

BRIEF SUBMITTED TO THE STANDING
SENATE COMMITTEE ON AGRICULTURE & FORESTRY

SOIL HEALTH STUDY



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INTRODUCTION

Hairy vetch - Hjertaas Farms

I am a farmer in South East Saskatchewan, this being my 50th year of farming. I have been farming the last 25 years regeneratively. My family homesteaded this farm 110 years ago. When my grandfather settled he began to break (plow) the prairie. This was an incredibly diverse ecosystem consisting of several hundred grasses, forbs, legumes and woody type species. It harboured incredible diversity below ground as well as above. The Lewis & Clark expedition a hundred years prior made many comment in their journals about the incredible diversity they encountered as they walked along the Missouri river not far to the south of us.

This act of breaking the prairie had huge consequences; incredible diversity to monoculture agriculture. The effects of this act are still being felt today as our knowledge of agro ecosystems becomes greater. The formerly 12% organic matter soils have degraded to as low as 2 to 4% on my farm in 80 years. This was not done by design. My grandfather and father and I all farmed as best as we knew how, using some of the best knowledge provided to us by the extension system of the day. Degradation still happened and is still happening on many farms today. A couple other consequences of this breaking of the prairie ; loss of biodiversity, lower water infiltration rates and resulting increased runoff damaging infrastructure. As organic matter levels decrease the water holding capacity of the soil decreases leaving soil less resilient. Soil is a living entity and is a sub aquatic environment. As it loses its ability to hold water (loss of aggregation) the ability of microbes to function becomes diminished.

Over the hundred plus years of agriculture in Western Canada large amounts of soil have been and are still being eroded from farm fields. The thickness of a paper equals a tonne of soil on an acre. Our average soil loss is 4 tonnes per acre. The UN in 2015 declared the International year of the soil and concluded at the end of a worldwide conference of soil scientists that at the current rate of degradation of soil we have less than 60 harvests left. With world population increasing and agricultural soils worldwide decreasing in function this indeed does not auger well for human populations. The answer is regenerative agriculture. It a popular term but the meaning is unclear to many. The following is a definition developed by Understanding_Ag. (Regenerative consulting company) that is very powerful to me.

" FARMING AND RANCHING IN SYNCHRONY WITH NATURE AND THE FOUR ECOSYSTEM PROCESSES TO REPAIR, REBUILD, REVITALIZE AND RESTORE ECOSYSTEM FUNCTION STARTING WITH LIFE IN THE SOIL AND EXPANDING TO ALL LIFE ABOVE THE SOIL."

On my farm over the past 25 years of regeneration, we have increased organic matter by 4% across the farm. Our production levels are 2 to 2.5 times the neighborhood average. Our water and snow to large part stays where it falls. We are seeing grassland bird species that I have never seen in my lifetime. We no longer use any synthetic inputs. Our son and daughter in law returned to the farm as they could see there could be a future in this type of farming. A 4% increase in organic matter over 25 years is a lot of carbon sequestered.

PRINCIPLES OF REGENERATION

1

Keep a living root as long as possible

The key is green leaves longer. Sunlight has to be captured. The plant turns this into complex sugars and a good percentage of it is exuded through the roots into the soil profile. This is feed for the microbes that live in the soil. There is complex signaling going on underground called “quorum sensing”. The microbes and plants are communicating. The plants send food down and in return the microbes feed the plant. This is the magic that creates nutrient dense food. This relationship began 420 million years ago when life began to creep on to the rocks from the sea. We need to keep photosynthesis happening as long as possible. Most annual crops are photosynthesizing for 70 to 80 days per year. We have the potential on the prairies to capture sunshine for 220 to 260 days per year. There is evidence now that photosynthesis continues under snow but obviously you need green leaves for it to happen.

2

Keep the surface covered

The second principle is litter, armour or cover on the soil. Think of this as skin on your body. A burn can be devastating to the function of our bodies. Removal of litter from the surface is equally as devastating. Litter keeps the soil cooler in the hot months and warmer in the cool months. It prevents moisture from evaporating and greatly reduces the physical forces of raindrops from damaging the surface of the soil.

3

Minimize disturbance

Soil microbes create structures in the soil called aggregates. This enables soil to function; more space for water and air, allows for easier root penetration and microbes to perform different functions (as an example Diazotrophs single celled bacteria can break the double bond of nitrogen in the air and make it plant available, but this only occurs in the centre of an aggregate where slightly anaerobic condition exist). Mycorrhizal fungi cover large areas of the soil and bring nutrients back to the plant. They are often referred to as the internet of the soil. Disturbance in the soil causes havoc with these natural processes; which leads to synthetic Band-Aids to attempt to “fix” the problem.



Diversity

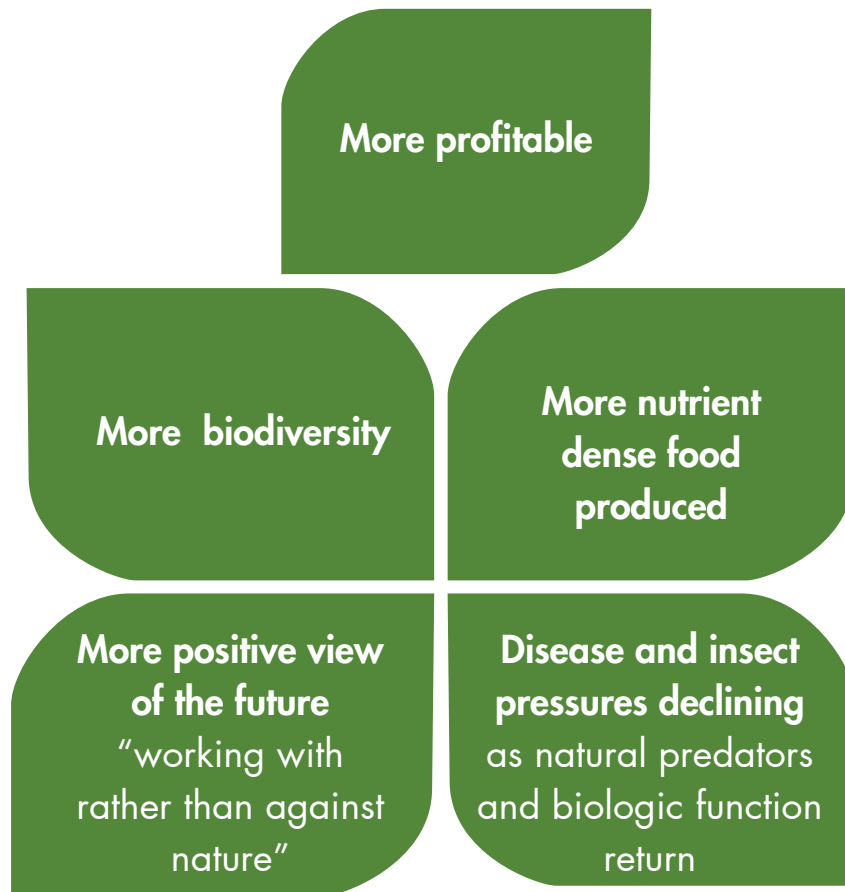
100 plus years of mono culture agriculture has simplified biological process much to our detriment. Whatever we can do to add crops within existing production systems or before and after will greatly enhance biological systems. Cover crops do a great job of adding diversity.



Incorporating livestock

Our prairie soils were formed under grazing animals. Million of bison, deer moose, elk, antelope and sheep created the rich prairie soil that our forefathers came here to farm. They add microbiology; speed up biological time and cause a rapid release of exudates from the roots, causing rapid regrowth. This does not mean that every field needs to have livestock but rather a system is developed where over several years every field will have livestock on it for a short period of time.

The principles are the same on all farms but the practices will be hugely different. In general terms most regenerative farms are seeing:



CLEARLY THIS IS A WIN/WIN FOR SOCIETY

WHAT CAN GOVERNMENT DO TO FOSTER THIS MOVEMENT?

The key to increasing adoption is knowledge to understand the why.

To support soil health workshops / field days/ soil health conferences will be a huge benefit. Farmers learn best in small group settings and from their peers.

Education of consumers about the values of regeneratively produced food.

Nutritive value as well as the ecological value. If there is no demand there is not much point.

Improve labelling to reduce or eliminate greenwashing.

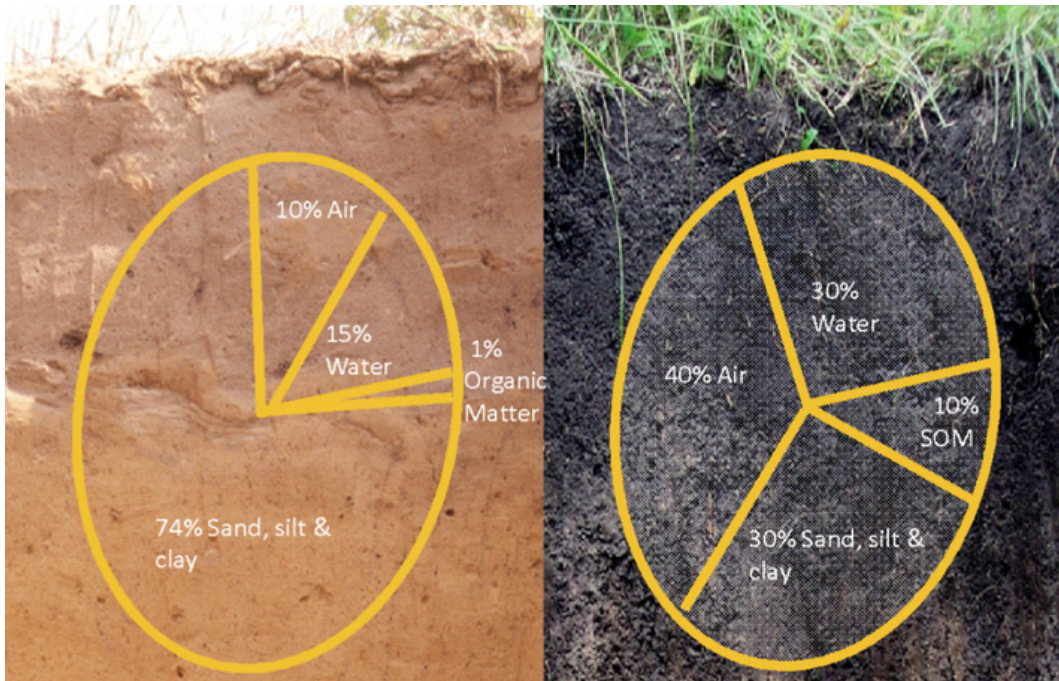
Continue to fund programs such as the On-Farm Climate Action Fund.

Launch the Sustainable Agricultural Strategy (SAS).

The SAS is set to include pathways and milestones to improve climate change mitigation, adaptation and resilience, biodiversity, water, and soil health.



Monoculture versus diversity



Degenerative soil

Regenerative soil

These are identical soils management vastly different. Notice the aggregation on the right. For most of history we went right to left and then moved on to new territory. With regenerative agriculture we can move soil from the left to the right by following the principles of regenerative agriculture. This is relatively new knowledge and a game changer.



The state of the world's soil. Desertification is a major factor in climate change. The only solution is regenerative agriculture.



Showing formation of aggregates around the roots as a result of the symbiosis between plants, soils and microbes. This shows the soil is regenerating.



Regenerating desertified areas using ruminants and good grazing management.

Blain Hjertaas

Blaine has farmed all his life on the century-old Hjertaas farm. 25 years ago he began his regenerative journey by seeding grass and raising cows. Having been a high tech industrial farmer this was quite a change. Shortly after this transition he took his first Holistic Management course. This greatly sped up his learning curve plus gave him a network of like minded people he could relate to.

The farm began to improve both financially and ecologically. His oldest son and daughter in law came back to the farm about 15 years ago and they run a flock of 400 ewes plus some custom cow-calf pairs. This freed up more time and he became a Holistic Educator. This has opened many doors for him. More recently he has been involved with the General Mills pilot project on the eastern prairies. He works with 45 farms helping them to become more regenerative. This is one of the largest agro-ecological studies ever conducted.

Blain has been passionate about soil carbon sequestration for many years and has been measuring soil carbon on his own farm and many others in Saskatchewan and Manitoba. On his farm, they are sequestering more carbon than one Canadian individual's carbon footprint on every hectare they operate.

Blain has been married to Naomi for 43 years. They have three children and four grandchildren.