

The Muck Soils of Fellsmere Farms, Florida

The drainage operations of the Fellsmere Farms Company are now so far advanced that a considerable portion of the muck soils are rapidly approaching the conditions which will permit of their successful cultivation, and the present is a favorable time to discuss the character of this class of land and the methods which should be adopted in its preparation and cultivation.

There is only one large body of muck land in Florida which is being drained as a whole on a carefully thought out plan, and where the work is sufficiently far advanced to enable the land seeker to closely estimate the date at which his land will be ready for occupation. It is only natural, therefore, that the developments at Fellsmere are being followed with the closest interest by those interested in the development of the State and by the agricultural community of the whole country, and it is scarcely too much to say that upon the success of Fellsmere the success of all Florida reclamation projects now depends. It is fortunate that public opinion, which seldom errs, should have centered itself upon Fellsmere, where natural conditions are perfect and where the drainage and development operations have been carried on with a thoroughness and completeness not thought of elsewhere.

It is, therefore, hardly an exaggeration to say that it is of national importance that the character of this vast tract of muck soil and the methods recommended for its successful cultivation should be as widely known as possible, and it is for the purpose of disseminating such information that these notes are published.

The Fellsmere muck deposits cover about 70,000 acres of land in one solid block, and are situated at the head of the St. Johns River valley, and have been formed in the valley in which this river takes its rise.

The muck deposit is the accumulation of vegetable matter during a period of a great but unknown duration. It is underlaid with a deposit of blue clay and shell marl, which is an ideal sub-soil.

The level of the surface is remarkably uniform and before the drainage operations of the Fellsmere Farms Company were commenced the land was usually covered with shallow water. It was covered by a more or less dense growth of plants consisting chiefly of saw grass, maiden cane, sedge, fern-brake, mallow, etc. Wherever the surface of the ground remained dry for a long enough period at a time seeds of trees and land bushes would find a resting place and form a nucleus for the small clumps of cypress, gum, myrtle, bay, and willow. As the muck grows deeper over the center of the tract, these trees disappear. The land is not a swamp, but a great level prairie.

The muck soil varies in depth from a few inches near the rim of the basin to eighteen feet at the North-east corner of Lake Wilmington.

All muck soils are exceedingly rich in Nitrogen, which is usually calculated as Ammonia. Relatively to the remarkable Nitrogen contents they are

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Irish Potatoes One Month After Planting in Fellsmere "Muck" Land.

deficient in Phosphoric Acid and Potash, but they are not deficient in these elements when compared to other productive soils. So many analyses of Florida muck soils have been made by the office of the State Chemist that their composition is now well known. As a result of these analyses, the general composition of these soils may be placed as follows:

Ammonia (Nitrogen)1.50 per cent to 3.30 per cent
Phosphoric Acid0.10 per cent to 0.20 per cent
Potash0.10 per cent to 0.15 per cent

In some cases the Nitrogen present in muck soils calculated as Ammonia will exceed the above figures. The following analysis was made of muck from Fellsmere Farms, and is reported on page 162 of the report of the State Chemist for the year 1910:

Ammonia (Nitrogen)4.12 per cent
Phosphoric Acid0.18 per cent
Potash0.065 per cent

Muck soils are very much alike whether found in different parts of Florida or in Iowa, Indiana or California. But, of course, the Florida muck soils have the incomparable advantage of the Florida climate and the lands at Fellsmere have the advantage of the Fellsmere drainage system, without which the best muck soil is valueless.

Muck soil without added Potash and Phosphates will grow large crops of foliage plants. It will also produce large crops of cane, corn, rice and potatoes, with exceedingly heavy stalk, straw and vine, but a comparatively small yield of sugar or grain. This, however, is again only comparative, as the yield of sugar or grain is more than equal to that produced on adjacent soils.



Ten Months Old Bananas and Sugar Cane in Fellsmere "Muck" Land.

The application of Potash and Phosphates will very greatly increase the yield of sugar and grain without affecting the size or weight of the plant.

Intelligent, up-to-date farmers do not at the present day require any instruction as to the value of Ammonia in the soil. If sufficient Ammonia in any soil is available for a vigorous plant growth, the plant will be healthy, vigorous and luxuriant; if insufficient, the plant will be stunted and poor. It is needed in large quantities by all plants, and if not present must be supplied at great expense, either by commercial fertilizer or by turning under leguminous plants. With a luxuriant growth assured by sufficient available Nitrates (Ammonia) in his soil, the skillful farmer can play with his crops as a skillful musician on his instruments. He can increase the size of his wheat grain by adding a little Phosphoric Acid, or increase the lusciousness of his fruit with a little Potash. But he can accomplish little or nothing if his plant is not in a luxuriant condition of growth, and this condition can be assured only if the Nitrogen (Ammonia) is present in sufficient quantities and in an available form in the soil.

In order to render this vast storehouse of Ammonia available for plant food, the land must be thoroughly and perfectly drained. The prize is worth the effort; the figures of the values which can be derived from the drainage of this tract are almost beyond imagination. If the tract is estimated to contain 70,000 acres of muck of an average depth of four feet, and if the Ammonia contents be estimated at an average of 2.00 per cent, the value of the Ammonia contained in the muck lands of the Fellsmere Farms Company, (estimating the value of Ammonia at \$3.50 per unit, which is the value assigned for the year 1912 by the Bureau of the Chemist of the State of Florida) reaches the enormous figure of \$632,100,000.00.



A Field of Young Beans in Fellsmere "Muck" Land.

In other words, every acre of land covered with muck four feet deep, has an Ammonia value of \$9030. Assuming that only one-tenth of this can be made available as plant food, we still have left the amazing figure of \$903 worth of Ammonia locked up in each acre, capable of being converted into plant food. It is primarily to release and render available this vast store of Ammonia that the drainage operations of the Fellsmere Farms Company are being carried out, and it is the duty of the farmer to supplement this drainage work by a proper system of farm ditches and by the proper treatment of his land. Proper drainage is the essential necessity for muck lands, for until the lands are properly drained the available Ammonia is useless for plant food and the soil is unproductive. The Fellsmere Farms Company has planned its drainage system with the object of supplying effective drainage not less than four feet deep to each ten acre farm in the muck land.

The farmer should take advantage of such drainage to the fullest extent possible. He should cut his farm ditches 105 feet apart, either down to the subsoil if the muck is shallow, or at least four feet deep where the muck is deep. If he wishes to obtain quick results it might be advisable to cut the block in two by an additional ditch, which would be abandoned later. The ditches need not be large, say $2\frac{1}{2}$ feet at the top and $1\frac{1}{2}$ feet at the bottom, but they must be opened to the full depth.

With deep drainage the soil will become aerated, the acid accumulations of centuries will be washed out by the rains, and the plant food will gradually become available. No stoppage of the free circulation of air through the soil must be tolerated; the ditches must be kept clean; the drainage must be allowed to flow freely. If the lands are properly drained, they will suffer



Peanuts and Corn from Fellsmere "Muck" Land.

very little from dry weather, nor will they suffer ill effects from occasional unusually wet weather.

After the lands are thoroughly drained their treatment will depend on the objects aimed at. For broad farming the lands should first be plowed with oxen or some mechanical plow, and sown with rice. After the rice has been taken off, it is possible that a large part of the land can be broken with mules. If this is impossible, it can be again plowed and harrowed as before. In any case, subsequent cultivation can be carried out with mules or horses.

For intensive farming of small areas, hand methods can be employed, involving of course smaller investments for plant and stock.

In conclusion, the Fellsmere Farms Company publishes below, with the kind permission of the State Chemist, the following letter, which should be committed to memory by every person who is interested in the cultivation of muck lands.

STATE OF FLORIDA
AGRICULTURAL DEPARTMENT—DIVISION OF CHEMISTRY.

TALLAHASSEE, FLA., JULY 8, 1913

Dear Sir:

The whole secret of successful cultivation of muck land is covered by the term "drainage". The drains must be deep and close together to drain the acid water caused by decomposition of the vegetable matter and to let the AIR into the soil,—to oxidize the soil, thus allowing the useful soil bacteria to thrive. Such bacteria can not live without air, and moisture (not free

water) nor can they exist in acid soil. All muck lands, not properly drained, are very acid. The acid can be removed only by drainage. Dry land is not necessarily drained land. Large areas of muck land have been partly drained, the surface water removed, and the soil water evaporated. Such soils are not properly drained, as the acid remains after drying the soil.

From the history of the _____ drainage operations, my opinion is that though the soil has never been drained, it has had the surface water removed, but the soil has simply been dried out by evaporation, leaving all the accumulated acids in the soil. Such was the case, (and is probably still the case) at the "_____ Saw Grass".

When properly drained, muck lands are very productive. When but partly drained and the soil water simply evaporated, the acids still remaining in the soil, they are not productive.

There is no practical method of removing acid from muck lands (which contain large amounts) except by thorough drainage, by which acids are washed out. The soil should be drained (not dried) full three feet to the water table. Rain water should fall upon, pass down and through the soil, to the drainage ditches which should be as deep as possible, not less than three feet, and about 105 feet ($\frac{1}{2}$ acre) apart. The cuts may be as long as practical, leading to the main or lateral ditches.

The whole secret (if there be any) for the successful cultivation of muck land is, perfect drainage, to remove acids and aerate (oxidize) the soil. All muck soils are deficient in phosphate and potash the application of which, on well drained muck lands, insures large crops.

Yours truly,

(Signed)

R. E. ROSE, State Chemist.

The Fellsmere Farms Company publish the above letter with pleasure, in the belief that this information should be given as wide publicity as possible.

Sufficient drainage is the key to successful cultivation of muck soil in this climate. Over-drainage is impossible, but too little drainage invites failure. The fertility of the muck lands is beyond all doubt; the climate enables the crops to mature at times when fancy prices can be realized; the Fellsmere Farms Company is by its drainage system making the lands available, and it only remains for the cultivator to intelligently apply the information which is so plentifully available from the experience of others who have succeeded in other places.

The prizes to be won at Fellsmere Farms are very great, the chances are open to every man, and everyone who undertakes it can feel that he is acting in the spirit of the true American and contributing by his skill and energy to the happiness of the toilers of the world by opening to them the road to independence.

FELLSMERE FARMS COMPANY,
Fellsmere, Florida.

November 1, 1913.