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TOBACCO

THE GROWING OF TOBACCO

BY FÉLIX CHARLAN

Bulletin on Tobacco No. A-3

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

JANUARY, 1907

633. 2109



DOMINION DEPARTMENT OF AGRICULTURE TOBACCO DIVISION OTTAWA, CANADA

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BULLETINS ON THE CULTURE OF TOBACCO.

No. A-1.—Preparation of the seedlings and the care to be given to them. No. A-2.—Manures in tobacco culture.

Sent free upon application to the Department of Agriculture, Ottawa.

$\mathbf{T} \mathbf{O} \mathbf{B} \mathbf{A} \mathbf{C} \mathbf{C} \mathbf{O}.$

Growing of Tobacco-Selection of the Land-Sowing-Care of the Plantation-Harvesting-Curing-Preparation-Fermentation-Diseases and Insect Foes.

Although the tobacco remains on the land a comparatively short time (from seventy to one hundred days, according to variety) the farmer who takes up the industry must, to be successful, give his attention to it for a much greater length of time. In Canada, the seed beds are made usually in the early part of April; and from that date until the crop is sold, or is in such condition that it may be kept without risk, say by January or Februarv, the tobacco must receive intelligent and constant care. There must be such care, to obtain a good crop; and a continuation of such care when the crop has been harvested to prevent its deterioration.

It will be readily understood that in such a long space of time as has been referred to, from April to the following January or February, the plant will require various sorts of attention, according to the various phases of its growth and preparation for the market. A review of these various phases will be found in this bulletin.

SELECTION AND PREPARATION OF THE LAND.

All soils are not suitable in an equal degree to the growing of tobacco. Rich and light soils, containing a good supply of vegetable matter, will yield the best results.

Soils deprived of vegetable matter, however rich they may be in mineral elements, are not sunitable for tobacco growing. Tobacco is a plant which, during the greater period of its growth, affords poor protection to the soil against the sun; and moreover, in spite of its endurance, it may be expected to suffer from the effects of a protracted drought.

The plant, which is a weak seedling when transplanted from the seed bed to the field, has a rapid growth, and should be able to throw out easily a large number of roots; and to this end a deep soil, which retains moisture and is more easily drained, is preferable. Such a soil facilitates 'hilling up,' and thus permits the adoption of the flat cultivation system, which is cheaper than the system of ridge cultivation.

Good drainage of the sub-soil water is essential; for an excess of moisture will do even more injury than a prolonged drought. Sufficient drainage must be provided in any soil where an accumulation of sub-soil water is to be feared.

The soils of hillsides with a normal slope generally yield excellent results, mainly on account of the rapidity with which an excess of water drains off.

Low and marshy soils yield tobacco of cosrse and loose texture which dries and burns badly. Such soils should be avoided altogether. The same may be said of soils containing an excess of lime, which yield a leaf lacking in elasticity.

Good crops may be obtained on clay soils, provided the latter contain a sufficient proportion of sand and humus to be easily brought to and kept in a good state of tilth with the plough, harrow and cultivator. Such soils, known as 'heavy,' are conmon in some parts of Canada. Some, however, contain a rather large proportion of lime, giving them a marly appearance, and these yield a tobacco of thicker texture than do the light soils, while the difficulty of getting them into proper shape is a serious defect, the favourable time for ploughing being hard to determine.

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The best soils for the growing of tobacco are those which contain a sufficient proportion of elay and humus to enable them to retain a good supply of moisture, and which are known nuder the general appellation of 'loamy soils,' and classed as sandy loams, loams, clay loams or henvy loams, as the proportion of elay increases or decreases. Stiff clay soils are the least suitable.

The colour of soils influences the colour of tobacco. Light coloured tobacco is obtained more easily from a light coloured soil. This question has little importance, in so far as Canada is concerned, at the present time; as the lightest coloured products of the country, 'Burley' and 'Conqueror,' may be easily obtained from some of the light soils of Ontario and Quebec.

Sandy loams or even loamy soils will give the best results with light tohaccos, such as Havana Seed Leaf, Connecticut Seed Leaf, Comstock and Zimmer Spanish. Tobaccos with a rather heavy texture will do best on loams, or clav loams.

Some gravelly soils appear to be suitable to the growing of smull varieties of Canadian tobacco, such as Canelle and Petit Ronge; but analyses of these soils show that they may be classed as elay loams, allowance of course being made for the larger particles.

Tobacco being a very exacting crop, and its period of growth of comparatively short duration, the soil in which it is grown should be rich and frequently manured.

The land selected should be ploughed as early as possible the preceding fall, in order to be well aerated and properly saturated with moisture. It will be better to plough twice; once at the end of August or the beginning of September, and again, say two or three weeks before the hard frosts and heavy falls of snow.

The farm-yard manure, which is available at that time, should be ploughed in at the last ploughing. Only well decomposed manure should be used. The advantage of upplying the manure in the fall is that it will have time to become available during the winter months, that is to say, the elements of the manure will have time to change into soluble plant food before the seedlings are put in.

Spring ploughing should be done as early as possible. The manure may be buried by the plough, or spread over the field after ploughing, and mixed in by the disc harrow. The latter system is practised at the Central Experimental Farm at Ottawa with very good results. Green manure may be used in the spring; but care should be taken to let sufficient time clapse between the time of manuring and setting out. Manure should be applied in the proportion of ten to fifteen tons per aere.

Commercial fertilizers should be applied only in the spring. When the plants are to be set in close together, such fertilizers may be sown broadcast, and incorporated with the sil by the disc harrow. When the plants are to be set wide apart, in rows, the fertilizer may be spread so as to be buried under the ridges, or as near as possible on the location of the future rows. A few growers even wait until the seedlings are set out, and distribute the fertilizer around each plant, mixing it with the earth. This is a rather expensive method; but, judiciously practised, it gives good results.

Commercial tertilizers may be used in the spring as an addition to an application of farm-yard manure put on in the preceding fall; and in such cases they are applied at the rate of 200 or 300 pounds of complete fertilizer per aere. They may also be used exclusively, at the rate of one thousand to fifteen hundred pounds per aere; but this is not as good a method.

SOWING.

Sowing may be done on hot or cold leds. The first are preferable, owing to the fineness of tobacco seed, and may afford better protection to the young plants against the inclemencies of the weather when such are to be feared. In most parts of Canada, and even in the Province of Ontario, owing to the occasional severity of the spring, the use of hot beds can scarcely be dispensed with. The operation of sowing his been dealt with at length in Bulletin No. A-1 of the Tobacco Division of the Department of Agriculture, Ottawa, so that the subject need not be dealt with here; but a copy of the bulletin referred to will be furnished upon request.

An advantage would be gained by having hot beds really hot; that is, maintained at a temperature of from 70° to 80° Fahr., so that they could be ventilated from time to time, even on cold days, by lifting up the glass frames. They would rapidly regain the few degrees of heat which this operation might cause them to lose. Airing will prevent the rot, which sometimes occurs in prolonged rainy weather, an injury of which numerous instances were observed in the spring of 1906.

The whitewashing of the ghass tops or frames, in order to protect the young plants against deadly sunstrokes, is recommended, in preference to the use of cloths for the same purpose. Possibly the absorption by the bed of outside heat will be reduced by this method, but the absorption will be more regular, and the possibility of neglect is less than when cloths are used. However, it is well to use the latter at night, and daring a snow full, if such should happen to occur, though in the case of a snow fall a covering of boards would answer the purpose better.

For setting out, the plants should be from three to three and a half inches long. Plants of this size will be easily obtained on thin beds. It is a convenient size for either hund or muchine transplanting, and ensures a good new start for the young plant.

In order to promote the development of the roots of the young plant in the hot heds, it will be necessary to reduce the frequency of sprinkling toward the end of the stay of the plants in the beds. In order to hurden the plants before the time of setting out, the tops should be lifted up gradually a little more each successive time, until they may be completely removed on fine days.

The practice favoured by some growers of causing an exaggerated degree of germination of the seed before sowing cannot be recommended. It is better to use seed simply swellen, or even dry seed.

A good hot led, sown with dry seed from the 10th to 12th April, will easily yield plants ready for setting out about May 25th.

SETTING OFT.

The soil of the tobacco field should be in a perfect state of tills at the time of setting out or transplanting. It should then be prepared according to the system of phanting to be adopted, viz.: level or ridge planting.

Fht—i.e., level enlitivation is practicable on deep and well drained hands. Ridge caltivation will give better results on soils lacking in depth and in which an excess of moisture is to be feared. For planting on the level, the field should be marked both ways with a marker, into checks or irregular squares, the points where the lines intersect being the points where the plants are to be put in. A child may be employed to go ahead and distribute the plants, that is, lay a plant down at every cross section of the lines, while men follow, and set the plants in. A peg may be used in planting, to make a hole to set the plant into; though in very light soils the hand may be used. The plants are set at a moderate depth, to the collar, immediately nhove the rests. Care should be taken to avoid setting the plants on pieces of undecomposed manure, and to avoid bending the roots, which might eause the plant to become diseased.

Cloudy weather is favourable to the revival of the young plants. Evaporation is then less active, and the plants do not wilt so much. Planting should be done during the cool hours of the morning or carly evening. Whenever the soil is too dry, each plant should be watered carefully as soon as set in.

In taking up the plants from the hot beds the greatest possible care should be used to avoid breaking the roots or shaking off the earth clinging to them. To this end, the bed should be well watered half an hour or so before taking up the plants. For setting out, care should be taken to select well formed plants, green and thick-set, well provided with roots, and all as equal in size as possible, in order to obtain regularity of growth and size in the field.

Hand planting is rather tedious and costly. On large plantations, a planting machine is used. Such a machine, drawn by a tesm of horses, and operated by three men, will set out some twenty thousand plants in a day, doing the watering at the same time. These machines may be had from agents in Canada for from \$75 to \$90.

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The distance apart at which plants should be set varies according to the variety. Such varieties as Canelle and Petit Rouge may be planted 18 inches apart between the rows, and 12 inches apart in the rows. Other varieties, such as Havana Seed Leaf, are planted two and a half feet by two feet apart. 'Very satisfactory results, so far as growth is concerned, have been obtained from a plantation of Comstock Spanish set out 26 by 18 inches, in spite of the drought which prevailed during the ycar. As a general rule, it may be said that the varieties Havana Seed Leaf, Connecticut Seed Leaf, Comstock and Zimmer Spanish, when grown in Canada, should not be planted wider apart than two and a half by two feet.

When the rows are 26 inches apart, it will be possible to give the three hoeings necessary with a horse hoe, even though a very heavy horse should be used, before the development of the plants interferes with this work.

Some varieties with long, spreading leaves must be set farther apart. The Burly variety is set three by three feet apart, and sometimes even three and a half by three feet; but the necessity of planting more than three feet apart has not been proved.

There is another system of planting called the quincuix system, which has the advantage of affording much room for plant development. By this system the plants in each row are set so as to face the open space between the plants in the next row.

RESETTING PLANTS.

The plantation should be visited a few days after the setting out, and all plants which have been destroyed by insects or which did not succeed should be reset (replaced).

Resetting should be done early, in order to obtain a plantation as uniform in size as possible. Early resetting is particularly necessary in the case of close set plantations; for, in this case, late plants are checked in their development by the first ones, the growth of which has been normal since the start.

This is also the time for spreading poisonous solutions if traces of injuries caused by insects are observed.

There are many points in favour of early planting. There is the possibility of early fall frosts, and also the difficulty of obtaining a thorough drying of tobaceo in the shed before the severe weather sets in; so that all varieties of average size, such as Havana, Connecticut and Comstock, should be planted toward the end of May. As to Canelle and Petit Rouge, which ripen early, they may be safely set out from the 15th to the 20th of June.

When the plants are set out early, toward the end of spring, they find sufficient moisture in the soil to enable them to make a good start. They throw out an abundance of roots and are thus better prepared to withstand dry weather, their roots drawing the water necessary to their growth from the sub-soil. In 1906 a drought prevailed, and it has been observed that fields set out early in that year, from May 25th to June 5th, suffered less than fields later planted, and yielded better developed products.

CULTIVATION.

Cultivation should start early after the setting out of the plants; that is, as soon as the plants are well established, and the plants which have been set out to replace unsuccessful ones have got a good start, which will be about tweive days after planting.

The object of cultivation is not only to destroy the weeds, but also to keep the soil loose. It facilitates aeration, and, on the other hand, checks the too rapid evaporation of the water in the surface soil. The earth always gets firmly packed during the operation of setting out and resetting, and in view of this the first stirring of the surface soil should be effected as early as possible.

Cultivation by the horse cultivator is not sufficient. To complete the work, each plant must be hoed around by hand.

Subsequent cultivation is effected at varying intervals, according to the more or less rapid growth of weeds and atmospheric conditions. Heat, following a heavy rain, generally causes a thick crust to form upon the soil, and cultivation is then necessary for the aeration of the soil. Horse-hoe cultivation should continue until the time when, owing to the development of the plants, the passage of animals or machines might injure them.

HILLING.

This operation can scarcely be dispensed with in the ease of flat eultivation. It is easily done by means of a small, double mould board plough, the spreading of which is regulated according to the distance between the rows, and which throws the earth from both sides along the rows of plants. The first result of hilling is to firm the plants.

Before hilling, cleaning should be done; that is, the small leaves which are at the lower part of the plant should be removed. These leaves are left scattered around the plants, they decompose rapidly as soon as they are covered with earth in the hilling process. Short roots called adventitious roots develop in their places, and contribute in a large degree to the rapid and vigorous growth of the plants.

Hilling should be done when the plants are about six or eight inches high, and not before the ground has been cultivated at least twice.

Do not hill up when the ground is either very damp, or too dry as in a drought. In the first case, the earth would pack closely and aeration would be ehecked; in the second case, the opening up of the soil at such an unfavourable time would eause it to dry out completely.

THINNING AND TOPPING.

Thinning consists in removing from the lower part of the plants all of the leaves which, being close to the soil, become torn or dirty. Thinning should be done as high as three or four inches above the earth where hilling is practised; and still higher in the case of ridge planting where no hilling is done and where cleaning, which precedes hilling, is not practised.

The utility of thinning will be easily understood. It relieves the plant of all valueless leaves, which would never eome to maturity, and which, owing to their being close to the ground, afford a harbour for insects. Through the removal of such leaves, all the vigour of the plant will rise up to the high parts of the stem.

It is only after a proper thinning that the grower is able to determine just how much of the plant should be topped, that is to say, to judge of the number of leaves which should remain on each plant, propertionate to the plant's vigour and the weather conditions.

Topping should be done early, i.e., as soon as the plant has formed the required number of leaves and the operation may be done without injury to the top leaves. As nearly as possible, the stem should be eut or topped on a level with the highest leaf left on the stalk.

Early topping affords more time for the complete development and better ripening of the top leaves. Late topping may cause the crown leaves to remain small and thick and of inferior quality. On a properly topped plant, the top leaves should be almost as fully developed as the mid-stem leaves.

SUCKERING.

After the topping is done, numerous suckers will appear at the base of the leaves and the top of the stem. They should be carefully removed.

Suckering is done to allow the plant to reserve all its strength for the nutrition of its leaves. However, it is not necessary to destroy all of the short suckers as soon as they appear. This operation does not need to be started until the suckers are four or five inches long. The whole plantation should be gone over systematically, row after row, starting from the end which has been topped first, until the other end is renched, assuming that the topping has been done in the same systematic way.

Generally speaking, it will be sufficient to do this operation three times, in order to keep the plantation in good condition.

The last suckering should be done one or two days before harvesting.

SEED PLANTS.

Plants reserved for the production of seed for future erops require close attention. Such plants are, of course, not topped. The best plants in the plantation should be selected for this purpose, and the selection should be made early. They should be marked or tagged, and their development watched with the greatest care. Any plants showing the slightest sign of disease or of a weak constitution, should not be kept for seed, but only such as will unite, with the best possible conditions of growth, all the characteristics of the type which it is desired to propagate.

Undesirable cross breedings may be avoided by eovering the flower heads of the selected plants with ganze, or light paper bags, shortly before the opening of the first flowers.

Keep, only the main flowering stem; and remove all branching stems, which generally yield seed too light and of poor quality.

It is a bad practice to remove all the leaves from the plants kept for seed. The leaves are absolutely necessary to the life of the plant, and their complete removal is a practice that should never be followed.

The leaves of the seed plants are generally of inferior quality, and are very often damaged by the fall of the fragments of flowers. Their loss must be regarded as a matter of course, the only aim being to obtain seed as heavy as possible.

A part of the leaves may be removed only when the ripening of the pods is proceeding too slowly, and when it is desired to hasten it. But this should not be done before the brown colouring of the pods is sufficiently developed. The lower leaves are removed at first, and the rest, if necessary, are taken off slowly and gradually as the season advances and renders the operation more urgent.

Things muy be considered as satisfactory if the seed is ripe before more than half of the leaves of the plant have been removed.

When the leaves are removed too soon, the seed is light and of inferior quality, showing lack of nourishment.

When some pods are too long in ripening, it is better to cut them off with scissors and destroy them.

The stem may be cut with the pods on, the latter being left on the stem until they are dry; or the cluster of pods may be removed and hung up in a dry and well ventilated place. The last named method seems to be the best.

The seeds are left for the winter in the pods, the latter being opened only shortly before sowing time. The seeds should be emefully sifted. They may be kept for years in bottles not tightly corked, so as to permit of the necess of air, in bags, or in wooden boxes.

HARVESTING.

Tobacco plants should be harvested as soon as they are ripe.

A leaf of tobaceo may be considered as ripe when it becomes spotted with short, yellow markings, which first make their appearance at the edge and tip of the leaf, and extend toward the mid-vein. The tip euroes and hardens. On bending, the leaf breaks straight aeross with a sharp, characteristic sound. Sometimes, when the ripening is far advanced, the leaf becomes slightly swollen. In some varieties, the characteristic yellow spots are searcely visible, but the tip of the leaf euroes inwards, and the leaf itself hardens, and seems to become thicker. Ripe tobaceo fields exhale a penetrating aroma, especially in hot weather.

Ripening proceeds from the bottom leaves to the top ones. When harvesting is done by cutting the stalks—the usual method in Canada—the date should be chosen when the top leaves are ripe enough to take a good colour in curing, and before the bottom leaves are over ripe. When the bottom leaves have been too long ripe on the stem, they have no longer any weight, elasticity or firmness.

Generally speaking, the cutting should be done eight days after the appearance of the signs of muturity on mid-stem leaves, and when they begin to appear on the top leaves.

There are some cases, however, when ripening proceeds very irregularly.

A long drought will cause the leaves to ripen before they have attained normal development, thus causing a serious loss in the weight of the erop.

It may happen that, with the conditions of ripening satisfactory, and the growth normal, just as the grower prepares to harvest, a rain occurs, and the plants get green and start to grow again. On no account should harvesting be done then; as such plants, cut in the full period of growth, would be hard to cure and would take on a green colour. It will be necessary to wait—but not longer—until the signs of maturity have reappeared, and then harvest as rapidly as possible. Besides the poor condition in which they are for curing, tobacco plants harvested inumediately after a rain are deprived of the gums or resins which exude from ripe tobacco. Such plants are called 'washed.'

SUITABLE TIME FOR HARVESTING.

Harvesting should be done in dry weather, when ripening is progressing satisfactorily.

Do not start cutting early in the morning, when the leaves are still covered with dew, and are brittle, as they are too liable to break then, and the water would injure the tissues.

The best time for harvesting is on a bright day, when the dew has all evaporated, and when the leaves, having regained their elasticity, hang down slightly, and are less liable to break when being removed from the field. Under such conditions, the wilting takes place rapidly, and the handling which follows is facilitated. The cutting may be continued until late in the afternoon.

Harvesting may be done either by cutting the stalks or stripping the leaves (Priming). With the first method, the stalk is bent with one hand and cut at the base, as near the ground as possible, with a hatchet or storing knife. The stalks are put together, in bunches of from 4 to 8, according to their size, and are left to wilt on the ground for a certain length of time regulated by weather conditions (cloudy or bright skies).

When the wilting is done, the stalks are speared upon a strip or lath by, means of a V-shaped spear which fits upon the lath. In order to facilitate the operation of spearing, which requires some effort, these laths are hid upon special trestles, or held upright, one end upon the ground. The length of the laths corresponds to the inside dimensions of the drying houses; generally speaking, they are about four feet and perhaps a few inches in length, and from six to eight plants may be speared upon a lath, according to the size of the plants. After being 'loaded,' the laths arc hung in special wagons fitted with frames in about the same way as the drying houses, though, on the carts, the laths are closer together to reduce the risk of bruising of the leaves during the hauling from the field to the curing shed. They may also be loaded in small heaps, the layers being put crosswise and the tops of the stalks inward, but when this method is followed, care should be taken to unload the wagon as soon as possible, as over-wilting might result from a long exposure in heaps.

Care should be taken not to leave the plants too long lying a too held. A proper wilting will ensure a good colour, as well as a greater degree of firmness and elasticity in the leaves, provided the euring be not carried on too rapidly at the beginning. An extreme wilting will reduce the elasticity of the tissue, and very often cause an appreciable loss of weight.

• When the priming, or leaf harvesting method, is followed, the leaves are stripped from the stems gradually as they become ripe. The work begins with the lower leaves, which are the first to ripen, and continues progressively until the top leaves are reached.

The leaves are strung on heavy twine, which is stretched in place of laths in the drying house, though the lengths of twine are closer together than laths would be. The leaves are put on the string back to back, to avoid too close fitting and thus facilitate passage of air between them.

Long exposure of the stripped leaves on the ground is still more objectionable than in the case of stalk cutting. A good wilting is sufficient. The curing should, at first, be conducted more slowly than in the case of stalk.

CURING HOUSES AND CURING.

Buildings specially fitted for the curing of tobaceo are termed euring or drying houses. Any clean building may be used for this purpose, except when the curing is to be done by means of fire or hot air, but the best results will be obtained in tight houses where æration may be easily controlled, increased or decreased, or even entirely suppressed.

Tight curing houses are therefore preferable. Small trap doors to permit entrance of air should be provided at the base of the building; and there should be air flues in the roof, for which there are various plans. The number of ventilators in a building is of course regulated by the length of the building.

The ventilation of the eentral part of the house will be more easily done if the building is only of a moderate width, say twenty-seven or twenty-eight feet. A building of this width will afford ample space for a central passage about four feet wide, and three strips or later in either side of the passage. The passage is necessary for convenience and ve. It permits of inspection of the hanging tobaceo, and facilitates the exit of warm and damp gases, which gather in the open space of the passage and escape through the ventilators in the roof.

The choice of location of the curing house is an important matter. The euring house should be built on dry ground. If necessary, the site should be raised in order to avoid dampness. Low places, situated near marshes or running water, should be earefully avoided, as well as hill tops or too high places where strong winds might influence the euring process. The best location will be a well drained site in an open space, but not exposed to the wind. The building should be placed lengthwise with the direction of the prevailing winds during the euring season.

In arranging for the hanging of tobacco, eare should be taken to have the laths far enough above each other, so that when the tobacco is hung there will be sufficient ventilation space between the tips of the stalks or leaves of the top tier and the ends of the stalks of leaves of the tier below. The space between the laths of the different tiers will be determined by the average size of the product, i.e., the length of the stalks or plants ; or by the variety of tobacco. If the leave are hung on twine, as has been referred to, there will of course be much less space between the various tiers of twine than between the tiers of laths.

Laths should be placed side by side, six inches apart. The lengths of twine should be at such a distance from one another as to leave a space of half the width of the hand when the wilting is completed, thus allowing for ample ventilation.

The bottom tiers should be placed high enough above the floor to leave a space of at least one and a half or two feet between the latter and the tips of the tobacco.

The curing should start very slowly, in order to obtain a good yellow colour; after which more air may be admitted. To hasten the colouring, the curing house may be kept closed a day or two at the start; that is to say, the side trap doors should be closed, but the ventilators at the top should remain open, so as not to supress ventilation altogether. The ventilation may be increased as soon as the edges of the leaves have turned brown, and when the mid-rib of the leaf has become supple. On warm and damp days, the curing house may be completely opened. On a very windy day, care should be taken to close the openings facing the wind, in order to avoid breaking the leaves or too rapid drying.

In continued damp weather, it will be necessary to dry artificially the air of the house, to avoid mould. Little fir's of smokeless materials such as dry, scentless wood, charcoal, &c., should be started at various places on the floor of the curing house, in order to dry the air evenly in all parts of it, without causing too high an elevation of temperature. Continued dampuess might cause the products to turn dull and gray, instead of taking on a bright colour. Artificial drying will remove this danger. This operation makes tight puring houses indispensable.

The hest results will be secured when the leaves remain slightly supple all through the curing period, until the time of taking them down. Tobaceo dried under such conditions is generally more elastic, and the leaves are less mottled.

STRIPFING-BULKING.

A careful examination of the mid-rib of the leaves will show whether or not the drying is complete.

The tobacco may be taken down from the laths when the colour of the leaf tissue is normal, and when the ribs are wrinkled in their whole length. On being opened up, the ribs seem to consist of a mass of independent fibres; and only the ligneous, or woody, tissue should remain. No water should come out of the rib when the latter is squeezed near its inferior extremity. Sometimes a viscous substance will come out when this means of verification is adopted, but such substance should not be mistaken for water. The tobacco should also be supple, but not damp, with enough elasticity to regain its former shape after being squeezed with the hand.

For taking down the tobacco from the laths, a day should be chosen when the weather is neither too dry nor too damp.

In very dry weather, the tobacco will become rigid and would be in a poor condition for the haudling which is to follow. In very damp weather, the tobacco might absorb too arge a quantity of water, which would interfere with its keeping qualities. Weather generally known as 'mild' will be the most suitable.

As soon as the enring is completed, the tobacco should be removed from the curing house. A longer stay would injure its quality. The leaves are affected by changes in the moisture contents of the air; they turn dull, lose their firmness, and even get mouldy in contact with the stalks.

The leaves are stripped from the stems, and piled into small heaps or 'bulks,' in which they remain supple until the time of grading and tying into hands.

The 'bulks' should be only moderately high. The leaves are placed in two rows, tip to tip inside. They should be frequently examined, in order to make sure that no rise in temperature takes place. When such a change is observed, the bulks should be broken up and rebuilt upon another spot. Cloths are laid over the bulks, in order to retain the elasticity of the tobacco, but no weight should be pat upon them, as fermentation might result. If the leaves possess the right proportion of humidity when put in bulks, the bulking improves their colour, which becomes more uniform, and light streaks disappear.

TYING.

The tying, or putting into 'hands,' of tobacco, consists in putting together a certain number of leaves, from 15 to 20, and binding the 'hand' with another leaf, wound around the biggest end of the rib, the tip of the binding leaf being tucked conveniently into the 'hand.' Before tying the leaves into 'hands,' the grower should carefully grade the leaves, so as to pack only a uniform quality of products into bales or boxes. In grading, the points to be considered are: the length of the leaves, their thickness, their elasticity, and their colour. Torn leaves should never be graded with leaves in good condition.

Grading is a rather delicate task; that is, it requires a nice sense of discrimination and therefore some training. However, the necessary skill and judgment may be rapidly acquired. The value of the crop is always increased by careful grading.

After being gathered into 'hands' the leaves are again piled into bulks. Two rows of 'hands,'--with the tips inside and slightly overlapping--are piled up to a height of three feet, or more. These 'hand' bulks are covered with cloths to prevent their 'rying, and slightly weighted down. The tobacco in these 'hand' bulks should be examined more frequently than in the leaf bulks, as the 'hands' pack down much more easily and are therefore much more liable to ferment.

However, tobacco may be kept in bulks for a fairly long time, provided the temperature is not too high. Care must be taken, of course, to protect the tobacco from frest, and the bulking should be done in a building where such a thing as frost is not to be feared.

The tobacco is packed just before marketing. In packing, the hands should be arranged slightly overlapping, with the tips always in the centre. The bales are submitted to a light pressure, until they have acquired sufficient compactness to withstand the handling they will necessarily receive during transportation. The bales are wrapped with cloths, or thick paper, and secured with straps or bands which are wide enough not to cut into the leaves.

FERMENTATION.

Tobacco which is not to be nurketed at an early date should be fermented.

As soon as the icc is are put into 'hands,' the latter are piled into bulks 5 or 6 feet high. A thermometer is placed in the centre of the heap or 'bulk,' in order to seenre a record of its temperature. The temperature rises more or less rapidly, according to the proportion of moisture in the leaves, the size and height of the bulks, and the temperature of the room in which the tobacco is bulked; but it should never be allowed to go above 120° to 125° Fahr. When the thermometer gives this reading, the bulk should be broken up and rebuilt, care being taken to place in the centre of this new heap the 'hands' which were at the bottom and at the top of the first bulk. This exchange of position of the 'hands' will ensure a uniform fermentation of the total heap.

The first bulk should be broken up not only when the temperature threatens to rise above the maximum at which an injury may occur, viz., 125° Fahr.; but also-when the fermentation decreases and when the heap shows a tendency to eool off.

The temperature will rise again in the second bulk, but not so rapidly, and not so high as during the first fermentation. This second bulk is allowed to cool off until the temperature of the tobacco is the same as that of the room. Packing may then be started. When dealing with a great quantity of tobacco, large heaps containing several rows of overhapping 'hands' may be built. Fermentation is thus made easier and more regular, the loss of heat not being so great. But the huilding and the care of such heaps require a certain amount of practice, special equipment, and expert management.

Fermentation may also be earried on in boxes, in which the tobacco is packed. It will start buring the course of the following summer, or as soon as the boxes are placed in rooms with suitable temperature. Boxes of suitable size are prepared, and the 'hands' packed in, butts outward. Pressure is exerted so as to obtain a net weight of some 300 or 350 pounds per box. Facilities for the escape of gases produced by the fermentation are provided by leaving an empty space at each end of the box. This is done by putting in boards one and a half or two inches thick, one at each end of the box, before filling, and withdrawing these boards after the box has been filled and the pressure anglied. The corresponding parts of the boxes are put together so as to provide for a free circulation of air.

With this mode of fermenting, it sometimes happens that fermentation does not proceed with the same uniformity either in the centre, or near the sides of the box. The chief objection to this process is that no control may be kept over the progress of fermentation; and when the boxes are opened, it is sometimes found that a part "of the tobacco has been injured by over fermentation, while another part has not had sufficient fermentation.

Fermentation can also be carried on in bales. These are piled up to a height of 3 or 4 tiers, and taken down from time to time in order to put in the centre the bales which were at the top. Of all methods, however, this one is the least worthy of recommendation.

Never pack tobacceo in bales or boxes until the leaves are absolutely dry, although still supple, and the ribs are completely shrank. To neglect this precaution would be to court certain failure.

DISEASES AND INSECT ENEMIES OF TOBACCO.

Tobacco is subject to various diseases. The most common and at the same time most severe of these are Blight, or Mosaic Disease, and the Antracuose.

The Mosaic Disease reveals itself in spots distributed over the leaf, some parts of the leaf taking on a darker green than the normal hue, while other parts take on a light yellow hue, as though they were wilted. The disease will be easily detected by holding the leaf up to the light. Some of the yellow parts dry up towards the end of the period of growth, and rust spots appear which rapidly extend and go through the tissues.

In some cases, the yellow parts colour more deeply, and become reddish, giving to the leaf almost the appearance of mosaic, hence the name 'Mosaie Disease,' applied to an advanced stage of the blight. When the disease reaches an acute stage, the leaf generally swells up.

The Antraenose is easily detected by the yellow aspect of the affected plants. A closer examination of the stalk will show on some parts of the stem, or on the ribs of the leaves, soft and black spots. When the disease starts at the intersection of two ribs, the tissue of the leaf is itself infested. In the last stage of the disease, the appearance of the plant is the same as in the case of the Mosiae Disease, viz.: marbling of the tissue of the leaf, and numerous rust spots.

These diseases are contagious. They are easily transmitted by insects' bites, and by topping and suckering.

It has been observed that a healthy seedling, planted on a bunch of manure, almost always becomes affected with Mosaie Disease.

Highly nitrogenous manures may predispose tobacco to Mosaie Disease.

When only a small number of plants are affected with either of the diseases referred to, the best course to follow is to remove these plants at once, and to burn them. When the disease is spread over a large area, care should be taken to confine it as much as possible. To this end, the grower in topping and suckering should start with the healthy plants and finish with the diseased ones, in order to avoid carrying the disease from one plant to another.

The sick plants should be harvested before they have reached maturity, and dried separately.

In the case of seed plants, a close watch should be kept over the suckers, as these make an appearance. Often traces of the disease will be found on the latter, while normal leaves will appear healthy. Only the seed of plants the buds of which were of a healthy green, should be kept for sowing purposes.

Tobacco has many insect enemies. The worst of these make an appearance at the time of the setting out of the plants, and among them is the cut worm.

The cut worm is generally found in lands overrun with weeds, or that have been long in grass. It works near the surface of the ground, cutting the plant at the collar. The greater part of the damage is done during the three weeks which follow the setting out, and there are many cases on record of plantations which had to be entirely re-set. When the plant has become fairly well developed, and the stem more resistant, the attack of the worm does not cause the death of the plant, but the growth is never so vigorous afterward, and the cut made by the worm favours infection with some contagious disease.

The cut worm can be successfully fought by spreading poisoned grasses between the rows of the plantation. The following solution is recommended for the purpose: 2 ounces of Paris green to 10 gallons of water. The grasses are soaked in this solution and spread upon the plantation at nightfall, the worms being attracted both by the coolness of the wet grasses and the food they offer. A mixture of cornmeal and Paris green, in the proportion of 1 lb. of Paris green to 50 or 100 lbs. of cornmeal, may also be used for spreading around the plants. The mixture is slightly moistened, with water, to which sometimes a little molasses is added. Bran, slightly moistened, may be used in the place of cornmeal. It spreads very easily.

The spreading of poisoned grasses, with the view of poisoning the worms, will be more efficient if it is done a few days before the setting out of the plants.

The grower can hardly be reminded too earnestly of the care and caution which should be exercised in the handling of such a dangerous thing as Paris green. It should *always* be kept out of reach of fowls and cattle, and of children and inexperienced or irresponsible persons.

As to the caterpillars, which attack the foliage, and in some districts completely devastate the plantation, a close search should be made for them, and this search may be made by women and children. The caterpillars are found, in daytime, on the lower surface of the leaves. When the infested plantation covers only a small area and is situated near the farm buildings, the fowls may be allowed access to it.

An attempt has recently been made to destroy the caterpillars by spraying the infested plants, by means of a spraying machine, with a solution of arsenious acid. The spraying should be done as soon as caterpillars appear, as these are more easily destroyed when young. Early spraying will also permit of the excess of poisonous matter to be washed off by the rains before harvesting.



