Building Up a Soil

The Fertility Depends Very Largely Upon Humus Supply

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The first thing that is worn out in soils is the vegetable matter or humus. The longer soils are tilled and the longer they are cultivated, the more rapidly will the humus be exhausted. Unfortunately, most of the methods of handling soils, as commonly practiced, deplete the humus content very fast. The continued growing of grain crops, especially those that require considerable stirring of the soil, like corn and potatoes, rapidly reduces the humus supply; for when a soil is stirred frequently the conditions are favorable for its most rapid decay. Naturally, in this decay considerable quantities of plant food are set free, and this is one of the immediate benefits from cultivating corn. When this practice is continued year after year on the same land, the supply of humus ultimately becomes so low as to reduce the productiveness below a profitable basis.

It is, of course, true that the constant removal of crops from the land removes large quantities of immediately available plant food, and this has much to do with the decreasing productiveness of such soils. The most important reason for this condition, however, is the reduced supply of humus, which lessens the available plant food, allows the soil to become hard and compact and increases the amount of surface washing.

The following table shows the results of rotation at the Missouri Experiment Station:

Rotation.	Yield of Corn, 1905. Bu. per A.
Corn—17 years	11.8
Corn, wheat, clover—17 years	50.7
Corn, oats, wheat, clover, timothy—17 years	54.2
Corn, wheat, clover (manured)—17 years	77.6

From these results it will be seen that where corn is grown continually for 17 years, without manure, the yield has been reduced to 11.8 bushels per acre. Where the land has been simply rotated to corn, wheat and clover the yield stands at 50.7 bushels per acre. The increase is due first to the fact that the ground is cultivated but once in three years, thus being less exhaustive than where cultivated each year; and to the fact that clover, being a humus and nitrogen-building crop, is inserted. Where the rotation has been the less exhaustive, of corn, oats, wheat, clover and timothy, the yield is 54.2 bushels per acre, and where manure has been added in the corn, wheat and clover rotation the yield is 77.6 bushels per acre.

How Restore Vegetable Matter?

Since humus, then, is of much importance, and since the decreased productiveness of worn lands is largely due to the depletion of their humus, naturally the first step to take in building up these worn lands is to restore the vegetable matter. Likewise the man who is thinking of the future, and who is determined to make his soils better from year to year, instead of allowing them to wear out, will manage his soil in such a way as to conserve this important ingredient.

This vegetable matter must be restored either by the application of manure or the turning under of other organic matter, such as weeds, grass, cornstalks, etc., or the growing of special crops for green manuring. The use of manure is, of course, of first importance, for it will not only supply organic matter, but will at the same time add considerable quantities of soluble plant food.

Some system of live stock farming where the crops produced can be fed and the manure carefully saved and returned to the land will be found the most economical method of farming for maintaining the humus. Where the manure supply is limited, however, as is the case on most farms, the use of green manures will be the cheapest source of vegetable matter. Any kind of vegetable matter turned under will help. As a general rule, a man should never burn off any crop residue, but turn them under to add humus.

Since humus is so rapidly removed from the soil by cropping, it is necessary that some means be provided for replacing it. The first essential to the maintenance of the vegetable matter is the adoption of a systematic rotation of crops that includes a wide use of such crops as clover, cowpeas and soja beans. Even a small grain crop, alternated with corn, will maintain the humus supply much longer than where corn is grown continuously, but where legumes are used the supply of humus is much more easily maintained.

Growing Leguminous Crops.

Crop rotation alone, however, will not maintain the humus supply, nor the fertility indefinitely. This is only the first essential. The rotation must include a wide use of leguminous crops, both as regular and as catch crops thrown in for pasture or green manure. Such crops are usually known as humus-building crops, because in order to build up humus in a soil nitrogen is necessary, and these plants have the ability to secure it from the air. They do not depend upon the soil nitrogen for making the vegetable matter of which they are composed. If these crops are removed from the land, however, the humus actually added to the soil is small, although since the soil is not stirred while these crops are on the land they tend to maintain it.

To build up the humus rapidly in a soil, it is necessary that these crops be pastured or fed and the manure returned; or, better still, that occasionally crops be turned under. It is seldom advisable to turn under a regular crop of green manure, but catch crops should be used for this purpose. Cowpeas or soja beans may be sown in the corn at the last cultivation, or sown after a regular crop of oats or wheat, and either pastured off or turned under to add humus. Peas may also be planted with the corn with a pea attachment to the planter, and the peas and lower blades of corn removed by sheep, or the peas and corn pastured off together. The peas may be harvested with the corn and used for silage or fed with the fodder, though a greater fertilizing value will be had if the peas are pastured or turned under.

It can readily be seen, therefore, that to maintain the humus supply of a soil absolutely, and especially if the humus is to be built up, it is necessary to make a wide use of leguminous crops to be pastured, or turned under, unless feed or manure is brought in from sources outside one's farm. The grain farmer who makes little manure and sells the bulk of his crops from the land must resort to the turning under of leguminous crops if the humus supply is to be maintained.

"COWPEAS," A SOIL BUILDER.

Scotch Query.

A bluff, consequential gentleman from the South, with more beef on his bones than brain in his head, riding along the Hamilton road, near to Blantyre, asked a herdboy on the roadside, in a tone and manner evidently meant to quiz, if he were "half way to Hamilton?" "Man," replied the boy, "I wad need to ken whar ye hae come frae, afore I could answer your question."—Exchange.

When a man realizes the gulf between ideals and actualities, he becomes bitter.

House Plans Important.

The care in the home and all other forms of household work are greatly facilitated by right planning and the use of suitable materials for the construction and furnishing of the home. An adequate and convenient water supply and other conveniences are essential, not only for comfort and for saving labor, but also from the standpoint of home hygiene.

Pawnshops in Berlin are controlled by the government. The rates of interest are low, and the profits are used for charitable purposes.

Pasture Feed for Hogs

Good Forage Reduces Grain Required for 100 Gain Thirty Per Cent—Alfalfa Is Considered the Best

By L. A. Weaver, Instructor in Animal Husbandry in the University of Missouri

Owing to the high prices of grain, the production of pork with grain alone is not nearly so profitable as it once was. It takes five or six pounds of grain in dry-lot feeding to make a pound of pork. Results of investigations at the Missouri Experiment Station indicate clearly that pork can be produced most cheaply by feeding grain in combination with forage.

In most of the work done at the Missouri Station straight corn was fed when the forage was a legume such as alfalfa, clover, cowpeas or soy beans. With non-leguminous forages such as bluegrass, rape and oats, sorghum or rye, the corn was supplemented with linseed oilmeal, the ration being made up of six parts of corn to one part of oilmeal.

Fattening hogs on rape and oats at Missouri Experiment Station.

Alfalfa Forage.

Where alfalfa can be grown successfully there is probably no forage crop that will give better results for swine feeding. An acre of alfalfa will pasture during the grazing season from ten to twenty shoats. The important point to be observed is not to pasture too closely. Best results are obtained by so pasturing that one or two cuttings of hay may be taken off the field in addition to the amount foraged off by the hogs. At this station alfalfa with one year's trial pastured twelve head for 168 days. The amount of grain fed was about one-half of a full feed. It required 3.07 pounds of grain to produce one pound of gain, as contrasted to five or six pounds if grain had been fed alone in a dry lot. The gain accredited the forage was 597 pounds, which, with pork at 6 cents, gave a return of $35.82 per acre.

Clover Pasture.

Red clover probably ranks next to alfalfa. It will not feed so many hogs per acre, and does not furnish pasture for so long a period as alfalfa. Results at this station, however, show it to be one of the best forages. In two trials, one acre of clover pastured eleven head for 130 days. The amount of grain per pound gain was 2.97. The gain accredited to forage in this case was 572 pounds, or, with pork at 6 cents, the return from an acre of clover was $34.32.

In pasturing the clover care should be taken not to turn in on it before it is ten to twelve inches high. It should not at any time be pastured too closely.

Rape Pasture.

The "annual" forage crop which has given best results at this station is rape in which has been sown a few oats. Rape may be sown as early in the spring as the ground can be worked, or about the same time that oats would be sown. It is a rapid-growing, succulent crop, and hence it is well adapted for swine pasture. The "Dwarf Essex" is the variety sown for this purpose. Good results have been obtained by sowing five or six pounds ahead of the drill and then drilling in one-half bushel of oats. Six to ten pounds of clover sown at this time is also good to add to the mixture. The rape should not be turned onto until 14 to 18 inches high. If not pastured too closely and the season is favorable it will come on again, thus furnishing pasture for a long period.

With three trials, an acre of rape and oats pastured ten head for 107 days. The grain required per pound gain was 3.28 pounds. The pork accredited forage is 380.7 pounds, or at 6 cents per pound it gave a return of $22.84 per acre. These figures indicate that rape is one of the most profitable forages for swine and should be used more often.

Bluegrass Pasture.

The best results are obtained with bluegrass before August and after the fall rains, since bluegrass goes into a resting stage during the dry weather of late summer. To successfully finish hogs on bluegrass requires the feeding of more grain per 100 pounds live weight than on clover, alfalfa or rape and oats pasture. The grain ration should be 2½ to 3 per cent of the live weight of the hogs.

There have been four trials with bluegrass. During the first two straight corn was fed. During the last two trials the ration consisted of corn six parts and oilmeal one part. This is considered better than corn alone. For the four trials one acre of bluegrass supported an average of 12.5 head of hogs for 142 days. The amount of pork accredited to the forage was 252.5 pounds, or a return of $15.18 per acre, figuring the pork at $6 cents per pound.

Economy of Forage Crops.

The average amount of grain required to produce a pound of gain with five dry-lot experiments, where a well-balanced ration was fed, was 5.11 pounds. With the four forage crops mentioned above, the average amount was 3.49 pounds. In other words, a saving of a little more than 30 per cent of the grain was effected by the use of forage crops.

The advantage of feeding the crop on the land should also be considered in figuring the economy of forage crops.

While the kind of grain to feed is important, the amount of grain is of equal, if not greater, importance in determining the economy of gains. It has been shown at different stations that the best forage crops are little more than a maintenance ration. If gains are to be obtained, then, it is necessary to feed some grain. Experiments indicate that the greatest economy of grain is obtained when one and one-half to two pounds of grain are fed daily for each 100 pounds of live weight. The best general rule is to feed the hogs enough grain to cause a daily gain of three-fourths of a pound for each 100 pounds live weight.