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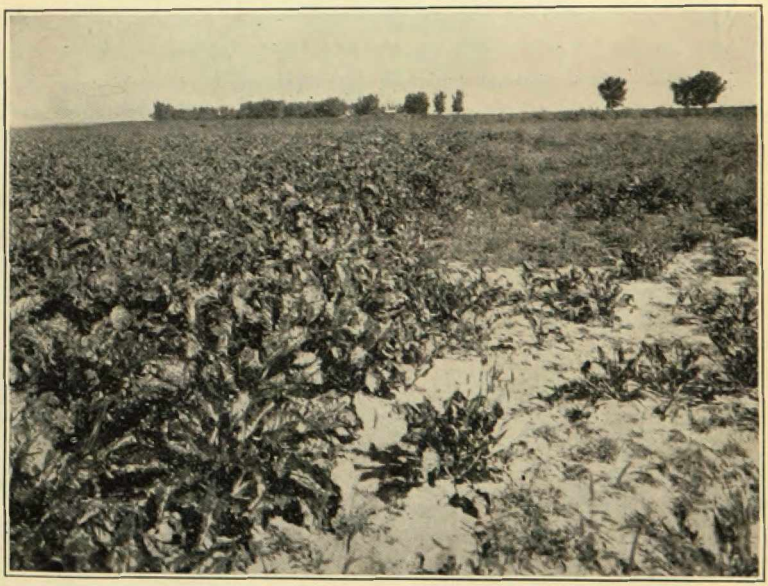

Fertilizer Made the Difference

COLORADO AGRICULTURAL COLLEGE
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FORT COLLINS

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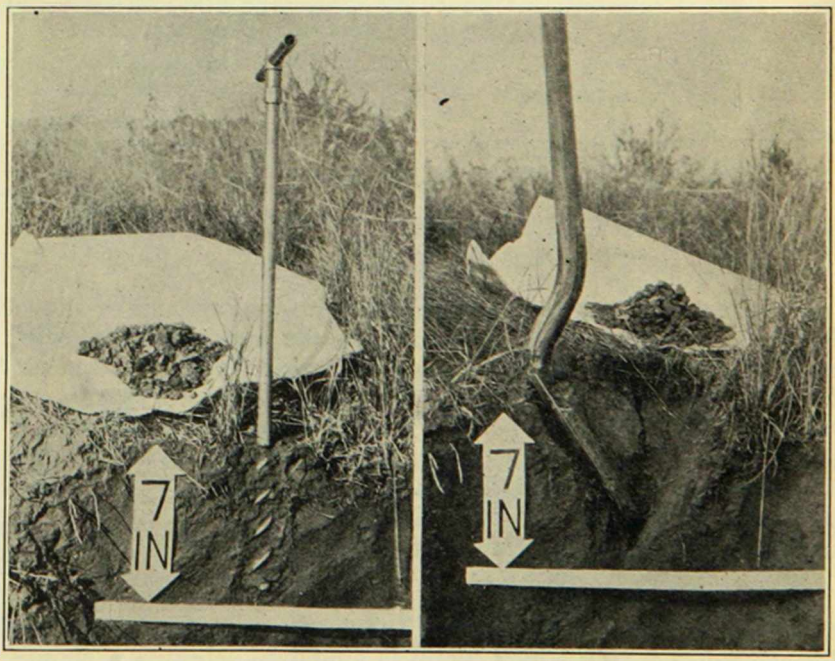
HOW TO OBTAIN SOIL SAMPLES FOR ANALYSIS

By R. D. Hockensmith

"Does my soil need fertilizer?" "Does my soil contain excess alkali salts?"

Unfortunately, these questions are very diffcult to answer even tho the sample of soil that usually accompanies them is analyzed accurately. Unless the soil samples have been taken properly, the results of such analyses are of little or no value to the farmer.

In taking samples for determining the available phosphorus or other requirements of the soil it must be remembered that the requirement varies considerably in different parts of the same field. Since it is impractical to test each acre separately, the best plan, everything considered, is to take an average of the field by securing a number of samples, to a depth of at least 7 inches, mix them well, and send about one quart of soil to the Colorado Agricultural College.

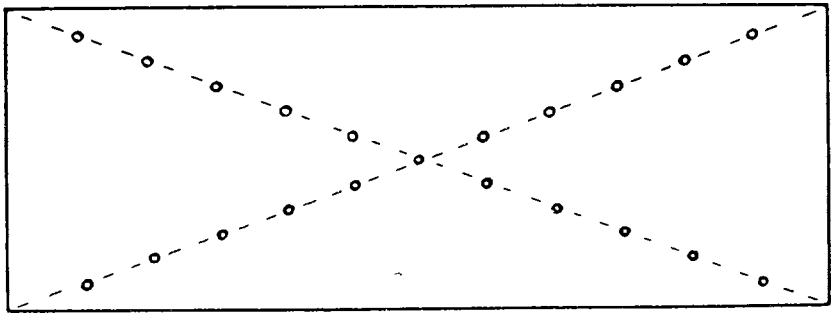


With an auger With a shovel

Methods of taking soil samples

A good method of taking a sample is as follows: Select an average place in the field to be sampled, clean off the surface organic matter, and when an auger is used simply bore down to at least 7 inches, withdraw the auger and transfer all the soil removed to a clean paper or canvas cloth. Repeat this at several places in the field so as to get an "average," mixing them thoroly all together on the paper or cloth. From this mixture take about a quart sample and send it in, placing this in a clean box or a tin can, such as a 1-pound coffee can, which has been washed and dried. Samples shipped in paper sacks seldom reach the laboratory due to the bursting of the paper and subsequent loss of soil.

The several borings which are obtained should be well distributed over the whole field. A good plan is shown in the accompanying illustration.



Showing a good plan for distributing samples over a field

If a part of the field is greatly different from the remainder of the field, then two separate samples should be obtained.

In case no auger is available and the use of a spade or shovel is necessary, clean off the surface organic matter as suggested above and dig a hole to the depth of at least 7 inches. Clean out the loose soil from the bottom of the hole. With the spade, cut off a slice from top to bottom having a uniform thickness of about one-half inch and transfer this to a clean canvas. Repeat this in a number of well-distributed locations in the field (see diagram), mix well, and place in container for shipping. The use of a soil-sampling tube is desirable if one is available.

Samples from Alkali Soil.—In securing samples for alkali determinations it is desired that the samples be obtained as follows: Select a spot where alkali is abundant. Secure a sample of the alkali crust. Send a 1-quart sample of this crust separate

from other samples. With a soil auger, secure samples in 1-foot depths down to 4 feet, from several places in the alkali spot. Put the borings from each 1-foot depth on separate pieces of canvas or in four sacks. After mixing each portion thoroly, take about 1 quart from each 1-foot depth, and label clearly.

Analysis Does Not Tell All.—After such samples have been taken correctly and have been analyzed, recommendations are difficult to make unless something is known about the cropping system, the crop to be grown, drainage of the land, depth of the soil and any peculiar conditions which you may notice. An analysis of a sample of soil alone will not reveal the kind of crop that is best adapted to a particular piece of land. The composition of the soil is only one of a large number of factors that affect the kind of crop that should be grown and the yield of that crop.

For these reasons we request that in addition to the soil sample you send us the following information:

1. Topography of land: Level, hilly, swampy_____
2. Area: How many acres, approximately?_____
3. Drainage: Is the land level, or sloping; underlaid by gravel, sand or clay?_____
4. Water table: How far below surface?_____
5. Irrigation water: From river, lake, spring or well?_____ Is it abundant or scarce? What is its quality: Good, saline or alkaline?_____
6. When was manure last applied and how much?_____
7. Previous crops:_____
8. Present crop:_____
9. Crop desired to be grown:_____
10. Is the sample average, better or worse than the average of the field?_____
11. Remarks:_____

About Terms Used.—In expressing the results of a soil analysis the terms "p.p.m." and "pH value" are often used. The term "p.p.m." as used in expressing alkali salts in soils, means parts of alkali salts per million parts of soil. When the report of a soil analysis gives 5000 p.p.m. of alkali it is probable that the quantity of alkali salts would be harmful to most plants. In the case of black alkali, much smaller amounts would be very injurious to some plants, while in the case of white alkali, larger amounts may cause little or no trouble. It may be stated from our experience with alkali soils, that the kind and amount of replaceable cations is of more importance in determining the harmful effects in alkali soils than the quantity of salts present. The term "replaceable cations" refers to the basic elements such as calcium, magnesium, potassium, sodium, etc., that are present in the soil in such a form that they can be easily replaced by each other. The kind and amount of cations present also determines to a large degree the physical condition of a soil.

The term "pH value" is used to express the hydrogen-ion concentration, which is a way of expressing the degree of acidity or alkalinity of a soil. While some plants will grow in an acid soil, others will not. It is well known that many plants prefer to grow in soil of a certain pH value. Most plants prefer an approximately neutral soil; others prefer one with an acid reaction and still others grow best in one with an alkaline reaction. Thus it is important to know the pH value of a soil.

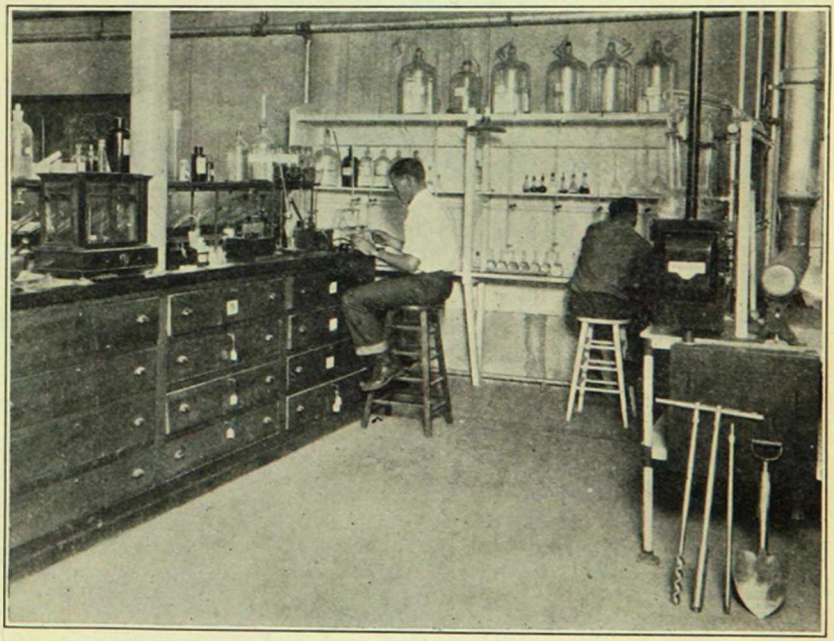
The following diagram may prove helpful in comparing pH values:

pH values	1 2 3 4 5 6	7	8 9 10 11 12 13 14
	acid	neutral	alkaline

A soil with a pH value of 7 may be considered as neutral in reaction. If the pH value is below 7 it is acid, and if the pH value is above 7 it is alkaline. As the pH values increase from 1 to 14 the degree of acidity decreases and the degree of alkalinity increases. One must bear in mind, in general, that no clear-cut line can be drawn between the plants that are tolerant of acidity and those that are sensitive to acidity, for most plants seem to be able to adjust themselves to a considerable range in pH values. A few, however, such as alfalfa, sweet clover and sugar beets, are very sensitive to acidity. In the same way a small group—

that includes the strawberry—is sensitive to alkalinity. Potatoes, on the other hand, will grow as well in an alkaline soil as in an acid soil unless scab is prevalent.

Where the soil analysis shows an evident lack of available phosphorus, a recommendation can be made as to the number of pounds of treble superphosphate that would be required per acre. Such recommendation is possible, however, only when the information requested above is given.



The soils laboratory where your samples will be tested