FERTILITY OF SASK. SOILS: FROM PLOUGH TO NOW

AGVISE SOIL FERTILITY SEMINAR

STAYBRIDGE SUITES, SASKATOON
MARCH 14, 2019

by
Les Henry
Henry Perspectives, Saskatoon
$50.00  GST incl.

Cash or Cheque-  Receipt issued
1. **The Original Condition**

2. **Grandfather Breaks the Prairie Sod**

3. **Summerfallow: The Largest Mining Exercise in Sask.**

4. **1960s: Start of Serious N Fertilizer Use: Soil Testing**

5. **1990s- Zero Till – Continuous Crop – Proper Fertilizer**

6. **Now**

7. **Future**
1. THE ORIGINAL CONDITION

SOIL PARENT MATERIALS

Glacial till – (most common) stones, sloughs

Water Laid -  Heavy, Medium, Light textures

Wind Blown – Sand dunes: Loess plains
VARVES
`~ 50 YEARS OF GLACIAL LAKE ACTIVITY

Photo by Allan Hewko
And then there was 10,000 years of this ......
Blackstrap Lake

NE33 32 3W3
Native Prairie
20 lbs/ac Nitrate N to 8 feet

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<th>Depth, ft</th>
<th>Moisture %</th>
<th>Nitrate-N lb/ac</th>
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Then Comes Grandfather Jerome with his Steam engine and plough

BRUNSWICK FARM  1906-1963-  NO FERTILIZER USED
### ½ & ½ Rotation
378 Lbs/ac Nitrate N to 12 feet

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Native Prairie
3. SUMMERFALLOW - Largest Mining Exercise in Sask.

1910-1920:

Easy pickings

Fertile prairie soils (Brits said we were unfair competition)

Wheat prices high

Farmers rich: “We will all be millionaires by 1930”
Jerome Henry built this house in 1917. ALL amenities: Central heat, Hot & cold water, Flush toilet, Electric lights, with $35/bus wheat. Guess who?
Brunswick Farm 1906 – 1963:
Never a pound of fertilizer used
1920s

Early 20s – recession

Late 1920s – boom times

Land bought at prices too high …..
1930s: The Dirty 30s

Drought: Serious wind erosion

Low prices

Disaster: Many farms abandoned
THE DIRTY 30S
Strasbourg  June 1979
1940s – wet cycle – good crops
WW 2 - good prices- mortgage paid

1950s – wet cycle – good crops – poor markets

By the 1950s the mining excercise of summerfallow had seriously depleted available Phosphorus supplies
Strip tests in the 1950s showed that P was seriously low on FALLOW

P response, Whatley, Kindersley August 1, 1958

11-48-0 @40lb/ac

23-23-0 @80lb/ac

Check
YIELD OF CPS WHEAT (bus/acre)
Elstow Loam soil, Outlook SK, 1991
Soil Test P 4 ppm, 0-6 inches
Data by Les Henry, Soil Science, Univ. of Sask.

Yield (bus/acre)

P₂O₅ applied lb/acre
Paynton SK May 1952:

6th Continuous Crop of Spring Rye: Black fine sandy loam

No Fert = 27, 20 lb/ac P\(_2\)O\(_5\) = 32, 20N + 20 P\(_2\)O\(_5\) = 38 bus/ac

Truck is 1.5 ton International:
Bought with ONE truckload of spring rye
4. 1960S-START OF SERIOUS N FERTILIZER USE-

SOIL TESTING
Fertilizer Consumption in W. Canada

tonnes ('000) of N and P$_2$O$_5$

Nitrogen
Phosphate
Hundreds of Field strip tests for Soil test N Calibration

Waitville Loam  Grey Wooded ( Luvisol)
Minky Farm : North of Nut Mountain

Wheat ~ 1966  No N fertilizer =No Crop
N as broadcast ammonium nitrate 34-0-0

N 60  N 0
lb/ac
White pins = Farmers

Black Soil

Grey Soil

Minky Farm
Kelvington Hall
Al Slinkard preaching pulses
Wilson Farm Okla SK : 1966: N Fertilizer test with Wheat:
Soil Wv Loam: N as broadcast Ammonium Nitrate 34-0-0
N Rate. Lbs N/ acre
Hail damage June 24 : Photo July ?
302 Site Years
U of S
AAFC+ substat.
Industry
The N-Water interaction is HUGE!!

Outlook SK Irrigation District 1970s – Soil NO3-N to 2 feet = very low
Dark Brown soils, low OM, not much N fertilizer in past  CJSS 1985 and 4th Ed ‘Soil Fert” page 30
Sask. Soil Testing Lab: 1966
SEPTEMBER 1966: SOIL TESTING BLITZ

* 2 farm Field days in each of 42 Ag Rep (Extension) districts- and it all happened in a week.

* Coordinated by U of S Extension, all staff from Soil Science U of S, Soil Survey, AAFC Research stations, Sask Ag specialists helped. Anybody with a degree in Soils and a driver’s license – even Les Henry

* The field day demonstrated how to take a sample, how to decide where to sample, and distributed kits with bulletins, soil test boxes etc.
1966: Ed Halstead:

- set up lab to run N, P AND K. Lesser lights like Les Henry said “why do K – we have filing cabinets full of field experiments that say we do not need it”
- Roy Lanz- Elephant Brand dealer at Nipawin said some of his customers had great response to K. The U of S etc field experiments had not been done on the deficient soils
- The first year of soil testing found extremely K deficient soils. Yes Virginia, we do have K deficient soils in Sask
- Carrot River soils on #13 Soils Map shows it all.
Cr: vl Soil K 61 lbs K 0-15 cm

NP K 58 bus/ac

N +P 10 bus/ac

Barley, 1968 Eugene Kozun Farm
Photo by Lyle Cowell (Nutrien)  
? 15 lbs K₂O/ac with seed  
Barley – green plants are wild oats

Likely the same field ~ 2010
Sask – old soil test summaries

Figure 20. Soil K on stubble - Saskatchewan.

Drawdown 5 lbs K/ac/year
IPNI data shows 7

66 & 67 DIFFERENT TEST
5. 1990s

• Continuous cropping

• Zero Till

• N rates high enough to get big yields

• Cereal, Oilseed, PULSE* rotation
  * thanks to Al Slinkard
6. NOW

Since 2010 irrigation farming without the pivot compliments Mother Nature

Big N rates + big rain = Big Crops

Serious drawdown of soil P reserves. ? micros
Percent of Samples Testing Below Critical Levels for P in 2015

* Only states with 2,000 samples or more are shown on this map
7. THE FUTURE

- Soil building with P fertilizer – big rates if P gets cheaper
- P good candidate for variable rate
- Micros: some good recent greenhouse data - need to take to field

- ?? Life after Glyphosate – should be thinking about
THE END

...... Appendix – some additional info for browsing
NaHCO$_3$ P, Indian Head- after 20 year exper. Spratt & McCurdy, 1966

$y = 0.13x + 48$

$R^2 = 0.78$

NaHCO$_3$ P
lb P$_2$O$_5$/acre 6 "
End of Exper.

Total P$_2$O$_5$ Applied in 7 applications lbs/acre

March 14, 2019  Les Henry, Staybridge Suites, Saskatoon
From: Johnson et al., 2014
Better Crops... Vol. 98 No.4 Page 22