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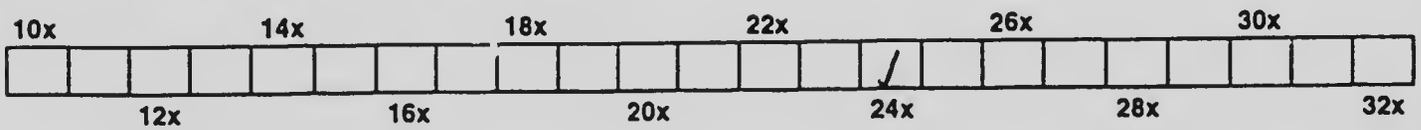

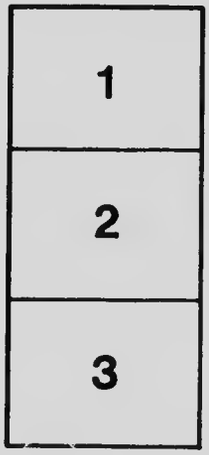

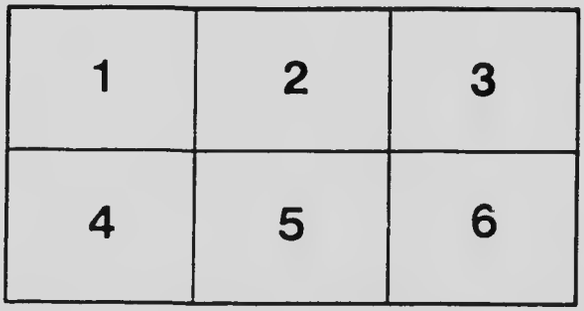

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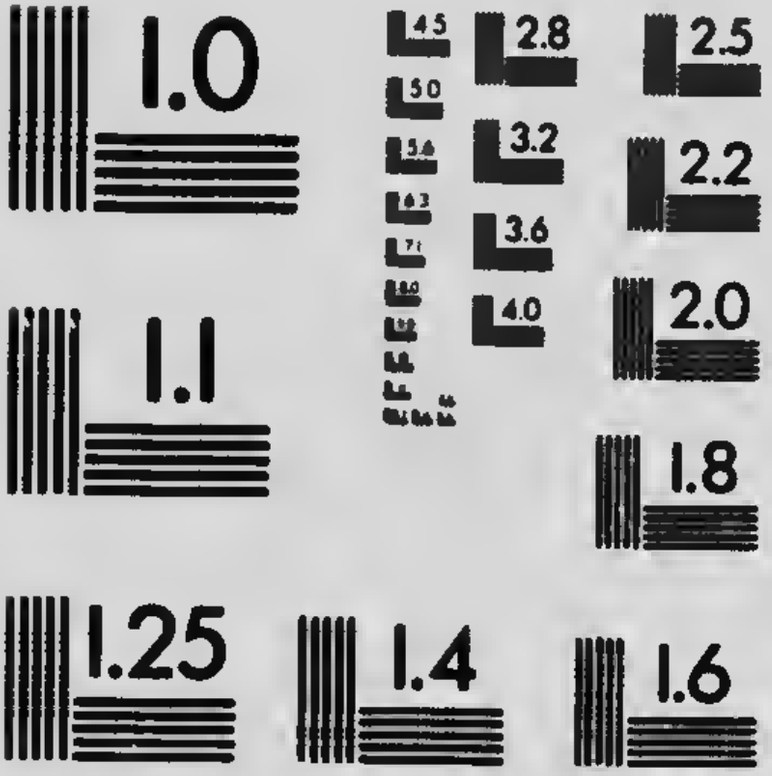

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DEPARTMENT OF AGRICULTURE
OTTAWA, CANADA

TOBACCO

PREPARATION OF THE SEEDLINGS AND THE CARE TO BE GIVEN TO THEM

BY

FELIX CHARLAN

Bulletin relating to Tobacco No. A 1.

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

JANUARY 1906

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SEEDLINGS.

If there be a country in which tobacco is cultivated where the seedlings should be the object of very special care, Canada is most certainly that country.

The summer is sufficiently long and warm to permit a large number of varieties of tobacco to come to maturity, but the severity of the spring and the early frosts of autumn necessitate the use of numerous precautions if it is desired to plant and harvest the tobacco, and take it in early enough to prevent its being injured by the inclemency of the fall.

It must be admitted that the development of the plant, which occupies our attention, when the season is sufficiently warm, from the moment when it is planted out until that of gathering it in, is from 90 to 100 days, on an average, according to the variety. En passant we would ask Canadian growers to give the preference to the lighter varieties, which are generally more forward, and, especially in Quebec, not to adopt too exclusively the cultivation of heavy kinds, which yield, it is true, a greater return in weight, but ripen more slowly and are relatively more difficult to dry, thus exposing the plants to the danger of being frozen in the drying room before the process is completed.

Transplanting should take place from May 20 to June 10 in order that the tobacco

There is plenty of evidence that in a country where the winter is rigorous, the half warm forcing bed is strictly necessary, as the production of plants in the seed bed can only be obtained after a period of from 30 to 60 days, or even more. In fact, the half warm forcing bed is the one more often used in Canada, and about which we will now give a brief description.

The essential element in a half warm forcing bed is a layer of fresh manure capable of producing by its fermentation, a sufficient increase in temperature, and over which is laid the bed of earth in which the seed ought to be sown, in order that it may find itself in circumstances favourable to rapid growth.

In order to avoid the chills arising from the outer air, the whole is surrounded with a suitable framework, and covered over with a sash, it may be of cotton or paper covered with three coats of linseed oil, and thus rendered more transparent and more rain-proof, or it may be of glass; this last gives more heat, but requires to be watched more carefully during the warm days, in order to avoid a premature growth, which will not always correspond with the date fixed for the transplantation. Thus completed, the bed supplies the delicate tobacco seed with the warmth produced by the fermentation of the layer of manure, and a cushion of warm air in which it can put forth its young shoots, secure from the frosts of spring.

SETTING UP THE FORCING BED.

At the bottom of a trench about half a yard deep, and corresponding in breadth and length with the dimensions of the frame for the seed-plot, place a layer, some 7 to 9 inches thick, of brambles, branches of pine, husks of oats or barley, and generally of materials likely to stop the passage of rats, moles and mole crickets; on this the frame,

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Transplanting should take place from May 20 to June 10, in order that the tobacco may be harvested between August 20 and September 15. There is plenty of evidence that in a country where the winter is vigorous the production of the plant in the seed-plot cannot be effected under thirty to sixty days, or even more, according to the methods adopted, the half-warm forcing bed being employed; this is what we have experienced everywhere in Canada, and what we are about to describe briefly.

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constructed as above, is supported, and filled in to a sufficient depth. This layer, having been well pressed down, is covered over with a bed of horse manure, fresh, full of straw, and capable of producing vigorous fermentation. This manure has the inconvenience of fermenting very rapidly, but the fermentation can be retarded and made more lasting, so that its action can be continued until the time when frosts are no longer to be feared, by adding a certain quantity of stable manure, also containing straw, and in which the straw, as well as that in the horse manure, ought to be saturated with liquid manure in order to supply a good heat.

The addition of the stable manure has the extra advantage of lessening the production of mushrooms, which develop in very considerable quantities on hot-beds made exclusively from horse manure.

The layer of manure having been well stamped down, and beaten with a rammer until reduced to the thickness of about one foot, then on top is placed a bed of good earth, mellow and sufficiently light, fertilized in the autumn by sprinklings with liquid manure, or by being mixed with well-rotted manure, and which has been exposed all the winter to the action of the frosts, in order to destroy the seeds of weeds and larvæ of insects which it contained previously. The use of mould is equally good. In such a cold country as Canada the preparation of mould specially intended for the setting of seeds, revivifying it in the autumn after it has been kept in reserve during the hot season, turned with the spade from time to time, kept free from noxious herbs, and clear of insects by the visits of domestic fowls, should be a most advantageous work; it allows of the construction of forcing beds capable of developing the plant more quickly than can be done in beds of ordinary earth, and in which the seed can be sown several days later and ripened earlier.

In case ordinary arable earth is used, it is just as advisable to cover its surface with a thin layer of well-powdered and sifted earth, thus rendering its equalization more complete and the seeding easier. A little soot can be added to the mould, as it removes worms.

The use of strong and clayey soils is to be avoided; these retard the development of the beard root, and at the time of transplanting render the extraction of the plant difficult.

The forcing bed should be slightly inclined to the light.

EXPOSURE OF THE FORCING BEDS.

It is better to choose places sheltered from the wind and open to the sun. The backs of the forcing beds can be set against a wall facing well to the east, and, if the beds are set in the open field or in the garden, it is wise to protect them from the prevalent winds by hurdles filled with branches of trees and kept in place by means of picquets.

SASHES.

As has already been said, the sashes can be made either of paper or cotton, oiled, kept in place by crosspieces, or of window glass firmly set in a wood frame, the dimensions of the latter, as in the case of the frames in which cotton or paper are held, ought not to be too large, in order to make the working easier. It is essential to make these sashes watertight by carefully adjusted fittings.

The sides of the box are made like those of the sashes, slightly inclined so as to expose the seedlings to the light, the rain water is made to run off more quickly, which is very necessary in case of sashes of paper or cotton, whilst what is more important, the heat of the sun can be utilized to better advantage.

In order that all parts may be easily reached, the forcing beds ought not to be more than four feet to four feet and a half in breadth, whilst the height of the box should be calculated so as to allow for a space of three or four inches between the top of the seedlings and the lowest part of the sash.

CHOICE OF SEED.

This subject can hardly be treated satisfactorily at this stage, it will have to be reverted to for a minute when we treat of the care to be given to the plantations, and particularly to those plants intended to produce seed.

In the matter of seed, the grower should deal only with safe and scrupulous traders, should only use seed in which the germinative power has been fully preserved, and, lastly, in order to be certain of this final point, should test the seed.

In order to do this, he can place a certain number of seeds between two sheets of blotting paper, slightly moisten the whole, and place it in a fairly warm part of the house, where the temperature varies but little (near a hearth), and keep the moisture up by adding several drops of lukewarm water from time to time. From the showing of sprouted seeds at the end of six or eight days, sometimes ten days, and taking into account the temperature and the degree of moisture, he will be able to reckon the useful return from the purchased seed.

The seed of the tobacco plant ... and we should have no difficulty to obtain a supply of good young seed and to use this ... stock during four or five years. ... The variety produced by the grower is thus better developed in every way, he can place it to greater advantage on the market, and he can follow the cultivation more closely with a view to making a profit, if he is an observer of the lessons taught by former years. Seed germinates the more quickly the younger it is.

Seed may be sown germinated or dry.

The sowing of dry seed in half-warm forcing beds ought to fit the plant for transplanting in forty to forty-five days. Hence this seedling will seem preferable to that obtained from swollen or germinated seed. Dry seed will better resist the period of intense cold which prevails about the beginning of the setting up of the seed beds, it has very little to fear from frost, and can await the development of heat in the forcing bed in case the fermentation of the layer of manure should not be sufficiently speedy. We advise Canadian growers to devote a more or less important portion of their seed plot to this method of sowing, and we should be glad to know the results which it produces in the country. (It is well understood that half-warm forcing beds, capable of developing an increase of temperature of 70 to 80 degrees in the atmosphere in which young plants are growing, and that notwithstanding what the outside temperature may be, are meant.)

It should be noted in passing that the temperature most favourable for the germination of the seed and the growth in seed plots, is about 80 to 82 degrees, dry seed can stand a temperature of 110 degrees.

The sowing of sprouted or swollen seed has the advantage of forcing the growth of the plant in the forcing bed, and of thus making a very appreciable gain in time.

One should, however, always avoid the exaggerated germination which is practiced in some parts of Canada; on good forcing beds the seed looks like a little white dot, or only swollen, grows very rapidly, and one does not risk hurting too-developed seeds in the course of the unavoidable blows, which it produces at the moment of sowing. Moreover, there is a serious inconvenience in exhausting the feeble resources of the seed before it can be in the soil, which ought to nourish and develop the young plant to which it will give birth.

GERMINATION.

Germination of seed can be easily obtained by inclosing it in a pocket of thick woollen material soaked in tepid water, drained, and kept in a part of the house where the temperature is about 80 degrees and as equable as possible. It is very easy to examine the seed by opening the pocket from time to time. In other cases the seed can be mingled with mould gathered from the hollows of trees and which is then sown with

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it, a slight moisture should be maintained, and as in the preceding case, it should be kept in a warm place. When the majority of the seeds split the outer coat, and the white embryo plant shows, the time has come to sow.

SOWING.

On account of its tenuity it is difficult to spread the pure seed equally over the seed bed. The most practical way of obtaining this result is to mix the seed with some non-active matter, such as fine burnt sand, mould, &c., in the proportion of $\frac{1}{10}$ of seed to $\frac{9}{10}$ of sand. A suitable medium is semoule, a non-hygroscopic substance, which does not agglomerate, is easy to sift and of about the same density as the tobacco seed; this allows of a homogeneous mixture. A thimbleful of seed ought under good conditions to sow a surface of 9 feet square; this ought to be sufficient for the requirements of transplanting for a surface 75 to 100 times greater, according to the fertility of tho seeds.

In every case the grower should seek to have his forcing beds of equal density, in which the plants will not be too close together, in order that these last may develop under favourable conditions, strike out the necessary beardroot, and not stretch out threadlike roots too early.

The seed having been spread over the forcing bed, which has been previously rendered sufficiently moist by a moderate sprinkling, the latter is slightly pressed down either by the hand, or better still, with a little board, after having been powdered over with a very thin coat of fine mould kept for the purpose. The next thing is to put on the sash. The plant will spring up in six or eight days, according to the degree to which the seed had been germinated at the time of sowing and the temperature of the seed-bed.

The forcing bed being [illegible] satisfactorily humid state, and the sash, retarding great evaporation, condensing [illegible] the frame the steam produced, and maintaining over the young plants an atmosphere saturated with moisture, the sprinklings are not necessary at the beginning. One thus avoids chilling the seed-bed by unseasonable visits, and by letting in the outer air whilst sprinkling. The coming up of the plant should be easily observed through the glass sash, but in case sashes of cotton or paper are used, it is necessary to examine it through little windows in the side of the wooden frames.

When using glass sashes it is necessary to watch that the young plants are not surprised by too warm a sun, as may happen during the fine spring days.

In such a case, one draws over the glass a cloth which he can keep in place by crosspieces of wood, or in some other manner, or he can obscure it by whitewashing with lime. The cloths used for this purpose can be utilized on clear nights to prevent loss of heat through radiation.

In a fairly extensive seed-bed it rarely happens that all the seeds thrive equally, and give young plants ready for transplanting at the same date; but in order to allow transplanting to be gone on with without stopping [illegible] to have an abundant supply of young plants continuously, it is well to seed forcing beds at intervals of some days, or to seed on the same day half-warm forcing beds with dry seed, swollen seed, or germinated seed, the young plants from which will come up one after the other more or less rapidly.

The grower is the best judge as to what precautions to take to effect this. He has, moreover, other means at his disposal to hasten or retard, in a normal year, the coming up of the seedlings in case any slight mistake should be made at the time of seeding the forcing beds.

SPRINKLING.

Sprinkling ought to be carried out with great moderation. It ought never to deluge the forcing bed, but merely keep up the moisture. When the grower judges it proper to put sprinkling in practice, he should do so, particularly at first, in the warm

part of the day, keeping the sash open as short a time as possible, and distributing the water, slightly warmed beforehand, by means of the rose of a watering pot, piereed with very small holes, or with a bunch of broom, used as a water sprinkler. In this way one will avoid laying bare the roots of the young plants, and, in case a slight baring should be noticed, one ought immediately to spread sifted mould over, in order to re-cover the roots.

It follows that as the plants become more vigorous, one should proceed to acclimatize them, opening the sash during a part of the day, and as the evaporation becomes more active, one should increase the quantity of water given to the forcing bed, but it is then better to sprinkle frequently, avoiding, however, doing so too late in the evening, always using slightly warm water, and being careful not to use a larger quantity than is strictly necessary for keeping up the humidity for the seedlings. In this way one avoids loss of heat whilst giving the young plant all the water it requires, in such proportions and at such times as the young plant requires. Moreover, the fermentation of the layer of manure, which supports the seed-bed, is not disturbed by the invasion of the water from the sprinklings; which invasion would result in the drying up of the mould in cases in which the water would be distributed too copiously.

WEEDING.

However great the care expended in the preparation of the mould, the forcing beds are more or less invaded by weeds. In order to release the young tobacco plants and allow them to develop more freely, one proceeds to the necessary weedings. These last, preceded, if necessary, by a sprinkling, will be made by hand, or with the point of a knife, during the warm part of the day. The laying bare of the roots of the young plants should be avoided, and a coating of mould ought always to be given when the work is completed. Weedings should be effected in a regular manner until the time when the tobacco plants occupying the whole forcing bed have become strong enough and no longer permit the other plants to develop near them.

THINNING OUT.

In spite of precautions taken at the time of sowing, it frequently happens, one might say usually, that the young plants come up too near each other. It is necessary to thin out the forcing bed before the young plants are too far developed, leaving in the earth the stronger, which thus released, will develop more rapidly, and strike out an abundant beard root. By this means the production of weak plants is avoided a thing which happens when the young plants, too close together, develop a tendency to lanky growth. As in the case of weedings, the thinnings out ought to be preceded by a light sprinkling, which facilitates the extraction, and followed by a coating of mould, this last being particularly urgent.

VENTILATION OF THE SEEDLINGS.

When the young plants have put out six leaves, which should happen shortly before the time of transplantation, and when the temperature becomes milder, they must be acclimatized so as to prepare them for transplanting, and give them the necessary vigour.

To this end, during the warm part of the day, the sashes should be partly opened. At first the sashes should be open only for a short time, this time should gradually be increased until such time as they can be finally taken out altogether; in the latter case, especially in Canada, one should never forget to replace the sashes in the evening, so as to protect the seedlings from the white frosts.

It is impossible here to indicate the exact time at which the sashes can be opened. The young plants require air as well as heat and light, and whenever a favourable opportunity offers, except in the very first days of the sprouting of the seeds in the hot

beds, it should not be allowed to slip. A seedling given proper ventilation will always make a greener and more vigorous plant, but the ventilation must be so regulated as not to produce too sudden variations in the temperature, and as nearly as possible to maintain the latter at between 70 and 80 degrees.

YELLOW PLANTS.

Sometimes it happens that the young plant turns yellow. In this case it is well to infuse into the waters used for sprinkling a little fertilizer, for preference oil cake, placed in a cloth bag, steeped in the receptacle whence the water is drawn. The oil cake may be replaced by colombine (dung from the hen-house). This done regularly, generally restores their lost vigour to the young plants.

It is equally likely to produce a species of rot which attacks the roots of the young plants, and appears caused by germs (a species of mushroom) coming from the old badly conserved mould, and which develop with the sprinkling. The infected earth should be replaced by mould purified by exposure to the air, and open to the incursions of domestic fowls.

ENEMIES OF THE SEEDLING.

Young tobacco plants present an easy prey to insects, and these frequently invade the forcing beds.

Slugs should be exterminated by placing over the hot beds, in the evening, fresh willow bark or slices of carrots, on which the slugs gather during the night. These can be gathered up next day and destroyed. The seedlings can be surrounded with cordons of quicklime, or curled pads of horse hair or cotton; in every case the immediate approaches to the hot beds should be kept free from all herbaceous vegetation.

Lice equally attack the seedlings; when the sun is warm they like to gather in the shade, where one can place moistened bark of trees, under which they are found and destroyed.

Earth worms can be hunted at sunset or by night, or even in broad day, by shaking the forcing beds by means of rods placed underneath them.

Moles and cricket moles sometimes commit serious ravages.

The former is little to be feared when the precautions for the setting up of the forcing beds, indicated above, are taken. It can be caught in a trap, dug out of its hill towards mid-day, or at sunset, and destroyed by a blow from a spade just at it sets to work again. The mole cricket may be asphyxiated by inundating his galleries with water to which $\frac{1}{20}$ of oil has been added or recourse can again be had to coal tar, placed at the mouth of the passages, in doses about the size of a small glass of liquor.

CARE TO BE GIVEN THE SEEDLINGS ON THE EVE OF TRANSPLANTATION.

Behold the time when our young plants are to be put in the open earth. The work of preparing the earth for their cultivation has often been retarded by inclement weather, and our beds are abounding with young plants, which have acquired a development of $2\frac{1}{2}$ to 3 inches. One can slacken and diminish the sprinklings so as to avoid the plants becoming virgate, and so that they may slightly strengthen themselves and bear transplantation well. However, the young plant ought never to harden in the seedplot, such a plant can easily recover from the season of transplantation, but it has a tendency to go to seed very rapidly and not even to form a few leaves. In case the seedling should be thrown back, one can force it, by more frequent sprinklings, taking care not to employ water containing caustic matter (liquid manure); in emergency a trace of nitrite of soda may be added in order to stimulate the growth.

It is difficult to indicate here precisely the manner in which the seedlings ought to be treated a little while before transplantation. All that we can say to the grower

is that he has two energetic means at his command; his sashes and the sprinkling; in combining their use at times and in a judicious manner, especially in a normal year, the intelligent grower ought to be able to avoid any too disagreeable surprises.

PUTTING INTO THE NURSERY.

This is practiced when the seedlings are too thick, some young plants, those that are most vigorous, should be taken up and transplanted into another half-warm forcing bed, or into good garden earth. It furnishes, though only in small numbers, vigorous subjects, easy of recovery, able, moreover, to be transplanted with a portion of the mould in which they have sprouted and grown, but on the other hand, it involves a large amount of hand work. We do not advise the use of nursery plants for the cultivation of seed, especially for lighter varieties, it would speedily result in debasing the type, which would no longer meet the requirements of the market for which it is cultivated. The best thing is to make thinly sown forcing beds, in such a way as to obtain vigorous subjects and equal sprouting.

EXTRACTION AND CHOICE OF SUBJECTS.

For transplantation, preference should be given to thickset and green plants which have thrown out an abundant beard-root. Subjects suitable for transplanting should measure 3 to 3½ inches. The use of yellow or virgate plants, or of those motled in green and yellow (signs of disease) should be avoided. The taking out of the young plants ought to be preceded by a sprinkling sufficiently abundant to insure the forcing beds being less disturbed, and the roots of the young plants unbroken, care should be taken to avoid shaking off any earth which may adhere to the roots, and which facilitates the plant's recovery from transplanting.

The young plants when taken out are placed together, without being pressed, one against the other, and slightly inclined, in a basket or other utensil with a large opening, covered with a damp cloth, and kept in a cool place, until the time when they are wanted. They can be thus kept a sufficient time, but it is better to employ them as soon as possible, in order to avoid their failing and a tendency to fade.

After the extraction of the plants the forcing bed should be freely sprinkled with mould, in order that the slightly disturbed roots of the remaining young plants may be brought back to a good condition. A second removal may be made some days later.

It sometimes happens that the grower finds himself obliged, towards the end of the transplantation, to use a slightly virgate young plant. He should, in such a case, transplant the seedling more deeply in such a way as to facilitate the development of the adventitious roots and to restore to the plant, in a certain measure, the vigour lost at the end of its growth in the seed-bed.

DATE OF SOWING.

From what precedes the grower desirous of having his young plants ready for transplantation from May 20 to June 10 to 15, ought to seed his forcing beds in the very first days of April, if he sows dry seed, some days later (about the 8th), if he sows germinated seed.

He can obtain a young plant fit to transplant in 30 days, and sometimes less, by pushing the growth in very hot forcing beds, and under glass, but the plant is relatively delicate, and is not fitted for early transplanting, when the nights are still cool, and the white frosts may be feared, the young plant grown under a sash, and given a period of evolution lasting 42 to 45 days, should be given the preference.

The obtaining of the young plant in the forcing bed, appears a sufficiently sure and easy operation; the greatest attention ought meantime to be brought to bear on this part of the cultivation of tobacco, for it is on this that the future of the whole crop often depends.

If the grower wishes to surely solve the important problem of obtaining sound, vigorous and abundant young plants at the best time, in order to be able to realize this condition, necessary for the cultivation of tobacco in Canada, to plant at the favourable time, and with as much care as possible, notwithstanding all that has been said above, his ingenuity will still find plenty of room to exercise itself. It is impossible to foresee whether the season will or will not be favourable, and every modification of the atmospheric conditions may often bring with it, serious consequences, in view of which the grower must alone and in the proper time decide upon his course of action.

DEPARTMENT OF AGRICULTURE,
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