Soil pH matters – the rising of the pHoenix

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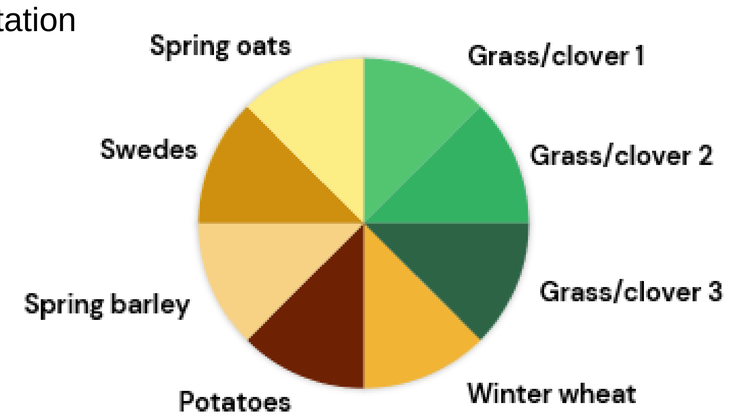
Introduction

- Optimum pH for grasslands is 6.0 and for arable 6.2
- Only 1/3rd Scottish soils between 5.8 and 6.2 (Dolan et al, 2019)
- pH limits availability of nutrients
  - phosphorus uptake highest between 6 & 7.5
  - potassium uptake highest above soil pH of 6
- Poor soil pH leads to
  - Reduced yields, diffuse pollution and increased N_2O emissions

Methods

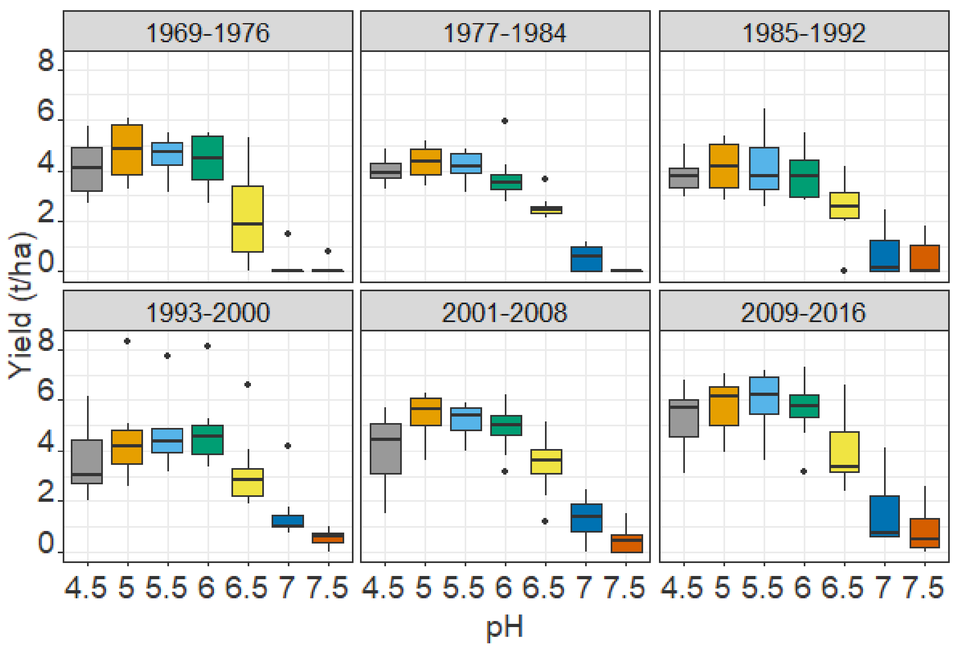
- Trial established in 1961 in North Scotland to demonstrate impact on yield to farmers
- 8 course ley / arable rotation



- Yields measured every year
- Soils health assessed for Grass/clover 2, winter wheat, potatoes spring oats in 2018

Results

- Spring oats yields – tolerant of low pH but not tolerant of high pH



Spring oats yields per cycle - Box and whisker plots show median, min, max and interquartile range

- pH had no effect on SOM%
  - Lowest in oats before the ley phase
- Ext. P lowest for pH 6 & 6.5
  - Greater uptake due to higher yields
- Ext K increasing with increasing pH
- Earthworms are very low at pH 4.5
  - Lowest in the potato phase

Attribute	pH 4.5	pH 6	pH 6.5	pH 7.5
pH	4.9	6.1	6.6	7.5
SOM (%)	10.3	10.1	10.3	10.3
Ext. P (mg/l)*	22	11	10	15
Ext. K (mg/l)	127	130	146	154
Ext. Mg (mg/l)	18	74	106	121
VESS	2	1	2	1
Earthworms (number/pit)	1	5	5	6

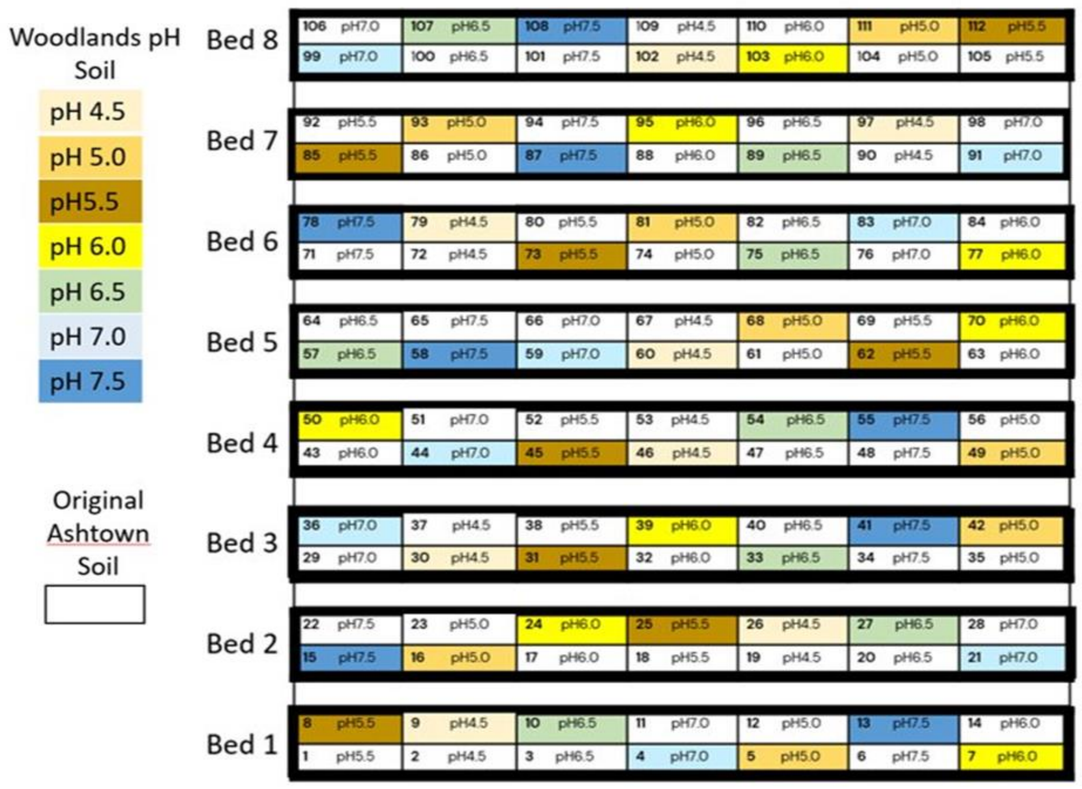
Investigate | Monitor | No action required

- modified Morgan P

- Soil Health Scorecard for pH plots averaged across 4 crop types
Source: TestingTheLongTermEffectOfpH2965_190918_WEB.pdf (windows.net)

Future – Joint venture with Aberdeen University

- New Resources
  - "old soil" and "new soil"
  - Randomised plots
  - Beds will be planted with crops in spring 2023
- Opportunities for collaboration



Acknowledgements

The soil health scorecard was produced as part of the AHDB-BBRO Soil Biology and Soil Health partnership (ahdb.org.uk/greatsoils). The Scottish Government Strategic Research Programme

References

Dolan et al (2019) A Report on Soil and Organic Materials Analysis from the Soil and Nutrient Network Farms 2016 – 2018