SOIL TESTING AS A TOOL IN LAWN MAINTENANCE

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Prior to 1987, Grass Roots, Inc. used soil testing routinely for turf establishment but only tested established turfs when these areas responded poorly to treatment. Test results from these random samples seemed to show some trends and so in late 1987, Grass Roots, Inc. began routine soil testing for new customers and fully incorporated soil testing in 1988 as part of a paid estimate package for new accounts.

Ten to fifteen soil subsamples for each test were randomly taken at a 3" depth using a soil probe. Subsamples were mixed together to obtain a representive soil sample. Samples were submitted to the M.S.U. Soil Testing Lab for analysis. All samples referred to in this article were marked for lawn recommendations and are from established turf areas having a variety of maintenance and quality levels. Sixty-four soil test reports were analyzed from the following counties: Clinton (3 tests), Eaton (4 tests), Ingham (52 tests), and Livingston (5 tests). Of these sixty-four, one test was taken in 1987, thirteen in 1988 and fifty in 1989.

Table 1 lists the raw data from these sixty-four tests. It is interesting to note that of the sixty-four tests, only ten did not recommend any additional phosphorus or potassium. This represents just over 15% of the total. Furthermore, fifty-three, or 83% of all tests, recommended potassium. Of these fifty-three recommending potassium, fifteen also recommended phosphorus, which is a little over 23%. Only one test recommended only phosphorus, which represents about 1.5%. So sixteen samples had some phosphorus recommendation which is 25% of all samples. Figure 1 illustrates this graphically.

Table 2 and Figure 2 illustrate the general soil textures of the samples. Fifty-seven or 89% of samples fall in the loam, clay loam, sandy clay loam, and sandy loam textures.

Another interesting and probably expected result for the mid-Michigan area is the skewing of pH readings toward the alkaline side of the pH scale. As presented in Table 3 and illustrated in Figure 3, fifty-one samples or just under 80% fall in the 7.2 - 8.1 pH range with the highest occurrence of samples at 7.7 and 7.8 (eight samples at each of these pH levels).

Table 4 and Figure 4 look at the specific phosphorus recommendations among the sixty-four samples. Recommendations are given in pounds of P_2O5 per 1000 square feet per year. Again, only 25% of the tests recommended phosphorus, which is not surprising considering the immobility of phosphorus and the natural levels in our soils. Many of the sites where phosphorus was deficient were subsoils, especially on the two sites where 3.5 and 4 pounds of P_2O5 were recommended.

Table 5 and Figure 5 present the most striking information. All but eleven samples had some potassium recommendation, and almost half of all samples tested recommended at least 2.0 pounds K_2O per 1000 square feet per year. This is on established turf, the majority of which has had relatively high maintenance with many accounts having had professional lawn care service in the past.

This indicated to me that we are not coming close to meeting the potassium requirements of our turfs with our current lawn care practices. On high wear areas like athletic fields, M.S.U. recommends doubling soil test potassium recommendations, which can obviously lead to severe deficiencies of this nutrient if soil testing is not a part of your program. This comes at a time when potassium is becoming more and more recognized as critical to a healthy turf.

When looking at this data in relation to your own turf management program it is important to remember that this was not set up as a scientific experiment. No statistical analysis of data was carried out. The trends presented are for the mid-Michigan area, predominantly Ingham County. Other areas may have completely different trends.

This, however, does not diminish the importance of soil testing as a tool for any quality turf management program. In fact, this probably strengthens it because it demonstrates that there is no standard recommendation that applies to every circumstance. In conclusion, the following statements can be made concerning these test results:

- 83% of all tests recommended potassium, and almost 50% of the recommendations were for two pounds K_2O per 1000 square feet per year.

- 25% of all tests recommended phosphorus and of these recommending phosphorus, all but one test also recommended potassium.

- Soil pH levels for this area tend to be alkaline.

From a service standpoint, soil testing has become an integral part of our turf management program. It has given us a much more complete picture of nutrient requirements for our accounts. I finally feel that the guesswork of turf fertilization has almost been eliminated.

Soil testing has also modified our product usage considerably. Now, products with a 1:1 nitrogen to potash ratio are major components of our fertilizer purchases. Also, products with 1:1:1 ratio of nitrogen to phosphate to potash are used to meet the needs of those accounts requiring supplemental phosphorus. Soil testing has allowed us to truly customize a program for each client, and do it the most cost efficient way by applying the exact nutrient requirements for that particular turf and soil system.

Table 1. Summary of soil test recommendations for sixty-four samples from established turf sites in the mid-Michigan area.

DATE	SOIL GROUP	pH	P	K
9-16-88	4	7.4		1.0
5-30-89	3	7.2		2.0
8-23-89	3	7.5		
5-30-89	3	7.2		2.5
9-12-88	4	8.0		2.5
5-30-89	3	7.5	.5	.5
8-18-88	2	7.3	3.5	2.0
8-04-89	2	7.8	1.0	2.0
8-11-89	3	7.7		2.5
8-04-89	2	7.3		
2-24-89	2	7.7	4.0	2.0
9-16-88	4	7.5		.5
10-12-88	2	7.6		2.5
8-12-88	2	7.0	1.5	1.5
5-30-89	3	6.8		2.0
10-12-89	3	6.3		2.5
8-11-89	3	7.6		2.5
4-13-89	3	6.9		1.0
6-09-89	3	7.5		1.0
4-07-89	2	6.8		.5
4-07-89	3	6.5		2.5
5-04-89	4	6.9		1.5
8-26-88	2	6.6		3.0
4-29-88	2	7.2		2.5
4-21-89	3	7.9		2.5
4-21-89	3	7.4		2.0
4-07-89	2	7.9		1.0
8-11-89	3	7.8	2.5	2.0
4-21-89	3	7.6		.5
5-04-89	4	7.8		
8-04-89	2	7.7		2.0
4-07-89	2	7.8	1.5	1.0
4-07-89	2	7.8		.5
	2	7.7	.5	1.0
4-27-89	2	7.8		
4-07-89	2	7.0		1.5
6-02-89	2	7.0	.5	
4-07-89	2	7.3		
9-12-88	3	7.9	2.0	2.5
5-06-88	2	6.5		3.0
9-12-88	3	7.6		2.5
4-07-89	2	7.9	1.0	2.5
4-21-89	3	7.7		1.0
9-12-89	3	7.2		
9-06-88	2	7.6		
5-04-89	4	7.8		2.5
8-11-89	3	8.1	1.0	2.5
8-11-89	3	7.5		2.5
3-27-89	2	5.3		
4-07-89	2	7.4		2.0
8-04-89	2	7.7	2.0	1.5
8-23-89	2	7.4		1.0
9-12-88	3	7.7		1.0
10-12-87	3	7.5		2.5
5-30-89	3	7.8	1.5	1.5
10-18-89	3	7.7	1.0	2.5
10-18-89	3	7.3		1.5
10-18-89	3	7.3		2.0
11-30-89	4	7.6		3.0
6-02-89	3	7.3		
6-02-89	3	7.5	1.0	.5
9-07-89	2	5.8		
9-25-89	3	7.6		.5
9-25-89	3	7.4		.5

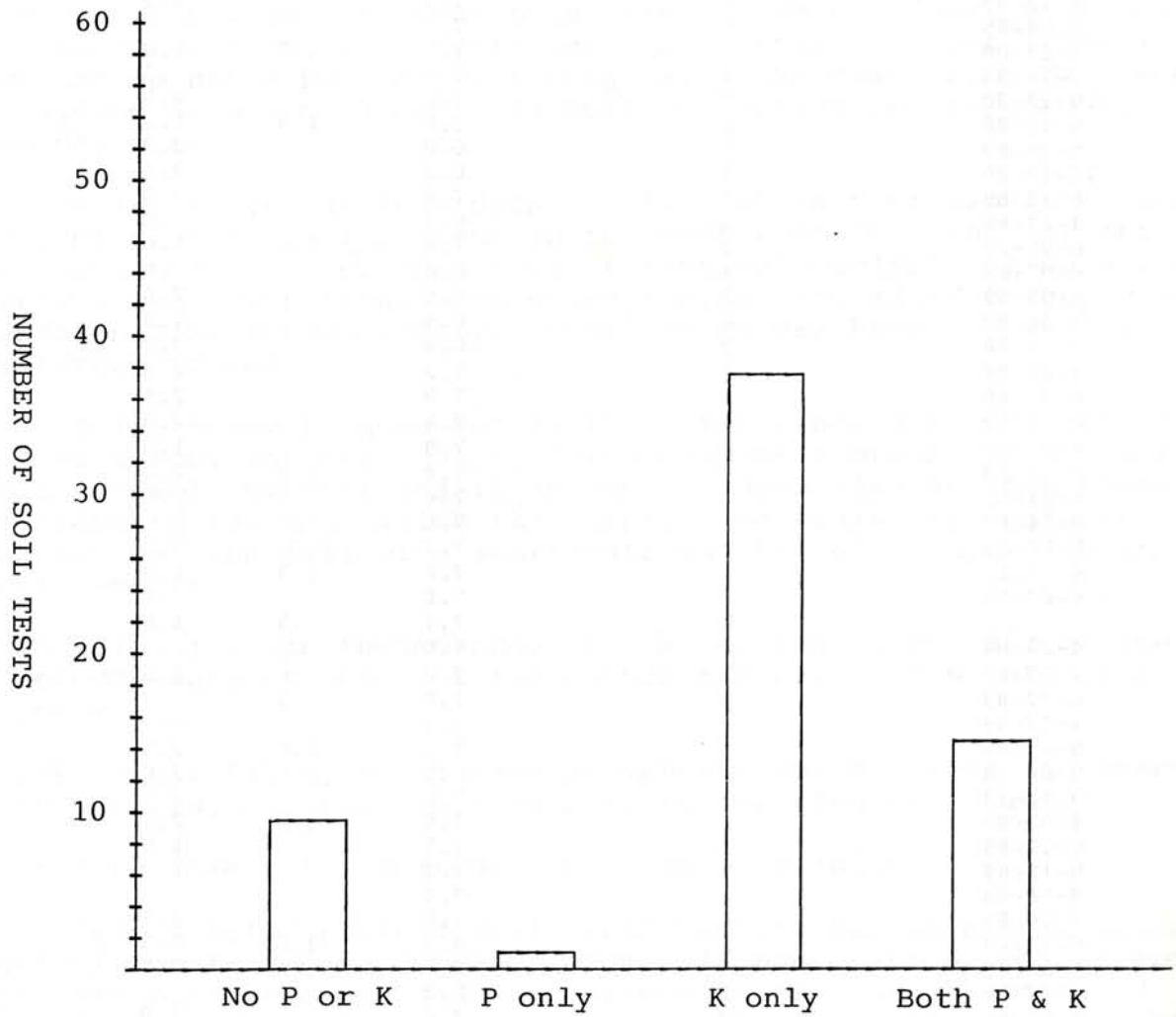

Figure 1. Number of soil tests recommending phosphorus and/or potassium.

Table 2. Number of soil tests for each soil group.

Soil Group	# of tests
1	--
2	26
3	31
4	7

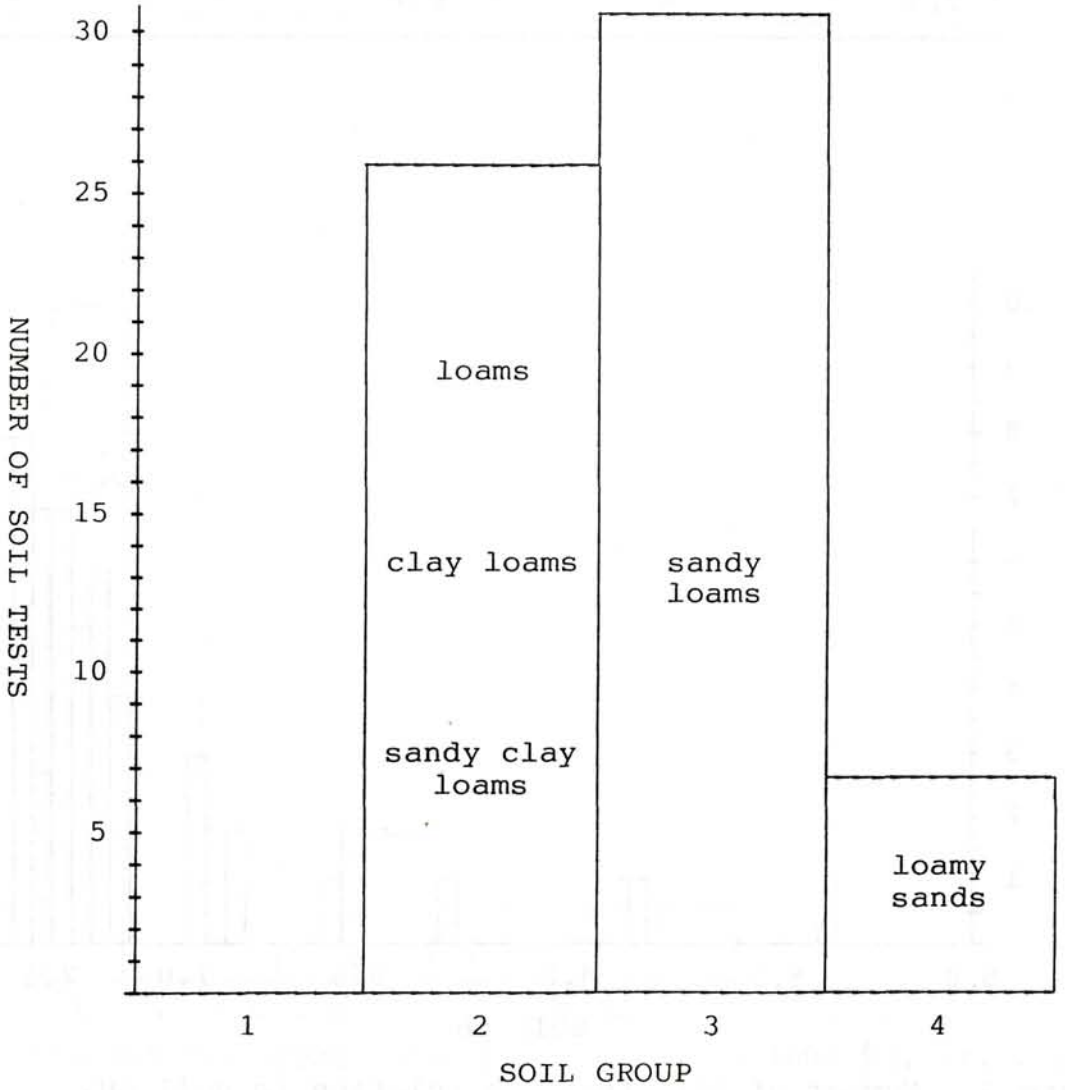

Figure 2. Number of soil tests for each soil group.

Table 3. Number of soil tests in relation to soil pH.

pH	# of soil tests	pH	# of soil tests
5.3	1	7.3	6
5.8	1	7.4	5
6.3	1	7.5	7
6.5	2	7.6	7
6.6	1	7.7	8
6.8	2	7.8	8
6.9	2	7.9	4
7.0	3	8.0	1
7.2	4	8.1	1

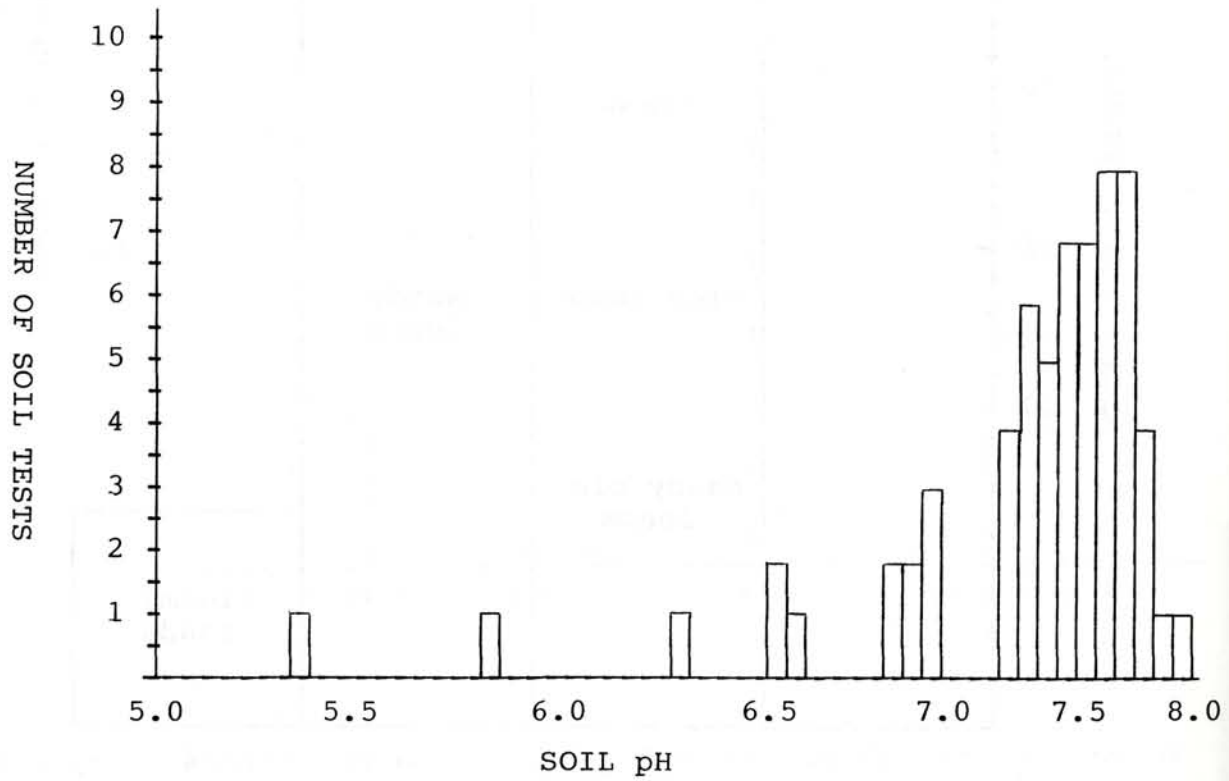

Figure 3. Number of soil tests in relation to soil pH.

Table 4. Number of soil tests in relation to level of phosphorus recommended.

Phosphorus Recommendation lbs. P_2O_5/1000 sq. ft./year	Number of soil tests
0.0	48
.5	3
1.0	5
1.5	3
2.0	2
2.5	1
3.0	--
3.5	1
4.0	1

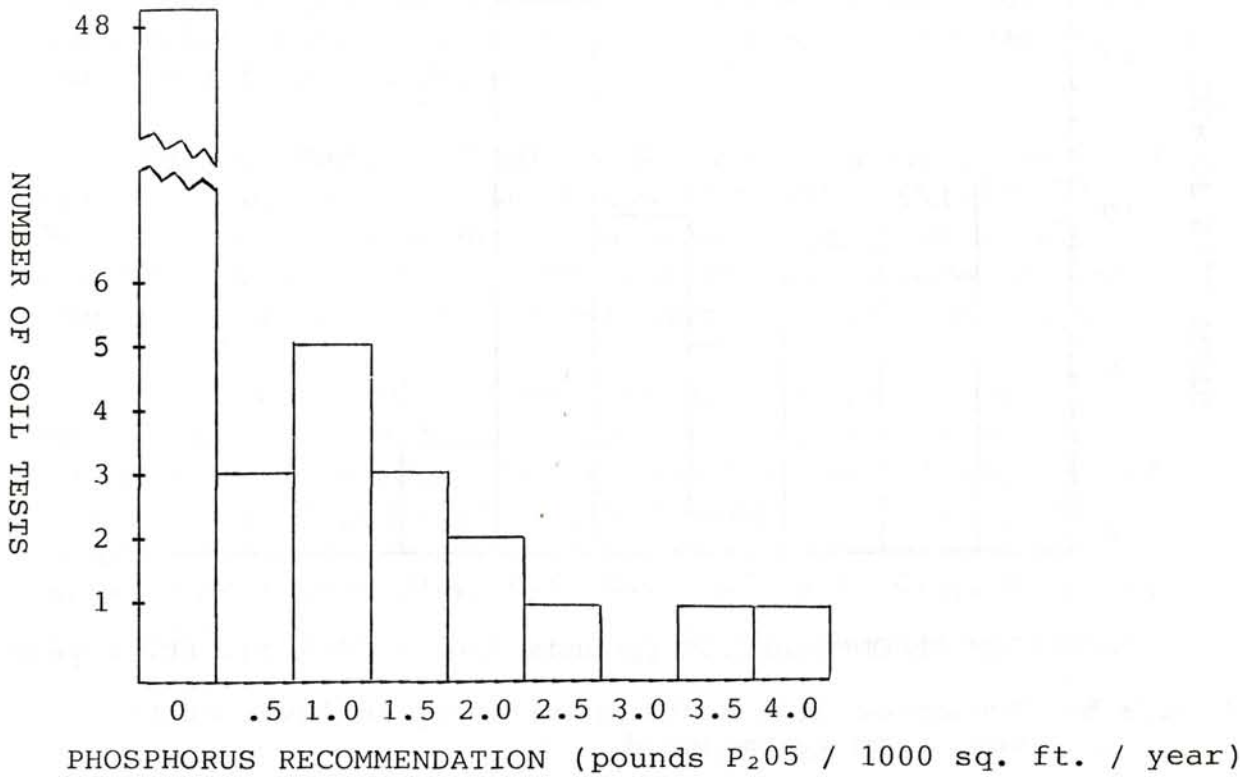

Figure 4. Number of soil tests in relation to level of phosphorus recommended.

Table 5. Number of soil tests in relation to level of potassium recommended.

Potassium Recommendation lbs. K_2O /1000 sq. ft./year	Number of soil tests
0.0	11
.5	8
1.0	9
1.5	6
2.0	10
2.5	17
3.0	3

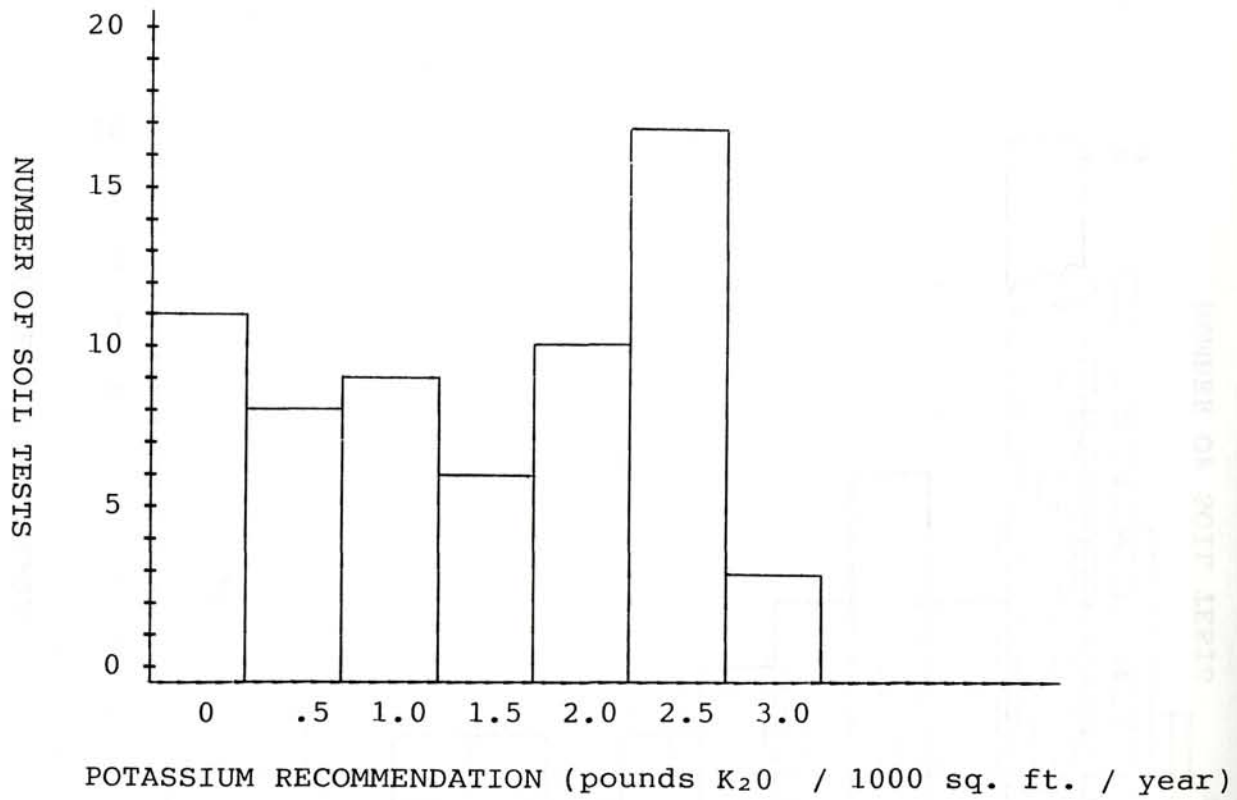

Figure 5. Number of soil tests in relation to level of potassium recommended.