

THE PURCHASING OF FERTILISERS.

(Paper by C. O. Williams, Chief Chemist Cedara School of Agriculture.)

In a paper read before the Sugar Congress two years ago I dealt with the question of manures in a general way, and other papers on the programmes of the last two Congresses have also treated on this question of manuring. It is therefore my object in this one to deal with only one particular aspect of it, and that is the economical purchasing of fertilisers. This has been gone into fairly fully by me in an article published in the Journal of the Department of Agriculture a few months ago and my discourse to-day will be merely informal and somewhat cursory.

It is supposed, in the first place, that the farmer has satisfied himself as to the need of fertilisers for his land and the constituents required. This is a very important matter for many a planter adds needlessly to the cost of production of his crop by applying unnecessary fertilising materials or the wrong form. Again, by leaving out a very essential constituent he may render futile the application of other ingredients, for by the law of minimum the growth of the cane crop would be governed by the amount of that fertilising constituent in the soil which is most deficient. For instance, if the soil is lacking in potash no amount of phosphatic fertilisers applied to the soil will increase the growth of the crop until that potash deficiency is also made up.

False Economy.

When the planting season is drawing nigh I can imagine that the farmer becomes forcibly aware of it by the number of fertiliser catalogues he finds in his post bag at that particular time of the year. I am afraid that many of our farming friends have not sufficient knowledge of this question to study these catalogues to the best advantage, and very often may choose a fertiliser because it is the cheapest per ton, for instance. Others may allow themselves to be persuaded by the specious arguments of the charming young man who calls upon them on his firm's behalf. It is not my intention, however, to insinuate that there are fertiliser firms in this country who deliberately try to hoodwink the agricultural community in this respect, but nevertheless it is very essential that the farmer should have sufficient knowledge of this matter to scan fertiliser catalogues intelligently, and to be able to hold his own when it comes to interviews with trades representatives.

The three elements most often not found to a sufficient extent in an available form in the soil for the needs of the crop are nitrogen, potassium and phosphorus, and the commercial value of a fertiliser is generally calculated as depending solely on the

quantities of these three elements present in it. With regard to the element potassium it is the equivalent amount of its compound with oxygen i.e., potassium oxide or potash, that is always estimated, and similarly with regard to phosphorus it is the corresponding amount of phosphoric oxide that is taken into consideration.

System of Unit Values.

From what has been stated it follows that when analysing a fertiliser we usually estimate the percentage amounts of nitrogen, potash and phosphoric oxide in it. One per cent. of a ton (i.e. 20 lb. in actual weight) of any of these constituents is taken as a unit for the purpose of valuation of that particular constituent. It is not proposed in this paper to explain how this unitary method is applied in fixing the fair average commercial value of a fertiliser and if anyone should find that he is not sufficiently capable of making use of the table of unit values provided, for the purpose of comparing the commercial values of the various brands of fertilisers quoted to him by different firms and thus ascertaining the best bargain offered, we shall always be pleased to assist him provided he sends the necessary particulars to us.

It is not claimed that this system of valuation of fertilisers is perfect, for in drawing up the list of unit values certain assumptions are made which may be rather far from the truth, but we may claim that it is on the whole fairly reliable and certainly serves a useful purpose.

Precautions to be Observed.

If the catalogues of the various fertiliser dealers for the present season are scrutinised, and the prices compared on the system advocated above, one will soon realise that there is often a marked difference in the value offered, and this is particularly the case with the so-called mixed or compound fertilisers. As stated at the outset, a farmer is often only too ready to look at the price per ton and does not pay sufficient attention to the composition of the fertiliser. In order to keep the price per ton down a manufacturer will sometimes add a cheap or worthless ingredient to his mixture, and even if this low grade fertiliser were sold as cheaply, comparatively, on a unit basis, as high grade ore, it would still be not as good a bargain, for the farmer would have to pay more in railage, cartage and handling, on the same amount of true fertilising material. As a rule, however, the price per unit of a constituent in a high grade fertiliser is lower than in a low grade one even if the total price per ton of the former may be often considerably higher.

The Purchasing of Fertilisers.—Contd.

It is generally found that in the case of the simple or one-constituent fertilisers the unit values do not vary a great deal according to the prices quoted by most firms for any particular class of fertiliser. For example, in the case of the several brands of sulphate of potash on the market the price of potash per unit does not differ by a large amount. This, however, is by no means an invariable rule, and even when purchasing simple fertilisers it will be often found that some firms offer a much better bargain than others.

Mixed Fertilisers.

But it is with regard to the mixed or compound fertilisers, however, we find that the greatest differences appear, and speaking generally one may state that the prices asked for fertilisers of this nature are in a large number of cases comparatively too high, that is, as compared with the prices of the simple fertilisers of which they are composed. When valuing a mixed fertiliser the sum of 10/- per ton is allowed to the dealer to cover the cost of mixing and re-bagging the several ingredients, which is considered to be a fairly generous figure. (Incidentally, it may be pointed out that the question of cost of bags does not come in here at all, as some occasionally try to argue, for in valuing the simple fertilisers the cost of the bags is allowed for and the same number of bags are used for a mixed fertiliser as for the simple fertilisers making it up).

I should not go to the extent of stating that farmers should always buy their simple fertilisers separately and from them make up their own mixtures, for there are a large number of cases where the mixed fertilisers are sold at a reasonable figure, and, moreover, the farmer gets the benefit of having his mixtures made much more thoroughly and uniformly than is possible for himself to make them, and such a ready-made mixture saves him a great deal of trouble. One point to bear in mind is this, that he should not buy a mixture which is unsuitable for his purpose or which contains an ingredient which his soil may not require. For example, it has been found by experiment that application of a nitrogenous material is often unnecessary and may even depress the yield, and since it is the most expensive constituent per unit of all, he could often cut his fertiliser bill down very considerably, and with advantage perhaps to his crop, if he bought a mixture that did not contain this constituent at all.

Fertilisers That Will Not Mix.

Should a farmer decide upon mixing his own fertiliser then he should bear in mind that there are some materials that will not bear mixing with others without causing loss or deterioration. To give a few instances:—

1. Superphosphates and other fertilisers containing water-soluble phosphate should not be mixed with any material containing free lime or even with carbonate of lime because the water-soluble phosphate gets reverted to a less soluble form.
2. Mixing sulphate of ammonia with lime materials causes loss of ammonia.
3. Mixing nitrate of soda with very acid materials like double superphosphate or even a damp superphosphate will cause nitrogen in the form of nitric acid to escape.
4. Mixing potash fertilisers with lime materials will gradually produce a hard, lumpy mixture difficult to sow.

It may be mentioned, however, that in most cases if the mixture is applied to the soil very soon after it is made up no very appreciable loss or deterioration takes place.

The Fertilisers Act.

This Act was placed on the Statute Book in order, primarily, to protect the farming community, but incidentally it also protects the honest fertiliser dealer against unfair and dishonest competition on the part of an unscrupulous dealer. Regulations have been drawn up under this Act and have been in force for several years, and copies of them may be obtained through the usual channels, if desired. The gist of some of these regulations I should like to put before you:

1. Every importer, local manufacturer, or dealer in fertilisers must register every kind he imports or manufactures under a definite brand, giving also the necessary particulars as regards composition, etc. These particulars the dealer must supply to the buyer under a guarantee whenever a sale is effected, and the latter should carefully see that this warranty is received by him before taking delivery.
2. Every bag must be marked with the brand of the fertiliser, and in the case of some of the more important simple fertilisers the proper grade and the percentage of the constituent must also be shown. For example, "Superphosphate: X Brand: Medium High Grade: 16.8 per cent."
3. Basic Slag, raw and treated phosphate rock and the various raw bone products must be guaranteed to be within certain degrees of fineness as laid down in the regulations, for the availability of these fertilisers depends largely on their fineness.
4. All guanos and mixed fertilisers must contain specified minimum amounts of the usual fertilising constituents (i.e., nitrogen, potash and phosphoric oxide).
5. All raw bone products must be certified as having been efficiently sterilised.

An Important Point.

6. If a farmer has reason to suspect that the fertiliser is not what he ordered or is not up to the

The Purchasing of Fertilisers.—Contd.

standard given on the guarantee, and wishes to have the fertiliser analysed, he should not take delivery of the consignment from the railway authorities. The sampling of the consignment would have to be carried out at the railway station, under the conditions laid down in the regulations, and the fees for the analysis of the sample are also given in the regulations. Sometimes, farmers send to us samples of registered fertilisers to be analysed some months after the sale has been effected, but we are precluded by the Departmental regulations from carrying out the analysis of such samples, and in any case the farmer would have no redress under the Act even if the composition of the fertiliser was found to be appreciably below the guarantee. It may be pointed out here that all imported fertilisers are sampled at the port of landing and sent to a government laboratory. Also periodical sampling is carried out of fertilisers manufactured or made up in the Union, so the farmer is fairly well protected in this matter, and it is not often he would find that his fertilisers are markedly below the guaranteed composition.

We often find farmers blaming the fertiliser if they do not find their crops coming on as well as they expected, but there are a large number of reasons for the failure of a crop besides a worthless fertiliser as I have tried to show in the paper read before you two years ago.

In conclusion it may be stated, for the information of all agriculturists, that these same regulations also apply, with the necessary changes, to the sale of farm foods.

QUESTIONS.

Mr. D. L. Patrick asked a question with regard to "fillers" mentioned by Mr. Williams. If one had a very rich fertiliser ingredient which occupied a very small space surely it would be easier to distribute it if it was mixed with something else, particularly if mechanical means were used to distribute it. In such case he considered it was necessary to have a "filler."

Mr. Williams replied that some fertilisers were so damp and sticky that it was essential to have some drying agent to mix with them. But with mixed fertilisers very often one ingredient dried the other and there was no need for a filler; nevertheless it was very often put in by manufacturers. In any case if it is necessary to mix fertilisers before applying to the soil, he thought it would be better for the farmer to do that himself.

Attention was then drawn to the fact that in such event the question of time, facility, and labour came in. Would it not be better to have it mixed under technical supervision rather than do it on the farm.

Mr. Williams replied that that was a question for the farmer himself to decide. He could assure them that the prices asked for some of these mixed fer-

tilisers were such that he thought it would pay almost any farmer to make his own mixtures. In this connection, however, he was not referring to mixed fertilisers in general.

Mr. W. V. Blewett then addressed the members present as follows:—

"I would like to make a few remarks. Mr. Williams in his opening remarks seemed to be rather apologetic at coming here to read a paper on the purchase of fertilisers! As a matter of fact some of the staff suggested that we should put a notice up "Do it Now" and I don't think there is any need for Williams to be apologetic about it. (Laughter). Then I began to be afraid, when he was talking about some fertilisers not being much good, that he might be going to denounce fertilisers generally. However, there is no doubt that Mr. Williams has laid down the correct lines on which fertilisers should be bought and there is very little doubt that to-day with the protection of the Fertiliser Regulations the planter is getting a better product than he did a few years ago. It is agreed pretty well everywhere that fertiliser should be used, and what is wanted is more experimental work to decide which is most economical to the planter. Obviously every planter with different soils will not require the same fertiliser.

With regard to the question of "fillers" nowadays it is not possible to charge the planter for something which is merely a filler; at least it is not possible if he keeps his eyes open. If he is led away by some representative he must of course pay a price higher than that based on the unit price of the fertiliser. But if a filler has no plant food obviously it is easy for the planter to value that fertiliser, and he need not pay for anything that is a filler. I agree that it is very often necessary to have some "driers" but they should not be classed as "fillers." A filler obviously cannot be charged to the planter if he buys with his eyes open.

There is another difficulty which fertiliser manufacturers have to face. They are called on to make up a big range of fertilisers, chiefly for reasons of competition. You see all sorts of "specials" and it is becoming the practice in countries where fertilisers have been used for long periods to reduce the number of those "specials." There are various things which have to be taken into consideration in connection with the valuation of the different fertilisers. It costs just as much to bag a low grade as a high grade fertiliser, and the tendency is to sell higher grade fertilisers year by year for the reason that the cost of mixing, bagging, handling and transport are all reduced in the high grade fertilisers.

Mr. Munks stated that he had been in the habit of using bone dust on all his soils, in mixtures and alone. He wished to know if he was doing right or wrong.

The Purchasing of Fertilisers.—Contd.

found he could not mix the fertilisers economically on his farm then he did not see any great objection to buying the mixture ready made.

At the conclusion of his remarks Mr. Williams was loudly applauded, and the Chairman thanked him on behalf of the members.

STREAK DISEASE EXPERIMENTS.

At this stage the weather having cleared up somewhat it was decided to proceed to No. 1 "Hill" Plots where Mr. Storey explained, through the medium of a wireless broadcasting set and loud speakers placed in the field, the nature of the various plots. These plots were planted on March 15th, 1924, with cane cut from a single field.

The condition of these plots at four months old was shown in a photograph recently circulated to members. Exceptionally severe secondary infection had occurred and all plots were fully diseased with Streak, although some of the plots had been originally planted from healthy setts.

The plots were most interesting, as they plainly demonstrated the extraordinary spread of Streak disease. But the important feature of the demonstration was the answer to the question: What effect has Streak disease on tonnage? Only weighing tests will prove this conclusively and these will be carried out in due course. From appearances, however, it was plain that the cane which started undiseased was easily better than that which started diseased. A plot of heavily infected mealies which had been planted late in the season also gave rise to a good deal of discussion as to the spread of disease being assisted by the growing of maize in the vicinity of cane.

In close proximity to the cane plots an experimental plot of Sunn Hemp (a green manure) was seen, but this was of exceptional height as the plants had been allowed to grow for the purpose of obtaining seed. When ploughed in at the proper stage this plant is claimed to be a good green manure for coast soils.

THE LUNCHEON.

The members then proceeded to the Social Club where a most excellent luncheon had been prepared by the ladies of the staff, and to which the members had been invited as the guests of The African Explosives & Industries Ltd. The ladies had worked very strenuously to make the lunch a success and everything was greatly appreciated.

After the loyal toast the Chairman rose to propose the toast of "The African Explosives & Industries Limited," coupled with the name of Mr. W. V. Blewett, as follows:—

"It falls to my lot to propose the toast of our hosts, and with that I couple the name of Mr. Blewett. I wish to say how pleased we are with the entertainment they have given us to-day. In going round the various fields, and looking at the different experiments, we can see that there is someone alive

even if, as some think, we have been dead ourselves. (Hear, hear). Someone is doing the work to show us how to grow cane under the best conditions and get the best results. When we see all that is being done one sometimes wonders whether it is really necessary for us to get an experimental station ourselves! Of course they may be doing it for an ulterior motive! (Laughter). Perhaps they want to show us how to grow 60 tons to the acre. If they can do that then I am sure we will all be only too pleased to get their fertilisers."

Mr. Blewett in rising to reply, said:—

"I feel rather guilty in rising after the very excellent reception you have just given me, especially as I have really done less than anybody in connection with the work and the arrangements made to see that you were properly entertained. I have been away during the last two or three weeks and the other members of the staff, especially the ladies (hear, hear), have been working hard to see that Umbogintwini kept up its reputation for hospitality. When I came back and wanted to butt in they said "there is nothing for you to do, its all fixed up." I won't mention anyone by name but I take this opportunity of thanking those who have done so much to ensure the success of to-day, and I hope that we have shown you all how welcome you are.

With regard to Mr. Johnson's remarks I may say that when we started putting down experimental plots it did not enter our heads that the South African Sugar Association as an association would be interested sufficiently to come out here in a body. We thought that individual members might come along to see things for themselves, but we had no idea of being honoured in the way we have been to-day. The beginning as regards cane experiments was that Mr. Storey was out here and talking about doing some experimental work in connection with Streak disease, and we offered to do it here. We offered our help by doing anything he could suggest. Then he started first on one soil and later on two other soils, to put in these Streak and healthy plots for the purpose of arriving at some idea as to the effects and growth and the treatment of this Streak disease. It is to be hoped that those results will be useful.

Although I have no doubt Mr. Storey could speak with confidence on several points, undoubtedly this sort of work will ultimately enable you to make certain definite statements and lay down certain rules which will enable you to increase your tonnage per acre. (Hear, hear). Later on Mr. Dodds came down and we said the same thing to him, that we would help in any way with regard to experimental work he wished to carry out, and we arranged various green manuring plots and so on. Both Mr. Storey and Mr. Dodds know, whether the work we do is advertised or not, we are quite prepared to investigate from the scientific point of view wherever we have the facilities.

The Purchasing of Fertilisers.—Contd.

We have other plots here—the fertiliser plots—and as Mr. Johnson said one might question our motives in that connection. (Laughter). We did that for the sake of the staff here. Several of the staff were anxious that we should put down experimental plots here instead of elsewhere as we have been doing in the past, so that they could see the effect of certain fertilisers of which we were inclined to speak rather flamboyantly. We had no idea when we started those plots that they were to be demonstration plots. Mr. Dodds knew what was happening in regard to that, but they were put down for our own experimental work. If there is one thing that we believe in here, it is that scientific work is of value to all agricultural and industrial interests of this country (hear, hear), and because of that we like to do that work here. We are in touch with the Government officials at Cedara and other officials in this country, and we are anxious to get to know about the growing of crops and the treatment of crop diseases and so on.

I think that men like Mr. Dodds and Mr. Storey are entitled to the enthusiastic support of all the people in the Sugar Industry. (Hear, hear). I say that as an outsider in so far as the Sugar Association is concerned, but that is the feeling which I hold very strongly, that they ought not to get reluctant but enthusiastic support. For your own sakes quite apart from anything else, money spent and time devoted to scientific work and increasing our knowledge of the crops we grow, is going to come home multifold before very long (hear, hear), and there is no doubt that the Sugar Industry must get a "push" from somewhere. Under our present conditions we ought to be very dissatisfied with the yield per acre in Natal and Zululand, and I think a slogan such as "Thirty tons per acre" ought to animate the whole of you people. (Loud applause).

Mr. Johnson the Chairman then proposed the toast of "The Ladies," saying they could not be too grateful to the ladies for the way they had catered for them. They had done splendidly.

Mrs. King suitably replied on behalf of the ladies, and said that they were all very proud of their village and the products of the factory, but from the housewife's point of view they were also very interested in the price of sugar. By using more of their fertilisers she felt sure they would increase their crops of cane and so reduce the price of sugar. (Applause).

PLOTS ON THE FLATS.

After lunch, although it was still raining slightly, the party proceeded to inspect the Flats plots where various experiments had been carried out with fertilisers on healthy and diseased cane and other crops. Here Mr. Blewett explained the nature of the various experiments to a deeply interested audience. Everything had been done in the most scientific way so that results might be reliable

when obtained. The visitors saw the plots at an interesting stage and in due course will receive reports on each experiment as it is completed.

Thereafter the party returned to the Social Club where tea was served and the programme continued.

BEST METHODS OF APPLYING FERTILISER.

In replying to the question (No. 5): "What method is considered the best in applying fertilisers?"

Mr. Blewitt stated:—

That question has interested us considerably during the last year or so, and there is no doubt that the results of fertilising very often prove inconsistent owing to the method in which the fertiliser has been applied. This morning you saw the healthy and Streak plots on what we call the "Hill" site. There you have a light sandy soil and we wanted to give certain of those plots the best chance by giving them a heavy dressing of fertiliser, so that we could see the effect of Streak growing with and without fertiliser.

The whole of that plot had a dressing of fertiliser some few months ago when we were growing tobacco there, but the tobacco crop proved a failure. Half of that had a heavy dressing of mixed fertiliser, applying 1000 lbs. to the acre, and applying the fertiliser in contact with the setts of cane, and we were surprised to find that the cane which was unfertilised came up quicker than the fertilised cane and was for quite a time certainly of stronger growth. I think it is only now that the fertilised cane is gaining on the other, but the set-back then was very marked. It is of common knowledge with small seed, say cabbage seed, that the effect of fertiliser may be harmful if they are intimately mixed, but we did not think it would be so marked in the case of cane.

We went into the matter in connection with crops such as cotton monkey nuts, and maize, and planted many thousands of seeds of the various crops and applied fertiliser in different quantities both in immediate contact with the seed planted by hand, and also putting the fertiliser under and above the seed, and away from the seed. The result certainly has been very interesting. There can be no doubt that in a dry season harm can be done to most of our crops by applying the fertiliser in contact with the seed or setts as the case may be, whereas in the wet season those results would not happen. With very heavy rains it would not make very much difference if the fertiliser was in contact with the seed or not. But we have had extremely heavy rains recently which we cannot take as normal conditions. I mention this point in connection with the answer to the question which has been put.

Fertiliser can be broadcast. Broadcasting I think is an excellent method; it is quite sound and safe. It is perhaps difficult without proper machinery to give an even distribution of your fertiliser but

