# Agricultural Land Use

## Agri-Environmental Indicators Report

### The Environmental Sustainability of Canadian Agriculture

### Census 2021




Agriculture and Agri-Food Canada
Agriculture et Agroalimentaire Canada
Canada

**Agricultural Land Use**
Agri-Environmental Indicators Report, Census Year 2021

Status**:** National Coverage, 1976 to 2021

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## Summary

Agricultural land use and land management are two important factors affecting the agri-environmental sustainability of farming. Knowledge about the status and trends of agricultural land use and land management practices are key factors to consider for assessing the agri-environmental status and performance of the agricultural sector. Between 1961 and 2021, there was consistent decline in the number of Canadian farms alongside an increase in average farm size. This long-term consolidation, supported by technological advances over the last fifty years, has resulted in the near doubling of average farm size[1].

During the past several decades, environmentally beneficial management practices (BMPs) have been adopted and applied. Examples include the increasing trend towards no-till instead of conventional tillage and the declining trend of summerfallow acreages, especially across the Prairie provinces. This chapter provides a general overview of the status and trends related to livestock numbers, tillage practices, land use and crop area as key factors that can affect the sustainability of agricultural practices. This information also helps to understand and interpret the various agri-environmental indicators, which address specific environmental issues in detail.

## The issue and why it matters

Agri-environmental sustainability depends on the widespread use of agricultural management practices designed to prevent or reduce the degradation of land, water and air. For example, an increase in the area of row crops under no-till or an increase in the amount of land used to grow hay, pasture or other perennial crops can lower the risk of soil erosion and improve the sustainability of soil resources. Conversely, an increase in the area of row crops grown under conventional tillage or without erosion-control measures boosts the risk of soil erosion and reduces sustainability. Similarly, changes in the number, type and location of livestock can have significant implications for air, soil and water quality.

The level of environmental risk may increase or decrease depending on the specific management practices employed, such as the tillage and manure management methods used in crop and livestock production. Reliable information on trends in agricultural land use and management practices over time is essential for assessing the ways in which the environmental sustainability of agriculture is changing. It is also

[1] For more information: Overview of Canada's agriculture and agri-food sector - agriculture.canada.ca

important for understanding risks and opportunities, and for developing practices, policies and programs that foster sustainable agricultural production. This information serves as both vital inputs to the agri-environmental indicators, as well as being key to interpreting the indicator trends. There are several drivers and variables that influence agricultural land use, including but not limited to farm consolidation and intensification, changing consumer preferences and market demands. For instance, a decline in beef and forage production can result in an increase in the area devoted to annual crops. These changes in turn affect other indicators and factors such as biodiversity, soil fertility, erosion risk, risk of water contamination and the agriculture sector's contribution to greenhouse gas (GHG) emissions.

## Agricultural land use and management information

This report presents some of the key changes in land use, cropping practices, tillage practices and livestock populations that occurred between 1981 and 2021 in Canada, based on data from the Census of Agriculture. The potential environmental implications of these trends are identified and explored in more detail in the specific agri-environmental indicator reports.

### Agricultural land use

Different types of agricultural land use may have different potential environmental risks. The total area of farmland in Canada includes field crops, hay and forage crops, fruit, vegetables and other specialty crops, pasture, rangeland and all other land (woodland and wetland, idle land and buildings, yards, gardens and lanes) owned or operated by producers. To present an overview of long-term land use trends for each province and for Canada as a whole, four key census land use variables have been used in this report:

1. Area of cropland (field crops, hay and forage crops; vegetables, fruits and berries, sod and nursery, Christmas trees, excludes summerfallow and pasture)
2. Area of summerfallow
3. Area of pasture (improved pasture and rangeland)
4. Area of "other land" (This encompasses the newly designated "woodlands and wetlands" category, which consists of woodlots, sugarbushes, windbreaks, marshes, bogs, ponds and sloughs; the "all other land" category includes idle land and land with farm buildings, barnyards, lanes and home gardens.)

## Crop types

Different crops and their associated farming practices can have different effects on the environment. In addition to having land use data, it is important to know the crop types that are grown in a given region and the associated temporal trends.

## Tillage practices

More farmers have been implementing sustainable farming practices such as crop rotation and reduced tillage to enhance soil health and productivity. When interpreting land use trends, it is important to consider the land management practices employed by agricultural producers. The practices considered in this chapter relate to tillage and weed control and include the distribution of conventional (intensive) tillage, conservation (reduced) tillage and no-till practices. These have been included in the Census of Agriculture since 1991 using six variables:

1. Area of cropland prepared for seeding using conventional (intensive) tillage (tillage practices that turn over the top 15 to 20 cm of soil, burying plant residues and exposing the soil, followed by secondary tillage to break up soil aggregates and produce a smooth, even seedbed);

2. Area of land prepared for seeding using conservation (reduced) tillage (tillage practices that break up the soil and kill weeds but do not turn the soil over, thus maintaining most of the crop residue on the surface);

3. Area of land prepared for seeding using no-till (management practice in which there is no tillage after one crop is harvested and the next crop is sown; all plant residues are maintained on the soil surface);

4. Area of summerfallow on which weeds are controlled by tillage only (the practice of fallowing traditionally includes periodic tillage during the growing season, which buries crop residue);

5. Area of summerfallow on which weeds are controlled by a combination of chemical applications and tillage (chemical and tillage weed control involves reduced tillage frequency or only spot cultivation);

6. Area of summerfallow on which weeds are controlled by chemicals only (no tillage).

### Livestock

Data on the number, location and type of livestock, together with associated changes over time, are essential for assessing the relationship between agricultural production practices and the health of the environment. The crop and livestock sectors are closely connected, as the cropping systems used by many farms are determined by the feed and manure management requirements of on-farm livestock. In addition, efficient local production of some crop types encourages the development of specific livestock production systems. This relationship between land use and livestock production has significant implications for assessing and mitigating greenhouse gas emissions, soil erosion, surface water and ground water contamination, soil carbon depletion and air quality degradation. In this report, the number of animals in each of the five categories below has been used to identify relevant changes and trends:

1. Dairy cows
2. Beef cows
3. Pigs
4. Poultry
5. Sheep and goats

## Limitations

One of the main concerns related to the analysis of land use, crop, tillage and livestock data is the tendency to interpret individual activities in isolation from other factors, including management practices that are being used but cannot be included due to a lack of data. For example, an increase in potato production may leave larger areas of soil unprotected over the winter; however, if winter cover crops are added to the potato rotation, this helps to mitigate risks and maintain soil health.

Another limitation to the analysis and trends reported in this chapter relates to changes in Census of Agriculture questions over time, and the possibility that the Census questions have been misinterpreted by respondents. For example, in 1981, the area of unimproved pasture was under-reported in the four western provinces because it was aggregated with non-agricultural landuse classes such as marshes. Therefore, the data were not directly comparable with previous years. This also affected the area of total farmland and “other land” categories for each of the western provinces and for Canada as a whole. The interpretation of livestock numbers may be problematic in the case of farm animals (for example, poultry and hogs) that undergo more than one “cycle” per year. The Census reports the number of animals held on-farm at a specific point in time; however, if it is assumed that this total number of animals is resident at the farm throughout the year, the environmental impact may be overestimated if there are time

periods between production cycles when there are fewer or no animals on-site. A more complete description of Census data quality and potential errors is provided by Statistics Canada (2021a).

## Results and interpretation

### Land use

According to the 2021 Census of Agriculture, the total farm area in Canada, which includes cropland, pasture, forest, wetlands and other land owned by agricultural producers, was about 62.2 million hectares. Newfoundland and Labrador had the smallest share of this total farm area at 0.08%, while Saskatchewan had the largest share at 40.1%.

Cropland, which encompasses annual field crops, alfalfa and tame hay, summerfallow, vegetables, fruits, nursery crops and sod, made up the largest portion of agricultural land in 2021, accounting for 57.6% of the total farm area. The total cropland area was 37.1 million hectares, a slight decrease from 2016, indicating shifts in land use and agricultural practices over time. The dynamic nature of Canadian agriculture is reflected in these changes. Table 4-1 illustrates the changes in the proportion of different agricultural land use categories relative to total farmland in Canada from 1976 to 2021.

From 1921 to 2021, and specifically from 1976 to 2021, there has been a general increase in cropland and tame pasture, while summerfallow has shown a decreasing trend at the national level (Figure 1). In provinces like Ontario, Quebec, Prince Edward Island and the Prairie provinces, cropland has consistently been the predominant agricultural land use category since 1976 (with the exception of Alberta in 1976) and has shown a slight upward trend in most regions and across Canada as a whole (Figure 1). While at the same time, the area of improved pasture (tame or seeded) has been declining since 1976 in all provinces except Alberta, Saskatchewan and Manitoba, where it has been on the rise (Figure 2).

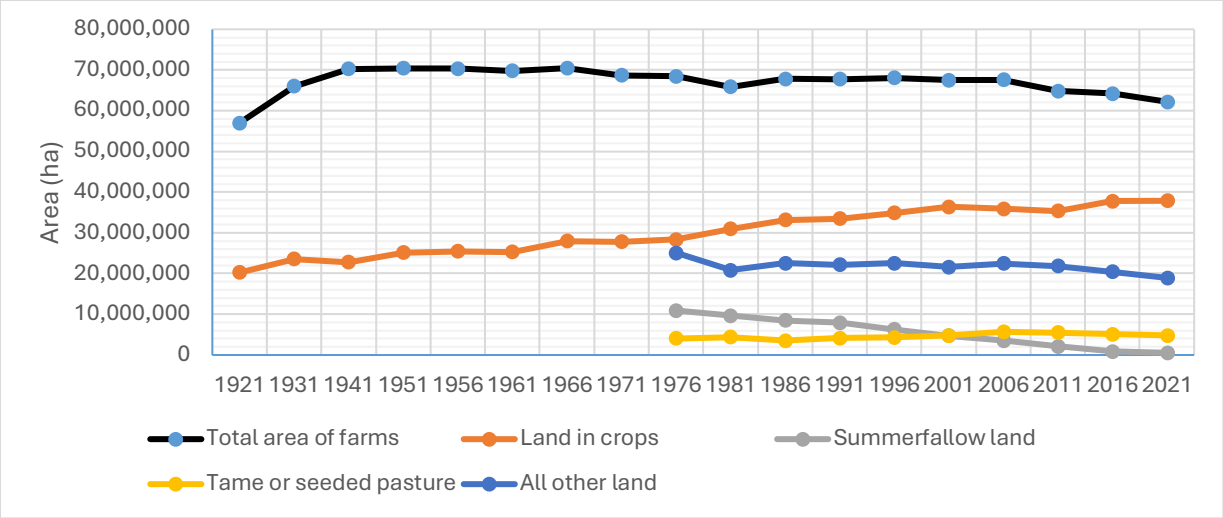



**Figure 1: Temporal variation of use of farmland in Canada (Statistics Canada, 2021b).**

Summerfallow involves leaving a field uncultivated for a year to manage weeds and boost soil moisture levels. In Canada, this practice is predominantly seen in the Prairie region, especially in the semi-arid grasslands of southern Saskatchewan and Alberta. While traditionally, weed control during a fallow year was achieved through repeated cultivation, weed control is now mostly achieved with the use of herbicides (known as “chem-fallow”) which has become more prevalent over the last 30 years.

Since 1976, the use of summerfallow has been on a steady decline across the Prairies. The 2021 Census of Agriculture indicates that the area of land under summerfallow in Canada has continued to shrink, with only 534,157 hectares reported in 2021. This reduction is largely attributed to the adoption of no-till farming, facilitated by the availability of effective herbicides and advanced planting equipment capable of seeding through crop residue on the soil surface. No-till farming offers several advantages, including improved soil moisture retention, reduced risk of soil erosion during fallow periods and lower fuel consumption.

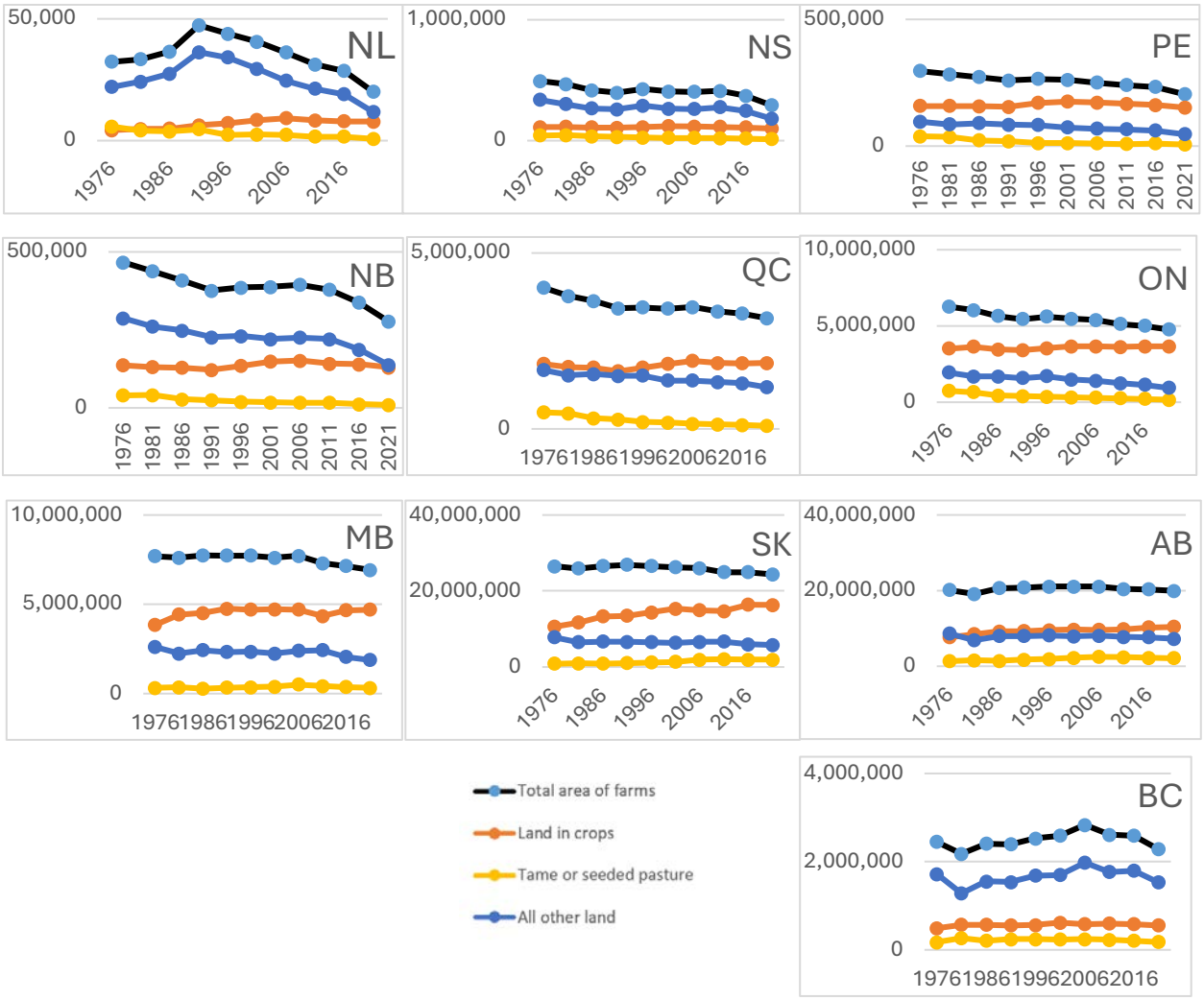
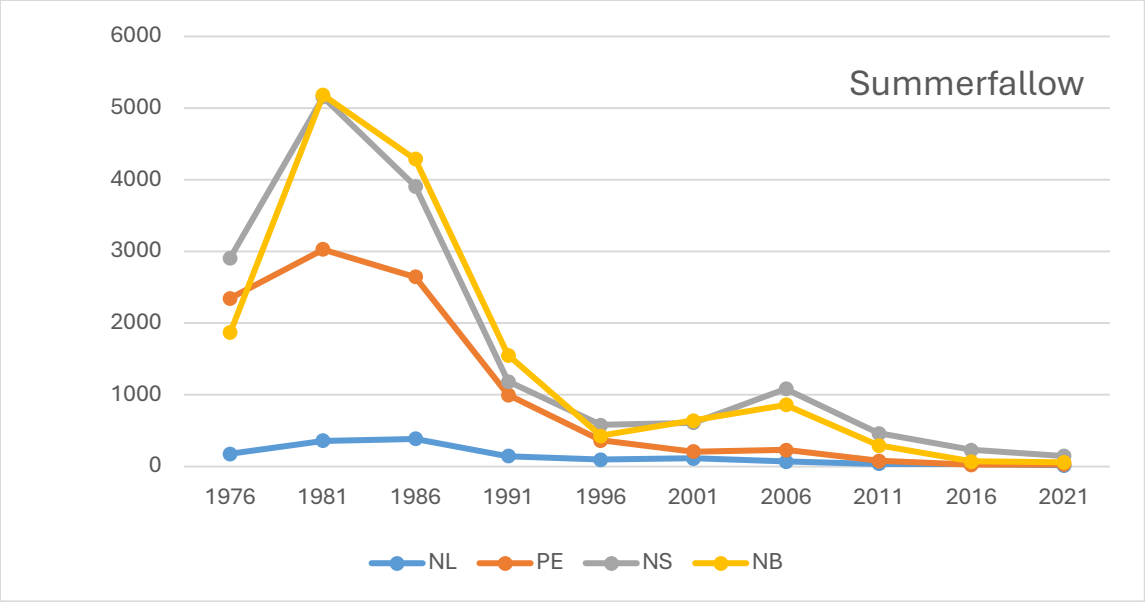


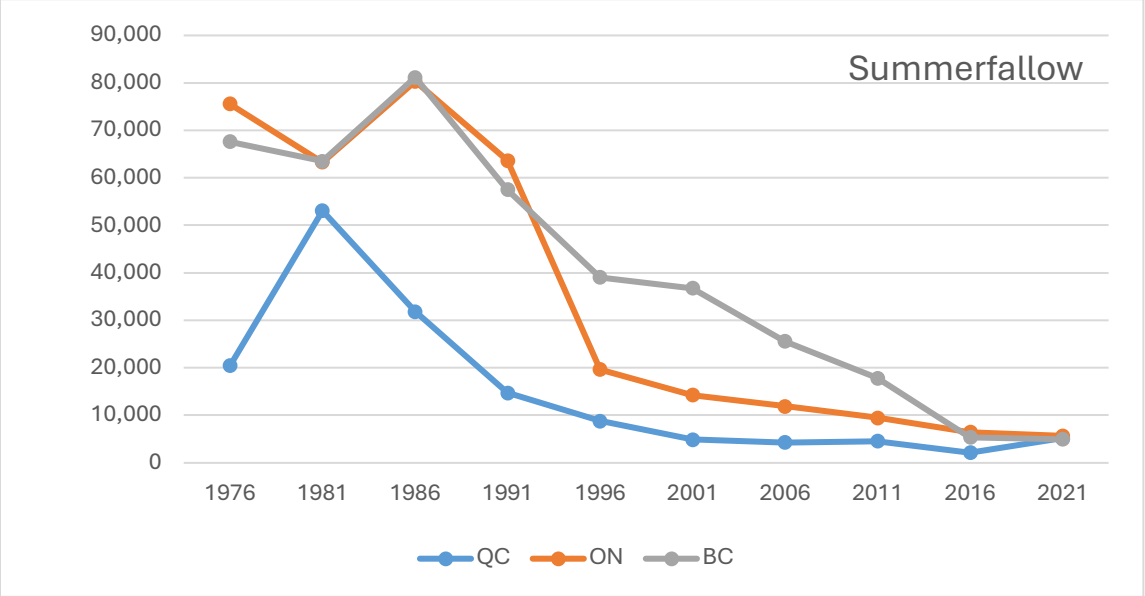

**Figure 2: Temporal variation of use of farmland in provinces (1976-2021) (Statistics Canada, 2021b).**

## Table 1: Agricultural land use as a share (percentage) of farmland, 1976 to 2021 (Statistics Canada, 2021b).

| | Total area of farms | | | | | | | | | | Land in crops | | | | | | | | | | Summerfallow land | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hectares | | | | | | | | | | Percent | | | | | | | | | | Percent | | | | | | | | | |
| Geography | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 |
| Newfoundland and Labrador | 32,398 | 33,454 | 36,561 | 47,353 | 43,836 | 40,578 | 36,195 | 31,302 | 28,630 | 20,002 | 13 | 14 | 13 | 13 | 16 | 21 | 25 | 27 | 28 | 39 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Prince Edward Island | 295,839 | 283,024 | 272,433 | 258,875 | 265,217 | 261,482 | 250,859 | 240,514 | 232,893 | 204,234 | 54 | 56 | 57 | 60 | 64 | 67 | 68 | 69 | 70 | 74 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nova Scotia | 493,293 | 466,023 | 416,507 | 397,031 | 427,324 | 407,046 | 403,044 | 412,000 | 370,553 | 291,392 | 23 | 24 | 26 | 27 | 26 | 29 | 29 | 28 | 29 | 34 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| New Brunswick | 466,780 | 437,888 | 408,893 | 375,631 | 386,019 | 388,053 | 395,228 | 379,526 | 338,046 | 277,363 | 29 | 30 | 32 | 33 | 35 | 38 | 38 | 37 | 41 | 47 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Quebec | 4,008,945 | 3,779,169 | 3,638,801 | 3,429,610 | 3,456,213 | 3,417,026 | 3,462,935 | 3,341,333 | 3,279,267 | 3,144,580 | 46 | 46 | 48 | 48 | 50 | 54 | 56 | 56 | 57 | 59 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ontario | 6,261,705 | 6,039,237 | 5,646,582 | 5,451,379 | 5,616,860 | 5,466,233 | 5,386,453 | 5,126,653 | 4,997,245 | 4,761,559 | 56 | 60 | 61 | 63 | 63 | 67 | 68 | 70 | 73 | 77 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Manitoba | 7,699,651 | 7,615,926 | 7,740,226 | 7,724,990 | 7,732,138 | 7,601,779 | 7,718,570 | 7,293,839 | 7,137,698 | 6,928,630 | 50 | 58 | 58 | 62 | 61 | 62 | 61 | 60 | 65 | 68 | 12 | 8 | 7 | 4 | 4 | 3 | 2 | 1 | 1 | 0 |
| Saskatchewan | 26,511,533 | 25,947,086 | 26,599,354 | 26,865,488 | 26,569,062 | 26,265,645 | 26,002,605 | 24,940,023 | 24,922,881 | 24,388,514 | 40 | 45 | 50 | 50 | 54 | 59 | 58 | 59 | 66 | 67 | 27 | 26 | 21 | 21 | 17 | 12 | 9 | 6 | 2 | 1 |
| Alberta | 20,205,455 | 19,108,513 | 20,655,340 | 20,811,002 | 21,029,228 | 21,067,486 | 21,095,393 | 20,436,150 | 20,335,525 | 19,893,223 | 38 | 44 | 44 | 45 | 45 | 46 | 46 | 48 | 50 | 52 | 13 | 12 | 10 | 9 | 7 | 6 | 4 | 3 | 1 | 1 |
| British Columbia | 2,449,526 | 2,178,596 | 2,411,060 | 2,392,341 | 2,529,060 | 2,587,118 | 2,835,458 | 2,611,382 | 2,590,210 | 2,285,729 | 20 | 26 | 24 | 23 | 22 | 24 | 21 | 23 | 22 | 24 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 0 |
| Canada | 68,425,124 | 65,888,916 | 67,825,757 | 67,753,700 | 68,054,956 | 67,502,447 | 67,586,741 | 64,812,723 | 64,232,948 | 62,195,226 | 41 | 47 | 49 | 49 | 51 | 54 | 53 | 55 | 59 | 61 | 16 | 15 | 13 | 12 | 9 | 7 | 5 | 3 | 1 | 1 |

| | Tame or seeded pasture | | | | | | | | | | All other land | | | | | | | | | | Natural land for pasture | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Percent | | | | | | | | | | Percent | | | | | | | | | | Percent | | | | | | | | | |
| Geography | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 |
| Newfoundland and Labrad | 18 | 12 | 10 | 10 | 5 | 6 | 6 | 5 | 6 | 4 | 68 | 72 | 75 | 77 | 78 | 73 | 68 | 68 | 67 | 59 | | | | | | | | 27 | 28 | |
| Prince Edward Island | 13 | 13 | 8 | 7 | 4 | 5 | 4 | 4 | 4 | 3 | 33 | 30 | 33 | 33 | 31 | 28 | 27 | 27 | 26 | 23 | | | | | | | | 4 | 3 | |
| Nova Scotia | 9 | 10 | 9 | 8 | 6 | 6 | 6 | 5 | 5 | 4 | 68 | 65 | 64 | 65 | 68 | 65 | 65 | 67 | 66 | 62 | | | | | | | | 6 | 5 | |
| New Brunswick | 9 | 9 | 7 | 7 | 5 | 5 | 4 | 4 | 3 | 3 | 62 | 60 | 61 | 60 | 60 | 57 | 57 | 58 | 55 | 50 | | | | | | | | 6 | 5 | |
| Quebec | 12 | 12 | 8 | 8 | 6 | 5 | 4 | 4 | 3 | 3 | 42 | 40 | 43 | 44 | 44 | 40 | 40 | 40 | 40 | 38 | | | | | | | | 4 | 3 | 3 |
| Ontario | 12 | 11 | 8 | 7 | 6 | 6 | 6 | 5 | 4 | 3 | 31 | 28 | 30 | 29 | 30 | 27 | 26 | 24 | 23 | 20 | | | | | | | | 8 | 6 | 5 |
| Manitoba | 4 | 5 | 4 | 4 | 5 | 5 | 6 | 6 | 5 | 5 | 34 | 29 | 31 | 30 | 30 | 30 | 31 | 33 | 29 | 27 | | | | | | | | 20 | 19 | 19 |
| Saskatchewan | 3 | 4 | 3 | 4 | 5 | 5 | 8 | 8 | 8 | 8 | 29 | 25 | 25 | 25 | 24 | 24 | 26 | 27 | 24 | 24 | | | | | | | | 19 | 18 | 19 |
| Alberta | 7 | 8 | 7 | 8 | 9 | 11 | 12 | 12 | 11 | 11 | 43 | 36 | 39 | 38 | 39 | 37 | 38 | 38 | 38 | 36 | | | | | | | | 31 | 32 | 31 |
| British Columbia | 7 | 12 | 9 | 10 | 9 | 9 | 9 | 9 | 8 | 8 | 70 | 59 | 64 | 64 | 67 | 66 | 70 | 68 | 69 | 67 | | | | | | | | 53 | 55 | 55 |
| Canada | 6 | 7 | 5 | 6 | 6 | 7 | 8 | 9 | 8 | 8 | 37 | 32 | 33 | 33 | 33 | 32 | 33 | 34 | 32 | 30 | | | | | | | | 23 | 22 | 22 |


Summerfallow
6000
5000
4000
3000
2000
1000
0
1976
1981
1986
1991
1996
2001
2006
2011
2016
2021
NL
PE
NS
NB


Summerfallow
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1976
1981
1986
1991
1996
2001
2006
2011
2016
2021
QC
ON
BC

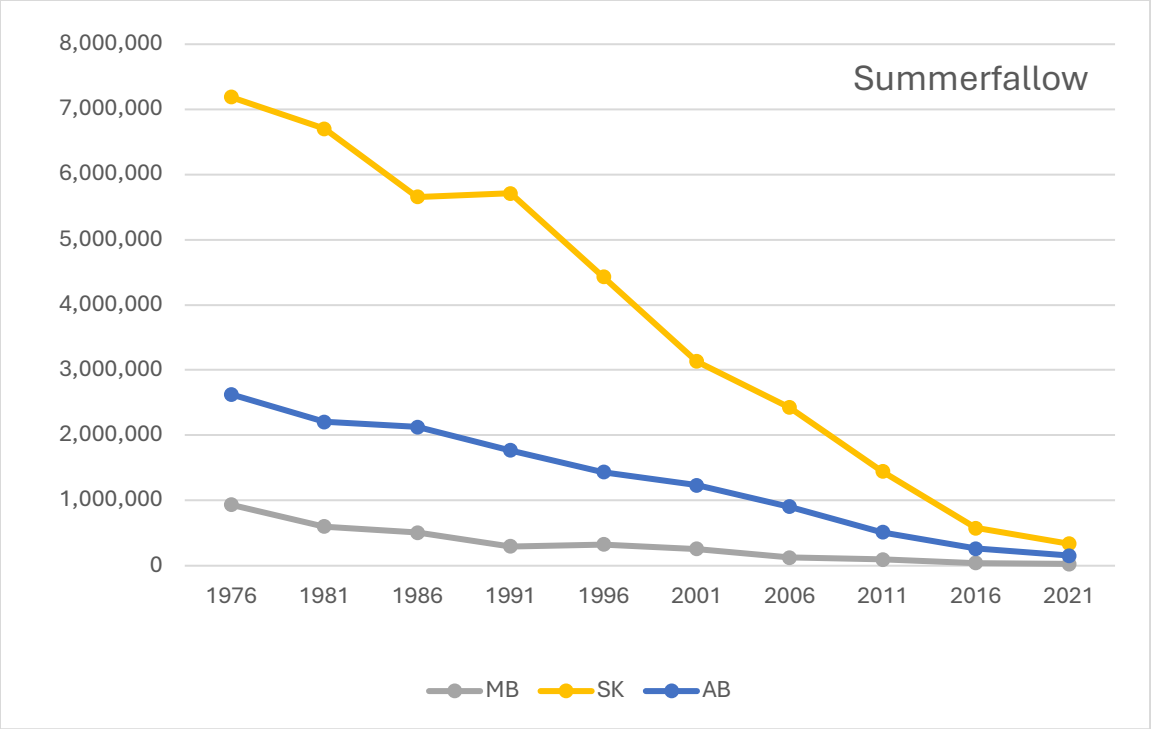



**Figure 3: Temporal variation of summerfallow in different provinces 1967 to 2021 (Statistics Canada, 2021b).**

## Table 2: Share of cropland in various uses, 1976 to 2021 (Statistics Canada, 2021c).

| | Land in crops | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hectares | | | | | | | | | | | | %Cereal Grains/Total Cropland | | | | | | | | | | %Oilseeds/Total Cropland | | | | | | | | | |
| Geography | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | Geography | Unit of me | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 |
| Canada | 28,343,453 | 30,965,812 | 33,181,235 | 33,507,780 | 34,918,733 | 36,395,151 | 35,912,247 | 35,350,270 | 37,790,608 | 37,876,632 | Canada | % | 68.6 | 67.8 | 65.2 | 61.5 | 57.9 | 49.4 | 44.9 | 39.3 | 36.7 | 38.6 | 3.8 | 6.7 | 10.8 | 11.5 | 12.6 | 12.9 | 16.9 | 23.8 | 23.8 | 25.3 |
| NL | 4,301 | 4,744 | 4,876 | 6,274 | 7,180 | 8,435 | 9,175 | 8,344 | 7,940 | 7,810 | NL | % | 6.2 | 6.2 | 5.6 | 3.3 | 2.0 | 3.0 | 1.2 | 1.3 | 3.5 | 4.8 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| PE | 158,448 | 158,280 | 156,498 | 154,103 | 170,361 | 175,488 | 171,296 | 166,209 | 162,005 | 151,814 | PE | % | 44.7 | 46.7 | 46.0 | 41.4 | 37.4 | 36.2 | 32.1 | 27.1 | 28.4 | 28.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.7 | 0.0 | 0.3 |
| NS | 111,667 | 112,782 | 109,512 | 106,231 | 112,364 | 119,219 | 116,609 | 113,672 | 108,232 | 99,972 | NS | % | 15.0 | 17.1 | 11.3 | 12.0 | 10.8 | 9.8 | 7.6 | 6.2 | 6.9 | 7.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| NB | 137,069 | 130,526 | 129,475 | 122,247 | 135,008 | 148,883 | 151,996 | 142,138 | 139,416 | 130,210 | NB | % | 23.1 | 21.2 | 23.5 | 21.5 | 23.0 | 21.8 | 17.6 | 15.4 | 15.9 | 18.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.4 | 2.6 | 0.7 | 0.4 |
| QC | 1,847,507 | 1,756,038 | 1,744,396 | 1,638,453 | 1,738,811 | 1,849,938 | 1,933,274 | 1,874,760 | 1,866,829 | 1,870,575 | QC | % | 23.1 | 23.7 | 22.3 | 19.7 | 16.3 | 17.4 | 16.4 | 12.9 | 13.9 | 12.4 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.4 | 0.9 | 0.8 | 0.7 |
| ON | 3,506,943 | 3,632,727 | 3,457,966 | 3,411,667 | 3,544,927 | 3,656,705 | 3,660,941 | 3,613,821 | 3,650,789 | 3,662,814 | ON | % | 27.1 | 24.6 | 25.6 | 18.8 | 17.8 | 15.2 | 20.3 | 17.5 | 17.2 | 17.0 | 0.2 | 0.2 | 1.2 | 0.8 | 0.6 | 0.4 | 0.3 | 1.0 | 0.5 | 0.5 |
| MB | 3,847,546 | 4,420,369 | 4,519,335 | 4,761,050 | 4,699,146 | 4,714,830 | 4,701,010 | 4,348,869 | 4,666,063 | 4,701,755 | MB | % | 74.1 | 67.5 | 64.5 | 62.0 | 59.8 | 52.3 | 45.1 | 38.0 | 34.8 | 36.2 | 8.7 | 14.9 | 18.7 | 17.6 | 19.1 | 21.3 | 24.6 | 32.8 | 29.1 | 31.0 |
| SK | 10,600,917 | 11,740,864 | 13,325,811 | 13,458,915 | 14,398,651 | 15,375,929 | 14,960,103 | 14,728,934 | 16,385,436 | 16,314,216 | SK | % | 87.6 | 86.5 | 81.4 | 77.6 | 71.2 | 57.9 | 52.1 | 44.5 | 39.7 | 43.1 | 3.7 | 6.4 | 11.0 | 12.4 | 14.7 | 16.4 | 21.1 | 29.7 | 30.3 | 32.2 |
| AB | 7,639,441 | 8,441,242 | 9,162,524 | 9,292,044 | 9,546,547 | 9,728,181 | 9,621,606 | 9,753,849 | 10,223,079 | 10,380,457 | AB | % | 73.7 | 73.8 | 68.9 | 65.0 | 62.8 | 56.7 | 51.8 | 47.6 | 45.7 | 47.0 | 4.4 | 7.7 | 13.1 | 13.6 | 13.9 | 11.5 | 17.6 | 25.8 | 25.3 | 26.9 |
| BC | 489,614 | 568,241 | 570,843 | 556,796 | 565,738 | 617,545 | 586,238 | 599,674 | 580,820 | 557,009 | BC | % | 34.8 | 33.8 | 29.1 | 22.1 | 22.0 | 16.7 | 14.8 | 17.1 | 17.2 | 17.1 | 2.4 | 4.5 | 7.5 | 7.3 | 4.6 | 3.8 | 4.4 | 6.0 | 6.6 | 7.5 |

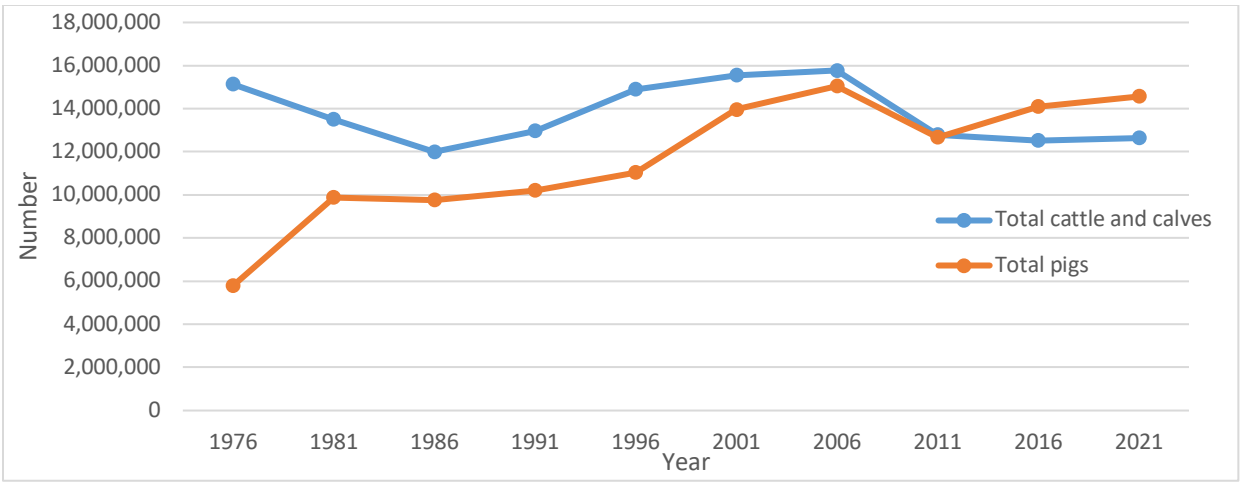
| | | %Corn/Total Cropland | | | | | | | | | | %Potatoes/Total Cropland | | | | | | | | | | %Pulse & Soybeans/ Total Cropland | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Geography | Unit of me | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 |
| Canada | % | 4.3 | 5.0 | 3.9 | 3.9 | 3.8 | 4.2 | 3.9 | 4.5 | 4.9 | 5.0 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.9 | 1.4 | 1.8 | 2.7 | 4.3 | 8.5 | 7.7 | 7.7 | 11.3 | 10.3 |
| NL | % | 0.1 | 0.6 | 0.0 | 0.0 | 0.0 | 1.6 | 7.5 | 3.9 | 2.6 | 1.5 | 11.0 | 8.3 | 4.9 | 4.3 | 4.7 | 3.0 | 3.6 | 2.5 | 1.9 | 2.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.4 |
| PE | % | 3.1 | 1.7 | 1.1 | 0.9 | 1.0 | 1.5 | 1.5 | 3.0 | 4.2 | 6.8 | 13.2 | 16.3 | 16.6 | 20.4 | 25.7 | 24.6 | 23.1 | 21.1 | 20.8 | 22.7 | 0.4 | 0.2 | 1.2 | 2.1 | 1.4 | 1.6 | 2.7 | 12.6 | 11.3 | 7.9 |
| NS | % | 5.6 | 4.4 | 4.1 | 3.0 | 4.3 | 4.9 | 6.2 | 8.6 | 11.8 | 12.1 | 1.3 | 1.4 | 1.5 | 1.7 | 1.7 | 1.7 | 0.9 | 0.7 | 0.7 | 0.4 | 0.1 | 0.1 | 0.3 | 0.3 | 0.5 | 0.7 | 0.9 | 3.1 | 0.0 | 4.5 |
| NB | % | 1.9 | 1.5 | 1.0 | 0.9 | 0.9 | 1.7 | 3.0 | 5.0 | 5.2 | 5.3 | 16.4 | 16.7 | 15.1 | 16.8 | 16.2 | 15.9 | 15.9 | 14.8 | 13.4 | 16.2 | 0.3 | 0.4 | 0.1 | 0.2 | 0.5 | 0.2 | 0.5 | 3.0 | 3.9 | 2.5 |
| QC | % | 9.0 | 14.2 | 16.9 | 19.9 | 21.4 | 26.4 | 23.9 | 24.5 | 24.8 | 24.1 | 0.9 | 1.0 | 1.0 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 0.9 | 1.1 | 0.1 | 0.1 | 0.3 | 1.8 | 5.9 | 8.4 | 9.7 | 15.0 | 19.3 | 20.7 |
| ON | % | 28.2 | 31.4 | 26.9 | 26.3 | 25.0 | 25.7 | 21.0 | 25.8 | 27.2 | 27.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 6.4 | 9.6 | 12.6 | 18.5 | 23.1 | 26.3 | 25.7 | 28.7 | 30.9 | 32.6 |
| MB | % | 0.5 | 2.5 | 0.6 | 1.1 | 0.9 | 1.4 | 2.0 | 2.7 | 4.2 | 5.1 | 0.4 | 0.4 | 0.4 | 0.4 | 0.6 | 0.7 | 0.7 | 0.7 | 0.6 | 0.7 | 0.5 | 1.2 | 1.5 | 1.4 | 1.8 | 3.8 | 5.5 | 7.7 | 15.7 | 14.5 |
| SK | % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.5 | 0.6 | 2.5 | 9.6 | 7.4 | 4.9 | 6.5 | 5.9 |
| AB | % | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.5 | 1.0 | 1.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.1 | 0.1 | 0.1 | 0.9 | 1.3 | 3.2 | 2.9 | 3.2 | 8.1 | 6.3 |
| BC | % | 1.8 | 2.1 | 2.0 | 1.7 | 1.8 | 1.9 | 2.3 | 2.4 | 3.1 | 3.5 | 0.9 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.1 | 0.0 | 0.0 | 0.1 | 0.6 | 0.5 | 0.4 | 0.7 | 3.4 | 3.5 |
| | | | | (Corn for grain + corn for silage) | | | | | | | | | | | | | | | | | | | | (total dry field peas+ total dry field beans +Soybeans) | | | | | | | | |

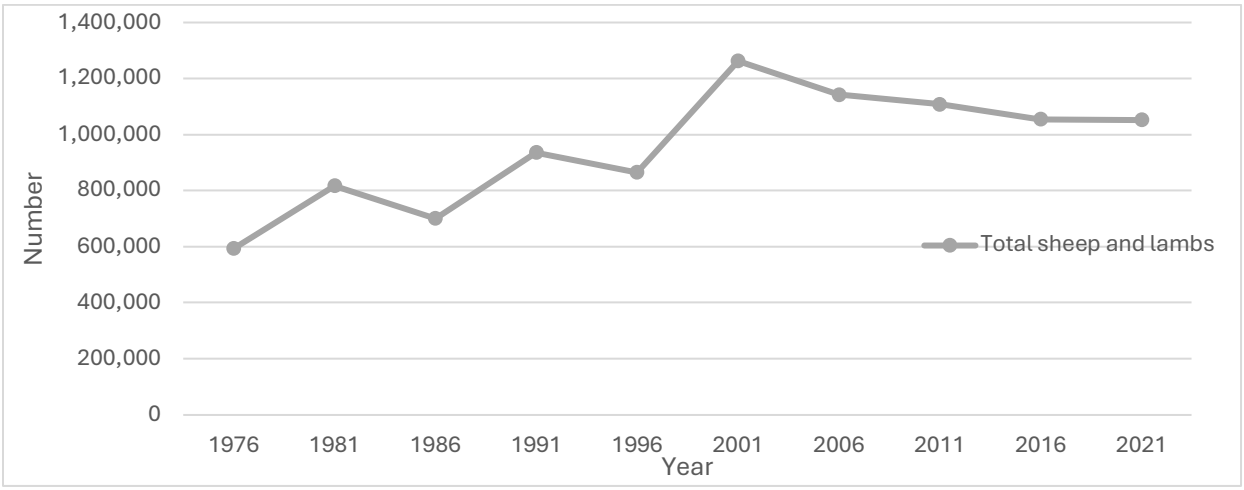
| | | %Forages/Total Cropland | | | | | | | | | | %Total Tree Fruits & Total Berries, Grapes/Total Cropland | | | | | | | | | | %Total Vegetables/Total Cropland | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Geography | Unit of me | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1976 | 1981 | 1986 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 |
| Canada | % | 20.3 | 16.5 | 15.8 | 17.2 | 17.8 | 20.1 | 22.2 | 19.4 | 15.1 | 13.8 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.3 |
| NL | % | 64.5 | 66.8 | 75.3 | 77.9 | 71.2 | 76.4 | 69.8 | 76.2 | 79.2 | 77.9 | 0.6 | 2.1 | 5.1 | 5.4 | 11.7 | 7.3 | 9.7 | 6.9 | #VALUE! | 3.9 | 14.0 | 11.4 | 8.1 | 7.7 | 7.5 | 5.2 | 4.7 | 4.3 | 4.1 | 4.3 |
| PE | % | 35.2 | 31.6 | 32.7 | 32.7 | 32.0 | 33.1 | 37.2 | 31.2 | 30.1 | 28.5 | 0.3 | 0.3 | 0.5 | 0.5 | 1.4 | 1.9 | 2.4 | 3.1 | #VALUE! | 3.6 | 1.5 | 1.1 | 0.7 | 0.8 | 1.0 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 |
| NS | % | 64.5 | 63.0 | 62.5 | 63.5 | 63.4 | 62.8 | 64.7 | 58.9 | 54.8 | 53.1 | 9.1 | 9.6 | 12.2 | 14.1 | 14.6 | 15.6 | 22.7 | 18.7 | 18.3 | 18.6 | 2.7 | 2.8 | 3.3 | 3.6 | 3.2 | 3.0 | 2.3 | 2.4 | 2.2 | 2.2 |
| NB | % | 52.9 | 53.1 | 53.5 | 52.8 | 51.9 | 52.7 | 54.9 | 49.7 | 46.6 | 44.4 | 1.6 | 2.9 | 3.8 | 4.0 | 5.3 | 6.3 | 6.4 | 8.5 | #VALUE! | 12.8 | 2.1 | 2.6 | 2.5 | 2.4 | 1.7 | 0.7 | 0.6 | 0.5 | 0.5 | 0.5 |
| QC | % | 60.6 | 55.0 | 55.9 | 52.6 | 50.7 | 42.2 | 44.2 | 40.9 | 35.2 | 35.4 | 0.7 | 0.8 | 0.9 | 1.3 | 1.4 | 1.3 | 1.5 | 2.1 | 2.3 | 2.5 | 1.8 | 1.9 | 1.9 | 2.2 | 2.3 | 2.4 | 2.2 | 2.0 | 2.0 | 2.0 |
| ON | % | 32.9 | 28.7 | 28.9 | 30.4 | 28.7 | 27.7 | 28.3 | 23.3 | 19.1 | 18.8 | 1.0 | 0.9 | 1.0 | 0.9 | 0.8 | 0.7 | 0.7 | 0.6 | 0.6 | 0.5 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 | 1.9 | 1.7 | 1.5 | 1.5 | 1.4 |
| MB | % | 15.0 | 11.5 | 12.2 | 14.5 | 15.9 | 18.6 | 20.1 | 17.0 | 13.1 | 11.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | #VALUE! | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SK | % | 8.3 | 6.0 | 5.4 | 6.9 | 7.6 | 9.9 | 13.9 | 12.6 | 9.2 | 7.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| AB | % | 20.4 | 16.7 | 16.5 | 18.5 | 20.1 | 25.8 | 25.2 | 21.3 | 16.7 | 15.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| BC | % | 53.8 | 51.1 | 53.0 | 58.6 | 61.5 | 64.9 | 66.8 | 64.1 | 60.0 | 56.9 | 3.2 | 3.0 | 3.2 | 3.3 | 3.2 | 3.2 | 3.4 | 4.1 | 4.4 | 5.0 | 1.5 | 1.4 | 1.3 | 1.5 | 1.3 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 |
| | | | | All Tame Forages | | | | | | | | | | | | | | | | | | | | Total vegetables (excluding greenhouse vegetables) | | | | | | | | |

**Table 3: Proportion of tillage practices and summerfallow under different tillage practices to total land prepared for seeding, for available Census years to 2021 (Statistics Canada, 2016e, 2021e).**

| | Total land prepared for seeding (ha) | | | | | | | Tillage incorporating most of the crop residue into the soil (%) | | | | | | | Tillage retaining most of the crop residue on the surface (%) | | | | | | | No-till seeding or zero-till seeding (%) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Geography | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 | 1991 | 1996 | 2001 | 2006 | 2011 | 2016 | 2021 |
| Canada | 29,028,766 | 28,692,831 | 29,733,424 | 29,048,749 | 29,580,090 | 33,034,182 | 33,923,235 | 69% | 53% | 40% | 28% | 19% | 17% | 14% | 24% | 31% | 30% | 26% | 25% | 24% | 25% | 7% | 16% | 30% | 46% | 56% | 59% | 61% |
| Newfoundland and Labrador | 2,050 | 1,066 | 2,023 | 2,381 | 1,943 | 1,817 | 1,987 | 84% | 88% | 75% | 88% | 86% | 63% | 58% | 8% | 8% | 13% | 6% | 10% | 11% | 9% | 8% | 4% | 12% | 6% | 4% | 25% | 33% |
| Prince Edward Island | 111,720 | 116,826 | 119,241 | 109,972 | 116,802 | 116,717 | 113,439 | 91% | 82% | 76% | 78% | 74% | 72% | 58% | 8% | 16% | 22% | 19% | 22% | 24% | 32% | 1% | 2% | 2% | 3% | 4% | 4% | 10% |
| Nova Scotia | 31,664 | 23,898 | 30,538 | 26,656 | 29,731 | 35,533 | 38,172 | 88% | 77% | 71% | 66% | 60% | 56% | 47% | 8% | 20% | 20% | 20% | 22% | 24% | 26% | 4% | 3% | 8% | 14% | 17% | 20% | 27% |
| New Brunswick | 61,681 | 58,443 | 68,027 | 65,731 | 64,649 | 64,370 | 68,883 | 85% | 80% | 82% | 78% | 68% | 66% | 59% | 12% | 18% | 15% | 17% | 24% | 23% | 30% | 2% | 2% | 3% | 5% | 7% | 12% | 11% |
| Quebec | 851,921 | 830,393 | 1,119,709 | 1,129,051 | 1,183,149 | 1,264,221 | 1,303,341 | 85% | 80% | 77% | 62% | 49% | 41% | 36% | 12% | 16% | 18% | 28% | 33% | 41% | 47% | 3% | 4% | 5% | 10% | 18% | 18% | 17% |
| Ontario | 2,508,344 | 2,495,761 | 2,699,146 | 2,699,477 | 2,863,199 | 3,061,706 | 3,124,036 | 78% | 59% | 52% | 44% | 37% | 38% | 34% | 18% | 22% | 22% | 25% | 30% | 34% | 35% | 4% | 18% | 27% | 31% | 33% | 28% | 30% |
| Manitoba | 4,219,049 | 3,958,497 | 3,922,964 | 3,890,618 | 3,732,780 | 4,168,595 | 4,331,659 | 66% | 63% | 54% | 43% | 38% | 41% | 29% | 29% | 28% | 33% | 35% | 38% | 39% | 42% | 5% | 9% | 13% | 21% | 24% | 20% | 29% |
| Saskatchewan | 13,034,981 | 13,436,507 | 14,094,297 | 13,348,192 | 13,292,917 | 15,202,159 | 15,462,894 | 64% | 45% | 32% | 18% | 10% | 7% | 5% | 26% | 33% | 29% | 22% | 20% | 19% | 18% | 10% | 22% | 39% | 60% | 70% | 74% | 78% |
| Alberta | 7,966,393 | 7,592,353 | 7,472,837 | 7,578,201 | 8,071,783 | 8,866,491 | 9,215,613 | 73% | 57% | 37% | 25% | 13% | 12% | 12% | 24% | 33% | 35% | 28% | 22% | 19% | 22% | 3% | 10% | 27% | 48% | 65% | 69% | 66% |
| British Columbia | 240,964 | 179,085 | 204,642 | 198,472 | 223,136 | 252,573 | 263,212 | 83% | 65% | 65% | 55% | 39% | 36% | 36% | 12% | 24% | 21% | 26% | 32% | 27% | 28% | 5% | 10% | 14% | 19% | 28% | 37% | 36% |

| | Total farm area | Land in crops (excluding Christmas tree area) | Total land prepared for seeding (ha) | Summerfallow land | Chemfallow only | Summerfallow, tilled only | Chemical and tillage weed control on the same land |
|---|---|---|---|---|---|---|---|
| Geography | **2021** | **2021** | **2021** | **2021** | **2021** | **2021** | **2021** |
| Canada | 62,195,226 | 37,876,632 | 33,923,235 | 1.57% | 0.40% | 0.74% | 0.43% |
| Newfoundland and Labrador | | 7,810 | 1,987 | 0.00% | 0.00% | 0.00% | 0.00% |
| Prince Edward Island | 204,234 | 151,814 | 113,439 | 0.02% | 0.00% | 0.02% | 0.00% |
| Nova Scotia | 291,392 | 99,972 | 38,172 | 0.00% | 0.00% | 0.00% | 0.00% |
| New Brunswick | 277,363 | 130,210 | 68,883 | 0.00% | 0.00% | 0.00% | 0.00% |
| Quebec | 3,144,580 | 1,870,575 | 1,303,341 | 0.40% | 0.03% | 0.29% | 0.07% |
| Ontario | 4,761,559 | 3,662,814 | 3,124,036 | 0.18% | 0.01% | 0.11% | 0.06% |
| Manitoba | 6,928,630 | 4,701,755 | 4,331,659 | 0.64% | 0.05% | 0.36% | 0.23% |
| Saskatchewan | 24,388,514 | 16,314,216 | 15,462,894 | 2.16% | 0.60% | 1.04% | 0.52% |
| Alberta | 19,893,223 | 10,380,457 | 9,215,613 | 1.69% | 0.45% | 0.68% | 0.55% |
| British Columbia | 2,285,729 | 557,009 | 263,212 | 1.87% | 0.00% | 1.38% | 0.45% |



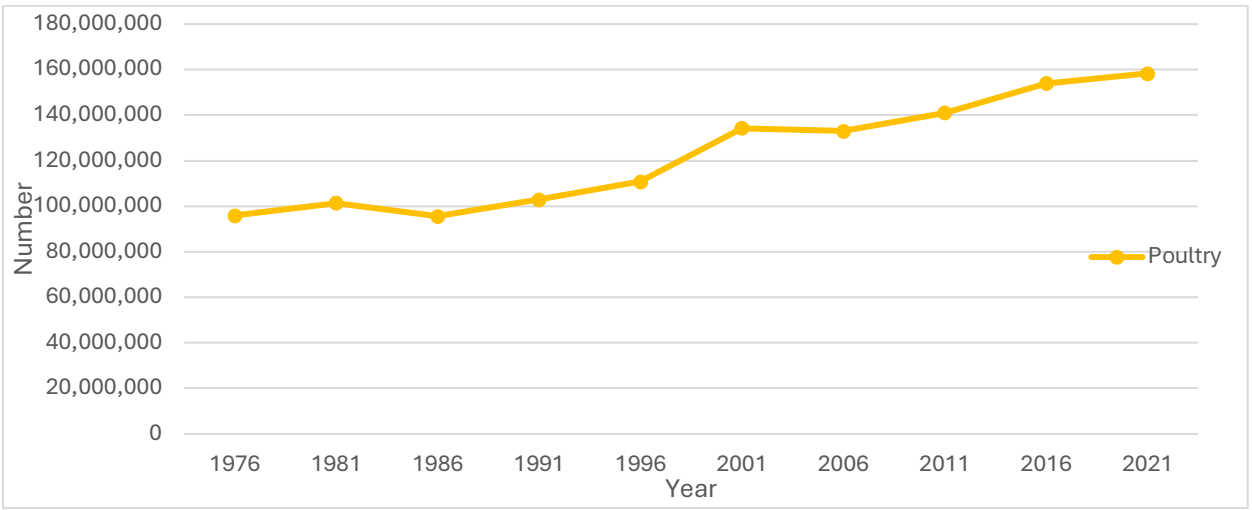




**Figure 4: Changes in livestock populations in Canada from 1976 to 2021 (Statistics Canada, 2021f).**

## Crop trends

The agricultural landscape of Canada has evolved significantly over the years, with major crops like wheat, canola, corn and soybeans leading the way. Oilseed (canola, soybean, flax, mustard, sunflower) and grain (wheat, barley, oats, rye, corn) farms continue to make up the largest proportion of farms in Canada. Considering the number of farms, in 2021 there were 65,135 oilseed and grain farms, accounting for 34.3% of total number of farms. This was followed by beef farms and feedlots with 39,684 farms (20.9%). Together, these two farm types accounted for 82.7% of the total farm area.

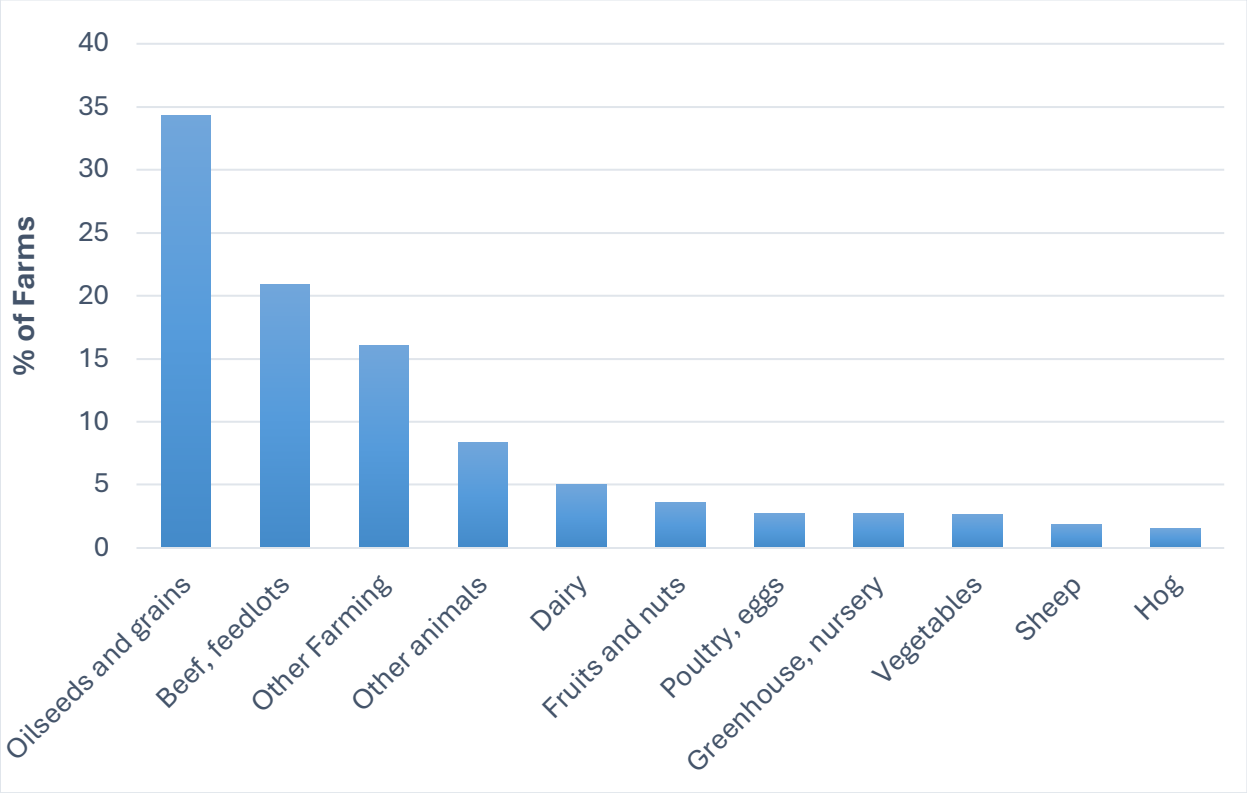



**Figure 5: Proportion of farms by farm type in Canada, 2021 (Statistics Canada, 2021g).**

As indicated in Figure 5, in 2021, the agricultural landscape in Canada was dominated by a few key farm types. Oilseeds and grains farming was the most prevalent reflecting the importance of crops like canola, wheat and barley in the Canadian agricultural economy. Beef and feedlot operations were the second most common, highlighting the significant role of cattle farming in regions such as Alberta and Saskatchewan.

Other farming (16.1%, 30,510 farms), included a variety of smaller-scale or mixed farming operations such as maple syrup and maple production, hops farming, tobacco, herbs and spices, seed production, etc.).

Farm types categorized as “Other animals” (8.4%, 15,873 farms) included beekeeping, horse and other equine production, rabbit farming, fish farms, among others. These combined with dairy (5%, 9,403 farms) contributes to the diversity of Canada’s livestock sector. Additionally, fruit and nut farms (3.7%, 7,101 farms), poultry and eggs production (2.8%, 5,296 farms) and greenhouse, nursery, and floriculture operations (2.8%, 5,256 farms) were significant, though less prevalent.

The remaining farm types included vegetable (2.7%, 5,076 farms), sheep (1.9%, 3,575 farms) and hog (1.6%, 3,016 farms), each contributing to the overall agricultural diversity in Canada. This distribution of farm types underscores the varied and adaptable nature of Canadian agriculture, with different regions specializing in different types of production based on local conditions and market demands[2].

Data from the 2021 Census of Agriculture shows that wheat remained the most widely produced crop in Canada, especially in the Prairie provinces, with increases in durum wheat production. In 2021, wheat was grown on about 9.5 million hectares, a slight increase from the 9.0 million hectares reported in 2016. Canola continues to be a key oilseed crop, although the area of production decreased from 9.2 million hectares in 2016 to 8.6 million hectares in 2021. Corn and soybeans have seen growth, particularly in Ontario and Quebec, as the result of advancements in farming practices and technology, such as the development of newer varieties. Simultaneously, the reduction in beef production and improvements in dairy genetics has resulted in fewer grazing livestock in Eastern Canada, contributing to the conversion of forages into cropland, also helping to increase corn and soybean production. Corn was planted on approximately 1.5 million hectares in 2021, up from 1.4 million hectares in 2016, while soybeans covered about 2.1 million hectares in 2021, down from 2.3 million hectares in 2016 (Statistics Canada, 2021c).

Pulse crops such as lentils and peas have also gained importance over the last 20 years, reflecting a shift towards more diversified cropping systems. Lentils were grown on around 1.8 million hectares in 2021, a decrease from 2.3 million hectares in 2016, and peas were grown on about 1.5 million hectares in 2021, down from 1.7 million hectares in 2016. Overall, Canadian agriculture has continued adapting to evolving market demands and environmental conditions, demonstrating movement towards enhanced resilience and innovation.

[2] Census of Agriculture: Mapping Tool – provides a spatial distribution of dominant farm types.

These comparisons illustrate the dynamic nature of Canadian agriculture, with some crops expanding while others contract, influenced by market conditions, technological advancements and environmental factors.

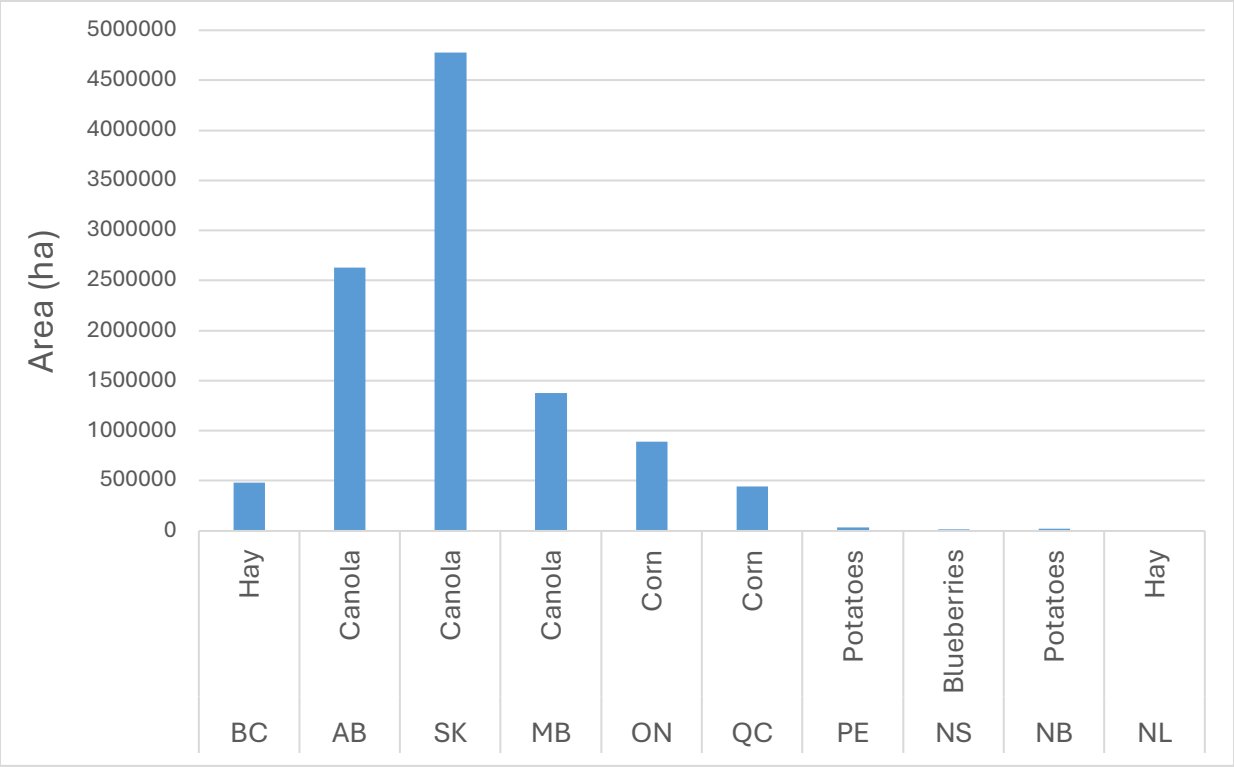



**Figure 6: The most dominant crop (annual or perennial) in each province based on 2021 Census of Agriculture (Statistics Canada, 2021c).**

Between 2016 and 2021, the status of forage crops and pasture in Canada experienced some changes. According to the 2021 Census of Agriculture, the area dedicated to tame or seeded pasture decreased by 4.1%, while the area of natural land for pasture remained stable (slight increase of 0.6%). At the same time, the total area of cropland increased slightly, by 0.3%, to 92.9 million acres in 2021, most of which was dedicated to annual field crops versus forages and hay. Despite these changes, the overall area for forage crops remained relatively stable, reflecting the continued importance of these crops in Canadian agriculture. However, this indicates a shift in land use, with farmers possibly converting tame pasture land to other uses and increasing annual crop production. This suggests a complex pattern of land use change, where, in some regions, land is being transitioned to field crop production. Alberta and Saskatchewan remain significant contributors to forage production.

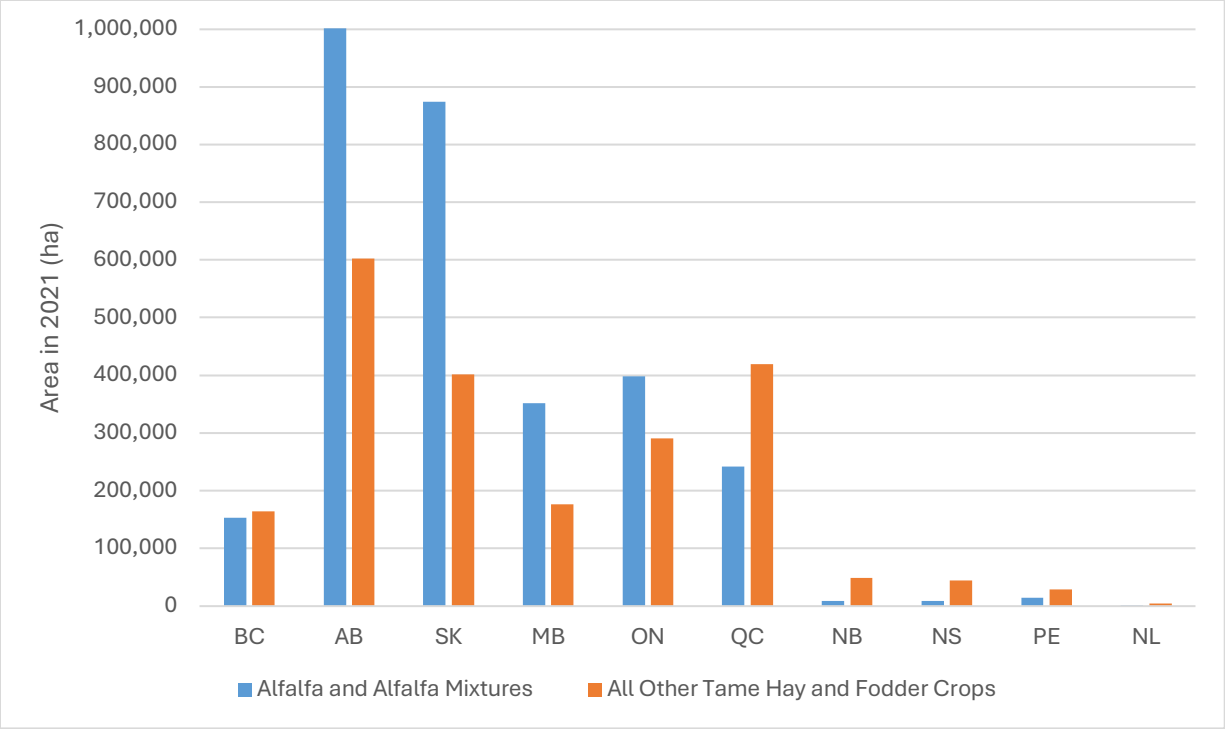



**Figure 7: Forage crops by hectare, by province in 2021 (Statistics Canada 2021i).**

In 2021, the spatial distribution of alfalfa and forage crops in Canada varied significantly across different regions, as reported in the Census of Agriculture (Figure 7), (Statistics Canada, 2021i). Alfalfa, a key forage crop, was predominantly grown in the Prairie provinces, with Alberta, Saskatchewan and Manitoba leading in production. These provinces benefit from favourable climatic conditions and extensive agricultural land suitable for alfalfa cultivation.

Forage crops, including alfalfa, hay and other grasses, were widely distributed across Canada. The Prairie provinces again dominated in terms of acreage, reflecting their role as major contributors to Canada's livestock industry. Ontario and Quebec also had substantial areas dedicated to forage crops, supporting their dairy and beef sectors. In contrast, the Atlantic provinces and British Columbia had smaller but significant areas for forage crops, tailored to local agricultural needs and practices (Statistics Canada, 2021i). This distribution highlights the regional specialization in forage crop production, driven by climatic conditions, soil types and the specific demands of local agricultural industries

## Tillage practices

During the last few decades, many producers have sought to reduce their use of tillage as a means of cutting their fuel costs and improving soil health. The use of conservation tillage and no-till has increased steadily since the early 1990s. The reducing trend of the application of summerfallow is mainly due to the increasing trend of no-till seeding technology and its application. No-till seeding allows the crop residue from the previous crop to trap winter snow, improve soil structure and reduce moisture loss during seeding. From 2011 to 2016, the total area of land seeded using no-till technology increased by 6.8 million hectares in Canada. No-till has become a common land management practice in situations where crop and soil conditions warrant, while tillage (conservation and conventional) is still used where surface residue buildup is a concern.

In 1991, the first Census that asked for information on the distribution of tillage practices, only 6% of Canadian farms reported using no-till, while in 2016 it increased to 59%. By 2021, the adoption of no-till practices continued to rise, with 67% of farms reporting the use of no-till seeding. The no-till adoption rate in Manitoba, Saskatchewan and Alberta has remained very high. The primary drivers for no-till are better moisture retention, decreased erosion, the availability of herbicides, the availability of appropriate seeding equipment and reduced fuel use (Statistics Canada, 2021d).

The adoption of no-till practices in Canada has continued to rise, with 67% of farms reporting the use of no-till seeding by 2021. This increase reflects the growing recognition of the benefits of no-till farming, such as improved moisture retention, reduced soil erosion and lower fuel costs. The Prairie provinces, particularly Manitoba, Saskatchewan and Alberta, have seen the highest adoption rates of no-till practices, benefiting from the availability of suitable seeding equipment and herbicides. While no-till practices have become more common, conservation tillage is still used in areas where surface residue buildup is a concern, helping maintain soil health and structure while reducing the need for intensive tillage. The shift towards no-till and conservation tillage practices has had a positive impact on the environment, reducing greenhouse gas emissions, improving soil health and enhancing biodiversity on agricultural lands.

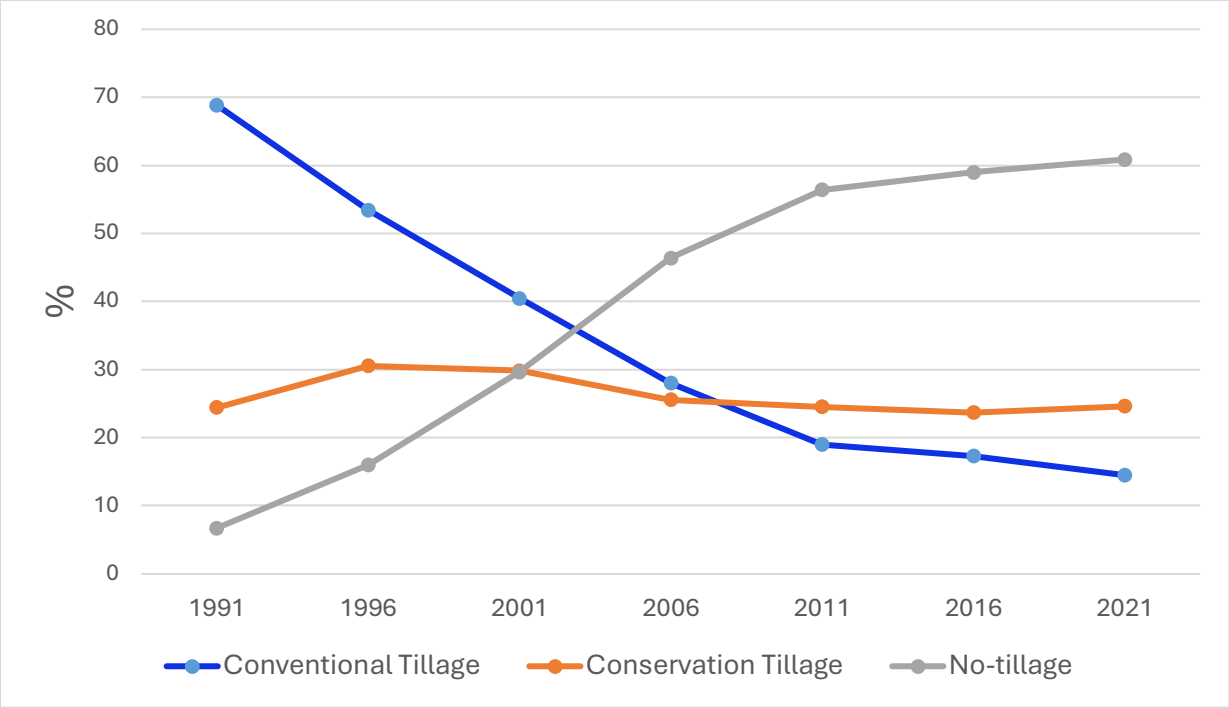



**Figure 8: Temporal variation of tillage practices between 1991 and 2021 in Canada (Statistics Canada, 2021d).**

## Livestock

Based on the 2021 Census of Agriculture, cattle ranching and farming make up 23.5% of all farms in Canada. The Prairie provinces continued to account for just over 80% of the total beef cattle in Canada. In 2021, Alberta had about 1.4 million head feeder beef cattle, which was still more than the combination of all other provinces combined. Quebec and Ontario remained the leading dairy and milk producers. Manitoba continued to have the most hog and pig producers, while British Columbia had the majority of poultry and egg producers (Statistics Canada, 2021e).

The number of farms reporting beef cattle declined by 10.2% from 2016 to 2021, and the number of beef cattle decreased by 3.1% during the same period. Despite fewer dairy cows, milk production rose by 7.5% from 2016 to 2021. The number of farms reporting dairy cows decreased by 12.1%, and the total number of dairy cows fell by 2.8% as farm operations continued to consolidate. Overall, in Canada in 2021, for every dairy cow, there were approximately 4.2 beef cows (Statistics Canada, 2021e).

Pig numbers increased from 14.1 million in 2016 to 14.6 million in 2021, and the number of farms reporting pigs dropped to 7,423. This growth was attributed to favorable market conditions, which boosted the price of pigs relative to the period before the last Census.

The number of farms reporting hens and chickens increased by 16.3% from 2016 to 2021 (Statistics Canada, 2021e).

### Intensity of agriculture

Agricultural land use intensity can be evaluated by looking at the ratio of cropland to total farm area (%) or, more simply, the proportion of farmland that is cropland, particularly annual cropland, as opposed to perennial crops such as forage, hay and pasture. An increase represents a growing proportion of farmland put into annual crop production and thus an increase in the average intensity of farming, while a decreasing ratio indicates a greater proportion of farmland in pasture and unproductive land and thus a decline in production intensity. An increase in the intensity of agriculture does not necessarily correspond to increased environmental risk in all cases. For example, often this trend also indicates that agricultural production is being concentrated on soils and landscapes that are more suited for production, which can moderate environmental impacts and increase sustainability.

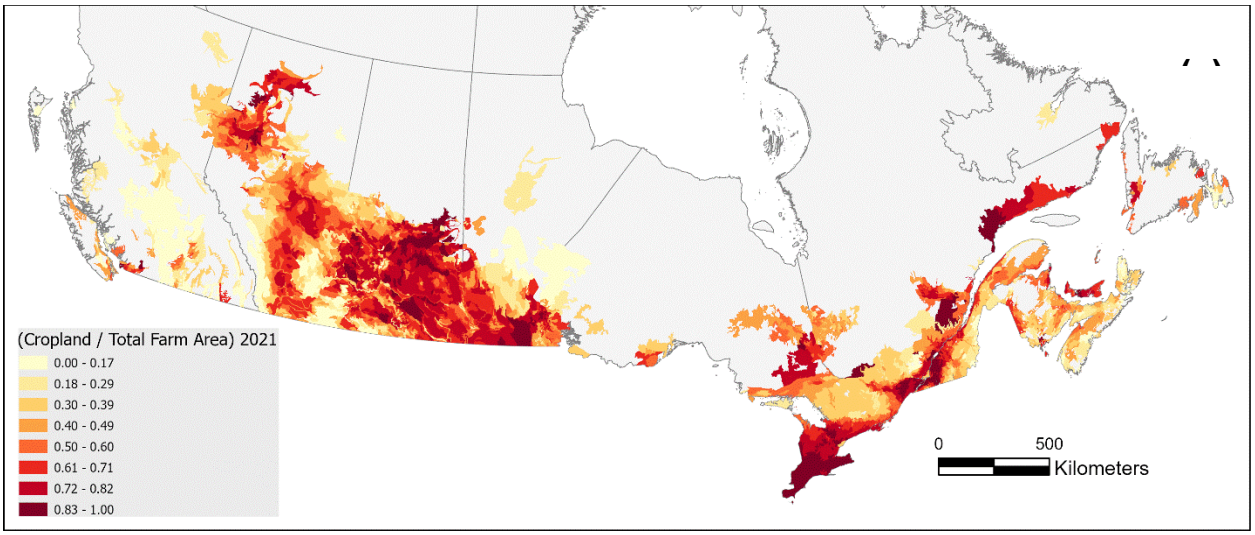
The change in the ratio of Census cropland (annual field crops, alfalfa and tame hay, vegetables, fruit, nursery crops and sod) to total farm area between 1981 and 2021, as an indicator of changes in agricultural intensity, is shown in Figure 9. The map shows that between 1981 and 2021, an increase in agricultural intensity occurred across the major agricultural regions of Canada, particularly in the Mixedwood Plains and most of the Prairies.

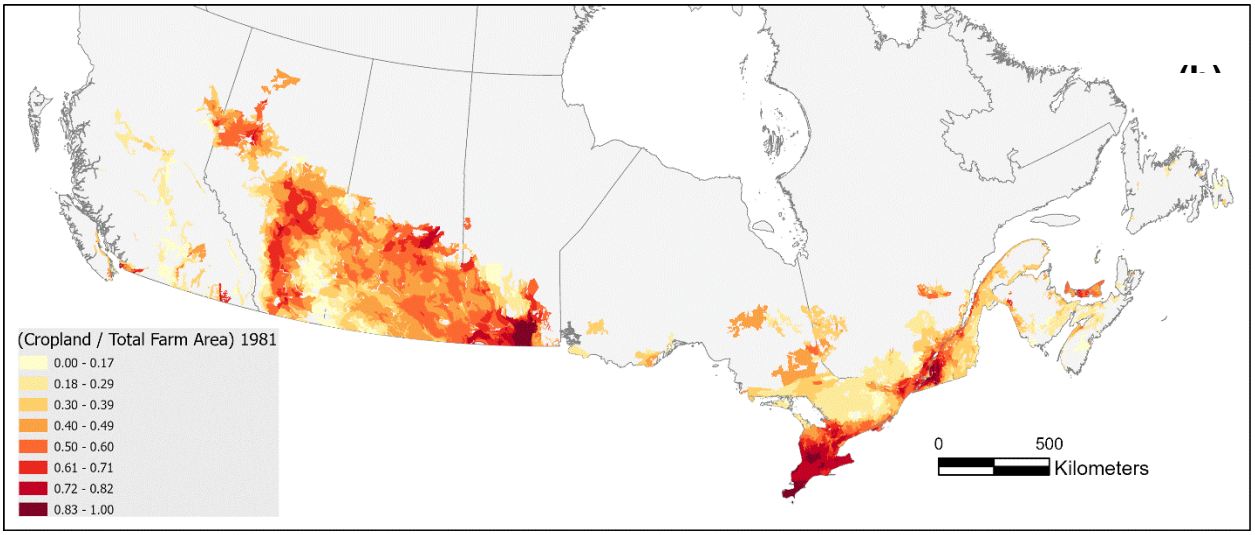
This trend toward increasing intensity was particularly pronounced in areas with the most productive land. On the Prairies, this trend is associated with the decrease in summerfallow, as well as some recent loss in tame hay and forages. East of the Prairies, there is a trend of converting grassland, pasture and idle land to more productive annual and specialty crops as cattle numbers in this region have declined and grain and oilseed market prices have remained relatively strong, providing higher positive returns.

In addition to these trends, the 2021 Census of Agriculture highlighted several other factors influencing agricultural intensity. Technological advancements, such as precision farming and improved crop varieties, have enabled farmers to increase yields on existing cropland. These technologies allow for more efficient use of inputs like water, fertilizers and pesticides, thereby enhancing productivity without necessarily expanding the total farm area.

Moreover, climate change has also played a role in shifting agricultural practices. Farmers are adapting to changing weather patterns by altering crop rotations and selecting more resilient crop varieties. This adaptability has contributed to maintaining

or even increasing agricultural intensity in certain regions despite environmental challenges. Finally, economic factors, including global market demands and trade policies, continue to influence the intensity of agriculture. Strong commodity prices and favourable trade agreements have encouraged producers to maximize land use for crop production, reinforcing the trend toward greater agricultural intensity (Deaton et.al, 2022 and OECD, 2025).



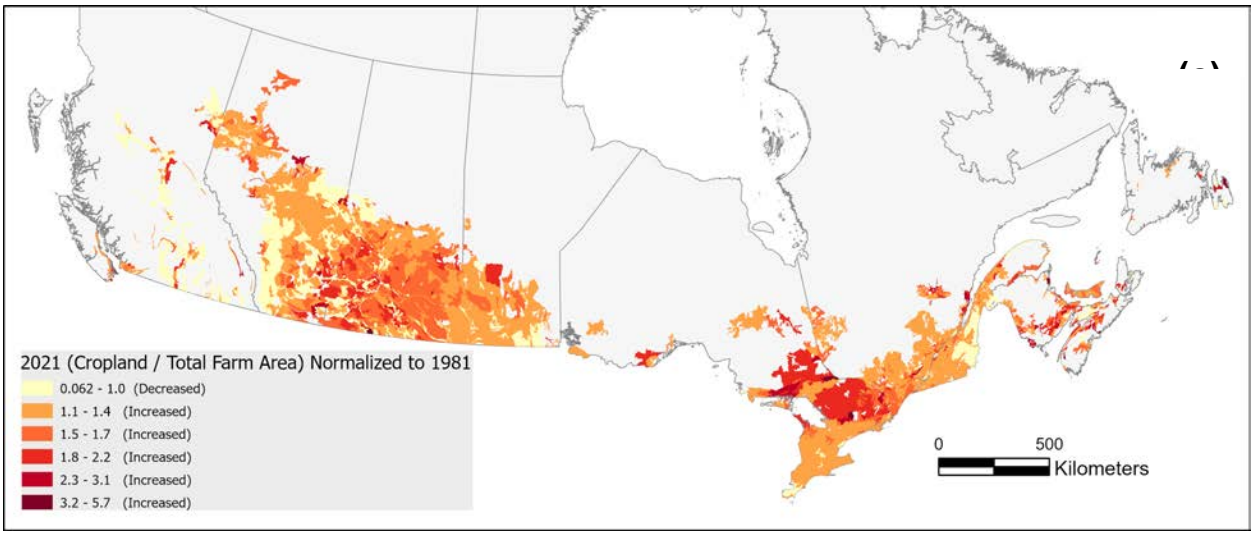



**Figure 9: Agricultural intensity defined as the ratio of cropland to total farm area in (a) 2021 and (b)1981 (based on Cropland Area and Total Farm Area variables of the Interpolated Census of Agriculture to Soil Landscapes of Canada (SLC). (c) Change in agricultural land use intensity between 1981 and 2021 as defined by normalized agricultural intensity of 2021 to 1981. As (c) indicates in most locations agricultural intensity has increased since 1981.**

## A new way to detect agricultural land use change

Agricultural landscape of Canada is dynamic. Forest is cleared and brought into production in frontier regions and farmland is converted to urban/developed uses around towns and corridors. Traditional statistics, especially the Census of Agriculture, are essential for understanding how much farmland exists and how it is used within the census geographical boundaries that are large areas. They do not precisely indicate where land use change has occurred or when the transition took place within a Census five-year interval. A national monitoring approach therefore benefits from spatially explicit, annually updated evidence that complements census totals.

## Identifying agricultural land use change from space

Satellite images record information of the land from the sky. Agriculture and Agri-Food Canada (AAFC) as all other large countries of the world has started to apply satellite Earth Observation (EO) data for various types of agricultural monitoring ranging from annual crop type mapping at the national extent and scale, seeding and harvesting date estimation and mapping, crop yield modelling and mapping and agricultural land use change detecting and mapping. EO-based agricultural land use change can detect locations where land use related to agriculture has changed at some point in time. Two types of agricultural land use change are tracked: (1) forest conversion to agriculture

and (2) agricultural land conversions to developed land (urban, industrial or transportation). By following each location through time, we can identify where and when (approximated year) such changes occurred.

To detect land use change, lasting shifts in multi-year EO-derived data should be considered. For instance, for converted forest to agriculture, the EO signature of forest changes to the EO signatures of agricultural fields in EO time series data and it stays like that for the following years after the change.

The EO approach applies long, multi-sensor satellite time series to directly detect and date transitions in the surface signal characteristics associated with different classes of land cover/use. It is based on analysis of the patterns of time series of primary and derived EO data through time to identify structural breaks and persistent post-change behaviour. For the two transitions of interest: Similarly for conversions of agriculture to developed land, the growing season pattern of EO data time series representing growth and harvesting crop changes and stays completely different where the land is converted from agriculture to urban or other developed area. Forest → Agriculture is detected as an abrupt loss of tree canopy signal, followed by the emergence of stable seasonal crop patterns (a repeatable “green-up / maturity / senescence” cycle).

Agriculture → Developed (urban/industrial) is detected as a sustained loss of agricultural seasonality indicators of impervious or compacted surfaces.

Because the inputs are national and systematic, the approach scales to all agricultural areas of Canada.

Figure 10 shows an example of detecting expected areas with agricultural land use change for conversion of forest to agricultural land between 2000 and 2020 in the northern agricultural fringe of Alberta. In this figure new fields have appeared in the recent EO data or EO-derived data where forests once stood.

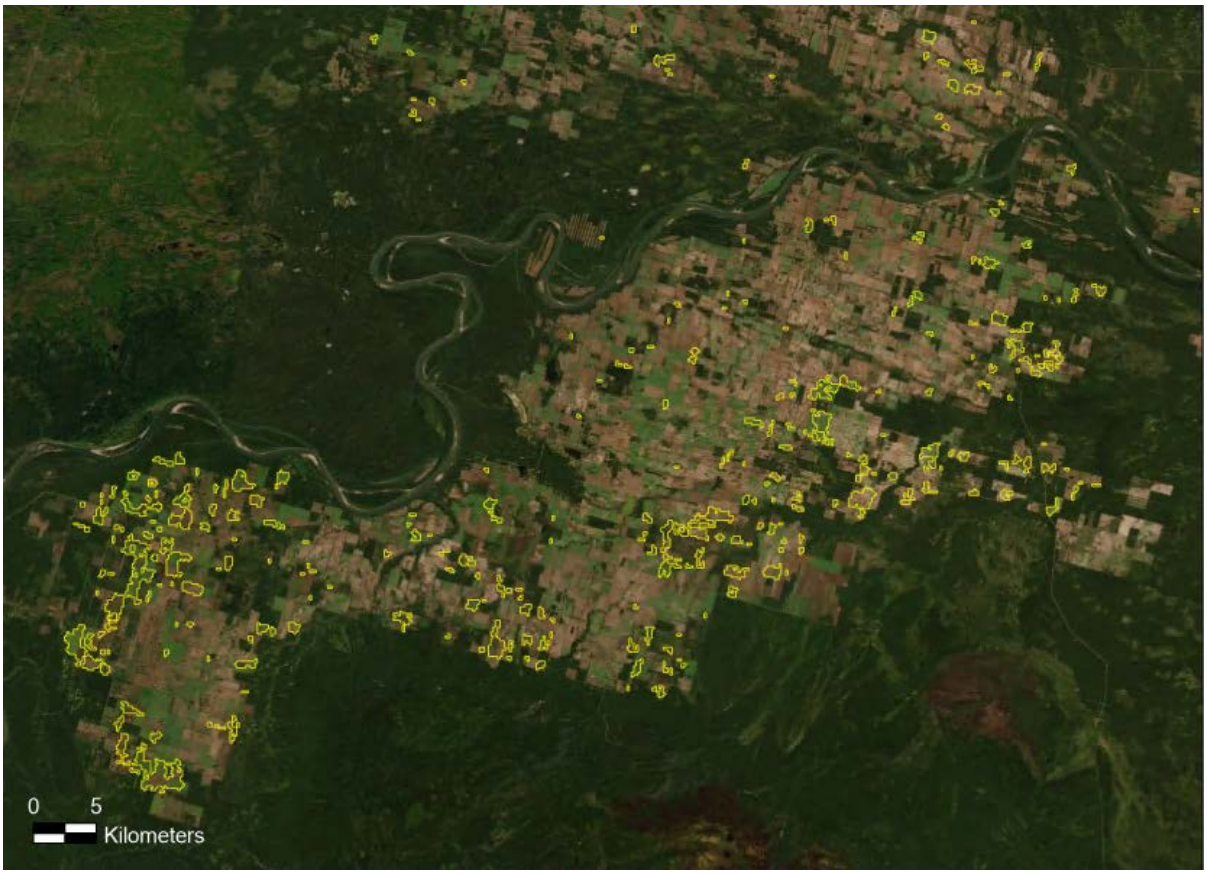



**Figure 10: Example of identified fields (yellow outlines) in northern Alberta where forest was converted to agriculture between 2000 and 2020. Background imagery illustrates the spatial pattern of clearing along the agricultural frontier.**

In many cases such conversions from forest to agriculture are applied gradually over the course of a few years as these deforestations take time. Such transitions of land use can also be detected in EO data (Figure 11).

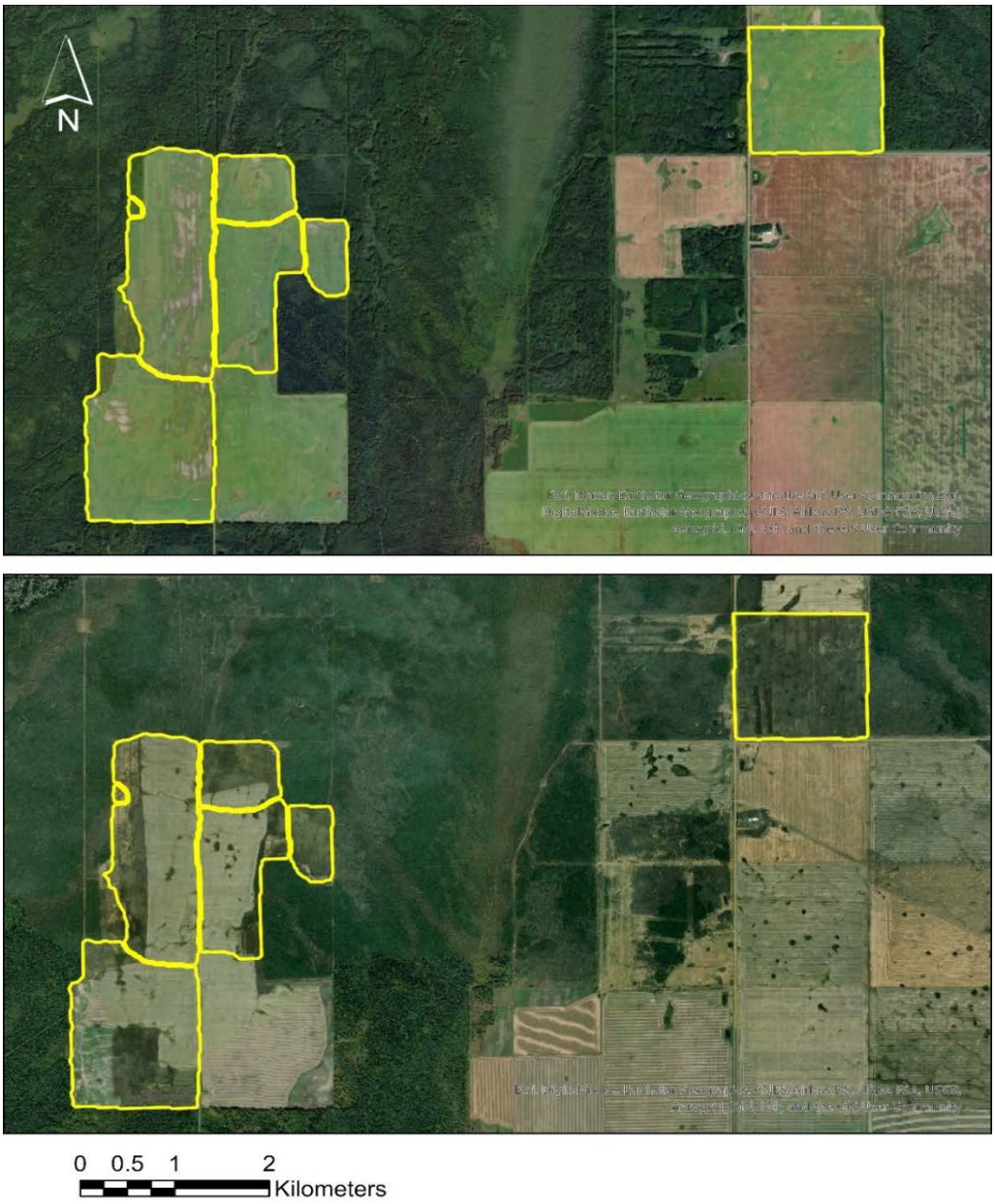



**Figure 11: An example of a local view of staged clearing and conversion from forest to agriculture in northern agricultural regions of Alberta. The bottom panel shows an earlier stage with partial clearing; the top panel shows later conditions with fields fully established. Yellow outlines indicate identified change areas between 2000 and 2020. The background is the 2020 WorldView high resolution image.**

## National-scale mapping and magnitude estimation

Landuse change detection techniques can be applied on all agricultural regions of Canada and adjacent areas to detect and map expected areas of change at the national extent. As more EO-derived data become available annually, such landuse change areas can be fine-tuned and their accuracy can be improved.


**Figure 12: Identified areas of conversion of forest to agriculture between 2000 and 2020 within Canada's agricultural regions (yellow).**


**Figure 13: Identified areas of conversions of agriculture to developed (urban) between 2000 and 2020 within agricultural regions of Cabada (yellow) dominantly distributes around populated areas and roads.**

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