

SOME NOTES ON COASTAL AFFORESTATION IN CO. WEXFORD

By J. J. DEASY.

I

INTRODUCTION.

From time to time since I took up duty as forester for the State lands at Curracloe, some foresters and others interested have made enquiries of me concerning afforestation in that area. In these notes I have endeavoured to give an idea of some conditions affecting tree growth there, the silvicultural methods practised, etc.

My own connection with Curracloe dates from October, 1942, and since then I have visited the area once every few months.

In submitting this paper for publication in *Irish Forestry* I have to acknowledge indebtedness to the following: Mr. T. McEvoy for first suggesting to me that I should write it; the Forestry Division for permission to publish it; Mr. T. Clear for furnishing the names of some of the plants; some of my predecessors, namely, Mr. D. McGlynn, Mr. D. Corboy, and Mr. E. Munnely, as well as the workman-in-charge, Mr. M. Kehoe, for giving me some information about the area (Mr. D. O'Brien who was forester for the area at the opening of the centre, I have not met); the Director of the Meteorological Service, Department of Industry and Commerce, for supplying tables of rainfall data; and Mr. M. Swan for a helpful suggestion concerning my comments on the future tree crop.

II

HISTORY.

A new note was struck in the State afforestation of wasteland in this country in 1931. In that year the Forestry Department purchased and undertook the planting of a tract of sand dunes at Curracloe, Co. Wexford (see Figure I).

This area consisted of a strip of ground running in a North-South direction, a little over two miles in length and about half a mile in breadth at its widest part. The sea washed its eastern and southern boundaries along their entire length. Outside, along the total length of its western boundary was an expanse of slobland extending to a maximum depth of two miles, which area was once a shallow arm of the sea but was reclaimed during the fifties of the last century. It can be assumed that prior to the reclamation of those sloblands the ground purchased by the Department consisted of a narrow tongue of land jutting into the sea.

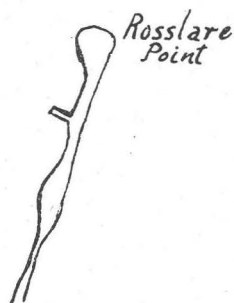
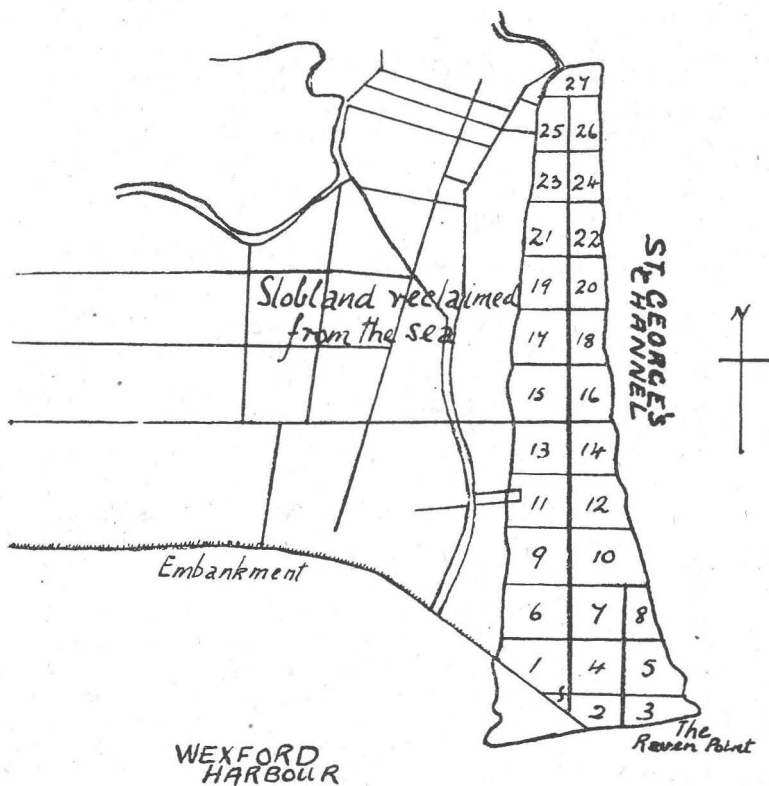


FIGURE I.

Scale — One and a Half Inches
to One Statute Mile.

At some period sand thrown ashore by the waves of the sea was blown on to this area forming dunes which varied in height from a few to fifty feet. These dunes which were widely and irregularly scattered were connected by ridges of sand. Most of the dunes and ridges were covered to a greater or less extent with vegetation; others or parts of others were destitute of any growth whatsoever. Between these dunes and ridges were low lying flat areas. Some of these areas were well covered with vegetation; some were only sparsely covered and contained pockets of loose sand; some were under water for part of the year.

It is a matter of doubt when this area was overwhelmed by sand. Except in the case of littoral dunes there has been little movement of sand here over a long number of years.

On the landward side of the area within the boundary there was a narrow strip of marshy land.

Vegetation.

At the time of acquisition the dominant vegetation was Marram Grass or Sea Matweed (*Psamma arenaria*) on the greater number of the dunes and ridges, Bracken (*Pteris aquilina*) and Yorkshire Fog (*Holcus lanatus*) on the lower well "fixed" ridges, Silver Weed (*Potentilla anserina*) and poor meadow grasses on the drier flat areas and Creeping Sally (*Salix repens*) and Rushes (*Juncus communis* and *J. acutus*) on the wetter flat areas.

Marram Grass by its rhizomes was capable of spreading quickly and was very tenacious in holding its grip once it gained a foothold. In this way it was an important factor in maintaining the stability of the sand.

Selection of Species.

The species used mostly were Scots Pine, Corsican Pine, Maritime Pine (*Pinus maritima* or *P. pinaster*) and Sitka Spruce. Other species used were *Pinus contorta*, Mountain Pine, Austrian Pine, *Pinus radiata* (*insignis*) and Black Alder.

On the bracken-covered areas a mixture of Scots Pine and Corsican Pine was made with the Scots Pine in the higher proportion; on the definitely fixed non-bracken areas (excluding the swampy ground) a similar mixture but with the higher proportion of Corsican Pine; and on the less fixed portions which included most of the plantable dunes, pure Corsican Pine. Some ground was set aside for Maritime Pine seed, mostly in dry well-fixed troughs on the seaward side of the area.

Unstable dunes, flat areas under water for part of the year and pockets of loose sand were considered unplantable.

For the swampy ground Sitka Spruce was selected with two rows of Black Alder along its western side, the outer row of which also corresponded to the western boundary of the plantation.

Cultural Operations.

A serious hindrance to the establishment of vegetation on the sands was the presence of stock and rabbits. The number of rabbits was immense. By burrowing and grazing they were responsible for much loosening of fixed sand and killing-off of young vegetation. On that account and owing to the fact that rabbits kill young trees by biting off the shoots and nibbling the bark, the first step taken was the fencing of the area with a stock-rabbit fence. It was not considered necessary to continue the fence along the whole coastline so it was erected along that line for only a certain distance at each end. The selection of the site of this coastal fence was a ticklish problem. It was a matter of trying to select a line where the fence would not be buried with the movement of sand nor yet left hanging by the sand being blown from under it. It did not prove possible however, to find such a line and repairs to parts of the fence on that side have often been necessary since.

The necessary fencing having been completed, the extermination of the rabbits by trapping, snaring and the use of fumigants was carried out pretty thoroughly.

Permanent rides were laid down dividing the area into compartments which ranged in size from 12 ac. to 27 ac.

Draining of the swampy ground was carried out, six and a quarter miles of main and sectional drains being made. The turves produced were inverted and spread at a spacing of 5' x 5' in preparation for the planting of Sitka Spruce and Alder.

The total area considered plantable was planted in the two seasons ended April, 1931 and April, 1932. Pitting and planting was done with the ordinary planting spades, the spacing for the pines being $4\frac{1}{2}' \times 4\frac{1}{2}'$, and the age of the plants being two-year-one. The cost of this work, excluding the cost of the plants on the ground, was on an average 18/- per acre. The pines were planted rather deeply with roots straight down as this was considered to have a good influence on the future windfirmness of the trees.

There were failures. Plants on partially stabilized sand were in some cases blown out of it completely, some were buried in sand-drifts, drought accounted for others, and hares for some more. In some areas the losses were as high as 50 %. Losses on well-fixed dunes were not heavy. Beeting-up of the definitely fixed areas only was carried out.

A small area of loose sand about an acre in extent was planted with Marram Grass with a view to stabilizing the sand. The grass for planting was thinned from parts where it grew thickly by the sea-shore. The tufts of grass were planted at a spacing of about 3' each way. They were quite effective in forming a cover.

It was decided at this stage that some time should elapse so that the position could be reviewed before further expense would be incurred in replacements.

Cleaning of the young plantation from grass and bracken was necessary during the first few summers. This consisted in switching over the bracken fronds before they opened fully and trampling or cutting the grass where heavy. That operation was necessary twice a year until the young trees became well established.

Direct Sowing of Maritime Pine Seed.

An area of approximately thirty-six acres was sown, some in 1931 and the remainder in 1932, with Maritime Pine seed. Some preparation of ground was necessary. This consisted of lightly skimming with nursery spades the surface vegetation off patches about 9" square. The minimum of sand was removed in this operation as it was found that blown sand tended to accumulate in the depressions thus formed and if these were made too deep, the seed was too heavily covered. The spacing of the patches was $4\frac{1}{2}' \times 4\frac{1}{2}'$. This work was done immediately before the sowing of the seeds.

The seeds were prepared by soaking in water for a week. They were then given a dressing of red lead powder as a protection against birds. The sowers carried the seed in light cans and followed those who prepared the patches, and the seeds, at the rate of 4 or 5 per patch, were lightly pressed into the sand with the foot. They were then covered with sand to a depth of a half inch. Sowing was done during the month of May.

The first year's sowings germinated well on the whole and as it was a favourable year the losses were not heavy. The second year's sowings also germinated well but the losses were heavy due to drought. The temperature of the sand rose very high on hot days with the result that many seedlings were scorched and killed off. Slugs accounted for more. Slaked lime was used effectively against the slugs. They were also collected in the early mornings. The blue-grey woodlouse (slater) was another pest of some importance and probably accounted for more than did the slugs. Many patches were left without any seedlings. These were beaten-up by re-seeding. It was found that transplanting the seedlings from patches where they were too thick tended to loosen the remaining ones too much.

The progress of most of the seedlings was disappointing during the first few years. About 5 % made satisfactory progress but the remainder lagged behind. The conditions affecting the weak ones seemed to be the same as the conditions affecting the strong ones. After four or five years, however, the seedlings that survived the check period came away satisfactorily. Where the clumps were too thick they were thinned by breaking over the superfluous seedlings. The fact that the seeds germinated well but that most of the seedlings spent a long period in check, with heavy losses was rather discouraging and resulted in this method losing favour to some extent so far as the quick establishment of a crop was concerned.

A trial was given to some well-rotted leafmould which was brought some distance from an old hardwood stand. This was placed on the prepared patches before the sowing of the seed and was also used in covering them. It seemed to have been effective to some extent in conserving the moisture but apart from that no great benefit seemed to have been derived from it.

MANURIAL EXPERIMENT.

A small manurial experiment was carried out on an area of seedlings in Compartment 27. The manures used were :—

- (a) 1 oz. Nitro chalk per patch ;
- (b) 1 oz. Nitro chalk and 2 ozs. Semsol per patch ;
- (c) 2 ozs. Semsol per patch ;
- (d) 2 ozs. Basic Slag per patch.

A separate plot was set apart for each manure, the conditions in each of the four plots appearing as nearly identical as possible. The manures were applied to every second row in the year of sowing when the seedlings were well up. The seedlings thus treated do not seem to have benefited, however. In all cases the patches of seedlings had to be weeded each summer until they reached the stage when they were safe from damaging weed growth.

Experiment in Planting Seedling Types.

In 1940 some experimental plots of Maritime Pine were planted in Compartment 27. The seedlings were raised at Avondale and were planted out as one year seedlings. They were divided into four lots, each lot having received different nursery treatment as follows :—

- (a) Seedlings wrenched once during the summer, lifted and lined out in October following ;
 - (b) Seedlings wrenched once during the summer, “ balled ” (i.e., roots covered in a ball of nursery soil with an outer covering of moss tied on to hold the soil in place) and lined out in October following.
 - (c) Seedlings wrenched twice, balled and lined out in October.
 - (d) Seedlings not wrenched but balled and lined out in October.
- The four plots were planted on a site where conditions appeared to be uniform throughout. The losses were lightest in the case of (c) and heaviest in the case of (d). Losses in (a) and (b) were the same.

At present the growth of the surviving plants in (a) and (b) is about the same. Growth in (c) is better than in either (a) or (b) and growth in (d) is better than in (c).

Some further planting of Maritime Pine, some plants balled, some with naked roots, has since been carried out. The former are making better progress, sometimes rather strikingly so.

Insects and Fungi.

In 1938 the Sitka Spruce, planted in 1931 and 1932, was attacked by *Neomyzaphis abietina* and was partially defoliated. They were free of them by 1940.

In 1939 there was the first evidence of the caterpillars of the Pine Shoot Moth (*Evetria buoliana*). The Scots Pine was the first to be affected. The attack spread along the landward side of the area and caused great devastation. The Corsican Pine which at first appeared immune was attacked to a limited extent where it grew in mixture with the Scots Pine. Very few trees of the latter escaped. The caterpillars were still at work in the summer of 1945 and had by then turned their attention to the *Pinus contorta*. At that time no insect parasitic on these caterpillars seemed to have put in an appearance.

This outbreak was a rather unfortunate occurrence as the affected trees can never be expected to be more than firewood.

It is uncertain how this pest reached this area as there are no coniferous trees within a few miles of it. It is probable that it was introduced with a consignment of plants.

The presence of the Pine Needle Cast Fungus (*Lophodermium pinastri*) was apparent in the Scots Pine and Corsican Pine mixtures but no serious damage was caused.

Fire.

The danger from fire here is real enough. In most cases, however, the blocks are separated by wide strips without trees and surface fires are easily controlled by the use of sand. As regards sources of danger it is the old story here. The worst offenders are the careless holiday makers who go into the plantations and nonchalantly throw away lighted cigarette ends or leave picnic fires to burn themselves out unattended.

There was an outbreak of fire in September, 1943, when a small number of Corsican Pine on the slope of a dune was destroyed.

During the danger periods the area is patrolled as a precautionary measure against fire.

Climate and its Effects.

The nearest Rainfall Station where climatic conditions approximate to those at Curracloe is at Courtown Harbour which is about twenty-five miles to the North. There the average rainfall over the ten years 1935 to 1944 inclusive was 37.64 inches per annum. For the period during which active shoot growth of pines and spruces is apparent each year, the average monthly rainfall recorded at the same station for years 1940 to 1944 inclusive was as follows: March 2.76 inches, April 2.09 inches, May 2.60 inches, June 1.24 inches, July 2.22 inches, August 1.98 inches.

Once the trees are established here there appears to be little danger from lack of moisture as there is nothing in this ground to impede the downward progress of the roots. An example of the depth to which tree roots penetrate in the sand can be seen where the side has been blown out of a partially stabilized dune. On the section of the dune can be seen the roots of Corsican Pine which have penetrated downward as much as 30 feet in search of moisture and nutrients.

Wind force is the most important limiting factor in the production of a good crop here. Shortly after the plantation was laid down severe east winds caused considerable losses by blasting the foliage on the eastern half of the area. Later when the trees came up the Scots Pine and even the *Pinus contorta* over the whole area suffered from blast due to strong gales from S.W. and W. Practically all recovered but there were losses among the Scots Pine.

Frost caused some damage to the needles of the Scots Pine in January, 1940, and some *Pinus radiata* were killed outright at the same time. The Sitka Spruce has occasionally been damaged by late spring frosts but in most cases the growth of the leading shoots was not sufficiently advanced to be susceptible.

III

PRESENT POSITION.

Tree Crop.

Some very good blocks of Maritime Pine and Corsican Pine are now to be seen, especially in sheltered places. Some trees of these species sown or planted in 1931 are now (Autumn, 1945) 20' high with a b.h.q.g. of 4". A big percentage of the Maritime Pine, however, are leaning, curved and heavily branched. The *Pinus radiata* are looking very healthy and seem well able to withstand salt spray and strong gales. On parts of the marshy ground the Sitka Spruce, having penetrated the top layer of peaty soil which was about 8" deep, has struck the pure sand, and, as a result, trees that once seemed promising are now anything but healthy looking. In parts where the layer of peaty soil is thicker, the growth of this species is still vigorous. Mountain Pine made very poor progress and in some cases are only bushes about 2' high. Austrian Pine looks healthy but the growth has been rather slow.

Vegetation and Fixation.

The vegetation on the area at present is by no means a poor one and the dunes, ridges and flat areas abound in many of our well known inland flora as well as many species peculiar to the sea-shore. Dominant among the former in addition to those mentioned earlier are: Yellow Bedstraw (*Galium verum*), Hearts-ease (*Viola tricolor*),

Bird's-foot Trefoil (*Lotus corniculatus*), Rest-harrow (*Ononis arvensis*), Sun Spurge (*Euphorbia paralias*) and Portland Spurge (*Euphorbia portlandica*), members of the family Orchidaceæ, and many relatives of the Dandelion and Daisy. Mosses and Lichens are also to be found as well as some Fungi such as Puff-Balls. Conspicuous among the flora of the sea-shore is the Sea Holly (*Eryngium maritimum*).

There has been a big advance in the fixation of the loose sand areas inland since the area was fenced and planted. There is no doubt that the absence of stock and rabbits has been responsible to a great extent for the spread of vegetation. The shelter produced by the tree crop has also had a favourable influence as the commotion of sand produced by the wind is not as great as when the area was bare of trees and exposed to every breeze.

There has not been much improvement in the case of littoral dunes, however. The shapes of these are often changed. Holes are torn in their sides by violent storms. These holes, mostly basin-shaped, are deepened by the sand being whirled around in them by the wind and then as a result of a gust the sand is whisked out and deposited elsewhere.

In 1939 a violent storm caused drifting of a littoral dune which resulted in closing the entrance of a small inlet of the sea, thereby reclaiming some 5 or 6 acres. It cannot be stated, however, that this area is permanently reclaimed as one never knows when, by some vagary of the weather, this dune blocking the entrance will get yet another shift.

Seed Production.

Good crops of seed are at present being borne on Scots Pine, *Pinus contorta*, Maritime Pine and Mountain Pine sown or planted 1931 and 1932. So far no natural regeneration of any species has occurred. Even though the direct sowings of Maritime Pine seed have not been very successful, the fact that the seed is so readily available and that this method of stocking the area is cheap, has resulted in an effort to fill the suitable blanks by sowings of Maritime Pine seed collected and extracted on the spot. The seed is extracted during hot spells in summer, or at other seasons on a sheet of iron over a well-fenced fire. The temperature at the iron is not allowed to rise above 120° F. The cones open fairly easily and the seeds are then shaken out and the wings rubbed off before storing. About 10 lbs. of seed are ready for sowing each season.

IV

FUTURE TREE CROP.

As I have not seen any mature plantation-grown trees on like or nearly like situations, it is not possible for me to forecast with any

certainty the probable yield. The production of good class commercial timber during the first rotation cannot be regarded as a guaranteed success, however.

It is not known if or when the attack of the Pine Shoot Moth will peter out nor is it known which species it may attack next.

It can be expected that as the trees grow taller they will suffer from blast. Scots Pine shows much signs of blast at present and on that account even if it had never been attacked by an insect pest, would not be a good yielder on this area. Damage by wind to the edges of the plantation can be expected. As the plantation is made up of a series of small blocks with rather extensive unplanted areas between, it can be expected that the marginal trees for some depth in these blocks will be blasted. The trees on high dunes may also be expected to suffer. Taking all factors into consideration the safest species now appear to be Maritime Pine, *Pinus radiata*, Austrian Pine, Corsican Pine and *Pinus contorta* in that order.

Apart from the production of commercial timber this plantation will play an important part in the role of protective forest which in itself is sufficient justification for the expense incurred. By the use of the "selection system" at the time of felling (i.e., gradual removal of trees and planting or encouraging natural regeneration in the shelter of standing trees) it should be possible to prevent or greatly minimise wind damage to the succeeding crop.

The plantation will act as a defence against the possible sudden encroachment of sand on the valuable flat sloblands to the west and also shelter them for some depth in from cold east winds.

The plantation already has an æsthetic and ornamental value. It is thus a good example of how forestry operations, by the exclusion of stock and ground game, can greatly increase the number and abundance of objects of interest to the naturalist and others.

To the regular visitor this dune land can be a dreary and depressing place in winter time. With the sky overcast and the clouds threatening, the sea roaring and shades of Sahara in the landscape the effect can be very melancholy.

There is some compensation, however, in the summer time. When the sun is high and the sky is blue there are many sights that can gladden one's heart and arouse one's interest. There can be seen the great number of butterflies that frequent this sandy land. Such beauties of the butterfly world as the Peacock and the Red Admiral can be found here in large numbers as well as many other lovely and decorative ones that are not often seen inland. Some flit energetically about, others flutter laboriously and after a short flight may flop at your feet as you walk along. The green and red Burnet Moths are very numerous here and may be seen in swarms at the time of hatching out, some flying weakly about, others hanging on blades of grass waiting for their wings to dry.

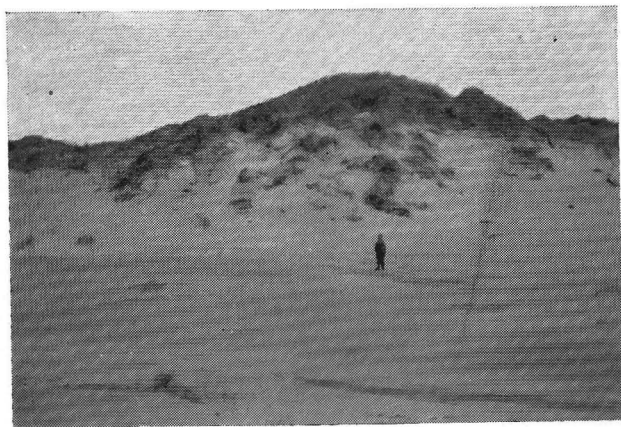


FIG. II



FIG. III



FIG. IV

Slugs and snails are here in great variety (not very attractive these, but interesting, even if some are harmful). In shady places or when the dew is still on the grass some fine specimens of the large black slug can be found. Up to 4" in length, it has a smooth neck and a corrugated back. If you watch it, it may sometimes rear its head high which would indicate that it is not such an humble creature as one might imagine!

Walking along through pockets of loose sand one is struck by the manner in which the sand has been rippled into the most fanciful wave-marks by the wind; or by the beautiful patterns created by the tufts of Marram Grass on the bare sand as they shoot up at regular intervals from the open network of rhizomes to form squares, diamonds and triangles sometimes very perfect in outline.

In general the scenery has improved considerably since the area was planted. Standing on the top of a high dune one is pleased by the picturesque pattern that meets the eye. Here can be seen blocks of young trees as they form canopy and transform this erstwhile semi-desert waste into what one hopes will be productive forest.

The bird population has increased with the growth of the trees and blackbirds and thrushes can often be heard in full song. Finches, sparrows and other small birds are plentiful.

Indeed, if no other purpose were served by the planting but the improvement of the amenities of this stretch of coast, it would, to many, be compensation enough.

NOTES ON FIGURES.

FIGURE I: The numbers 1 to 27 indicate the compartment numbers of the Curracloe plantation.

FIGURE II: Partially stabilised dune, some distance from the shore, looking south-west, compartment 17. Note the cap of marram grass.

FIGURE III: Maritime Pine produced from direct sowing of seed in 1931. Compartment 4. Note cones.

FIGURE IV: In the foreground, unplantable area, under water for part of the year; in the background partially stabilised dune surrounded by pine trees. Looking south, compartment 12.
