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### Lessons from soil quality monitoring in Alberta.

Tom Goddard, Senior Policy Advisor, Alberta Agriculture and Forestry, Edmonton

In 1997, a soil quality program was initiated under the Alberta Environmentally Sustainable Agriculture (AESA) initiative. It ran for nine years, which is not much time in 'soil years', but was instructive nevertheless and allowed us to examine soils across the province as well as develop soil quality tools and extension materials. Everything in this article can be found in documents posted on the website for the program<sup>1</sup>.

A core component of the program was the monitoring of typical farm fields to both determine initial soil quality parameters and see if they changed over time. Typical soil and cropping systems were selected from 42 eco-districts from the Ft. Vermilion area to southeast of Medicine Hat. Since farmers manage whole landscapes with complex soil conditions, the sampling points within the fields were situated on three landform positions – upper, mid and lower slope positions.

As expected, not a lot changed over the brief moment in time as there were no 'experiments' or changes imposed on the fields other than the typical rotation sequence and agronomic management. On a provincial scale, only bulk density and soil test phosphorus showed any statistical changes of the 18 parameters that were measured. Bulk density decreased slightly on a provincial scale by 5% for all landscape positions. This may be due to adoption of no-till on many fields and the increased use of forages in rotations on the sites. Across the province, phosphorus increased by 19 per cent in the lower landscape position.

Landscape positions created many differences within the fields. Bulk density was lower in the lower landscape positions, as was pH. The lower landscape positions had higher organic matter, nitrogen, phosphorus, potassium and sulfur values than the upper positions.

Another program component was extension activities. Presentations at meetings, workshops and field days, as well as cooperation on projects with research groups in Alberta and beyond added to the program. The University of Manitoba used samples from the benchmark sites to determine the fate of pesticides to calibrate a national pesticide risk model.

The soil quality program has also contributed to the general body of soils information for the province. Benchmark site soils and crops were sampled for micronutrient values, providing a reference base for consultants working on disturbed or contaminated sites. Another study was done to analyze the soil phosphorus levels across the province over a 30 year period from the 1960s to 1990s. This was done by comparing results from the provincial lab (1960s) and a period of results from Norwest Labs (1990s). This provided answers to questions or concerns about soil phosphorus levels in Alberta and it still stands as the largest dataset of its kind in Canada.

Risk assessment was another component of the program under which we developed a Soil Quality Card. This is a simple card for farmers to score their soil health based on a dozen different indicators<sup>2</sup>. A soil quality health kit was also assessed and used for applied research and extension purposes. The report on the kit is still a popular

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<sup>1</sup> AESA Soil Quality Resource Monitoring Program. Alberta Agriculture and Forestry. <http://www.agric.gov.ab.ca/soilquality>

<sup>2</sup> Alberta Soil Quality Card. [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex3918/\\$FILE/sqcard2.pdf](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex3918/$FILE/sqcard2.pdf)

## ARECA Soil Health Initiative

This article is part of a series to promote better understanding of our agricultural soil resources along with practices that can influence soil health.

download, more recently to European countries. Since technology continues to improve, several of the instruments in the kit have newer versions out which puts analytic power in the hands of anyone willing to spend a couple of hundred dollars. An emerging trend globally is that of “citizen science” meaning the provision of crowd-sourced data from the public that can be as good as that generated by scientists at universities and research stations. An example of this is the Christmas bird count which is North America's longest-running Citizen Science project. Soil quality is more complex of course, but perhaps there is a way for soil owners to monitor soil quality over a longer period of time.

Information generated during the AESA soil quality program helps us to better understand the soil's physical, chemical and biological characteristics for Alberta's agricultural landscapes. The Alberta Soil Quality Card is still available as a simple field based assessment tool and the evaluation work for a prototype soil health kit is still a valuable starting point for assessing the merit of newer self-test techniques.



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