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AGRICULTURE SOIL CONSERVATION IN CANADA

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INTRODUCTION

In Canada, the degradation of agricultural soils has been an ongoing phenomenon since the turn of the century. Its main causes — wind, surface water runoff, salinity, acidity, compacting and the loss of organic matter — lead to productivity loss that has to be compensated for through the use of more fertilizer. Bad agricultural management practices are also a factor in the degradation of soils.

It is only recently that farmers and official agencies have understood the link between agricultural production and maintaining soil quality. Putting an end to soil degradation has become an important part of ensuring that farming continues to be economically viable. Thus soil conservation is part of the overall challenge of sustainable agriculture, along with manure management, and wise use of pesticides and chemical fertilizers.

BACKGROUND

The climate in the eastern part of the country and the farming practised at the turn of the century fostered good land management and improved soil fertility. Conversely, degradation of soils became a problem in the Prairies where huge sectors of natural grassland had been ploughed without regard for the stability of the soil or its crop capacity. Agricultural practices imported from Europe, the east of Canada or the United States were not appropriate for the arid Prairie soil and, as the population in western Canada grew, the problems associated with agriculture became more and more visible. (In the late '20s, there were over 10,000 abandoned farms in southern Alberta alone.) The prolonged drought and the depression of the "dirty '30s" made things even worse for that region. After a research station was established in 1992 in Swift Current, Saskatchewan to develop crops adapted to the "Dust Bowl" and the Prairie Farm Rehabilitation Administration (PFRA) was set up in 1935, soil conservation became a priority for western Canada.

Having survived the western drought and the country-wide depression, Canadian agriculture entered an expansionary phase when production had to be increased in response to the demand from new markets opened up by the Second World War. Technological progress in the areas of pesticides, fertilizers and new varieties of field crop seed totally changed farming techniques. The idea that some soil-impoverishing crops (corn, soya) should alternate with crops (legumes) that improved soil suddenly became obsolete and the era of monoculture was born. Farming techniques inevitably leading to the degradation of soils began to be used all across the country. The phenomenon of soil degradation was no longer limited to the Prairies and the government's promotion of several conservation initiatives was overtaken by the technological revolution. In fact, high prices and the availability of fertilizers and pesticides that seemed to compensate for the effects of soil degradation diverted attention away from the soil resource.

The 1977 drought and those of the '80s together with a decrease in farm prices, raised awareness of the problems engendered by the soil erosion and salinity. It was seen that technology could not solve all the farmers' problems and that high production costs and low yields demanded that efficiency be increased; this perception led to a renewed interest in soil conservation techniques, both by farmers and the various levels of government.

CAUSES AND CONSEQUENCES OF SOIL DEGRADATION AND SOLUTIONS

Drought and allowing land to lie fallow were the main causes of the wind erosion in the Prairies during the '30s. We now know that during periods when fields lie fallow other kinds of soil degradation, such as salinity, loss of organic matter and erosion, can result from surface water runoff. Excessive tillage, farming of marginal land, cultivation of low residue grains and stubble burn-off are other popular practices that degrade soils.

In 1983, PFRA's Water Conservation Branch estimated that loss of income due to soil salinity amounted to \$257 million annually. Losses due to wind erosion and surface water runoff were estimated to be some \$368 million a year. More generally, in 1987, Agriculture Canada estimated that soil degradation was costing \$1.3 billion and that this figure would increase to \$2 billion a year by the end of the century.

During the '80s, PFRA made numerous recommendations for limiting the impact of climatic conditions on soil degradation; for example, leaving stubble in place, and ensuring a minimum of agricultural production to maintain the ground cover. At present, many farmers have adopted such soil conservation practices as direct seeding, decreasing tillage of the soil, and using forage crops on marginal lands - all innovative strategies that decrease the impact of activity on the soil. However, they are not effective enough during a drought or when growing low residue grain crops. In those cases, permanent conservation solutions, such as wind-breaks, grassed waterways, stripped cropping, and barriers consisting of perennial grasses, are needed.

To add to these soil conservation techniques, biotechnology researchers are trying to develop crop varieties that adapt to difficult conditions (higher salinity soils, drought resistance) or that support no-tillage planting.

FEDERAL INITIATIVES

The first firm commitment with respect to soil conservation policy was the renewal of the Economic and Regional Development Agreement (ERDA). Provisions concerning the conservation of soil and water resources were included in the ERDAs signed by the federal government with Alberta, Prince Edward Island, British Columbia, Alberta and Saskatchewan.

The federal government's intention to come to grips with this problem was confirmed in late 1985, when the Premiers' Conference put soil conservation on its agenda. The conclusions were included in the National Agricultural Strategy published in November 1986.

Implementation of this strategy led to the National Soil Conservation Program whereby by the federal government and the provinces negotiated agreements on soil and water conservation with a view to promoting demonstrations, research, technical and financial aid, and monitoring with respect to soil conservation, as well as raising public awareness of it. Agreements signed with the Yukon, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia, New Brunswick and Prince Edward Island were perceived as models whose features should be extended to all aspects of sustainable agriculture. In 1993, this program was replaced by the Green Plan.

In 1998, a new National Soil and Water Conservation Program was unveiled. The \$10 million reserved for the Program is to support the Sustainable Development Strategy of Agriculture and Agrifood Canada by funding projects, targeted to conservation of agricultural land.

CONCLUSION

According to the results of a study entitled *The Health of Our Soils*, published by Agriculture and AgriFood Canada in July 1995, greater use of ecological agriculture methods during the last ten years has improved the quality of soils in some areas of the country. The study shows that degradation of the soils is due in great part to the use of improper agricultural methods; the health of soils will continue to deteriorate in areas where intensive agriculture is practised and on low-productivity lands where ecological agricultural methods are not being used.

On the other hand, the health of our soils is improving where soil conservation methods have come into use, an area accounting for on one third of Canada's cultivated acreage. The fact that the use of fallowing has decreased 30% over 20 years has helped stem erosion, while more rotation of crops has led to an increase of organic material in the soil.

According to the study mentioned above, the Prairies region has suffered less from soil degradation than the other regions of Canada, mostly because of the decrease in fallowing but also because permanent ground cover has been encouraged over certain areas. In general, the Central and Atlantic provinces of Canada have experienced the most soil degradation because of the intensive farming practised there (especially in view of the relatively poor soils in the Maritimes); however, there has been a definite increase in the percentage of organic material in the soil in some areas as a result of better crop rotation.

The authors of the report emphasize, however, that conservation methods must be adapted to the needs of farming operations. The kind of crops grown and the means of production also play a major role in the health of soils and must be implemented in concert with appropriate ecological agricultural methods.

We thus arrive at the real point of soil conservation, which is only one part of agriculture's *sustainability*. Now that the concept of sustainable agriculture has taken hold, a new policy is called for that will take into account the environmental impacts of agriculture and promote the conservation of resources and returns.