

Highwood Field Day, June 20, 2018 Hosted by MSU Extension and Central Ag. Res. Center

Post Farm Field Day, July 13, 2018
Cropland soil acidification

By Clain Jones, MSU Soil Fertility Extension Specialist; clainj@montana.edu, 994-6076, <http://landresources.montana.edu/soilfertility> for more information. Thanks to Adriane Good, Jesse Fulbright, Dale Krause, and Tyler Lane for measuring pH in their counties.

1. Low pH soils have been found in many regions of MT (Fig. 1).

- pH < 5.0 about where aluminum toxicity starts
- pH < 4.5 often noticeable poor germination
- pH < 4.0 crop failure

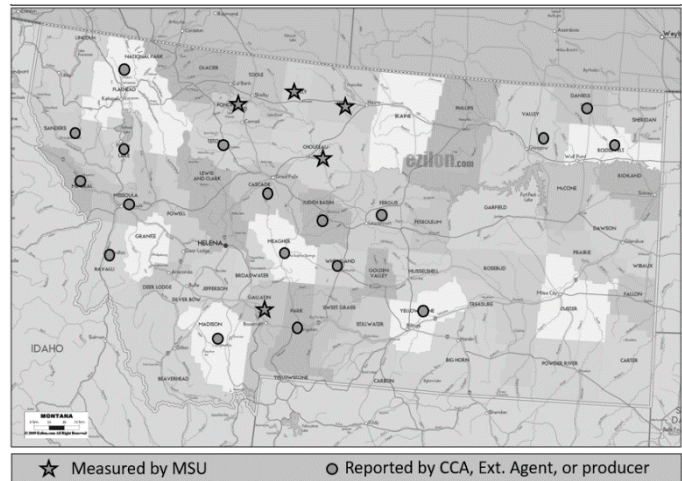


Fig. 1. Counties with at least one field having pH < 5.5. Symbol is not at location of field(s).

Any surprises on map?

2. N fertilization contributes to soil pH drop. N fertilizer sales have increased greatly (Fig. 2). Soil pH is low in the top few inches of soil, where N fertilizer is placed (Fig. 3).

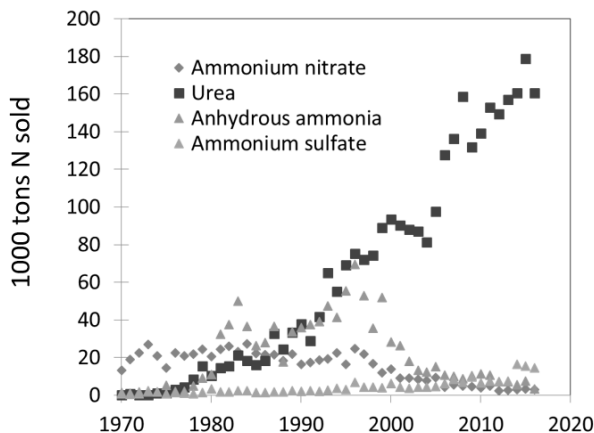


Fig. 2. N fertilizer sales in the MT.

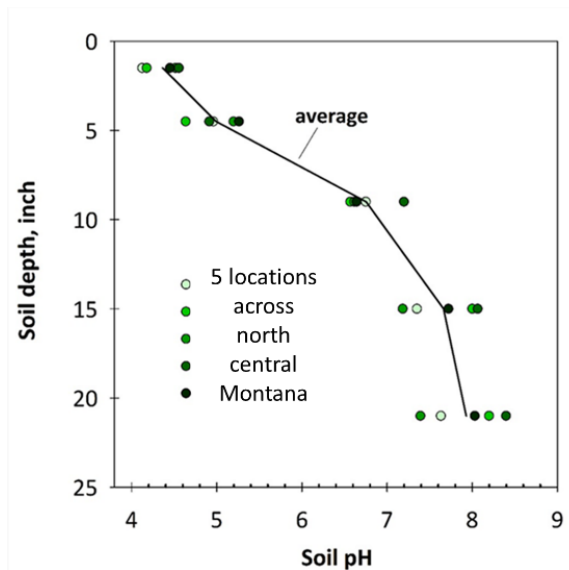


Fig. 3. Chouteau County pH stratification in no-till fields. Engel unpub. data.

3. N rate affects soil pH drop.

- 14 years of N fertilization west of Bozeman (Fig. 4).
- 6 years of N fertilization near Big Sandy (Fig. 5). Why differences in pH drop/lb N?

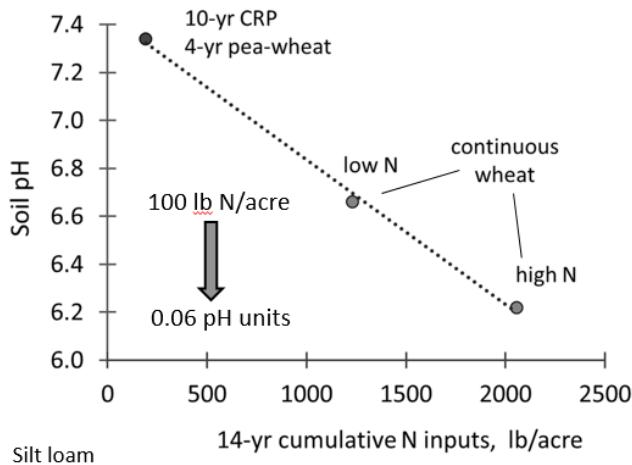


Fig. 4. Soil pH (top 4") after 14 years of N fertilization on dryland at Post Farm. Engel et al., unpub. data.

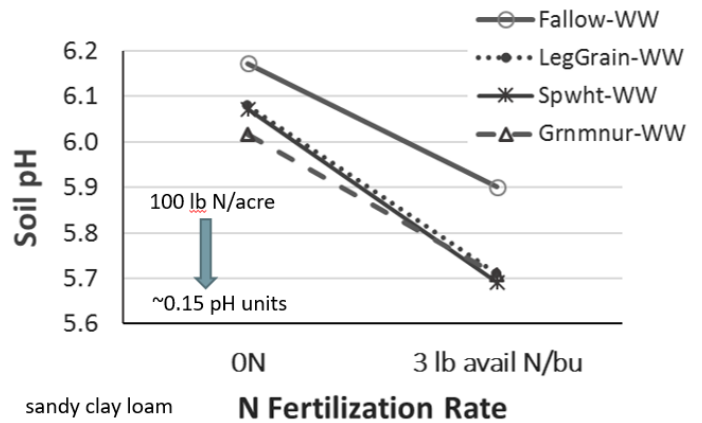
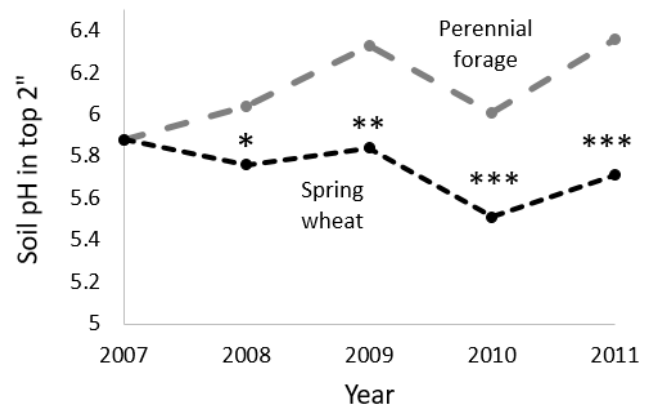


Fig. 5. Soil pH (top 3") after 6 years of N fertilization under different dryland cropping systems near Big Sandy. Jones and Miller, unpub. data.

4. Perennial forages can help increase soil pH (Fig. 6).

5. Take home messages on prevention: Scout and soil sample to know if have problem or not. If all fields > 7.5, feel fortunate. Otherwise:

- Reduce N rate when possible (perhaps by shifting away from HRWs, consider pulses)
- Use N more efficiently: by soil testing, apply lower N rates in areas limited by resource other than N, make sure have adequate P, K, S and micros, split application with conservative pre-plant rate and top-dress if adequate moisture, apply N close to peak plant uptake
- Consider using less acidifying N source (CAN), non-acidifying N source (Ca nitrate), manure, or legumes in rotation
- Add perennials to rotation (list of acid-tolerant varieties provided on our Acidification website <http://landresources.montana.edu/soilfertility/acidif/index.html>)



crops differ with * > 90%, ** > 95%, *** > 99% confidence

Fig. 6. Soil pH over 5 years on dryland spring wheat vs perennial forage with similar N rates near Mandan, ND (Liebig et al. 2018).