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# GENERAL.

## INCREASED PRODUCTION FROM FERTILIZING COFFEE.

**T. B. MCGLELLAND.**

It may interest the coffee planters to learn something of a fertilizer experiment which has been in progress for some years on a coffee plantation at Las Vegas, Porto Rico. This experiment was originally undertaken to demonstrate the effect of sodium nitrate alone as a fertilizer for coffee. Sodium nitrate was applied semi-annually from 1916 to 1919 inclusive at rates varying from 100 to 600 pounds per acre per annum. As no increase in yield was obtained which could be attributed to the use of this fertilizer alone, in 1920 a change was made in the kind of fertilizer employed. In the new treatment two plats were given nitrogen alone, one in the form of ammonium sulphate and one in sodium nitrate, and two others received acid phosphate and potash in addition to nitrogen, a complete fertilizer.

Though the plats were each of 1/10 acre in area, the discussion will be in acre rates, and the yield in pounds of dry coffee beans, parchment removed, estimating 5 pounds to the almud of cherries.

No effect from the change in fertilization was seen on the 1920 crop. The check plat produced at the rate of 275 pounds, and in yield was ahead of any other plat.

In 1921 it produced at the rate of 250 pounds, while the two plats which had received complete fertilizer produced at the rates of 375 and 462 pounds, respectively, very material increases over the check.

In 1922 the check yielded at the rate of 106 pounds, and the complete fertilizer plats at the rates of 137 and 219 pounds.

In 1923 the yield rate was 125 pounds for the check and 175 and 155 pounds, respectively, for the complete fertilizer plats.

In the very small 1924 crop the rate was 25 pounds for the former and 162 and 125 pounds for the latter.

In the 1925 crop the check yielded at the rate of 100 pounds, and the complete fertilizer plats at the rates of 425 and 525 pounds per acre, respectively.

For the 5-year period 1921-25 the total rate of yield for the check was 606 pounds, whereas the rates for the two plats receiving complete fertilizer were 1,274 and 1,486 pounds, respectively. The application of complete fertilizer to these plats more than doubled the yield in this period.

This increase in yield is all the more striking when the record of the preceding 5-year period 1916-20 is considered. The record for one of the plats, which was later given complete fertilizer, extends through three years only, 1918-20, of this first period, but for the four other plats the entire period is covered. The check plat tied for first place the first year, and led in yield three of the remaining four years, showing it to have been originally not inferior to the plats which later, under the stimulation of complete fertilizer, so far out-yielded it.

The planter's interest in this experiment will largely centre on the relation of expenditure to income, and the possible application to his own plantation of any lesson to be learned from this demonstration. The accounts of course, will vary with the price of coffee and of fertilizer and with the location of the plantation, involving differences in cost of labour and of transportation, and, as a consequence, each planter may modify the accounts to suit his own conditions.

For the purpose of discussion we shall arbitrarily assume certain values.

Applying the fertilizer immediately after the usual fall and spring cleanings and using as a basis for calculation the retail fertilizer prices for 1925, f.o.b. San Juan, the annual fertilizer costs for one acre may be estimated as follows:—

Fertilizer applied to one acre	Price	
	Minimum	Maximum
225 pounds ammonium sulphate	\$ 7'13	\$ 7'87
300 „ acid phosphate	„ 2'70	„ 3'00
100 „ potassium sulphate	„ 2'65	„ 2'75
Sum : ...	<u>\$ 12'66</u>	<u>\$ 13'62</u>
Mean price ...	\$ 13'14	
Rail road freight, San Juan to Mayaguez	„ 1'17	
Transportation, Mayaguez to Las Vegas	„ '63	
Labour for mixing and applying	„ 3'00	
Total annual expenditure :	<u>\$ 17'94</u>	

This expenditure per acre per annum approximates the added revenue from an additional quintal of coffee selling at \$24.

In the present case an expenditure of \$107.64 for fertilization from 1920 to 1925 increased production by 774 pounds of coffee (average increase over check made by two plats receiving complete fertilizer). In addition to the cost of fertilization this increase involved no other expense than picking, preparation, and transportation to market, which may be placed at \$6.00 a quintal, or \$46.44. The total expenditure then amounted to \$154.08, or \$19.91 a quintal. A profit or loss from the use of fertilizers would then depend on the selling price of the coffee. With coffee at \$20 there would be an insignificant profit; at \$25 there would be a substantial profit—\$39.42 an acre for the period covered.

In addition to the cash returns to date, the fertilized plats are in better condition than the check and were no additional fertilizer to be applied would, no doubt, produce in the next crop much more than the coffee which has never been fertilized, and so increase the sum total on the profit side of the account.

Just how cumulative the effect of fertilization will be, remains to be shown by future yields, but it is interesting to note that no increase in yield was obtained the first year, that increases of 25 to 100 per cent. were obtained in the next three crops and increases of 325 to 548 per cent. in the two following crops.

Nitrogen alone proved much less effective than the three elements in combination—nitrogen, acid phosphate, and potash.

Other investigations carried on at this Station have indicated that potash is a most important component of a coffee fertilizer for soil similar to that of this Station, which is a stiff red or brown clay classified as Adjuntas clay. It is suggested that planters who plan to fertilize their coffee use a higher proportion of potash than in the experiment just recounted. In the Agricultural Notes of September, 1925, the recommendation was made that ammonium sulphate and potassium sulphate be mixed in equal proportions by weight and the combination applied at the rate of 300 pounds per acre. In connection with this plat it was recommended that a second plat, as nearly as possible like the first in condition of trees, location and soil, should be given 150 pounds of phosphoric acid in addition to the nitrogen and potash. These two plats would serve the planter as a guide for subsequent fertilizer operations.—Agricultural Notes, Porto Rico Agricultural Experiment Station.

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## PAPAIN

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The following extract is taken from a pamphlet entitled "Minor Industries for the Leeward Islands" by A. E. Collens, F.I.C., F.C.S., Government Chemist and Superintendent of Agriculture for the Leeward Islands, and F. H. S. Warneford, M.A., B.Sc., A.I.C., F.C.S., Assistant Government Chemist, Leeward Islands:—

Commercial papain is the dried latex of the fruit of *Carica papaya*. It is largely used as an aid to digestion in virtue of the proteolytic ferment contained therein.

At the present time the demand is in excess of the supply which is obtained chiefly from Ceylon with small quantities also from Montserrat. The United States of America is the largest consumer importing annually to the value of £15,000 to £16,000.

*Carica papaya* is a distinctly tropical plant; specimens grown out of the tropics seldom bear fruit. The plant is best grown below an elevation of 1,200 feet. Once established the trees are capable of enduring a wide range of moisture variations in the soil; but under water-logged conditions they suffer.