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Agriculture.

EDITED BY BENJ IRBY, RALEIGH, N C

Prof. Benj. Irby, late Professor of Agriculture, Agricultural and Mechanical College, Raleigh, has become a regular contributor to this department. All questions relating to the farm, garden or orchard will be answered by Prof. Irby.

SOIL HUMUS.

This subject is often discussed by agricultural writers. Mr. Bryan Tyson has recently had something to say of it in these columns. A recent bulletin of the North Dakota Station, discussing this important subject, opens with the following statement:

"The matter of humus in the soil is attracting the attention of all thoughtful farmers, and many are asking for information and how to prevent its loss, or how to increase soil humus. An attempt will here be made to explain what is meant by the term soil humus and in what way its presence in the soil is beneficial. Our statements are based in part upon our own investigations and in part upon results drawn from data of other stations." A few definitions and explanations may assist in better understanding what may follow.

That portion of earth that is cultivated for plant growth is the soil. It is made up of mineral and organic matter. The mineral matter consists of lime, potash, phosphates, iron, magnesia, aluminum and various other minerals of less importance.

The organic matter includes everything that once existed as vegetable or animal matter.

Volatile matter consists of the moisture gases and organic matter, all of which can be driven off from a spadeful of soil by heating it or burning it.

Humus is that part of the organic matter in the soil which has partially decayed, such as leaf mold, rotten roots and blades of grass, clover or peas. Rotted manure is rich in humus. Unrotted manure, or green crops plowed in, soon make humus by rotting down in the soil.

The opinion seems to be gaining ground that much of the available plant food is the portion in the humus, and as the humus increases in the soil the potassium, phosphoric acid and other mineral products existing in the soil in insoluble forms not suitable for plant food are taken up by the humus to form new compounds better suited to nourish the growing plants.

In eight determinations of North Dakota soils, 41 per cent. of the phosphates was found in the humus, and the proportions ranged from 10 per cent. to 91. Of the nitrogen from 46 to 80 per cent. of the total was found in the humus and on an average 61 per cent.

What becomes of this nitrogen when the humus is destroyed by decay? It goes back into the atmosphere or is washed into the rivers and so carried out to the ocean. In these ways five pounds of nitrogen are lost for every pound used by the growing crops.

If, then, the mineral matter taken up by the plants and the nitrogen, are drawn largely from the humus of the soil, it will be seen how important it is to maintain well the supply of organic matter in the soil, that it may be transformed into humus as needed by the plants under cultivation. Continuous wheat growing is a process destructive of humus and of all organic matter in the soil. Not that the wheat uses up such large quantities, but under conditions of wheat growing as generally practiced in this State, there is a rapid decay of organic matter, nitrification under these conditions being very rapid and the products escape as gases into the air and are washed out of the soil, or in case of the mineral products, phosphates, etc., they combine in such forms as to be no longer readily available for feeding the plant.

An acre of soil to the depth of one foot weighs about 3,225,000 pounds, or 1 600 tons, and some soils as much as 1800 tons per acre. Experiments have shown that soils containing the most humus hold the most moisture, are warmer, looser, mellower, most easily worked and most fertile.

Following is a summary of this important bulletin on soil humus:-

1. By twenty years of wheat growing from 40 to 60 per cent. of the organic matter of our soils have been lost.

2 For every pound of organic matter that has gone to furnish its nitrogen to wheat, five pounds have been lost.

3. Many of our soils that originally contained from 8,000 to 10,000 pounds of nitrogen per acre to the depth of one foot now contain from 3,000 to 6,000 pounds.

4. By the loss of humus our soils have become less retentive of moisture and give it up by evaporation sooner than when they were well supplied humus.

5. Bare summer fallowing and burning of the wheat stubble destroys large quantities of organic matter and humates.

6. To keep the supply of humus in the soil we must imitate nature, and grow for the present at least one year in five a grass crop on our land.

7. By keeping up the supply of humus in the soil, the crops will feel the effects of drouths less than in soils poor in humus.

9. Clover would be an ideal crop to maintain the humus in the soil and to aid in collecting nitrogen from the air, but any grass will serve the purpose of supplying humus, and Bromus inermis has done well in this State, and may be used.

WHEAT, OATS, BARLEY AND LIME.

In the variety of tests with wheat at Maryland Experiment Station for a period of six years, Fultz leads, with an average of 37 8 bushels, followed by Currell's Prolific, yielding 36 2, Wisconsin Triumphs 34 9 bushels and Valley 33 7 bushels.

Promising varieties of later introduction are Beal, Rocky Mountain, Ruby and Terry.

With two crops, corn and wheat, the increased yield produced by different amounts of lime, placed the limit of profit with an application of 40 bushels per acre.

Lime in connection with peas increased the yield of wheat slightly and produced a marked improvement in the set of grass.

Twenty bushels of stone lime per acre applied for corn in 1893 produced an increase of 110 per cent. in the hay crop of 1896, and a second application of lime (twenty-five bushels of oyster shell lime). for corn produced an increase of 66 per cent. of grain in 1897.

The best variety of winter oats tested was Virginia Gray, yielding 48 8 bushels per acre.

The most favorable time for seeding winter oats in this latitude seemed to be about September 1.

The hot water treatment of barley seed was effective in preventing smut, increasing the yield 16 per cent.

One of the things which should receive more attention that it does upon many farms is that of making the labor that is performed as efficient as possible. Upon most farms there is work enough done. During the busy season the average farmer works even harder than he should. But he does not always work to the best possible advantage. Much that he does really counts but little. This is often due to the fact that he does the work at an unfavorable time. Sometimes, too, there is a great loss in efficiency because of the manner in which the work is done. Both of these errors should be guarded against. For labor is always expensive and no one can afford to use it carelessly. The way to make it effective is to study how it can best be employed, The men who make the most money farming are not abler men than many of their less successful competitors. Neither do they work harder than do the others. The secret of their exceptional prosperity lies in the fact that they plan their work so carefully that everything that is done helps to swell the total of efficient, and therefore of profitable, labor.—Practical Farmer.

CLOVER.

After the first crop of clover is cut the management will depend largely upon the purpose for which the second crop is desired.

The second growth of clover makes good pasturage, and often comes in at a time when it will be needed. It is often the case that as hot, dry weather comes on the grass in the pastures fail, and if the stock has been kept out of the clover fields until the plants have made a good start to grow a considerable amount of good feed may be received at a time when it can be used to good advantage. Clover makes a quick growth, and sun shades the soil, and will often continue to make a vigorous, thrifty growth even after hot, dry weather sets in.

If not needed for pasturage, the second growth of clover will make a fairly good yield of hay, and can be cut, cured and stored away to use during the winter. Good clover hay is especially valuable for the dairy cows and all young growing stock, and there is little risk in securing too much.

While not always the case, yet in many seasons it pays to allow the second growth of clover to mature seed, and then cut and thresh. Sometimes prices get so low that there is little if any profit in growing the seed, as it is an expensive crop to harvest and thresh. The yield is small, running from four to seven bushels to the acre, and rarely getting more than this; then the cost of threshing is considerable, so that a fairly good price must be realized if the crop is a profitable one.

The mulch or straw of clover after the threshing is done makes splendid bedding, and is equal to wheat or oat straw as feed. One of the best ways of using the second growth of clover is to turn it under as a fertilizer for the wheat crop, as it supplies nitrogen, one of the essentials to a good wheat crop to the soil.—N. J. Shepherd.

WORK FOR JULY.

Millet and cow peas may yet be seeded and make excellent hay crops. German millet is the best variety of millet to sow, as it makes a heavier yield of better quality hay than the others. The land should be plowed and harrowed down to a fine seed bed, and the seed be then sown at the rate of one bushel to the acre. In this issue will be found a report of the result of seeding millet and German clover together, which was most satisfactory, two excellent crops being secured from the land. Millet should not be seeded on poor land. To make a good crop, the land should be in good heart. If the crop is cut when in bloom, which is the time at which it makes the best hay, it is not exhaustive of fertility. Where land is poor, cow peas or cow peas and German clover should be sown, and should be helped with 300 pounds of acid phosphate and 200 pounds of kainit, or 50 pounds of muriate of potash to the acre. This will ensure a crop which will add materially to the fertility of the land, and if German clover is sown with the cow peas, will secure a covering crop for the ground during winter, and one to turn under as a preparation for corn. —Southern Planter.

RURAL SCHOOLS

Here is where every wise parent who lives in the country will give his most serious thoughts and attention and we can with the greatest assurance declare that this is not as difficult a question to provide for with reasonable satisfaction if close attention is given to several important facts concerned. Parents please sit down and we will reason together. You have children who are the very center of your love, all your plans of life are directed to their future welfare. You know that education is good for them, will be of service and credit to them, and is a necessity these days and they must have it. These thoughts conflict with other plans. You see in your farm life many things in the most favorable way of your ambition; you can have comforts and health and promise of accumulating for the future and perhaps plenty of good company, but the question of school stands before you as a vexatious one, preventing permanent plans for the future and keeps you unsettled, questioning how long should you wait, and how to do. Perhaps you have the ordinary country school taught by a neighborhood girl in a little frame building on the cross roads near by or miles away. Yes, and perhaps you send your child or children over there like all the neighbors and they go day by day and you console yourselves by merely knowing they are going to school. You get them ready each morning and hurry them off with their books and dinner in hand and they usually go cheerfully and hopefully, walking along joining other children alike on their way to school and perhaps you watch for them anxiously at the time for their return. Of course there are little vexatious things occurring from time to time, day by day, as they come and go, they get tired of the walk, they get to school late, they straggle along and play, the neighbors' children quarrel with them, they cannot study because they hurried to school, they get careless, and are subjected to numerous and trying conditions that their parents don't think of because they are thoughtless and you only know that they don't improve, and you think it is because of the natural difficulties to country schools; and you think you must go to town to educate your children. Now let us point out to you the mistake. You say you love your children and that you are living for them. But you are neglecting them. You give them none of your time and you should give them one third of your time, even if you only care to use them for your own selfish purposes of saving and making money out of their services.

Remember that every hour of your time given to your children will bring you greater return to your own profit and to their benefit than any other labor you can find.

It is no trouble to get a good teacher in any neighborhood, and get a place for them to teach, if nowhere else have it at your own place. But if at another's place, near or far, always go to school with your children and go after them. Carry them there, if too far to walk, and in that way see the teacher every day and you will know how she is doing, and who the children have as associates. You can in that way protect your children from all the difficulties and danger and disadvantages common to country schools and they will progress, learn and profit by it as well as they could in any school. If you are capable you should assist them in their studies; if you have no education and you love your children you will so conduct yourself as to influence them to learn those things for their good. Do your part as far as you can to help and correct them. Let each neighborhood practice this plan and the school question will not be difficult. We repeat that for the time you give to your children for their improvement you will be rewarded ten fold more than any other thing you have you have to do. This neglect of children is a common fault, not intentional but owing to thoughtlessness and custom, and one that is seldom estimated. —Southern Fruit Grower.

FUNCTIONS OF ROOTS.

The roots of a plant are the organs by which it absorbs water from the soil, and with this water a variety of food elements are introduced, observes a writer on Farm Chemistry.

The roots take up apparently all the diffusible substances (those capable of passing through a membrane) which are present in the water which they draw from the soil. The plant may thus receive a number of substances not actually required for its nutrition.

The feeding power of roots is not, however, confined to the taking up of ready formed solutions, they are also capable of attacking some of the solid ingredients of the soil, which they render soluble and then appropriate. This important action of roots exists in different degrees in different plants. The action only takes place at the points of contact between the rootlets and the particles of the soil, and is brought about by the acid sap which the roots contain. This action of roots probably plays an important part in the supply of phosphoric acid and potash to the plant, as these substances, especially the former of them, exist in the soil in difficulty soluble forms, and are rarely found in solution in the water present in soils. Besides furnishing the plant with its ash constituents, the root has the important function of supplying nitrogen; this is nearly always taken up in the form of nitrates. A plant is capable of making use of nitrogen in the form of nitric acid or ammonia; it also, according to several experimenters, is able to assimilate nitrogen, when in the form of urea, uric or hippuric acids, and several other amide bodies. The facility, however, with which ammonia and other nitrogenous substances, are converted into nitric acid in the soil is so great that nitrates become by far the most important source of nitrogen at a plant's disposal. Most plants are unable to assimilate the nitrogenous humus contained in soil. The very weak solutions taken up by the roots are concentrated in the upper parts of the plant, the water being rapidly evaporated by the leaves, as already mentioned. The essential ash constituents are employed in the formation of new tissues. The non essential ash constituents which have been taken up by the roots are partly disposed of in a solid form, as a permanent incrustation of the older tissues. The soluble salts which are not thus disposed of, at first accumulate in the sap, and are probably more or less removed from the surface of the leaves and stem by the washing effect of rain.

The deposition of silica upon the external tissues of wheat, barley, and other graminaceous plants is a familiar example of the exception of a non essential ash constituent. Silica is also abundant in the leaves, and in the outer bark of many trees, and is commonly found as an incrusting constituent of old tissues. Insoluble calcium salts, frequently the oxalate, are also deposited as incrusting matters in old tissues. These incrustations are indirectly of service to the plant, as they tend to harden the tissues and thus protect them from injury.

Soluble non essential ash constituents, as chloride of sodium, are found abundantly in the succulent parts of plants when such ash constituents have been present in the soil. They generally diminish in quantity as the plant matures, and are never stored up in the seed.

The amount and composition of the ash of succulent plants, as meadow grass, clover, and mangel, is greatly influenced by the character of the soil, and the manure applied. The ash of a seed, on the other hand, is very constant in composition, resulting from the selective powers of the plant.

Of the particular action of ash constituents within the plant little is known. Phosphoric acid and potash are undoubtedly the most important of the ash constituents; they are always found concentrated in those parts of the plant where cell growth is most active, as, for instance, in the layer (cambium) between the wood and bark of a tree, and are abundantly stored uy in the seed.

Silica was long supposed to be an essential constituent of wheat, barley, and other similar plants, and to be the ingredient on which the stiffness of their straw chiefly depended. It has been shown, however, that maize may be successfully grown without any supply of silica, and with no perceptible difference as to the stiffness of the stem. The grass growing on peat bogs contains scarcely any silica, though silica is abundant in ordinary hay.

WASHING OF THE LAND.

You cannot too strongly insist upon the value of humus in the soil to prevent washing, is the true statement made by Mr. W. F. Massey in the July Southern Planter. The great trouble all over the South has been that the constant clean culture of the soil and the constant use of chemical fertilizers to squeeze a little more sale crop, has brought about the conditions that require terracing to prevent the bodily carrying away of the soil on the hillsides. Then, too, all over the country land has been cleared of forests which should never have been cleared. In the mountain region of Western North Carolina this process is going on, and lands are in cultivation on the steep mountain sides which should have been kept in forest, This clearing of the mountain sides is the leading agent in the destructive floods that sweep down the valleys, and if the practice is continued, the day is not far off when the fine lowlands of the rivers will be uncultivatable. And not only in the mountains, but all over our Piedmont country there are hillsides which should have been left in forest, and which must eventually be reforested if the best results are to be expected. There is no one thing that claims more attention from our people than forestry, and the preservation of tree growth on our uplands. Then, too, a tree belt along the rushing streams that come down from the mountains is as important as a forest growth on the mountains. Men clear the rich bottoms right to the banks of the streams and every freshet carries the rich alluvium down to fill the rivers and harbors of the coast. A dense belt of willows or other waterloviug bushes along every stream on the bottom lands is one of the most important things in the checking of disastrous washing. Tree growth on hillsides too steep for proper cultivation, and the cultivation of the soil so as to fill it with vegetable matter are the means by which we will most effectually check the washing so common now. Terracing is at best but a temporary measure. I had far rather have a soil full of vegetable matter like a piece of new land, without any terraces, than to have the same situated land terraced but destitute of the humus.

There would be more full pocket books if the the small leaks on the farm were stopped.

LIVE STOCK

ALL ABOUT HOG CHOLERA.

Last week we promised to give The Progressive Farmer readers a talk on the above subject. Our article may seem rather long, but the importance of the subject will, we hope, excuse us.

This dread disease, hog cholera, is rapidly spreading throughout Michigan, and the Experiment Station of that State is receiving a flood of letters seeking information about its cause and the best means of combating it. Dr. George A. Waterman, consulting veterinarian of that station, after studying all the publications of the National Government on the subject, as well as the bulletins of the experiment stations of Nebraska, Iowa, Indiana, Arkansas and other States, has issued a well digested summary of all that is known on the subject, as bulletin No. 157, of Michigan Station.

While hog cholera and swine plague are different diseases, they so often exist at the same time in the same animal, and their results are so nearly the same, it is not of much importance to notice their difference, but it is just as well, for all practical purposes, to treat them as one and the same disease.

Each is caused by a specific germ or virus that finds entrance into the body in the food, drink, or air. These germs are so small that the eye cannot detect their presence except when aided by a powerful microscope.

As it has been well settled by scientific investigation that these and all other disease germs are produced from parent germs previously existing, and that none of them are spontaneously originated without such parent seed germs, it is evident that in order to have an attack of hog cholera the virus of the disease must be introduced into the herd in some manner. A study of some of the ways by which the virus is carried from place to place will better enable us to understand how to prevent the disease.

The air is a medium by which the germs of most diseases pass from place to place and so it is in hog cholera and the spread of the disease in this way is hard to hold in check. Streams furnish a means of conveying the virus from place to place. The water of an entire stream is often polluted by hog cholera in some herd which has access to it. Ponds, especially if fed from streams from other farms, are a source of contagion. Dogs and other small animals, that roam at will, may carry in the dirt upon their feet the virus, if it so happens that they pass through a yard or field where an affected herd is kept, or if they find the carcass of an animal which died from the disease and has carelessly been left lying where they can get at it. Crows and other carrion birds may also be the means of conveying the disease in the same way. Buyers going from drove to drove, or visitors, may spread the disease. The introduction of new stock into the herd is always fraught with more or less danger, especially if they have been shipped on the railroad. All new stock should be quarantined upon another part of the farm for five or six weeks before placing them in the herd. Railroads spread the disease by carrying infected animals. For this reason fields bordering upon railroads may be looked upon with suspicion for the pasturing of hogs.

The time elapsing after the animals are exposed, or the germs are introduced into the herd, before the disease manifests itself, varies from four or five days, to three or four weeks.

The symptoms of hog cholera are somewhat variable. In some cases it takes a very acute form, the animals living only a day or so; while at other times it may run a lingering course of three or four weeks. In some outbreaks quite a large per cent. of the cases will recover; while at other times nearly every animal affected will succumb. At times those that recover will do well, growing and fattening nicely, and again they will seem to be stunted and never amount to much.

Generally the first symptom noticed is that the animal refuses his feed to a

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