Status of Soil Test Phosphorus, Potassium and pH in the Upper Midwest

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Every three to four years the Potash and Phosphate Institute (PPI) conducts a survey of soil testing laboratories across North America and develops a state by state summary of soil test results. PPI has just concluded their most recent survey and this presentation discusses the results for Wisconsin and surrounding states.

PPI collected data on approximately 2.5 million soil samples collected in the fall of 2000 and spring of 2001, thus the survey results represent the fertility status of soils for the 2001 crop year. Data was collected and reported as cumulative relative frequency across nine soil test ranges, and as the percent of samples that tested medium or below in P and K or had pH values less than or equal to 6.0. These are soil test categories where most agronomists would predict a significant yield response in the year of application to P, K or lime. The agronomic definition of medium is not the same for all states because of differences in philosophical approaches and research results.

Fertilizer sales data indicate that P, and K fertilizer use peaked in about 1981 and has been slightly decreasing and steady since. Increased acreage of some crops, such as soybeans, and increased yields of almost all crops, suggest that nutrient uptake and removal have probably increased over the same time period. Based on these trends, it could be expected that soil test levels for P and K would be dropping. The reporting of increased P and K deficiency symptoms across the corn belt, and this survey tends to confirm that soil test P and K levels need attention. If you would like more information about "Soil Test Levels in North America, PPI/PPIC/FAR Technical Bulletin 2001-1, contact PPI at (707) 447-0335 or www.ppi-ppic.org and request "Soil Test Levels in North America, PPI/PPIC/FAR Technical Bulletin 2001-1.

Figure 1.

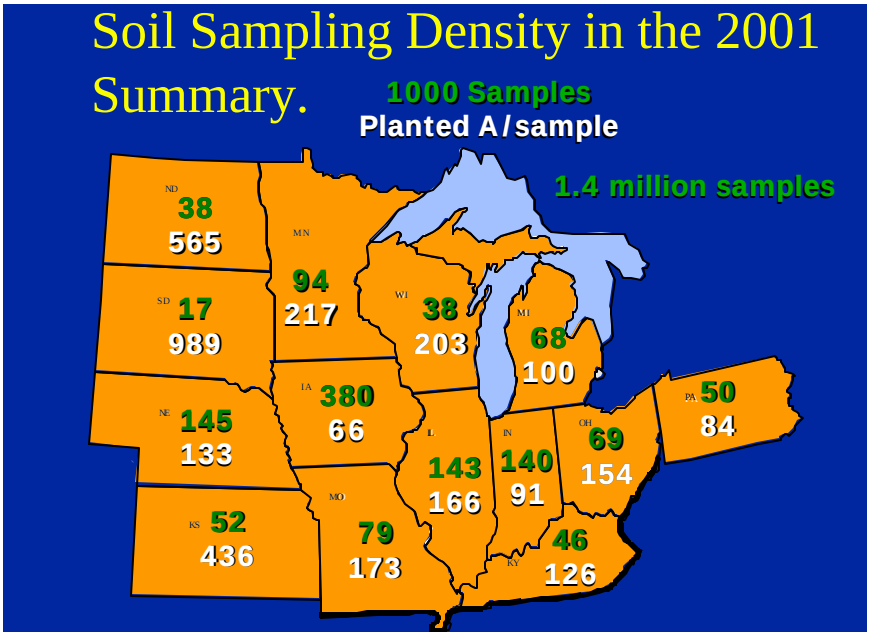


Table 1. Cumulative relative frequencies for soil test P in the WI region, sorted by P level and sampling density

State	Planted Acres 1,000	Sample density A/sam	Samples	Bray P-1 equivalent, ppm 0-5	6-10	11-15	16-20	21-25	26-30	31-40	41-50	>50	Medium or below
				Cumulative relative frequency, %									%
MN	20,293	217	93,587	5	28	47	60	69	76	85	90	100	47
IA	24,990	66	380,265	3	12	26	39	50	60	74	83	100	39
IL	23,671	166	142,619	1	3	18	17	27	38	57	71	100	42
WI	7,809	203	38,378	0	3	8	16	24	34	49	61	100	24
MI	6,768	100	67,927	0	2	5	11	17	25	38	50	100	25

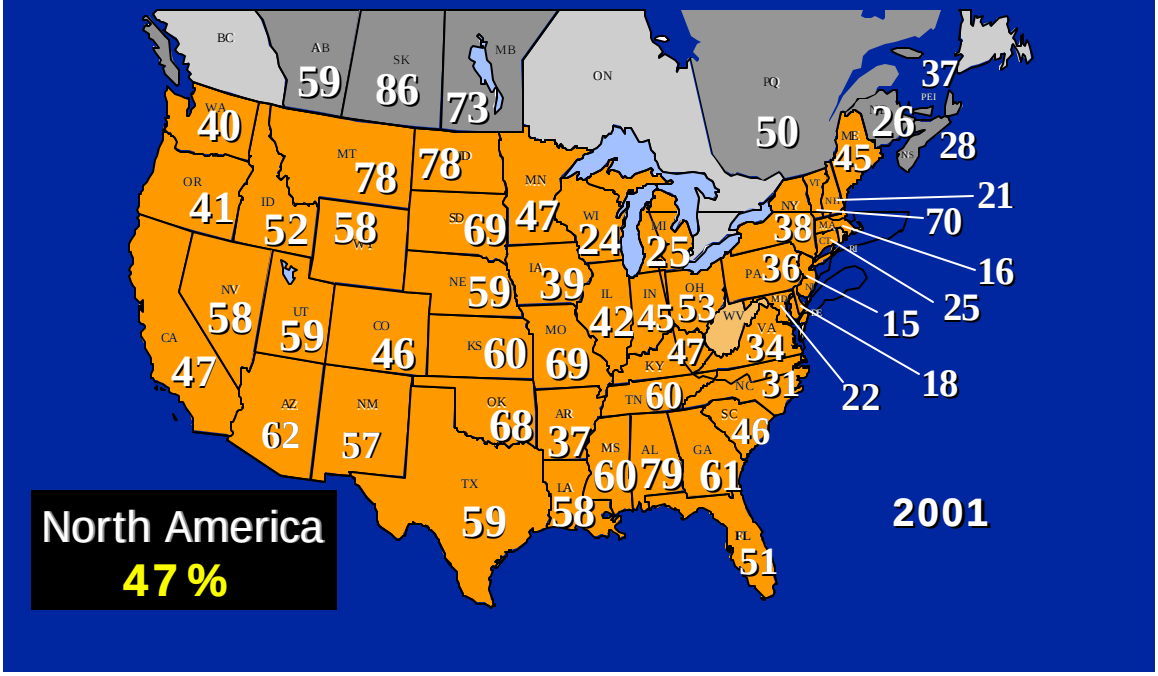
Table 2. Cumulative relative frequencies of soil test K in the WI region sorted by K level

State	Samples	Ammonium acetate equivalent K, ppm 0-40	41-80	81-120	121-160	161-200	201-240	241-280	281-320	>320	Medium or below
		Cumulative relative frequency, %									%
MN	88,011	1	5	22	51	71	81	87	91	100	22
IA	327,457	1	8	30	54	75	84	90	93	100	30
IL	142,625	1	9	32	56	75	85	91	95	100	62
WI	38,386	2	25	57	77	88	93	96	98	100	41
MI	67,988	2	15	44	70	85	92	96	98	100	71

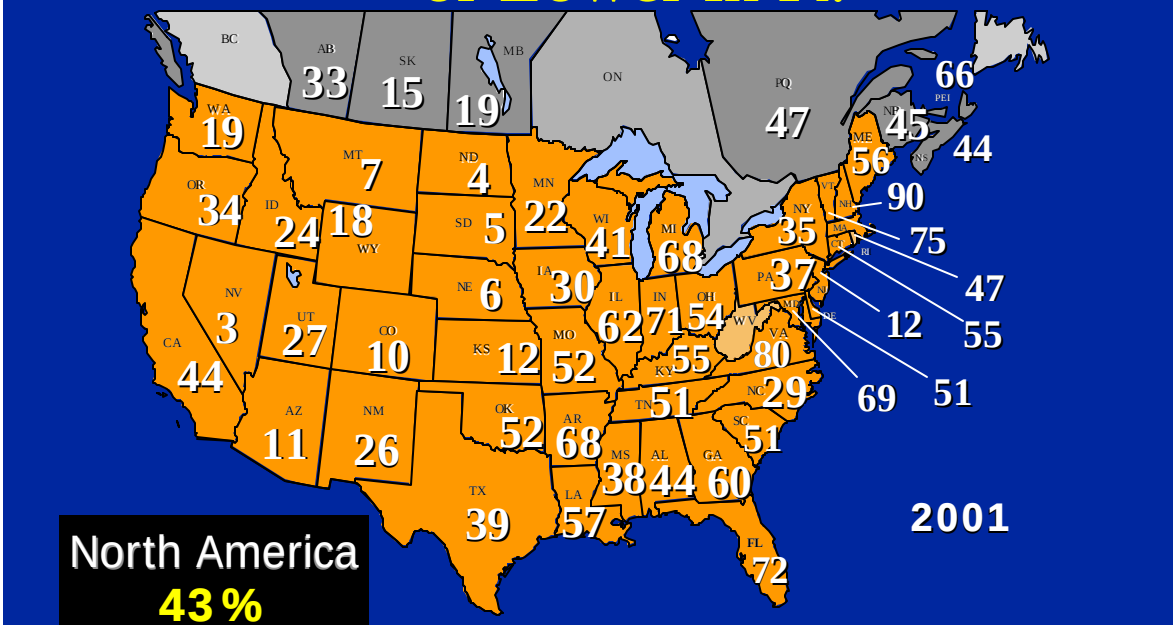
Table 3 Cumulative frequencies for soil pH in the WI region

State	Samples	Soil pH range (water 1:1) <5.0	5.1-5.5	5.6-6.0	6.1-6.5	6.6-7.0	7.1-7.5	7.6-8.0	8.1-8.5	>8.5
		Cumulative relative frequency, %								
MN	86,978	0	4	17	35	52	67	90	100	100
IA	324,945	1	7	27	56	77	87	95	97	100
IL	143,123	1	8	30	65	87	97	100	100	100
WI	38,413	1	4	17	43	82	98	100	100	100
MI	68,484	2	7	22	48	73	89	98	100	100

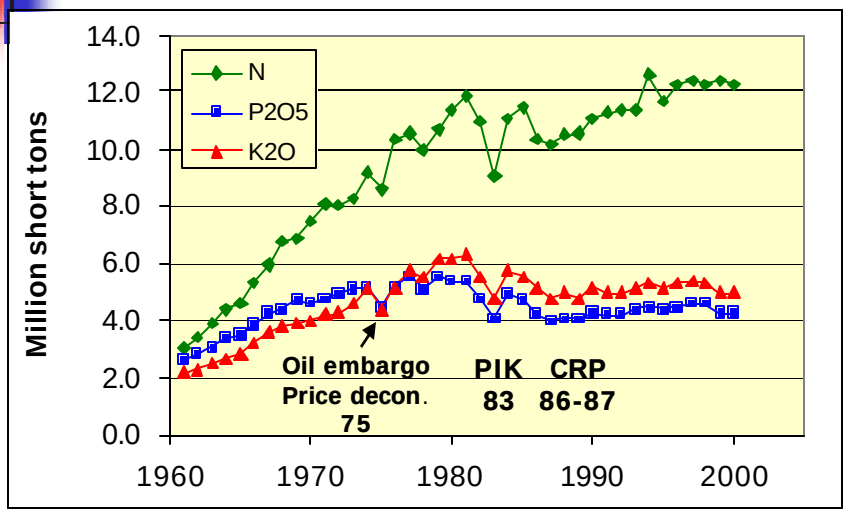
Percent of Soils Testing Medium or Lower in P.



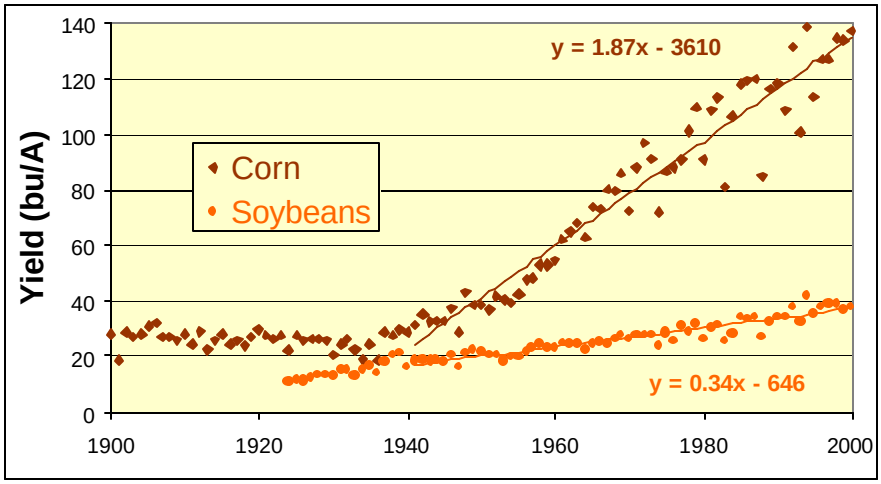
Percent of Soils Testing Medium or Lower in K.



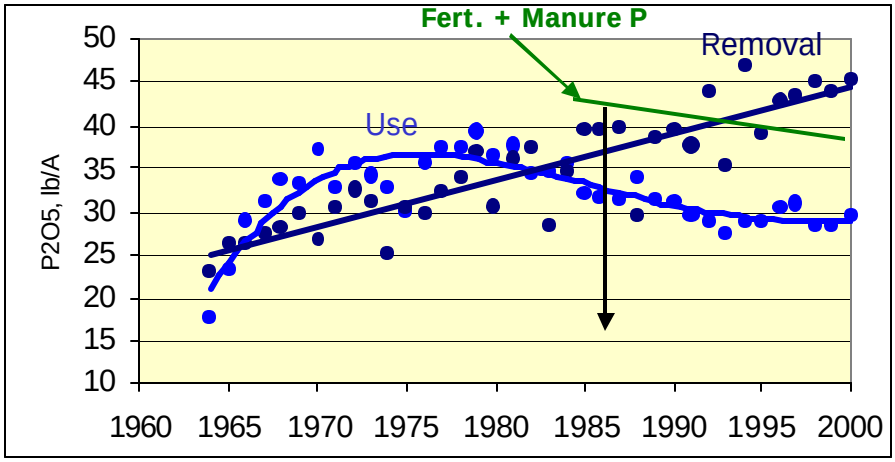
Commercial Fertilizer Use in the U.S.



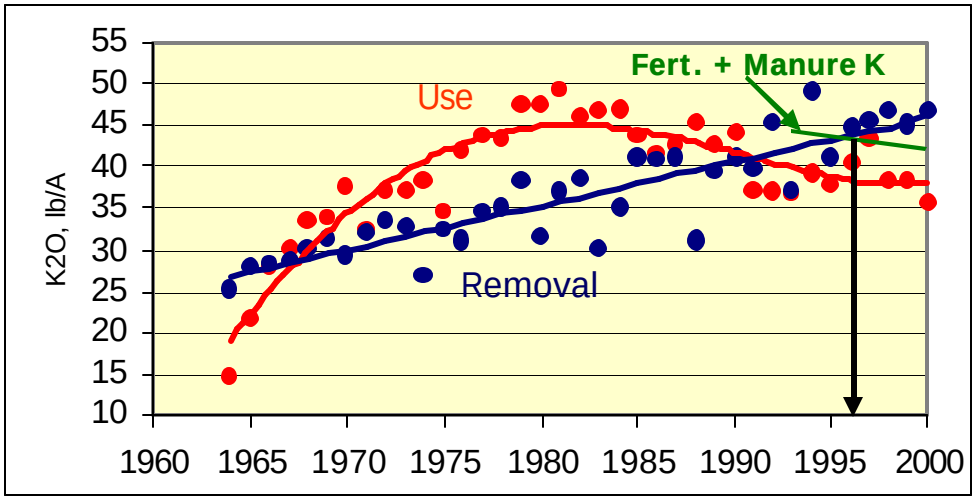
U.S. Corn and Soybean Yields

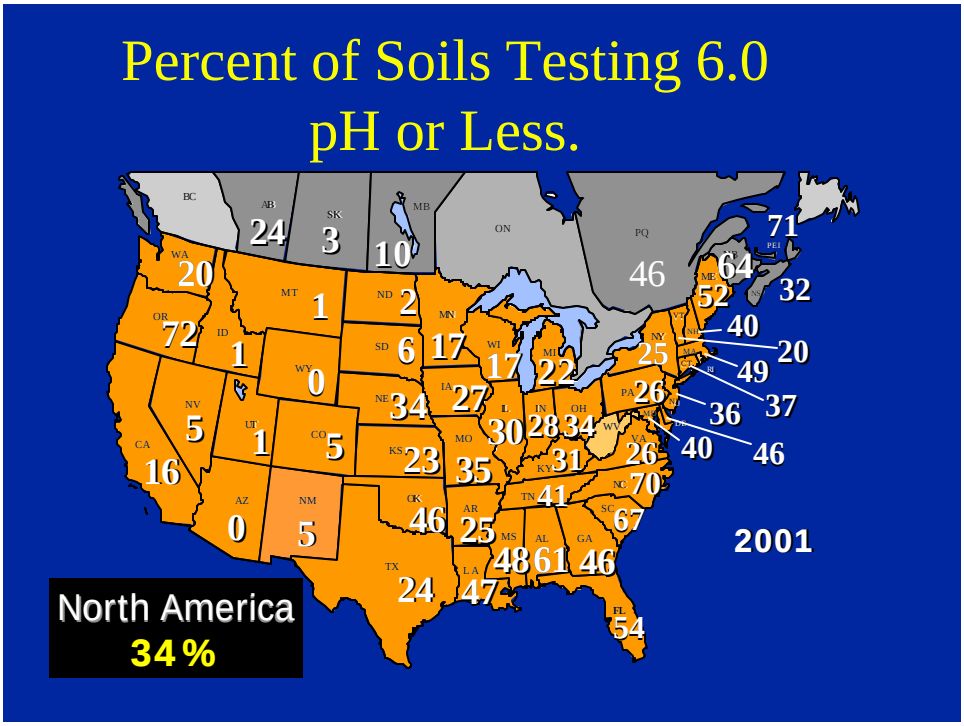


Average P Use on Corn and Soybeans in the U.S. Relative to Crop Removal



Average K Use on Corn and Soybeans in the U.S. Relative to Crop Removal





What's going on?

- **Increased yields of almost all crops, particularly corn and soybeans.**
- **Acreage of soybeans has been increasing, relative to corn, which means increased removal of K.**
- **Low crops prices lead to reduced P and K fertilization.**
- **Farm economy.**
- **Accuracy of removal numbers at higher yield levels??**
- **Soil test accuracy??**
- **Cash rent "mining".**
- **Reluctance of landowner in cost sharing adequate fertilizer use.**
- **Reduced emphasis on P and K sales at dealer level?**