

Trees
No. 832

C.S.

C.S.O.

SUBJECT.

1919

1st November

Tree planting in the Falkland Islands

Previous Paper.

MINUTES.

N.E.

Draft Circular letter submitted.

As an enclosure we might send them copies of the typewritten document "Tree Planting in the Falkland Islands", which I have marked "A". The whole thing would not take long to print -

T.W.
1.11.19.

Office

Draft app^d with slight amendments.

I think it would be better to have printed "Extracts from Kew Bulletin No 5. - The Falkland Islands" by W. Dalhimore.

and those extracts I have marked with green pencil.

Until we see what sort of a response the sheep-farmers make I would rather not mention any suggestion of the Government committing themselves to any expenditure.

Nov 1st 19.

T.R. St. Johnston
Administrator.

Subsequent Paper.

N.E.

Proof submitted. The enclosure will be printed on stout paper than the proof now submitted -

T.W.
10.11.19.

The Manager, Port Howard,
 " " Port Louis, North,
 " " Port Stephens,
 " " Fox Bay, East,
 " " Fox Bay, West,
 " " Hill Cove,
 " " Chartres,
 " " Spring Point,
 " " Weddell Is.,
 " " Saunders Is.,
 " " Keppel Is.,
 " " Pebble Is.,
 " " Beaver Is.,
 " " New Is.,
 " " Great Is.,
 " " Carcass Is.,
 " " West Point Is.,
 The Editor, Falkland Is., Magazine,
 " Supt. Admiralty Cable Station,
 " O-i-C, Navy W/T Station.

Letter from Manager, Carcass Is. 16.12.19.
 " " " Fitzroy, South 24.12.19.
 " " " Rincon Grande, 26.11.19.
 " " " Douglas Station, 5.3.20.
 " " " -----
 " " Manager, Pebble Is. 6.3.20.
 " " S.M. West Falkland, 29.3.20.

H.E.,

I asked for this paper to be sent down from Government House in order to submit two letters on this subject, one from the Manager of Pebble Is. dated 6.3.20., and the other from the s.s. West Falkland, dated 29.3.20.

In his letter, the Magistrate, West Falkland, asks that copies of the literature on this subject be sent to him to give to the wife of the Manager of Port Stephens. The Manager of Port Stephens with others was supplied with a copy of the Circular No. 832/19 of the 1st November, 1919.

The Memorandum from the Royal Botanic Gardens, Kew and the letter from the Board of Trade were loose in the paper when it came from G.H.

a.g.
 20.4.20.

C.S.O.
 assist in any way you can.
 then put up file to me for
 perusal.
Wm.
 22.4.20

H.E.,

I think it would be better to wait until we receive replies to all Circulars sent out before doing anything in this matter.

A. J. G.

27. 4. 20.

Very well. Wait till next local mail arrives from W.F. and, if necessary, send reminders.

W. J. G.
27. 4. 20

^{Let} B. U. 15. 5. 20.

J. A.
22/7/28

MEMORANDUM.

Subject. Tree Planting in the Falkland Islands.

Assistant Director,

I have read Circular No. 832/19 respecting suggestions for tree planting in the Falkland Islands and note that there are indications that the Government are trying to create an interest in the subject in the Colony.

From what can be learnt from the Circular, however, it appears that farmers and others are being asked to undertake planting on their own account. That is quite contrary to our suggestions and I am afraid will lead to little or no improvement of the present conditions. Such a scheme would encourage the establishment of a large number of small plantations instead of two or three large, densely planted woods. We very definitely indicated that the trees must be planted in large enough areas to provide their own shelter and it is unlikely that every farmer will be prepared to make a trial of a block of 30 acres or so. Again it will be very difficult to get a number of people to adopt the same method of management.

From what we can learn ^{from} ~~the~~ past experiments the greatest ^{chance} ~~hope~~ of success lies in the hope of the Government being able and willing to undertake the experimental work with the co-operation and sympathy of the people. Private enterprises are liable to be held up at any time, ^{note W. Blake's experience,} but a Government experiment might be expected to continue for a given number of years without change of policy.

W.D.

8. 1. 20.

Telephone:—8720 EXTENSION.....

Telegraphic Address:—
"TIMBER," EDINBURGH.



Registered No. _____

*ans.
8-11-19*



BOARD OF TRADE,
TIMBER SUPPLY DEPARTMENT,
1 QUEEN STREET,
EDINBURGH.

5th February 1919.

Dear Hill,

I enclose some notes on the Turf Planting at Corroul. I am sorry that I have no copy of the earlier and more precise article which you will find in Volume XX of the R.S.A.S. Transactions. I am having photographs sent you which illustrate the planting in three stages. It seems a long way to the Falkland Islands, but if they have similar ground there I do not see why the system should not succeed as well as it has done with us. I regard the manure as a very important element. Though the amount is small, the result is perfectly visible after ten years' growth. It seems to give an initial stimulus which enables the plant to fend for itself.

I hope to look you up at Kew some day soon.

Yours very truly,

John Stirling Boyd

Arthur W. Hill, Esq.,
Royal Botanic Gardens,
Kew,
Surrey.







Tree planting in the Falkland Islands.

A

General.

In any attempt that may be made to establish trees in the Falkland Islands the authorities must be prepared for a good deal of experimental work and many disappointments before they can entertain an idea of establishing a successful forest area or be certain of the impossibility of such an object. Unfortunately there are no native trees to guide them in the selection of likely subjects for forest work, whilst soil and climate are so indifferent that they offer little encouragement to the supposition that trees which thrive on the mainland may also grow well in the islands.

Wind and the comparative scarcity of natural shelter appear to be the chief difficulty standing in the way of any attempt to establish trees in the islands. In addition, cold and wet soil, often of a sour peaty nature, and a comparatively low average maximum temperature, all of which are more or less detrimental to tree growth, have to be faced. On the other hand the absence of severe frost and the fact that several European trees have grown well until they reached the top of their shelter are favourable signs and it is an encouraging sign that the European Gorse or Furze attains its maximum height in the islands. Encouragement may also be taken from the successes obtained in other countries where conditions of climate and soil have been decidedly depressing and good forests have been reared. A typical instance may be mentioned in the valuable forests of Maritime Pine established on the shores of the Bay of Biscay, where, less than a century ago the ground was a barren waste of constantly moving sand exposed to the full force of the Atlantic winds.

The attempts that have been made in past years to establish trees in the Falkland Islands have not been of a sufficiently comprehensive character to prove anything other than, given

shelter, the soil conditions can be adapted for the successful growth of certain exotic trees. In any future operations that may be contemplated provision should be made for planting comparatively large blocks of trees for, the greater the depth of a plantation the taller the trees are likely to grow. In small woods planted in exposed places practically all the trees are stunted whereas in a wider area each succeeding rank of trees grows a little taller than the one immediately in front and in time quite well developed trees are obtained. For experimental purposes at least 50 acres in not more than three areas should be planted and provision ~~should be~~ made for the proper upkeep of the ground after planting for a period of 10 years. At the end of 10 years it would probably be possible to form a fairly accurate opinion as to whether tree planting upon a more extensive scale was justifiable and likely to be beneficial to the islanders, or whether the project was doomed to failure. In any case if proper records were kept, the experiment would be of considerable value in the event of future operations of the same nature being suggested.

Supervision of Experiments.

In order that any experiments that may be contemplated should not fail through want of proper attention to details it is desirable that an intelligent man should be appointed who would be able to give his whole attention to the work, for in the event of the man in charge having other duties to perform he may be unable to attend to necessary details at the critical moment and the success of the work be imperiled. A careful islander could probably be found to undertake the work with occasional supervision from a more experienced man. A better way of dealing with the matter would be to secure at the outset the services of a man trained in forestry work and give him the entire charge.

Selection of Ground.

For experimental purposes it is advisable that ground should be chosen in a position where some natural shelter is afforded, i.e. valleys and undulating ground. The soil should be as typical as possible, wet and dry land, loam and peat, being included. In the event of more than one area being selected the different stations should be near enough together to facilitate work and supervision, and be within easy distance of a residential centre.

Shelter.

The provision of shelter appears to be the key to the successful cultivation of trees in the Falkland Islands, for, given shelter from wind, other conditions of climate and soil can be met. The only native plant that can be depended upon for shelter appears to be Veronica elliptica, and the maximum height of that plant is about 6½ feet, the average height being from 2 to 5 feet. There are other shrubby plants growing from one to four feet high which may also be of some value for certain places. Fortunately the common Gorse grows well in the islands. It is a very good shelter plant and should be sown over land that is to be planted with trees two or three years in advance of the trees. Land that is already covered with Gorse could be dealt with immediately. Round the outskirts of a plantation a belt of Gorse ^(Ulex europaea) or Veronica elliptica as dense as possible should be formed. This should be 6 or 8 feet wide or perhaps a little wider on the side of the prevailing wind. Behind this the shelter plants should be thin enough to allow of trees being planted 3 feet apart. This distance is approximate, and it will probably be found advisable to have small groups of shelter plants with the young trees in between. In no case, however, ought the shelter plants to be allowed

as close planting of the trees is the essential thing.

to ~~make~~ ^{make} large gaps amongst the trees. They are simply to protect the young trees for a few years, afterwards they must provide their own shelter, which they are best able to do by forming a dense mass of branches. It is not advisable to form a straight boundary line to a plantation, an undulating outline usually forming a better wind break in addition to presenting a better appearance.

When bushes cannot be procured for shelter, rough hurdles interlaced with reeds or packed with long grass can be used. Such a means of providing shelter is, however, more expensive and generally less effective than that formed by plants.

When gorse is to be used for shelter the seeds should be sown broadcast on the ground but it is probable that quicker results could be obtained by cultivating Veronicas in a nursery and planting them out. If seedling plants of Gorse are transplanted the work should be done whilst they are very small and the tops should be cut back at the same time.

Soil.

In places where the soil is naturally of a loamy or sandy nature and is naturally well drained, it can be prepared for planting with little trouble. If clear of bushes it can be ploughed or turned over by some other means but when bushes exist, the intervening spaces should be dug, removing at the same time any plants not required for shelter.

When the ground is naturally wet, open drains 15 inches wide and 1½ to 2 feet deep should be dug at intervals of from 12 to 20 feet parallel with the natural slope of the land. In the case of wet and sour peat, drains should be opened 6 feet apart. They should be 15 inches wide and 15 to 18 inches deep. The peat removed from the drains should be taken out in blocks 18 inches long and the width and depth of the drains.

The turves should be laid upside down on the margins of the drains to sweeten. From 4 to 6 months later a young tree may be planted in the centre of each turf, taking care to pulverize the soil well as it is replaced about the roots. A little basic slag may be mixed with the soil at this time. By the time the young trees have filled the raised soil with roots the upper or drained portion of the peat bed will have become sufficiently sweetened by drainage and the admission of air for the roots to enter. When cutting drains and arranging planting positions in this way the men should work in pairs, otherwise, for convenience, they are inclined to cut the peat out in small sections which are unsuitable for the subsequent reception of plants. When planted the young trees should be spaced about 3 feet apart each way. All the trees that are planted may not grow and any vacancies should be filled up as soon as possible.

Fencing.

Any ground that is to be planted with trees should be provided with a sheep and rabbit proof fence otherwise the young trees will probably be eaten off as soon as they are planted.

Nursery.

An acre or two of ground in the most favourably situated part of the area selected for planting should be set apart for a nursery. The ground should be trenched, manured and properly cultivated. Any ~~ground~~ not required for immediate use might be planted with potatoes, turnips or some other crop. It should be sheltered by a good wall or hedge of Veronica and one or two cross hedges of Veronica should be planted as additional wind breaks. During the early days of spring advantage

should be taken of the first period when the soil is moderately dry to form seed beds. These may be 4 feet wide and any length that is convenient, and separated from each other by paths 15 inches wide. Work the surface soil into a fine condition and sow the tree seeds thinly over the surface covering them with not more than half an inch of soil. If the ground is very light, a light wooden roller may be passed over the beds or the surface may be lightly pressed ~~over~~ with a spade but if it is inclined to be heavy it must be left as loose as possible. The seedlings ought to appear in from 4 to 6 weeks and from that time the ground must be kept free from weeds. When the young plants are about 3 inches high they must be transplanted, placing them in lines a foot apart and 4 to 6 inches apart in the rows. In this position they will remain until they are from 6 to 9 inches high. Any trees that can be increased by cuttings, such as Willows or Poplars, may be started in the nursery or in the places the trees are to occupy. Stock plants ought, however, to be kept for cuttings so that trees in permanent positions could be left untouched. Cuttings of such trees should be made at least 12 inches long from fully ripened wood.

Planting.

The young trees ought to be planted in permanent places as early in life as possible. As a rule they give the best results when they are less than 12 inches high especially when they are subjected to wind. Plants from 6 to 9 inches high might be tried in the Falkland Islands. They should be planted amongst previously raised shelter plants and be spaced about 3 feet, or not more than 4 feet, apart on the best soil. Where the worst conditions prevail they should be planted at 3 feet apart. They must be lifted carefully so as to preserve all the roots and when planted care must be taken to spread the roots out to their fullest extent, the soil being pressed firmly about the roots, ~~but~~ the upper roots ~~not~~ being covered by ^{not} more

than half an inch of soil. During planting operations the roots must not be allowed to become dry.

Early autumn and spring are the best times for planting trees. Probably autumn will be the most satisfactory time for the Falkland Islands as the winds are stated to be at their worst in spring.

Seeds of Birches might be sown thinly in the places the trees are to occupy surplus plants being drawn out and replanted. The young trees should be left about one foot apart. They will then draw one another up and the stronger ones will eventually kill the weak ones.

Other cultural Work.

During the summer months the man in charge will have ample work in looking after nursery plants, keeping planted ground free from coarse weeds, pruning shelter plants that appear to be overgrowing young trees, preparing ground for planting, etc. Until the whole of the ground to be planted has been drained and otherwise prepared additional labour will be required. Although it is unnecessary to manure the ground that is to be planted a dressing of basic slag or fresh lime may be applied with advantage where the ground is acid or sour.

Selection of Trees.

On account of the peculiar conditions prevailing in the Falkland Islands it is probable that evergreen coniferous trees will prove more successful than deciduous, broad-leaved trees, and for general planting, particularly on the wetter ground, it is likely that the most appropriate tree of all will be Picea sitchensis, followed by Picea Engelmanni and Picea alba. The two former are natives of Western N. America and the latter of Eastern N. America. For well drained land Pinus Banksiana

from N. America, P. contorta var. Murrayana from Western N. America and the European Pinus Cembra and P. sylvestris might be tried. As a shelter tree for the outskirts of plantations a trial should be made of the Austrian Pine (Pinus Laricio var. nigricans). This is an excellent shelter tree although its timber is not of good quality. Other Conifers worth a trial are - Cupressus nootkatensis, Thuja plicata, and Araucaria imbricata. Seeds of the latter tree might be procured direct from Chile and be planted singly about 3 feet apart in the positions the trees are to occupy.

Amongst broad-leaved trees the most likely to succeed are Birches, Alders, Willows, Poplars and Antarctic Beeches. Amongst the Birches, Betula alba var. pubescens, a British tree, is useful for wet ground and B. alba var. verrucosa, also a British tree, for dry, stony soil. The N. American species B. occidentalis and B. papyrifera might also be tried. The most suitable Alders are Alnus glutinosa and A. incana, both European trees suitable for wet ground. Of the tree Willows Salix alba, S. coerulea, S. fragilis, and S. viridis are suitable, whilst of basket making Willows, S. triandra, S. viminalis, S. purpurea and S. rubra might be tried. Poplars should be represented by Populus Eugenei, P. serotina and P. trichocarpa. Ligustrum ovalifolium, L. vulgare, Tamarix in variety, Sambucus nigra, the stronger growing New Zealand Veronicas, Hippophae rhamnoides and Escallonia macrantha might be tried for shelter and Pyrus Aucuparia, P. Aria, P. intermedia, Berberis Darwinii, B. Aquifolium, Rhododendron catawbiense, R. ponticum, Olearia Haastii, Calluna vulgaris and Cytisus scoparius as flowering plants that withstand wind.

To procure seeds and cuttings.

Most of the plants enumerated above would need to be raised from seeds. Seeds of Berberis Darwinii, and Escallonia macrantha could be obtained direct from Chile, Tierra del Fuego or Patagonia, others would probably be most conveniently

procured via, this country, either through a seedsman or by arrangement with this establishment. Messrs. Dicksons, Ltd., Eastgate Street, Chester, or Messrs. Little and Balantyne, Carlisle would probably be able to supply many of the seeds. The Willows and Poplars could be raised from cuttings sent in the first place from this country, afterwards from cuttings produced in the islands. Cuttings would need to be sent away during the resting period but seeds could be timed to arrive in the Falkland Islands towards the end of winter.

(Enclosure to Circular No. 832/19 of the
6th November, 1919).

Extracts from = = = = =

THE FALKLAND ISLANDS

(FORESTRY)

By W. DOLLIMORE.

Extracts from Kew Bulletin No. 5.

The flora of the Falkland Islands consists of herbaceous plants and shrubs. The largest bush is *Veronica elliptica*. A few plants approaching 7 ft. in height have been recorded from the West Falkland, otherwise its average height is from 3 to 5 ft. *Chiliodendron amelloideum* (Fuchsia), grows 3 to 4 ft. high and *Myrtus nummularia* is also prominent. The commonest shrub is the "Diddle-dee" (*Epelum nigrum* var. *rubrum*), which is found from a prostrate plant to dense rounded bushes 1 to 2 ft. high. A few of the other low growing shrubs are *Pernettya empetrifolio*, (*P. pumila*), *Gaultheria microphylla*, *Baccharis magellanica*, and *Veronica serpyllifolia*. *Poa flabellata*, Hook. f., the "Tussock" Grass, a large growing perennial at one time the most prominent feature of the shores but now scarce on the larger islands, is a valuable fodder plant, otherwise the natural vegetation is poor as fodder, and only carries one sheep to four acres.

The chief difficulties to encounter in forestry operations appear to be wind; wet, sour and badly drained ground, and lack of initiative and technical knowledge on the part of the inhabitants. But considering the difficulties that have been surmounted in other countries where successful forests have been established under what were equally disheartening conditions, there appears to be no good reason why the subject should not be given a proper trial, for in a place where natural trees do not exist, the establishment of woods of even moderate growth would be of great benefit to the islanders both from shelter they would afford, and as a source of firewood and timber for fencing. The general amenities of the islands would also be much improved should successful forests be established.

About 25 or 30 years ago Mr. Robert Blake, a prominent sheep farmer in the Falklands, made what was probably the most determined attempt that has yet been undertaken to establish a plantation of trees in the Islands. Unfortunately he left the Islands in 1898 and was thus unable to give the young trees personal attention. They, however, made fairly good progress

and some reached the height of 30 ft. A few years ago they were reported to have lost their heads as soon as they rose above their shelter. Mr. Blake in giving Kew the benefit of his experience writes:— "I may be optimistic but I honestly believe many places in the Falklands could be planted with trees and that they would flourish"

"In Tierra del Fuego, with a climate far more rigorous than ours, bushes and trees grow freely. I have been able to bring a few of these bushes to the Islands—the Antarctic Beach (*Nothofagus* spp.) a kind of Laurel (*Laurelia serrata*) and Califate (*Berberis buxifolia*)—they grow freely at Hill Cove on the West Island. My first experiment was taking out some small Austrian Pines. Many survived the voyage and thrived well, then I tried seeds of Austrian and Scots Pines and had no difficulty with them. I transplanted several hundreds when they were about 6 in. high, in 1898 (apparently those mentioned by Skottsberg) when I came home, but my manager took more interest in breaking land for hay and green crops than in my hobby. I tried in 1914 to engage a man who would be capable of carrying out experiments for me in the Islands but without success; what is needed is a good nurseryman, one accustomed to raising trees from seed, and a man who would know when and how to transplant. . . . I don't think there would be trouble over wind-breaks if suitable ground were selected in the valleys, but I doubt if any good results would be obtained by planting on the ridges where hard clay is generally found 6 or 9 in. below the surface. Gorse makes a good wind-break and grows freely, but the bushes I mentioned as coming from Tierra del Fuego would be better, and there is a kind of Poplar whose leaf on the underside is a silvery colour; this grows like a weed. The original was in Government House Gardens and I obtained a slip or two in Governor Kerr's time. Willows grow freely."

In January 1911, suggestions for tree planting in the Falklands were made by Kew on behalf of Mr. E. P. Cotton, and within the last few months advice has again been sought.

From the foregoing notes it is plain that with the exception of the work carried out by Mr. Blake no real effort has been made to establish trees in the Falkland Islands under forest conditions and that the trees planted in gardens have apparently survived only so long as they were well sheltered. Therefore.

although many of the introduced trees seemed to have disappeared within a few years, it has yet to be found out whether trees planted in large enough blocks to afford one another shelter will succeed. With this in view the following suggestions have been made.

In any attempt that may be made to establish trees in the Islands, the authorities must be prepared for a good deal of experimental work and many disappointments before they can entertain an idea of establishing a successful forest area or be certain of the impossibility of such an object. Unfortunately there are no native trees to guide them in selection of likely subjects for forest work, whilst soil and climate are very indifferent. Wind and the comparative scarcity of natural shelter appear to be the chief difficulties standing in the way of any attempt to establish trees in the Islands. In addition, cold and wet soil, often of a sour, peaty nature, and a comparatively low maximum temperature, all of which are more or less detrimental to growth, have to be faced. On the other hand, the absence of severe frost and the fact that several European trees have grown well until they reached the top of their shelter are favourable signs and it is an encouraging fact that the European Gorse or Furze attains its maximum height in the Islands and that a Poplar and Willows thrive. This proves that, given shelter, the soil conditions can be adapted for the successful growth of certain exotic trees and in any future operations that may be contemplated provision should be made for planting the trees in large blocks. *for the greater the depth of a plantation the taller the trees are likely to grow.* In small woods planted in exposed places, practically all the trees are exposed and stunted, whereas in a wider area each succeeding rank of trees grows a little taller than the one immediately in front until finally well developed specimens are obtained.

The provision of shelter appears to be the key to successful tree planting in the Falklands for, given shelter from wind, other conditions of climate and soil can be met. The only native plant that can be depended on for shelter is *Veronica elliptica*, and the maximum height of the plant is barely 7 ft. There are other native shrubs growing from 1 to 4 ft. high which may also be of some value for certain places. Fortunately the common Gorse grows well in the Islands. It is a good shelter plant and in addition to being used for hedges, seed might be sown over

the land to be planted with trees two or three years in advance of the trees. Land that is already covered with Gorse could be dealt with immediately. In addition, various subjects such as those mentioned by Mr. Blake might be procured from Tierra del Fuego. Round the outskirts of a plantation a belt of Gorse or Veronica as dense as possible should be formed. The outer belt for a plantation should be 6 or 8 ft. wide, or perhaps a little wider on the side of the prevailing wind. Behind this the shelter plants should be thin enough to allow of trees being planted 3 ft. apart. This distance is approximate, and it may be found advisable to have small groups of shelter plants with young trees in between, or even parallel, narrow hedges 12 to 20 ft. apart. In no case however, ought the shelter plants to be allowed to form large gaps amongst the trees. They are simply to protect the young trees for a few years, afterwards they must provide their own shelter, which they are best able to do by forming a dense mass of branches. It is not advisable to form a straight boundary line to a plantation, an undulating outline often forming a better wind-break in addition to presenting a better appearance.

In places where the soil is of a loamy or sandy nature and is naturally drained, it can be prepared for planting with little trouble. If clear of bushes it may be ploughed or turned over by some other means, but when bushes exist the intervening space should be dug, removing at the same time any plants not required for shelter. When the ground is naturally wet, open drains, 15 in. wide and $1\frac{1}{2}$ to 2 feet deep, or wider and deeper if necessary, should be dug at intervals of from 12 to 2 ft., parallel with the natural slope of the land. In the case of wet and sour peat, drains should be opened about 6 ft. apart. They should be 15 in. wide and 15 to 18 in. deep, the peat being removed in large blocks and being laid upside down on the margins of the drains to sweeten; occasional wider and deeper drains may be required. From 4 to 6 months afterwards, a young tree may be planted in the centre of each turf, taking care to pulverize the soil well as it is replaced about the roots. A little basic slag may be mixed with the soil at the time. By the time the young trees have filled the upturned and inverted sod with roots, the upper or drained portion of the peat bed will have become sufficiently sweetened by drainage and the admission of air for the roots to enter. When cutting drains and arranging planting positions in this way the men should work in pairs, otherwise, for convenience, they are inclined to cut the peat in small sections which are unsuitable for the subsequent reception of the plants. As a rule

the turves are so arranged that the plants can be placed about 3 ft. apart. Vacancies caused by the death of young trees must be filled at an early opportunity. Should a hard piece of clay or gravel occur a little below the surface of the ground it must be broken up during the preparatory work.

All ground that is to be planted with trees must be provided with a sheep and rabbit-proof fence, otherwise the young trees will probably be eaten off soon after they are planted.

An acre or two of ground in a favourably situated part of the area selected for planting should be set apart for a nursery. The ground must be trenched, manured, and properly cultivated. Any ground not required for immediate use might be planted with potatoes, turnips or some other crop. Shelter must be provided by a wall or by a good hedge of Veronica, Gorse or some other subject; one or two cross hedges would also be an advantage. The seeds should be sown in beds 4 ft. wide and any convenient length, separated by paths 15 in. wide, advantage being taken of the earliest dry days of spring to carry out the work.

When the young plants are about 3 in. high they must be transplanted into nursery lines 12 in. apart and 2 to 6 in. between the plants. In this position they will remain until 6 or 9 inches high. Any trees that can be increased by cuttings, such as Willows or Poplars, may be started in the nursery or in the places the trees are to occupy. Stock plants ought, however, to be kept for cuttings so that trees in permanent positions could be left untouched.

When the young trees are from 6-9 in. high they should be placed in permanent positions and spaced from 3-4 ft. apart, according to the nature of the soil and the species. They must be lifted carefully so that all the roots are preserved, and during planting, if the ground has not been previously worked, care must be taken to make the holes wide enough to allow the roots to spread out to their full extent. Care also must be taken to keep the upper roots near the surface of the soil. Early autumn and spring are the best times for planting trees. Probably autumn will be the most satisfactory time for the Falklands as the winds are stated to be at their worst in spring.

On account of the peculiar conditions prevailing in the Islands it is probable that evergreen coniferous trees will prove

more successful than deciduous, broad-leaved trees, and for general planting, particularly on the wetter ground, it is most likely that the most appropriate tree of all would be *Picea sitchensis*, followed by *Picea Engelmanni*, and *Picea alba*. The two former are natives of Western N. America and the latter of Eastern N. America. For well-drained land *Pinus Banksiana* from N. America, *P. contorta* var. *Murrayana* from Western N. America and the European *Pinus Cembra* and *Pinus sylvestris* might be tried. As a shelter tree for the outskirts of plantations a trial should be made of the Austrian Pine (*Pinus Laricio* var. *nigricans*). This is an excellent shelter tree although its timber is not of good quality. Other Conifers such as *Cupressus nootkatensis*, *Cupressus macrocarpa*, *Thuja plicata*, and *Araucaria imbricata* are worth a trial.

Amongst broad-leaved trees the most likely ones to succeed are Birches, Alders, Willows, Poplars, and the Antarctic Beeches. Of the Birches the form *Betula alba, pubescens*, and the North American *B. occidentalis* and *B. papyrifera* should be tried. The most suitable Alders are *Alnus glutinosa*, and *A. incana*, both European trees adapted for wet ground. Of the tree Willows *Salix Alba*, *S. coerulea* *S. fragilis* and *S. viridis* are suitable, whilst of basket-making Willows *S. triandra*, *S. Viminalis* *S. purpurea* and *S. rubra* might be tried. Poplars should be represented by *P. Eugenei*, *P. serotina*, *P. canescens*. and *P. trichocarpa*. The Sycamore, *Acer Pseudo-platanus*, and the Antarctic Beeches from Tierra del Fuego are also worth attention. For shelter and ornament the following small trees and shrubs may be tried. *Ligustrum ovalifolium*, *L. vulgare*, *Tamarix* in variety, *Sambucus nigra*, the stronger growing New Zealand Veronicas, *Hippophae rhamnoides*, *Escallonia macrantha*, *Pyrus Aucuparia*, *P. Aria*, *P. intermedia*, *Berberis Darwinii*, *B. Aquifolium*, *Rhododendron ponticum*, *R. catarobiense*, *Olearia Haastii*, *Calluna vulgaris*, and *Cytisus scoparius*.

XI.—THE FALKLAND ISLANDS.

FORESTRY.

TUSSOCK GRASS.

W. DALLIMORE.

The records of the Royal Botanic Gardens, Kew, indicate that on several occasions between 1842 and the present date correspondence has taken place between the Governor of the Falkland Islands and other individuals, the Colonial Office, and the Director of the Royal Botanic Gardens, Kew, respecting trees suitable for experimental planting in the Islands, and the advisability of planting the Falkland Islands Tussock Grass extensively in certain parts of the British Isles; therefore, in view of recent interest shown in the two subjects, the following notes have been prepared.

FORESTRY.

In order that the difficulties which beset the islanders when considering the establishment of trees may be understood, it is necessary to give a few details respecting the geographical position of the islands and the prevailing physical and climatic conditions.

* They are situated in the South Atlantic Ocean, between 51°

* Colonial Office List.

and 53° S. lat., and between 57° and 62° W. lon., about 480 miles N.E. of Cape Horn, and about 1000 miles due south of Monte Video. They consist of East Falkland (area 3000 square miles), West Falkland (2300 square miles), and about 100 small islands, with an area of nearly 1200 square miles. The surface is undulated with Mount Adam, the highest ground, rising to 2315 ft. above the level of the sea. The entire country is wild moorland with outcrops of rocks and wide stone runs which litter large areas of the valleys with stones. Much of the soil is peat, often of a wet and boggy nature. In other places it is loam or clay, and in some instances peat overlies clay of such tenacity that natural drainage is almost impossible and the peat becomes semi-liquid. There are, however, areas of fertile soil suitable for potatoes, cabbages, turnips, oats and other agricultural crops, whilst various vegetables, currants, gooseberries and raspberries can be grown in sheltered gardens. Oats rarely ripen and are grown as a green fodder crop. There is naturally a great shortage of lime in the soil and agricultural lime cannot be easily obtained from other countries to correct the acidity of sour soil. Occasional movements of bog land on the hills and mountains take place, and in several instances such movements have caused the inhabitants a good deal of inconvenience. The only roads in the islands are in the neighbourhood of Port Stanley, communication between the various points being by sea or on horseback.

The climate is severe but healthy, except for those predisposed to pulmonary affections. It is uniformly cold, the mean temperature being 42° Fahr. The thermometer ranges between 30° and 50° in winter, and between 40° and 65° in summer. The cold is intensified by constant high winds which prevail, especially in the summer, rising about 10 a.m. and falling away between 4 and 5 p.m. The annual rainfall seldom exceeds 25 in., though there are a good many wet or damp days, the number ranging between 220 and 240 a year. In the summer the atmosphere is remarkably dry, and evaporation is rapid.

The population in 1915 was 3451,* the majority of the people

* Whitaker's Almanack, 1917.

being engaged in sheep farming or in seafaring industries. The flora consists of herbaceous plants and shrubs. The largest bush is *Veronica elliptica*. A few plants approaching 7 ft. in height have been recorded from West Falkland, otherwise its average height is from 3 to 5 ft. *Chilotrachelum amelloideum* (Fuchsia), grows 3 to 4 ft high and *Myrtus nummularia* is also prominent. The commonest shrub is the "Diddle-dee" (*Empetrum nigrum* var. *rubrum*), which is found from a prostrate plant to dense, rounded bushes 1 to 2 ft. high. A few of the other low-growing shrubs are *Pernettya empetrifolia* (*P. pumila*), *Gaultheria microphylla*, *Baccharis magellanica*, and *Veronica scryphillifolia*. *Poa flabellata*, Hook. f., the "Tussock" or "Tussac" Grass, a large-growing perennial at one time the most prominent feature of the shores but now scarce on the larger islands, is a valuable fodder plant, otherwise the natural vegetation is poor as fodder, and only carries one sheep to four acres.

The chief difficulties encountered in the establishment of trees appear to be wind, wet, sour and badly drained ground, and apathy or lack of initiative and knowledge on the part of the inhabitants. But considering the difficulties that have been surmounted in other countries where successful forests have been established under what were equally disheartening conditions, there appears to be no good reason why the subject should not be given a proper trial, for in a place where natural trees do not exist, the establishment of woods of even moderate growth would be of great benefit to the islanders both from the shelter they would afford, and as a source of firewood and timber for fencing.

The general amenities of the islands would also be much improved should successful forests be established. From the time when the earliest emigrants entered the country the absence of trees appears to have made the greatest impression upon newcomers, and from the middle of last century successive Governors and a few of the more progressive settlers have considered the possibility of establishing trees either for ornament or profit. Planting schemes, usually of a very half-hearted character, have been suggested from time to time, but, whether from apathy, lack of general sympathy, or the disinclination to risk money on a project that could only be considered in the light of an experiment, they have not materialised, and the introduction of young trees or tree seeds has not gone beyond the individual efforts of a few settlers and a few attempts by Government officials to procure trees and shrubs for the garden at Government House. Unfortunately in the few efforts that have been made the persons interested have not possessed sufficient technical knowledge to enable them to give the young trees the special attention necessary to enable them to overcome the unfavourable conditions which prevail, neither have they made proper reports upon the behaviour of the various species tried, therefore the position has not altered from what it was when Col. Moody, the first Lieut.-Governor of the Islands, took office in 1842.

During that year the Ross Expedition wintered in the islands and the Governor apparently became interested in plant life partly through the enthusiasm of Dr. (Sir Joseph) Hooker, one of the officers of the expedition. The first information we possess of the trees and shrubs being introduced into the Islands is a despatch from Governor Moody to Lord Stanley at the

* Information respecting the Falkland Islands Chas. Knight, 1843.

Colonial Office, dated 16th November, 1842, advising him that the Antarctic Expedition (Captain Ross) returning from St. Martin's Cove, Cape Horn, brought to the Colony 700 young trees, chiefly winter harks, beeches, and holly-leaved berries, &c., and that the trees were immediately planted with hopes that they might succeed. We know nothing of the fate of those trees save that on 1st February, 1844, the Governor, in a letter to Sir William Hooker, reported that the elder trees and the Antarctic beeches in the graveyard were doing well.

The next information we have of trees and shrubs being sent to the Falklands is a list of plants forwarded from Kew on 27th December, 1848. The plants were:—*Arbutus Uncedo*, *Aucuba japonica*, *Berberis Aquifolium*, *Betula alba* 2, *Buxus sempervirens* 2, *Colutea arborescens*, *Crataegus orientalis*, *C. Oryacantha*, *Cytisus albus*, *C. scoparius* 2, *Elaeagnus orientalis* 2, *Euonymus japonicus*, *Fagus sylvatica*, *Garrya elliptica*, *Hedera Helix*, *Hippophae salicifolia* 2, *Ilex aquifolium*, *Laburnum vulgare*, *Ligustrum vulgare*, *Picea alba*, *Pinus Laricio* 2, *P. montana* var. *Mughus* 2, *P. Pinaster* 2, *P. rigida* 2, *P. sylvestris* 4, *Planatus?* *campestris*, *Platanus orientalis*, *Prunus Laurocerusus*, *P. lusitanica*, *Quercus pedunculata*, *Q. sessiliflora*, *Q. sp.*, *Ribes alpinum* 2, *R. aurcum*, *R. Menziesii*, *R. nigrum* 2, *R. sanguineum*, *Rosa sp.*, *Salix Caprea*, *S. lanifera?* *Spartium junceum*, *Spirae Lindleyana*, *Syringa vulgaris*, *Taraxacum baccata*, *T. b. var. fastigiata*, *Thuja occidentalis*, *Tilia sp.*, *Ulex europaeus* 4, *Vinca major*, *V. minor* and the following fruits:—Currant, white 6, Currant, red 6, Gooseberry 6 varieties, 12 plants, Raspberry, double bearing 6, R., Yellow Globe, 6, R., Fastoff 6, Blackberry (*Rubus fruticosus*). Whether these plants arrived safely and became established is unknown, but it appears likely that the plants of *Ulex europaeus* may have been the parents of the numerous Gorse plants now present in the Islands. The *Laburnum* is still to be found in one or two places.

Their introduction does not appear to have made much difference to the general aspect of the islands, for in 1870 the Governor, Col. G. D'Arcy, wrote on 2nd May to Sir Joseph Hooker that "the people of the settlement are very industrious and very anxious to help themselves by raising vegetables, but the wind actually blows the seed out of the ground," and asking whether in his wide experience he could suggest any hardy tree or bush to make a fence. He added, "there is not a tree or bush on the islands of any kind." He had apparently overlooked the *Veronica*, and Sir J. Hooker suggested that he should try that.

In 1886, Mr. Arthur Barkly, recently returned from the Seychelles, relieved Governor Kerr for a year. After the luxuriant plant growth of those islands he was unfavourably impressed by the bareness of the Falklands, and during his term of office wrote to Kew for seeds or roots of any hardy bushes or shrubs that would be likely to thrive; he thought that they might be expected to grow 12 or 15 ft. high, and that evergreen bushes would greatly improve the appearance of the country. It is not very clear whether seeds were sent on this occasion but on 10th June, 1891, a letter was received at Kew from the Colonial Office saying that the Government of the Falkland Islands wished for a small supply of seeds and plants, and asking for the advice of the Director as to selection and packing. Seeds for indoor and outdoor cultivation were obtained from Messrs. Sutton and included Palms, *Protons*, *Caladiums*, *Magnolias*, *Laurestius*, *Azalea*, *Arbutus*, *Roses* and *Hardy Ferns*. A more comprehensive list of plants was sent, however, with the approximate price, apparently, for approval, but it appears to have been rejected on account of expense. The Governor, however, was determined to procure seeds, and the Colonial Secretary of the Falklands on his return home in 1891 was requested to approach Dr. (Sir Daniel) Morris regarding plants or seeds. In the end it was decided that an amount not exceeding £10 should be spent on seeds and plants, the amount to include packing. The order was executed by Messrs. Veitch, of Chelsea, and seeds of a variety of trees, including Pines, Birches, Poplars, etc., were sent on 17th January, 1893.

In 1893 Mr. Edward Rawlings wrote to Kew for advice respecting *Pinus insignis*, as his nephew, Mr. R. E. Nichol, was desirous of attempting a plantation in the Falkland Islands.

About 25 or 30 years ago Mr. Robert Blake, a prominent sheep farmer in the Falklands and now a Director of the Falkland Islands Company, made what was probably the most determined attempt that has yet been undertaken to establish a plantation of trees in the Islands. Unfortunately he left the Islands in 1898 and was thus unable to give the young personal attention. They, however, made fairly good progress and some reached the height of 30 ft. A few years ago they were reported to have lost their heads as soon as they rose above their shelter.*

* Carl Skottsberg, A Botanical Survey of the Falkland Islands, 1907-1909.

Mr. Blake in giving Kew the benefit of his experience, writes: "I may be optimistic but I honestly believe many places in the Falklands could be planted with trees and that they would flourish. It must always be remembered in these latitudes that the further west one travels the warmer the climate and that the north coast of the Islands is warmer than the southern shores. This, no doubt, is accounted for by the cold current which runs continuously from west to east, passing south of the Islands; this is not felt on the northern coasts. I fear the situation of Port Stanley is not at all suitable for tree raising experiments. I think, therefore, in making experiments these should be carried out on the north coast of the west Island. Native bushes like the *Pachina*, *Veronica* and *Diddle-dee* grow far larger in the north of the west Island, also there is a marked difference in some of the grasses and herbs, all going to show that the climate on the west is milder than on the east. . . . In Tierra del Fuego, with a climate far more rigorous than ours, bushes and trees grow freely. I have been able to bring a few of these bushes to the Islands—the Antarctic *Myrica* (*Nothofagus* spp.), a kind of Laurel (*Laurelia* var. *arata*) and *Califate* (*Berberis buxifolia*)—they grow freely on the north coast of the west Island. My first experiment was taking out some Austrian Pines. Many survived the voyage and grew very well, then I tried seeds of Austrian and Scots Pines, but I had difficulty with them. I transplanted several hundred of them they were about 6 in. high, in 1898 [mentioned by Skottsberg] when I came home, but my manager took more interest in breaking land for hay and green corn crops than in my hobby. . . . I tried in 1914 to engage a man who would be capable of carrying out experiments for me in the Islands but without success: what is needed is a good nurseryman, one accustomed to raising trees from seed, and a man who would know when and how to transplant. . . . There are no men in the Islands with knowledge of the craft, and again it is so long before there are any tangible results. . . . Ground must be prepared by ploughing and the rubbish must be cleared off. The soil in the best ground is a mass of roots, and to insure some measure of success the experiments should be made on a fairly large scale, ploughing and cleaning the ground is a laborious process and people in the Falklands are hardly in a position to sink the required capital. I don't think there would be much trouble over wind-breaks if suitable ground were selected in the valleys, but I doubt if any good results would be obtained by planting on the ridges where hard clay is generally found 6 or 9 in. below the surface. Gorse makes a good wind-break and grows freely, but the bushes I mentioned as coming from Tierra del Fuego would be better, and there is a kind of Poplar whose leaf on the underside is a silvery colour; this grows like a weed. The original plant was in Government House Gardens and I obtained a slip or two in Governor Kerr's time. Willows grow freely."

In January, 1911, suggestions for tree planting in the Falklands were made by Kew on behalf of Mr. E. P. Cotton, and within the last few months advice has again been sought.

From the foregoing notes it is plain that with the exception of the work carried out by Mr. Blake no real effort has been made to establish trees in the Falkland Islands under forest conditions and that the trees planted in gardens have apparently survived only so long as they were well sheltered. Therefore, although many of the introduced trees seem to have disappeared within a few years, it has yet to be found out whether trees planted in large enough blocks to afford one another shelter will succeed. With this in view the following suggestions have been made.

In any attempt that may be made to establish trees in the Islands, the authorities must be prepared for a good deal of experimental work and many disappointments before they can entertain an idea of establishing a successful forest area or be certain of the impossibility of such an object. Unfortunately there are no native trees to guide them in the selection of likely subjects for forest work, whilst soil and climate are very indifferent. Wind and the comparative scarcity of natural shelter appear to be the chief difficulties standing in the way of any attempt to establish trees in the Islands. In addition, cold and wet soil, often of a sour, peaty nature, and a comparatively low maximum temperature, all of which are more or less detrimental to tree growth, have to be faced. On the other hand, the absence of severe frost and the fact that several European trees have grown well until they reached the top of their shelter are favourable signs and it is an encouraging fact that the European Gorse or Furze attains its maximum height in the Islands and that a Poplar and Willows thrive. This proves that, given shelter, the soil conditions can be adapted for the successful growth of certain exotic trees and in any future operations that may be contemplated provision should be made for planting the trees in large blocks, for the greater the depth of a plantation the taller the trees are likely to grow. In small woods planted in exposed places, practically all the trees are exposed and stunted, whereas in a wider area each succeeding rank of trees grows a little taller than the one immediately in front until finally well-developed specimens are obtained. For experimental purposes at least 50 acres in not more than three areas should be planted, provision being made for their proper upkeep for at least ten years. The most suitable position would probably be found in the valleys of the west Island. At the end of 10 years it would be possible to form a fairly accurate idea as to whether tree planting upon a more extended scale was justifiable and likely to be of benefit to the islanders, or whether the project was doomed to failure. In any case, if proper records were kept, the experiment would be of considerable value in the event of future operations of the same nature being suggested.

In order that any experiments that may be contemplated should not fail through want of proper attention to details, it is desirable that an intelligent man should be appointed who would be able to give his whole time to the work and be able to keep proper records. A young man with practical knowledge of forest work at a high elevation in the West Highlands of Scotland or on the mountains of Wales would be desirable, more particularly a man who was capable of training youths in all kinds of practical work, *i.e.*, seed sowing, nursery planting, permanent planting, preparing ground, fencing, draining, road-making, &c.

The provision of shelter appears to be the key to successful tree planting in the Falklands for given shelter from wind, other conditions of climate and soil can be met. The only native plant that can be depended upon for shelter is *Veronica elliptica*, and the maximum height of that plant is barely 7 ft. For shelter purposes the height may be taken as from 4 to 5 ft. There are other native shrubby plants growing from 1 to 4 ft. high which may also be of some value for certain places. Fortunately the common Gorse grows well in the Islands. It is a good shelter plant and in addition to being used for hedges, seed might be sown over land to be planted with trees two or three years in advance of the trees. Land that is already covered with Gorse could be dealt with immediately. In addition, various subjects such as those mentioned by Mr. Blake might be procured from Tierra del Fuego. Round the outskirts of a plantation a belt of Gorse or *Veronica* as dense as possible should be formed. (The accompanying photograph gives a good idea of the value of Gorse as a hedge plant for the Falklands.) The outer belt for a plantation should be 6 or 8 ft. wide, or perhaps a little wider on the side of the prevailing wind. Behind this the shelter plants should be thin enough to allow of trees being planted 3 ft. apart. This distance is approximate, and it may be found advisable to have small groups of shelter plants with young trees in between or even parallel, narrow hedges 12 to 20 ft. apart. In no case, however, ought the shelter plants to be allowed to form large gaps amongst the trees. They are simply to protect the young trees for a few years, afterwards they must provide their own shelter, which they are best able to do by forming a dense mass of branches. It is not advisable to form a straight boundary line to a plantation, an undulating outline often forming a better wind-break in addition to presenting a better appearance.

In places where the soil is naturally of a loamy or sandy nature and is naturally drained, it can be prepared for planting with little trouble. If clear of bushes it may be ploughed or turned over by some other means, but when bushes exist the intervening spaces should be dug, removing at the same time any plants not required for shelter. When the ground is naturally wet, open drains, 15 in. wide and 1½ to 2 ft. deep, or wider and deeper if necessary, should be dug at intervals of from 12 to 2 ft., parallel with the natural slope of the land. In the case of wet and sour peat, drains should be opened about 6 ft. apart. They should be 15 in. wide and 15 to 18 in. deep, the peat being removed in large blocks and laid upside down on the margins of the drains to sweeten; occasional wider and deeper drains may be required. From 4 to 6 months afterwards, a young tree may be planted in the centre of each turf, taking care to pulverize the soil well as it is replaced about the roots. A little basic slag may be mixed with the soil at the time. By the time the young trees have filled the upturned and inverted sod with roots, the upper or drained portion of the peat bed will have become sufficiently sweetened by drainage and the admission of air for the roots to enter. When cutting drains and arranging planting positions in this way the men should work in pairs, otherwise, for convenience, they are inclined to cut the peat out in small sections which are unsuitable for the subsequent reception of plants. As a rule the turves are so arranged that the plants can be placed about 3 ft. apart. Vacancies caused by the death of young trees must be filled at an early opportunity. Should a hard piece of clay or gravel occur a little below the surface of the ground it must be broken up during the preparatory work.

All ground that is to be planted with trees must be provided with a sheep- and rabbit-proof fence, otherwise the young trees will probably be eaten off soon after they are planted.

An acre or two of ground in a favourable situated part of the area selected for planting should be set apart for a nursery. The ground must be trenched, manured, and properly cultivated. Any ground not required for immediate use might be planted with potatoes, turnips or some other crop. Shelter must be provided by a wall or by a good hedge of *Veronica*, Gorse or some other subject; one or two cross hedges would also be an advantage. The seeds should be sown in beds 4 ft. wide and any convenient length, separated by paths 15 in. wide, advantage being taken of the earliest dry days of spring to carry out the work. When the young plants are about 3 in. high they must be transplanted into nursery lines 12 in. apart and 2 to 6 in. between the plants. In this position they will remain until 6 or 9 in. high. Any trees that can be increased by cuttings, such as Willows or Poplars, may be started in the nursery or in the places the trees are to occupy. Stock plants ought, however, to be kept for cuttings so that trees in permanent positions could be left untouched.

When the young trees are from 6-9 in. high they should be placed in permanent positions and spaced from 3-4 ft. apart, according to the nature of the soil and the species. They must be lifted carefully so that all the roots are preserved, and during planting, if the ground has not been previously worked, care must be taken to make the holes wide enough to allow the roots to spread out to their full extent. Care also must be taken to keep the upper roots near the surface of the soil. Early autumn and spring are the best times for planting trees. Probably autumn will be the most satisfactory time for the Falklands as the winds are stated to be at the worst in spring.

On account of the peculiar conditions prevailing in the Islands it is probable that evergreen coniferous trees will prove more successful than deciduous, broad-leaved trees, and for general planting, particularly on the wetter ground, it is likely that the most appropriate tree of all be *Picea sitchensis*, followed by *Picea Engelmanni* and *Picea alba*. The two former are natives of Western N. America and the latter of Eastern N. America. For well-drained land *Pinus Banksiana* from N. America, *P. contorta* var. *Murrayana* from Western N. America and the European *Pinus Cembra* and *Pinus sylvestris* might be tried. As a shelter tree for the outskirts of plantations a trial should be made of the Austrian Pine (*Pinus Laricio* var. *nigricans*). This is an excellent shelter tree although its timber is not of good quality. Other Conifers such as *Cupressus nootkatensis*, *Cupressus macrocarpa*, *Thuja plicata*, and *Araucaria imbricata* are worth a trial.

Amongst broad-leaved trees the most likely ones to succeed are Birches, Alders, Willows, Poplars and the Antarctic Beeches. Of the Birches the form *Betula alba, pubescens*, and the N. American *B. occidentalis* and *B. papyrifera* should be tried. The most suitable Alders are *Alnus glutinosa*, and *A. incana*, both European trees adapted for wet ground. Of the tree Willows *Salix alba, S. coerulea, S. fragilis* and *S. viridis* are suitable, whilst of basket-making Willows *S. triandra, S. viminalis, S. purpurea* and *S. rubra* might be tried. Poplars should be represented by *P. Eugeni, P. serotina, P. canescens*, and *P. trichocarpa*. The Sycamore, *Acer Pseudo-platanus*, and the Antarctic Beeches from Tierra del Fuego are also worth attention. For shelter and ornament the following small trees and shrubs may be tried. *Ligustrum ovalifolium, L. vulgare, Tamarix* in variety, *Sambucus nigra*, the stronger-growing New Zealand Veronics, *Hippophae rhamnoides, Escallonia macrantha, Pyrus Aucuparia, P. Aria, P. intermedia, Berberis Darwinii, B. Aquifolium, Rhododendron ponticum, R. catawbiense, Olearia Haastii, Calluna vulgaris*, and *Cytisus scoparius*.

To conduct anything like an exhaustive experiment with trees planted under forest conditions will entail some considerable expense, but that cannot be avoided, and in a letter to Kew, dated 14th April, 1919, Mr. Blake says that he is willing to undertake the preparation of all the land required for such an experiment providing an expert man is provided to control the work.

It is to be hoped that the Government of the Falkland Islands may find itself in a position to accept Mr. Blake's interesting offer, as the proper preparation of the ground, which is a matter of considerable expense, is of prime importance, and such an experiment should certainly be made.

TUSSOCK GRASS OR TUSSAC GRASS.

Poa flabellata, Hook. f., the Tussock or Tussac Grass, is one of the most interesting plants of the Falkland Islands. It is a perennial and forms large clumps or masses rising to a height of 7 ft. with long, arching leaves which possess valuable feeding properties and are greedily eaten by horses, cattle and sheep. The bases of the leaves, stem and rootstock are sweet, with a nutty flavour, and offer such a temptation to horses and cattle that when allowed free access to the plants they almost invariably kill them by eating them to the ground line. Sections of the stems cut into small pieces and prepared in various ways are also eaten by the inhabitants, whilst one of the early Governors of the Islands records that two deserters from an American ship kept themselves alive for 14 months by eating the stems.

Attention was originally directed to the plant by Col. Moody, the first Lieut.-Governor of the Falklands, in 1842, in a dispatch to Lord Stanley at the Colonial Office. During the same year the Antarctic Expedition under Sir James Clark Ross wintered in the Islands and Dr. Hooker paid a good deal of attention to the grass, sending home a description and apparently seeds to his father, Sir William Hooker, at Kew, who, in turn, read a paper on the plant before the Geological Society in November, 1842. From that time onwards for several years Governor Moody continued to direct the attention of the Colonial Office to the value of the grass as a fodder plant and strongly recommended on several occasions that experiments should be made with it on the exposed shores of the islands on the coast of Scotland, suggesting that one of the small islands of the Orkneys, such as Hunda, should be given up for the purpose. He further recommended that a man should be sent out to study the plant and collect seeds.

In 1844 Governor Moody reported to Lord Stanley that a settler, Jergen Christian Detleff, had a parcel of 6 lbs. of Tussac seed for sale, which he was desirous of sending to England and for which he expected not less than £2 10s. a pound, but for a large quantity he would probably accept a less price per pound. In this report the Governor very strongly recommended that the grass should be given an extensive trial in Britain, and on 1st February, 1844, in a letter to Sir W. Hooker, he advised the dispatch of a quantity of seed for Kew, enclosed with a larger amount to Lord Stanley at the Colonial Office, with a quantity from a settler on speculation for sale. This seed appears to have been widely distributed, and there is evidence that within a few months plants were growing at Kew, Glasnevin, Cloubrenny in County Meath and in the Island of Lewis. It is only in the latter place, however, that there is any reason to suppose that it was planted as a farm crop. The seed was sent to Lewis by Mr. (afterwards Sir James) Matheson, then a Member of Parliament, and the cultivation of the grass was undertaken by Mr. Scobie. Writing to Mr. Matheson in 1849, Mr. Scobie reported "The seeds which you sent me in 1844 were sown the following spring in various parts of the islands, viz., Coll, Holm, Linsader, Golsen, &c.; of all these the two former were the only places where this valuable grass appeared, and of these two Holm was the most successful and vigorous, being sown in a square plot of deep, brown moss of medium dryness close to the sea." About this time Lewis-grown seed appears to have germinated fairly well and all spare seed was sent to Messrs. Lawson, of Edinburgh. The only sample in the Kew Museums was procured from that firm and was from the 1850 crop. Some years later when seeds were required to send to Australia there was a difficulty in obtaining them fully developed or fertile. On several occasions between 1850 and 1888 plants were sent from Stornoway to Kew for distribution to other places. In 1888, however, the farm-grown plants had disappeared from Lewis owing to the apathy of the farmers and their objection to planting a grass that required cultivation and could only be fed to stock in a cut state, through the animals killing the plant when allowed to graze upon land where it was planted. The plants obtained in 1888 were from the private garden of Sir James Matheson at Stornoway, and some were sent to Prof. Hartog at Cork, who reported the following year that the grass was doing well on drained bog at Dunmanway. In 1889 Prof. Hartog received seeds direct from the Falkland Islands which seem to have grown well in Ireland. He sent seeds to Kew and other places which do not appear to have caused later comment. As a matter of fact the grass does not grow well at Kew; it never becomes vigorous and soon dies out. It apparently must have a comparatively cool climate and a peaty soil. As Mr. Scobie attained a greater degree of success than any other planter in Britain so far as records show, it may be advisable to quote his remarks regarding the behaviour of the grass in Lewis. He says: "The seed was sown in a square plot of deep brown moss of medium dryness close to the sea. The moss, scarcely yielding anything previous to its being turned over and enclosed, was delved and cut into small pieces with the spade, and the seeds sprinkled in and roughly covered with a rake, and trampled at the same time with the feet. The second year the stools were almost as strong as the third, though it is allowed this grass only attains maturity the third year, it cast seed the second and third years. Three acres were delved over, of the same deep moss, in spring, 1847, to the depth of 12 in., and after it was packed with a hoe, a sprinkling of guano applied, and single plants dibbled 3 ft. 4 in. apart. The whole of this prepared moss is drained 3 ft. deep and 20 ft. apart, being moss drains. I think the moss for the Tussac should be delved over in January, and a light spading of moss thrown over the surface, out of the bottom of the trench, to keep out the sun from drying-up the moss too much. February, March and April are most advisable for planting, May and June having proved too late and dry. Plants supplied with seaweed manure are greener in the leaf and thriving better than the rest. Some failure occurred from wet rising from below in the moss, and also from imperfect drainage, and from drought, the peat being liable to become very hard in summer. Seaweed spread over the surface of the ground in summer is an advantage."

According to a Kew record dated 1877,* the plants on Sir

* Kew Report, 1877, p. 21.

James Matheson's land in the Hebrides had for some time suffered from the attacks of a coleopterous larva. By the same note we find that Sir Joseph Hooker had by that time modified his views regarding the general value of the grass, for he says: "I have expressed my doubts as to the plant being really adapted for pasture purposes. The Tussocks are only formed slowly, and would be soon destroyed by cattle, and the plant consequently exterminated."

Within the last few years recommendations have been made that the grass should be widely planted in the colder and more exposed parts of Britain, but before undertaking experiments, intending cultivators would be well advised to take advantage of the experience gained from previous experiments, and to remember that the plant can only be grown successfully in positions near the sea, and on properly drained and cultivated ground. Moreover, the leaves must be cut and fed to cattle, for if cattle are allowed free access to the plants they are invariably killed by the animals eating the bases. It must also be remembered that the grass has not come up to expectations in the past, either here or in the Falklands, where in 1844 it was referred to as the Golden Glory of the Falkland Islands.†

† A Report on the capabilities of the Falkland Islands.

There appears to have been some disagreement as to the date of introduction of Tussock Grass into the British Isles. The Ross Expedition has been credited with its introduction in 1842, and another date is given as 1844. The matter appears to be settled in "Life and Letters of Sir J. D. Hooker," i. p. 130. Answering a letter to Sir J. Ross in November, 1844, Sir Joseph wrote: "I am delighted to hear that some of the old Tussac vegetated, as everyone has said that our expedition seed all failed. It is quite a triumph to me, I can assure you, as now the expedition was the first to introduce the grass. I have 11 plants in my bedroom, growing very slowly, and there are a great many in the garden." This evidence is, however, discredited by a later letter written to Sir J. Ross on 1st September, 1845, for Sir Joseph writes: "your excellent brother's plant of Tussac flowered with us and turned out to be the British *Dactylis glomerata*, to our shame and confusion at Kew. . . . The fact is that we have only lately procured seeds and raised young plants of the true Tussac." This suggests that the first plants were raised from seeds sent by Governor Moody in 1844.

For an exhaustive account of the introduction to, and experimental planting of Tussock Grass in Britain, the Journal of the Royal Agricultural Society, 1842-1850, should be consulted.

EXPLANATION OF PLATES.

Plate I.—The homestead surrounded by Gorse hedges some 6 ft. or 8 ft. high. The crop being cut is green oats for hay. The house stands about 80 ft. above sea level. All the land under oats is suitable for tree-growing. The hill in the distance rises to 2000 ft.

Plate II., Fig. 1.—A crop of oats with potatoes in the foreground close to the fence.

Fig. 2.—The same batch of oats seen in Fig. 1. The fence and potatoes being on the right of the photograph. The ground is all ploughed down to the beach.

SeedsWhere obtainable

<i>Betula alba pubescens</i>	Kew next year
- - <i>verrucosa</i>	Johannes Rafn Copenhagen F.
- <i>occidentalis</i>	Kew
- <i>papyrifera</i>	Kew
<i>Alnus glutinosa</i>	Rafn.
" <i>incana</i>	do., Kew
<i>Ligustrum ovalifolium</i>	Vilmorin 4, Quai de la Mégisserie, Paris
- <i>vulgare</i>	do.
<i>Tamarix gallica</i>	do.
<i>Sambucus nigra</i>	do.
<i>Hippophae rhamnoides</i>	Kew. Vilmorin
<i>Pyrus aucuparia</i>	Kew Vilmorin
- <i>Aria</i>	Kew Vilmorin
- <i>intermedia</i>	Kew next year
<i>Berberis Darwinii</i>	Kew. Vilmorin
<i>Ulex europaeus</i> (gorse)	Dicksons, Chester.
<i>Berberis Aquifolium</i>	Kew.
<i>Rhododendron ponticum</i>	Kew.
<i>Olearia Naastii</i>	Kew.
<i>Cytisus scoparius</i> (Broom)	Kew. Dicksons.
<u>Conifers.</u>	
<i>Picea sitchensis</i>	Vilmorin
- <i>Engelmannii</i>	do.
- <i>alba</i>	do. Rafn
<i>Pinus contorta murrayana</i>	do.
- <i>Cembra</i>	do.
- <i>sylvestris</i>	do. Rafn
- <i>Laricio nigricans</i> (Austrian)	do.
<i>Cupressus nothkatensis</i>	do.
<i>Thuja plicata</i> (gigantea)	do.
<i>Araucaria imbricata</i>	do.

All the cuttings of *Salix* (Willow) and *Populus* (poplar) can be supplied by Kew

- | | |
|------------------------------|---------------------------------------|
| <i>Alnus cordifolia.</i> | <i>Cyperus Lawsoniana.</i> |
| <i>pinna.</i> | <i>Cytisus scoparius.</i> |
| <i>incana.</i> | " " var. <i>Andraemus.</i> |
| <i>Berberis Aquifolium.</i> | <i>Fraxinus oregona.</i> |
| <i>Darwinii.</i> | " <i>pennsylvanica, 2.</i> |
| <i>Betula lutea.</i> | <i>Genista virgata.</i> |
| " <i>Maximowiczii, 2.</i> | <i>Pyrus Aucuparia var. moravica.</i> |
| " <i>occidentalis.</i> | " <i>pinnatifida.</i> |
| " <i>papyrifera.</i> | " <i>prunifolia.</i> |
| <i>Caragana arborescens.</i> | " <i>rotundifolia.</i> |
| <i>Cornus alba.</i> | <i>Rosa sericea.</i> |
| " <i>mas.</i> | " <i>Soulicana.</i> |
| " <i>officinalis.</i> | <i>Spartium junceum.</i> |
| " <i>sanguinea</i> | <i>Thuja plicata</i> |

Seeds of trees such as *Picea sitchensis*, *P. alba*, *Pinus sylvestris*, *P. Laricio* var. *nigricans*, *P. Banksiana*, common Birch and Alder etc., may be obtained from Messrs Dicksons, Ltd., Seedmen, Eastgate Street, Chester; Messrs. Little & Ballantyne, Seedmen, Carlisle; W. Wm. Wireman, Seedman, Forres; W. E. Wireman, Seedman, Elgin, Morayshire; or Messrs. Dickson & Co., Seedmen, Waterloo Place, Edinburgh.

Norway Spruce.

Yew
Kiefer

Common
Alder

Tree Willow

Siberian Spruce

White Pine

Giant Arbutus

Shrub Sea Buckthorn

Strawberry

Belgian system of planting on turfs
by

Sir John Stirling Maxwell.

21. Belgian System of Planting on Turfs.

(*With Plates.*)

By SIR JOHN STIRLING-MAXWELL, Bart.

In 1906 I contributed to this Journal an account¹ of the method adopted for planting high moorlands in Belgium, and described some experiments which had been begun on the same lines at Corroun in Inverness-shire. It is too soon to pronounce anything like a final opinion on these experiments either in Belgium or Scotland, but some report may be welcome to a few readers who have taken an interest in the subject.

For the benefit of those who are not familiar with it, I may here recapitulate the rudiments of the system, referring the reader to the former article if more detail is required. The ground is prepared some months before planting by cutting shallow drains, the turfs from which are placed upside down in rows between the drains. Each tree is planted on a turf in a hole cut with a heavy trowel,² and is given two handfuls of such soil, sand, or gravel as can be obtained near at hand, mixed with a small proportion of basic slag or other manure, the plug cut out by the trowel being broken up and used to fill up the hole. This method is specially adapted for planting water-logged peat. The advantages claimed for it, as compared with notching, are :—

- (1) That smaller plants can be used.
- (2) That they begin to grow at once.
- (3) That they are not smothered by grass.
- (4) That they suffer less from drought and frost.
- (5) That they develop a better root-system.
- (6) That they are easier to beat up.

The ultimate success depends upon the broad fact that most kinds of peat, though utterly unsuitable for tree life in their water-logged state, form very fair soils for several coniferous species when air and water can circulate freely through them. The lifted turfs achieve this desirable transformation in a few months, and it extends gradually to the surrounding surface, as

¹ Vol. xx., page 4.

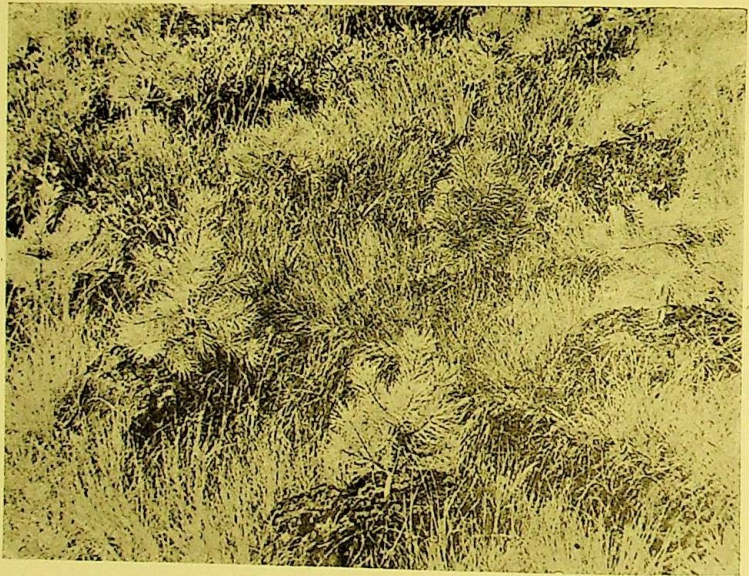
² This tool is illustrated in the former article. It can be obtained from Messrs P. & R. Fleming, 29 Argyle Street, Glasgow, price 7s.

the result of drainage, before the roots of the young trees begin to penetrate beyond the turfs.

In the Hertogenwald, easily reached from Verviers or Spa, this kind of planting may be seen on a very large scale. It has been in operation for some ten years, on moss land indistinguishable from a Scots moor in the nature of the soil and the variety of plants which cover it. The Belgian Government appears to be satisfied with the result, as its operations still continue, but the forest officers have laboured under very great difficulties. To begin with, the scene of operations is 1800 to 2000 feet above the sea, and it is absolutely without shelter, being the summit of a very long acclivity. The plantations are open to red deer and roe, not a heavy stock, but enough to do great damage. The Government, eager to afforest the largest area at the least expense, plants at six feet, which is much too wide, and the drains are too far apart to dry the ground effectually. Almost the only species employed is the common spruce (*Picea excelsa*), which suffers more than most trees from careless planting. The work is all done by contract, though under supervision of the forest officials. The work of preparation, which can be strictly specified and examined, is well done, but the plants supplied by the contractors are often unsatisfactory, and imported from too low an elevation. The results obtained are consequently slow, unequal, and rather disappointing.

The experiments at Corrouw were begun in 1907. They have been made partly at an elevation of 800 to 900 feet, and partly at 1300 to 1400 feet. The figures which follow all refer to the latter group of experiments, which now extends to rather more than 100,000 plants, not including the area to be planted this spring. The planting has all been done in spring (as it is in Belgium). There is no object in putting out the plants in autumn to be targets for the wind and frost. At the end of the first year's growth, under this method, they are well rooted and fit to hold their own. The species employed have been—

<i>Pinus sylvestris</i>	.	.	.	27,000
<i>Picea excelsa</i>	.	.	.	15,000
<i>Picea sitchensis</i>	.	.	.	14,000
<i>Picea alba</i>	.	.	.	10,000
<i>Pinus montana uncinata</i> (erect variety from the Pyrenees)	.	.	.	32,000
<i>Pinus strobus</i>	.	.	.	1000



2-YEAR SEEDLINGS OF SCOTS PINE.

"Planted" on turf April 1907, photographed October 1909. The upper figure shows a single tree; the lower, a portion of the plantation with the young trees among the herbage.

The preparation of the ground has cost hitherto £2, 6s. 8d. per acre for 4840 plants per acre. The planting, including the conveyance of sand, has cost 16s. 8d., making £3, 3s. 4d. in all. This does not include the cost of the plants. They were for the most part 2-year seedlings from the home nursery, and their cost, though it cannot be exactly estimated, is very small. Sand or fine gravel has been found on the spot, and is indeed seldom far off on a Scots moor. A small allowance must be made for the basic slag, which has been added to the sand in the proportion of one to seven. This manure certainly hastens the development of the plants during the first few years. In experiments made seven years ago in the Hertogenwald, its influence is still clearly visible both in the better development of the plants, and in the greater numbers which have survived the attacks of frost, game, etc. Sand without manure has given fairly good results at Corrou. Planting on the turf without the addition of anything has not succeeded nearly so well. When it is remembered that the ground could not have been planted at all without careful draining, and that it would have been useless to dibble 2-year seedlings into the natural surface, it will be seen that the expense has been very little if at all in excess of ordinary notching with 2-year 1-year plants. How the two methods compare in results can be judged from the photographs (Plates I. and II. and Fig. 1.)

In the accompanying figure (Fig. 1) the right-hand specimen is a 2-year seedling of Scots pine, which was planted on up-turned turf, the left a 2-year 1-year Scots pine, notched. Both specimens are from the same plantation, they were planted in April 1907, and photographed in October 1909.

As time goes on the difference will probably become more striking. The notched plants often sit five, six, or even ten years without making any perceptible growth—mere sticks with a microscopic tuft at the top, which once led a scornful person to observe that a rose with two Corrou trees made a nice button-hole.

I am not sure, however, that 2-year seedlings can be recommended for the turfs except in the case of Scots pine, which makes a strong growth in its third year, and always seems to get a good hold in the first season. Spruce and Mountain pine seedlings are delicate things, and unless they make a really good start the first year, are apt to get turned out by the frost.

In these species, 2-year 1-year plants certainly give the best result at 1300 feet. On lower ground, 2-year seedlings would no doubt succeed. The operation of planting, though perfectly easy, requires care, and I have discovered startling differences in

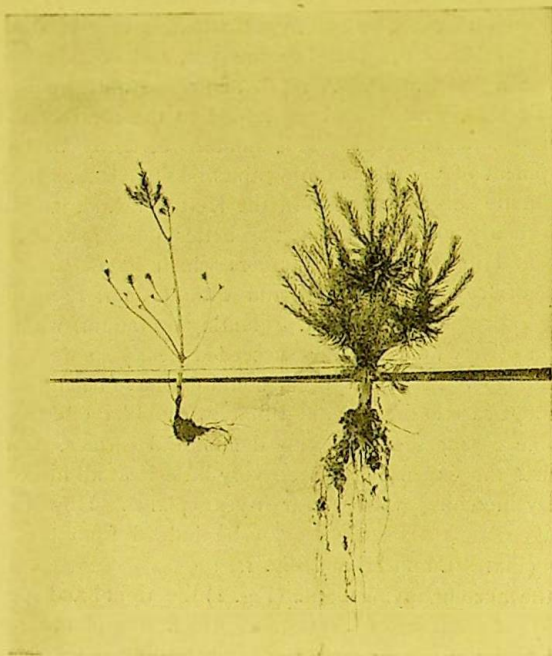


Fig. 1.

comparing the work of different planters. Each planter proceeds along a line of turfs, so it is easy to distinguish his work and compare it with that of the man on each side of him. In making such comparisons, I found that in the case of Norway spruce, the failures varied from 4 per cent. for a good planter to 48 per cent. for a bad one, and in the case of Scots pine from 0 per cent. to 33 per cent. The men were all new to this kind of planting and, I believe, were all doing their best, but their skill varied. The roots of 2-year seedlings are very fragile and require careful handling. In the case of Scots pine our percentage of blanks, 17 per cent., is large, but I attribute the heavy death rate partly to imperfect planting and partly to the

PLATE II.



SCOTS PINE 2-YEAR—1-YEAR.

"Notched" in April 1907, photographed in October 1909. The upper figure shows a single tree; in the lower, the plants can be distinguished among the herbage in the plantation.

fact that the seedlings were brought from the sheltered nursery at Pollok, which is less than 100 feet above sea-level. Nothing could be more vigorous than the 83 per cent. which survive, and I have no hesitation in recommending the use of 2-year seedlings of this species. We have reluctantly decided to abandon Scots pine altogether in the higher plantations, because the snow is too much for its brittle wood. Sitka spruce seems likely to give the best results on the turfs at high elevations. In a group planted in the spring of 1907 (with 2-year 1-year plants) I could only find two deaths, among the 424 plants composing the group. We also hope for great things from the Pyrenean Mountain pine, but it remains to be seen whether it will keep its upright habit in Scotland. The intermediate (German) variety of this pine has also been tried. This variety, by the way, may be seen 50 years old at Balmoral, where it was planted by the Prince Consort on a considerable scale. It evidently has no value as a timber tree, though it attains a greater height than the dwarf variety which is familiar in British gardens.

The method of planting above described is primarily intended for the conversion of wet moorlands into forest, but there are other cases in which it may be found useful. Mr Munro Ferguson tells me that he has employed it at Novar, and is employing it more every year. Where a good forest soil, clear of weeds, has to be re-planted, it would be obviously out of place. But where a plantation has to be made on grassy or weedy ground, it is probably in the end the cheapest and surest method, especially if it is desired to use small plants. On ordinary soils it will be unnecessary to add imported soil or manure; the decayed vegetation below the turfs will provide sufficient stimulant. If the ground does not require draining, the turfs can simply be turned over where they are wanted.

Sir,

I am directed by the Administrator to inform you that shortly before His Excellency left England he had ~~some~~ ^{several} conversations with the arboricultural authorities at Kew Gardens on the subject of tree-planting in the Falkland Islands, and to enclose for your information a copy of a Report issued by them on the subject.

2. In His Excellency's opinion, difficult though the

undertaking might be, the successful cultivation of ~~tree~~ certain species of trees in the Falkland Islands would be of the greatest benefit not only to the sheep-farming interests but also to the ^{entirely} ~~community~~ ^{It would mean the shift and also a great improvement in the general pasture for all animals.} Similar experiments in tree-growing have been made with success in certain parts of northern Europe and are now being prosecuted ~~in~~ on the north-west coast of Scotland under conditions of soil and climate approximating very ~~near~~ nearly to those obtaining in this Colony, and it seems not unreasonable to hope that followed up on correct lines, with expert guidance, a right selection of trees, and perseverance and care, the ~~growing~~ ^{growing} of trees in the Colony might eventually meet with a fair measure of success.

The Administrator is aware that certain experiments of this nature have already been made in the Colony but have met with but scant success, owing probably to the absence of expert knowledge of the subject and the lack of general interest in the project. I am to ask you if you will be so good as to inform me whether any such experiments have been made on the land under your ownership or management, and, if so, to state what ^{of success} ~~measure~~ ^{of success} has resulted. ^{Myself, Mr. Williams, and appropriate ones if any trees would be interesting to place on records.} I am further to say that His Excellency would be glad to be informed whether in the event of any general scheme of tree planting ~~on correct lines~~ being undertaken by the Government you would be prepared, after reading the enclosure to this

letter, to co-operate by setting aside a small portion of your land in a suitable situation ~~xxxx~~ for experimental purposes. Should a sufficient measure of encouragement be received in reply to this communication His Excellency would ~~be~~ propose to procure from Kew or elsewhere sufficient stocks of seeds of different varieties of trees judged most suitable for growing in the Colony and to supply these to such persons as desired to undertake experimental work in this connection. ^{He already has a certain number of seeds of 22 varieties of hardy trees obtained thro' the authorities} The fullest instructions and advice available from Kew and from certain experimental afforestation authorities working under conditions similar to those of the Falkland Islands ^{will} ~~would~~ be furnished for the guidance of those ^{concerned:} ~~interested, and, should the matter be taken up with interest by the majority of the sheep-farming community of the Colony it would doubtless be possible to obtain the ~~xx~~ personal services of an expert adviser during the early years of experimental work.~~

It is hoped that with the earnest cooperation of ^{persons interested} ~~the Colony~~ a sufficient start may be made to ~~justify~~ ^{justify} experiments on a larger scale, to the ultimate great advantage of the Colony.

Also a notice in gazette in brief to the above effect. (Let me see draft for gazette notice)

TRH

at Kew, and these he is prepared to distribute immediately among those who wish to commence experiments at once



832/19.

Rincou Grande
November 26th 1919

The Colonial Secretary.

Sir,

I beg to acknowledge receipt of your Circular No 832/19, on Tree planting in the Falklands, my opinion of Trees once one got any to grow, they would be beneficial to the Land by drying up the marshy patches & sheltering the Grasses which would bring it on much earlier, also a very good shelter for the Stock.

I'm quite willing to set aside a portion of Land for experimental purposes.

I have a couple of Poplar growing here, they do fairly well.

I am, Sir,
Your obedient Servant,
R. G. Round

832/19

Pearce Island
Dec 16th 1919

The Hon J. P. Goddard
Colonial Secretary

Sir,

In reply to

Circular No 832/19.

I am quite willing to set aside a piece
of land and experiment in tree growing.

I am Sir

Your obedient servant
Jason Hansen.

Sullivan House,
Falkland Islands.
24th December, 1919.

Sir,

With reference to your circular letter of the 6th November, I beg to inform you that up to the last few months there have been no experiments in tree planting made on the land under my management. Last October I planted some Scotch Elm seeds both here and at Fitzroy, the former in a cold frame and the latter outside in boxes. The seeds planted here in a cold frame started to germinate about a month ago and are now about six inches out of the ground. The seeds at Fitzroy have not yet germinated, probably because they were planted later and have not the advantage of a frame. Towards the end of November I planted Scotch Fir, Sea Buckthorn, Snowberry and Tree Purslane, both here and at Fitzroy but these have not yet had time to germinate.

I should be very glad to set aside a small portion of land for experimental purposes as I am of the opinion that if the right kind of seeds were obtained, tree planting in the Falkland Islands would be quite a feasible proposition.

I believe the Giant Arbor^{vita}~~vitae~~ would be a suitable tree for this country, as it grows in almost pure clay and is capable of withstanding a considerable amount of wind and salt spray. I tried to obtain seeds of this species last August from Paris but they had none in stock at that time.

I am, Sir,

Your obedient servant,

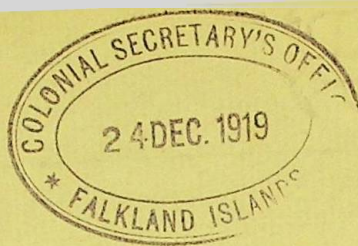
(Sgd) H. C. Harding.

The Honourable

The Colonial Secretary.

Stanley.

SULIVAN HOUSE,
FALKLAND ISLANDS.



832/19

December 24th 19

Sir,

With reference to your circular letter of the 6th November, I beg to inform you that up to the last few months there have been no experiments in tree planting made on the land under my management. Last October I planted some Scotch Elm seeds both here & at Fitzroy, the former in a cold frame, and the latter outside in boxes. The seeds planted here in a cold frame started to germinate about a month ago and are now about six inches out of the ground. The seeds at Fitzroy have not yet germinated, probably because they were planted later and have not the advantage of a frame. Towards the end of November I planted, Scotch Fir, Sea Buckthorn, Snowberry & Tree Pines, both here & at Fitzroy but these have not yet had time to germinate.

I should be very glad to set aside a small portion of land for

SULIVAN HOUSE,
FALKLAND ISLANDS.

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I am, Sir,

your obedient servant.

The Honorable

The Colonial Secretary
Stanley

H. C. Harding



Douglas Station, 832/19.
San Salvador,
Falkland Islands, S.A.

5th March 1920

Sir,

In reply to your circular No 832/19 dated November 6th 1919, I see no reason why certain trees should not be grown in the Falklands. I would be pleased if you would inform His Excellency I am quite willing to try some experiments round my Settlement. I have only one Willow and two or three Coast bushes growing at present and as they are all growing in shelter it is not a very fair test to see how they would do in the open.

I am, Sir,

your obedient servant
R. Goenshields



Petble Island
West Falklands
March 6th 1920.

The Colonial Secretary
Port Stanley.

Sir. Reference your Circular
No. 832/19 in which you
ask for any information
with regard to experiments
carried out in the grow-
-ing of kees on this stat-
-ion.

As far as I can determine
at various times in the
past fifty years attempts
have been made to grow
kees of several different
species, the most success-
-ful attempts being on
Keppel Island where

Falkland Islands under
forest conditions.

The experiments made
by the South American
Mission were made
under similar condi-
-tions to those made
at Hill Cove by Dr.
Blake and at least
twenty years earlier.

In the event of a gen-
-eral scheme of tree
-planting being under-
-taken I shall be pleas-
-ed to co-operate by set-
-ting aside a small
block of land suitably
situated for experiment-
-al purposes.

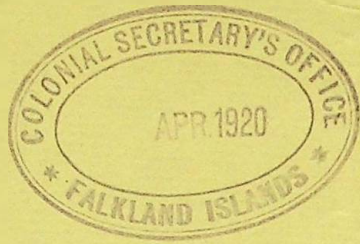
Yrs. Obediently
George. T. Deane.

There are at present about a dozen trees the largest of which is about 30 feet high.

These trees were planted by the South American Missionary Society, and were apparently all obtained in the first place from Yulra del Senego, some of them were planted certainly over forty-five and perhaps over fifty years ago.

May I point out that the extract from Kew Bulletin No 5 is in error when it states that "With the exception of W Blake no real effort has been made to establish trees in the

832/9.



Office of the Magistrate

Fox Bay.

W.F.

March 29th '20.

Sir,

I have the honour to state that I have received a letter, not however in official form, from Mr. J. Slaughter who is manager of Weddell and Speedwell Islands, "J. Clark" is apparently his sub manager at Speedwell.

Mr. Slaughter says -

"J. Clark at Speedwell is very keen on the tree business, the island is very exposed our idea is rather ambitious but we want to make hedges by degrees of gorse about the camp for shelter and would like to plant trees, will you ask the authorities in Stanley if they will send him (Clark?) The pamphlet on tree growing and some seeds, he has quite a good garden in which

which to plant seeds, and
leave the plants for some years
while the shelter is growing".

I have ventured to send
the extract alone since the letter
has a good deal of extraneous
matter in it, explained by Mr.
Slaughter being a personal friend.

This is the first application
I have received to have seeds
sent to any camp.

May I have copies of the literature on
this subject, to give to the wife of the manager at
Port Stephens. I have the honour to be,

Sir,

Your obedient servant

J. E. Hamilton.

Stipendiary Magistrate.

West Falkland.

The Honourable
Colonial Secretary

Stanley

E. 7.