

Making Money On the Farm

II.—Maintaining Fertility

By C. V. GREGORY,
Author of "Home Course in Modern Agriculture"

NOT all lands need drainage, but there are none on which the problem of maintaining fertility is not an important one. Fertility of the land in its broadest sense means its ability to produce large crops.

One of the important factors influencing fertility is the amount of plant food in the soil. Ten elements, carbon, hydrogen, oxygen, calcium, magnesium, iron, sulphur, nitrogen, potassium and phosphorus, are necessary to the growth of plants. From 90 to 95 per cent of the dry matter of plants is made up of carbon, oxygen and hydrogen, which are obtained from air and water. Of the others only three, nitrogen, phosphorus and potassium, are used in such large quantities that the supply in the soil is likely to become exhausted. These three are usually spoken of as the essential plant foods.

Amount of Plant Food in Soils.
These plant foods are present in varying amounts in all soils. In many cases it is necessary to increase the supply by the use of commercial fertilizers. The real need of most soils, however, is not the addition of more of these materials, but the judicious use of those already there. It is estimated that there is enough phosphorus in the upper seven inches of soil in the Mississippi valley to raise a hundred bushels of corn to the acre every year for sixty years and enough potassium to last 600 years at the same rate. Much of this phosphorus and potassium is combined with other materials in such a form that it is unavailable for the use of the plants. One of the principal problems of the farmer, then, is to make this stored fertility available.

One of the most effective means of doing this is by keeping the soil plentifully supplied with humus. Humus is the name given to decaying organic matter in the soil. It is the humus that gives the dark, rich color to soils. It leaves that "brown streak in the furrow" that farmers have long regarded as an indication of fertility. Humus gives the soil a spongy texture and greatly increases its water-holding capacity. It also makes the soil lighter and warmer. Soils which contain large amounts of humus do not bake or become cloddy easily. They are mellow and respond readily to cultivation. Humus contains considerable nitrogen and furnishes a home for bacteria, which aid in making plant food available. Certain acids are also formed in the decaying of humus that aid in making the phosphorus and potassium available. It might almost be said that the chief problem of maintaining fertility is the problem of keeping the soil supplied with humus.

Maintaining the Humus Supply.
Probably the best way of maintaining this humus supply is by the liberal use of barnyard manure. The surplus straw should be used for bedding, so as to save all the liquid portion and add to the bulk of the manure. Shredded fodder is also good for this purpose. The manure should be hauled



FIG. III.—ACCUMULATION OF MANURE.

to the land as fast as formed. When it is allowed to decay in the barnyard much of the nitrogen is lost, and rains falling upon it also wash out other elements. The manure spreader is an implement that should be found in every barnyard. The manure can be loaded direct from the stables to the spreader at almost all seasons of the year and spread in an even layer upon the field. With a spreader the manure can be made to cover twice as much ground, so that the whole farm can be gone over oftener.

While barnyard manure is undoubtedly one of the best means of maintaining fertility, it cannot always be had. Many farmers, because of their location near markets which demand certain crops, find it more profitable to supply those crops than to raise live stock. Others prefer grain farming because it is less confining. Such farmers must have some method of maintaining fertility which does not depend primarily upon manure.

The Value of Clover.
The best substitute for manure is clover. Clover supplies an abundance of nitrogen, the most rapidly used of

the three essential elements. Three-fourths of the air is made up of nitrogen. Clover and other leguminous crops are able to get nitrogen from this source by means of bacteria which live on their roots. These bacteria change the nitrogen of the air into nitrate, a form in which it can be used by the plants. Fully one-third of the nitrogen collected by the clover plant is left in the soil in the roots and stubble. One crop of clover in a four year rotation will furnish nearly enough nitrogen for the remaining three crops in the rotation.

This is a much cheaper form of obtaining nitrogen than by purchasing it in commercial fertilizers at 10 to 15 cents a pound. It is much more profitable to keep the nitrogen supply fairly constant by the continued use of a rotation with legumes than to add a large amount at one time. Nitrogen in the form of nitrates is readily soluble, and every rain washes some of it out of the soil. This is not true of the other essential elements to any marked extent. Too liberal a supply of nitrogen at one time tends also to promote too rapid leaf growth at the expense of fruit or grain.

The stubble and roots of the clover, together with the cornstalks and other rubbish, will do a great deal to keep up the humus supply. In addition to



FIG. IV.—LOADING MANURE SPREADER.

this, if no manure at all is available, some humus may have to be supplied from some other source. This is especially true if the soil is naturally poor in humus. One of the simplest ways to supply this is by green manuring. This means the turning under of a green crop, such as clover, cowpeas or some other legume. This supplies both humus and nitrogen. The best time to plow under such a crop is in the fall, so that it will have time to decay before spring. A large mass of undecayed material plowed under in the spring checks the upward movement of moisture and is liable to make the land sour.

Another method of adding to the humus supply is by mowing a crop of clover about haying time and letting it lie on the ground. The second crop can be cut in the same way or used for fall feed or for seed.

"Clover Sick" Soil.

After clover has been grown for a considerable length of time, especially if much has been plowed under for green manure, the land is liable to become "clover sick." This is caused by an excess of acid in the soil. This acid can be neutralized by the application of ground limestone. Caustic or quicklime is not so good as limestone, since it burns up large quantities of humus and in general is too violent in its action. Lime has another advantage on clay soils in that it causes the particles to adhere together in larger masses, thus making the soil more porous. The usual rate of application is from twenty to forty bushels to the acre. With the application of lime, as well as with the adoption of any other new method, it is best to try it on a small scale first. Then if it proves profitable its use can be extended.

The judicious use of clover or some other legume will effectively solve the humus and nitrogen problems. There remains the question of the potassium and phosphorus supply. Clover also aids with these. The humus formed from it helps to dissolve the unavailable materials and prepare them for the use of the plant. As stated before, there is enough potassium in the upper seven inches of the average prairie soil to last 600 years under the most intensive culture and enough phosphorus for fifty years. Clover changes this seven inches into twice as many feet. Clover roots go down ten or a dozen feet or farther. Alfalfa roots go down twenty feet or more. These deep roots bring up minerals from the lower layers of soil and leave them where the shallower rooted grain crops can get them.

Making Fertility Available.
Gypsum, or land plaster, has a considerable effect in making potassium and phosphorus available. Applied at the rate of 500 or 600 pounds per acre, it will often increase crop yields considerably. It also has a beneficial effect on alkali soils. Use one or two bushels to the acre.

Probably the most effective way of making phosphorus, potassium or other plant foods available is by tillage. Frequent and thorough cultivation, keeping the soil fine and mellow, favors the chemical processes by which locked up plant food is made available. It must be remembered, however, that the faster these materials are liberated the sooner will the supply become exhausted. When rotation with legumes, tillage and the application of lime and gypsum no longer produce satisfactory results it is a sign that there is a lack of potassium or phosphorus, or both, in the soil. Phosphorus is more liable to become scanty in amount since the supply is smaller. Bone-meal and ground phosphate rock are the best forms in which to apply this material. The former is quicker in its action, but considerably more expensive. Potassium is usually bought in the form of muriate or sulphate.

month and the shop orders and blue-prints for 16,000 employees run up into millions, a pneumatic tube system "shoots" the mail from the different offices to the mailing department and to the various buildings throughout the works. Large automobiles hurry the mail matter to and from the city postoffice.

The steel tubes are laid under ground and the carriers are shot through them by compressed air. Small motors keep a continual supply of compressed air on hand. The speed with which shop orders can be delivered in this method is astonishing as it only takes a carrier a minute to go from one end of the 275 acre plant to the other.

COUNTY COURT

Continued from page 3

P. J. Holm	14.00
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G. Eggimann	68.50
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O. Shelly	75.37
W. N. Clark	50.75
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A. Pescinski	48.25
C. Murali	87.00
G. Blumh	59.50
T. Myrick	48.42
S. T. Sincclair	12.00
F. Eggimann	59.00
Henric	45.00
O. Kunzman	56.75
A. Gunther	41.50
W. Eggimann	26.00
A. Hornshuh	63.12
C. Friel	32.25
F. Blumh	12.00
W. Brenner	28.50
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Aug. Staehley	42.50
D. J. Hughes	28.00
Fred Chin	39.50
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Henry Engel	9.00
Geo. Randall	20.00
Geo. Kelland	2.00
A. Blanchard	4.00
B. McArthur	14.00
L. N. Skinner	3.00
H. E. Skinner	13.00
John Reiheman	5.00

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Chamberlain's Cough Remedy the Best on the Market.
"I have used Chamberlain's Cough Remedy and find it the best on the market," says E. W. Tardy, editor of the Sentinel, Galshoro, Tenn. "Our baby had several colds the past winter and Chamberlain's Cough Remedy always gave it relief at once and cured it in a short time. I always recommend it when opportunity presents itself." For sale by Jones Drug Company.

District No. 17.

Carlton & Rosenkrans	23.20
E. C. Babcock	5.00
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D. R. Dimick	5.00
W. L. Biggs	35.00
Hiram Pipkey	45.00
Henry Pipkey	23.00
Mike Perringer	12.00
Charley Pavalliz	15.00
Mat Pavalliz	41.00
A. Phelps	4.00
T. C. Collier	14.00
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Rob Vorpahl	7.00
J. Hemmalman	5.00
Ellick Tice	9.00
Wm. Tice	4.00

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Wm. M. Moehnik	26.75
Eugene Cummins	2.11
Trojan Powder Co.	63.17
E. W. Hornshuh	7.50
P. Williams	12.00
T. Evans	12.00
L. Buckner	13.00
A. Baker	17.00
E. W. Hornshuh	30.00
Alvin Hornshuh	28.85
T. Davis	19.50
T. Kamrath	19.75
J. T. Barrow	5.00

Dist. No. 19.

Carlton & Rosenkrans	41.75
E. Deltrich	2.00
H. Deltrich	4.00
J. Moshberger	12.00
H. Schoenborn	8.00
Otto Striker	2.00
A. Moshberger	2.00
C. Helvey	4.00
R. P. Wallace	24.00
F. Churchill	24.00
F. Wallace	12.00
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B. Sullivan	10.00
P. Putz	10.50
A. Baurer	10.00
A. Scherrler	12.00
W. M. Bottmiller	10.00
Ed Grace	16.00
J. Maxon	12.00
N. M. Scribner	18.00
C. Shockey	15.00
W. M. Wettlauffer	7.00
P. Sullivan	6.00
T. Grace	13.00
A. Haag	8.00
Joe Parrish	22.75
F. Hettman	36.50
F. Shute	7.75
T. Wirtz	14.75
D. Fairfowl	7.75
B. Marchall	9.00
F. Nicholas	2.00
D. A. Miller	8.00
G. Wallace	4.00
S. Martin	1.00
E. Kirk	3.00
C. Kirk	5.00
R. J. Kirk	1.75
T. L. Parrish	12.00
E. McIntyre	4.00
F. Rees	12.00
A. Harrington	6.00
J. Mayfield	4.00
A. Stormer	5.00
Geo. North	4.50
C. Shockey	22.50
N. Scribner	63.25
M. VanDonge	2.00
J. Putz	12.25

Dist. No. 21.

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Chas. Bockman	20.00
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P. E. Bonney	21.00
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Will Hettman	12.00
John Arquette, Sr.	18.00
Joe Arquette	12.00
John A. Arquette	17.00
Merit Clark	4.00
Charles Fischer	40.00
Claude Winslow	34.00
F. Countryman	34.00
Alfred Anderson	14.00
E. A. Swanson	29.00
U. S. Dix	17.00
Frank Winslow	52.75

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ORDINANCE NO. —
An ordinance declaring the probable cost of the improvement and the share thereof of each tract, lot, block or part thereof, for the improvement of Eleventh Street, Oregon City, Oregon, from the Western line of Main Street to the Southern 60 feet of said Eleventh Street for a distance of 200 feet Westeryly, thence with a centering width to that of 56.7 feet Westeryly to the Eastern line of Water Street; also from the Eastern line of Main Street to the Eastern line of Van Buren Street; and directing an entry of such assessment in the docket of city liens.

56.7 feet Westeryly to the Eastern line of Water Street; also from the Eastern line of Main Street to the Eastern line of Van Buren Street in accordance with a notice of Street Improvement published by order of said City Council on the Oregon City Courier of May 21st, 1909 and May 28th, 1909, to be \$20,826.15, one-third of which, or \$6,942.05 is chargeable to the permanent street improvement fund, and two-thirds, or \$13,884.10 to the property abutting upon the proposed improvement, and assessed upon each lot, block, or part thereof, liable therefor its share of such cost as follows, to-wit:

Lot 1, Block 9, A. Knapp	\$459.03
Lot 2, Block 9, The Northernly 34 feet thereof, Eva A. Hawley	116.03
Lot 7, Block 9, The Northernly 34 feet thereof, Olive E. Albright	116.03
Lot 8, Block 9, The Northernly 34 feet thereof, Albright	459.03
Lots 4, 5 and 6, Block 10, a part thereof, described as follows, to-wit: Beginning at a point on the Southernly line of said Block, 51 feet Westeryly from the Southeastery corner thereof, and running thence Westeryly along the Southernly line of said Block, 159 feet to Southwestery corner of said Block, thence Northernly along the Westernly line of said Block, 100 feet thence Easternly at right angles to last course 159 feet, thence Southernly 100 feet to the place of beginning, Frank Busch	\$402.50
Lots 3 and 4, Block 19, A part thereof described as follows: Beginning at the Southwest corner of Lot 4, and running thence Northernly along the line between Lots 4 and 5, and 5 and 6, 100 feet, thence Easternly at right angles to last course 26.6 feet to the Westernly line of the right of way of the Oregon and California Railroad Company, thence Southwestery along said right of way line 102.8 feet to the Southernly line of lot 4 and thence Westeryly 3 feet to the place of beginning, Ellen S. Warren	17.03

Lots 3 and 4, Block 19, A part thereof, described as follows: Beginning at a point in the Westernly line of Lot 4 on the Southeast corner of said Lot 4, and running thence Westeryly by a line parallel to a line between Lots 3 and 4 of said Block, 69.8 feet to the Easternly line of the Right of way of the Oregon and California Railroad Company, thence Northeastery along said right of way line 102.8 feet thence Easternly by a line parallel to line between lots 3 and 4 of said Block, 58.4 feet to the Easternly line of Center Street, thence Easternly 48 feet to the place of beginning, Ellen S. Warren

Lots 3 and 4, Block 19, a part thereof, described as follows: Beginning at a point in the Southernly line of Lot 4 which is 3 feet Easternly from the Southwest corner thereof, and running thence Northeastery 102.8 feet, thence Easternly parallel to line between lots 3 and 4, 20 feet thence Southwestery 102.8 feet to the Southernly line of Lot 4, thence Westeryly 20 feet to the place of beginning, Oregon and California Railroad Company

Lot 4, Block 19, a part thereof described as follows: Beginning at the Southeast corner of said Lot 4, and running thence Northernly along the Easternly line of said Lot 4, 52 feet, thence Westeryly to the line between Lots 3 and 4, 69.8 feet to the Easternly line of the right of way of the Oregon and California Railroad Company, thence Southwestery along said right of way line 53.5 feet to the line of said lot 4, thence Easternly 82 feet to the place of beginning, Christian Hartman

Lot 5, Block 19—Mary Barlow. 276.34
Lot 6, Block 19, the Southernly 34 feet thereof—Mary Barlow. 69.93
Lot 1, Block 20. A part thereof described as follows: That part of Lot 1 lying North of a line drawn from the center of the Easternly line of said lot 2 to the center of the Westernly line of said lot—F. C. Burke. 147.57
Lot 2, Block 20. A part thereof described as follows: That part of Lot 2, lying North of a line drawn from the center of the Easternly line of said lot 2 to the center of the Westernly line of said lot 2. A. B. Buckles. 340.59
Lot 3, Block 49. The Southernly 34 feet thereof—Catherine F. Milley. 94.04
Lot 4, Block 49—Catherine F. Milley. 367.48
Lot 5, Block 49—Bank of Oregon City. 233.57
Lot 6, Block 49. The Southernly 34 feet thereof. Bank of Oregon City. 59.04
Lot 1, Block 50—J. T. Apperson. 719.90
Lot 2, Block 50. The Northernly 33 feet thereof. J. T. Apperson. 184.58
Lot 5, Block 50. The Northernly 33 feet thereof. J. T. Apperson. 96.34
Lot 6, Block 50. The Northernly 33 feet thereof. J. T. Apperson. 355.73
Lot 1, Block 67. The Easternly 55 feet thereof. O. W. Eastham. 220.58
Lot 1, Block 67. The Westernly 50 feet thereof. V. Harris. 200.41
Lot 2, Block 67. The Northernly 33 feet thereof. J. T. Apperson. 108.05
Lot 5, Block 67. The Northernly 33 feet thereof. Mary D. Huntley. 115.01
Lot 6, Block 67—Mary D. Huntley. 462.36
Lot 3, Block 68. The Southernly 33 feet thereof. A. D. Putrow. 51.18
Lot 4, Block 68—A. D. Putrow. 175.84
Lot 5, Block 68—A. D. Putrow. 324.90
Lot 6, Block 68. The Southernly 33 feet thereof. A. D. Putrow. 80.69
Lot 3, Block 97. The Southernly 38 feet thereof. W. R. Eaton. 36.52
Lot 4, Block 97—E. J. Maple. 144.52
Lot 5, Block 97—T. Blanchard and J. Blanchard. 122.43
Lot 6, Block 97. The Southernly 38 feet thereof. George Rieberger. 34.92
Lots 1 and 2, Block 98. A part thereof described as follows: Beginning at the Northeast corner of said Block 98 and running thence Southernly along the Easternly line of said Block 99 feet, thence Westeryly at right angles to last course 70 feet, thence North-

erly at right angles to last course 99 feet to the Northernly line of said Block