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THE CARE AND MANAGEMENT OF FARMYARD MANURE.

THE Agricultural Department of Madras has issued a bulletin on this subject, with special reference to South India, which has been written by Mr. Benson, the Deputy Director. In the early part of the paper the author mentions that "with sufficient manure and abundance of water there is scarcely any limit to the productiveness of the land in India," and the same may be said to be true in all cases where the ordinary rules of tillage have been well observed. The author then endeavours to impress upon his readers the important fact that the more valuable part of cattle manure is the liquid excrement, and that this should be preserved together with the solid excrement in order to obtain the full benefit of the fertilizing properties of what is generally spoken of as "farmyard manure." There are, of course, many difficulties in the way of preserving the liquid part of farmyard manure, and the important part of the bulletin under review consists of practical suggestions in order to secure this end. Mr. Benson gives two methods for managing farmyard manure. The first he deseribes as follows :—

"The floor of the cattle-shed should be made 2 or 3 feet lower than the surrounding ground, and the sides and the bottom of the pit plastered with clay. On the floor a layer of ashes should then be spread once for all, and every day a layer of vegetable rubbish should be spread over the surface as litter, that is, for bedding. For this purpose, leaves, coarse grass and other vegetable rubbish may be collected and stored during those parts of the year when they can be easily procured and when the ryot and his cattle have plenty of leisure. Waste fodder and various refuse portions of crops, such as the ear-heads from which corn has been threshed, &c., may be used as bedding. The shed may be 10 feet long and 6 feet broad for a pair of cattle. It is best that the cattle should be left loose in the shed, so that they may tread on every part of the manure and press it down. If the manure is not pressed, it will rot too fast and become much heated and give off bad smells and the health of the cattle will be injured. Every morning the dung dropped by the cattle in the previous night should be evenly distributed and a thin layer of litter spread over it. In this manner the manure may be collected until the pit is filled, which may take about three months.

"Too much bedding should not be supplied ; otherwise the manure will be too dry and not decompose with sufficient slowness, and thus lose in value. The manure in the pit should always be thoroughly moist throughout its bulk. If the manure has an ash-colored appearance anywhere when it is being removed that is a sign that it has not decayed properly ; this appearance being due to the great heat caused by the manure being too dry. If the straw, &c., supplied as bedding be long and hard, the manure will not rot properly ; such litter should be cut up into short pieces. Unless the manure is well rotted, it will not be of much use to crops, as it will not act quickly. It will also make the soil too open, so that the crops thereon may suffer much from drought. The manure, if properly managed, will be of a black colour and of mellow substance, thoroughly rotted throughout so that it may almost be cut with a knife. In removing manure from the pit the unrotted portion near the surface should be placed on one side, and after the well-rotted portion has been taken out, should be put back again at the bottom of the pit, and manure may be collected again as before.

"By this method of managing manure, about 5 to 7 tons of good manure may be obtained yearly for each head of cattle kept, whereas if the dung be thrown out in loose heaps in the open air, only about half a ton of very inferior manure will be obtained in the year."

The author admits that there are two objections to this method of collecting the manure :—

1. That it is supposed to cause unhealthiness among the cattle housed.

2. That it requires a large amount of litter to be supplied.

The first objection is easily disposed of by Mr. Benson, who observes—"Experience has shown that it is groundless." Our experience, however, has been rather different, for in two instances have we traced outbreaks of foot-and-mouth disease to this method of accumulating cattle manure. We shall probably be told, however, that the method was not properly carried out, either by the decomposing manure being allowed to remain too long in the shed or an insufficiency of litter having been strewn over the mass. We remember seeing this system of manure collection in working at the Saidipet Farm, Madras, where animals were standing on a large accumulation of manure, which, while it made the surroundings decidedly unwholesome-looking, tended to make the cattle to all appearances miserably uncomfortable; and though it struck us that the conditions under which the animals were kept were far from healthy, we have Mr. Benson's word for it that experience has shown the objection to be groundless, so far as South India is concerned. Then, as regards litter, we are told that if straw is not available in easy terms, any vegetable refuse, such as leaves and grass would do. On upcountry estates we know that *mana* grass is used for this purpose, and in such situations and country places there would be no difficulty in obtaining some sort of vegetable refuse to serve as litter; but in towns, there is no denying the fact that to obtain even such refuse in a *clean* condition, is a matter of the utmost difficulty. We have seen coir-dust used as convenient and easily-obtained bedding, but though it served its purpose as an excellent absorber of liquid matter, it was found that the condition of the result and manure was not improved, for though it would have been suitable enough for application to perennial trees, the intractability of the coir-dust was a serious impediment to its use in garden or even grass cultivation; and it was impossible to get coir-dust in a well-decomposed mould-like form which would have materially added to its usefulness in this connection. There is this much, however, that cannot be gainsaid by any advocate of this system of manure preserving, that the method can never be carried out in connection with dairies, however suitable it may be where working bullocks are kept. The first law in connection with dairying enforces cleanliness and sweetness, and no one can say that the method is either clean or sweet, at least as these terms are understood in connection with dairy management. We doubt, even if the system is adopted in the case of cart or trotting bullocks kept within municipal limits, whether the Sanitary Inspectors would not consider they had a good case for prosecution. We must admit that we are not enamoured of this system, though we have seen it practised in England and Scotland. In warm countries such as ours where decomposition goes on so rapidly, we do not think it a desirable one; while there is a dash of slovenliness, arising from what seems an attempt to shirk work, which does not commend itself to our minds. The same results can be attained without keeping the animals in contact with their own excrements, if a little more energy were expended. Mr. Benson is certain that the system does no harm to cattle. We will not contradict him, though we can as surely affirm that it does them no good. At any rate, we should like to see our own animals living, when we daily visit them, under more congenial circumstances; for we cannot agree to consider them as purely animated manure-making machines. We have seen a slight modification of—which is a decided improvement on—this system, whereby the cattle are housed in an elevated shed, the flooring of which admits of the liquid excrement dripping through and saturating vegetable refuse in the compartment underneath. By this means the floor of the bed is in a dry condition, and the comfort of the animals not altogether neglected. The liquid manure plus the vegetable refuse is, at the same time, preserved from waste or wash: while the solid manure is collected and thrown down below by a trap door. The only objection which may perhaps be brought against this method is the extra cost of the specially designed structure.

Mr. Benson, however, gives the Indian ryot the option of a second method of collecting cattle manure, which is described as follows :—

"The floor of the cattle-shed should be made smooth and compact with a gentle slope towards the back, where a small channel should be placed so that all the urine falling on the floor may be carried by the channel to a pot placed outside the shed at one end. The dung can be removed every day and thrown into a pit, the sides or bottom of which should be plastered with clay, and over which a low thatched roof has been erected. Whatever vegetable refuse is available on the farm may be thrown into the pit, and the urine collected poured over the heap daily. The whole mass of dung urine and vegetable rubbish should be kept uniformly mixed and well trodden and pressed down so as to make the mass decay uniformly and slowly.

"If the manure pit last described cannot be protected by a simple shed, the heap should be covered with earth. It has in all cases been found very useful to cover manure heaps with earth, as this prevents the loss of valuable fertilising matters into the air. This practice is fully adopted in some places, *e.g.*, in Tinnevelly with the best results. If the upper portions of a manure heap become dry, the heap should be turned over so as to mix the moister and the drier portions together, and if there be any tendency for the heap to dry up generally, it may be watered slightly with advantage. The covering of the heap with earth to a great extent prevents undue drying. The great aim should be to maintain the heap in a moist state so that the whole mass may decay slowly and completely, and thus the fertilising matters of the manure may be preserved and rendered more immediately useful than as they are found naturally."

This method is certainly the more acceptable of the two mentioned in the bulletin under notice. While the surroundings of the cattle will be preserved in a sanitary condition, excellent and well-rotted manure (for both systems aim at bringing the manure into this state) will be obtained. We are afraid that the first system, if sanctioned, will merely mean a licence to the average native cattle owner to attain to the supreme degree of felicity which will be his if he be permitted to be at rest while filth accumulates around him and his animals.

RAINFALL AT THE SCHOOL OF AGRICULTURE DURING JULY.

1	..	Nil	13	..	Nil	25	.. Nil
2	..	Nil	14	..	Nil	26	.. Nil
3	..	Nil	15	..	·03	27	.. ·27
4	..	Nil	16	..	·16	28	.. ·01
5	..	Nil	17	..	·73	29	.. Nil
6	..	Nil	18	..	·27	30	.. Nil
7	..	Nil	19	..	·11	31	.. Nil
8	..	·04	20	..	·31		
9	..	·15	21	..	·03	Total	.. 2·39
10	..	·24	22	..	·01		
11	..	·01	23	..	·01	Mean	.. ·077
12	..	Nil	24	..	·01		

Greatest amount of rainfall in any 24 hours on the 17th ·73 inches.

Recorded by P. Van De Bona.

THE FIXATION OF NITROGEN.

Dr. Andrew Wilson contributes to the "Science Jottings" column in the *Illustrated London News* an interesting article on the fixation of nitrogen by the vegetable world. Where and how in the plant is this free breakfast table utilized? Where and how is the free nitrogen actually fixed and made useful for the purposes of the plant's life? Professor Marshall Ward tells us that the view that it was the leaves of the plants which absorbed it, and that the living protoplasm of the leaf cells was the agent which effected the operation, will not bear criticism. Then comes a second possibility. The bacteria, it was held, lived naturally on the soil, as many microbes do. They acted the part of underground cooks and caterers, and produced in the soil itself the nitrogenous food elements, who were duly absorbed by the plant's own roots. Even the bacteria in the root swellings, it was contended, might perform this work, which really enriched the soil, of course, and through it gave to the plant its nitrogen. This view of things remains for further elucidation. It may, therefore, be left for the present.

The third possibility maintains that the fixation and utilization of the air-nitrogen could be conceived to result from the action of the plant *per se*, regarded as stimulated to an excessive degree of energy by the bacterial swellings on its roots. Here the matter is viewed as if the bacteria on the roots acted the part of instigators of an action which, but for their encouragement and assistance, the leguminous plant would not be able to undertake. It is clear that the difficulties of the problem increase when this view is considered. Without the bacteria the plants can not avail themselves of the free nitrogen. What, then, is the exact relation of the microbes to the plant's work? Professor Marshall Ward, who inclines to this view of things, reminds us that there is an intimate connection between the root swellings and the roots themselves. These swellings are the seats of great activity. They are really chemical laboratories wherein business is always very brisk; so that it may well be that the living machinery of the plant is really stimulated in a direct degree by the efforts of the microbes on the roots, and that the plant is supplied from the root swellings with materials on which its own living cells can abundantly operate. My remarks that the plant gets its food materials cooked for it in this way, by the microbes, serves to explain the gist of this third view. It may be able to assimilate cooked food when it could not fix that which is raw.

Then comes the fourth and last suggestion. It is that the root swellings are merely so many accumulators of the nitrogen food, and that the plant simply absorbs what its microbe lodgers and boarders have prepared. This opinion regards the microbes as mere parasites, and unless the bacteria are capable of absorbing the free nitrogen from the air itself, as Prof. Marshall Ward observes, it is difficult to account for the gains by the plant on this theory. This, then, is the end of this story of plant feeding. That its real outcome—whenever shall be settled—is of immense importance to agriculture cannot be doubted. Once again we see how the so-called "unpractical" work of science in its laboratory and with its microscope, has bearings of the most intimate kind on commercial prosperity and human interests.—*Sugar Journal.*

TOMATO DISEASES.

Growers of tomatoes, especially in the low-country, must often have experienced much difficulty in raising the plants owing to disease affecting them; and to most growers the attack known as "drooping disease" must be the most familiar. It is particularly disheartening to see healthy plants all of a sudden begin to show signs of withering—often only in certain regions at first—and finally dying out altogether. This and other diseases of the tomato-plant have been the subject of enquiry in the pages of the *Journal of Horticulture*, and the information elicited through the agency of that excellent periodical is of a most useful character, and will we are sure be welcomed by our readers. As regards "drooping disease," which is so familiar, we first give the opinions of two correspondents who write as follows on the subject:—

"Your readers may, some of them, be glad to know that a prompt earthing-up round the stem of a drooping plant will usually save it. I use light soil and a few loose bricks or boards. Plants treated thus promptly will often equal in crop the best in a house. For black spot in the fruit I find the best thing is to sprinkle sulphur on very hot lime whilst slaking in a bucket, then walk up and down the house, shaking the bucket violently, and the sulphur and fresh lime will fly all over the house. This makes the fruit a little dusty, but that is better than losing it. Cladosporium also does not seem to make headway where the lime and sulphur bucket is used. I attribute a comparative freedom from both clubbing and drooping in my Tomatoes to the use of chemical