# CANADIAN AGRICULTURE AND WORLD FOOD SUPPLIES

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## 1. IS THERE A WORLD FOOD PROBLEM? WHAT IS THE EVIDENCE

- Television, magazines
- World Population Conference: Bucharest, 1974
- World Food Conference: Rome, 1974

## 2. IF SO, WHERE IS IT SEVERE?

- India: population, poverty, underdevelopment
- Bangladesh: population, poverty, underdevelopment
- Haiti: population, poverty, underdevelopment
- Sahele: poverty, underdevelopment
- Holland: population, no poverty, highly developed
- Japan: population, no poverty, hihgly developed

## 3. IF SO, SHOULD WE TRY TO HELP?

a) Rationally, No: it makes sense to exploit your neighbour for your own immediate gain
- Aristipus (435-360BC): pleasure is the highest good
- Demoscritus (460-370BC): lousy physicist; better philosopher, the true end of life is happiness achieved by inner tranquility
- Epicurus (340-270BC): avoidance of pain is the highest good; eliminate desires by satisfying them; intellectual pleasures are better than bodily pleasures, however.
- Hedonism: the desire for the greatest amount of pleasure egoistic vs. universalistic

b) Rationally, Yes: for world survival - selfish approach
: for love of others - selfless reason
: rejection of Hedonism, triage, the lifeboat ethic
: acceptance of the leadership of people like Eric Fromm, Barbara Ward, Jean Vanier, Mohandas Ghandi

## 4. WHAT IS AN LDC?

- one cannot generalize
- J.K. Galbraith

Model I - The Sub-Sahara African Case (also Haiti): lack of a developed native cultural base: no taxes, schools, government or leadership; army or police in control: lack of infra-structure.

Model II- The Latin American Case (also OPEC countries, Bangladesh): adequate, native elite, products of an undemocratic educational system; large mass of uneducated poor; landlords and serfs; neither the elite nor the poor want to help the country; army in - army out; capital associated with power and not used productively.

Model III- India, Pakistan, UAR, Indonesia: broad cultural base; government planning possible; very rich and very poor but capital not aligned with the army; useful capital in short supply; more needed and can be used; therefore, develop it locally and import it because it can be used effectively.

Recapitulation of models:
Sub-Sahara countries and Haiti; Latin America, Bangladesh and OPEC; India, Pakistan, UAR, Indonesia.
Differentiated through their cultural bases and use of capital.

## 5. WHAT CAN CANADA DO TO HELP?

a) Increase food production at home: costs money
b) Support world food security plans: costs money
c) Encourage food production in LDC: costs money
d) Help LDC to escape from poverty by trading beneficially with them: costs money
e) As individuals, learn about empathy and love; that costs nothing.

## 6. WHAT IS CANADA DOING NOW ON THE NATIONAL SCALE?

a) Increasing agricultural production through:
- studying our land resources and using them efficiently
- studying range land ecology and the use of land not suitable for crops; for raising animals; improving ruminant efficiency
- studying energy consumption and production; energy balance as well as costs; exploiting photosynthesis and nitrogen fixation of plants to save energy.
- through genetics and plant breeding developing new varieties of crops, including forage crops and feed grains for animal nutrition.
- through animal genetics, breeding, nutrition and reproductive physiology increasing the efficiency of muscle protein production; concurrently, increasing use of forage crops, instead of grains, in ruminant feeding.

b) Managing resources better: air, water, land, genes

Air
- Industrial and automobile air pollution reduces crop production and can make the growing of certain crops impossible
- agriculture contributes to air pollution by pesticide sprays, burning of agricultural wastes, e.g. straw, and odors from animal wastes
- remedial action being taken: control of emission from stacks and engines; reduction in use of pesticides; new methods of waste disposal.

Water
- 1 lb. wheat requires 60 gal. water
- 1 qt. milk requires 1200 gal. water
- 1 lb. meat requires 2500-6000 gal. water
- 1 automobile requires 100,000 gal. water
- agricultural production adds little phosphorus to rivers and lakes but city sewage does; agricultural production adds little nitrogen to water but thunderstorms do; food processing plants add greatly to B.O.D. of water supplies, however.
- remedial action is being taken with respect to water treatment.

Land
- arable land in Canada (see Figure 1&2): 50 million hectares suitable for intensive farming; 5% of our total land mass of 1 billion hectares
- land loss (see Figure 3): urbanization, highways, pipelines
- land pollution by municipal waste: heavy metals in sewage sludge
- possible land expansion: Canada (see Figure 4)
  U.S.A.
  Tropics: ecology
- land and climate: land capability (see Figure 5)
- short-term climatic variability: 1974 - wet spring, poor summer, wet and cold fall.
- long-term climatic changes: $30^{\circ}$ - $50^{\circ}$ (Houston-Winnipeg; Cairo-London); little effect
  $50^{\circ}$-$60^{\circ}$ (Wpg.-Ft. Smith; Prague-Oslo); large effect
  $30^{\circ}$-$20^{\circ}$ (Delhi-Bankok: Monsoon); large effect
  - mathematical models require scarce yield data to estimate crop/weather interactions
  - remedial action: plant breeding for early ripening, frost resistance, drought tolerance; irrigation research.

Gene Resources
- recognition that gene resources, like fossil fuels, are not inexhaustible
- preserving genetic resources in gene banks to avoid loss of genetic variability due to breeding and the replacement of land races with highly selected crops or animals

Rationalization of Canada's position
- we have relatively small area for crop production:

| 1975: Crop | Acres (millions) | Bushels (millions) |
|---|---|---|
| Wheat | 23.4 | 628 |
| Barley | 11.0 | 437 |
| Oats | 6.0 | 290 |
| Corn | 1.6 | 143 |
| Rapeseed | 4.0 | 72 |

- we have a small population and therefore can export.
- in terms of production or export, we are not in the major leagues, however.
- a Canadian population in the year 2000 (35 million, 90% urban) is a challenge. We must feed them and still export.

c) Reducing Losses to Crops and Animals
- Insect control by chemicals or by biotic agents such as parasitoids; grasshoppers; biting flies

- Weed control by chemicals, biotic agents such as insects and by cultivation to improve crops and rangelands.
- Disease control by plant breeding for resistance and antisera for animals; quarantines for imported plants and animals; identification and control of disease vectors; control of plant pathogens by chemicals or biotic agents.
- Vertebrate pests: birds; wolves and dogs; rodents
- Reduction in losses during harvesting and storage of crops (fungi, insects, rodents)
- Use of food processing to convert perishable agricultural raw material into readily stored and shipped form.

d) Practicing "Total Agriculture"
- concern for the total system: production, protection, distribution, utilization.
- concern for the quality of rural life to maintain rural populations
- concern for food as well as for agricultural raw materials
- concern for quality as well as quantity of food
- new definitions of quality: Consumer satisfaction
  Processing quality
- food research defined: investigations of the chemical, biochemical, nutritional, physical, functional and aesthetic properties of agricultural raw materials and their components and of the processes required to convert them into valuable foods.

e) Maintaining a strong agricultural research capability to support Canada's agriculture policy
- establish priority areas in agricultural research
- focus the mental and physical resources in industry, university, provincial and federal research organizations on these priority areas.
- encourage in-depth research to establish a base of knowledge
- encourage the application of this knowledge to the problems at hand.

7. TO WHAT EXTENT CAN CANADA HELP INCREASE FOOD PRODUCTION OVERSEAS?

- Through appropriate food aid, e.g. World Food Plan for assistance to building infrastructure
- Through loans of dollars to help develop infrastructure
- Through loans of technical manpower: CUSO, CESO, farmers via CIDA, agricultural scientists via Agriculture Canada to make possible:
  technology transfer and adaptation
  transfer of animal and plant germ plasm
- Through trade to increase income and increase effective demand.

8. TO WHAT EXTENT IS THE GREEN REVOLUTION A REALITY?

a) Research centers exist
- IRRI: International Rice Research Institute, The Philippines (Los Benos), rice.
- CIMMYT: International Maize and Wheat Improvement Centre, Mexico (Mexico City) wheat, corn, barley, triticale (rye-wheat)
- ICRISAT: International Crop Research Institute for the Semi-Arid Tropics India (Hyderabad), millets, sorghums, pigeon peas, chick peas
- CIAT: International Center for Tropical Agriculture: Columbia (Cali), field beans, cassava.
- IITA: International Institute for Tropical Agriculture: Nigeria (Ibadan), cow peas, cassava
- CIP: International Center for Potatoes(Research): Peru (Lima), potatoes

b) Positive aspects
- India has achieved self-sufficiency and no longer requires massive food aid except to off-set grain given to Bangladesh. In only 6 years, and by converting only 1/3 of her wheat acreage to HYV, India has doubled her wheat production
- Mexico tripled her wheat production between 1945 and 1956 by using 90% HYV. Mexican HYV corn acreage, however, is only at the 10% level.
- The Green Revolution(GR) is labor-intensive because the crops require more care and two crops per year means double the labour needs.
- GR appeals to the wealthy, urban government leader through the possibility of lowered imports.
- GR is now attempting to develop information packages to help the small farmer
- The Consultative Group on International Agricultural Research now guides all the institutes.
- GR, now only 10 years old, has only just started to show its potential.
- GR is buying time.

c) Negative Aspects
- GR is a Western-style package for use in non-Western countries.
- GR has run into technical problems, its input costs are high in dollars and energy and it has generally left the poor farmer poorer
- GR is confined to wheat and rice; these HYV's do best on irrigated land and remain heavily concentrated in a few areas.
- High yields in experimental plots (300%) are not borne out in the farmer's field where 100% increase for wheat and 20% increase for rice are realized.
- Larger farms become mechanized. less labor is required, rural unemployment grows and the rich get richer while the poor get poorer.
- Large acreages sown to only a few varieties makes them vulnerable to disease and insect attack and HYV's are more susceptible.
- Narrowing the genetic base of any crop is dangerous; HYV's displace local similar crops whose genes are then lost.
- Double cropping with the same crop help predators proliferate.
- Breeding for resistance to disease is a continuing process which must be done in the country of use; infra-structure is needed.
- The wheat and rice HYV's are generally no more nutritious than the original cultivars. However, because they are high-yielding and bring in more money, the HYV's of wheat and rice has displaced more nutritious crops such as peas, beans and lentils (pulses).
- Traditional peasant agriculture is based on low risk; no one can afford to take chances. The GR is based on maximized output, high input and high risk.
- GR emphasizes massive monoculture and monocropping, whereas traditional farming is based on intercropping.
- Laboratory work in air-conditioned buildings is tending to displace field work - muddy boots and contact with farmers.
- For continuity and viability, the GR must be adopted by the countries that need it and made part of their economy and society.

d) Conclusion
- Algebraic sum is difficult and dangerous to calculate.
- the technology has been developed; the farmer is being shown how to use it; the farmer must have incentives to use it
- the algebraic sum is positive, but not markedly so.

9. WHAT ARE THE MAJOR OBSTACLES TO SOLVING THE WORLD FOOD PROBLEM?

a) Within a country; national problems
- Institutional obstacles: land tenure system
  education system
  extension of knowledge to farmers
  distribution system
  marketing system
- Inferior status of women: waste of valuable assets;
  food and nutrition are home-based, therefore better health for all and probably a reduced rate of population growth
- Employment - equity - income problems compounded by politics, political pressures, political decisions, e.g. cheap food prices to control wages.
- Rapid urban growth without the needed physical or social infrastructure.

b) International Problems
- Lack of a world food security plan: reserves vs. surpluses
- Geopolitical struggles among the great powers
- Differential consumption of resources, e.g. energy, fuel and other strategic materials
- Lack of disinterested commitment by the haves to the have-nots.
- Prevalence of egocentric hedonism in the "Western Democracies".

10. CONCLUSION

a) Resume
- The existence of the world food problem has been accepted
- The sites of severity were identified and LDC's described
- The need to help less fortunate countries was established
- The role of Canadian agriculture in Canada's contribution was examined
- The extent of which agricultural production overseas could be increased was assessed.
- The major obstacles to progress were reviewed.

b) Individual involvement
- During this presentation, too much emphasis was given to what Canada could, or should, do and inadequate attention given to what individual Canadians can and should do.
- To quote McLean's Magazine, "We cannot continue to behave stupidly; we must act or perish."
- To quote the Hon. Eugene Whelan, "The gut issue is Canada's concern for

the hungry and poor in other nations. How much are we willing to sacrifice in order to help our less fortunate brothers?"

c) Mohandas Ghandi's list of cardinal sins of mankind;
   1. Politics without principles
   2. Commerce without morals
   3. Education without character
   4. Wealth without work
   5. Pleasure without conscience
   6. Science without humility
   7. Worship without sacrifice.

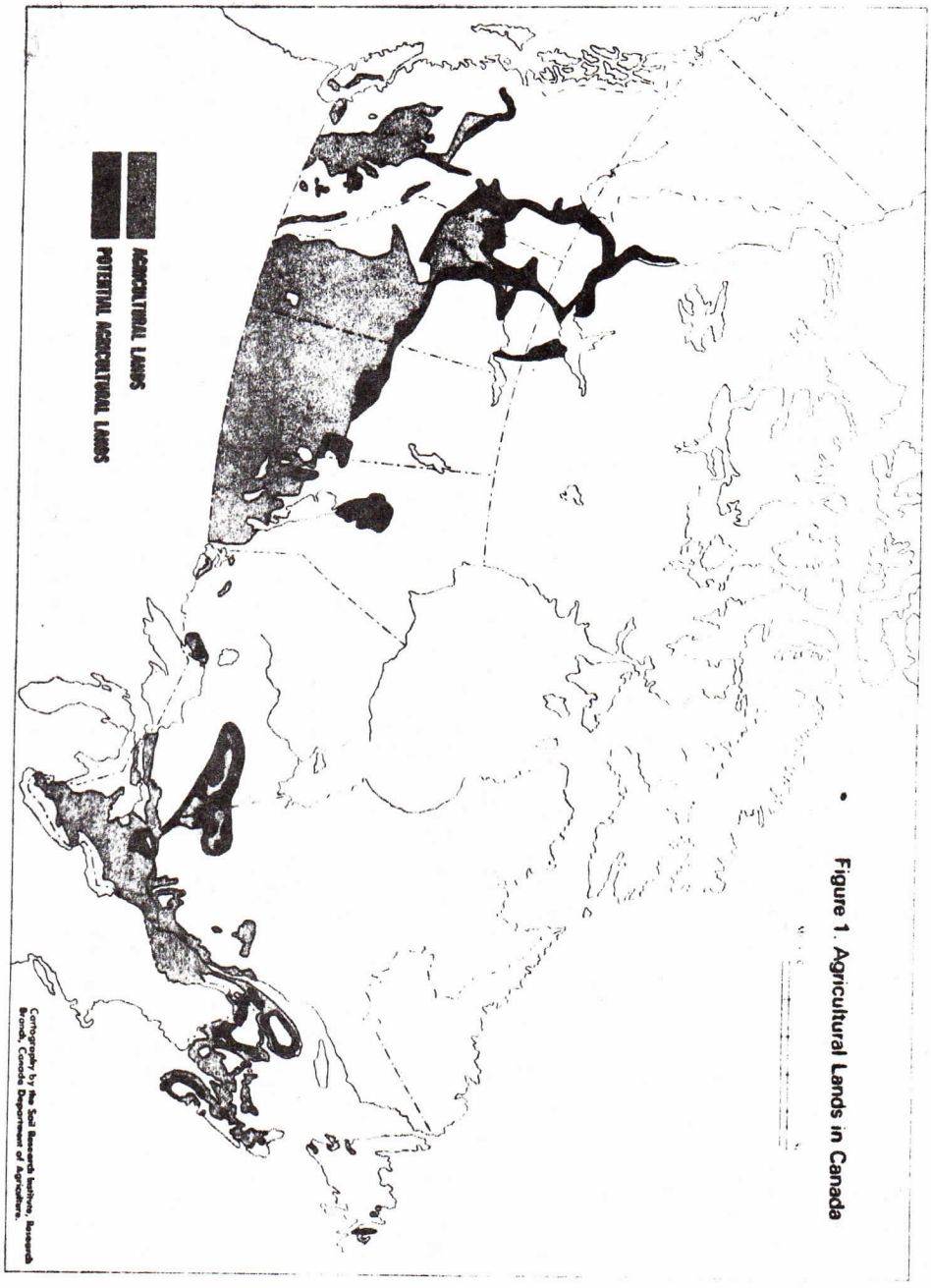


Figure 1. Agricultural Lands in Canada

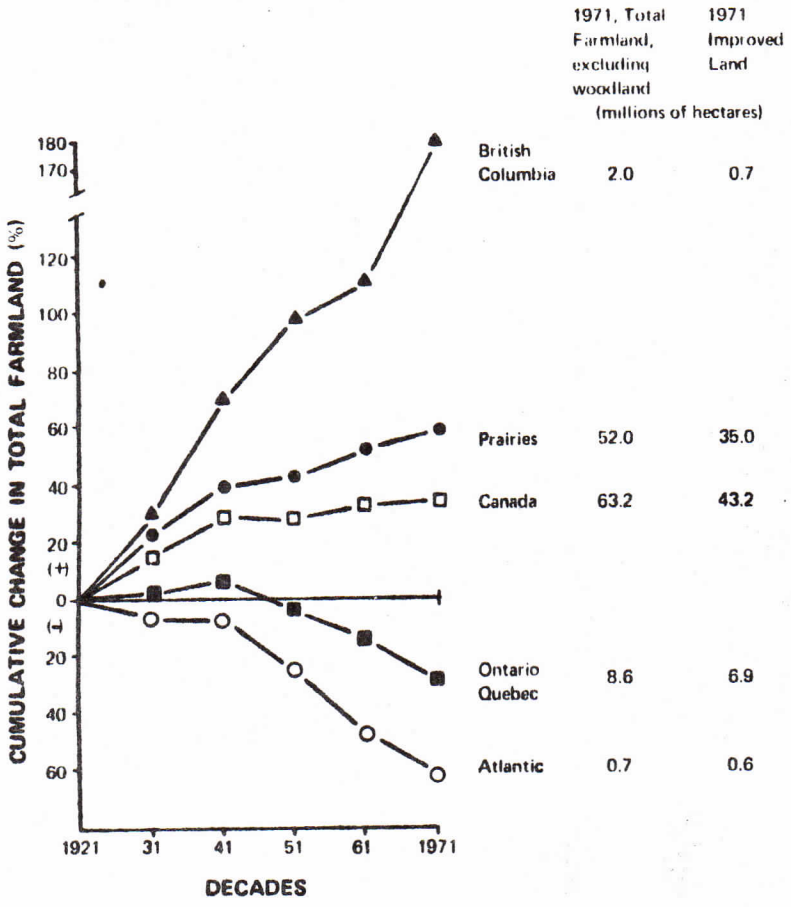


Figure 2. Change of total farmland (excluding woodland) in major agricultural regions of Canada

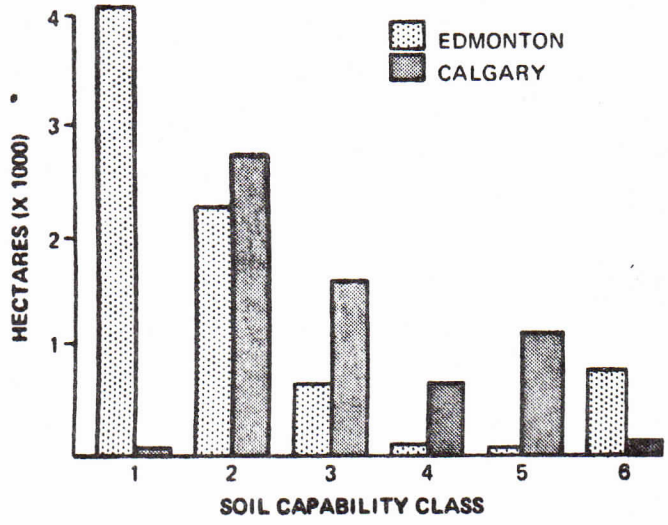


Figure 3. Hectares of agricultural soil capability classes taken by urban development of Edmonton and Calgary between 1966 and 1973

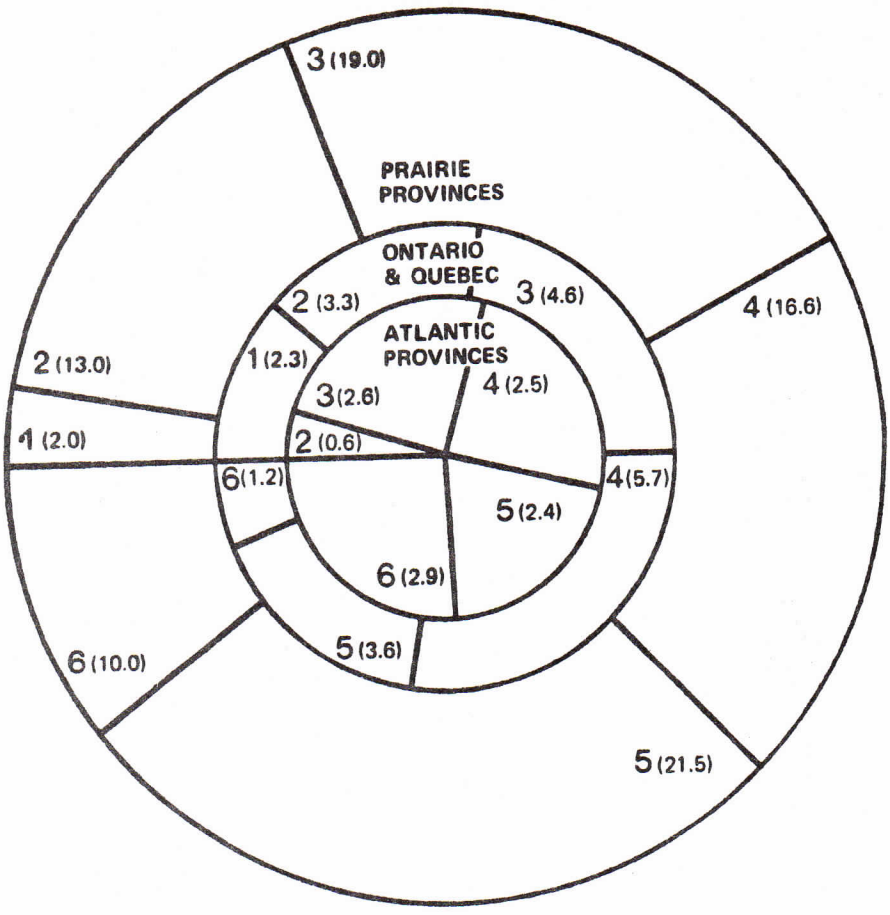


Figure 4. Areas of capability classes (millions of hectares) in different agricultural regions. Note: All area segments orginate from the centre.

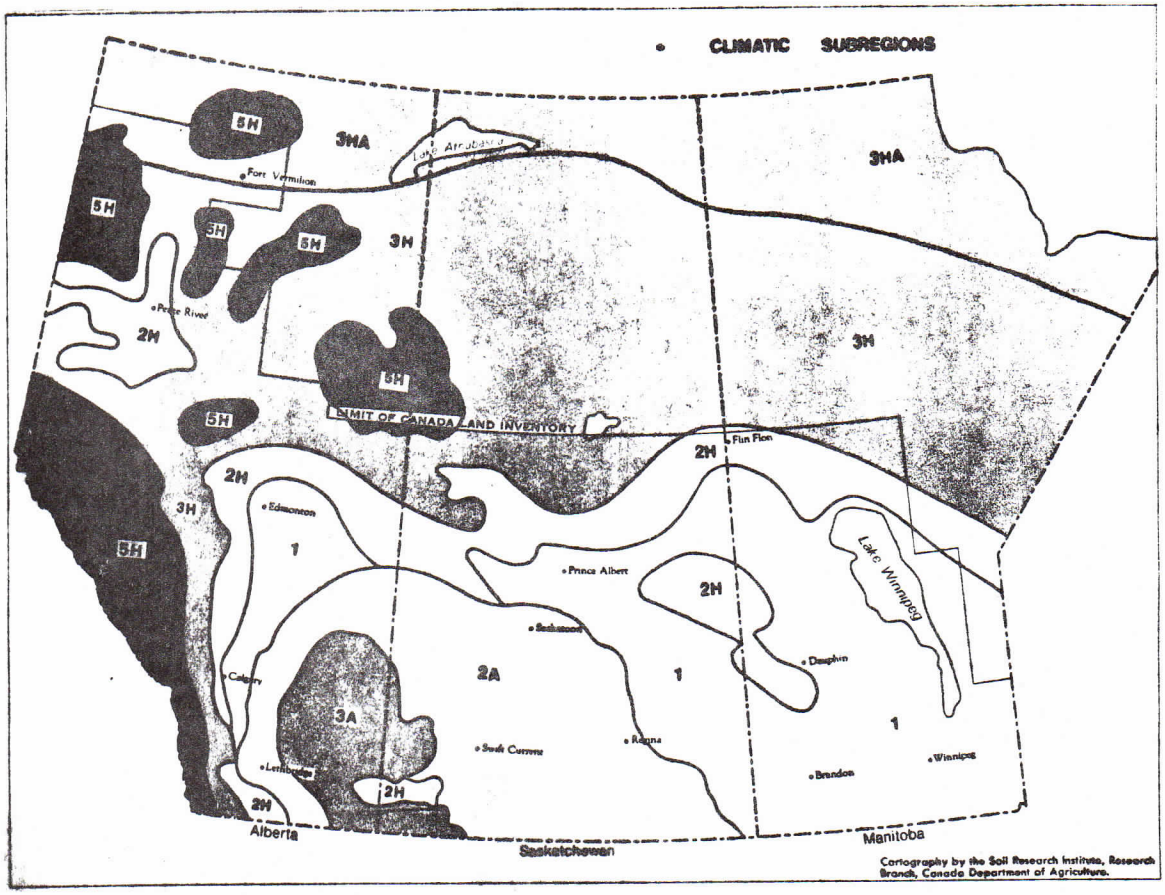


Figure 5. Agro-climatic subregions of the Prairie Provinces.