

INTRODUCTION

Is soil quality being maintained or enhanced in agricultural ecosystems of Alberta? This question has a long pedigree on the Canadian prairies: J. Bracken observed in 1912 that the essential challenge for prairie agriculture was “finding for each soil and climatic zone the system that is at once the most profitable and the most permanent” (citation from Janzen 2001). This mindset led to the establishment of long-term cropping system experiments by the Dominion Department of Agriculture in the early 1900s. Data obtained over decades and centuries from the different cropping systems studied help to determine the long-term effects of agricultural practices on soil quality and production.

Efforts to maintain or improve prairie soil resources have continued with time. The onset of the Great Depression, or Dirty Thirties, in 1928 began a ten-year cycle of severe drought. Dust storms, soil erosion and crop failure characterized the era, and led the federal government to pass the Prairie Farm Rehabilitation Act in 1935 to preserve the soil resource. Land unsuitable for growing crops was taken out of cultivation and developed as grazing land or community pastures, which are still maintained today (Prairie Farm Rehabilitation Administration 2000). In the 1960s and 1970s, a comprehensive survey of land capability for agriculture, forestry, recreation and wildlife showed that only 5% of Canada’s lands could support annual crop production (Canada Land Inventory 1970). In the 1990s, concerns about soil quality were driven by recognition that soil not only supports agricultural productivity, but also provides important ecological services such as regulating water flow, maintaining clean air and water, and holding and breaking down toxic wastes (Acton and Gregorich 1995).

However, the concept of soil quality is being strongly debated in the professional literature at the present time. Some practitioners endorse research and management of soil quality (Karlen et al. 2003), while others have serious reservations about the validity and application of the concept (Letey et al. 2003). Therefore, as a starting point for this review, a survey of literature related to soil quality indicators was conducted for the AESA Soil Quality Program by Connie Hall of Alberta Agriculture, Food and Rural Development (Hall 2003). The objectives of this review are to evaluate the definitions and goals associated with the soil quality concept, to review approaches used to develop soil quality indicators, and to make recommendations for developing soil quality indicators for agroecosystems in Alberta.