

The Effect of High Moisture Content at the Time of Soil Sample Preparation Upon Purdue Soil Test Values¹

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In North Central regional potassium studies, Barber et al. (1) found that drying the soil, particularly the 18-24 inch depth samples, usually increased the exchangeable potassium and the potassium available to the plant. This did not appear to be true for the sixteen Indiana samples taken at 0-6 inch depth. Since many soil samples received in the Purdue Soil Testing Laboratory are from eroded fields, differences in available potassium related to the preparation and testing of moist samples from eroded fields may be important. This is particularly true in the spring when many samples are received in a moist condition. Since drying these samples takes additional time, there is a tendency to prepare the samples and test them as soon as they can be crushed and screened. It is also possible that soil sample preparation and testing when moist may alter pH and available phosphorus test values in the Purdue procedure.

The main purpose of this experiment was to determine whether moist rather than dry soil sample preparation and testing would change Purdue soil test values.

Methods

In Experiment I and Experiment II, 31 moist soil samples received from farmers were crushed and screened when moist and tested soon thereafter. Crushing and screening were done with a soil grinder with a 10-mesh screen. This grinder with two electrically powered metal rollers, was manufactured by the Hinkle Machine Shop, Lincoln, Nebraska. Soil tests used were those by Spain and White (2, 3) which are routinely used in the Purdue Soil Testing Laboratory.

In Experiment III, 101 previously crushed, screened, and air-dried soil samples received from farmers were riffled and separated into four subsamples. Two of these four subsamples were allowed to dry at room temperature until they were recrushed and rescreened. The other two subsamples were completely soaked with water and allowed to dry at room temperature. They were then recrushed and rescreened when just dry enough to go through the soil crusher without making a mud roll. Moisture in these samples ranged from 8.69% to 15.7% by weight. The air-dry subsamples which were not soaked with water had an average of 1.88% moisture.

After they were recrushed and rescreened, all subsamples were tested for available potassium with the same procedures used in experiments I and II.

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Results and Discussion

The preparation and testing of moist, as compared with dry soil samples, did not appear to result in different values for soil pH and available phosphorus (Table 1). In the first two experiments there was some indication of higher potassium tests on the moist than on the air-dry samples. This is the reverse of the relationship reported by Barber et al. (1).

In Experiment III, the dry subsamples tested higher in available potassium than did the moist subsamples (Table 1). In experiments I

TABLE 1. Influence of moist crushing and screening on Purdue soil test values.

Experiment	No. Samples	pH		Available Phosphorus lbs. per A. of P		Available Potassium lbs. per A. of K	
		Moist	Dry	Moist	Dry	Moist	Dry
I	19	6.08	6.04	45	47	126	119
II	12	6.16	6.14	36	33	114	100
III	101	—	—	—	—	144	161

and II the moist samples were prepared, tested, air-dried, and retested without further preparation. This may have resulted in larger aggregates with less total surface and lower potassium test values in the air-dry samples. In Experiment III, subsamples were either (a) soaked, partially dried, prepared, and tested, or (b) air-dried, prepared, and tested. It was easily observed that the samples prepared and tested moist had larger aggregates than the air-dry subsamples. Also, the samples prepared and tested moist had an average potassium test value of 17 pounds per acre or 11% lower than those prepared and tested when air-dry. The lower potassium test appeared to be the result of

TABLE 2. Influence of moist crushing and screening on Purdue soil test values for potassium.

Texture	No. Samples	Potassium Test			t Test	Probability
		Increased	Decreased	Same		
Silty clay loam	5	0	5	0	2.97	.05 or less
Silt loam	76	8	68	0	5.92	.01 or less
Loam	14	3	11	0	2.29	.05 or less
Sandy loam	6	1	3	2	2.04	.10 or less
All samples	101	12	87	2	6.83	.01 or less

less soil surface for the action of the chemicals in soil with larger aggregates. Even though these data agree with much previously reported research in which drying increased potassium test values, there is considerable question about whether or not the reasons for the differences are the same.

Moist preparation and testing for potash appeared to result in lower potassium test values in a higher percentage of cases in silty clay loams and silt loams than in loams and sandy loams (Table 2). Decreases in potassium test values due to moist preparation and testing were significant at the 95 to 5 or higher level of probability in all textures except sandy loams. Hence, it appears that all soil samples received by the Purdue Soil Testing Laboratory should be completely air-dried before being prepared for testing. Texture is not determined until samples are crushed and screened in preparation for testing.

Summary

In experiments I and II with 31 soil samples, drying did not appear to change Purdue soil test values for pH and available phosphorus, but it did appear to decrease available potassium test values.

In Experiment III with 101 soil samples, moist subsamples tested an average of 17 pounds per acre lower in available potassium than the air-dried subsamples. Moist preparation resulted in lower available potassium test values more frequently in silty clay loams and silt loams than in loams and sandy loams. The lower available potassium test values with the moist subsamples appeared to be related to decreased soil surface because of larger soil aggregates.

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