Trends in Crop Production in the Canadian Prairies

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Introduction

Dryland agriculture in the Canadian prairies is continuously confronted by change. In response to growing competition in the global market place producers have sought alternative crop production methods in order to maintain their farming enterprises. Driving the change has been lower prices for cereal grains, declining input costs (e.g., glyphosate), changes in government policies and programs (e.g., grain transportation, farm safety net programs), new markets and value-added opportunities, improvements in machinery design and soil management practices, and growing concern about soil and environmental degradation.

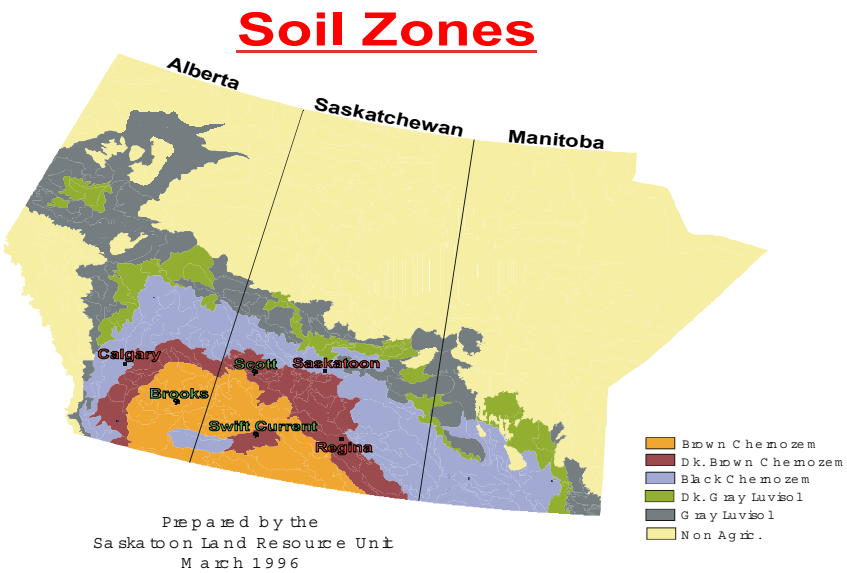
Objectives

This study examines the trends in crop production in the Canadian prairies over the last two and a half decades (1976 to 1998). The focus is on both cropping choice and tillage practices for the major soil climatic zones in western Canada.

Background

The Canadian prairies have about 32 million ha of land suited to the production of annual crops. This region is divided into five main soil-climatic zones (Fig. 1) (Campbell et al. 1990). About 21% of the cultivated area is located in the Brown soil zone (Aridic Ustoll), 22% in the Dark Brown (Typic Ustoll), and the remainder in the more moist Black (Typic Udoll), Dark Gray and Gray soil zones (Alfisols).

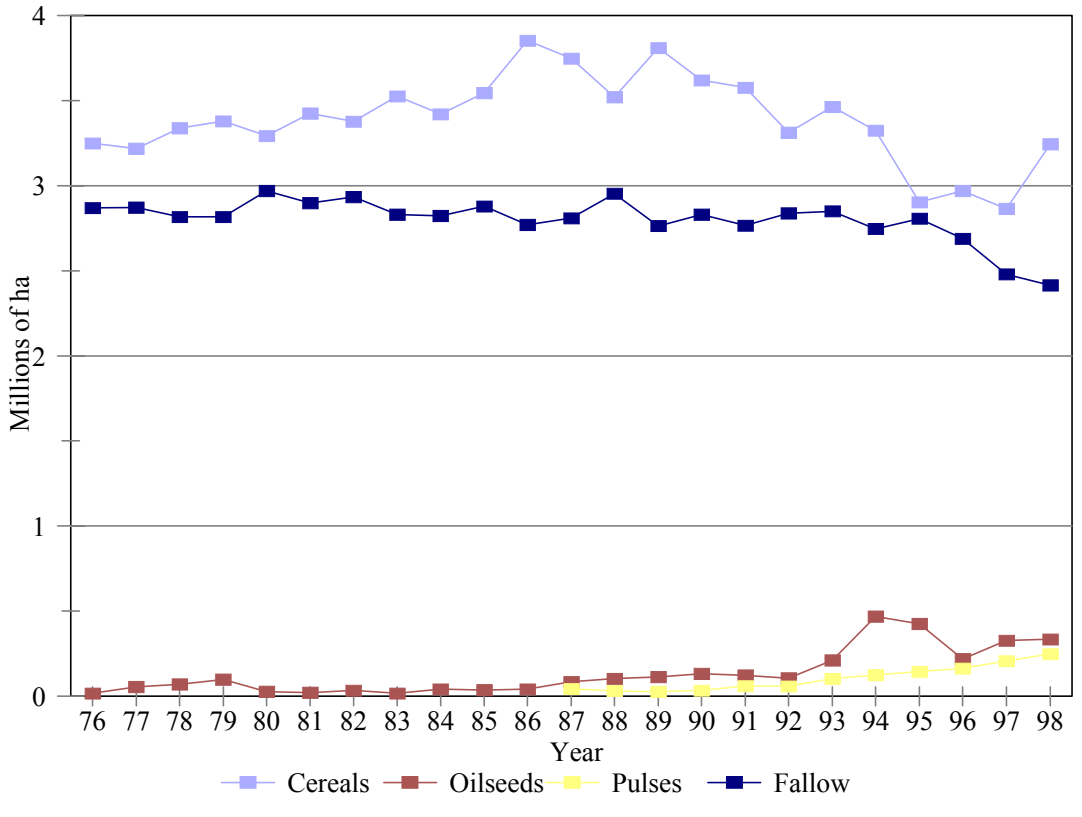
FIGURE 1. Soil Map of the Western Prairies



Brown Soil Zone

•There is about 6.5 M ha of arable land in the Brown soil zone.
•Approximately 2.8 M ha has remained in fallow since 1976 with the exception of a small decline in fallow to 2.4 M ha in 1997 and 1998 (Figure 2).
•In 1996, 56% of the seeded area used some form of conservation tillage practices, up from 44% in 1991 (Statistics Canada 1997).
•Interchange among other cereal crops has maintained cereal area despite recent declines in wheat (Figure 2). For example, in 1998 when spring wheat decreased to 1.2 M ha durum more than doubled to 1.7 M ha.
•Specialty crops have shown a steady increase, but the area they occupy is still relatively small and their influence on trends is minor.
•Pulse crops (e.g., lentil and field pea) increased from 0.04 M ha in 1976 to 0.25 M ha in 1998.
•Oilseeds (e.g., canola, flax, and mustard) sown in this soil zone increased from 0.02 M ha to 0.03 M ha.
•Thus, there has been evidence of crop diversification with increases in pulses and oilseeds in this soil zone, especially since 1987.

Figure 2. Land Use Trends in the Brown Soil Zone



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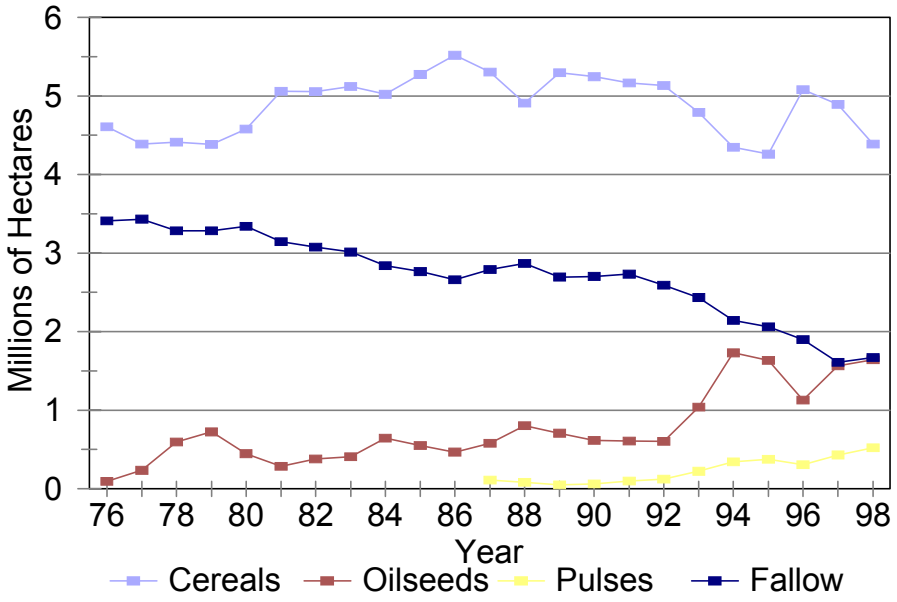
Brown Soil Zone

•There is about 8.5 M ha of arable land in the Dark Brown soil zone.
•Since 1976, fallow area has decreased approximately 50% in the Dark Brown soil zone from 3.4 M ha to 1.7 M ha (Figure 3).
•In 1996, 63% of the seeded area was under conservation tillage management (up from 34% in 1991).
•Cereals occupy the majority of land in this soil zone (about 41% of the arable land) with spring wheat (2.2-3.5 M ha), durum (0.4-0.8 M ha), barley (0.7-1 M ha) and oats (0.15-0.3 M ha) totaling about 4-5 M ha of land in this region (Figure 3).
•The increase in area devoted to specialty crops has increased steadily in this soil zone since 1987 with significant increases in area since 1994.
•Pulse crops (e.g., lentil and field pea) have increased from 0.11M ha to 0.55 M ha since 1993 (Figure 3).
•In 1998, 1.6 M ha of land were devoted to oilseed (e.g., canola, flax and mustard) production, up from 0.1 M ha in 1976 (Figure 3).
•Increased area of specialty crops has been much more pronounced than in the Dark Brown soil zone than in the more arid Brown soil zone.
•The decrease of about 1.8 M ha in fallow since 1976 has been accompanied by an increase in oilseed and pulse area of 1.9 M ha (1.1 M ha for canola , 150,000 ha for flax, 120,000 ha for mustard, 320,000 ha for peas and 200,000 ha for lentil).

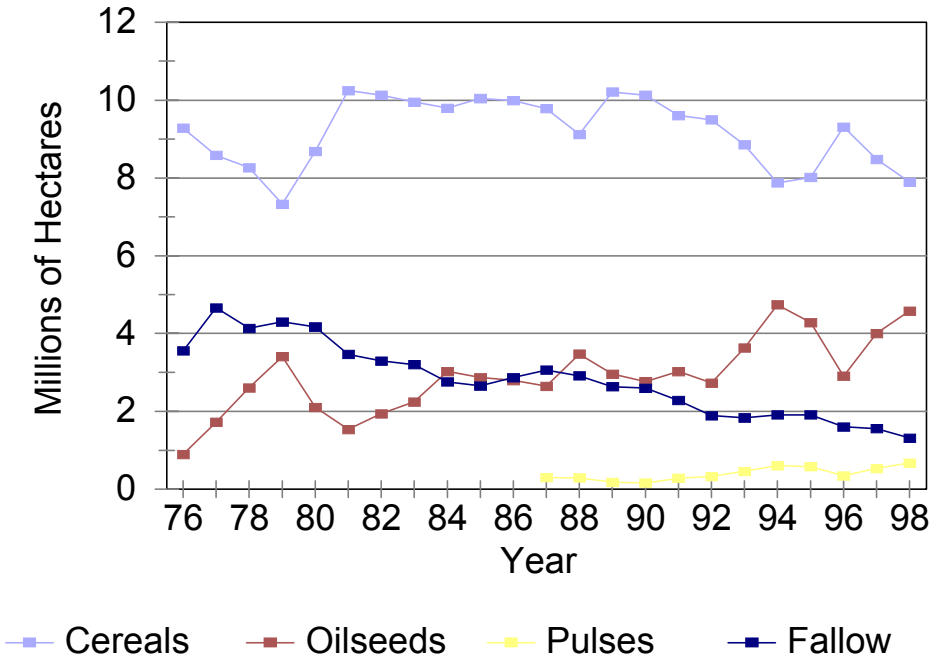
Figure 3. Land Use Trends in the Dark Brown soil Zone



Black, Dark Gray, and Gray Soil Zones

•The arable land in these three soil zones totals 14-15 M ha.
•The largest decline in fallow frequency occurred in the these soil zones (sub-humid region) where fallow area dropped 63% from 3.6 M ha in 1976 to 1.3 M ha in 1998 (Figure 4).
•In the Black and Gray soil zones, about 48% of the seeded area is managed using conservation tillage practices (up from 34% in 1991).
•Although all the cereals tend to vary in area since 1976, there were no sustained trends (Figure 4).
•Spring wheat area has varied between 3.3-6 M ha. Durum is less frequently grown than in the semiarid prairies, with 100,000-300,000 ha grown.
•Barley (2.6-4 M ha) and oats (0.7-1.2 M ha) are more commonly grown in this sub-humid area.
•Pulses (e.g., lentil and field pea) have increased in area from 0.3 M ha in 1993 to 0.67 M ha in 1998 with field pea occupying the majority of this area (Figure 4).
•Canola increased from 1.3 M ha in 1977 to almost 4 M ha in 1998 (Figure 4).
•Thus, since 1976, a decrease of almost 3 M ha in fallow area has been primarily captured by canola (2.6 M ha gain) and field pea (600,000 ha gain).

Figure 4. Land Use Trends in the Black, Gray and Dark Gray Soil Zones



Trends in Rotation Length

With Crop diversification and the reduction of fallow there has been a lengthening of the cropping frequency in recent years in all soil zones. In the 1970's producers in the Brown soil zone cropped (mostly wheat) one year and fallowed the next; in the Dark Brown soil zone they cropped (mainly to cereals) two years in three; in the Black and Gray soil zones they cropped three years in four. Currently, farmers tend to crop three years in five in the Brown soil zone, four years in five in the Dark Brown soil zone and 10 years in 11 in the Black, Gray and Dark Gray soil zones (Table 1).

Table 1. Trends in Rotation Length in the Canadian Prairies

Soil zone	Proportion of land in fallow						Average rotation length[1]					
	1976	1980	1985	1990	1995	1998	1976	1980	1985	1990	1995	1998
Brown	0.47	0.47	0.44	0.43	0.44	0.38	1/1.1	1/1.1	1/1.3	1/1.3	1/1.3	1/1.6
Dark Brown	0.42	0.40	0.32	0.31	0.25	0.20	1/1.4	1/1.5	1/2.1	1/2.2	1/3	1/4
Black and Gray	0.26	0.28	0.17	0.17	0.13	0.09	1/2.8	1/2.6	1/4.9	1/4.9	1/6.7	1/10

Summary

•In the Brown soil zone there has been evidence of crop diversification with increases in pulses and oilseeds, especially since 1987.
•Area of specialty crops has been much more pronounced in the Dark Brown soil zone than in the more arid Brown soil zone.
•In the Dark Brown soil zone, the decrease of about 1.8 M ha in fallow since 1976 has been accompanied by an increase in oilseed and pulse area of 1.9 M ha (1.1 M ha for canola , 150,000 ha for flax, 120,000 ha for mustard, 320,000 ha for peas and 200,000 ha for lentil).
•Since 1976, in the Black and Gray soil zones, a decrease of almost 3 M ha in fallow area has been primarily captured by canola (2.6 M ha gain) and field pea (600,000 ha gain).
•With crop diversification and the reduction of fallow, there has been an intensification of cropping frequency in all soil zones.
•Coincident with the movement to extended and diversify cropping systems has been the growing popularity of conservation tillage management.

Conclusions

In response to increasingly difficult economic conditions for cereal production on the prairies in the past two decades, producers have been forced to diversify by seeding more of their land (reducing fallow) and growing more oilseed and pulse crops. Fortunately the scientific community has played their part by developing cropping alternatives, and improving soil management procedures that have helped facilitate this transformation. Unfortunately, inherent climate restrictions have not allowed this transformation to be implemented uniformly throughout the prairies.

References

Campbell, C.A., Zentner, R.P., Janzen, H.H., And Bowern, K.E. 1990. Crop Rotation Studies on the Canadian Prairies. Public. 1841/E, Canadian Government Publication Centre, Supply and Services Canada, Ottawa, ON. 133pp.