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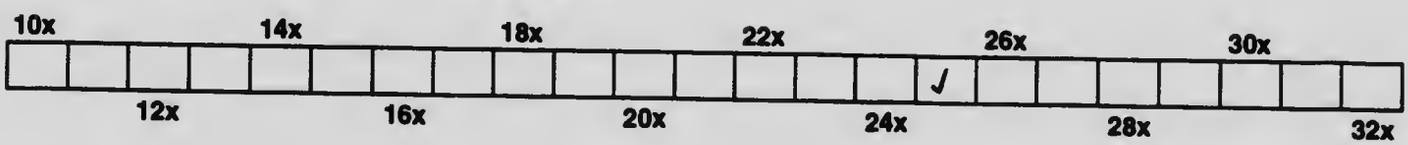

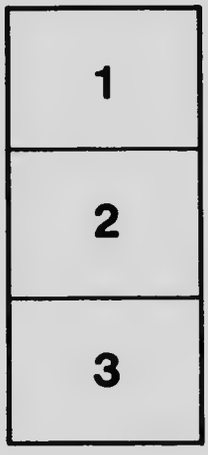

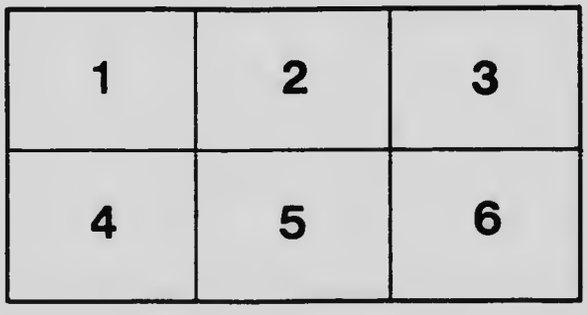

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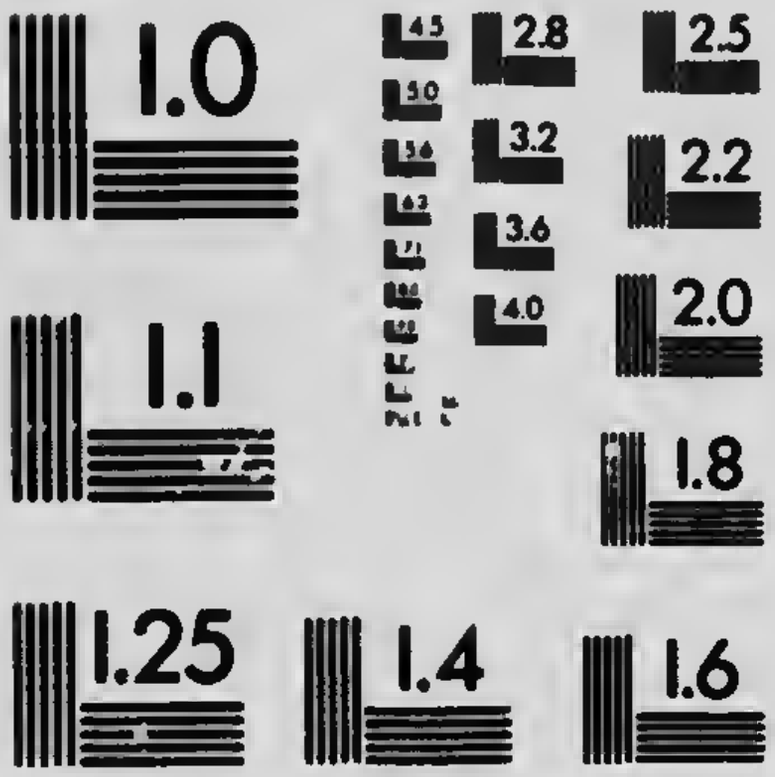

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DOMINION DEPARTMENT OF AGRICULTURE
OTTAWA, CANADA

TOBACCO DIVISION

QUEBEC EXPERIMENTAL TOBACCO STATIONS

SEASON 1911

BY

O. CHEVALIER

Tobacco Bulletin No. A-13

Published by direction of Hon. MARTIN BURRELL, Minister of Agriculture, Ottawa, Ont.

MAY, 1912

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30332—1

OTTAWA, May 25, 1912.

The Honourable Minister of Agriculture,
Ottawa.

SIR,—I have the honour to submit herewith Bulletin No. A-13 of the Tobacco Division, entitled 'Quebec Tobacco Experimental Stations,' season 1911. This is a report of Mr. O. Chevalier, the officer in charge of the stations, on the work performed during the season 1911-12.

The work of these stations covers a very wide field, and this bulletin should make interesting reading for the Quebec tobacco growers who wish to keep informed on our work.

I recommend that it be printed for distribution.

I have the honour to be, Sir,
Your obedient servant,

F. CHARLAN,
Chief, Tobacco Division.

30332—1½

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I.

QUEBEC TOBACCO EXPERIMENTAL STATIONS.

ST. JACQUES STATION.

The year 1911, as a whole, was a fairly favourable one for tobacco. The snow went off rapidly, the beginning of April was warm and the beds were seeded early. The seedlings made a rapid growth, the month of May being particularly warm and conditions generally favourable. On May 20, the beds were filled with healthy and robust seedlings; no difficulty had been experienced in preparing the soil which was in a good state of tilth, and everything was ready for setting out. The seedlings took root well and everything went nicely for a month and a half. Unfortunately the growth was practically checked by a severe drought, which started on the 20th of July, and the crop suffered a serious set back. The leaves ripened early and showed a tendency to thicken. However, the growers who were not afraid to cultivate and weed as often as necessary secured a crop of good quality, which sold without difficulty at profitable prices.

TEST OF VARIETIES.

The selection of the 'Yamaska' which, as will be remembered, is a hybrid Comstock x Sumatra, was continued. Special attention was given to the Big Ohio x Sumatra, a more recent hybrid, very promising both as regards yield in weight and quality of tissue. Experiments with Cuban, a directly imported variety, were also pursued with a view to increase the yield and to ascertain the most profitable proportion of nicotine. The results of these experiments are given further on in this report. A trial of Turkish tobacco, including two varieties, Karchi and Karchi Yaka, was also made with a view to secure information on the adaptation of this type of tobacco in Canada.

SEEDING.

For reasons already stated in a previous report, the warm beds were adopted, with the exception of one bed, out of the total number of six, which was prepared and conducted as a hot bed, as a check. Each bed measured 5 feet by 21 feet.

All the beds were prepared in the spring and treated as follows, six days before seeding: Victor fertilizer, one-fifteenth of a pound per square foot of seed bed, sprinklings with a solution of hen manure (one part of manure diluted in ten parts of warm water) and sprinklings with a solution of nitrate of soda, every other day, (one pound of nitrate in a gallon of water).

All beds were seeded on the 10th of April at the rate of one-seventh of an ounce of seed for 100 square feet of bed. Swollen seed was used.

Beds No. 1 and 2. Hybrid Big Ohio x Sumatra.
Bed No. 3. Yamaska.
" 4. Cuban.
" 5. One half in Karchi and the other half in Karchi Yaka.
" 6. (Hot bed.) One half in Big Ohio x Sumatra and the other half in Yamaska.

The majority of the seedlings were up ten days after seeding, with the exception of the Turkish varieties which seem to be a little slower. Owing to the favourable weather conditions, no difficulty was experienced in maintaining a temperature of 48 to 53 degrees Fahr. in the bed at night. The temperature never rose above 85 degrees Fahr. in the day time. The seedlings grew rapidly and the fourth leaf appeared on May 3.

Mushrooms appeared on the hot bed in such numbers that it was practically impossible to control their growth. This bed was completely lost; it had to be turned over and the soil was carefully kept separate.

As the soil was very clean, little weeding was required. The seedlings were greatly benefited by the treatment with hen manure and nitrate of soda, and on the 18th of May everything was ready for setting out. Beds were filled with a dense growth of healthy and robust seedlings. The only ones that showed a tendency to spindle were the seedlings of the Cuban and Turkish tobaccos. Not the slightest trace of disease was observed during the entire growth of the seedlings.

TRANSPLANTING.

The field on which plants were sown in 1911 was a clover sod, ploughed before the winter. The manure was incorporated with the soil in the spring, as none could possibly be had in the fall. Spring work started at the beginning of May, which is comparatively early for the province of Quebec.

The soil was prepared as follows:—

1. One ploughing before winter.
2. Second ploughing in the spring, to incorporate the manure with the soil.
3. Three harrowings with the disc harrow and the common harrow, followed by rolling.

All these cultural operations were well done, the temperature and weather conditions being particularly favourable. A few days before the setting out, which took place on the 20th of May, the chemical fertilizer was spread on the acre plot which had been set aside for an experiment with fertilizers. A report on this experiment will be found further on.

The crop was composed as follows:—

1. One arpent of Yamaska.
2. One arpent of hybrid Big Ohio x Sumatra on which the experiment with chemical fertilizer was carried.
3. One arpent of Cuban, directly imported.
4. One-half arpent of Cuban. This field was planted with seedlings from Canadian seed.

Transplanting was done entirely by machine; the seedlings were set 18" x 30" apart; they were well watered at planting time.

The distances apart (18" x 30") were modified on a part of the Cuban plantation, with a view to ascertain what distances apart would give the highest yield in weight with an average proportion of nicotine with this variety. This question is dealt with further on in this report.

As soon as the setting out was completed, a mixture of bran and Paris green was spread to protect the plantation from cut-worms and grubs. The seedlings took root extremely well, a warm rain on the 22nd of May did much good. Only about 3 per cent of the seedlings had to be replaced.

Varieties grown.	Area.	Transplanting.	Topping.	Harvest.	Yield.
Yamaska.....	1 arpent....	May 20.....	July 18.....	Aug. 24.....	965 lbs.
Big Ohio x Sumatra.	1 "	" 20	" 18.. .	" 24	1,552 "
Cuban	1½ "	" 21.....	" 29.....	Sept. 2	1,005 "
Turkish tobacco. ..	¼ "	" 15.....	" 22..	Completed Sept 21....	215 "

A great deal of cultivation was necessary during the year. The summer of 1911 being very hot and dry, cultivators and weeders had to be kept going quite often to keep the soil moist. It may be said that one acre of tobacco this year required three times as much work as in an average year. The curing was rapid and easy, owing to the long open fall. The last of the tobacco was stemmed on December 20, 1911.

ST. CESAIRE STATION.

The two arpents of land available on this station were planted in Yamaska and Big Ohio x Sumatra; the object was to compare these two strains with the same varieties as grown at St. Jacques l'Achigan. Another half arpent, not included in the rotation, was planted in Comsto ' Spanish for seed production. Eight hundred seed plants were selected and 25 pounds of choice seed were harvested. This production of seed was the chief object of our work at St. Césaire station in 1911.

Seeding was done as usual and with complete success; the seedlings were plentiful, healthy and of good quality. Setting out took place on May 19 in a well prepared soil and under favourable weather conditions; however, insects caused a little more damage than at St. Jacques. About 6 per cent of the seedlings had to be replaced in three successive settings. The land had received twelve tons of manure to the acre, ploughed in before the winter of 1910-11; it was harrowed and rolled three times in the spring. A summary of the work done and of the results obtained will be found in the following table:—

Varieties grown.	Area.	Transplanting.	Topping.	Harvest.	Yield of seed.
Yamaska..... .	1 arpent....	May 19.....	July 16.....	Aug. 22.....	967 lbs.
Big Ohio x Sumatra..	1 "	" 19	" 16.....	" 23.....	963 "
Comstock	½ "	" 20 ...	..... Seed-plants		25 "

The amount of cultivation required was not so great as in the northern counties, local storms having greatly moderated the effect of the drought in St. Césaire district. Unfortunately, such storms were often accompanied by hail. Thus on August 12 about 30 per cent of the leaves of our crop were destroyed as well as a large quantity of seed plants. This accounts for the poor yield obtained. The curing was done with little trouble and the tobacco, the last of which was stemmed on December 20, was perfectly cured and had a very good colour.

The ground was ploughed a few days after the crop was harvested, as done at St. Jacques. The crops obtained at St. Jacques and St. Césaire will be classed and fermented at the Ottawa experimental farm. The results of this work and the observations made on the different varieties grown will be given later.

II.

NOTES AND APPENDICES.

NOTES ON THE SELECTION OF SEED PLANTS.

The number of Quebec growers who produce their own tobacco seed is yearly increasing. A few words of advice as to this practice may, therefore, be of some use. In previous publications, growers were warned against the degeneration that may result from growing seeds under bags, and explanations were given on the cleaning of floral clusters. It is now proposed to go a little further in the work of selection proper.

Successful selection requires a great deal of work, and work of a delicate nature. In the first place, one should carry an ideal type in his mind. A selection is made of the plants that come closest to this ideal, then other selections are made among the group first chosen, bearing in mind the qualities that one wishes to develop or the defects that are to be eliminated.

So many things are necessary in selection work that one should start as soon as the seedlings have taken root. A first selection is made of those seedlings that have shown themselves the best in this respect. Notes are taken on, say, 500 plants. Then a second choice is made, based on the vigour of growth. The plants that are first to reach their normal height and in which the floral bud appears the quickest will be kept.

With this method, the weak and sickly plants are naturally eliminated. It is obvious that plants blighted, yellowed, rusted or diseased in any way cannot be included with the strong plants that have just been selected. Furthermore, we know what is required in a plant that is to be topped. Now a selection is made of the plants possessing the type that it is desired to fix. Here begins the most delicate part of our work: the phyllotaxy or, in other words, the study of the leaf itself. Notes are made on the length of the internodes, the shape of the petioles, the ramification of the ribs, the distances between the main ribs and the manner in which these ribs end at the periphery of the limb. The shortest internodes should be chosen, as they give the greatest number of leaves, and preference should be given to those plants the leaves of which have the finest ribs, the most regular and the widest apart. The shape of the limb must be carefully studied; all plants whose leaves are wavy or sharp-pointed will be eliminated and only the plants with regular leaves, flat and as round-ended as possible will be kept. Next come the thickness and the texture of the leaves. Out of the 500 plants selected at the start about 200 can be kept for the production of seed. The methods of seed production are outlined in our bulletins No. 6 and No. 8, to which our readers are referred.

It will be seen that the production of tobacco seed is a tedious and rather complicated work. The method outlined here is the one followed on our experimental stations and by which we have produced at St. Césaire this year, 25 pounds of choice

Comstock seed, whilst our station of St. Jacques l'Achigan yielded 10 pounds of excellent seed of various varieties. The whole of this seed was sifted and passed through a special separator in the laboratory of the Tobacco Division at Ottawa.

NOTES ON BEDS.

A new sort of bed called the 'warm bed' and possessing marked advantages over the hot and especially over the cold beds, was recommended to the growers in the report of this division for 1910. It will not be necessary to go into details, as the value and the advantages of these beds as well as their mode of preparation are set forth in bulletin No. A-12, to which our readers are referred. However, it is thought desirable to call the attention of our readers to this year's results. Of the six beds of 21 x 5 feet that were established this year at St. Jacques l'Achigan, only one was a hot bed, used as a check. The growth of the seedlings in both beds was carefully noted. At the very start, the seedlings in the hot bed grow quicker than in the warm bed but they lose in quality what they gain in earliness. The atmosphere of the hot bed is saturated with humidity, generally viciated, and the temperature is high. These abnormal conditions of growth result in what may be called an overfed seedling, which generally shows a tendency to elongate or spindle. It looks as though the proper balance was not maintained between nutrition through the roots and nutrition through the leaves, the latter being by far the most active. The result is that the roots develop very slowly and the mineral nutrition of the plant is deficient. This lack of balance in the general nutrition of the seedling results in perturbations by which its resistance to diseases is considerably decreased. On the other hand, in the warm beds the seedlings remain stock, and the roots system is much better developed. The nutrition through the leaves and through the roots goes on in a normal way, the seedling grows under natural conditions and its resistance to diseases is very little affected. As a matter of fact, not the slightest trace of disease was observed in warm beds, whilst the roots and collars of the seedlings were rotting in the hot beds. Lastly the hot beds were so infested with mushrooms that the surface, covered with spores, appeared to be entirely black. This bed had to be destroyed. Under these conditions it will be readily admitted that the sterilization of soils by formaline or by steam is necessary to prevent permanent infection of the soil.

This difference in quality between the seedlings produced on hot and warm beds persists and is chiefly apparent at the time of planting. As many as 19½ per cent of the former and only 3 per cent of the latter had to be replaced. It is supposed that damage from insects was the same in each case. For these reasons we conclude that warm beds are much superior to hot beds and they will altogether be used in the future.

Before concluding we desire to remind the growers that sowing with dry seed gives very good results on this system of warm beds. It has been observed, in every case, that a more uniform stand is secured where dry seed is used than when the seed is germinated before sowing. The greater the proportion of germinated seeds, the less uniform the stand. It should be remembered that the germ grows upwards. This is called heliotropism. The inverse phenomena is called geotropism. When sowing with dry seed, some germs have their terminal point pointing downwards whilst

others are pointed upwards. The growth of the latter is normal from the start, but the first must twist around and straighten up before beginning to grow upwards. This twisting process of the germ requires a long time, hence the delay in the growth of these seedlings. This is one of the chief causes of the lack of evenness in the stand. This phenomenon can clearly be seen by observing the germination carefully through a magnifying glass.

Of course the use of germinated seed has one advantage: the plants come up quicker, and for this reason it may, at times, be desirable to adopt this method even on warm beds, but in this case the seed should be germinated very slightly; they should only be swollen until the tegument begins to split open.

NOTES ON GROWING TURKISH TOBACCO IN CANADA.

A plantation of Turkish tobacco was seen by the author in September, 1910, at Ste. Sophie, on the farm of Mr. Schaposnick, who was the first to introduce this tobacco in Canada. The advantages of growing this tobacco are obvious. In the first place there is a great demand for this variety, owing to the increased consumption of Egyptian cigarettes in Canada; then it is a paying crop: an acre of Turkish tobacco may yield as much as 600 lbs. and prices range up to 40 cents a pound.

However, there are some decided objections which did not escape our notice. The numerous hands required in growing Turkish tobacco, owing to the special method of culture, the difficulty experienced in keeping the peculiar aroma which gives this tobacco its market value, and, lastly, the length of time required for its ripening—as many as four months must elapse before it can be harvested—these are three serious drawbacks.

Wishing to ascertain, for ourselves, the value of this crop in Canada an experiment was undertaken at our station of St. Jacques l'Achigan. Two varieties of Turkish tobacco: Karchi and Karchi Yaka were grown. As a whole the experiments were favourable, and though it is not positively known as yet what the aroma will be, still we feel justified in recommending the growing of Turkish tobacco in Canada, but in small areas only (half an acre at most) and only by growers who have a very large family.

The yield obtained was about 200 pounds of tobacco. The cost of production is about 22 cents a pound and the selling price about 35 to 40 cents. Our profit was $26; which is equivalent to a net profit of $104 per acre. The most important item is the high cost of labour, which is the chief drawback in the growing of this tobacco.

The growing of Turkish tobacco is quite different from that of other varieties. The warm bed may be employed but sowing should be done at the very beginning of April. The plants are set out out at the end of May. They are set very close, 6 x 20 inches; therefore transplanting must be done entirely by hand. The application of manure should not exceed 20 tons per acre; it is this quantity which gives the best yields without affecting the aroma. If more than 20 tons are applied, the growth is too rapid, the aroma poor and the leaf coarse.

Hilling and weeding are done in the same manner as usual. Topping is done very late and very high and it is advisable to leave the first two head buds. By this means the yield is materially increased. At least two months are required before

harvesting, which is done leaf by leaf, starting with the ripe bottom leaves. The tobacco should be fairly well ripened. The leaves are harvested one by one, from bottom to top, as they ripen. Thus the field has to be gone over four, five or six times, and it is hardly possible to complete harvesting before the end of September. It is this operation which requires the most labour and which restricts the growing of Turkish tobacco to those growers only who have large families. Owing to the closeness of the plantation, children are able to do better work. It is thought that a child of ten years, well trained in this kind of work, may harvest from 25 to 30 pounds a day.

The harvested leaves are strung on laths, and the laths, which are 4 to 5 feet long, are hung horizontally in special curing houses. A curing house for Turkish tobacco consists of a light wooden frame, 5 to 6 feet high, covered with glass. Hot bed sashes make very good covers. The curing house may be set up against a wall with a sunny exposure, which forms the best possible situation. The wall is used as the back of the curing house. The opposite side is glazed like the top, at least on three-fourths of its length. Bed sashes can also be used for this purpose. They should be set with a light slant, as well as those of the roof, to facilitate the removal of the water in case of rain. The two ends of the curing house may be covered with cotton sheets which are quite satisfactory. The great difficulty in curing is in obtaining the pale colour which is preferred in Turkish tobacco. Care has to be given to regulate the entrance of air, of light and the degree of heat This is a delicate operation which requires a great deal of care, as there is great danger of sweating during the hanging of the products. The curing takes place slowly; it requires from 40 to 50 days.

The first curing is completed by a second one, in a garret, where the laths are hung vertically, fairly close to each other. This is what is called '*mise en touffes*' or 'bunching.' Then the leaves are graded in low leaves, middle leaves and top leaves; in each of these three groups the leaves are divided in dark and light-coloured leaves, or six classes in all. The tobacco is now ready for fermenting.

NOTES ON CHEMICAL FERTILIZERS.

In Bulletin No. A-6 of the series of the Tobacco Division, the importance of experiments with chemical fertilizers is dwelt upon, and the proper method of experimenting is explained. The chief purpose of the bulletin is to encourage the growers to ascertain for themselves the fertility of their land by a well planned test of single fertilizers and to warn them against the irrational use of fertilizers put on the market under the name of 'complete fertilizers.' Experiments were carried on our stations, using the method recommended to the growers, and the results obtained as well as the observations made during the last three years have been compiled and are here presented.

The fertility of the soil was determined by a physico-chemical analysis, and by actual growing experiments, the latter in order to check the data of the analysis. This work required two years, after which a special fertilizer was ordered, the composition of which was based upon the results obtained. An arpent of land was divided into three equal plots on which the following mixtures were applied in 1911:

Plot No. 1.—500 pounds sulphate of ammonia, 300 pounds sulphate of potash and 300 pounds of superphosphate.

Plot No. 2.—500 pounds of sulphate of ammonia, 300 pounds sulphate of potash and 200 pounds superphosphate.

Plot No. 3.—600 pounds sulphate of ammonia, 300 pounds sulphate of potash and 100 pounds of superphosphate.

Farmyard manure, at the rate of 12 tons per arpent had been applied during the preceding winter.

The yields were as follows:—

Plot No. 1.—1,423 pounds per arpent.
" 2.—1,302 " "
" 3.—1,348 " "

As the figures show, plot No. 1 gave the best results, corresponding very closely to the results obtained during the two preceding years. This was to be expected, but the test does not leave any doubt as to this point.

In presenting the results of the test made in 1909 it was concluded that nitrogen seemed to be the most important element. This fact is confirmed by this year's test, whilst the rather important part played by phosphoric acid is clearly brought into light. Comparing plots No. 1 and No. 2 it is seen that the addition of 100 pounds of superphosphate increased the yield by 121 pounds. A comparison between plot No. 3 and plot No. 1 brings further evidence as to the value of phosphoric acid. Although plot No. 3 has received 100 pounds more of sulphate of ammonia than plot No. 1, yet, compared to the latter, it shows a decrease in yield of 75 pounds, which can be attributed to the fact that it had received 200 lbs. of superphosphate less than No. 1. It would thus seem that the mixture of fertilizers designed for plot No. 1 is the best all around.

It was shown in chemical analysis that the soil contained 0·71 in phosphoric acid. It may be a cause for surprise that this insignificant quantity of superphosphate (200 pounds) should have such a marked effect on the yield when there is already such a large proportion of phosphoric acid in the soil. It cannot be admitted that the addition of this quantity of superphosphate has made good a lack of phosphoric acid in the soil, even considering the rather high yield in grain and the fairly large production of tobacco seed. One may, at this stage, recall a suggestion of Mr. E. Gauthier, who wonders if the action of chemical fertilizers is really a nutritive action, or if it is not rather of a 'dynamic, exciting, anti-toxical nature'? Do not chemical fertilizers rather act as 'a stimulant, a diastase or of an anti-toxin.' This hypothesis is perhaps not very far from becoming a law. In fact it has been practically proved to be true so far as manganese is concerned. An interesting experiment would be to act upon this suggestion and see if those soils of Ontario, which absolutely refuse to grow some varieties of tobacco, could not be made to grow these varieties with the help of chemical fertilizers.

No doubt the continuous growing of tobacco on the same field produces a sort of infection and such infected soils are said to be 'tobacco sick.' The question is to find a means to avoid this infection or to correct it.

NOTES ON THE ROTATION.

A few years ago, after a careful study of the systems of culture in which tobacco may be included, a three years rotation was adopted by this Division and recommended for reasons stated in Bulletin No. A-5. The rotation is as follows:—

Tobacco.
Oats or barley.
Clover.

This rotation having been followed for three years on our Quebec experimental stations, its practical advantages may now be ascertained. The average yield from the various crops grown during these three years are given in the following table:—

Year.	Tobacco Comstock Spanish at 12c. a lb.	Barley at 35c. a bushel.	Clover at $8 a ton.	Gross revenue.	Net revenue.
	lbs.	bushels.	tons.	$ c.	$ c.
1909.....	980	32	1¼	141 60	71 60
1910	1,076	36	2	149 35	85 75
1911.....	1,150	38	1¾	155 00	88 60

The difference between net and gross returns is considerable, but it should be remembered that the cost of production is very high on our experimental stations, as all help, for any work, has to be paid for. The chief thing to note is that the gross and net revenues have steadily increased every year from 1909 to 1911. Now, figuring up the total average revenue for the three years from the arpent which was in tobacco in 1909, in barley in 1910 and in clover in 1911,—that is to say the arpent on which the rotation has run its course,—we have a result of $146.80, which is a little better than in 1909. Judging from the results of the first three years it may safely be assumed that the second rotation's period will yield a revenue considerably higher than the first one, from year to year. This is a good point in favour of the rotation which we recommend.

However, although this rotation is the one that is actually giving the best results, it is not perfect, and might be made more profitable. It has been thought that the production of clover seed might be included with advantage and a suggestion to this effect was made to the growers.

The following method might be adopted:

Cut the first growth of clover no later than the end of June then let the second growth ripen until September and cut when the heads are completely black. The crop should be left to dry on the field three or four weeks, or even a month. The ripening will be more thorough and the seed will thresh easier. The clover seed, being well protected and very hardy, does not suffer from exposure to rain, cold or even snow. After turning over the crop a few times, on the field, it may be gathered and threshed when the weather is very cold and dry.

An acre may easily yield one hundred pounds of clover seed which, at 20 cents a pound, would make an additional revenue of $20 from the rotation.

But the growing of clover seed has many other advantages. In the first place the grower who has not to buy seed at the prevailing high prices and who produces cheaply a large quantity of it is not afraid to sow it thickly on his fields and has always a large crop. There will be more clover roots and more nodules to gather nitrogen, which is a very important point for the tobacco grower. Lastly the farmer who produces his own clover seed will very soon have an acclimatized variety, adapted to the conditions of his district, and will no longer fail to get a catch.

In a good year one arpent of clover will yield two tons of hay which represents an average of $16. Adding $20 of seed, there is a gross total revenue of $36. Thus this method enables us to get more out of the rotation whilst increasing the fertility of the soil. This is the reason why we recommend it to the growers.

Tobacco is not the only plant to be benefited by this three years' rotation. The yields in barley and clover also show a gradual increase as will be seen by consulting the table. There is, however, one exception in the last crop of clover, but this is an accident due to the extreme drought of the summer of 1911.

The tobacco plantation of 1909 was followed by barley in 1910 and by clover in 1911. In 1911, barley was sown on the field which was in tobacco in 1910, whilst tobacco was planted on a clover sod. This is one result in favour of the rotation, but a better one still is expected in 1912.

Next year the rotation will start over again and the tobacco plantation will be in the same field as in 1909.

EXPERIMENTS WITH THE GROWING OF CUBAN.

A few years ago an experiment was made with the growing of Cuban tobacco. The product was utilized as fillers in the manufactures of cigars which were very much appreciated. Unfortunately the Cuban variety gives only a very light yield in weight in this country, and the object of this year's experiment was to find out a method of culture by which this yield could be increased.

An experiment was made on one arpent, which was divided into six plots; on each one of these six plots the crop was treated as follows:—

Plot No. 1.—Ordinary method of cultivation.

" 2.—Topping was done much higher than in preceding plot.

" 3.—Cultivation was done as usual, but one foot bud was left, which was topped in due time.

" 4.—Same as No. 3 but two foot buds were kept instead of one.

" 5.—One bud was left to every leaf.

" 6.—The growth of the plant was not checked and all buds were removed shortly before harvesting.

The six plots were prepared in the usual manner and planted the same day at the usual distances of 18" x 30". The yields are given in the following table.

No. of plots.	Yields in weight.	Yields in weight per arpent.
Plot 1	107 lbs	642 lbs.
" 2	108 "	648 "
" 3	108 "	648 "
" 4	122 "	732 "
" 5	129 "	774 "
" 6	92 "	552 "

The table shows that plot No. 5 gave the best yield in weight, being 222 pounds higher than the poorest yield and 274 pounds higher than the yield obtained in the first trial in 1909. Considering only the uniformity of product, plot No. 2 is ahead, but uniformity is not a very important point with this variety as the Cuban tobacco can only be utilized as fillers. Furthermore, the method of culture followed on plot No. 5 has the advantage of doing away with a lot of labour, as suckering is practically unnecessary. This yield of 774 pounds is not a heavy one but in a normal year a yield of 850 to 900 pounds may be expected. Quebec growers should take an interest in the Cuban tobacco; up to the present time, this variety is the only one that is specially adapted for use as fillers.

This crop of Cuban will be fermented shortly and the proportion of nicotine in the various lots, under different methods of culture, will be determined. It is possible that our conclusions may be somewhat modified as a result of these observations. If so, our readers will be informed of the results.

LABORATORY WORK.

During the year, 16 samples of soils, 6 of which were from Quebec and 10 from Ontario, were submitted to a chemical analysis. Results of this analysis are given in the following table:—

ANALYSIS OF SOILS.

QUEBEC SOILS.

				A	B		
Moisture	7·64	8·15	9·40	6·76	6·70	7·81	8·73
Nitrogen	0·061	0·068	0·044	0·038	0·040	0·031	0·54
Phosphoric acid	0·71	0·87	0·91	0·63	0·63	0·59	0·77
Potash	3·50	2·43	1·96	3·19	3·16	2·25	3·12
Iron and manganese peroxide	5·25	5·41	3·57	6·55	6·60	5·17	6·08
Lime	0·58	0·49	0·61	1·54	1.54	0·61	0·45
Humic acid	5·50	4·37	4·59	3·16	3·22	3·76	3·41
Silica	65·62	68·12	71·17	67·81	68·00	70·22	67·68
Alumina	12·28	13·00	11·28	11·52	11·39	12·41	11·72
Magnesia	0·42	0·37	0·18	0.24	0·27	0 28	0·34
Sulphuric acid	traces					traces	
Nitric acid	"					"	
Chlorine	0·002			0·062	0·065	0·002	

ONTARIO SOILS.

Moisture	0·52	0·71	0·51	0·65	0·67	0·91	0·73	0·61	1·12	0·84
Nitrogen	0·051	0·047	.....	0·041	0·089	0·040	0·048	0·051	0·057	0·061
Phosphoric acid	0·164	.....	.....	.....	0·192	0·221	0·177	0·160	.....	
Potash	0·101	0·097	.....	0·083	.....	.....	0·081	.....	0·074	
Iron and manganese peroxide	3·29	.....	.....	.....	.....	.....	.....	2·97	.....	
Lime	0·27	0·41	0·58	0·21	0·44	0·51	0·39	0·46	0·43	0·34
Chlorine	none.	traces.	none.	high.	traces.	high.	high.	traces.	traces.	high.

Analyses A and B are two analyses of the same soil from St. Damase, Que. Tobacco grown on this soil is practically incombustible. As may be seen this soil is rich in lime, iron, potash, silica and chlorine. The high proportion of potash is a cause for surprise, seeing the incombustibility of the tobacco. Salts of lime and iron, and particularly the chlorides, may have brought about a retrogradation of certain salts of potash, and silicate of potash and chloride of potassium on the one hand and insoluble silicates of lime and iron on the other, have been formed. The presence of a large quantity of chloride of potassium would explain the poor burning quality of the tobacco grown in the district.

BULLETINS ON THE CULTURE OF TOBACCO.

No. A-1.—Preparation of the seedlings and the care to be given to them.

A-2.—Fertilizers in tobacco culture.

A-3.—The growing of tobacco.

A-4. Report on the tobacco industry in Ontario.

A-5.—The importance of rotations in tobacco culture.

A-6.—Experiments carried on in 1908.

1st. Preliminary experiments in the growing of seed plants.

2nd. Experiments in the sterilization of soils.

3rd. Chemical fertilizers in tobacco culture.

A-7.—Bright tobaccos—Virginia and North Carolina.

A-8.—Experimental work, 1909.

1st. Experiments in the growing of seed plants.

2nd. Sterilization of soils, seed tests, thickness of seeding.

3rd. Advantages of the use of home-grown tobacco seed for the Canadian farmer.

A-9.—Work of the experimental stations in 1909.

1st. Experimental stations for the growing of tobacco.

2nd. Work of the tobacco division in the province of Quebec in 1909.

3rd. Experiments at the Harrow station in 1909.

A-10.—Tobacco growing in British Columbia.

A-11.—Tobacco culture in Canada.

A-12.—Report for the year 1910.

1st. Central Experimental Farm, Ottawa.

2nd. The Quebec Experimental Tobacco Stations.

3rd. The Harrow Station.

4th. Cleaning and grading tobacco seeds.

Appendix. The Tobacco Division of the Department of Agriculture.

A-13.—Quebec Experimental Tobacco Stations.

A-14.—Research work at Harrow Experimental Station in 1911.