

commendable and we wish it all success. The inclusion of Rural Broadcasting in the programme of the All-India Radio at Madras may also be taken advantage of for approaching the villagers.

2. Co-operative Societies and Beekeepers Associations as those at Tenkasi and Namakkal can attend to the sale of honey and the distribution of standardised appliances.

3. Arrangements may be made to translate the departmental bulletin and the pamphlet into the various languages so as to make them useful to the villagers.

4. The Government have recently sanctioned a temporary scheme for the introduction of the industry in Chittoor Dt. It is hoped that similar schemes will be provided for all the districts where facilities for the development of the industry exist.

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GROWING, CURING AND MARKETING OF VIRGINIA TOBACCO IN GUNTUR*

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From time immemorial Guntur was an outstanding centre for the production of tobacco in India and in recent years it accounts for the major portion of the total export of cigarette tobacco. Guntur with its good retentive black soil and an average rainfall of 35 inches a year is the most suitable tract for the cultivation of cigarette tobacco which should be grown only as a dry crop in order that the leaves may be of mild flavour. For long, India produced and exported nothing but pipe tobacco and very low grade cigarette tobacco. Up to 1920, only country tobacco leaf of narrow body, with a thick and stout stem, with practically no colour, was produced and exported in leaf form to England, pressed into bales of 250 lbs. nett each. After 1920 owing to the imposition of heavy import duty on tobacco in England, the London market wanted the tobacco to be in the form of strips i. e., with the major portion of the thick mid-rib removed. The saving in terms of money can easily be appreciated when one considers the fact that the stems that are removed weigh as much as 25% of the whole leaf. After 1920, Virginia tobacco cultivation spread gradually in Guntur district and by 1924 large areas were grown. This Virginia variety contained less wood than the country, and the leaf was broad and silky. In the country variety the percentage of bright coloured leaf was between 1 to 2 of the total yield and the rest was a mixture of light brown, brown and dark leaves. In the Virginia tobacco the yield of bright coloured leaf is found to range from 5 to 10%. The introduction of flue curing improved the colour of the cured leaf and the percentage of bright coloured leaf increased from 5 to 10% in the case of sun cured, and to 40 to 50% in

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the case of flue cured tobacco. The foreign market appreciated the improvement in quality and good prices were paid for Guntur bright flue cured virginia strips, which gave a good impetus to the cultivators and the development of flue curing was very rapid. In 1930 there were only about 200 barns in Guntur but by 1934 the number of barns in Guntur increased to 2500. On account of great demand for bright virginia flue cured tobacco in London market from 1936, the number of barns in Guntur tract increased rapidly to nearly 5000 in number during 1938 season. The manufacturing buyers in the United Kingdom commenced to blend larger quantities of this improved Indian Tobacco with the more costly American tobacco.

In 1934 the Imperial Council of Agricultural Research took up the question of improvement of the cigarette types of tobacco and formed a committee of both officials and non-officials to discuss and chalk out lines of work for the development of the bright cigarette tobacco. As a result of the recommendations of this committee on which I had the privilege to serve, an experimental station was started in 1936 at Guntur. In the meanwhile, in October 1936 a conference of tobacco growers, manufacturers and exporters was held at Guntur at the initiative of the central marketing staff. An association was formed to improve the marketing of cigarette tobacco. The work of the association is progressing slowly.

From Guntur the cultivation and flue curing of cigarette tobacco has spread to some portions of the neighbouring Hyderabad state and parts of Kistna District. The most striking feature of this development is, that it has not only spread round about Guntur, but it has taken a deep root in Mysore State. In 1937 a limited liability company was started with a capital of Rs. 10,000,00 of which 10% was subscribed by the Mysore Government and the balance 90% by the public. The progress that this company has made within the short time is remarkable. During 1937 the company had 2200 acres under tobacco and in the ensuing season arrangements have been made to place 5000 acres under tobacco. The quality of the Virginia tobacco produced in Mysore is of a very high standard. In a few years I am sure this crop will spread throughout the state of Mysore which badly needs a money crop.

Growing. The following types of soils are considered good for the production of bright Virginia tobacco suitable for cigarette manufacture:—

1. Good retentive black soils of Guntur district in which tobacco can be grown under dry conditions and which imparts a mild flavour to the crop.
2. Fine whitish clay the physical condition of which imparts good colour to the tobacco.
3. Red loam with good, even, and regular distribution of rain during the growing period as in Mysore.
4. Silty soils, *Badava* lands or *Padugui* lands on both sides of rivers which are subject to floods every year or occasionally. Floods deposit fine rich silt; and if the virginia tobacco is grown on such soils, best tobacco in

point of growth, texture and colour is obtained. This is the experience gained after many years of trial.

Virginia tobacco grows well under moderate climate having a temperature of 85° to 95° during the growing season. The best season in Guntur tract is found to be soon after the heavy monsoons are over i. e., about first of October of every year, when seedlings can be transplanted with advantage. Seedlings are to be raised between the August 15th and 20th and only seedlings of 45 days or 50 days growth should be transplanted. Older seedlings are found to give bad results in point of growth of the crop. Want of rain arrests growth of the crop, and heavy rains spoil the crop completely, especially in heavy retentive black soil tracts of Guntur where the roots of plants rot. This heavy rain is less dangerous in red loamy soils of Mysore. Another havoc that the heavy rains play with the Virginia tobacco is the production of spots on the leaf. Spots are not liked by the manufacturers of cigarette for the reason that after cutting the leaves, the cut-tobacco from spotted leaves will be composed of broken threads, whilst the cut tobacco from the spot-free tobacco will be of long uniform threads. These broken threads from spotted leaves will impede the uniform good working of the cigarette machine and will give less out-turn, say about 50% only. Only long threads of tobacco will work uniformly in a cigarette machine and give the maximum out-turn.

In the red loamy soils of Mysore where there is even distribution of rain the planting season is different. With the starting of the first rains in June the Mysore planting season commences. Seedlings are raised during the middle of April with the help of well water and when 45 days old, the seedlings are transplanted. The late season i. e., October or November, is not suitable for Mysore soil conditions. But however this is being tried now, in some tracts where there is protracted water supply from irrigation schemes and it may prove successful.

Proper rotation of the crop is an important factor affecting the colour of tobacco. The excess of nitrogen in soil completely spoils the colour of the tobacco. In the rotations of crops for the tobacco belts, all nitrogen fixing crops, like legumes, must be completely avoided, and crops like cereals that feed on nitrogen and eliminate the excess nitrogen from the soil must be introduced. This fact has been amply demonstrated in the Guntur district. Invariably a tobacco crop after maize, dry paddy or *Jonna* gives the best results in respect of colour.

Manuring. In tracts where the soils are found to contain more nitrogen the colour is found to be affected adversely. Nitrogen imparts good growth but in the case of bright cigarette tobacco it is not the quantity produced that counts for a good crop but the quality i. e., the colour. However, the question must be considered from the economic point of view also. What is the good of producing a very low quantity of the finest quality tobacco if the cost of production is prohibitive? Hence the aim must be to maintain a fair quantity of nitrogen that is necessary for the good growth of tobacco

without injuring its colour. Potash must be applied in addition, as tobacco is a potash feeder. 60 to 75 lbs. of nitrogen per acre and 2 cwts. of potassium sulphate are found by experience to yield a good crop of bright tobacco. The potassic salt imparts good burning quality and silky texture to the leaf.

Topping. In fields where the growth is rank, topping should not be done. If the plants are not topped in such fields, the sap enters the flowers and makes the plant produce a large number of seed capsules. Thus there will be less flow of sap into the leaves, resulting in the leaves being smooth and silky with the good colour which is ideal for cigarette making. In case by mistake the topping is done in fields having rank growth the sap which would otherwise go to form seeds will enter the leaves making them coarse and rough resulting in bad coloured leaves with rough and leathery texture of no commercial value. In case of tobacco fields of poor growth, topping is absolutely necessary. If the plants are not topped, the sap in the plant will be wasted in the formation of seeds and the leaves will become very thin, and will not develop in size and the result will be a poor leaf both in point of quality and quantity. Hence in such fields topping must be done; if this is done the sap that would otherwise go to the formation of seeds will enter the leaves and develop the size and make the leaf fairly thick so that when it is cured, it will have fair colour and texture without becoming papery. This judicious application of topping as mentioned above should be observed in order to obtain a good commercially paying crop.

Flue Curing. Curing is not merely drying, but it is a life-process due to the activity of the cells of the leaf. Curing is an art and will require the closest attention, good judgment, and most painstaking experience to attain perfect results. No one will succeed in curing without long practical experience, however minute the details of instructions regarding curing he may possess. Only long practical experience will make a good curer. As bright colour is the chief determining factor in getting the best price for the crop, great care must be bestowed in curing. The first and most important point in curing is the picking of the leaves. Only the leaves ready for harvesting should be picked and the time of picking must be determined only by an experienced man in the line. Over-ripe leaves when cured in barns become brown and spongy and immature leaves when cured in barns, dry green; and both are unfit for the manufacture of cigarettes. Generally 20 days after the crop flowers, the leaf turns light green with a yellowish tinge and this is the best time to pick the leaves and cure. Such leaves will give the best results in every respect when cured in barns. Now regarding the process of curing the usual courses are as follows: - Yellowing process takes 24 hours. During this process the green leaves are made to become yellow in the barns with the ventilators shut and maintaining the temperature at 90°F. The second stage is fixing the colour and this is done by raising the temperature slowly from 90° to 120°F by one or two degrees every hour and allowing air to enter by regulating the ventilators as and when necessary. This process takes about 16 to 20 hours. Then the third stage is the curing

process which generally takes nearly 30 hours at a temperature range of 120°F to 140°F. It is only at this stage that plenty of dry air is allowed into the barn since there is rapid oxidation going on in the leaves. If plenty of dry air is not allowed the leaves become spongy and lose colour. If this stage is carefully attended to, good results are assured. Then the fourth and last stage of curing is drying the stalk and is a simple matter. It is done in 20 hours at 140° to 170°F.

This system of curing, takes nearly 100 hours and in certain extraordinary cases where thick leaves are housed in barns, more than 130 or even 150 hours. This long period for a single curing is a source of trouble to the cultivator, and limits the number of curings that can be carried out in a given time. Though, theoretically, a 20 acre crop is expected to be cured in a single barn, only a portion of the crop can be normally cured at the proper stage of ripening; in other words, a portion of the crop has to be cured in an overmature stage resulting in a product that is poor in all respects. To avoid this, Mr. Ragland's revised formula can be applied with great success, and the barn owner can cure *within the proper time* all the 20 acres crop. In this new formula the number of hours for curing is reduced considerably and it will be possible to save nearly 20 to 24 hours for every charge. Instead of nearly 100 hours spent in a charge according to the old method, a curing can be completed in about 72 to 75 hours. This saving of twenty-four hours for every charge means a great deal for the cultivator who will be able to house all his crop in proper time and cure the whole lot with the best results. The new formula is as follows:— As soon as the tobacco is harvested and housed in the barn the temperature is kept at 90° for three hours and then advanced rapidly to 125° or as high as the tobacco will bear without scalding. Allowing the heat to remain at this temperature for only a few minutes, it is reduced to 90° again. This process is called "Sapping", for in this process the sap cells are opened and water comes to the surface of the leaves, and the yellowing process is hastened requiring only from 4 to 8 hours instead of from 24 to 30 hours by the old formula. Then the rest of the stages of curing are carried out according to the old method. Though this method is not generally followed in Guntur tract, I have adopted this method when thick leaves were housed in the barns; and it has given good results. This year the same process was tried very successfully in Mysore and good results were obtained.

Another important point in curing is humidity. The atmosphere in Guntur has natural correct humidity and hence the cured leaves can be removed from the barns, handled nicely and stored properly. But in Mysore during the late curing season the humidity was very low and as a result the curing process was hindered. Unless artificial methods are adopted and proper humidity is maintained in barns, it will be difficult to cure in Mysore as in the last season. In Mysore, the handling of the cured stuff is very difficult from January to June when the humidity is very low. From June till the end of December the humidity in Mysore is fairly high and suitable for

curing and handling of tobacco. After 1930 when this flue cured tobacco was shipped on a commercial scale, improved methods of grading, reconditioning, and packing in deal wood cases or hogsheads also simultaneously followed. Well graded, well conditioned and well packed stuff fetched high prices in London markets. By 1936 the grading system reconditioning and packing in deal wood cases and hogsheads all developed fairly well and the marketing system also improved considerably. Though a fair progress has been made in Guntur during the past 7 or 8 years in the matter of grading, reconditioning, packing, etc., yet the progress is neither very rapid nor has it come any where near the standards of America or Africa. Since 1936 there are distinct signs of growing interest in Indian tobacco on the part of the buyers in London Market. As it is, the flue cured Virginia strips that are being shipped to London are not well graded and they are classified as trash. Only a few exporters have some sort of rough grading of their own and the grades vary with different business houses. No. 1 grade of one merchant is not the No. 1 of another. Every exporter adopts his own grades. There are many small merchants who without understanding the real requirements of the London market, ship trash and nondescript grade of tobacco and flood the London market. The flue cured Indian strip tobacco now sold in London is classified as mere trash and the good Indian strips of No. 1 and No. 2 are only equal to No. 4 grade of American or Rhodesian crop. This adversely affects the reputation of Indian tobacco and the huge shipments of nondescript tobacco even pull down the price of good and medium tobacco.

In point of quantity India is the second largest producer of the tobacco in the world but in quality it stands last. As England is the producer of the finest cigarettes in the world, she requires high class tobacco and is prepared to pay high prices for such fine tobacco. Under such circumstances ways and means must be adopted in the interests of all concerned, i. e., growers, curers, exporters and manufacturers to improve the marketing of this valuable crop. First, an association comprised of all the above interests must be formed and standard average grades established for every season. The association must be controlled by the Director of Agriculture of the Province. The head of the association must be an experienced man of very high repute possessing a knowledge of foreign and local markets and should be *persona grata* with the tobacco cultivators of the Guntur district. He must be paid adequate salary to preclude temptations and salary must be met by the government wholly or partly. The head of the association must be helped by two gentlemen, one elected by the exporters and the other elected by cultivators. These three are to be invested with full powers and the majority decision of the three will be final in all matters. The function of the association must be (a) to classify the tobacco produce in Guntur into certain standard grades and send such type samples to the trade commissioner in London for exhibition in London market, (b) to get reports of the opinion about the standard grades from London buyers through the trade

commissioner in respect of prices obtainable for different grade, quantity required to meet the London market demand in each grade and to immediately publish the same for the information and benefit of the members of the association. In order to protect the interest of all connected with this tobacco business, tobacco should be shipped by license holders only to foreign markets. Such licences will be issued by the Director of Agriculture with the provincial government on the recommendation of the association to exporters who undertake to abide by the rules and regulations of the association. Those who disobey these and export without licence must be penalised heavily. After ascertaining the views of the trade commissioner at London the association will fix the standard grades to be shipped to London, and lower grades should not be allowed by the association to be shipped. The association after the examination of the actual lots to be shipped will affix the *association mark and its grade number* either in hogsheads, cases or bales as the cases may be and also issue a certificate mentioning that it fixed such marks and grades on particular lots of tobacco. These marks and grade numbers will be of high value in the London market, and the buyers can safely give high prices and will be in a position to buy whatever grades that suit their requirements and will be absolutely sure of the quantity that they purchase. The nondescript tobacco will no longer enter London market and the existing fear among the honest shippers that the adulterated stuff will drive out the well graded stuff from the market, and any man who grades well his produce is bound to lose, etc., will vanish. The association will not be a purchasing and selling body but will be purely an advisory body. When any disputes arise, the association will arrange to settle such disputes and their decision will be final and will be binding on both parties i. e. buyer and seller. In case of disputes at London the decision of the trade commissioner will be final.

The association will fix the method of packing the different grades of tobacco. The higher grades will have to be packed in hogsheads or in deal wood cases and the lower grades in bales and the method of packing fixed by the association will have to be strictly adhered to by the licensed exporters. Regarding packing in dry condition, the association will issue a certificate and the exporters will be forced to pack in good dry condition; and only lots with a certificate issued by the association regarding the right condition of packing should be allowed to be exported to London.

All tobacco cultivators should be allowed to sell tobacco at the place of production. All tobacco produced either by the cultivators or barn owners must be allowed to be sold only in one of the half-a-dozen market places located by the association in suitable centres within the Guntur district. Those licence holders who sell their tobacco or those who buy the tobacco outside these markets will have to be penalised *very heavily*. The association authorities will publish market prices daily for ungraded tobacco based on London market for the guidance of both buyers and sellers. These

will be useful for both buyers and sellers and such prices will not on any account be binding on the buyer or seller. With the aid of the Government grants or loan the association will construct protected sheds for storing the tobacco in different centres and will charge the cultivator a small rent, say, at the rate of 4 annas a candy brought into the market. The association may on the request of the cultivators fix prices for ungraded bulks of the individual cultivators after careful consideration of the London markets. The association will issue certificates of the price fixed for each individual cultivator's produce and it will be a guide to both cultivators and exporters. As regards the price for a particular lot when there is any dispute between the cultivators who sell and exporters who purchase, the association will arbitrate and their decision will be final. The association will undertake the weighing of the produce and it will be binding on both buyer and seller.

The members of the association will have to pay an annual fee to the association. Apart from that, the exporters will have to pay the license fee which will be a fairly big sum in order to prevent undesirable exporters from the business. The cultivators must be made to pay a small cess on every acre they cultivate, say 4 annas per acre. This must be levied in the form of a cess by the Government and the money thus collected will go to the association. All these forms of revenue will meet the annual expenditure of the association, and in case there is deficit and the association is to run at a loss, then the provincial government must meet any such loss completely by making grants. If the above system is worked, then it will be a great boon to the manufacturers, exporters, and the cultivators and the tobacco business will develop by leaps and bounds.