SOME EFFECTS OF MANURE AND OF RATES OF APPLICATION.

Thin Manuring Often Better Than Heavy Manuring of Smaller Areas—Leguminous Crops Equally as Effective as Manure, and With the Added Value of Providing Feed for the Livestock.

By J. F. Duggar.

WITHIN my entire acquaintance I do not know a farmer nor a scientist but is an advocate of the maximum use of stable manure. The real question is not whether stable manure should be used, rather how to increase the amount of manure available, how to apply this in the form and at the time when it will be most effective, and in the quantity that will be most profitable.

PROF. DUGGAR.

The writer has always urged the maximum use of manure, but has sometimes failed to go as far as some others in urging exclusive reliance on this valuable material as a means of improving Southern soils under present conditions. He has found the use of legumes a means of soil improvement about equally as effective as manure and applicable on a larger scale in the case of farms where the number of livestock is limited. However he has always pointed out that where the requisite number of livestock can be obtained it is better to make two uses of the leguminous forage crops, namely; as food for animals and ultimately as fertilizer in shape of manure, than to plow them under. It is to be hoped that Southern farmers will give such increasing attention to the growing of livestock that each year a much larger proportion of our cowpeas, velvet beans, clover, vetch, etc., will be utilized as food for livestock. However, it is possible to increase the areas of these legumes much more rapidly than to increase the number of animals on Southern farms, so that for many years to come the legume will be plowed under as well as used for food.

Legumes Valuable in Supplementing the Manure Supply.

AN illustration of the difficulty of producing the amount of manure needed to fertilize any considerable proportion of the cultivated land of the South was brought to my attention recently as I questioned a farmer who grows no cotton, but only hay and livestock, regarding the number of acres of land he had manured since he began to operate this farm. Within a period of between five and six years the total acreage covered by manure was less than 30 acres on a farm of more than 300 acres. This was an average of, say, 2 per cent of the area covered by manure each year; or considering half the land as primarily pasture land, less than 4 per cent of the cultivated and hay land was annually manured. At this rate it would take twenty-five years to cover the cultivated land on the entire farm with manure, even in the case of a farmer who is an enthusiastic stockman and whose farm is far better provided with livestock and with barns than the average farm, thus insuring the saving of a larger amount and better quality of manure.

This point is mentioned not to deprecate the value of manure, but as an indication of the necessity of relying largely, under present conditions, on the use of legumes for soil improvement, and for the further purpose of raising the question whether it is better to apply the amount of manure that is available at the usual rate, say eight to 12 tons per acre, or to spread it thinly over several times this acreage. We cannot get a thoroughly satisfactory answer to this question from the comparatively small amount of experimental work which has been published on this subject. For example, the writer has obtained in two different years an increase of 8.8 and 10.8 bushels of oats for each ton of horse manure of highest quality, when used at the rate of only two tons per acre. On the other hand, from heavy applications of the richest of cow manure, made from feeding cottonseed meal, etc., the increase for each ton of manure was less than two bushels per ton of manure where the quantity of manure ranged between six and 22 tons per acre.

I believe it to be a general rule that a larger return per ton of manure is obtained by comparatively light applications, say from two to six tons per acre.

It is true that there is difficulty in distributing broadcast with any degreee of uniformity amounts less than six tons per acre, and that when the amount falls much below this figure it is almost necessary to apply the manure in the drill in order to get any evenness of distribution.

Manure is Valuable for Its Indirect Effects.

THE man who has a limited amount of manure should constantly bear in mind that manure is helpful, not only by reason of the plant food which it contains, but also by reason of its indirect effects. One of these indirect and favorable effects of stable manure is the fact that stable manure, being rich in germ life, conveys to the soil with which it comes in contact the organisms which are capable of starting nitrification and other forms of bacterial activity. In other words, stable manure may exercise on soils notably deficient in germ life an influence which is somewhat like that exerted by the materials used in inoculating legumes. Of course the two processes are in most respects quite different, but similar in that the presence of a relatively small number of beneficial microscopic organisms makes possible a tremendous increase in the number of these friends of the farmer.

That manure may have this favorable indirect action is shown concretely by some recent experiments at the New Jersey Experiment Station. In these, manure was applied to various crops at the very light rates of one-half a ton, one ton, and two tons per acre. Even these small amounts of manure afforded a notable increase in the yields. It was remarked that the plots that received the smallest application of manure in a number of instances afforded yields fully equal to those receiving larger amounts. Moreover, these small amounts of manure were helpful even on those plots on which crimson clover or other winter-growing legumes were grown to supply the bulk of the nitrogen.

Where stable manure is applied largely for its indirect effect in increasing the germ life in the soil it is doubly important to secure an even distribution. As a matter of fact, much of the manure taken directly from the stalls is in a condition too lumpy to permit evenness of distribution unless the amount applied be quite large. A manure spreader is useful in somewhat reducing the size of the masses, but its use is excluded where very small amounts per acre are to be applied.

While the writer does not as a rule advise the composting of manure for field crops because of the cost of the labor involved in handling this bulky material, yet for the man who wishes to get the maximum biological effect, or as we might say the maximum inoculating effect, composting, by reducing the material to a considerable degree of fineness, makes possible more even distribution and doubtless increases the number of desirable organisms in the manure.

When manure is used, not primarily for its content of plant food, but rather in very thin applications for its effect in increasing the germ life in the soil, it may prove almost equally helpful on some of the legumes, such as alfalfa, as on the non-legumes, which latter are benefitted to a much greater extent than are the legumes, where the amount of manure is considerable.

BOLL-ROT OR ANTHRACNOSE.

Three Methods of Prevention or Protection Against This Disease.

BOLL-ROT, or anthracnose, has caused serious losses in many sections the past season. With increasing force these losses are occuring each year until now the disease has become so serious that in many sections it is truly alarming. The Progressive Farmer has frequently called attention to this rapidly growing menace to the cotton grower and has also pointed out the only known means of preventing the rapid growth and spread of the disease.

In the first place let us correct the popular error that some varieties are free from the disease. No variety has yet been found that does not suffer more or less when the infection is present and the weather and other conditions favorable to the development of the fungus or "germ" that cause the trouble. It is true that some varieties are more subject to the disease than others, but as stated, none is entirely free from it.

In 1909 and 1910 the per cent of diseased bolls was counted in 57 varieties at the Alabama Experiment Station. A small number of varieties were observed both years, but most varieties were only examined one or the other of these years. All varieties were effected to some extent, but some of them only slightly, the diseased bolls ranging from 0.4 to 35.3 per cent of all the bolls on the stalks counted.

In fields severely diseased the injury is apparent, but where the disease is slight it may entirely escape the attention of a fairly careful observer. Again, even when the disease is known to be present some bolls may be so slighly diseased as to escape detection. For this reason the utmost care must be taken in the selection of seed if the disease is to be controlled. In Bulletin No. 164 of the South Carolina Experiment Station, by H. W. Barre, the following statement is made regarding this matter: "Diseased seed and lint are frequently found, in fact, in bolls which to the casual observer, do not appear to be diseased at all." This clearly shows the ease with which the disease may be overlooked and the difficulty of being certain that seed saved for planting are not contaminated with diseased seeds.

The disease may affect young cotton plants, especially if the weather is cool in April and May and retards the growth of the plants, and there is sufficient moisture to favor the growth of the fungus. It may also affect young bolls and prevent their full development, but probably most serious damage is done by the disease attacking more fully developed bolls during moist weather in July, August and September and causing them to rot. Three means for preventing the disease seem to give promise of sufficient value to justify their use.

1. The fungus which has developed on the cotton plants, plowed under in the fall will probably die by planting time the next spring.

2. The fungus will very probably not live more than a year in the fields if there is no growing cotton plant on which it can grow. It therefore, follows that if the crops are rotated; that is, if cotton is not grown on in-

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