OMNIGENCE
ASSET MANAGEMENT

The Corn Line:

Quantifying Canada's Corn and Soybean Frontier to 2100

September 2026

EXECUTIVE SUMMARY:

Corn heat units, not soil, set the outer boundary of where grain corn and soybeans can be grown in Canada. That boundary is moving north. Using observed present-day climate and an intermediate emissions scenario, we estimate that the area of Canada meeting the heat requirement of the earliest grain corn hybrids roughly quadruples by 2100, from about 0.74 million to 2.85 million square kilometres. The area meeting the mainstream grain corn requirement rises from roughly 0.21 million to 1.40 million square kilometres.

These are large numbers and they should be read carefully. They measure the removal of a heat constraint, not the creation of corn ground; most of the newly qualifying area is Canadian Shield and boreal soil that will never see a planter. The investment relevance lies in the interior. Land already farmed on the prairies gains roughly 650 corn heat units, enough to carry Saskatoon from the margin of grain corn feasibility into mainstream grain corn territory and the Red River Valley to conditions resembling today's southern Ontario. Corn and soybeans are the highest gross margin rowcrops in North America, and that optionality migrates into land already owned and farmed.

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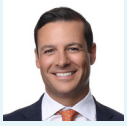

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METHOD:

This paper is a companion to The Northern Margin (Omnigence, September 2026), which mapped Canada's small-cereal frontier following King et al. (2018); here the same climate pipeline is applied to the corn threshold. Corn heat units are the Canadian standard for rating corn hybrid maturity, following Brown and Bootsma (1993). The daily value combines a night term based on the minimum temperature above a 4.4 degree Celsius base with a day term based on the maximum temperature above a 10 degree base, with the day term declining beyond 30 degrees. Provincial convention accumulates units from mid May to the first fall killing frost.

> **The 2,400 CHU corn boundary moves north 450 to 600 kilometres across the prairie longitudes by 2100.**
>
> Under an intermediate emissions pathway, not a high emissions one.

The current surface is computed from WorldClim 2.1 monthly minimum and maximum temperatures adjusted to present day conditions using the observed warming record. The 2100 surface applies the mean warming of a 34 model CMIP6 ensemble under SSP2-4.5, an intermediate emissions pathway. We deliberately avoided the high emissions SSP5-8.5 scenario and single model projections. Because the regional ensemble carries mean temperature only, the same warming is applied to daily minima and maxima; nights are in fact warming faster than days, which makes this choice conservative for CHU.

Daily temperature curves are interpolated from the monthly surfaces, with two disclosed adjustments. First, daily weather variance is applied around the smooth climatology, because the day term of the CHU formula is concave and a smooth series overstates it. Second, the season ends when the smoothed minimum temperature falls to 3 degrees, the level that reproduces mean first killing frost dates; the raw killing frost threshold applied to a smoothed series reads several weeks late.

The present-day surface is anchored to Manitoba Agriculture's published Red River Valley average of 2,700 to 2,800 units; our Winnipeg cell reads 2,786. Other published CHU references are not directly comparable: Saskatchewan's maps report 90 per cent confidence values rather than averages, federal maps accumulate over a fixed April to October window, and base periods differ, so published figures for the same station legitimately vary by 200 units or more. Against older average-based maps our surface reads modestly high, including roughly ten per cent high in southern Ontario, a premium consistent with the vintage of those maps and with the 200 to 400 unit rise in accumulated CHU that Major et al. (2021) measure in a century of prairie station records.

RESULTS:

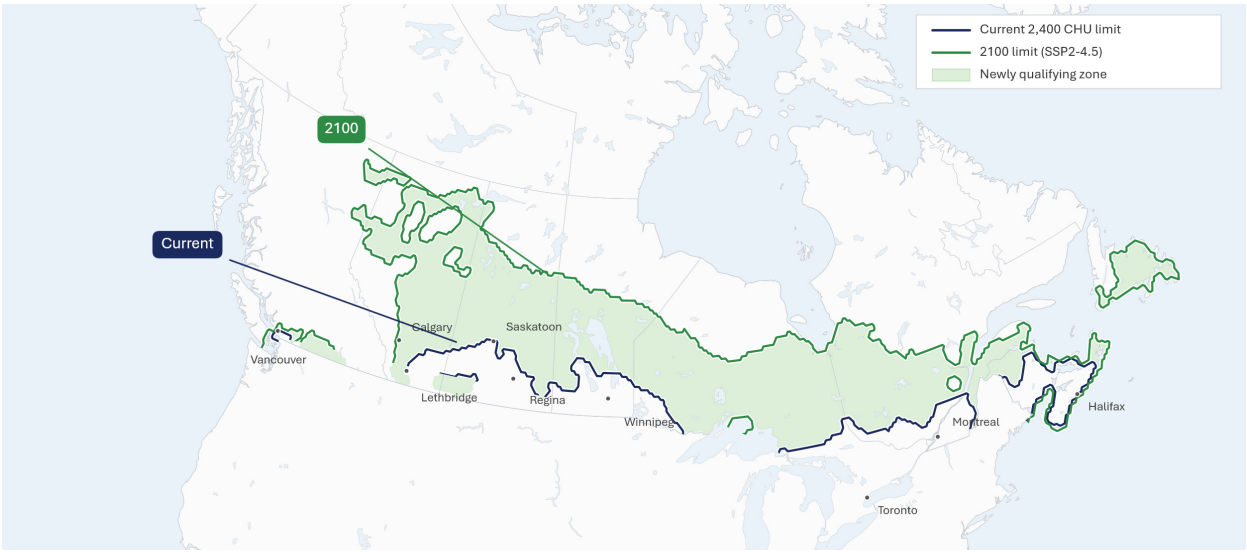
Table 1 sets out accumulated corn heat units at representative locations under current conditions and in 2100.

Table 1. Accumulated corn heat units.

Location	Current	2100	Change
Windsor, ON	4,026	4,780	+754
Ottawa, ON	3,308	3,994	+686
Morden, MB	2,837	3,487	+650
Winnipeg, MB	2,786	3,425	+639
Estevan, SK	2,668	3,307	+639
Regina, SK	2,666	3,333	+667
Brandon, MB	2,546	3,202	+656
Lethbridge, AB	2,472	3,170	+698
Saskatoon, SK	2,376	3,055	+679
Edmonton, AB	2,062	2,763	+701

Source: Omnigence analysis of WorldClim 2.1 and CMIP6 SSP2-4.5.

Across the prairie longitudes the 2,400 unit boundary that admits the earliest grain corn hybrids moves north by between 450 and 600 kilometres, with detached pockets of feasibility appearing as far north as the Athabasca lowlands.



Established growing regions gain roughly 650 corn heat units, which is the difference between a rotation built on cereals and canola and one that admits grain corn and soybeans. Locations that are currently marginal, such as Saskatoon, move to a position resembling today's Red River Valley, and the Red River Valley itself moves to a position resembling today's southern Ontario.

CAVEATS AND ASSUMPTIONS:

Heat is a necessary condition, not a sufficient one. The following constraints are material and none of them are captured in the area figures above.

- Soils. Much of the newly qualifying area is Canadian Shield or boreal soil: acidic, poorly drained, low in nutrients and heavy in stored carbon. The area figures describe climate, not arability.
- Water. Corn transpires materially more than the small cereals it would displace, and warming raises potential evapotranspiration faster than growing season precipitation. Heat gained is not moisture gained, and on the dry western margins the water constraint binds before the heat constraint releases.
- Photoperiod. Soybean development is sensitive to day length and varieties are bred in maturity groups tied to latitude. CHU feasibility therefore overstates the case for soybeans relative to corn; northern long days require dedicated breeding, exactly as the Manitoba soybean expansion required.
- Frost variance. CHU thresholds describe mean seasons. Realized corn economics depend on the left tail of the frost date distribution, which is why crop insurance attaches to it. A mean season that clears 2,400 units still contains harvest years that do not.
- Scenario and model uncertainty. Results depend on the emissions pathway and on model structure. SSP2-4.5 is an intermediate assumption. A lower pathway would compress the shift and a higher one would expand it substantially.
- Threshold definition. The 2,400-unit threshold admits only the earliest hybrids at the edge of the seed catalogue; mainstream grain corn requires 2,800 or more. Breeders also move the goalposts: hybrid heat requirements have fallen over time, which accelerates the frontier beyond what climate alone delivers.

INVESTMENT IMPLICATIONS:

The practical signal is not the frontier itself but the interior. Corn and soybeans are the highest gross margin rowcrops in North America, and land that can grow them trades at a structural premium to land that cannot. The roughly 650-unit gain inside the current farmed area converts cereal and canola land into corn and soybean land over the balance of the century, and that conversion accrues to owned farmland in established regions rather than to speculative positions on the Shield.

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