

# Factsheet: Defining Agronomic Practices for Forage Corn Production in Saskatchewan



## Objectives:

The objectives of this study were to develop and refine seeding and fertility recommendations for corn silage production and to evaluate the cost of production and feed quality of corn silage grown in Western Canada.

## Methodology:

The project was conducted at 6 sites (Scott, Lanigan, Melfort, Yorkton, Outlook, and Redvers) over 3 growing seasons (2016, 2017, and 2018). At each site, two corn brands were planted (Brand A and Brand B) based on the Corn Heat Units (CHU) of each location. To evaluate the effect of seeding rate and nitrogen rate on production of forage corn, the project included three seeding rates (30,350 plants/ac, 40,470 plants/ac, and 50,600 plants/ac) and three nitrogen rates (100, 150, and 200 lbs N/acre).

Table 1: Summary of corn heat unity (CHU) rating of each site, soil zone, and hybrid selected for year 3 of the study.

| Site    | Site CHU Rating | CHU Rating (2017/2018/2019) |                   | Soil Zone   |
|---------|-----------------|-----------------------------|-------------------|-------------|
|         |                 | Brand A                     | Brand B           |             |
| Scott   | 2,100           | 2,200/2,075/2,075           | 2,050/2,050/2,050 | Dark Brown  |
| Lanigan | 2,150           | 2,200/2,075/2,075           | 2,050/2,050/2,050 | Think Black |
| Melfort | 2,175           | 2,200/2,200/2,200           | 2,225/2,150/2,150 | Black       |
| Yorkton | 2,250           | 2,325/2,200/2,200           | 2,225/2,150/2,150 | Black       |
| Outlook | 2,300           | 3,325/2,350/2,350           | 2,300/2,300/2,300 | Dark Brown  |
| Redvers | 2,450           | 3,325/2,350/2,350           | 2,300/2,300/2,300 | Black       |

Table 2: Summary of seeding rates and nitrogen application rates used in each trial year of the study.

|        | Seeding Rate |               | Nitrogen Application Rates |             |
|--------|--------------|---------------|----------------------------|-------------|
|        | (plants/ha)  | (plants/acre) | (kg N/ha)                  | (lb N/acre) |
| Low    | 75,000       | 30,350        | 112                        | 100         |
| Medium | 100,000      | 40,470        | 168                        | 150         |
| High   | 125,000      | 50,600        | 225                        | 200         |

The full report is available on [www.warc.ca](http://www.warc.ca). This project was funded by the Saskatchewan Ministry of Agriculture through the Agriculture Development Fund (ADF), the Saskatchewan Cattleman's Association, and the Prairie Agricultural Machinery Institute.

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## Key Findings:

- Site CHU ratings are based on grain corn production; silage corn production generally requires 200 CHU values less than grain corn (Table 3).
- Significant 'site-year x brand' interactions for forage yield and quality indicates that regional trial results will be useful for producer hybrid selection.
- Nitrogen fertilizer rate had a small and variable effect on forage yield and a significant effect on forage quality.
- Increasing the seeding rate reduced crude protein (CP) and soluble protein, but increased dry matter (DM) forage yield.
- Increasing the N fertilizer application resulted in greater DM forage yield at 200 lbs N/ac, but the increase was only 0.6 Mg/ha.
- Increasing the N fertilizer application also increased CP and soluble protein concentration but only by 0.99% and 0.36% respectively. While increasing CP concentration was observed with N fertilization, it may be more economical to provide CP supplementation in a concentrate or pelleted form.
- Total Digestible Nutrients (TDN) was not affected by N rate or seeding rates; mineral concentrations for all treatments were suitable for beef-cow wintering diets.
- The cost of production per tonne of biomass yield increased with seeding rate; increasing the nitrogen rate was only economically viable at the long-season sites.
- Since there are significant site-year effects for forage quality, producers should always test the nutritional quality of the corn forage to confirm whether supplemental minerals are required based on nutritional requirements of their cattle.

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**Tables:**

Table 3: CHU calculated for all 18-site year locations using the nearest available EC weather stations

| Trial Site | Weather Station Site | CHU Rating | 2016 CHU | 2017 CHU | 2018 CHU |
|------------|----------------------|------------|----------|----------|----------|
| Redvers    | Oxbow                | 2450       | 2209*    | 2149*    | 2332     |
| Yorkton    | Yorkton              | 2250       | 2372     | 2291     | 2287     |
| Outlook    | Outlook              | 2300       | 2271     | 2091*    | 2288     |
| Melfort    | Melfort              | 2175       | 2263     | 2181     | 1876*    |
| Scott      | Scott                | 2100       | 2002     | 1983     | 1976     |
| Lanigan    | Watrous              | 2150       | 2104     | 2025     | 1826*    |

\*did not experience sufficient CHU for silage production

(Source: [http://climate.weather.gc.ca/historical\\_data/search\\_historic\\_data\\_e.html](http://climate.weather.gc.ca/historical_data/search_historic_data_e.html))

Table 4: Average DM yield, tonne/ha (ton/acre) for each treatment group

|              | Treatment | 2016          | 2017          | 2018          |
|--------------|-----------|---------------|---------------|---------------|
| Site         | Outlook   | 16.0 (8.5) a  | 18.2 (8.1) a  | 18.8 (8.4) a  |
|              | Redvers   | 18.3 (8.2) ab | 15.1 (6.7) b  | 15.7 (7.0) b  |
|              | Yorkton   | 17.4 (7.8) b  | 14.4 (6.4) bc | 11.6 (5.2) c  |
|              | Lanigan   | 19.1 (7.1) c  | 13.8 (6.2) cd | 12.5 (5.6) c  |
|              | Scott     | 12.3 (5.5) d  | 12.7 (5.7) d  | 10.8 (4.8) c  |
|              | Melfort   | 10.9 (4.9) e  | -             | -             |
| Brand        | Brand A   | 16.0 (7.1) a  | 14.8 (6.6) a  | 13.6 (6.1) a  |
|              | Brand B   | 15.4 (6.9) b  | 14.9 (6.6) a  | 14.7 (6.6) b  |
| N Rate       | High rate | 16.1 (7.2) a  | 14.8 (6.6) a  | 14.8 (6.6) a  |
|              | Mid rate  | 15.7 (7.0) ab | 15.2 (6.8) a  | 14.2 (6.3) ab |
|              | Low rate  | 15.2 (6.8) b  | 14.5 (6.5) a  | 13.3 (5.9) a  |
| Seeding Rate | High rate | 16.4 (7.3) a  | 15.3 (6.8) a  | 14.3 (6.4) a  |
|              | Mid rate  | 15.4 (6.9) b  | 14.9 (6.6) ab | 14.1 (6.3) a  |
|              | Low rate  | 15.2 (6.8) b  | 14.3 (6.4) b  | 14.0 (6.2) a  |

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