

BOTANICAL STATION—BARBADOS

OCCASIONAL BULLETIN OF

Miscellaneous Information—No. 5.

THE CULTIVATION AND MANUFACTURE OF ARROWROOT.

Since Mr. W. T. Thiselton-Dyer C. M. G. &c. &c. director of the Royal Gardens, Kew, stated in his report on the diseased sugar canes sent from this Station that it would be a great advantage wherever practicable to plant the ground previously occupied by cane with other crops for a year or two, I have been trying to obtain information relative to such crops other than gramineous which would be fairly remunerative and for which there is an adequate market.

As Barbados answers somewhat to the description given in the Kew Bulletin August 1893, of Bermuda where the finest arrowroot is made and as arrowroot seems to thrive and give large returns from the fields in St. Vincent which are infected with the Root, fungus it may not be out of place to reproduce here certain articles from the Kew Bulletins on the cultivation and manufacture of what may now be not inaptly styled the staple product of St. Vincent, with the hope that in suitable localities planters may be induced to try the cultivation of this plant on the fields in which the canes have been attacked with the fungus. Although at present prices it may not do much more than repay the cost of production still it will enable the planters to employ their labourers without a loss to themselves, a matter which is an impossibility now with those who from force of circumstances are driven to grow sugar canes on infected areas at a considerable loss, not only to themselves but also to their surrounding neighbours whose fields they are infecting.

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JOHN R. BOVELL,
Superintendent.

ROYAL GARDENS, KEW.

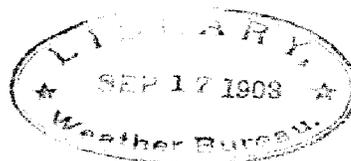
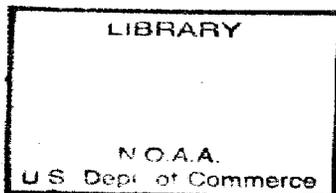
Bulletin of Miscellaneous Information, August 1893.

ST. VINCENT ARROWROOT.

The following particulars respecting the cultivation of arrowroot in St. Vincent have been furnished by the managers of Fancy and Owia estates, in that Island:—

FANCY ESTATE.

Cultivation of Arrowroot.—The land is cleaned of bush and weeds by burning or burying them. Then holes are made with the hoe, about 4 inches deep and 8 inches apart, and a piece of root, two or three joints, put in each hole. As soon as the roots commence to



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grow and the leaves appear above the surface the land must be carefully weeded with a small hoe. This is to be repeated in about five or six weeks; if the weeds grow rapidly it should be done sooner. In good soil three weedings are sufficient. When the leaves get yellow and the stalk falls, which will happen in from 10 to 11 months after being planted, the roots are fit to be dug.

OWIA ESTATE.

Arrowroot Cultivation.—Arrowroot requires some care in the selection of the land intended for planting, loose or sandy soils apparently suiting it best, though there are districts in which the soil is most undoubtedly clayey producing fairly good results in its cultivation.

New land would be cleared by having the trees cut down, the underwood, bush &c., if heavy and plentiful, heaped and burnt, the heavy trunks being left to rot or made into charcoal, some trunks at Owia are visible which must have been felled 20 odd years ago.

The land is next ploughed, or more correctly speaking, "hoed up" no other implements being used but hoes; the product of the cutting and burning (any charcoal made having been removed for sale first) is buried in, and "bits" or top joints of the tuber are lightly buried in, in rows about 6 inches apart. Roots (as the tubers are here called) which have been about a week dug are found to be the best for planting.

The time planting depends very much on the exigencies of the estates; lands in an established estate are planted to "come in" or be ripe for reaping at such time as the already established cultivation would allow of being manufactured without damage to either. Here of course, comes in a difficulty for the planter; a very dry season will bring all his arrowroot ripe together about January or February, and out of a cultivation yielding 700 barrels he can only manufacture 125 barrels per month, hence a good deal of his crop has to be manufactured either before or after it is properly ripe.

In wet weather, two or three weeks after planting leaves begin to show above ground, three weeks later the plants are sufficiently grown, as are also the weeds, to be weeded, principally by hand by women, whose duty it is to pull up and collect in heaps everything growing which is not arrowroot; certain kinds of weeds have to be loosened with small hoes. Three to four weeks later, by which time it is presumed that all the "bits" which were capable of growing have grown and shown leaves, the business of supplying is performed, that is spaces where no arrowroot appears are re-planted.

About six weeks after being supplied the fields again require weeding, the weeds being left on the surface and the plants lightly moulded up. After this, at intervals as required, the land is weeded, the more quickly the arrowroot grows, and so covers the ground, the smaller the number of weedings being required. After supplying, three weedings are generally sufficient, it being very essential to proper cultivation to keep it free from weeds.

The arrowroot ripens in 10 to 12 months from time of planting, and shows that it is ripe by "falling," that is, the leaves dry and the stalks bend at the root till the whole lies on the ground.

Some fields mature sooner than others, eight months of growth being in some places sufficient for maturity, giving, at the same time, a good yield; others, again, take full 12 months.

The arrowroot plant does not require over much rain, this tending to produce leaves and not root which is what is wanted, and with our seasons the growth appears to continue until the rains stop, the ripening following closely on the cessation of the rains,

an early heavy rainfall during, or towards the close of the dry season materially reducing the yield of arrowroot, on account of the roots "springing" and throwing out young shoots, the roots then containing more water than starch.

The only manure ever used at Cwia is farmyard manure, laid on before the land is ploughed or hoed up, and buried in with the ploughing.

The process of reaping is : In fields where there is considerable growth of leaves the stalks are cut down and heaped, and the labourers are put in with hoes, who dig out the roots in breadths, each labourer putting the roots dug at one side of his breadth, breaking off the top joints of the roots and burying them in as plants for the succeeding crop. This system of ratooning is allowed to run on, in some cases, 15 and 16 years.

The roots are afterwards measured, collected, and carted to the mill for manufacture.

In digging out, everything on the surface is buried in as manure for the next crop

ARROWROOT MANUFACTURE.

The following account of the manufacture of arrowroot in St. Vincent was contributed by the late Mr. J. W. Macdonald to the *Journal of the Society of Chemical Industry* in 1887. Mr. Macdonald was proprietor of the Wallilabo Estate, and one of the most successful manufacturers of St. Vincent arrowroot :—

WALLILABO ESTATE.

(Re-printed from the *Journal of the Society of Chemical Industry*, May 31, 1887.)

Arrowroot (*Maranta Arundinacea*) is a native of the tropics. The island of St. Vincent, in the West Indies, has taken the foremost part in its growth and production; a fair quantity is also made in Natal and smaller quantities in India, Fiji, Queensland, and other countries. Formerly, the Bermuda Islands produced a great deal, but, as there is very little arable land and a scarcity of water, and the inhabitants having turned their attention to growing early vegetables for the New York markets, arrowroot is gradually being given up.

Planting.—In St. Vincent, the plant grows 2 or 3 feet high. It has a weak fibrous stalk with six to eight arrow-shaped leaves, resembling the leaves of the lily. When the root is ripe, these leaves fall and wither. The plant flowers but does not bear seed, and is therefore propagated by the root. This can be done in two ways, either by pulling the green stalks, trimming off the long hairy roots, and setting them 6 inches apart in fields previously prepared for their reception, or, as is most generally done, by returning to the soil the upper end of the root, which is hard and fibrous and contains very little starch. As the fields are dug up, the labourers pick out the roots and break off these top pieces four to six inches long returning them to the soil. In this way reaping and planting go on simultaneously. Care must be taken, however, to avoid returning to the soil small thin weak roots. The roots commence to grow in about a fortnight, but, to avoid choking the fields, have to be weeded two or three times.

In about 10 to 12 months the roots are ripe, and are then 12 to 18 inches below the surface.

If they are reaped before being properly ripe, the next crop suffers and frequently takes 15 months to mature, and the fields require to be frequently weeded. With careful attention and manuring, fields will produce crops continually. The arrowroot is a very hardy plant, and will continue to grow up and die down for years after its cultivation has ceased in a field. The roots are long and tap shaped, and are jointed

at intervals of $\frac{1}{4}$ to 1 inch. In the soil they are protected by a fibrous covering which grows from each joint, the folds over-lapping each other to the end of the root. Full grown roots are from 10 to 18 inches long, the most starch being found in the lower or younger end.

Manufacture.—The first part of the manufacturing process is to soak the roots in water to soften the covering and the adhering earth.

They are then stripped of the covering and washed, and thrown into a second or rinsing tank. When thoroughly clean they are taken to the pulping machine. The skin is said to contain a resinous matter, which gives a yellow tinge and unpleasant flavour to the starch if the latter is not well washed. In former times the roots were very carefully skinned with German silver knives before being pulped.

This is said to have produced whiter starch, but as it was so laborious and expensive, it was discontinued. The skinned roots were pulped by subjecting them to great pressure by passing them through an upper, and then a lower and much closer pair of polished brass rollers, to break the starch cells. The method of pulping now generally adopted is to feed the clean unskinned roots against a fine saw grater very similar to a potato grater. It is a solid cylinder of hard wood about 28 inches diameter and 7 inches wide. Slits are made by a saw from end to end of the wood at $\frac{1}{4}$ inch intervals. Saw blades having six to ten teeth to the inch are then fitted into the slits and the whole immersed in water to swell the wood and fix the saws. The grater is now fitted into its place very close to a wooden feeding bed. As it revolves several hundred times per minute it tears the roots into shreds. A great deal, however, depends on the fineness of the teeth and the velocity of the drum.

On account of the very fibrous nature of the pulp, there is considerable difficulty in the sieving or separating the starch from it. The fibres readily gather into lumps and enclose the starch, so that hard sieving although very tedious, has to be resorted to. The pulp is first run into a box or sieve, the bottom of which is a sheet of copper or tin punched with holes about $\frac{1}{4}$ inch diameter. While water flows on, the contents are kept thoroughly agitated by hand, until all the starch has been washed out. While one strainer full is being washed, another is being filled, so that there should be no delay. However careful one is, there is a loss of starch in the fibre owing to the presence of small bits of the roots which have escaped pulping.

In one factory, instead of the above strainer a tin-lined copper cylinder has been tried. The cylinder was stationary, its under side being pierced with holes, and inside paddles or beaters revolved at great speed amongst the pulp and water, until the latter flowed away free from starch. The wasted fibre was then removed and a fresh charge of pulp put in. This, however, has been discontinued. In another factory, a half cylinder, also stationary, is in course of erection. Its under side is also pierced with small holes, but there is a slide under this to open or close at will. Inside, there are rakes attached to two shafts, which move in opposite directions, and cause the rakes to oscillate very rapidly between each other, thereby keeping the fibre always open. The starch water is let out, more water run in, and the operation repeated until the starch has ceased; then the fibre is taken out. The great objection to any mechanical washer is the tendency of the fibre to accumulate on the agitators and break them. I do not know at present of a single mechanical washer being in use. To get over this difficulty, it has been proposed to chop up or slice the roots into small short pieces, and either rasp them or pass them through metal rollers or mill-stones, so that the thin disintegrated pulp may flow over mechanical sieves. I do not know if this plan has yet been tried. Although causing a loss of starch, the present method of rasping avoids an undue pulverising of the soft yellow fibre and so gives a very white starch without much further trouble.

From the fibre strainers the starch water flows consecutively through a series of brass wire sieves of 40, 80, and 100 meshes; each of these retain small fleshy bits of unpulped root. From the last sieve the water runs into the settling cisterns, which are preferably lined with white glazed tiles to avoid accumulation of slime.

A portion of the fibre collected on the finer sieves, and also the coarse fibre is used for feeding the animals on the estate, the remainder and all the coarse fibre are used as manure. For this purpose it is left in heaps until it decomposes, after which it is distributed on the fields along with pen manure. Sometimes also ashes and guano are used. The waste water from washing the starch contains considerable amount of vegetable matter, and gives good results where it is run on the fields, but the extensive application of this is not practicable. After the starch has settled in the cisterns, the water is run off and more added, the whole is stirred up (optional) and again allowed to settle. This generally suffices to dissolve out soluble matters. At night all the cisterns are drained, and the starch is dug out and taken to a mixing box, where it is mixed with about twice its volume of water; then run through another fine sieve into the separating pans. These are small round galvanised cisterns with smooth perpendicular sides. When filled, the starch milk is stirred round with a round stick until it is in violent circulation. The stick is withdrawn and the cisterns left until morning. The stirring has the effect of separating the starch from any remaining impurities. These being of less specific gravity, settle last, and therefore on top of the starch. Next morning the water is dried off, and the light impure starch scraped off the surface. If the earlier parts of the process are carelessly done, this separation may have to be repeated before the starch is quite pure. Even should the separation be perfect re-washing is beneficial for further removal of vegetable matter. The impure surface starch contains a large proportion of starch entangled in very fine particles of fibre and broken cell walls. Although this can be dried and exported as an inferior starch, it is generally given to the labourers as a perquisite. It is used in various forms as flour. Poultry and pigs are also fed with it. Weak caustic soda extracts a colouring matter from it, but also precipitates a yellow substance, making it very difficult to separate the starch from it in a pure state.

The pure starch in the separators is now taken out in blocks, and placed on trays for about 12 hours to drain and harden. It is then broken into small pieces, and taken to the drying house, where it is air-dried. This building is open on all sides for free circulation of air. It is surrounded however, with galvanized wire to keep out the small birds which hover about. Inside there are wire shelves over large shallow wooden trays. The wet lumps of flour are placed side by side on the top shelf, where they remain until by the action of the air they crack up and fall through on to the next shelf.

In time, the whole falls through the lowest shelf, and is in a fine granular state, ready for packing. It contains from 14 to 17 per cent of water. In cold, wet weather, the starch dries very slowly, taking sometimes as long as two weeks. During this time, if the starch has been imperfectly purified, or placed too close on the wires, the lump gets sour, and becomes yellowish. Indeed the whole process must be as rapid as possible. In the settling cisterns especially, if the starch is left in contact with the impure water too long, its whiteness is affected, fermentation having taken place. The crop lasts from October to May. The name "Arrowroot" is, I think, derived from the Indian word *Ara-ruta*, or "mealy root," but some say that this root has been confounded with the *Alpinia Galanga*, which was called the arrowroot on account of its bruised roots being used as an antidote to the poison of the *Jatropha Manihot*, which was used for poisoning their arrows. I may say that tapioca starch is obtained from this poisonous root. The poison, however, is contained in the juice only, and is destroyed by heat.

Yield—Regarding the yield of arrowroot, an acre will produce 12,000 to 15,000 lbs. of roots, according to the season; in wet seasons the roots are heavy and moist, and give less starch. A fair average yield is 22 cwt. air dried starch, with 14 per cent. water, per acre, or about 19 per cent on good roots. I have no doubt that this will be considerably increased by the use of much-needed improved pulping and sieving machinery.

Chemical Composition.—The roots that I have analysed got slightly dried in transit, so that they show rather high amount of starch. The analysis, however, will give an idea of the constituents of the roots. In some respects it differs from an analysis by Benzon, stated in *Ure's Dictionary*, and which I append.

	J. W. M.	Bmszon.
Starch	27-07	26-00
Fibre	2-82	6-00
Fat	0-26	0-07
Albumin	1-56	1-58
Sugar, Gum &c.	4-10	0-60 (Gum)
Ash	1-23	0-25 (CaCl ₂)
Water	62-96	65-50
	100-00	100-00

The ash consisted of phosphate of lime and alkaline sulphates, and chlorides.

I have made an attempt to introduce the residual coarse fibre as a raw material for paper manufacture, but consumers say that it is too weak and lacking in tenacity. For paper making the starch still remaining could be recovered by steeping in boiling water, and used for sizing the finished paper.

Owing to the fall in the value of sugar, the production of arrowroot in the West Indies has been extended rather beyond the demand. The wholesale price has consequently fallen to an almost unremunerative point. This low price, however, will permit it to be used for whatever purposes the commoner kinds of starch are now employed. In some respects it is superior to common starch, and one of my chief objects in writing this paper is to draw the attention of large users of starch to this comparatively new source of very fine starch. Arrowroot swells much more readily and with less heat than maize, rice, or wheat starch, and forms a stiffer jelly. It is, therefore, highly adaptable for sizing and laundry purposes. I think this property is attributable to the larger size of the granules of arrowroot starch, which are among the largest of the starch granules, whereas the granules of wheat, maize, and rice starch are very small, and will contain a greater portion of starch cellulose and less granulose, the latter being the substance which swells when dissolved in hot water. Another use for which arrowroot starch is very suitable on account of its great purity and freedom from chemicals, is for the preparation of powder for the skin. Many of the powders sold are composed of very questionable ingredients. Arrowroot well crushed and dried on a plate before the fire is both simple and safe.

It is as an article of food, however that it has hitherto been mostly used, but the exorbitant retail price put on it (from 8d. to 2s. per lb.) has kept it out of general use. Of course, being starch, it cannot have the flesh forming power of flour and other nitrogenous meals, but it is the purest, most digestible and palatable of the starches, and is devoid of the unpleasant taste of flavour observed in potato starch and in the so-called cornflour, and other starches extracted from the cereals by the caustic soda and fermentation processes.

Regarding the annual production of arrowroot I have not been able to obtain many statistics. Bermuda raises only 500 to 700 kegs, so that very little of what is sold as Bermuda really comes from there. Natal produces 2,000 to 3,000 cases, and St. Vincent about 22,000 brls, 20,000 of which comes to England and most of the remainder is sent to America. The production of other countries is, I believe, very small.

VALUE OF ST. VINCENT ARROWROOT.

Messrs. Fergusson and Foster to Royal Gardens, Kew.

11 and 12 Great Tower Street, London, E.C.

March 24th, 1890.

Dear Sir,—We herewith hand our opinion of the three samples arrowroot, namely, "Owia," "Fancy," and "Wallilabo." The last mentioned in point of quality we find to be the strongest, and the others, "Owia" and "Fancy," to be about on a par. The marks "Owia" and "Fancy" have been well known on this market for many years, and have borne a great reputation, but during the last few years there has been a considerable falling off in quality and appearance, so much so that they now have reached the low level of inferior brands. In other words, they have lost their reputation.

We remain, &c.,

(Signed) FERGUSSON AND FOSTER.

J. R. Jackson, Esq.
Royal Gardens, Kew.

ANALYSES OF ARROWROOT SOILS.

Mr. JOHN HUGHES, F.C.S., F.I.C., to Royal Gardens, Kew.

Analytical Laboratory, 79, Mark Lane, E.C.

June 27th, 1890.

Dear Sir,—I have now the pleasure of sending you the results of my examination of the 10 soils referred to in your letter of the 4th instant. In general composition these 10 soils appear to be so similar that it will not be necessary for me to refer to them under separate reports. On analysis they are found to be singularly poor in nitrogen, phosphoric acid and potash; there are, further, of a very siliceous character, and possess small retentive properties, so that, under the influence of a stimulating climate, they would naturally suffer from exhaustion, and require manure if the crops grown were likely to require a generous supply of the above-named constituents of plant food.

The three specimens marked "Owia" are darker in appearance, and though more stony than those from the other two estates, are yet richer in nitrogen, soil No. 2 containing the most, and No. 3 the least. In phosphoric acid and potash, however, there appears, from the complete analysis made, to be little difference, as the figures for these constituents are remarkably close for all three estates. In lime the three soils from "Owia" are all richer.

	No. 1 containing	3.175	per cent of lime
	No. 2	3.056	" "
	No. 3	2.553	" "
" Fancy" estate comes next,			
	No. 1 containing	2.296	per cent of lime.
	No. 2	1.385	" "
	No. 3	1.953	" "
	No. 4	1.665	" "
" Wallilabo" containing least,			
	No. 1	1.027	per cent of lime.
	No. 2	2.296	" "
	No. 3	1.101	" "

I do not however consider that liming is necessary for any of the soils, and certainly not lime in a free or caustic state, though as finely ground chalk, gypsum, or finely ground bone meal, its application in moderate doses of 3 to 5 cwt. per acre will doubtless be attended with improved crops.

Arrowroot as a crop is not particularly exhaustive of the mineral constituents of the soil, such as phosphoric acid, potash, and lime, and the same remarks may be applied to nitrogen, provided that all the pulp and manufacturing residue be returned to the land. Still with all possible care, there must be a certain amount of exhaustion of the soil going on, which careful cultivation should replace by judicious manuring.

In addition to the application of ordinary farmyard manure, commonly called in the West Indies pen manure (or at least where such cannot be obtained), I would suggest a general manure of the following compositions containing per cent of the following:—

Soluble phosphate of lime tribasic phosphate rendered soluble by acid 15 per cent.

Insoluble phosphate derived from bone flour	...	...	...	...	10	..
Nitrogen as derived from sulphate of ammonia	...	...	...	...	2½	..
Nitrogen as derived from fish, dried blood...	...	...	...	...	—	..
Bone Meal	...	...	...	...	2	..
Potash derived from sulphate of potash	...	...	...	...	4	..

Such a manure can be obtained in London for £8 per ton, and should be applied at the rate of 5 cwt. per acre before the rainy season sets in.

Believe, &c.,

(Signed)

JOHN HUGHES.

D. Morris, Esq., F.L.S.
Royal Gardens, Kew.

ROYAL GARDENS KEW, TO COLONIAL OFFICE.

Koyal Gardens, Kew,

August 27th, 1890.

Sir,—I am desired by Mr. Thiselton-Dyer to inform you that there has been forwarded to Kew, at the request of the Honourable Sir Walter Hely-Hutchinson, K.C.M.G., Governor-in-chief of the Windward Islands, an extensive series of plants and tubers of the common Arrowroot, of manufactured arrowroot, of the soils of the principal estates producing arrowroot, and detailed descriptions respecting the methods pursued at St. Vincent in cultivating and manufacturing arrowroot.

2. These specimens were sent with the view of instituting an inquiry into the circumstances which have led to the low prices paid in this country of late years for the best brand of St. Vincent arrowroot, and in the hope that some useful suggestion might be obtained calculated to revive the name and credit of this article in the London Market.

3. As the subject was felt to be of considerable importance, steps have been taken to obtain as much information as possible on this side. The plants and roots have been examined, the soils have been analysed by an agricultural chemist, the manufactured article has been submitted to experts for valuation and report, and the methods of cultivation and manufacturing arrowroot pursued at St. Vincent have been carefully compared with the methods pursued in other countries.

4. The general results of the inquiry will be in detail later. It is well known that the best arrowroot at present in the market is Bermuda arrowroot. This obtains prices more than double, or even treble those obtained for St. Vincent arrowroot. Bermuda arrowroot may therefore be taken as the standard of what a good arrowroot should be, and the circumstances of its cultivation and manufacture are well deserving of consideration.

5. There is no reason to suppose that the arrowroot plants cultivated at Bermuda and St. Vincent differ in any essential respects from one another. Plants have been obtained direct from Bermuda and cultivated in the Bahamas and other islands in the West Indies, and the arrowroot prepared from them according to West Indian methods has been classed as St. Vincent arrowroot.

6. As regards soils, we appear to have no authentic analysis of Bermuda soils. It may however, be assumed that they have been formed by the disintegration of coral rock, and that they are tolerably rich in lime, phosphoric acid, and other important constituents of plant life. In a recent account of the arrowroot industry in Bermuda (a copy of which is enclosed marked A.) it is stated that "the ground is first well manured and ploughed deep." The advantage derived from such treatment is obvious. The St. Vincent soils, on the other hand, as may be gathered from the analysis furnished by Mr. John Hughes, F.I.C., F.C.S., are singularly poor in nitrogen, phosphoric acid, and potash, they are further of a very silicious character, and possess small retentive properties. It does not appear that manuring is regularly and systematically pursued on St. Vincent estates, and deep ploughing appears to give place to hole digging with hoes.

7. It is impossible to institute a more detailed comparison between the cultural methods pursued respectively at St. Vincent and Bermuda; but enough has been said to show that the advantages as regards soil and culture so far lie with Bermuda.

It is probable, however, that the superiority of Bermuda arrowroot depends as much upon the methods of manufacture as on soil and its treatment. In the account of the industry already cited, stress is laid on the fact that "at Bermuda the roots, after being collected, are washed, and their outer skin completely removed; this operation has to be performed with great nicety, as the cuticle contains a resinous matter which imparts colour and a disagreeable flavour to the starch, which no subsequent treatment can remove."

In the accounts given of the manufacture at St. Vincent, it appears that the skin is not always so carefully removed from the roots before they are pulped. One account, however, states that "in former times the roots were very carefully skinned with German silver knives *** but it was so laborious and expensive it was discontinued.

"The method of pulping now generally adopted is to feed the clean unskinned roots against a fine saw grater, very similar to a potato grater."

9. In other respects the process of manufacture pursued at St. Vincent appears to be carried on without that scrupulous care and attention to details pursued at Bermuda. There may also be some difference in the quality of water employed. The peculiar blue tint noticed in Bermuda arrowroot is said to be due to the use of water from lime stone springs. If water from streams or rivers is used at St. Vincent, although wholesome and pure, it may still be capable of giving a dark colour to the arrowroot.

10. It is evident, however, that the present position of St. Vincent arrowroot is only to a small extent due to the character of the water. At one time, when possibly the same water was used, the quality was much better. It is probable that a gradual exhaustion of the soil and a less skillful and a cheaper method of preparation have been the determining circumstances. In any case it is clear, as shown in the report by Messrs. FERGUSON and FOSTER, that "during the last few years there has been a considerable falling off in quality and appearance (in St. Vincent arrowroots,) so much so that they now have reached the low level of inferior brands. In other words, they have lost their reputation."

11. Messrs. Ferguson and Foster are supported in their opinion by other experts to whom samples of arrowroot have been forwarded from Kew.

It would be fruitless to dwell any longer on this point. The fact appears to be established that St. Vincent arrowroots in their present condition will only obtain the lowest prices. It remains, therefore, for the planters in St. Vincent to realise the fact, and to make a systematic effort to bring about a more satisfactory order of things. The matter is evidently in a great measure in their own hands, and if they will energetically grapple with the situation there is every probability that they will ultimately re-establish the good name of their produce.

12. The hints given by Mr. Hughes as regards the mineral constituents wanting in the soil should receive a careful attention. The treatment of the soil might be improved by a deeper and more thorough cultivation. The methods of manufacture pursued at Bermuda might be carefully studied by an intelligent representative of the St. Vincent planters, and every effort made to carry on the manufacture at St. Vincent on the Bermuda lines.

13. These suggestions, and others which will no doubt present themselves to those reading the reports enclosed with this letter, might be placed within reach of all concerned in the arrowroot industry of St. Vincent. Mr. Thielton-Dyer will be happy to give any further assistance, and it will afford him pleasure to aid the praiseworthy and sympathetic effort made by Sir Walter Hely-Hutchinson to place this industry on a satisfactory footing. The planters in St. Vincent have had numerous difficulties to contend with of late years, but the improvement of an important industry like this is a subject well worthy of their most earnest and careful attention.

I have, &c.

(Signed)

D. MORRIS.

EDWARD WINGFIELD, Esq., C.B.

PRESENT POSITION OF ST. VINCENT ARROWROOT.

Messrs. FERGUSSON and FORSTER, to Royal Gardens, Kew.

13 Great Tower Street, London, E.C.,

14th August, 1893.

Dear Sir,—We have not hastily replied to yours of the 8th instant, because before doing so we were anxious to collect and give you the best information respecting St. Vincent arrowroot. The chocolate and cocoa manufacturers, as you may know are the present consumers of this article, and coming, as they do, into the market for large quantities they naturally raise prices sometimes considerably, as is well understood these purchasers are not re-sellers. On the top of this there is oftentimes a speculative movement, and hence prices are unduly raised. We do not think that there is much chance for any great advance to be expected for some time in the qualities used by the manufacturers. The prices they have been paying of late have been 2½d., 3d. to 3½ per lb., the importation being greater than for the last year or two. The good estate growths have fetched 3½d., 4d., 4½d., and 5d. to 6d. for choice lots.

We may here mention that recently a parcel appeared upon the market from Grenada which fetched 3s. per lb. and was thought equal to the best St. Vincent. We also have information that a much larger quantity is expected from Bermuda shortly. This island has always sent us the very finest qualities, ranging from 2s. 2d. to 1s. 3d. per lb., only, however, in small quantities. We heard also that we may expect a good supply from Natal, which a few years ago used to send us considerable quantities and realised mostly higher prices than the best quality of St. Vincent. In conclusion we feel certain that the growers in St. Vincent would do well for themselves if they could manage to send to this market more of the finer grades than they have been doing of late years.

We remain, &c.

(Signed)

FERGUSSON & FORSTER.

D. MORRIS, Esq., C.M.C.,
Royal Gardens, Kew.

METEOROLOGICAL REPORT OF DODDS BOTANICAL STATION FOR 1898—HEIGHT ABOVE SEA LEVEL 210 FEET.

MONTHS.	BAROMETRIC PRESSURE.		TEMPERATURE.							TENSION OF VAPOUR.					HUMIDITY.			Rainfall for 1898.	Number of Wet Days.	
	9 a. m.	3 p. m.	Maximum, mean.	Minimum, mean.	Maximum, extreme.	Minimum, extreme.	Minimum blackened bulb, 4ft from ground in vacuo.	Mean for month.	Range.	Dew Point 9 a. m.	Dew Point 3 p. m.	9 a. m.	3 p. m.	Mean.	9 a. m.	3 p. m.	Mean.			
January.....	29.961	29.874	29.917	80.9	70.1	84.7	68.5	150.1	75.5	16.2	66.2	66.8	.614	.657	.650	67.0	68.8	65.4	1.86	13
February.....	29.955	29.905	29.945	82.6	72.6	84.6	68.5	150.9	77.6	16.1	67.0	66.4	.661	.648	.654	67.6	62.8	64.5	1.33	10
March.....	30.011	29.932	29.971	88.9	78.5	87.1	66.2	152.6	78.2	20.9	64.4	65.4	.605	.626	.614	59.3	59.6	54.9	.87	7
April.....	30.002	29.929	29.965	88.4	74.0	86.1	68.9	149.5	78.7	17.2	70.9	68.6	.756	.699	.727	72.0	65.3	68.6	3.30	18
May.....	29.980	29.925	29.957	84.1	75.8	87.2	70.5	152.8	79.7	16.7	72.2	71.4	.790	.769	.779	73.9	70.7	72.0	2.72	15
June.....	29.997	29.939	29.968	84.0	75.5	86.9	71.7	146.5	79.7	15.2	72.9	72.4	.810	.796	.804	74.8	73.9	74.8	6.77	20
July.....	29.972	29.919	29.942	84.9	75.6	86.9	71.0	152.8	79.9	15.9	74.0	73.3	.840	.820	.830	77.7	73.4	75.5	8.05	20
August.....	29.992	29.892	29.922	84.7	75.7	88.0	70.2	152.6	80.2	17.8	74.1	73.5	.843	.820	.830	77.0	72.7	74.8	11.32	17
September.....	29.926	29.871	29.908	85.5	76.1	89.0	71.1	154.8	80.0	17.9	74.9	71.8	.865	.779	.822	76.7	68.4	72.5	6.72	21
October.....	29.864	29.754	29.809	86.1	75.9	88.2	70.8	155.0	81.0	17.4	74.5	73.7	.854	.832	.845	75.9	74.2	75.0	7.42	21
November.....	29.920	29.882	29.876	85.0	75.9	88.9	70.6	151.8	80.9	18.3	71.6	70.0	.774	.778	.773	69.9	68.3	69.1	4.23	15
December.....	29.919	29.836	29.877	82.8	75.0	85.9	70.2	149.9	78.9	15.7	69.7	69.7	.726	.726	.726	70.3	69.1	69.7	3.60	21
	29.959	29.883	29.921	83.9	74.6	86.0	69.8	151.6	79.2	17.1	71.0	70.2	.764	.745	.754	71.8	68.6	69.7	58.10	193

BARRADOE RAINFALL FROM JANUARY TO DECEMBER, 1883.

NAME OF STATION.	Elevation Feet.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Totals.		
		Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	
I. District A.																												
St. Michael, (Lowlands)	337	18	2.04	12	1.70	4	1.36	10	3.83	13	3.73	20	6.98	17	7.54	18	13.19	20	8.86	..	..	14	5.21	23	5.43	166	59.47
Lower Estate	162	11	1.93	7	1.73	6	1.10	9	1.69	11	4.28	10	3.99	15	5.56	16	10.95	18	7.19	18	8.80	12	4.60	21	3.52	184	54.16	
Hagget Hall	216	11	1.66	5	1.36	5	1.06	11	2.65	13	3.29	17	3.63	21	7.08	13	8.74	9	2.56	16	7.24	9	2.90	13	3.06	146	44.68	
Clapham	320	..	2.68	8	1.01	5	1.30	..	3.40	13	3.46	10	6.17	14	5.43	13	12.18	19	8.68	..	7.63	12	6.08	18	5.51	117	65.20	
Leas	90	..	2.16	8	2.20	6	1.31	7	2.59	10	8.49	6	4.07	13	7.42	13	10.14	15	6.02	12	7.63	7	2.88	14	4.98	122	54.62	
Government House	97	17	1.70	14	1.45	10	1.87	13	2.14	12	2.60	48	5.07	16	5.92	16	12.33	17	8.65	21	6.68	13	2.71	17	2.69	188	52.97	
District A	17	14	1.69	14	1.22	8	1.22	10	1.98	15	2.57	10	5.34	17	8.01	18	10.88	17	6.06	21	7.34	13	2.62	21	3.17	187	51.70	
Central Police Station	110	14	1.17	12	1.37	7	1.37	12	1.99	14	2.12	23	6.37	16	8.20	16	11.59	18	9.18	16	6.63	12	3.10	15	3.58	176	53.12	
Bush Hall	223	6	2.11	5	1.69	5	1.27	7	2.55	6	2.06	33	5.27	15	9.18	18	14.20	14	11.91	10	7.88	11	4.96	12	4.11	117	67.49	
White Hall	70	11	1.40	6	1.12	3	1.45	9	2.26	13	2.28	16	6.89	17	8.20	14	13.83	14	9.18	17	5.27	11	4.13	15	4.24	146	57.75	
Grassie	..	8	1.62	9	1.65	6	2.19	10	3.36	17	8.87	15	7.08	14	7.15	12	12.27	15	9.62	13	10.25	9	5.58	15	5.42	144	70.07	
Dayrell	..	8	1.23	6	1.34	2	1.48	7	2.27	6	1.49	13	5.60	12	9.18	12	12.49	14	7.54	12	6.92	9	4.30	8	3.15	109	60.45	
Fairfield	..	125	21.15	110	17.15	66	12.40	108	30.21	142	36.97	187	64.56	188	88.91	173	142.66	190	95.46	158	83.34	181	48.63	192	48.39	1767	659.68	
Total	..	1136	1.76	917	1.43	550	1.08	955	2.32	1153	3.03	1558	6.38	1567	7.41	1442	11.89	1583	7.95	1580	7.58	1082	4.07	1600	4.03	15153	58.10	
Average
II.—District B.																												
Christ Church, (Lowlands)	150	9	1.94	6	1.21	6	1.11	6	2.42	8	2.60	10	6.28	11	6.74	6	10.73	12	10.67	8	9.92	7	3.98	8	4.88	97	61.81	
Woodhouse	220	11	1.89	9	1.66	2	1.10	7	1.90	13	3.21	13	4.75	16	6.77	10	10.08	17	7.76	16	10.95	13	3.35	15	4.00	142	55.92	
Leithens	..	9	1.79	4	1.35	4	1.84	8	1.77	9	2.83	10	3.89	14	6.15	10	6.80	14	7.14	12	9.66	10	4.84	9	3.15	113	49.34	
Seawall	254	11	2.12	7	1.76	4	1.16	9	1.84	13	2.97	13	4.76	18	7.21	11	9.61	18	9.33	17	11.43	13	4.82	16	4.00	139	61.09	
Coverley	183	6	2.03	5	1.30	5	1.18	10	3.21	9	2.44	9	5.60	7	6.37	6	12.01	11	7.99	15	12.34	12	4.09	10	5.23	105	63.79	
Hannay	169	10	1.13	5	1.02	3	1.23	10	3.05	16	3.48	14	6.09	16	7.01	18	11.75
Bentley	983	15	1.82	10	1.75	8	1.61	6	2.24	12	3.08	14	4.67	13	6.08	14	10.65	21	8.32	17	8.30	10	4.47	15	4.62	151	54.91	
Saule	870	15	2.34	9	1.69	6	1.45	8	1.69	14	3.58	14	4.85	18	6.70	17	10.56	19	7.31	19	8.45	10	5.31	15	4.68	162	55.58	
Wells	135	12	1.89	10	1.68	4	1.75	7	3.03	15	3.76	16	6.23	20	7.99	14	13.12	16	9.92	16	7.67	15	4.52	16	4.89	161	54.86	
Gibson	..	12	1.89	8	1.53	6	1.27	8	1.44	16	4.72	18	6.23	18	7.31	15	10.13	19	9.14	19	9.92	15	4.52	20	4.61	176	66.88	
Lower Greys	..	11	1.84	12	1.41	5	1.78	8	2.25	12	3.81	18	5.02	15	5.33	15	10.18	16	7.14	18	9.86	11	4.94	14	4.61	155	56.82	
Newton	..	15	2.11	13	1.69	6	1.15	11	2.32	13	3.54	17	4.09	21	6.36	16	10.88	18	5.98	18	10.78	11	5.03	14	5.29	173	60.19	
Barnstye	207	6	1.82	7	5.09	13	3.16	15	8.56
Mayoards	90	10	2.25	4	1.64	5	1.62	6	2.04	17	4.06	16	6.85	20	8.50	16	12.04	18	5.26	19	10.95
Maxwell	60	14	1.05	11	1.62	4	1.49	10	1.95	12	3.13	15	3.85	..	7.33	15	9.67
Army Lodge	..	13	1.98	11	1.05	5	1.49	12	1.60	15	3.85	15	4.07	20	7.33	15	9.67
Hastings	..	7	1.17	7	2.48	10	2.64	13	5.65	10	9.44
Foursquare	..	186	29.46	125	14.49	68	13.53	139	36.22	204	52.85	217	79.45	253	110.56	203	105.70	228	108.41	226	134.80	146	59.56	182	55.23	2177	855.95	
Total	..	1094	1.73	833	1.37	433	1.00	869	2.26	1275	3.80	1856	6.97	1951	6.96	1963	10.36	1629	7.39	1614	9.63	1123	4.58	1400	4.25	14496	57.26	
Average
III.—District C.																												
St. Georges, (Highlands)	531	3	2.20	2	1.55	2	1.17	9	3.88	16	4.19	13	7.06	15	6.46	13	15.35	17	8.13	14	10.15
Drax Hall	720	17	2.69	13	1.21	8	1.71	11	3.36	16	3.83	16	9.20	18	8.57	15	14.18	19	7.18	18	10.51	10	5.30	6	5.98	90	75.62	
Lennon Aboor	..	14	2.17	15	2.25	6	1.94	19	5.37	19	4.12	20	8.55	20	9.16	14	18.08	17	7.46	17	9.70	15	6.24	..	..	185	72.29
Fair View	720	33	2.04	18	2.06	6	1.24	12	6.40	10	4.76	16	10.44	15	8.58	12	14.84	17	10.59	17	10.33	14	7.56	15	6.21	163	69.98	
The Cedars	747	17	2.95	17	1.95	11	1.31	18	6.72	22	5.64	22	11.34	23	12.05	13	16.52	21	9.47	18	11.38	18	8.21	20	8.41	222	84.56	
Groves	637	11	1.44	11	1.12	6	1.23	9	3.24	16	6.67
Monashine	..	21	2.92	13	1.81	8	1.92	19	5.27	22	4.84	17	9.24	20	9.70	17	16.76	20	7.98
Golden Ridge	686	11	3.04	14	2.81	6	1.82	11	4.16	17	4.37	19	9.16
The Hope	..	13	1.25	10	1.05	6	1.36	11	3.19	14	2.93	17	8.07	23	7.07	17	14.99	22	7.65
Woodland	..	120	21.00	111	14.81	64	10.30	129	49.48	163	42.89	149	88.28	142	70.75	118	121.94	144	65.02	131	80.44	169	44.29	108	36.42	1488	67	

BARABOS RAINFALL FROM JANUARY TO DECEMBER, 1893—Continued.

NAME OF STATION.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Totals.			
	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.		
II.—District B.—contd.																												
St. George.	17	2.23	16	2.54	7	1.45	13	3.61	15	3.98	19	5.93	16	6.32	11	11.68	18	9.97	20	10.86	13	4.98	13	4.06	178	66.85		
District B. (Lowlands.)
Carmichael.	11	2.33	8	1.61	7	2.11	9	3.28	11	3.54	13	5.29	11	6.47	16	13.63	14	10.03	16	11.27	14	4.99	12	5.37	121	61.77		
Constant.	194	11	2.22	9	2.06	6	1.72	11	3.54	14	5.36	20	6.61	22	7.35	16	13.33	10	9.39	20	13.44	16	6.73	21	4.04	187	79.75	
The Valley.	163	16	2.32	12	1.61	11	1.36	7	3.23	11	3.36	12	8.76	15	7.75	10	13.48	17	8.35	19	10.59	13	5.33	22	5.54	161	71	
Brighton.	14	2.31	12	1.81	7	1.7	14	3.51	15	4.24	17	6.94	15	6.88	6	13.18	20	10.07	15	9.51	13	4.78	18	4.22	167	67.72		
Total.	65	11.31	65	9.63	38	8.01	54	17.16	56	17.44	81	33.47	79	35.27	65	61.35	90	47.21	90	54.63	68	25.81	86	21.73	817	348.02		
Average.	13.00	2.36	11.00	1.93	7.60	1.60	10.80	3.43	14.00	4.36	16.20	6.68	15.80	7.05	11.00	13.27	18.00	9.44	18.00	10.03	13.60	5.16	17.20	4.34	167.20	69.46		
III.—District C.																												
St. Philip.	16	2.09	10	1.11	9	.87	15	4.02	17	3.62	21	8.17	20	7.20	14	12.84	19	6.59	18	10.23	14	6.16	22	3.97	194	65.16		
District C. (Highlands.)
Cliffden.	18	2.39	9	1.37	8	.88	12	4.69	15	2.93	21	6.71	24	10.23	17	14.63	22	6.93	19	9.22	17	7.80	25	5.13	211	78.82		
Hill View.	11	2.06	11	1.92	7	.60	10	3.73	15	2.93	21	6.71	18	7.76	16	13.14	18	6.79	19	8.69	15	6.04	23	4.27	184	64.04		
Total.	44	7.94	30	3.80	24	1.85	37	12.35	49	8.91	65	26.36	62	25.21	47	40.67	59	30.11	56	29.14	46	18.99	70	13.97	689	207.82		
Average.	14.66	2.35	10.00	1.26	8.00	.62	12.33	4.12	16.33	2.97	21.66	8.79	20.69	8.40	15.67	18.57	19.67	6.70	18.67	9.38	15.33	6.66	23.83	4.45	196.22	69.28		
Sr Patrick (Lowlands.)																												
Bayreys.	7	1.04	6	.79	3	.7	7	3.03	14	2.89	19	6.10	16	5.76	10	11.81	15	6.07	18	9.76	18	9.76	9	4.87	13	2.01	138	54.20
Mappe.	8	1.45	7	1.32	5	.55	9	2.31	14	2.45	16	6.38	18	6.90	10	10.78	18	7.87	20	10.90	14	4.10	21	2.56	180	56.07		
Golden Grove.	13	1.66	10	.83	6	.29	12	2.38	16	3.04	18	7.38	18	7.48	13	13.52	19	6.00	21	10.92	16	5.06	19	3.00	168	55.81		
Willshires.	10	1.66	6	1.12	3	.26	8	3.10	16	2.79	15	7.28	15	7.41	13	13.52	11	6.00	16	9.72	12	6.06	18	3.00	139	61.80		
Three Houses.	135	8	1.69	4	1.00	4	.38	8	3.04	14	3.03	16	7.62	15	7.53	12	12.84	11	5.33	19	8.66	10	5.77	12	3.26	132	60.99	
Sandy Hill.	125	11	1.43	9	1.02	2	.37	10	2.72	10	2.19	18	5.26	19	6.79	11	8.18	14	6.29	15	11.10	10	3.21	14	3.25	138	53.01	
Kirron.	74	14	1.43	13	.98	4	.34	10	3.51	18	3.20	17	6.70	23	9.69	16	9.86	20	7.09	19	12.18	15	4.15	16	4.67	180	62.79	
Fortescue.	150	6	1.58	6	.90	7	.67	7	2.70	12	2.81	15	7.75	16	7.47	13	11.42	15	6.31	14	8.61	14	4.49	16	4.39	125	49.42	
Thicket.	249	9	1.95	4	1.14	3	.45	9	3.18	12	2.98	14	7.11	15	7.83	8	12.95	10	6.60	12	7.02	8	6.03	10	3.76	114	61.00	
Congo Road.	161	13	1.97	12	1.32	8	.39	11	3.05	15	3.08	17	6.37	20	7.36	13	10.68	23	7.86	20	8.43	13	3.27	21	5.53	186	68.03	
Bushy Park.	119	9	1.94	10	1.27	4	.52	10	3.43	12	3.08	12	5.78	12	5.92	10	9.27	20	7.91	18	9.53	19	3.29	14	2.49	138	52.88	
Senhouse Grove.	105	9	1.54	10	1.51	3	.44	10	3.43	11	3.77	16	6.72	14	7.63	15	10.22	18	7.22	16	9.80	12	8.68	15	3.92	152	66.17	
Oughersons.	291	14	1.63	8	1.00	6	.39	10	3.94	15	2.45	21	7.05	18	7.02	11	12.22	22	6.98	22	8.93	15	5.45	24	3.72	186	60.04	
Dooble.	13	1.66	10	1.33	7	.87	13	3.83	15	2.72	20	6.77	20	8.05	17	11.32	22	6.72	21	7.42	15	4.23	21	3.60	194	68.19		
Sunbury.	7	1.43	10	1.06	6	1.00	8	3.31	13	3.77	14	6.44	15	7.87	11	11.44	11	8.16	17	6.59	12	3.77	19	3.68	148	58.94		
Hampton.	8	1.33	7	1.18	5	.83	8	3.31	13	3.23	16	6.60	16	7.28	9	10.41	17	6.69	18	7.69	14	4.14	15	4.61	148	58.38		
Carringtons.	110	8	1.57	9	1.55	7	2.25	10	4.93	11	3.68	10	6.09	11	9.79	12	12.11	15	7.36	15	9.68	14	4.14	14	4.30	104	52.12	
Chapel.	228	14	2.38	10	2.14	7	.95	10	4.93	11	3.68	16	8.21	11	9.79	12	14.51	16	7.39	13	7.39	15	6.98	12	3.79	149	71.59	
Hilton.	264	17	1.61	17	1.60	9	.76	15	3.93	20	3.12	23	5.66	26	7.23	16	14.38	23	7.40	22	8.04	19	4.67	24	3.17	231	61.39	
Edgewaunbe.	207	8	1.60	9	1.57	5	1.62	10	3.78	12	3.81	10	6.31	10	6.37	11	10.24	21	9.01	16	10.94	15	3.99	16	4.29	153	60.55	
Foursquare.	12	1.61	12	1.01	9	.58	12	2.76	14	2.32	17	6.09	23	8.03	15	10.52	24	7.74	21	11.26	14	3.63	17	4.64	162	60.85		
Summerville.	13	1.66	10	1.14	5	.39	12	3.63	15	2.46	22	7.23	21	7.57	13	11.96	19	6.54	21	8.20	15	4.90	17	3.13	183	58.73		
Marshallfield.	13	1.47	12	1.43	7	1.14	11	3.97	16	4.43	17	6.55	18	7.72	10	11.12	19	7.72	19	6.87	14	3.80	16	3.60	173	60.28		
Bayfield.	8	1.47	7	.89	6	.48	8	2.72	13	3.04	20	8.02	14	7.50	9	10.78	13	5.90	12	7.29	12	4.74	10	3.56	131	56.43		
Total.	257	39.78	220	29.75	131	16.74	236	80.62	338	79.14	415	167.46	420	179.50	803	269.36	443	174.28	442	224.18	301	102.81	391	89.52	897	747.05		
Average.	10.28	1.69	8.80	1.19	5.24	.67	9.44	3.22	13.62	3.17	16.60	6.93	17.50	7.45	12.12	11.37	17.72	6.97	17.68	8.97	13.09	4.47	15.64	3.56	157.68	59.57		

BARRADOS RAINFALL, FROM JANUARY TO DECEMBER, 1933—continued.

NAME OF STATION.	Elevation.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Totals.	
		Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.
III—District C.—Contd.																											
St. John.																											
(Highlands.)																											
Stewart Hill	530	7	1.49	5	1.70	2	.49	5	2.88	11	3.95	10	7.24	13	7.23	11	14.03	13	6.20	19	9.76	14	5.45	14	5.20	132	63.91
Monterede	652	10	1.65	9	1.27	7	.67	11	3.94	18	3.01	16	7.59	18	6.88	15	13.16	15	5.72	17	8.02	17	6.29	16	4.63	173	62.23
Society	538	9	2.02	4	.41	6	.80	11	3.96	15	8.29	14	7.37	19	8.77	17	4.04	16	6.97	18	11.62	15	5.33	13	5.33	158	69.69
Quince	584	14	3.13	14	1.75	10	1.06	10	4.81	19	3.69	24	9.35	22	8.08	17	19.07	23	7.19	23	8.81	17	6.03	23	3.82	230	73.38
Cliff	767	13	2.86	12	1.32	8	1.00	13	4.17	16	4.7	22	10.25	15	8.55	16	16.21	20	9.20	19	10.76	17	6.89	20	7.05	197	84.36
Colleton	666	16	2.43	11	1.20	7	.95	11	4.53	14	4.41	17	8.13	16	9.37	12	16.78	17	8.19	19	13.06	14	5.69	20	7.05	176	82.18
Ashford	716	16	3.62	9	1.50	6	.51	14	4.73	16	6.13	18	8.70	20	8.23	14	13.83	19	7.15	18	8.83	17	4.87	18	6.44	181	71.03
Henley	641	8	2.31	10	1.70	6	1.44	5	4.21	10	3.51	14	10.38	13	8.52	12	15.08	15	8.63	16	10.07	16	5.08	21	6.98	180	80.53
Todd's	702	12	2.86	6	.90	4	.87	10	4.70	17	5.01	22	11.81	18	10.15	16	16.45	23	8.39	19	11.93	14	5.21	17	6.62	141	76.81
Chilton Hall	743	12	3.07	14	1.96	3	.51	10	4.07	14	3.37	16	7.71	16	8.48	13	13.58	17	7.80	15	8.94	11	4.63	14	6.42	151	72.59
Rothersall	707	15	2.88	14	1.75	6	.83	11	4.49	22	5.02	25	8.80	20	7.69	13	12.51	22	9.24	22	12.41	31	5.00	23	7.36	214	78.13
Haynesfield	900	13	3.21	12	1.45	8	1.02	13	4.70	15	5.62	19	8.12	17	7.81	15	11.18	22	8.44	15	9.11	12	5.46	15	6.76	182	72.20
Malvern	900	7	2.83	5	1.94	4	1.48	10	5.37	13	3.61	18	9.97	12	8.86	15	17.02	17	7.67	15	9.11	12	6.29	13	6.01	136	80.10
Kendal	900	7	2.83	5	1.94	4	1.48	10	5.37	13	3.61	18	9.97	12	8.86	15	17.02	17	7.67	15	9.11	12	6.29	13	6.01	136	80.10
Total	...	135	39.64	150	20.07	96	14.76	168	65.42	230	67.40	255	130.49	294	125.91	313	216.26	283	117.04	265	145.61	228	88.52	266	95.00	25.93	1128.91
Average	...	12.33	2.64	10.00	1.34	6.40	.98	11.29	4.36	15.33	4.47	17.00	8.70	16.33	8.39	14.20	14.42	18.87	7.86	17.67	9.71	15.20	5.90	17.73	6.34	17.86	75.05
IV—District D.																											
St. John																											
(Lowlands)																											
College	...	10	1.77	4	.68	5	.65	7	2.40	9	2.74	9	5.39	11	5.87	9	10.70	18	5.34	13	6.64	9	2.64	10	2.95	109	47.65
Newcastle	288	12	2.20	2	.20	5	.91	13	3.13	18	2.66	21	8.09	18	3.09	16	11.77	25	7.44	22	11.92	19	4.33	19	5.69	190	66.43
Total	...	22	4.05	6	.88	10	1.54	20	5.53	27	5.30	30	13.48	29	13.96	25	22.47	36	12.66	35	18.56	28	6.97	29	8.64	299	114.07
Average	...	11.00	2.03	3.00	.44	5.00	.77	10.00	2.77	13.50	2.65	15.00	6.74	14.50	6.98	12.50	11.23	19.00	6.34	17.50	9.28	14.00	3.48	14.50	4.32	149.50	57.03
IV—District D.																											
St. Thomas																											
(Highlands)																											
Mount Wilton	997	16	3.95	10	1.37	7	1.23	12	4.17	18	4.55	19	8.98	20	8.75	13	11.08	18	9.38	17	9.94	18	7.11	17	6.32	185	76.23
Bleasbury	1,035	16	8.70	11	2.10	5	1.24	9	5.19	15	6.07	15	9.76	18	13.27	10	13.32	16	11.50	17	10.60	15	7.47	16	7.79	161	61.71
Surges	905	20	4.21	19	2.44	10	2.06	17	6.89	22	6.31	23	11.84	27	13.24	17	13.19	23	12.02	18	12.49	20	8.98	21	9.02	237	102.79
Westwood	1,002	15	4.10	13	2.15	8	2.04	10	5.74	14	6.14	18	11.78	22	13.30	14	12.98	20	10.76	16	12.44	18	7.42	19	7.72	187	95.65
Lion Castle	1,800	19	3.72	19	2.25	10	1.74	14	6.00	19	5.66	19	11.52	25	14.95	18	13.58	22	12.07	19	15.08	21	6.60	23	8.92	228	101.69
Canefield	1,024	13	3.81	11	1.82	7	1.09	12	4.06	13	5.67	14	8.02	20	14.26	14	13.67	17	14.89	16	15.01	19	7.72	16	6.98	172	98.69
Duncombe	860	20	6.13	15	3.16	10	1.30	16	7.32	18	7.44	22	9.97	24	16.32	14	18.33	19	15.92	16	18.18	11	7.51	19	9.35	208	114.53
Farmers	903	14	3.89	12	2.59	5	1.06	11	5.97	13	6.29	16	7.44	18	16.82	13	12.79	17	14.94	19	20.49	12	9.48	17	7.84	167	107.90
Dukes	817	15	3.14	14	2.18	8	1.55	10	6.13	14	5.06	19	9.39	23	16.71	15	9.74	19	12.41	16	19.97	11	8.48	22	9.40	191	93.89
District D.	678	20	3.81	18	2.35	10	1.67	14	5.85	18	5.06	22	10.82	26	11.96	17	12.23	23	12.44	20	17.04	23	7.10	21	7.74	236	97.41
Ashford	...	18	4.03	16	1.56	11	1.97	13	5.98	21	5.75	22	10.46	24	11.11	18	13.30	21	10.23	21	13.00	22	7.32	23	8.63	230	93.64
Grand View	...	13	2.57	14	1.91	8	1.56	14	3.79	18	3.16	17	6.03	21	6.80	15	9.74	16	9.24	17	12.81	15	5.23	17	6.30	177	68.64
Mangrove Pond	...	13	3.22	18	1.91	8	1.51	10	5.49	10	5.11	20	9.01	22	9.91	19	11.50	20	12.78	20	16.22	17	4.17	20	5.80	192	88.33
Total	...	212	49.22	185	27.91	108	20.02	161	74.67	206	72.80	247	133.92	290	157.84	197	160.85	249	158.38	282	190.77	228	94.54	264	100.81	25.68	1231.13
Average	...	16.31	3.79	14.23	2.15	8.81	1.54	12.86	5.74	16.85	6.60	19.00	9.63	22.81	12.14	16.15	12.33	19.15	12.31	17.85	14.67	17.54	7.37	19.54	7.76	197.62	94.72

BARBADOS RAINFALL FROM JANUARY TO DECEMBER, 1884.—continued.

NAME OF STATION.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Totals.			
	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.				
(a) St. Thomas.																												
(Lowlands)																												
Fisher Pond	17	5.56	12	1.80	8	1.25	11	5.09	16	5.34	15	9.71	20	9.88	10	13.80	17	8.19	19	9.16	16	6.92	17	6.71	178	81.31		
Bassie Park	15	4.08	6	1.32	7	1.69	9	5.01	17	5.09	17	11.31	20	12.15	13	18.29	16	8.15	20	8.96	18	8.93	23	8.64	181	88.02		
Olivo Branch	10	4.97	12	2.34	8	2.15	7	6.19	27	6.69	16	10.00	19	11.42	16	16.33	22	5.95	23	9.47	18	7.25	14	7.17	170	79.20		
Salmans	11	3.63	15	2.20	9	1.45	17	6.18	21	5.94	21	11.55	21	12.33	15	16.33	22	8.77	22	10.17	18	7.71	25	7.96	217	93.04		
Chilton	9	2.52	10	1.08	5	1.32	15	5.19	15	5.26	21	9.89	23	10.41	17	13.25	15	7.50	19	7.69	20	6.53	20	5.98	184	78.19		
Loxwell	12	2.95	15	1.62	8	2.21	16	5.15	13	4.26	26	6.31	28	9.71	16	13.76	22	9.43	23	12.51	18	7.41	24	7.57	221	82.90		
Edgill	453	6	2.48	2	1.18	2	2.25	6	3.97	7	3.82	6	7.46	7	12.59	11	9.96	8	10.35	11	9.96	8	6.99	9	5.98	177	72.01	
Welch	398	18	2.33	12	1.29	7	1.17	13	3.65	12	3.10	15	5.65	21	7.46	17	9.88	16	11.35	12	4.63	19	6.43	173	67.22			
Bennets	350	15	2.53	17	2.01	8	1.78	8	4.61	18	5.27	20	10.77	25	11.19	15	15.18	19	15.86	18	18.20	22	6.00	23	5.10	216	101.00	
Dugatillo	...	19	2.68	15	1.74	7	.89	12	5.23	14	4.11	17	8.10	23	8.22	14	10.36	18	11.92	15	13.64	16	5.67	24	6.89	194	79.45	
Total	...	132	31.63	116	16.47	69	16.19	113	49.23	160	43.91	174	93.04	205	99.83	118	14.72	170	96.81	186	111.66	163	67.89	200	71.09	1,805	316.84	
Average	...	13.22	3.16	11.60	1.64	6.30	1.63	11.30	4.33	16.00	4.99	17.40	9.30	20.50	9.98	13.11	12.75	17.00	9.68	18.60	11.17	16.20	6.77	23.00	7.11	181.83	82.95	
(b) St. James.																												
(Highlands)																												
Spring Head	880	13	3.07	11	2.20	6	1.98	13	5.23	14	4.38	17	6.78	23	13.48	13	11.01	15	14.13	18	22.90	15	10.50	14	6.69	172	101.76	
Tattle	684	15	4.32	13	2.36	9	2.33	12	6.16	13	5.50	14	7.32	21	17.87	15	13.06	18	17.28	20	20.23	14	7.95	19	6.20	182	110.22	
Ston Hill	618	16	3.61	13	1.99	9	1.45	13	5.63	13	3.96	20	6.29	22	15.46	18	11.33	20	15.83	22	18.99	16	6.90	20	5.41	202	97.15	
Total	...	44	11.00	37	6.65	24	5.76	38	17.32	39	13.84	51	20.89	66	40.51	45	38.34	53	47.24	60	62.12	46	25.35	53	17.00	536	309.12	
Average	...	14.67	3.67	12.35	2.22	8.00	1.92	12.67	5.77	13.00	4.61	17.00	6.80	22.00	15.56	15.00	11.78	14.33	15.75	20.00	20.71	15.35	8.45	17.67	6.87	183.06	103.95	
(c) St. James																												
(Lowlands)																												
Howers	...	15	9.04	17	2.20	5	1.87	12	6.17	18	5.62	17	9.29	18	12.46	19	10.80	19	14.82	16	17.93	14	4.08	19	5.88	175	94.09	
Westmoreland	332	15	2.34	9	1.63	7	1.91	9	4.53	12	3.75	12	4.68	21	10.70	14	8.22	20	10.72	15	17.34	17	6.92	16	4.91	167	73.98	
Carlton	130	19	3.39	14	2.03	9	1.81	15	5.48	15	4.01	16	6.65	22	12.78	15	9.45	22	11.84	22	14.98	21	5.90	25	5.47	215	89.66	
Trenis	...	11	1.41	19	1.69	7	1.38	8	4.04	7	3.42	11	5.23	16	9.67	12	8.47	18	10.79	13	13.54	12	6.82	14	5.36	52	19.04	
Mount Standish	198	11	2.04	10	1.56	5	1.36	7	4.23	11	4.41	11	5.23	20	11.73	13	9.98	16	12.20	14	14.77	15	7.91	17	6.40	140	72.50	
Porters	...	14	2.38	12	2.01	6	1.10	11	5.38	13	5.32	13	7.64	20	11.73	13	9.98	16	12.20	14	14.77	15	7.91	17	6.40	164	85.47	
Hole Town Police Station	...	15	1.77	9	1.29	6	1.24	13	2.90	14	4.42	17	6.60	20	11.11	11	10.14	20	11.19	13	12.14	18	7.68	20	5.23	176	75.61	
St. Slias Vicarage	...	15	2.84	11	2.13	10	1.83	10	5.72	14	5.65	20	8.16	23	13.69	14	9.50	16	10.93	16	10.40	18	7.13	18	5.95	133	70.85	
Plum Tree	178	104.74
Total	...	155	19.05	101	14.54	63	12.80	98	44.49	114	43.72	139	58.90	174	100.37	110	78.25	149	96.49	115	119.51	116	45.61	129	41.41	1,408	674.15	
Average	...	14.37	2.25	12.62	1.82	6.59	1.42	10.89	4.94	12.67	4.75	16.25	7.36	20.50	12.51	13.75	9.73	18.62	12.06	16.44	14.94	16.67	6.52	18.44	6.92	176.01	84.43	

BARBADOS RAINFALL FROM JANUARY TO DECEMBER, 1893—Continued.

NAME OF STATION.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Totals.			
	Feet.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	
V.—DISTRICT N.																												
a. St. Peter.																												
(Highlands.)																												
Nicholas Alley	824	13	2.61	6	8.0	6	9.2	10	2.83	12	4.82	17	6.82	16	10.92	12	10.02	21	14.50	14	9.41	16	4.08	13	3.02	156	70.38	
Oxford	436	8	2.27	5	3.9	5	4.66	13	2.25	10	5.65	13	5.68	18	11.52	16	10.88	14	12.76	18	10.72	18	3.88	21	1.53	188	68.38	
Orange Hill	...	14	2.76	10	1.37	10	1.76	19	3.64	14	5.09	19	6.11	23	13.99	12	10.25	18	11.72	23	14.95	16	7.52	14	4.76	186	83.92	
Rock Hill	...	13	3.59	11	2.04	9	2.70	11	5.74	13	9.69	15	13.50	19	19.29	12	14.21	19	20.11	24	23.27	13	12.38	19	4.45	178	130.93	
Mangrove	...	11	3.90	7	1.83	7	1.63	12	4.91	18	5.73	17	8.80	20	15.65	12	11.12	19	16.46	21	17.06	11	9.80	11	4.73	161	100.11	
Black Bass	581	11	2.79	6	1.37	6	2.20	6	4.80	9	4.99	13	7.29	13	17.13	11	10.61	15	16.42	13	14.29	9	7.16	9	4.67	120	93.75	
The Castle	...	11	2.89	6	1.10	6	9.5	11	3.6	11	6.43	12	7.20	19	13.38	12	12.76	18	13.91	16	11.44	15	4.70	16	3.95	139	81.72	
Total	...	81	20.51	51	8.60	49	10.82	76	27.03	82	42.40	104	54.90	128	101.83	87	79.83	124	105.88	129	101.15	98	48.89	103	27.10	1112	629.04	
Average	...	11.67	2.93	7.29	...	7.00	1.55	10.86	3.80	11.71	6.06	14.80	7.84	18.29	11.40	12.43	11.40	17.71	16.18	15.43	14.45	14.00	6.88	14.71	3.87	158.86	80.86	
b. St. Peter.																												
(Lowlands.)																												
Whitehall	...	14	3.47	7	1.23	7	1.50	7	4.28	11	6.95	9	6.75	17	13.56	3	6.30	9	10.57	11	19.50	5	7.45	8	2.47	108	75.84	
Alfeyredale	...	19	4.24	6	7.9	3	7.2	11	2.67	11	4.13	10	5.34	21	12.18	13	9.86	14	12.06	13	13.04	11	4.80	16	3.88	149	71.99	
Bakers	...	389	5	1.62	5	7.8	6	1.55	6	3.73	9	3.73	7	5.23	19	13.46	7	9.21	14	12.00	15	10.52	10	5.87	16	3.30	163	71.18
Maynards	...	69	13	2.15	8	1.08	6	1.05	10	2.68	15	5.17	17	2.72	20	11.21	15	9.21	24	13.68	21	16.32	19	9.33	22	5.89	220	83.54
District E.	...	150	17	3.71	15	1.44	10	3.74	12	3.74	15	4.34	25	5.69	25	13.06	17	4.47	22	19.80	27	12.64	10	7.83	19	3.77	162	71.74
Anthon Hall	...	13	3.56	8	5.4	7	1.23	7	2.72	12	4.40	15	4.58	19	10.59	12	7.85	23	12.61	17	10.36	11	4.19	14	1.75	168	65.37	
Six Moss	...	14	2.48	6	1.06	6	3.3	11	3.03	13	4.70	11	3.26	21	10.98	16	7.83	16	12.27	12	11.66	10	5.21	15	3.71	152	67.29	
Haywards	...	11	2.20	6	7.7	2	7.6	10	3.23	11	4.61	11	6.84	13	9.10	8	7.63	10	13.27	12	11.66	10	5.88	13	4.65	141	77.22	
Gables	...	12	2.20	11	1.15	7	1.12	8	4.55	7	3.13	10	5.99	18	12.90	13	8.32	19	11.72	15	15.12	10	6.88	13	4.65	141	77.22	
Total	...	112	20.68	74	9.49	54	10.84	82	28.75	102	40.77	118	51.50	173	167.36	132	73.61	139	111.65	150	110.96	92	56.65	132	31.89	1632	638.61	
Average	...	12.44	2.39	8.22	...	6.99	1.59	9.11	3.19	11.55	4.83	13.11	5.72	19.22	11.92	11.33	8.18	17.67	12.41	16.67	12.38	10.22	6.18	11.47	3.54	179.2	72.54	
b. St. Lucy.																												
(Lowlands.)																												
Lambert	...	11	1.80	5	7.5	7	6.3	13	2.82	11	5.97	15	5.91	22	11.84	17	11.82	21	9.52	16	9.40	10	3.03	22	2.75	170	65.69	
Mount Gay	...	12	2.39	6	1.12	5	5.6	10	3.55	10	5.79	15	8.03	19	14.01	12	11.67	20	16.30	17	12.38	11	6.33	15	3.94	151	87.38	
Pickneys	...	14	3.27	7	1.49	5	1.05	10	3.35	10	6.84	10	7.16	21	14.61	12	13.95	14	14.48	17	10.48	11	6.94	13	3.89	156	86.41	
Spring Hall	...	71	11	2.01	10	1.09	6	3.1	13	3.79	12	3.69	15	5.05	22	9.10	12	9.77	18	9.68	17	7.18	10	5.22	13	2.48	159	58.59
Hope	...	15	2.57	8	8.1	3	5.8	13	3.91	15	2.88	18	6.22	21	10.44	14	12.66	14	8.7	17	8.40	12	4.21	14	3.17	151	64.16	
Harrison	...	12	1.91	11	8.8	4	5.0	12	3.51	8	4.57	11	6.95	23	13.63	8	10.02	13	13.13	17	10.90	10	6.50	16	3.79	147	74.43	
Lowlands	...	8	1.48	5	7.8	2	7.1	7	3.13	11	4.65	11	6.61	16	10.53	8	11.81	14	10.53	15	17.74	12	5.57	10	2.89	122	68.18	
Total	...	89	16.52	52	6.86	34	4.57	77	21.82	75	33.09	103	44.93	144	84.18	85	83.14	129	81.66	117	98.45	76	36.11	103	22.16	1039	502.79	
Average	...	11.86	2.22	7.43	...	4.86	1.05	11.00	3.12	10.71	4.73	14.71	6.42	20.56	13.03	12.14	11.92	17.14	11.67	16.71	9.75	10.86	5.16	14.71	3.17	153.69	71.85	

BARRADOS RAINFALL FROM JANUARY TO DECEMBER, 1894—continued.

NAME OF STATION.	Elevation.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.		Totals.	
		Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.
VI.—Diermot E.																											
<i>a.</i> St. Joseph.																											
(Highlands.)																											
Buckden.....	1,630	14	3.96	14	4.57	18	5.52	23	8.87	22	9.83	15	11.35	17	7.03	18	7.34	18	7.34	16	6.80	16	6.80	24	8.21	202	75.09
Little Island.....	910	21	3.58	18	4.42	16	5.28	24	8.96	25	11.08	17	12.89	24	7.75	18	8.89	21	9.26	22	7.22	21	6.98	21	6.98	210	78.83
Blackmans.....	960	18	4.07	17	4.93	19	6.01	24	9.81	25	10.56	17	12.79	25	8.69	21	8.70	23	8.70	24	7.77	23	7.77	24	8.47	240	85.25
Castle Grant.....	1,079	15	2.71	15	3.90	18	4.75	21	8.11	21	11.12	13	11.18	18	7.49	18	8.35	20	8.35	20	6.21	20	6.21	16	6.64	192	72.64
Andrews.....	780	16	3.68	13	1.85	17	5.96	18	6.72	21	12.90	21	16.15	22	8.75	20	9.35	20	9.35	20	7.79	20	7.79	32	7.79	215	92.67
Learmings.....	1,040	13	3.32	6	1.40	5	1.39	8	4.57	14	7.87	14	11.72	14	11.58	23	8.78	15	10.25	18	7.83	16	7.83	16	7.83	157	77.75
Retreat.....	1,040	16	3.57	10	1.18	8	1.88	12	9.18	13	7.00	15	11.25	15	11.11	16	14.31	18	9.26	22	8.74	21	9.46	25	10.81	196	94.03
Total.....		132	28.61	106	11.95	62	10.41	111	38.11	131	48.33	164	76.68	170	86.75	136	101.73	165	65.94	158	71.43	189	89.76	170	69.77	1640	601.66
Average.....		16.50	3.60	13.25	1.49	7.75	1.30	10.87	4.77	16.87	5.79	20.50	9.68	21.25	10.84	15.75	12.71	20.82	8.24	19.13	8.93	19.88	7.47	21.25	7.97	206.12	82.69
a. St. Joseph.																											
(Highlands.)																											
Hillswick.....		14	1.69	8	7.4	8	4.5	16	2.92	16	3.62	15	6.16	21	8.08	17	9.00	20	10.67	20	9.66	19	4.01	19	4.01	183	61.77
Spainsfield.....		11	1.94	10	1.37	7	9.4	11	3.85	16	4.23	15	5.81	19	9.07	16	9.64	19	11.48	18	8.68	15	6.01	18	5.98	177	70.81
Frizers.....		16	8.44	10	1.58	6	1.03	14	4.93	16	5.69	14	8.14	20	11.27	16	16.48	18	8.83	15	9.43	14	6.61	14	4.25	179	81.74
Mallows.....		14	3.12	10	1.44	8	1.18	13	3.47	15	3.60	16	5.38	20	9.24	14	10.52	19	6.93	15	9.42	14	4.82	12	5.06	174	63.19
Bessix Hill.....		11	3.41	10	1.43	6	1.62	9	3.47	9	3.04	13	4.61	18	9.56	15	9.98	19	11.61	18	12.76	13	6.05	14	6.13	155	72.27
District F.....		14	1.80	8	1.52	6	1.02	11	3.74	15	3.15	18	5.18	20	8.27	18	9.83	20	7.92	20	11.05	15	5.59	19	5.68	180	64.67
Parks.....		11	3.21	7	1.52	7	1.25	12	5.80	14	4.48	19	7.62	21	11.01	16	11.20	19	9.95	19	11.81	17	7.13	18	7.61	183	81.39
Sps.....		14	3.38	8	1.66	6	1.10	11	4.80	12	5.78	17	6.73	19	13.80	14	12.22	20	10.75	20	12.75	20	6.41	21	9.46	182	88.08
Total.....		108	20.08	71	11.36	54	7.53	97	32.68	114	33.89	137	49.68	158	80.39	121	88.57	154	76.77	150	88.35	184	47.56	135	48.59	1423	584.80
Average.....		13.50	3.51	8.89	1.41	6.75	1.41	12.13	4.08	14.25	4.19	15.89	6.20	19.75	10.05	15.12	11.08	19.25	9.60	18.75	11.04	16.75	5.94	16.80	6.07	177.91	73.03
a. St. Andrew.																											
(Highlands.)																											
Gregg Farm.....		16	2.57	10	1.30	6	7.9	11	3.54	16	4.07	18	5.42	23	11.72	17	11.02	20	13.48	20	19.55	18	9.34	20	7.11	193	89.81
Swans.....		10	1.69	9	1.29	6	9.3	10	3.33	13	8.26	15	5.48	22	11.62	14	13.08	23	12.01	23	19.29	14	6.08	16	4.46	173	82.84
Total.....		26	4.16	19	2.59	12	1.72	21	6.87	29	7.33	33	10.90	45	23.34	31	24.11	43	29.65	43	38.84	32	15.42	36	11.57	373	172.75
Average.....		13.00	3.08	9.50	1.25	6.00	1.86	10.60	3.43	14.50	3.65	16.50	5.45	22.80	11.67	15.50	12.05	21.90	23.99	21.50	19.42	16.00	7.71	18.05	5.78	185.06	
a. St. Andrew.																											
(Lowlands.)																											
Barkers.....		10	2.43	7	1.71	6	1.02	5	3.10	10	5.69	9	5.42	16	10.57	9	13.42	15	9.77	9	13.88	12	5.51	10	4.73	118	77.04
Spring Vale.....		12	3.79	9	1.65	7	9.4	10	4.35	12	4.44	16	5.65	19	13.97	12	13.68	16	13.97	16	12.87	16	6.29	14	6.36	158	86.11
Total.....		22	6.22	16	3.36	13	1.96	15	7.45	22	10.13	25	11.07	35	24.54	21	27.07	31	22.74	25	26.23	27	11.80	24	11.08	276	163.15
Average.....		11.00	3.11	8.00	1.67	6.50	1.98	7.50	3.72	11.00	5.65	12.60	5.53	17.50	11.77	10.50	13.28	15.60	11.37	12.20	13.12	13.50	5.90	12.00	5.79	138.06	

SUMMARY OF BARBADOS RAINFALL FROM JANUARY TO DECEMBER, 1888.

NAME OF STATION.	No. of Stations	January		February		March		April		May		June		July		August		September		October		November		December		Totals.	
		Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.
I.—District A. St. Michael (Lowlands.)	12	11-36	1-76	9-17	1-48	5-50	1-03	9-65	2-52	11-83	3-05	15-58	5-38	15-57	7-41	14-42	11-89	15-79	7-36	15-80	7-58	10-82	4-07	16-00	4-43	161-53	58-10
II.—District B. Christ Church (Lowlands.)	17	10-94	1-73	8-33	3-97	4-53	3-90	8-69	2-36	13-75	3-30	13-56	4-07	15-81	6-91	12-69	10-36	16-29	7-39	16-14	9-63	11-23	4-58	14-00	4-25	144-96	78-25
St. George (Highlands)	10	18-83	3-33	18-33	1-65	7-11	1-14	12-90	4-05	16-20	4-29	16-56	9-25	17-75	8-84	14-75	15-24	18-00	8-25	16-97	10-05	15-56	6-33	17-17	6-07	178-13	78-09
St. George (Lowlands.)	5	18-00	2-28	11-00	1-03	7-60	1-60	10-80	3-43	14-00	4-36	16-20	6-69	15-80	7-90	11-00	12-27	18-00	9-44	18-00	10-93	13-60	5-16	17-20	4-94	166-20	69-46
III.—District C. St. Philip (Highlands)	3	14-66	2-55	10-00	1-26	8-00	6-2	12-33	4-12	16-33	3-97	21-66	8-79	20-67	8-40	15-67	13-57	19-67	6-70	18-67	9-38	15-33	6-66	23-33	4-46	166-32	69-23
St. Philip (Lowlands.)	25	10-28	1-59	8-20	1-19	5-24	3-7	9-44	3-22	18-32	3-17	16-60	6-69	17-50	7-48	12-12	11-57	17-72	6-97	17-68	8-97	13-09	4-47	15-64	3-58	157-68	69-57
St. John (Highlands)	15	12-38	2-64	10-00	1-34	6-46	9-8	11-20	4-35	15-33	4-47	17-00	8-70	16-98	8-39	14-20	14-42	18-87	7-80	17-67	9-71	15-20	6-90	17-13	6-84	172-86	75-05
St. John (Lowlands)	2	11-60	2-03	3-00	4-4	5-00	7-7	10-00	2-77	13-50	2-65	15-30	6-74	14-50	6-88	12-50	11-23	19-00	6-84	17-50	9-28	14-00	3-49	14-60	4-32	149-50	57-03
IV.—District D. St. Thomas (Highlands)	13	16-31	3-79	14-23	2-15	8-31	1-54	12-38	5-74	15-65	5-60	10-00	9-69	22-31	12-14	16-15	12-33	19-15	12-21	17-56	14-67	17-84	7-37	19-54	7-75	197-62	94-72
St. Thomas (Lowlands)	10	13-29	3-10	11-60	1-64	6-90	1-62	11-30	4-93	16-00	4-89	17-40	9-30	20-50	9-98	13-11	12-75	17-00	9-63	18-60	11-17	16-80	6-77	30-00	7-11	181-83	83-95
St. James (Highlands)	3	14-97	3-57	12-35	2-22	8-00	1-92	13-67	3-77	18-00	4-61	17-00	6-80	22-00	15-60	15-00	11-78	14-38	15-75	30-00	30-71	16-38	8-45	17-67	5-67	162-00	138-05
St. James (Lowlands)	9	14-37	2-38	12-62	1-82	6-80	1-42	10-89	4-94	12-67	4-75	16-25	7-36	20-50	12-54	13-75	9-78	18-62	15-06	16-44	14-94	16-97	6-52	18-44	5-92	178-01	84-43
V.—District E. St. Peter (Highlands)	7	11-97	2-93	7-29	1-23	7-00	1-65	10-86	3-86	11-71	6-06	14-86	7-84	18-29	14-55	12-43	11-40	17-71	15-13	18-43	14-45	14-00	6-99	14-71	3-87	168-86	89-86
St. Peter (Lowlands)	9	13-44	2-29	8-22	1-05	6-00	1-30	9-11	3-19	11-56	4-53	13-11	6-72	19-22	11-92	11-38	8-18	17-67	12-41	16-57	13-13	10-22	6-18	14-67	3-94	150-22	72-54
St. Lucy (Lowlands)	7	11-86	2-22	7-43	9-8	4-86	6-5	11-00	3-12	10-71	4-78	14-71	6-42	20-58	15-03	12-14	11-92	17-14	11-67	16-71	9-78	10-86	5-16	14-71	3-17	152-69	71-85
VI.—District F. St. Joseph (Highlands)	8	16-60	3-60	18-25	1-49	7-75	1-30	13-87	4-77	16-37	6-79	20-50	9-88	21-28	10-84	15-75	13-71	20-62	8-34	19-13	8-93	19-88	7-47	21-25	7-97	206-12	82-69
St. Joseph (Lowlands)	8	13-60	2-51	8-89	1-41	6-75	9-1	12-12	4-08	14-25	4-19	16-89	6-40	19-75	10-05	15-12	11-05	19-25	9-60	16-75	11-04	16-75	5-94	16-89	6-07	177-91	73-03
St. Andrew (Highlands)	2	13-00	2-06	9-50	1-25	6-00	8-0	10-50	3-43	14-00	8-66	16-50	5-45	22-50	11-67	10-50	14-05	21-60	12-94	21-50	19-42	16-00	7-71	18-00	5-78	185-00	86-35
St. Andrew (Lowlands)	2	11-00	3-11	8-00	1-67	6-50	9-3	7-50	3-72	11-00	6-65	13-50	5-53	17-50	11-77	10-90	13-53	15-50	11-37	12-50	18-12	13-60	5-90	12-00	5-79	138-00	82-14
Total		245-84	48-48	185-99	27-12	124-34	21-63	307-11	74-68	261-18	82-73	309-88	136-94	359-01	194-45	267-13	235-03	341-37	191-90	334-41	326-03	275-68	115-01	328-45	109-33	3226-39	1447-49
Average		12-91	2-55	9-74	1-43	6-54	1-14	10-90	3-94	13-73	4-35	16-31	7-21	18-90	10-93	13-63	12-00	17-99	10-10	17-61	14-51	11-90	6-06	17-02	5-28	169-76	76-18

The average rainfall for 1892 and 1898 as compared with the average for 40 years, from 1857 to 1891 inclusive.

Months	Average for 40 years from 1857 to 1891 inclusive.		Average for 1892 from 17 Sta.		Average for 1893 from 107 Sta.	
	Inches	Decimals	Inches	Decimals	Inches	Decimals
January	3.88	9.24	3.65	9.55	3.65	9.55
February	3.38	1.92	1.43	1.43	1.43	1.43
March	1.70	2.48	1.14	1.14	1.14	1.14
April	2.28	3.87	3.94	3.94	3.94	3.94
May	3.45	7.47	4.35	4.35	4.35	4.35
June	5.50	14.47	7.21	7.21	7.21	7.21
July	5.91	7.52	10.23	10.23	10.23	10.23
August	7.45	11.49	12.00	12.00	12.00	12.00
September	7.32	13.49	10.10	10.10	10.10	10.10
October	8.25	5.55	11.50	11.50	11.50	11.50
November	7.62	10.73	6.05	6.05	6.05	6.05
December	4.84	4.29	5.28	5.28	5.28	5.28
	60.03	80.46	76.18	76.18	76.18	76.18

Weekly Statement of Comparative prices of the West Indian Good Brown Sugar for the fifty two weeks January to December.

Weeks.	Average for the ten years 1882 '91		For the year 1892.		Weeks.	Average for the ten years 1882-'91.		For the year 1892.		For the year 1893.	
	s.	d.	s.	d.		s.	d.	s.	d.	s.	d.
1	14	4.8	13	0	27	14	6.0	11	9	16	9
2	14	3.6	13	0	28	14	5.1	11	9	16	3
3	14	3.8	13	0	29	14	3.0	12	0	15	9
4	14	2.4	12	9	30	14	2.1	12	0	15	0
5	14	0.3	12	9	31	14	1.2	12	0	15	0
6	14	0.0	12	9	32	14	0.9	12	0	14	9
7	13	11.4	13	9	33	14	0.0	12	0	14	6
8	13	11.1	12	6	34	13	11.7	12	0	13	9
9	14	0.9	12	6	35	13	0.9	12	0	13	6
10	14	1.9	12	6	36	13	10.8	12	3	13	6
11	14	3.0	12	6	37	13	11.7	12	3	14	0
12	14	3.9	12	6	38	13	9.6	12	0	14	0
13	14	5.4	12	3	39	13	8.1	12	0	14	6
14	14	5.4	12	8	40	13	6.9	12	0	13	0
15	14	7.5	12	3	41	13	6.9	12	0	13	0
16	14	8.4	12	3	42	12	7.2	12	3	12	6
17	14	9.0	12	3	43	13	7.5	12	6	12	3
18	14	6.6	12	6	44	13	6.0	12	9	12	0
19	14	8.1	12	0	45	13	5.7	12	6	12	0
20	14	7.6	12	0	46	13	5.1	12	6	12	0
21	14	10.2	12	3	47	13	5.1	12	6	11	9
22	14	10.2	12	3	48	13	5.4	12	6	11	9
23	14	9.3	12	3	49	13	6.6	12	6	11	9
24	14	7.5	12	3	50	13	6.6	12	0	11	6
25	14	8.4	12	0	51	13	6.8	12	6	11	6
26	14	7.5	12	0	52	13	6.9	12	6	11	6
Av. for 6 mths.	14	5.15	12	4.61	Av. for 6 mths.	13	9.6	12	2.81	12	4.8

The average weekly prices for West Indian Good Brown Sugar for the ten years 1882 to 1891 is 14s. 1.87½, for 1892 13s. 3.46½, and for 1893 13s. 6.63. This Table is compiled from reports published in the "Sugar Cane Magazine."