

## THE CULTIVATION AND CURING OF CIGARETTE TOBACCO

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### HISTORY

**I**N December, 1929, the writer assumed charge of the North-Western Division and found in his control a Tobacco Research Station at Ganewatte with only a temporary bungalow and over fifty acres of land, only ten of which had been cleared but allowed to go back to jungle. It was decided that in the first year (1931) of tobacco cultivation fertiliser trials should be conducted with the local chewing variety of tobacco. The crop did not show any appreciable difference in response to the different treatments of fertiliser as the land was freshly burnt high jungle. An attempt to sell the crop disclosed the existence of a ring of buyers which every year controlled the price of chewing tobacco. It was also noticed that among other factors the prices of the major crops influenced the price which could be expected for chewing tobacco, an indication that the local chewing tobacco did not have a market outside Ceylon.

Attention was, therefore, directed towards the selection of a variety of tobacco which while having other uses would also not be confined to a limited market. In the Maha season 1932-33 trials were made with a number of other varieties of tobacco including White Burley and Harrison's Special. The latter showed signs of being a suitable tobacco for local conditions of soil and climate. Difficulty was, however, experienced in curing it for use as cigarette tobacco although a fair sample was obtained by the use of a makeshift curing barn which was heated by a discarded tea drier.

In Maha 1933-34 a larger area was planted with Harrison's Special Tobacco and the Ceylon Tobacco Co. lent the services of an expert from America to demonstrate to several officers of the Agricultural Department the curing of Harrison's Special tobacco in the makeshift barn referred to above. With the

experience gained therefrom a quantity of tobacco was cured at Wariyapola in an experimental flue-curing barn of iron framework covered with asbestos sheeting and heated by a furnace specially constructed for the purpose.

The tobacco cured here was pronounced suitable for cigarettes. In Maha 1934-35 planting was considerably delayed owing to the drought and much of the crop was spoilt by unseasonable rains which fell at the time the crop was harvested. The crop which was cured before the rains was pronounced to be superior to that turned out the previous year.

#### **ADVANTAGES OF CIGARETTE TOBACCO**

As already stated cigarette tobacco as it caters for a wider range of customers will not be dependent on local factors for its price. A duty ranging from Rs. 2.00 to Rs. 2.50 per pound is levied on all unmanufactured tobacco imported into Ceylon and over a million pounds are imported annually. Thus there is a local market for cigarette tobacco if it can be produced apart from the opportunities of export.

In 1934 nearly all growers of chewing tobacco have been left with the produce on their hands for want of a market which is at present restricted to the Jaffna cigar manufacturer who only buys the "sand" leaves and that at about 10 cents per 1,000 leaves.

#### **TOBACCO IN THE NORTH-WESTERN PROVINCE**

Tobacco cultivation in the North-Western Province is confined to the Hiriya Hat Pattu of the Kurunegala district, Kalpitiya Division in the Puttalam District and a group of villages in Pitigal Korale South in the Chilaw District. Only chewing tobacco is grown and because of the restricted market the returns are poor although this was at one time a very remunerative crop in this province.

#### **TYPE OF TOBACCO**

According to such qualities as colour, flavour, aroma and body or other characteristics produced by the method of curing tobacco is grouped into types. Types are sub-divided according to the use of the tobacco into classes.

The chief known types of tobacco are Cigar, Virginian and Turkish. The latter is classed as a cigarette tobacco owing to its being used exclusively for that purpose. Filler, binder and

wrapper are the three classes of cigar tobacco. Cigarettes, chewing, pipe-mixtures and snuff are the four classes of Virginian tobacco.

The reference cigarette tobacco, in this article applies exclusively to a Virginian type — viz: Harrison's Special tobacco.

Harrison's Special tobacco may, perhaps, with appropriate treatment be used for other purposes.

### QUALITY

For the manufacture of cigarettes tobacco must be of specific quality as determined by the association of such properties as size of leaf, texture, colour, aroma, flavour, body, combustibility and nicotine content. Soil and climate during the growth, cultural treatment and methods of curing are the chief factors which influence quality. One must not presume that just because Harrison's Special tobacco can be grown it will necessarily yield a tobacco suitable for the manufacture of cigarettes. Suitable soil and climate and the correct method of cultivation are essential.

### CLIMATE

For the production of the best quality of cigarette tobacco a moderate rainfall is needed. The rain should be evenly distributed right throughout the growing period of the crop while during the ripening period lighter showers should prevail. Heavy downpours followed by dry periods produce a poor quality of leaf and gentle showers are best. Heavy rains at harvest spoil the quality of the leaf which becomes thin, lacks body and has coarse midribs.

Plenty of sunshine during growth is also necessary. For transplanting dull days with frequent showers are ideal as under such conditions the transplant establish themselves quickly. A period of sunshine thereafter helps the rapid growth of the plants.

### SOIL

Provided the climate is suitable tobacco will grow in any well-drained soil. Cigarette tobacco can be profitably grown only on light loams. The best cigarette tobacco in the United States of America is grown on soils having about 75 per cent. of sand and only about 5 per cent. of clay. The texture of the soil also greatly influences the quality and quantity

of tobacco produced. Sandy soils of fine texture are ideal and such when correctly handled can be expected to yield a large quantity of leaf of a light uniform colour with good body, elasticity and silkiness. Coarse sandy soils need heavy manuring as otherwise the leaf will be of a chaffy, indifferent quality, light in colour and body and wanting in elasticity.

The sub-soil also influences the yield and quality of tobacco. A sufficiently open sub-soil which allows for drainage is best. In an excessively porous sub-soil the crop is adversely affected in time of drought and fertilisers are easily leached through in wet weather. A sub-soil in which the proportions of sand and clay are about equal is ideal, in that it allows for proper drainage and retains sufficient moisture.

### **SEASON**

So far Harrison's Special tobacco has only been grown in the Maha season during the months of October-November although the local chewing tobacco is grown in the Yala season from March till June. Trials are being made this year with a Yala crop at Ganewatte.

Planting out should be so arranged that harvesting can be done in dry weather. If the whole area is planted out within one month the entire curing could be completed before the next spell of wet weather. Two or three weeks of dry weather and continuous sunshine during the ripening stages of the crop are indispensable for the production of tobacco of the right quality.

### **ROTATION**

A number of considerations should decide the rotation of crops to be followed in tobacco land. The possibilities of a market for the crops so grown will undoubtedly largely determine the rotation.

A proper supply of decomposed organic matter must be maintained in the soil if good yields are looked for. On the very light sandy soils of Wariyapola, sunn hemp has been used with advantage. Cowpea was used at Ganewatte but had to be eliminated from the rotation because it encouraged eelworm.

The rotation now followed at Wariyapola is:

Maize in Maha  
 Green manure crop in Yala  
 Tobacco in Maha  
 Green manure crop in Yala  
 Maize in Maha.

### SEED SELECTION

The tobacco plant has a natural tendency to variation and is also very susceptible to changes of soil and climate. Rigid seed selection should, therefore, be practised if deterioration from locally grown seed is to be avoided. Cross-pollination between dissimilar plants of the same variety should also be avoided. Tobacco of great uniformity and high quality can be obtained from seed secured by selection and correct handling from plants of outstanding merit.

Selection should be made from plants showing trueness to the varietal type and best response to the peculiarities of soil and climate prevailing in the locality. For cigarettes, select seed from plants with leaves fine in texture, thin, with small midribs and fine veins and lightness in body. Plants with a large number of leaves of normal size are best while the leaves themselves should have an erect habit of growth with little or no tendency to droop. Plants with leaves which take on a greenish-yellow colour as they ripen should be selected.

After the parent plant has been selected remove all the top leaves and sucker branches leaving only three or four terminal flower branches for maturing seed. The number of leaves left on the seed plant is about the same as the number left when the main crop is topped. The flower head after it had been prepared for bagging resembles a crow's foot.

Even though only one variety of tobacco is grown bagging the flower-head is desirable because selected tobacco plants when self-fertilised have a prepotency in reproducing plants of similar habit and uniformity is a very desirable characteristic in flue-curing. A paper bag should be inserted over the flower-head and tied loosely round the stem of the plant with soft string. The bag should be removed every week and the flower-head examined. Any surplus flower branches and suckers which may have grown in the interval should be cut off and the petals of the

selected flowers removed as they dry. The bag should also be raised from time to time to allow the elongation of the flower stalks. When about seventy-five capsules have formed the bag is removed and all the remaining flowers are cut off. Even after the bag is removed flowers and buds may develop and these should be removed. As they approach maturity some tobacco plants deviate from the type that it is desired to select. Twice as many plants should therefore be selected for seed purposes as will ultimately be required. Each plant should give about one ounce of seed.

When the pods are brown the seed-heads should be severed from the parent plant and left to dry thoroughly with the pods pointing upwards in a cool dry place. Seed is then taken only from the pulp pods by nipping off the tips. The seed should be winnowed before being stored in an airtight glass bottle.

As only heavy well-developed seed should be used for sowing it is passed through a tobacco seed-grader to separate the light seed.

### NURSERIES

To obtain a sufficient supply of strong healthy tobacco seedlings seed should be maintained in a high degree of fertility with an abundance of available plant food at the time the seeds germinate, together with an adequate reserve to ensure the steady growth of seedlings.

The site selected for seed beds should be near a permanent supply of water and free from too much shade from large trees. An eastern exposure which will give the plants the sunlight of early morning is desirable. The same site should be used for seed-beds owing to liability to pest and disease.

A sandy loam with good natural drainage is the most suitable soil for seed-beds. If the soil is too light a few cart-loads of anthill earth may be spread over and thoroughly mixed with the soil.

The site should be levelled and a liberal application of old well-rotted cattle manure dug in, some time before the final preparation of the seed beds so that the manure may be converted into humus before the seed is sown. The site should be kept free of weeds during this interval. The site is eventually lined off into beds with drains between the beds to serve as pathways.

Open drains should also be cut around the four sides of the site. The beds may be of any desired length but the width should permit weeding and the removal of seedlings from either side without damage to those left behind.

Before sowing the beds are sterilised by burning brushwood and such material as coconut husks or old cadjans placed in sufficient quantities to sterilise the soil to a depth of about three inches. When properly sterilised the soil is friable, easily pulverised and has a light dull red colour.

After the beds have cooled all large pieces of charcoal and unburnt bits of husks, etc., are removed and a mixture made up of 1 lb. of superphosphate,  $\frac{1}{2}$  lb. of nitrate of soda and  $\frac{1}{2}$  lb. of sulphate of potash spread over every 20 square yards of seed bed. The surface soil is then thoroughly mixed with the fertiliser and ash by digging over and care taken not to bring the unsterilised soil to the surface. The seed beds are next reduced to a fine tilth and their surface levelled. The seed beds are enclosed with boards of bricks before sowing and roofed over with movable cadjans supported on a framework of sticks driven into the ground and tied together. These roofs should be high enough to permit of the watering, weeding and spraying being conveniently carried out.

One ounce of properly cleaned seed is sufficient for sowing 100 square yards of seed bed which should supply enough transplants for five acres of field. To ensure even distribution the seed is thoroughly mixed with sand one teaspoonful of seed being used for every quart of sand. After sowing gently press the seed into the soil and water the beds with a can fitted with a finely perforated rose. Watering should be done every day and the beds kept moist but not wet. When hardening off is begun before transplanting less water is given to the seed beds. According to the area to be transplanted and the size of the flue-barn two or three seed beds should be sown at intervals of about two weeks. Seed beds should be kept covered at night with light muslin. Cheap crepe cloth has been found very useful for this purpose. The same cloth has been used for three years. The covering must be thorough so that the seed beds are absolutely insect-proof. The beds should also be kept free from all weeds.

Seed beds should as a precaution against pest and disease be sprayed once a week with arsenate of lead 1 lb. to 30 gallons of water and with a suitable copper or sulphur spraying solution.

The cadjan roof over the bed should be kept on all day during the early stages of growth of the seedlings. Later the roof is removed for a short time each morning to give the seedlings more sunlight. The period of exposure to the sunlight is gradually increased till the desired age for transplanting the roof is kept off all day. This procedure is known as the hardening off the plants. Care should, however, be taken if there is any likelihood of rain as heavy showers will wash away the seedlings. Just before removing seedlings soak the seed bed thoroughly with water so that the plants can be lifted easily without being damaged. After removing all suitable seedlings water the beds again to firm the soil round the roots of the plants still left behind.

#### PREPARATION OF LAND FOR PLANTING

Land which is to carry tobacco should be in good heart and high fertility if the transplants are to strike root easily and to continue to grow uniformly and rapidly. For this purpose the land should be ploughed, cross-ploughed and disc-harrowed, allowing a sufficient interval between the successive operations for the decomposition of any green matter ploughed in and for the aeration and weathering of the soil. The interval allowed will depend on such considerations as the quantity and nature of green matter turned in, the rainfall at the time the land is ploughed up and the amount of sunshine the land receives. Any weeds which may spring up in the intervals should be destroyed while still young by occasional harrowings.

Just before transplanting the land should be levelled and drains opened according to the slope of the land. The number and depth of drains will depend on the rainfall but drains about six inches deep and one foot wide on four sides of every tenth of an acre ought to be sufficient.

By the use of a hand marker the land is next pegged out so that the plants are put 3 feet by 3 feet apart. A complete fertiliser mixture containing:

3	per cent.	available	Nitrogen.
5	„	„	Potash
8	„	„	Phosphate

is applied three or four days before the transplanting. A large teaspoonful of this fertiliser may be used at the spots where the transplants are to be put in and the fertiliser well mixed with the soil.

### TRANSPLANTING

When the seedlings are from 6-8 weeks old they are ready to be put out in the field. They should be about six inches high by then. The root when bent about  $\frac{1}{2}$  inch from the tip should snap in plants suitable for transplanting.

Thoroughly soak the seed-bed before removing the seedlings for transplanting so that they will come off easily. Select only short stocky seedlings and remove only as many seedlings as could be transplanted in one evening. The seedlings should be carried to the field in a shallow basket. Evenings are best for transplanting.

Make a hole with a short pointed peg, put the plant in taking care to cover all the roots, firm the soil round the plant, water liberally and cover with coconut husk. Do not use husks which were used the previous season. The husks should completely shade the seedlings for three days and if there is no rain the plants should be watered morning and evening. After the third day the husk may be opened about three inches and entirely removed after about two weeks. All vacancies should be supplied as soon as possible after the third day and within a week of the transplanting of the field. It is very essential that as uniform a stand crop as possible be secured so that at harvest uniform barn loads may be obtained. Watering should be continued according to the weather. If dry weather prevails water once a day after the plants have established themselves. This is about ten days after transplanting. When the crop has been in the field for about 3 weeks the watering should be gradually reduced to once in two and later once in three days or less frequent intervals according to the rainfall at the time.

### INTERCULTIVATION

Intercultivation should be begun as soon as the plants have established themselves in the field. This operation serves to destroy annual weeds which may spring up with the rains and to maintain a loose mulch over the surface which readily admits any rain that may fall, prevents drying of the rooting layers of soil, allows the movement of air into and out of the soil and

encourages the deeper rooting of plants all of which make for a better stand and growth of crop.

The first cultivation should be shallow and care should be taken to avoid disturbing the new roots. Later cultivation may go deeper. The number and frequency of cultivations will depend on the rainfall, the state of the soil and presence of weeds. All cultivation should be stopped when the crop is ready to be topped.

#### **PRIMING**

Priming consists in the removal of small leaves at the bottom of the plants. These "sand" leaves are usually of little value and their removal helps the more rapid growth of the plant by allowing a free current of air to circulate at the base of the plant. Priming is also a check against the spread of "frog-eye" in the field. Priming is best done when the crop is about 1½ feet high when the lowest three leaves should be removed. These leaves are best destroyed by burning. A second priming should be carried out just before topping.

#### **TOPPING**

Topping is the removing of the terminal bud which if allowed to remain would grow on to produce the flowers and later the seed capsules. Where to top and when to top are matters for judgment and experience. If the growth of the plant and development of leaves are poor top low at a height at which the leaves are about the same breadth as normally developed leaves. If the plant tends to grow coarse and rank do not top at all or if growth is not too coarse topping may be done but suckering is not carried out. In average conditions leave about ten to twelve leaves when topping. Topping should be done while the stem of the plant is still soft and juicy and should never be delayed till the flower heads develop. As all the plants do not develop their buds at the same time topping may have to be done several times in the same field.

#### **SUCKERING**

Suckering consists in removing the young shoots which appear in the axils of the leaves about ten days after the plants have been topped. The crop has to be suckered about three times before harvest. If, however, a period of wet weather comes on about harvest time the suckers should be allowed to grow temporarily.

## RIPENING

Ripening occurs from below upwards. In dry weather the lowest leaves should start ripening about two weeks after the crop has been topped. Ripening is indicated by a change in the colour and texture of the leaf. The leaf changes in colour from a deep green to a greenish yellow and in texture from soft and flexible to rough and brittle. The flue-curing tobacco must be fully ripe before it is harvested for if harvested earlier the leaf retains the green colour after it is cured. If on the other hand the leaf is over-ripe at harvest the cured leaf has an uneven colour and lacks elasticity and fineness. The stage of ripeness at harvest is therefore of extreme importance in flue-curing.

## HARVESTING

For flue-curing tobacco it is essential that all the leaf should be in the same stage of ripeness as otherwise all the leaf will not yellow at the same time in the flue barn. Three to five pickings are necessary for the complete harvest of a field of tobacco. Harvesting should be done in the morning while the leaves are still wet with dew. Every effort should be made to complete harvesting before the sun becomes too strong because the eyes of the labourers soon get tired and they are unable to distinguish colours correctly. The leaves are removed from the plant as they ripen, placed in shallow baskets and carried to the shed where they are strung together for hanging in the flue barn. The bottom and middle leaves are the most valuable and great care must be taken with these. The leaf should not be allowed to lie about in the sun and get sun scorched. Bruising should also be avoided.

## STRINGING THE LEAF

The leaf is now strung on to sticks or hanging in the curing barn. In the stringing shed the leaf is arranged in small heaps with the butts all in one direction. In stringing portable frames are used for supporting horizontally the sticks on to which the leaves are tied. Three or four leaves depending on their size, are held together with the backs of their midribs touching one another and the string which is tied at one end to the stick is drawn round the bunch about an inch from the butts, and the bunch thrown over across the stick. The next bunch of leaves is tied on the opposite side of the stick so that the successive bunches are on alternate sides.

Each stick is about 4 feet 6 inches long and should carry about 28-30 bunches of leaves. As soon as the stringing is completed the sticks should be arranged in the flue barn about 8 inches from one another.

*(To be continued).*