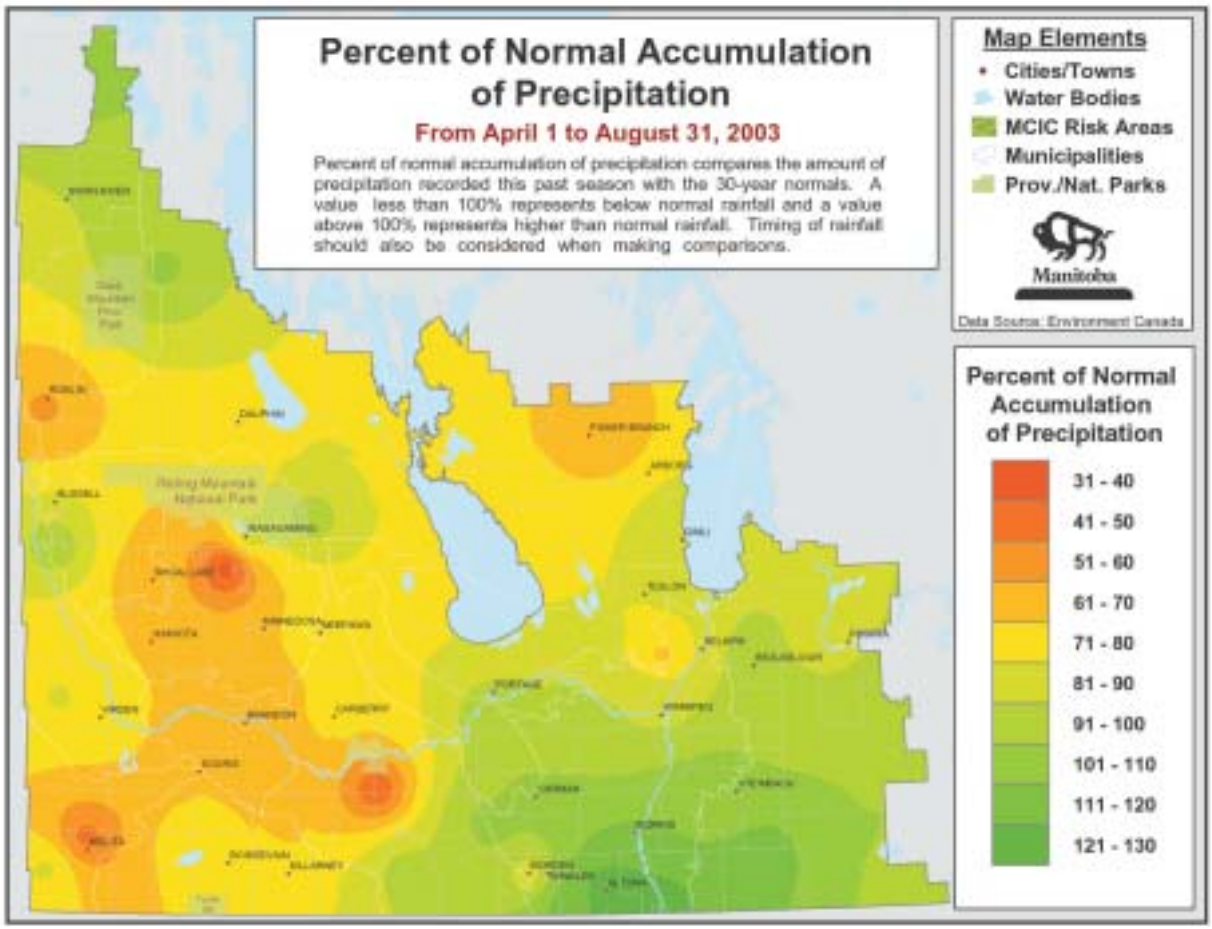

Total Accumulation of Corn Heat Units
From Average Planting to End of Season, 2003
The corn heat unit (CHU) is a measure of how heat affects the growth and development of corn and other crops. CHU differs from GDD in that day and night temperatures are considered separately.
Map Elements
Cities/Towns
Water Bodies
MCIC Risk Areas
Municipalities
Prov./Nat. Parks
Manitoba
Data Source: Environment Canada
Corn Heat Units
1,901 - 2,000
2,001 - 2,100
2,101 - 2,200
2,201 - 2,300
2,301 - 2,400
2,401 - 2,500
2,501 - 2,600
2,601 - 2,700
2,701 - 2,800
2,801 - 2,900

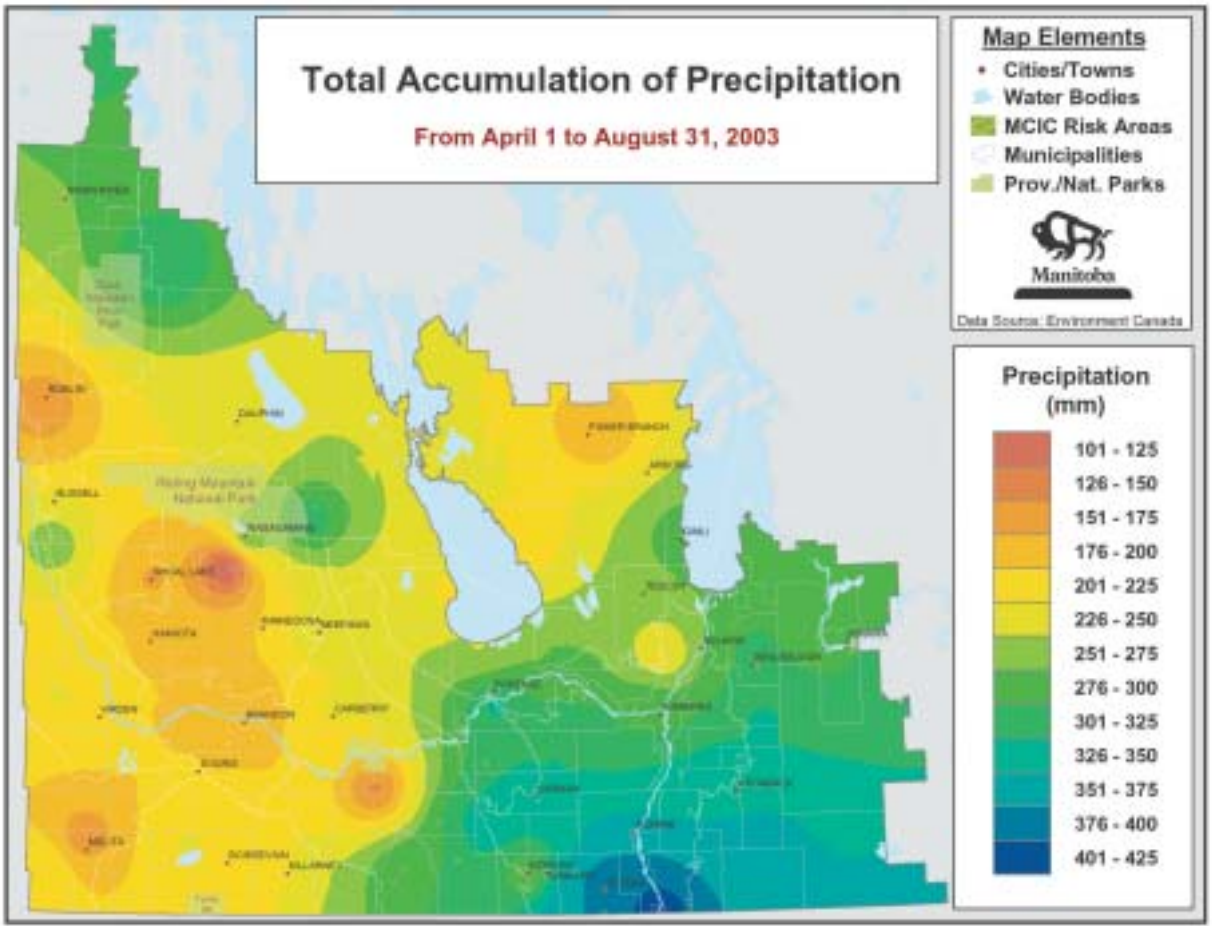

Normal Accumulation of Growing Degree Days above 5° Celcius
Seasonal Average
Normal accumulation of growing degree days above 5°C is the average annual accumulation based on 30-years of records. Normal values can be useful for determining crop suitability within various regions of the province as well as evaluating the risk of achieving a given number of GDD within a growing season.
Map Elements
Cities/Towns
Water Bodies
MCIC Risk Areas
Municipalities
Prov./Nat. Parks
Manitoba
Data Source: Environment Canada
Growing Degree Days above 5°C
1,401 - 1,500
1,501 - 1,600
1,601 - 1,700
1,701 - 1,800
1,801 - 1,900
1,901 - 2,000
2,001 - 2,100
2,101 - 2,200


Percent of Normal Accumulation of Growing Degree Days above 5° Celcius
2003 Season
Percent of normal accumulation of growing degree days represents a comparison between the actual accumulation of GDD from this past season to 30-year averages. A value of 100% indicates a "normal" year, below 100% indicates a year with less than average GDD, and a value above 100% indicates higher than average GDD.
Map Elements
Cities/Towns
Water Bodies
MCIC Risk Areas
Municipalities
Prov./Nat. Parks
Manitoba
Data Source: Environment Canada
Percent of Normal Accumulation of GDD
96 - 100
101 - 105
106 - 110
111 - 115
116 - 120
121 - 125
126 - 130

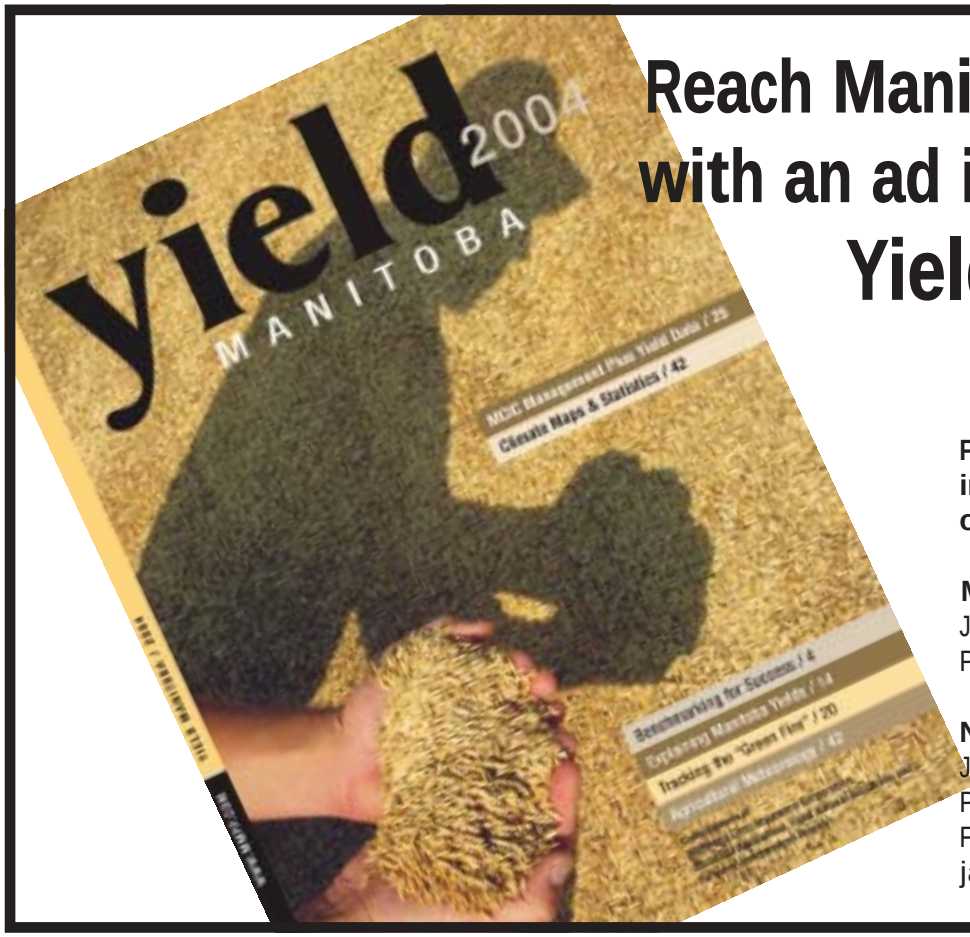

Total Accumulation of Growing Degree Days above 5° Celcius
2003 Season
Growing degree days above 5°C is an indicator of the amount of useful heat that is available for plant growth. GDD can be used to estimate the growth stages of many crops or to evaluate the climatic suitability for crop growth of a region.
Map Elements
Cities/Towns
Water Bodies
MCIC Risk Areas
Municipalities
Prov./Nat. Parks
Manitoba
Data Source: Environment Canada
Growing Degree Days above 5°C
1,401 - 1,500
1,501 - 1,600
1,601 - 1,700
1,701 - 1,800
1,801 - 1,900
1,901 - 2,000
2,001 - 2,100
2,101 - 2,200


Normal Accumulation of Precipitation
From April 1 to August 31
Normal accumulation of precipitation is the average amount of precipitation recorded from April 1 to August 31 over 30-years of record. Current averages are from 1961 to 1990.
Map Elements
Cities/Towns
Water Bodies
MCIC Risk Areas
Municipalities
Prov./Nat. Parks
Manitoba
Data Source: Environment Canada
Precipitation (mm)
101 - 125
126 - 150
151 - 175
176 - 200
201 - 225
226 - 250
251 - 275
276 - 300
301 - 325
326 - 350
351 - 375
376 - 400
401 - 425


Percent of Normal Accumulation of Precipitation
From April 1 to August 31, 2003
Percent of normal accumulation of precipitation compares the amount of precipitation recorded this past season with the 30-year normals. A value less than 100% represents below normal rainfall and a value above 100% represents higher than normal rainfall. Timing of rainfall should also be considered when making comparisons.
Map Elements
Cities/Towns
Water Bodies
MCIC Risk Areas
Municipalities
Prov./Nat. Parks
Manitoba
Data Source: Environment Canada
Percent of Normal Accumulation of Precipitation
31 - 40
41 - 50
51 - 60
61 - 70
71 - 80
81 - 90
91 - 100
101 - 110
111 - 120
121 - 130





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