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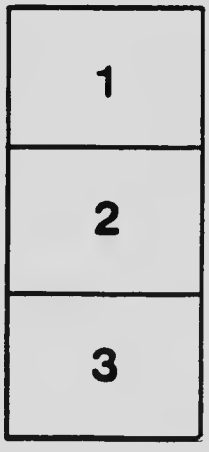

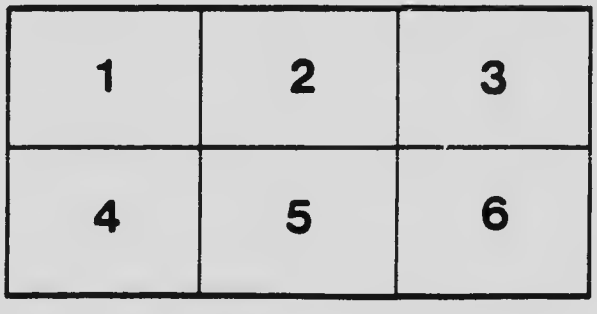

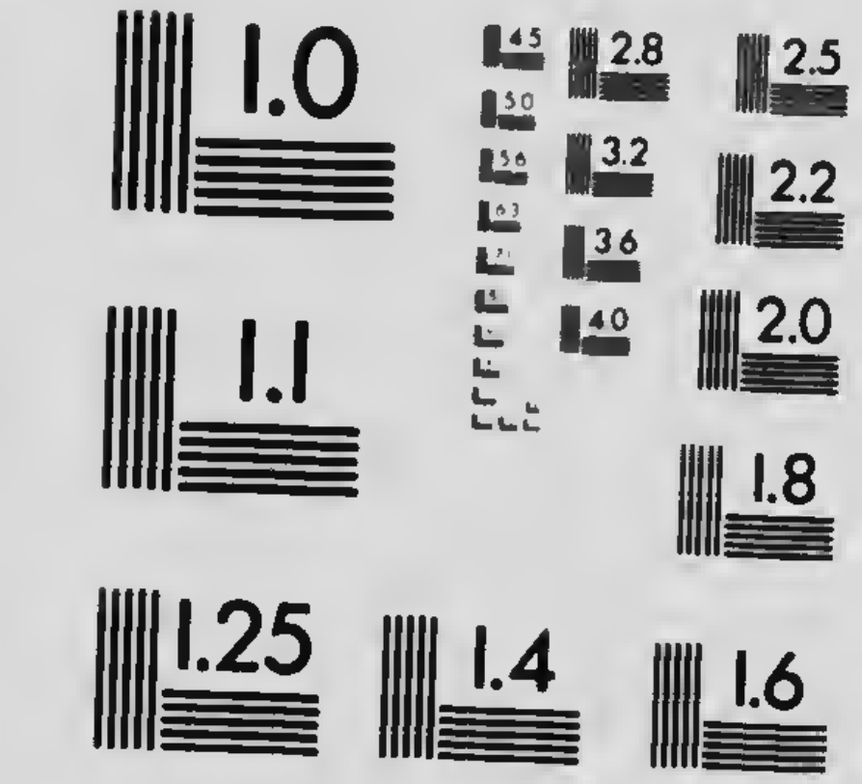

DEPARTMENT OF THE INTERIOR, CANADA
Hon. FRANK OLIVER, Minister; W. W. CORY, Deputy Minister
FORESTRY BRANCH—BULLETIN No. 10
R. H. CAMPBELL, Superintendent of Forestry

THE FARMER'S PLANTATION

BY

A. MITCHELL
Assistant Chief, Tree-Planting Division

OTTAWA
GOVERNMENT PRINTING BUREAU
1910

DEPARTMENT OF THE INTERIOR CANADA
Hon. Frank Oliver, Minister; W. W. Cory, Deputy Minister
FORESTRY BRANCH BULLETIN No. 40
R. H. Campbell, Superintendent of Forestry

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS.

PLATE I.

Photo by A. Mitchell, 1910.

Four years' growth of Manitoba Maple and Ash in Central Saskatchewan, near Cory, Sask.

PLATE II

Photo by A. Mitchell, 1910.

Four seasons' growth in Central Saskatchewan, near Delisle.

THE FARMER'S PLANTATION.

Most farmers when they begin life on the open prairie intend some time or other to plant at least a few trees to shelter their buildings and garden. Some begin to prepare for tree planting as soon as they get on their land, others prefer to leave it till later; but nearly every one has the intention, some time or other, of doing some planting.

The Forestry Branch has been assisting settlers to plant since 1901, and in that time it has been possible to note particularly the various difficulties experienced by the farmer in disposing of his plantations to the best advantage, and in bringing them to a successful issue.

The following pages deal with some of the [illegible] and it is hoped they will be of use to the farmer in carrying on his planting operations.

NARROW VS. BROAD BELTS.

NARROW PLANTING AND SINGLE ROWS OF TREES.

As with all other branches of crop growing in the west, the question of the rainfall at any locality is of the greatest importance in the work of tree planting. For instance, in Manitoba it is quite common to see single rows, or narrow belts of three or four rows, of maples or other trees doing quite well, even with sod covering the ground all under them, and a farmer from that province is astonished when he finds on coming further west that if he attempts to grow trees under the same conditions and allows the grass to grow under them, they at once begin to suffer, and that unless it is cleared away and the land again brought under cultivation, they will die altogether. In like manner Ontario men are surprised when they find that the system practised on their old farms in the east, of planting a single row of maples one rod apart all round the farm, is one not to be thought of in the west.

The truth is that all these styles of farm planting are quite possible in all parts of the western provinces, but they cost in work and money more than they do in the east, and more than the average farmer can spare.

The average annual rainfall in Ontario is about 33 inches, in Manitoba 22 to 25 inches, while that of some parts of Alberta and Saskatchewan is as low as 13 to 14 inches; and, when it is remembered that one inch of rainfall means 113⅓ tons of water per acre, it will be at once apparent that there is a vast difference in the conditions under which trees have to be grown in the western prairies as compared with those that prevail in Ontario. Single rows and narrow belts can be grown in the drier parts of the west, but it is at the expense of constant cultivation to conserve the moisture, and few farmers can afford to spend so much time on work of so unproductive a nature. Narrow belts and single trees are expensive luxuries in the west, and have the further disadvantage of affording poor shelter in the winter when the leaves are off, just at the time when it is most needed and the plantation should be most useful.

BROAD BELTS.

Belts of 20 yards and upwards are far easier to maintain, afford a much better shelter, and in course of time the thinnings will furnish a better quality of firewood, posts and rails; and, although for the first three or four years they may cost a little more for cultivation because of their larger area, the ultimate results will be very much better than those obtained from narrow strips.

PLATE III.

Photo by A. Mitchell, 1909.
Plantation near Macleod, Alta. Trees three to five years old.

PLATE IV.

Photo by A. Mitchell, 1909.
Plantation too near house. Trees of two seasons' growth. Plantation near Outlook, Sask.

The trees present a solid obstacle to the sweeping winds of the prairie, which pass over instead of blowing right through them. The shelter on the lee of the plantation is thus much better, and, as the drying winds are kept out, the maximum of moisture is conserved in the plantation for the use of the trees.

ARRANGEMENT OF PLANTATIONS

As immediate shelter for the home is of the greatest importance, the first effort in the way of planting is usually put forth in establishing a windbreak for this purpose. Afterwards, when the farmer gets firmly established and has more time and means at his disposal, he usually branches out into either sheltering his whole farm by planting round it, by two or three strips across it, or by extending his home plantations to inclose one or more small fields in close proximity to his buildings.

The small fields are very useful for grazing young stock or hogs, and for sheltering the ten-acre seed-lots which some farmers are finding so useful in raising pure seed of high productive quality for the farm.

HOME PLANTATIONS.

In arranging what may be called 'home plantations,' it will be well to keep them at least 100 feet from the buildings, in order to avoid trouble from snowdrift, and sufficient room for the garden, orchard and farm yard should be allowed for inside the shelters. Some of the earlier plantations in Manitoba are a good illustration of the necessity of this, for many of the narrow strips of garden set out in the early days are now overshadowed by trees 40 to 50 feet high, and the currant bushes, which no doubt used to be laden with fruit when the trees were small, are now scarcely able to clothe themselves even with leaves.

Settlers from Manitoba and the earlier-settled western states remember this when they come further west, and their plantation arrangements are usually characterized by having plenty of space inside, allowing plenty of room for garden, buildings and grounds. The whole area covered by the plantations and inclosed space is thus often 150 to 200 yards to the side.

BUILDINGS ON HILL-TOPS.

Many a farmer, in his anxiety to have a good site for his house and a view of the surrounding country, places it on the top of a hill; and where the top is flat enough and of sufficient area no difference need be made in either the distance from the house or the width of the plantation. But it often happens that the hill-top is too narrow for the usual arrangement, and the slope of the ground may be such that the trees, if planted 100 feet from the buildings, will be probably 15 or 20 years of age before they can afford the necessary shelter. In such a case it will be found good practice to place the plantation farther down the hill, or even on the level, and let it shelter the garden, and provide shelter for the house by a hedge of willow, caragana or other shrubs as close to the house as is convenient. The outer plantations will hold the snow, and there will be no trouble from that source inside the inner shelter. The strip of land for the shelter hedge need not be wider than 10 or 12 feet, and the hedge itself should consist of perhaps a double row of plants at three feet apart each way, with the plants alternating. This will give a sufficient thickness of hedge to make a good shelter, and enough spread of branches to shade the ground and lessen the labour of cultivation. The growing shoots of such hedges may be trimmed up on one or both sides, and when this is properly done they become quite ornamental. The regular trimming at the same time serves to thicken the hedge and increase its usefulness as a shelter. The best time to do the trimming is the month of July.

Two seasons' growth. A plantation near Gainsborough, Sask., set out in 1908. Photo by A. Mitchell, 1909.

PLATE VI.

Plantation near Rosthern, Sask. Trees in background planted in 1902 and 1903. Photo by A. Mitchell, 1909.

FIELD SHELTERS.

Surrounding belts and strips across the farm from north to south will no doubt come to be largely used in southern Alberta and western Saskatchewan, where, besides affording protection from soil drift, they will help to retain snow on the ground in winter, and also to prevent the excessive drain on the moisture in summer, resulting from the blowing of the hot chinook winds.

Some exception may be taken to the extra fencing required for such plantations, but it must be remembered that mixed farming will call for divided fields in any case, and the extra cost for fencing will be more than repaid in the additional comfort to the stock and added value to the farm afforded by the plantation.

Two points of interest to western men in connection with such shelter plantations are mentioned by Professor King, of Wisconsin, in his Physics of Agriculture, pp. 202 and 203. He says: "Wherever broad fields lie unsheltered by any windbreak, strong winds frequently sweep entirely away crops of grain after they are four inches high and at the same time drift away even as much as three or four inches of the surface soil, the best in the field. In such cases, windbreaks and hedgerows exert a very strong protective influence and greatly lessen such disastrous results. Not only do trees prevent such direct injuries to soil and crops, but they materially lessen the evaporation of moisture from the soil and thus help to secure a higher yield of crops," and then he goes on to show how he tested the evaporation from the soil on the leeward of a grove of black oak 15 to 20 feet high, and found that the evaporation at 320 feet from the plantation was 27 per cent greater than 20 feet from it. When one considers the small atmospheric precipitation of some parts of the west and the drying effects of the winds which blow across the prairie, this is important testimony and serves to lay greater emphasis on the need for such plantations west of the third meridian. Further east such shelter belts may not be so popular on account of snowdrifts lying in the lee of the plantations too long in the spring and delaying the work of seeding; but even in these districts they will in course of time be well worth considering with the object of preventing soil drift and sheltering stock when mixed farming comes to be practised in the prairie country more than it is at present. Such plantations need not take up an enormous amount of land. A strip four rods wide round all sides of a quarter section takes up only 16 acres, and three strips of equal width (one on the extreme west side, and the others at equal distances apart) will amount to only 12 acres—not a very great percentage to be under trees, and only about enough to supply thinnings sufficient to provide for the needs of the farm for its firewood, posts and poles.

Solid blocks of trees of 5 to 10 acres would, of course, be more economical to handle as far as fencing was concerned, and would undoubtedly furnish in course of time much better timber, but they would not afford such shelter to the whole of the fields.

In irrigated districts, especially, where farms are small and an intensive system of farming is followed, the land will no doubt become very valuable, and farmers may not find it economical to devote much of their land to the growing of trees. In such circumstances single rows along the ditches will probably be the method chiefly adopted to secure shelter. Experience has already shown that trees planted in this way require some time and pains to start; but after they are once fairly established there should be no trouble on account of lack of moisture.

THE VIEW.

While shelter from the sweeping winds of the prairie is of paramount importance, it is often a mistake to shut in the buildings on all sides by a thick plantation. There is usually one side from which storms are less frequent, or from which a better view can be obtained, and a good plan to deal with the view side of the house is to plant a hedge of caragana or other suitable shrub and keep it trimmed to a height of four or

tive feet, sufficient to shelter a flower border and the lawn, and yet low enough to be easily seen over. Inside the hedge, and about six feet from it, a row of standard trees of cottonwood alone, or cottonwood and some other trees, such as elm, alternately, should be planted a rod apart. These can be gradually pruned to a single stem, and in due time they will develop a head above the level of the hedge, thus affording a fair amount of shelter and yet not interfering with the view. From the outside the house will show well through the trees, and its appearance will be greatly enhanced.

SHRUB PLANTING.

Inside the hedge, and shading the roots of the standard trees, shrubs of lilac, Tartarian honeysuckle, wayfaring tree, spireas, dogwood, or rosa rugosa can be planted for the double purpose of affording flower and foliage effect and shade to the ground, and thus in course of time lessening the expense of cultivation. The best way to arrange the shrubs is to plant them in irregular groups and about three or four feet apart each way. They will require some hoeing the first two or three seasons, but they soon become quite bushy and afford a perfect shade to the soil, and no further cultivation will be required unless it be to knock down some of the more persistent weeds. With the modern style of having an irregularly curving inner margin to the shrubbery border very pleasing effects can be produced.

PREPARATION FOR PLANTING.

ON STUBBLE.

After the site for the plantation is selected the preparation of the land is the next consideration, for trees will not grow unless the soil is thoroughly well prepared beforehand. If on stubble, the ploughing for summerfallow should never be later than the first week in June, and it should be packed and harrowed as soon as it is ploughed. The ploughing should be as deep as possible, and cultivation by means of the disc, cultivator or harrow, should be frequent during the summer in order to keep down the weeds and conserve the moisture for the use of the trees in the following year.

The ploughing of stubble in late summer or fall, which is sometimes attempted by farmers as a preparation for trees, cannot be too strongly condemned. Such land is usually covered with weeds, which have already exhausted the moisture from the soil; and, besides, the weeds which are ploughed under usually bear quantities of ripe seeds, and these later on will cause the owner endless trouble in his plantations.

ON SOD.

When the site of the proposed plantation is on sod, the breaking should be done early in the spring and at least before the middle of May in the prairie country, when the grass is growing vigorously. The sod is best ploughed about two inches deep, and it should be turned over quite flat, and, if necessary, rolled to insure thorough rotting. In about six weeks the sod will be rotted and quite friable, and it should then be backset, turning up two inches more of the soil in the operation. The whole should then be thoroughly worked up the same day it is backset with the disc, drag-harrow, or, if necessary, scrubber or planker, till the soil is in as fine a condition as possible. About the end of September the land should be again ploughed, this time seven or eight inches deep, and again worked thoroughly the same day, after which it may be safely left over the winter.

The working of the land immediately after backsetting or ploughing is very important as, if the turned-over land is left for a few days it dries out very rapidly, and may be very lumpy when worked up afterwards. While the bottom of the furrow is made as compact as possible, the two or three inches of soil just beneath the surface should always be left loose to retain the moisture.

Photo by A. Mitchell, 1909

Eight-year old trees in Southern Saskatchewan.

In the early spring before the trees come, especially in southern Alberta and the drier parts of Saskatchewan, it should get another stroke with the harrow to loosen the surface of the soil, and establish that granular condition so necessary for the retention of the moisture. The disking or breaking without backsetting is a slovenly way to prepare the plantation, and, though in some districts good grain crops are often raised after land is treated in this way, land intended for trees requires better treatment, and farmers have no right to expect trees to do well on land only disked up after breaking. The little time it takes to back-set half an acre or an acre is nothing compared with the importance of having the work done well, and will be overwhelmingly repaid when the trees are growing, as well in the increased rate of growth as in the decreased amount of work required to keep them in good order. The importance of backsetting and doing it at the proper time can hardly be too much emphasized.

PLANTING THE TREES.

Probably the cheapest and easiest way to plant a large quantity of trees, i.e., seedlings, is to do it with a plough. The 'Instructions for planting cuttings and seedlings,' issued to all planters who get trees from the Forestry Branch, give the following directions for this:—

PLANTING WITH THE PLOUGH.

'The quickest and perhaps the best way to plant young seedlings in large numbers is to plough out a furrow as deeply as possible, running the plough twice in the same furrow, throwing the soil out to both sides. Take the seedlings by the top with the end of the foot resting on the bottom of the furrow, and then draw in the soil from each side with the feet, *tramping it solidly around the roots.*

'If the furrow is not deep enough, carry a dibble or sharp stick to make a hole in the bottom of the furrow in which the end of the root can be placed.

'Seedlings of cottonwood, ash, elm and maple are almost sure to die if not planted at least as deep as they originally stood in the nursery. It is best to set them about one inch deeper, as the soil will probably settle in the course of a few days after planting.

'Do not plough out the furrow far ahead of the planters as the soil dries very rapidly.

'After the trees are all set, the furrow should be filled in with the plough at once, or, if the horses cannot be kept from tramping the young seedlings, a shovel or hoe should be used.

'Do not hill the soil up around the stem of the trees. While planting, the seedlings and cuttings should be carried in pails half-filled with muddy water.

Great care should be taken to prevent the roots from drying out. The seedlings should never be left lying exposed to the sun or wind.

'Seedlings with a single straight tap-root may be very easily planted with a dibble the same as cuttings.

'The best time to plant is on a dull cloudy day or in the evening after the sun commences to get low.'

This method, however, presupposes that the farmer is able to plough straight, which many are not, frequently from want of experience, and frequently because the motive power is oxen. Straight and even planting is important on account of convenience in the after-cultivation, as well as for the sake of appearance of the plantation, and for these reasons many a man gives up the idea of plough-planting and takes to the spade or some other substitute. Even when a farmer can plough straight he often grudges the time his team is standing while he is planting-up behind it; the spring work is behind and he is strongly tempted to work his team all day, and plant his trees at noon or in the evening to save time. In such a case he falls back on the spade, and usually takes three or four times longer to plant the trees than is necessary.

SPADE PLANTING.

MARKING THE GROUND.

Straight rows are important for convenience in the after-cultivation, and the lines should be marked so that, if possible, horse cultivation, which is the cheapest, can be done both ways. It is not at all necessary for the trees to 'cut between the joints.' If any of the farm implements, such as the drill, can be adjusted to make the marks at a proper distance, probably this will make the most satisfactory marker if the team can be induced to go straight enough, and, if not, it is easy to make a light marker which can be drawn by hand. The best way to do this is to take a piece of 2 x 4 about 12 feet long, and either drive 6-inch spikes through it, or bore holes and put pegs in at the distances the trees are intended to be apart. It should have a light pole in the middle to drag it with, and a couple of braces. With this implement it will be possible to mark four rows at a time if the line is set in the middle where the operator walks. In wide plantations it will be worth while marking crosswise too, though in strips of only two or three rows a convenient measure for the distance between the trees in the row may be found in the spade or shovel which is being used for planting.

THE ACTUAL PLANTING.

In planting the seedlings used in the ordinary farm plantations, it is not at all necessary to dig a hole as for planting a fruit or other large tree. A hole is dug for two purposes, namely, to loosen the earth and to make room for the roots. The whole of the previous summer's work has tended towards loosening the soil and fitting it for tree growth, and therefore it only remains to get the trees into the ground as quickly as possible. To do this the following method will be found quite satisfactory.

A notch is made in the ground having the first cut at right angles to the second; thus: (A)| (B). The first cut '(A)' is merely a mark to facilitate the even turning up of the soil, and is made by simply driving the spade down with the hands. Cut '(B)' is done with the help of the foot, and the blade of the spade is thrust down about two-thirds of its length, according to the length of the root of the plant. After the second cut is made, the handle of the spade is depressed a little, to lift the spadeful of earth, and thrust well over to the right, forming a cavity under the spade. Into this cavity the root oft he plant is placed and the spade is jerked out; this allows the soil to fall down on the plant. The soil is then well trodden down with the heel. A little loose earth is kicked round the plant on the surface to preserve the moisture, and the job is complete. If the root is branchy the plant should be shaken briskly as the spade is jerked out in order to spread the roots. In the case of a deep-rooted plant the first spadeful of earth should be thrown out, and another one raised in the bottom of the hole. After a little practice this operation is very easy, and a man working along can plant 1,000 trees in a day. An ordinary garden spade or short-handled shovel is the best tool to use for work of this sort, though it is quite possible to do the work with a long-handled shovel if nothing else is convenient.

Crowbar planting or planting with a pointed stick is seldom found satisfactory in farm planting, and never speedy. A man is usually in too great a hurry to firm the soil properly round the root. He may pack it tight enough around the neck, but too often the fine root fibres at the bottom of the hole are left suspended in space, and by and by the planter is surprised because he finds so many of his trees have died. When this method of planting is done successfully a great deal of time is usually taken up in firming the soil at the bottom of the hole, and time on a farm in the planting season is valuable.

Even in planting cuttings the spade will be found the best. All that is necessary in such planting is to thrust the spade well down at an angle of about 45 degrees, twist it slightly round to allow room for the cutting to be slipped under the blade, then jerk the spade out. The earth falls all over the cutting, a firm tramping with the foot follows, a little loose earth is cast on the surface as before, and the cutting is in as

PLATE VIII.

Photo by A. Mitchell, 1909.

A neglected Plantation.

PLATE IX.

Photo by A. Mitchell, 1908.

Plantation of Russian Poplar overgrown with blue-joint grass. Photo taken about August 1. The trees were already losing their leaves. By the following June the trees had died. Plantation situated near Saskatoon, Sask.

close connection with the soil as it possibly can be. With dibble planting there is often the tendency to leave a cavity at the bottom of the hole by the ground being imperfectly trodden, and the result is either that the cutting dies or that it is deficient in vigour the first year and may die the following winter. In treading the soil round the roots of the trees the heel and not the toe should always be applied. A man cannot possibly apply his weight when using the flat of his foot, and many a tree has died because it was trodden with the toe. Trees must be planted firmly.

CARE OF PLANTATIONS AFTER PLANTING.

After the trees are planted they should be cultivated at once, instead of waiting (as is often done) for the weeds to appear. After this, only about three or four cultivations and going through perhaps twice with the hoe to kill the weeds close to the trees will be necessary throughout the summer. The great thing in tree culture, as in all other kinds of culture, is to get the work done at the *right time*, and many a time a great deal of work would have been saved if the farmer had not delayed cultivation and waited for the weeds. Many a man thinks his plantation splendid and proudly informs you he cultivated it three or four times, while, if he only knew it, his neighbour has his trees looking far better with no more work and perhaps less, simply because he cultivated to retain moisture, and did not wait for weeds to appear.

BLUE-JOINT OR COUCH GRASS AND SWEET GRASS.

On most soils, usually about six or seven weeks after breaking, the seams between the sods will be found full of blue-joint or sweet grass; and if the backsetting is delayed, the roots of these grasses never are killed, and in the following year patches of them will be seen growing vigorously all over the plantation. Then follows trouble for the owner, for grass and trees will not grow together; there is a fight for the mastery and the grass always comes off the victor. In many cases, even when backsetting is done, little pieces of grass roots manage to live over to the spring, and if not taken out in time give a lot of trouble.

By far the best way to meet this sort of difficulty is to watch for the little patches of grass while cultivating the first year after planting, and to dig the roots up with a fork there and then. The roots are seldom deep; blue-joint runs about four inches below the surface, while sweet grass is usually about seven or eight, and, when undertaken in time, the work does not take long. Many a plantation throughout the west is suffering to-day simply because the owner did not fork up these patches the first year after the trees were planted. Half a day's work with a fork will save many a day's labour afterwards. It is useless to think of getting rid of these weeds either with the hoe or cultivator. They are too deep and there is nothing for them but the fork or spade.

HOW BLUE-JOINT GRASS SPREADS.

A frequent vantage-ground from which blue-joint grass spreads in many plantations is from the opening furrow or breaking. In these furrows some sod is usually buried but not turned over. This sod never rots, and even when it is turned over in the backsetting, the work may be done so late that the sod does not get rotted and the grass roots are fresh and vigorous in the following spring. It will often pay well in such cases to take the stone-boat and remove such sod altogether and save further trouble.

When breaking for trees a much better plan is to begin on the outside of the piece and finish in the middle. The whole of the sod is thus turned over, and backsetting can be begun in the middle and finished on the outside.

Another source of danger arises from the spread of the grass from the sides of the plantation, especially when it is bordered by unbroken land. This is especially troublesome in narrow belts of four or five rows wide or less, for which unbroken land on each

Photo by A. Mitchell, 1909.

Trees planted too far apart and pruned. Note how weeds have got in and flourished.
Plantation near Saskatoon, Sask.

sible and no steps taken to prevent it, the grass soon takes possession of the ground and the trees die. To avoid this, the best plan is to plough a clean furrow-face as deeply as possible next the grass, throwing the soil into the plantations, and to avoid planting the trees too close to the edge. This custom of planting close to the edge of the grass is far too common. In no case should the trees be closer to the edge of the plantation site than five or six feet. This is very important, and it will be far better even to crowd the rows a little in the interior of the plantation, and allow the full outside space.

SWEET GRASS.

Sweet grass is much more difficult to get rid of than blue-joint after it gets into the plantation, and, where present in patches over two or three yards square, it will be far better to defer planting till more work has been done on the land. Patches of this size can be easily handled with a fork. grass is usually found in low-lying damp places, and is very often met with in the northern and moister parts of the provinces. Even in preparing the land when there are no trees to interfere with field cultivation it is difficult to get rid of, and Mr. Mackay, Superintendent of the Experimental Farm at Indian Head, recommends (in 'Farm Weeds,' page 27, 2nd edition, 1900): 'The first ploughing should be done when the ground is dry and the weather hot; early in August gives the best results. Plough deep and leave the ground rough for a few days, then harrow; repeat the ploughing in another week if the weather is warm and dry. Ploughing when the ground is wet only spreads the weeds.'

Where sweet grass has obtained the mastery in plantations, destroying it by ploughing is impossible, but good results have been obtained by smothering it with loose straw. Care, however, must be taken to have this done at the right time, i.e., in the beg' ning of June or when the grass is in the flush of its growth. If done early in the spring or in late summer or fall, the covering seems only to encourage it. A light layer is of no use; it must be about 18 inches thick, and straw, not manure, should be used.

DISTANCES BETWEEN TREES.

One phase of farm forestry that is not well understood by the average farmer throughout the west is the distances the trees should be apart. When informed that four feet each way is the spacing which is usually most desirable, many farmers protest, and cite cases they have known where the trees were planted six feet, eight feet and even a rod apart with excellent results. This may no doubt be true enough in countries of copious rainfall, but in dealing with the conditions peculiar to the prairie provinces the closer planting is by far the best.

The success of all growth in the west depends on the supply of moisture in the soil, and the man whose farming operations circle around its conservation is the man who gets good crops. It is also an axiom that will be admitted by all, that the less extra work the farmer has the better. He has usually enough to do without adding extras, and the more quickly his trees get beyond the necessity for cultivation the better it will suit him. When trees are young they grow bushy, and the closer they are planted together the quicker the branches meet and shade the ground for themselves, and the sooner the farmer's task of cultivating to conserve the moisture is over. Close planting is, therefore, really a labour-saver in establishing the plantation, besides affording a better stand of trees per acre, and, by-and-by, trees of better quality.

PRUNING.

No pruning is necessary in a plantation. As we have just seen, the branches close to the ground are required to shade the soil; if they are removed it is really a restoration of the bare soil condition that takes place, and the trees are back again to the

PLATE XI

Photo by A. Mitchell, 1909.

This plantation of Manitoba Maple was never pruned. It was nine years old from seed when photographed. Note clean appearance of tree trunks.
Near Gainsborough, Sask.

PLATE XII

Photo by A. Mitchell, 1909.

Pruning of these trees gave the opening for blue joint grass to get in and its growth in quantity. The trees will be hindered in growth and probably killed altogether. Plantation near Saskatoon, Sask.

period when cultivation was a necessity. This cultivation is usually not thought of oftentimes it is not possible; the top branches have not spread enough and the foliage is not dense enough to keep out the light; grass gets a foothold and the trees suffer from lack of moisture and often, indeed, die. Pruning has the additional pernicious effect of allowing the winds to pass freely through among the trees and still further dry out the soil. It is curious the fascination the use of a jack knife seems to have for the average man, and after two or three of the neighbours have come along and criticized the plantation and declared that the trees are far too thick and that they should be pruned right away, the farmer is constrained to believe them, and out comes the knife and off come the branches. If the neighbours were to suggest an additional turn or two with the cultivator, the press of work, too much to do, would immediately be put forth as an excuse, but the jack knife seems to be irresistible; and it is curious to note how widespread this feeling is, too, for whenever a plantation attains a height of 8 or 10 feet the invariable question is, 'Don't you think the trees are too close?' or, 'Don't you think they should be trimmed up?'

PLANTATIONS SHOULD NOT BE PRUNED.

When the proper time comes, nature will attend to the matter herself, and she never makes a mistake. If the average man takes time to think where he gets the finest, straightest and cleanest poles when he goes to the bush, he will remember it is *always* where the trees are growing thick together. The open grown trees are always bushy and coarse.

WHEN PRUNING SHOULD BE DONE.

Street trees and ornamental trees sometimes require to be pruned, but in this case the trees are being trained for a special purpose, and all that is necessary is to remove the branches which are likely to form a weak junction with the stem so that a future snow or wind storm will not split them off. Long, straggly branches should be shortened where necessary to preserve the symmetrical shape of the tree and shorten the leverage, and thus lessen the risk of breaking off in case of a storm. Clean stems on shade trees are sometimes very desirable, but many pruners err in their anxiety to obtain them by clearing the branches off too many at a time, and too early in the life of the trees, with the result that they often get topheavy and may break off in rough weather. The foliage is necessary for the formation of the wood, to strengthen the stem, and the sensible way to form a clean bole strong enough to withstand all weather is to remove the branches gradually, two or three of the lowest one at a time.

In their anxiety to have shade trees with a spreading head, many people cut off the leaders when the trees are about six feet high or even less, which encourages them to branch out four or five feet from the ground. A frenchy top is no doubt produced in this way, but it is too near the ground and a great many of the lowest branches must be removed before the tree is obtained under which the owner can sit and enjoy the shade, which is usually the object aimed at. A far better way is to wait till the tree is 10 or 12 feet high, and then begin to prune gradually to produce a clear stem of seven or eight feet.

The manner in which the cut is made when branches are removed is important. A very common practice is to leave an inch or so to stick out like a peg from the stem of the tree. This is wrong. The cut should be made clean and smooth with the stem, so that it will heal over rapidly and prevent the entrance of disease. The spikes take years to heal over and are besides very unsightly and often in the way.

THINNING.

A time comes when the trees in a plantation are too close, but that will not be until they are about from 15 to 20 years old, or even more; before that, according to the species, nature will have her work of pruning well under way. The canopy of

Photo by A. Mackie, 1908.

Cottonwoods at Indian Head Experimental Farm.

leaves overhead will be dense and the lower parts of the stems beginning to be clear of branches when it is time to thin; and when that time arrives it will be well for the farmer to remember that it is possible by injudicious thinning in a few minutes to undo the work of years.

In considering this phase of managing the plantation, it will be well to bear in mind always that the ash and the elm are the longest-lived trees, will be the most useful on the farm in the long run and are to be considered the permanent trees. Where they are, therefore, likely to be overshadowed by some more vigorous and less valuable neighbours, like maple, cottonwood or willow, it will often pay to sacrifice a few of the offending branches, or even cut down some of the trees altogether. Cottonwoods, willows and Russian poplars are best for rapid height-growth in order to give a shelter as quickly as possible, and the chief use of maples on a plantation is to shade the ground and save work to the farmer in the way previously referred to. This is the reason why plantations always have a plentiful supply of maples; and while, of course, the maple grows up to be a useful tree, still when it comes to thinning time there will usually—at first, at any rate—be a good many more maples taken out than anything else to allow the more useful trees to get a chance.

Altogether, thinning is a subject which requires much judgment, and it will be well always to remember that there is one safe rule in thinning and that is: 'Do a very little at a time.' It is easy taking out another tree at another time, but once a tree is out you cannot replace it.

THE USE OF WILLOW AND POPLAR CUTTINGS.

After a farmer has a plantation on his land consisting of a mixture, among others, of willow, Russian poplar and cottonwood trees, he has in the cuttings obtainable from these a supply of planting material which he can use to the greatest advantage in extending his plantations as much as he wishes.

Cuttings are made in the spring by dividing the small twigs of the previous year's growth into pieces 8 to 10 inches long. They may be from the thickness of a lead pencil up, and in preparing them care must be taken to make the cuts without splitting the wood, otherwise they will not grow.

Small lots may be made and planted just before growth begins in the spring, but if large quantities are required it may be necessary to prepare them before spring opens and store them till planting time. They can be kept quite safely in such cases by being packed away in the cellar in a box among damp moss or moist sand. They should always be planted deep, leaving about an inch above the surface of the ground.

Plantations raised from cuttings should always contain a large percentage of willow, as this tree acts in some measure as a soil cover to shade the ground among the more open-crowned poplars. A better mixture will be made by adding about 30 or 40 per cent of maples, or box-elders. The maple is a better soil cover and gives correspondingly better results in the plantation, but it, like ash and elm, cannot be raised from cuttings. These varieties are propagated from seed only.

GAPS IN PLANTATIONS.

Occasionally gaps are made in a plantation in the first year or two of its growth by the death of some of the trees. These vacant spaces should be filled up as soon as possible, and if seedlings of the kind forming the row are not available cuttings of Russian poplar, cottonwood and willow should be used instead. The fact that they are of a different variety from the greater number of trees forming the row is of very little importance. What *is* important is the covering of the ground with trees as soon as possible, so that the moisture may be preserved. Complete rows of the same varieties may be of importance in an orchard, but this is not the case in a plantation, which should not be looked upon as so many trees of so many different kinds. It is a planta-

tion, a unit, just the same as a field of wheat is a unit, and as long as the whole unit, i.e., all the area embraced in the plantation, is carrying its full stock of trees, that is the important thing, and it does not matter how the gaps are filled as long as they are filled with trees of desirable kinds.

TRANSPLANTING.

DECIDUOUS OR LEAF-SHEDDING TREES.

Many people, in their anxiety to beautify their homes, transplant trees from a neighbouring bluff and their efforts are not infrequently crowned with only indifferent success, or indeed failure altogether. There are usually three reasons for this, viz.: lifting trees that are too large, neglecting to preserve the earth round the roots, and doing the work at the wrong time.

In transplanting poplars, trees six to eight feet high will be perfectly safe, but they should be taken from open ground where they are branchy and where the roots are well developed. The tops or leading shoots should *never* be cut off. If this is done the trees have just to make new ones and it is only so much energy lost. The removal of the top is usually done with the idea of restoring the balance between the branches of the tree and the mutilated roots and, while without a doubt the intention may be good, it is not at all necessary to take the top off. If a poplar of this size is examined closely it will be found that there are usually two distinct sizes of branches on it, and if all those of the larger size are removed, the tops and roots will be, as a rule, well enough balanced. Care, of course, must be taken to preserve the symmetry of the tree when this is done, and the best time to do it is before the tree is removed from its original site.

In digging up the trees care should be taken to avoid shaking the earth off, and in cutting large-sized roots it is better to use a saw than an axe. Before commencing work the spade or the shovel should be well sharpened with a file in order to cut the small roots without shaking the earth loose. The best time to transplant poplars is in the spring, just before the leaves appear.

EVERGREENS.

Evergreen or coniferous trees up to four feet high are quite safe to move. Trees growing by themselves should always be selected, and they should never be pruned. Open-grown trees have their branches close to the ground, and this is one of nature's ways of keeping the roots cool and moist, and, besides, pruning destroys the beauty of the trees.

An ordinary shovel, well-sharpened, is the best tool to work with. It should be driven down on a slant well under the tree, describing the circle at a distance of 12 to 18 inches from it, and after the circle is complete the whole thing, root and earth, can be easily pried up with the shovel—a compact solid ball, which may be transported any distance with reasonable care. When in the wagon it will be well to pack round and underneath the root with wet sacks or straw, or, better still, the moist bottom of an old haystack. The best time to move conifers is in the last week of May or the first one in June.

It is perhaps unnecessary to mention that all trees, large or small, do best on well prepared land, that the soil must be packed well round their roots when planted and that surface cultivation is necessary afterwards.

GRADING UP POPLAR BLUFFS.

Many men living in bluffy districts express themselves as disgusted with the lack of variety in their woods and the poor quality of the timber grown. They forget how

much better off they are than the majority of their brethren who have no bush at all, but their desire for trees of a better quality is, after all, reasonable, and in many cases such bluffs are quite capable of being much improved.

The best way to do this is to sow seeds in the garden and transplant them as seedlings at a year old into the vacant places in the bush. Ash will do well in the more open spaces, while the native willow, which is usually of a poor quality, may be replaced by maples. These latter will stand a moderate amount of shade under the willows for a few years, and as they get larger the willows can be gradually removed. Tree willow, Russian poplar or cottonwood cuttings may be planted in the moister places.

Previous preparation of the soil will not be possible in most of these improvement plantings, but as these will usually be found in the moister parts of the country it does not matter so much. The shade and shelter of the bush will be found to offset the lack of it to a great degree as well as that of after cultivation. The young trees should be planted close, about four feet apart, and open spaces of 10 yards or over should be planted to ash, with perhaps every fourth tree maple, to provide the necessary soil cover. Planting in holes or pits wil give good results, and the pits should be about 15 inches deep and 18 inches to 2 feet in diameter, but probably the quickest and cheapest way will be to grub up the soil with a mattock where every tree is to be planted in spaces about as wide as for the holes. The trees must, of course, be firmly planted.

SUMMARY.

Briefly summarized, the whole question of successfully establishing plantations in the prairie may be stated thus:—

1. Wide belts are better than narrow ones, better shelter, cheaper to maintain, furnish better material in after years and more of it.

2. Thorough preparation of the land must be made before planting.

3. The trees must be firmly planted.

4. Cultivate as soon as they are planted.

5. Cultivate in summer to conserve moisture. Do not wait for the weeds.

6. Any blue-joint grass or sweet grass appearing the first summer should at once be dug out.

7. Close planting saves labour in the long run.

8. Plantations should never be pruned.

9. Put the work of the plantation first. It does not take long and only about one-third of the work when done at the right time.