



There is an ongoing need to develop automated systems to decrease the cost of soil sampling and improve the accuracy of soil nutrient maps.

K.A. Sudduth et al., 1997

Rapid Determination of Soil pH for Precision Farming

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July, 1998



Precision farming includes managing each crop production input on a site-specific basis to reduce waste, increase profits, and maintain the quality of the environment.

M.T. Morgan and D.R. Ess, 1997

Precision Farming Utilizes:

Global Positioning System (GPS)
Geographic Information System (GIS)
Variable Rate Application (VRA)



Negative Influence of Low pH

- ❖ Acidic ions can be toxic for some plants
- ❖ Limited amount of basic ions (Ca^{2+} and Mg^{2+})
- ❖ Reduced availability of nutrients (N-P-K)
- ❖ Decreased effectiveness of some herbicides
- ❖ Low activity of bio-organisms

D.B. Mengel, 1997



Laboratory Soil pH Measurement

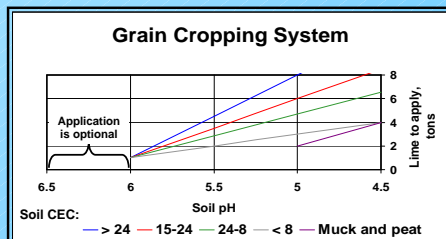
1. **Calibrate** the pH meter over the appropriate range.
2. **Measure** a soil sample into a cup.
3. Add pure water to the sample to bring the solution to a **weight-to-weight ratio of 1:1**.
4. **Stir** vigorously for 5 seconds **and** let stand for **10 minutes**.
5. Place electrodes in the slurry, swirl carefully, and **read the pH**.

M.E. Watson and J.R. Brown, 1997



Estimation of Lime Requirement

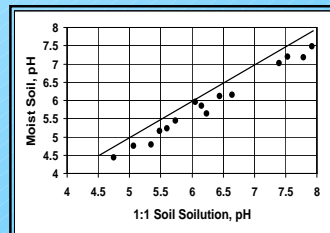
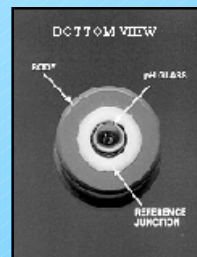
1. Direct titration of soils with $\text{Ca}(\text{OH})_2$
2. Use of a buffer solution to estimate lime test index
3. Estimation of lime requirement from soil properties



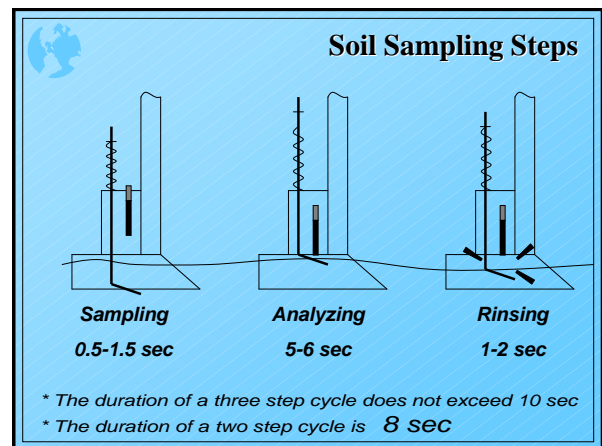
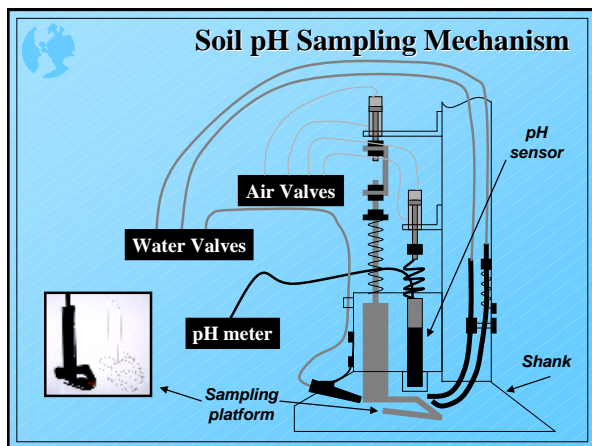
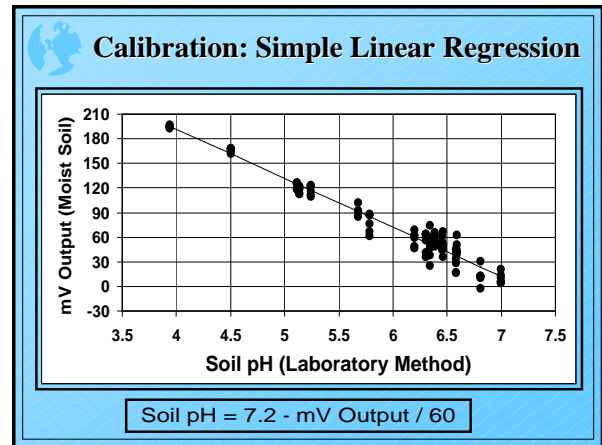
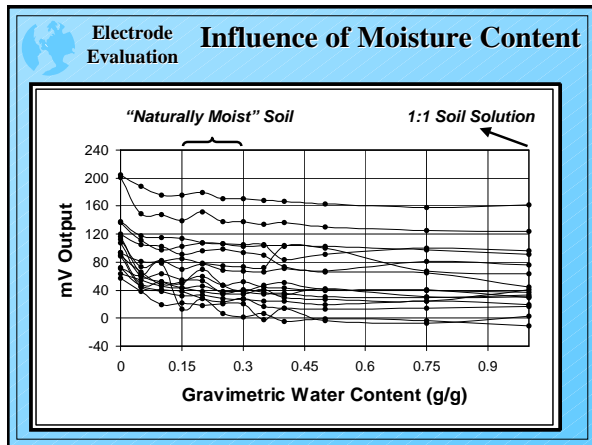
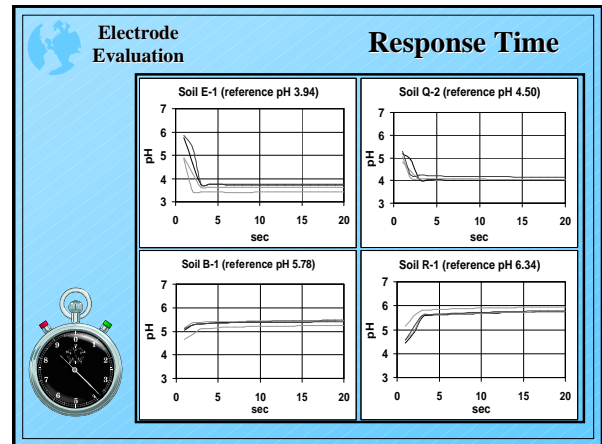
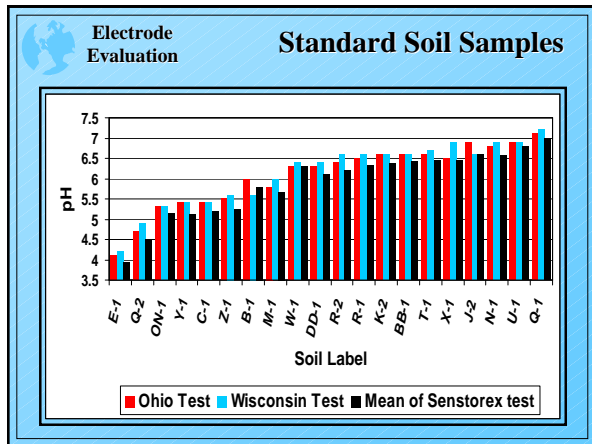
*Illinois
Agronomy
Handbook
1995-1996*

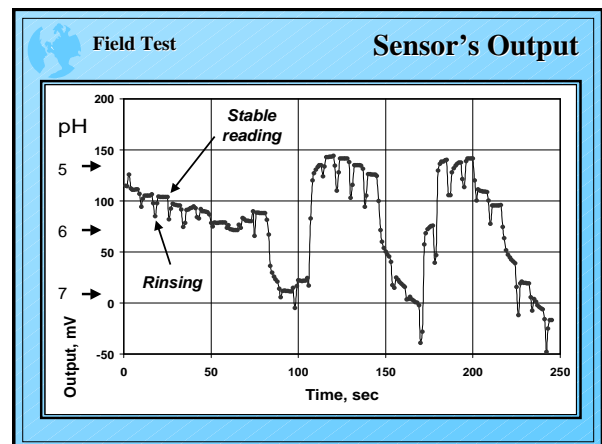
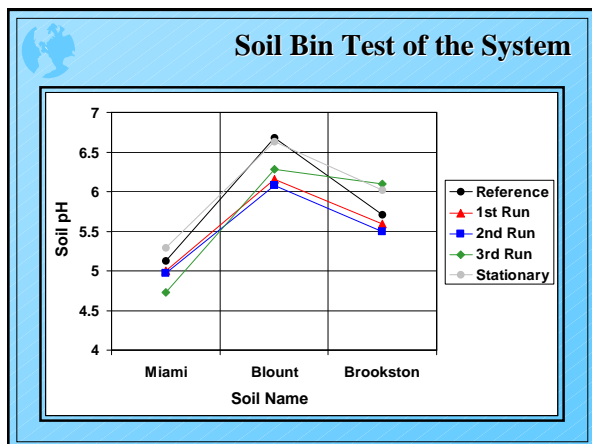
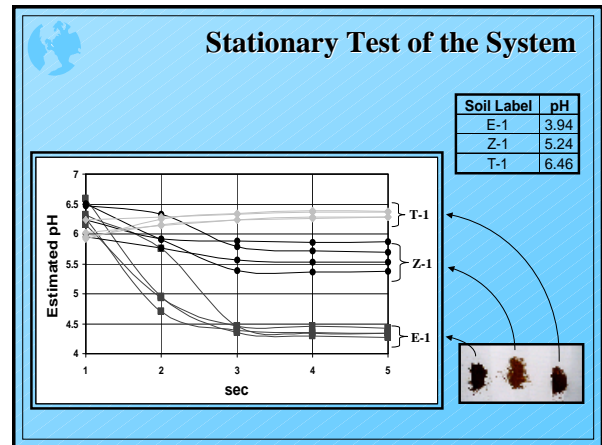
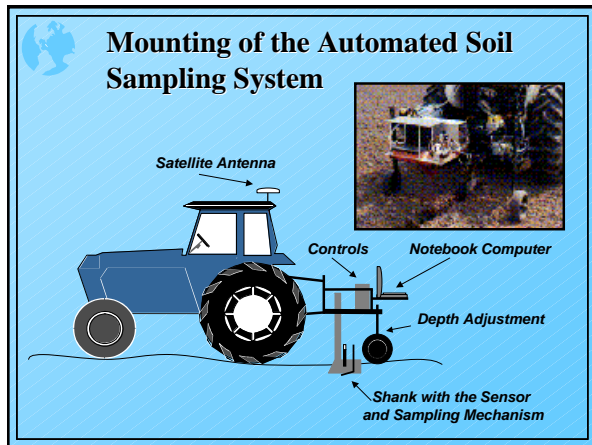
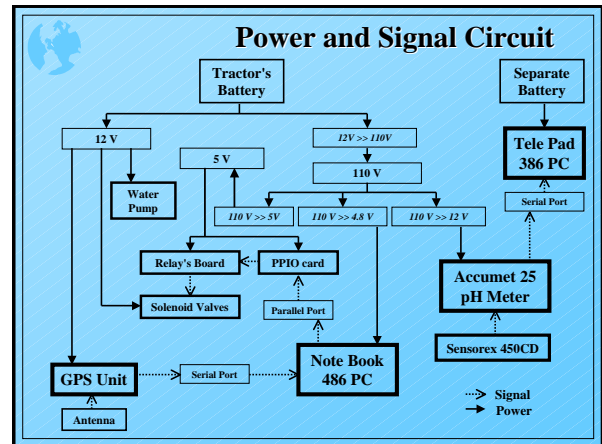
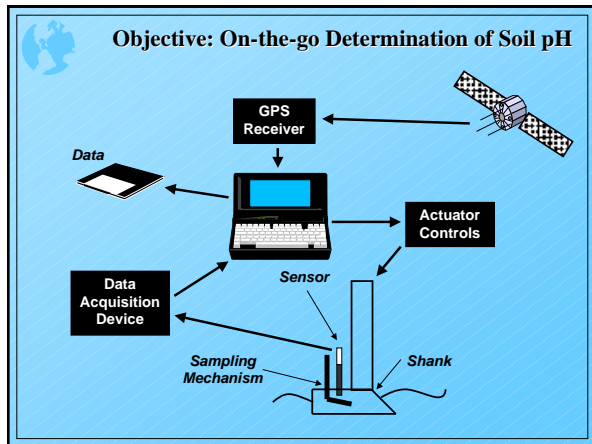


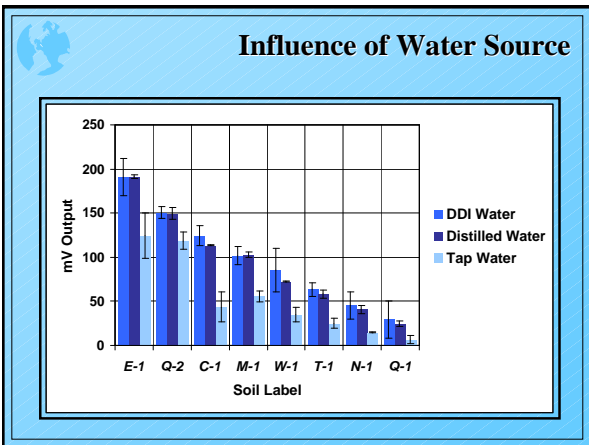
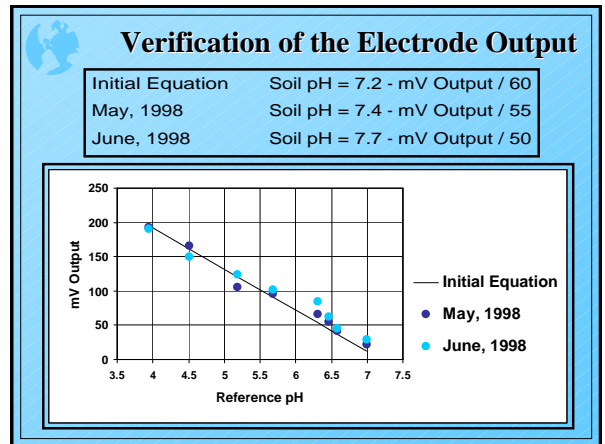
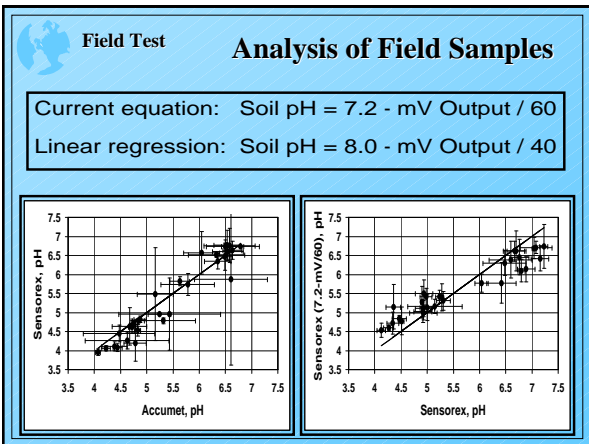
Sensorex 450CD flat-surface combination pH electrode



*Evaluation of Sensorex 450C electrode
(G.A. Breitenbeck and J.M. Bremner, 1984)*







Estimated Sampling Density (samples / ha)

Vehicle Speed, km/h	Distance between Samples, m	Distance between Passes, m			
		5	10	20	50
1	2.2	900	450	225	90
2	4.4	450	225	113	45
3	6.7	300	150	75	30
5	11.1	180	90	45	18
8	17.8	113	56	28	11

