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THE ANALYSIS TOBACCO PRODUCTION IN MYSORE DISTRICT OF KARNATAKA STATE

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ABSTRACT :

Tobacco is a principal cash crop of National importance. It has been playing a prominent role in the development of Nation's Economy. Although the cultivation of Tobacco is restricted to 0.3% of the total cultivated area, it provides employment to large number of people on the one hand. On the other hand, it makes significant contribution to National Exchequer by way of excise revenue and foreign exchange earnings. The purpose of this paper is to introduce the tobacco crop, the geographical requirements for its cultivation, varieties grown, and curing practices employed for tobacco in the country, in general and the Virginia flue-cured tobacco the principal variety grown in the Mysore district in particular. Special emphasis has been laid on relating the areas and seasons of tobacco cultivation with the environmental factors, like rainfall, temperature and soils. The spatial pattern of Virginia Flue Cured tobacco is reported, in relation to the agronomic requirements of cultivation. Further, an attempt has been made to delineate the tobacco region on the basic of environmental conditions, and of the concentration of the crop in Mysore district. The tobacco region is further sub-divided into three micro Zones; this sub-division forms the basis for comparative analysis in the subsequent papers of this study.

KEYWORDS : *Cultivation, Employment, Environment, Agronomic and Virgina .*

INTRODUCTION:

Tobacco was revealed by the great American Voyager Christopher Columbus in the path of voyage in 1492. On landing in the islands Tobago, Columbus and his men were taken by surprise to discover the native snuffing, a powdered leaf with obvious delight for smoking that was approximately made of roll of dried-up leaves. On trying these themselves, Columbus and his men were pleased with the intoxicants produced. They took along with them some quantity of dried leaves with its seeds and introduced it into Europe. The plant was first introduced into Europe in the year 1560 by a Spanish Physician. About this time Jean Nicot, the French Ambassador to Portugal, came to know of tobacco in Lisbon and introduced it to the French Court. The botanical name of the plant, Nicotiana and the word nicotine have been derived from his name. The habit of smoking was reported across the world during 17th century. The original habitat of the genus is considered to be South-American, particularly the regions surrounding the Andes. Out of a total 71 species prevalent in tobacco, only two species Nicotiana tabacum and Nicotiana rustica are cultivated. Apart from India important tobacco growing countries in the world are China, Brazil, Zimbabwe and USA.

Tobacco cultivation in India was introduced by Portuguese in 1605. Primarily tobacco was grown in Kaira and Mehsana districts of Gujarat and later spread to other areas of the country. Attempt to improve its cultivation in India had begun with the establishment of the Calcutta Botanical Gardens in Howrah in 1787. Imperial

Agricultural Research Institute, established in 1905, carried out botanical and genetic studies of tobacco. Commercial cultivation of Virginia tobacco in India in black soils was commenced in the year 1920. Flue curing was successfully done in 1928 at Guntur, Andhra Pradesh. After 1930, India found a place in the world tobacco map. India is the world's third largest producer of tobacco, endowed with rich agroclimatic attributes such as fertile soils, rainfall and ample sunshine. India produces various types of tobacco. Currently, Indian tobacco is exported to more than 80 countries spread over all the continents.

The purpose of this paper is to introduce the tobacco crop, the geographical requirements for its cultivation, varieties grown, and curing practices employed for tobacco in the country, in general and the Virginia flue-cured tobacco the principal variety grown in the Mysore district in particular. Special emphasis has been laid on relating the areas and seasons of tobacco cultivation with the environmental factors, like rainfall, temperature and soils. The spatial pattern of Virginia Flue Cured tobacco is reported, in relation to the agronomic requirements of cultivation. Further, an attempt has been made to delineate the tobacco region on the basic of environmental conditions, and of the concentration of the crop, I Mysore District. The tobacco region is further sub-divided into three micro Zones; this sub-division forms the basis for comparative analysis in the subsequent papers of this study.

The genus Nicotiana, belonging to the family of Solanaceae, is considered to be of recent origin, and is presumed to have its original habitat in and around the Andes region in South America. Columbus and his team (1492) carried off some quantity of dried leaves as well as seeds, and introduced them into Europe. The name of the hollow forked cane used for smoking by the Red Indians was used to designate the plant later, I, e.'tobacco' in Spanish and 'tobacco 'in English. The botanical name of the plant, 'Nicotiana', and the word 'nicotine' has been derived from the name Jean Nicot, who introduced the smoking habit into the French court. As an agricultural crop, it was first cultivated in United States in the year 1612 and the first shipment of tobacco was made in 1619 from the American colonies to Britain.

Tobacco was introduced by the Portuguese traders into India during he closing years of reign of the Mogul emperor, Akbar. The cultivation of the crop was first introduced into Goa, and then into Bijapur in Karnataka and it had spread further into two widely separated areas of India, viz. the present state of Gujarat (Surat-Broach areas) and Andhra Pradesh (machilipatnam regin). From this period on, it has continued to exist though in the face of social prohibition sometimes and has established itself as an important commercial crop of the country.

VARIETIES OF TOBACCO

All the known sixty species of genus Nicotiana are categorized into two groups. They are Nicotiana rustica and Nicotiana tobaccum. The former has a yellow flower, and is generally a more robust and densely growing plant. The later, Nicotiana tobaccum, has a white or pink flower, and an elongated, comparatively smooth, and generally pointed leaf, as distinct from the thicker, somewhat coarse textured leaf of the rustica species. In the cured state, both species maintain their distinct characteristics, and as such, differ qualitatively.

The sured leaf of Nicotiana rustica is generally dark or brown-greenish in colour, while that of Nicotiana tobaccum may be as light as bringht lemon (is case of fule- cured Virginia). There is a noticeable difference also in the strength of the tobaccos. In the case of rustica, the nicotine content ranges from three and three quarters to over eight percent (3.75-> 8%), while in th Nicotiana tobaccum leaf it seldom exceeds five and a quarterpersent (5.25%) and may be as low as half of one percet(0.5%).

Different varieties of tobacco have been evolved from these two broad categories of Nicotiana, for different forms of consumption, thereby making possible their cultivation in different agaro-climatic conditions. The varieties developed from the species, Nicotiana tobaccum, are called 'desi' (or local) types, and the varieties of the species Nicotiana rustica are called 'vilayati' (exotic). India grows varieties developed from both the species, Nicotiana tobaccum and Nicotiana rustics; but largest area is under Nicotiana tobaccum which is grown all over the country, while the cultivation of rustica varieties is confined mainly to the north and north-eastern areas which have cooler climates. From these two species, specific varieties have been developed for making cigarettes, cigars, cheroots, bidi, for smoking with the help of a hookah, and for chewing, and sniffing. The usability of a variety in a particular form is determined by its quality characteristics. Certain definite quality characteristics are required in the raw and the cured tobaccos, which are converted into the forms in which, they are to be consumed. Except in

case of tobacco used for chewing and sniffing the main factors to be considered are those associated with the smoking quality, which is judged by the physical characteristics of the leaf-like colour, texture, size of leaf, and freedom from blemishes.

The important varieties grown in India are classified into five categories on the basis of the form of consumption as cigarette types, bidi types, cigar and cheroot types, hookah types, chewing and snuff types. These varieties are grown in different agro-climatic conditions of the country in different seasons depending on temperature and rainfall patterns, as well as soil conditions.

CIGARETTE TYPES

The principal types of tobacco used in the manufacture of cigerattes are Virginia and natu varieties. Virginia is the most important types used in cigarette manufacture. At the same time, it is the principal variety for exports. Virginia tobacco is flue-cured, in specially constructed curing houses, known as barns, of varying dimensions. Some of the Virginia varieties are also air-cured, and are used in the cigarette industry, for blending with flue cured virginia tobacco. Among the air-cured varieties, white burley is an important, one. It is an exotic variety used for blending in varying proportions, to manufacture some of the well-know cigarette brands. The leaf is both rack and air-cured. It is strong with a characteristic aroma. Andra Pradesh and Gujarat are the important producers of this variety. Formerly, Mysore district (mainly Gundlupet taluk) was also a producer of the Virginia air-cured type; but it has now become almost extinct, due to the problems of marketing; it is not preferred by the tobacco companies, due to the high variability of its price from one year to another.

BIDI TYPES

In terms of quantity, this is the major vaarieaty or type of tobacco produced and consumed in the country. Karnataka state is also one of the major producers of bidi tobacco. Its cultivation is concentrated in the northern, deep-soil belt of the state, comprising the districts of Belgaum and Bijapur. In Mysore district, bidi tobacco was one of the major crops before the introduction of the Virginia variety, and it was cultivated during rabi season. With the development of the Virginia variety cultivation, the bidi type has lost its ground representing the area of tobacco, indicates increasing trend of Virginia variety, introduced and subsequently encouraged for development from the year 1967; it has gradually replaced the district.

The major varieties of nicotiana tobaccum used for bidi are Keliu, piliu and Gadiu; other types mixed with keliu in small proportions are Movadiu, kalipat, puri, mirji, nippani, sangli and jowari. Pandarpuri is the only major variety of Nicotiana rustica used in bidi-making.

CIGAR AND CHEROOT TYPES

Cigar and cheroot tobacco types are mostly produced in the states of Tamil Nadu and West Bengal. Cigar leaf is brown to dark brown in colour, thin in texture, and mild to medium, even strong, in flavor. The colour of the cured leaf of tobacco used in cheroots, produced in Tamil Nadu, is dark brown or almost black, and the texture varies from thin to medium. A number of varieties, called by local names, are used in the manufacture of cigars and cheroots in Tamila Nadu. The popular ones among them are 'Vellai Vazhai' and 'Karu Vazhai' which are used in the manufacture of cigars, while 'Osikoppal' is used for cheroots. The 'Ianka' tobacco produced on the manufacture of indigenous chuttas (Cheroots). The 'Bengi' variety of jati tobacco grown in west Bengal also is being used in the manufacture of cheroots. It is greenish brown in colour and medium in texture and strength.

HOOKAH TYPE

Hookah varieties is Nicotiana tobacco are mostly conined to the northern states; they are called 'desi' or 'jati' or 'mitha' tobacco. The leaf is greenish brown in colour, thin to medium in texture, moderately strong and about 18 to 20 cms lon and 6 to 9 cms broad.

CHEWING AND SNUFF TYPES

There is no specific variety sxclusivly gtrown for chewing or sniffing. Usually, the variety is consumed in a number of forms:- in Tamil Nadu, moona koppal, Oosikoppal, vattakoppal, and Yerumai koppal varieties; in the

northern states, 'jati' or 'desi' varieties, and in Gujarat, kalichopadia Judi tobaccos are used for chewing and sniffing. Generally, leaves with a medium to thick texture, and a pungent aroma, are selected for chewing ad sniffing. Colour plays a less important part; but, usually, a darker coloured leaf is selected for snuff, presumably as an indication of snuff.

There are however certain varieties which are mostly used for chewing and sniffing: e.g., Puchakkad tobacco grown is Dakshina Kannada district of Karnataka, the leaves of which dark brown are and medium in texture.

Amoung the varieties of nicotiana rustica, leaves of the 'motihari' variety of West Bengal, 'Vilayati' of Assam and Bihar, 'Calcuttia' of Punjab and Uttar Pradesh, which are well developed, are selected for chewing and sniffing. The cheaper grades of snuff are usually made from tobacco dust of any variety.

HARVESTING AND CURING METHODS

The harvesting of tobacco for consumption, in the form of cigarettes, cigars, cheroots and pipe tobacco is done leaf by leaf in stages as the plant matures, beginning with the bottom leaes and working upwards. Only matured leaves are picked in the morning and evening hours. The matured stage of the leaf is indicated by the leaves turnig yellowish-green colour and becoming brittle. In case of bidi tobaccos and of hookah and shewing tobacco, the entire plant is harvested by cttig it within 2 to 3 cms. From the ground, as soon as the majority of leaves show signs of maturity. In the case of bidi tobacco, maturity is indicated by the leaves turning yellow, and having characteristic spots of reddish brown colour.

METHODS OF CURING

The process of curing is intended to remove moisture from the green leaf, in such a manner that the final product has the required colour, texture, and aroma. It is the most important operation connected with the production of tobacco and has great bearing on the value of the final product. The quality of tobacco leaf, particularly with regard to colour and texture, is determined by curing. So tobaccos of different verities which are used for different forms of consumption, are cured by different methods, and the quality and relative price of the cured tobacco depends on the method of curing.

There are four principal methods of tobacco curing; namely (i) flue curing (ii) rack curing, (iii) ground or sun curing, and (iv) pit curing. The predominant method of curing in the country is ground curing. About two-thirds of the total tobacco is cured by this method. Rack curing is estimated at about 25 percent and pit curing a little over 5 percent. Flue cuing, which is a very expensive me, is used to cure Virginia tobacco, the principal raw material of cigarette industry. In Mysore District, Virginia tobacco is the only variety that is grown, and it is flue cured in barns.

Rack curing - This is one of the simplest methods of curing tobacco. The green leaves are cured on strings tied to posts specially erected for the purpose, usually in the shade. The leaves are allowed to dry in the open air for 1 to 1.5 months. When the mid-rib is dry, the bunches are removed on a dewy morning, and bulked in heaps on the ground. This method is commonly followed in curing natu, Virginia air cured, cigar, cheroot snuff, bidi and hookah tobaccos.

Ground curing - This is the most common method of curing tobacco through out the country. The usual process involves spreading of the plants on the ground in the early morning, and their collection into heaps in the evening. The heaps are turned over occasionally to prevent over heating; nevertheless, it is essential to bring about a certain amount of fermentation. The process is continued until the mid-ribs are quite, dry, and the leaf turns completely brown. The process varies according to the type of tobacco. In some cases, it may be necessary for the heaps to be sprinkled with water, in order to bring about the right amount of fermentation and render the leaves soft and pliable.

Pit curing - Pit curing consists of arranging layers of wilted leaves in pits, lined with reeds or straw. The top layer is then covered with earth. The plants are allowed to remain in the pit for six to eight days after which they are twisted into ropes, or made into bundles. In this case also, it may be necessary to sprinkle the leaves in the pits with water, if there is no dew at the time of pitting. There is, however, a great danger of overheating, if the pits are not opened up at the proper time.

Flue curing - This is the method used for curing Virginia tobacco, and is e one adopted for curing of tobacco

in Mysore district. Flue curing is the most expensive process, and can be applied profitably to cigarette leaf alone. It is an art, requiring skill and judgment. The flue curing process involves drying of green leaves under artificial atmospheric conditions; the process does not allow the green leaf to come into direct contact with smoke or fumes from the fuel, and permits the regulation of temperature and humidity. It is done in specially constructed barns of varying measurements. Carful control of temperature and humidity are essential, and they have to be modified in the light of experience is accordance with the type of leaf loaded in the barn.

ENVIRONMENTAL FACTORS OF TOBACCO CULTIVATION

Tobacco is a sensitive crop and its cultivation is highly concentrated, both spatially and temporally: it is grown only in specific seasons in the country. The types and varieties are also selected for cultivation in relation to these environmental factors. As such it is grown in different environment conditions during different seasons. The suitability of an area for the commercial cultivation of tobacco is determined by edophic and climatic conditions to a large extent. Tobacco is a tropical and subtropical crop. A mean temperature of 26.7°C is ideal. A frost-free growing period of 100-200days, and will distributed rainfall of 8.8 to 12.6 cm. per month, is required. It grows best on sandy loams, and a slightly finer sub soil having ample internal drainage, good aeration, and high moisture-holding capacity. In case of the absence of ideal conditions of soil and climate, a compromise is struck between them, and suitable cultural practices are devised by the farmers to make up the deficiencies I these requirements. By means of irrigation, manuring and inter-cultivation.

VIRGINIA FLUE CURED TOBACCO

In this context, the flue-cure3d Virginia variety grown in Mysore district of Karnataka needs elaboration. For successful cultivation of good quality FCY tobacco, it is necessary to have a soil with free draining, and good aeration throughout the growing season. Nitrogen starvation condition should prevail at the time of maturation of leaf. In India VFC is grown in varying types of soils such as black, clayey, sandyloam, and red soils; the tobacco grown in black soils has been losing ground in recent years, as the produce is not finding as international market. Tobacco grown in light sandy loams is very much preferred for export. The low inherent fertility, combined with a fairly good water- holding capacity non-alkalinity of the soil make it best suited for cultivation of Virginia tobacco.

As regards nitrogen nutrition of FCV tobacco, the soils having a low organic carbon and nitrogen status must necessarily be enriched with nitrogenous fertilizer. Experiments be enriched with nitrogen fertilizers over a number of years have shown that application of 20-40 kg N as a preplanting dose, or in two or three splits during crop growth, depending on the nature of the soil, is an optimum requirement. The VFC tobacco produced in saline and low lying areas have a high chloride content (over 2%) which is detrimental to burning quality and adversely affect the colour and storage quality of tobacco.

Like all other agricultural operation, the Indian tobacco cultivation, and particularly that of VFC tobacco, is a gamble with the climate, with regard to its water requirements. And departure of the rainfall from the required norm affects the quality and quantity of the VFC tobacco produced. A crop taken in a dry year is thick; dark colored, has high nitrogen and nicotin, and is inferior in flavor, whereas light showers on the early stages improve the quality greatly. Heavy and unseasonal, rains specially when the crop is about to mature, result in poor quality turnout, both in respect of grade and chemical composition of the leaf. Lesser duration of sunshine also leads to lower production of sugars; and higher that optimum temperatures results in a decreased net assimilation. The VFC tobacco produced in frequently irrigated land does not fetch a good price, nor find a ready market, s the water, sweet or saline, is likely to impair the quality of tobacco. However, irrigation at the time of transplantation and in the course of a long dry spell improves the production of the crop.

The environmental requirements for the cultivation or tobacco, in general, and Virginia flue cued tobacco in particular, present a complex combination. These conditions are responsible for the cultivation of various varieties in different agro-climatic conditions, in different seasons. At the same time the cultural practices adopted be the farmers are also variable in time and space, in order to minimize the adverse effects of environmental conditions on the quality and quantity of the taboo produced.

The type, grade and quality of tobacco produced is considerably influenced by the soil characteristics, particularly texture. Light soils tend to produce a large and thin leaf, light in weight and colour, mild is strength and

weak in aroma; whereas the leaf produced on heavy soils is usually thick, heavy, dark-coloured, strong and aromatic. On the other hand; some of the3 indigenous varieties grown in light open soils are relatively thick, heavy, and strong. This effect may be attributed to the varietal characteristics, the climate prevailing during the growing season and the cultural as well as manorial practices under which the croop is raised. As a result of the interaction of the variety with the environmental complex, production of the different tobacco types is concentrated in certain areas of the country.

ENVIRONMENTS OF TOBACCO CULTIVATION IN INDIA

India is a vast country with variable climatic and physiographic conditions, tobacco is produced in almost every state, except in a few, where the weather is excessively be hot or moist. The crop is grown in different seasons, in different agro-climatic belts. There are five tobacco research stations in the country located in a principal tobacco growing areas. They are:

- Vadasandaur in Tamilnadu
- Guntur in Andhra Pradesh
- Pusa in Bihar
- Anand in Gujarat, and
- Hunsur in the Mysore district of Karnatka.

The weather conditions reported in these research stations represents the respective tobacco areas. Representing the rainfall, temperature, as well as tobacco growing seasons of these regions, the position of Mysore district is evident. Apart from Mysore district all the tobacco growing areas of the country are plain regions with a mean elevation of less than 100 meters, where as in Mysore district, tobacco is grown at an altitude ranging from 700 to 1100 meters. Another peculiarity is that, the crop is grown in all other areas of India during the post-monsoon period, from October to February; whereas in Mysore district it is one of the main crops during the normal rainy season which extends from May to August.

The tobacco region of Mysore district, with a mean monthly rainfall of about 100mm, mean temperature of about 23.5°c to 27°c, and well aerated, red, sandy loan is best suited for tobacco cultivation during the normal rainy season. During the growing period, the temperature of this region is much lower than in other tobacco growing areas of the country because of its higher altitude. The other areas with less than 100 meters altitude have a higher temperature than that required for the cultivation of tobacco. During the rainy season, the environments combination in Mysore district provides optimum conditions for the cultivation of tobacco.

Variety wise distribution of tobacco in the country also presents a complex picture. With the exception of the Virginia variety in Mysore district, all other varieties are grown in the country during the post-monsoon season. But in Mysore district, which is situated on the Deccan plateau, the temperature and rainfall conditions are much lower during the 'rabi' season; in any other tobacco growing areas of the country so Virginia tobacco is grown normally during the rainy season.

With the sole exception of Mysore district tobacco is grown in other parts of the country, at lower altitudes, where the temperature in the Rabi season, is sufficiently high for the cultivation of the crop. The moisture retained in the soil during the post-monsoon period, and the small amounts of rain that occur I winter are sufficient for crop growth. At the same time, unlike the soil of Mysore district, which is red sandy loam the tobacco soils in the other parts of the country are mostly black, and are located in the plains. The cultivation of the tobacco varieties other than VFC is assisted by irrigation, because of prolonged dry conditions.

THE TOBACCO REGION OF MYSORE DISTRICT

Virginia flue cured tobacco, the only variety produced in Mysore district, is strongly influenced b climatic and other environmental factors. Hence, the area of cultivation of this variety is highly concentrated six taluks of the district, which possess ideal environmental conditions for the cultivation. The spatial pattern of the Virginia tobacco cultivation in the district is most distinct, as the crop is critical sensitive as regards environmental requirements. The map also indicates the concentration of tobacco cultivation, only in the climatic belt designated as "Southern transitional belt" by the agronomists.

The southern transitional zone in the districts which lies to the east of Western Ghats, is approximately 160

Km. long from Southeast to Northwest. At the Southern tip of the district, it begins from the western segment of Gundlupet talk as a narrow belt widening towards North and North West covering, the entire taluks of H.D.Kote, Hunsur, Periyapatna, and parts of Nanjangud and K.R.Nagar taluks. Although the width of the belt ranges from 15 to 65 Km it is only 20 Km. in the South, 30 Kms in the North and about 50Kms, at certain sections.

DELINEATION OF THE TOBACCO REGION

Regionalization of a phenomenon is one of the fundamental concepts to understand its organization. As such, the study of geographical elements through regionalization has a long geneology. The definition of a region, its extent, boundary and charactistics present ambiguity as well as contradictions. Both state and synamic phenomena are considered by grographers to derie spatial organizations, and regions are delineated on the basis of spatial ineraction and organization. There is varied nature of geographer's regions, classified and delineated on various criteria. This remains an unsolved problem, in spite of long tradition in the search for regions ad natural regionalization.

Any segment or portion of the earth surface is a region, if it is homogenous, in terms of such in areas grouping its homogeneity is determined by criteria formulated for the purpose of softing from the whole range earth phenomena, the items required to express or illuminate a particular grouping serially cohesive and is an intellectual concept. Hence, the extent of the area devoted for the cultivation of tobacco is designated as tobacco region, as it differs from other neibhouring cropping patterns. Though the distribution of the crop lacks the quality of uniform density, it has a common feature of area under the particular crop i.e., tobacco.

The most common method followed by geographers in understanding the spatial distribution of crops is the location quotient. With this model, area of the cultivation is normally classified into density sub divisions like highest, medium and lowest concentration. It gives a picture of the distribution patterns, but fails to identify the crop's relationship with spatial environmental factors, which exerts the greatest influence on sensitive crops like tobacco.

A committee constituted by the Government of India 10 in 1960, determined the cropping patterns according to relative acreage of various crops in a district; or a group of districts; but it's report has serious limitations – e.g., natural conditions influencing crop cultivation do not figure in it. The scientists of the Indian Council of Agricultural Research have tried to classify the cropping pattern are the country, having postulated that the present land use pattern and cropping pattern are the best 11, and these cropping patterns have been evolved by the farmers with their long experience. As such the scientists have tried to classify the cropping patterns based on agro- climatic conditions.

It is not difficult to visualize that the play of weather factors starts right from the time seed is put in the soil. Every weather sequence, favorable or adverse, has its impact on the growth and development of the plant. It is generally estimated that weather, as a single factor, could be responsible for 50 percent of variation in yield 12. In India, however, temperature variations from year to year are not of such a magnitude as to bring about major changes in its growth patterns. Even in case of sunshine, one could expect 7 to 9 hours sunshine per day on an average, which is sufficient for normal plant growth. It is the rainfall which comes out as the most important factor influencing the crop growth, and the choice of crops would have to depend upon the amount and distribution of rainfall. So, on this basis, agronomists have divided the whole country into 174 rainfall patterns.

For understanding existing cropping patterns, ramdas divided India into thirty rainfall divisions considering floods, droughts, date of onset of monsoons, and other major phenomena. Krishnan and Singh attempted to delineate zones and subzones of moisture regions to indentify the crop regions in India. They have drawn is Ililnes for moisture index using thornthwait's formula (P-Petx100) and for mean temperature (Max.+Min)on the soil map of India, sowing the major Pet. Soil map of India, sowing the major soil types. However, macro level cropping patterns of the country were identified in these studies and tobacco with its very small percentage of area coverage did not figurine them.

DETERMINANTS OF DELINEATION

In this context an attempt is made to identify the tobacco region of Mysore district which is concentrated in the narrow transitional belt characterized by an undulating topography. The tobacco growing villages are

distributed within an area of 1.25° latitude and 1.25° longitudinal extent ie. From 11°. 30' N. 12° 45' °N and 75° 45° E to 77°0'E longitude.

Tobacco is cultivated a s a rain fed crop the Mysore district. It is only in this traditional belt of Mysore district that tobacco is grown during the normal rainy season; where in other parts of the country it is produced usually as a 'rabi' crop on the moisture retained by the soil after the southwest monsoon is over. The altitude of Mysore district ensures that the temperature is more or less ideal during the rainy; season, and the amount of rainfall sufficient for the growth of tobacco plants. The temperature ranges between 23 .5°c to 27°c during the growing season with a total average of 480 mm. of rainfall, well distributed from May followed by 117.3mm in July . The combination of temperature and rainfall patterns and rhythms, and a suitable soil have provided ideal conditions for the concentration of tobacco cultivation. The complex soil and climatic factors have provided ideal physical opportunities for the production of exportable quality tobacco.

The variation of temperature over this tobacco-growing region is not much pronounced, and does not influence the extent of the area under cultivation ; it is rather the pattern of rainfall and soils that result in a pronounced variability in this micro region, and have determining impact the spatial distribution of the tobacco cultivation. So rainfall and soil conditions are considered to be the most important determinant for the delineation of tobacco region.

As the moisture retained in the soil also has an important effect on crop growth, the annual total amount of rainfall must be taken into consideration. The rainfall in the tobacco growing taluks is measured in 21 rain-guage stations in the six taluks growing tobacco of the district. The mean annual amount of rainfall is marked in the respective location of rain guage and the isohytes have drawn. These isohytes runs from North-west to South-east, and correspond with the isohytes maps published in the meteorological bulletin for the state.

The isohytes lines drawn on the soil map of the tobacco growing taluks are super imposed on the maps showing the tobacco growing villages, area of tobacco cultivation, and number of cultivators, and inferences were drawn.

STRUCTURE OF THE TOBACCO REGION

The superimposition of these maps shows that the tobacco cultivating villages' are located in a region having between 7000 and 1100 mm of annual rainfall. As revealed in the map, the tobacco region of Mysore district covers the transitional belt of the western taluks of Mysore district, which is bounded by 1100mm Isohyte in the west and 700 mm isohyte in the east, and includes all the tobacco growing villages of periyapatana, Hunsure, K.R.Nagar, Heggadadevana kote, Nanjjangud and Gundlupet taluks.

In this region, over eighty percent of the annual rainfall occurs during the period from May to October. The pattern of rainfall is characterized by fairly sharp heavy showers in the months of May (pre monsoon), followed by two peaks in July and October, and somewhat fewer showers in the intervening periods. The map also shows a sharp decrease in the amount of rainfall from 110 mm in the western part to 700 mm in the east.

The rhythm of rainfall in this transitional belt of the district is also highly favorable to the cultivation of tobacco. The early showers during the month of April facilitate the preparation of the land, and the almost assured rainfall of May helps in early plantation. The rainfall in the month of May is crucial for the plantation. The southwest monsoon, beginning in June and continuing in July and August, helps in the inter cultivation and growth of the plant. The transitional period from SW to NE monsoons in August and September marked by a lower amount of rainfall favours the operations of harvesting and curing of the crop.

The soils of the transitional zone are derived from granites. Agronomists have classified the soils of this zone into two categories, as red sandy loam and red loam. The western portion is characterized by red sandy loam and the east and south by red loamy soils. At some places, they are mixed up with black soil in varying proportions.

The soils vary in texture, from loamy sands to heavy loams, with varying depths of top and sub-soil. The central area had not more than 10 to 20 cms. Of soil depth over-lying gravel, whereas in the Sothern sector, i.e., in southern portion of H.D.Kote and Gundlupet taluks, vary deep red soils, even extending beyond two meters exist. In the western part of periyapatana, the sandy loams are deeper than in the eastern margin. Being a rolling country, even in a given area, the crests are generally eroded and left with shallow gravelly soils; whilst, further down the slope, one finds a progressive increase in depth as well as finer fractions. The soils exhibit a wide

spectrum of colours, ranging from light yellow to deep red. In certain pockets, which have been recently cleared of forests, the colours range from grey to dark grey The soils of the zone are generally deficient in nitrogen and phosphorus, but have medium to high level potash-which is ideal for Virginia tobacco. The tobacco cultivation is highly concentrated in the sandy loam, gravelly sand, and red loam areas. These three types have covered 42.6, 28.7 and 10.5 percent of the total samples .zone-wise analysis of the soils presents little variations. In the Western part sandy loam predominates; in the East, red loam and gravelly red soils replace sandy loam. These soils are also ideal for tobacco, but require a higher rainfall. Therefore cultivation of tobacco is restricted, due to deficiency of rainfall in the East. The patches of black soils are left without tobacco as they are unsuitable.

Along with these environmental factors, relative humidity, evapotranspiration, sunshine, wind, and hailstones are the other climatic elements which affect the cultivation of tobacco in the transitional belt. Tobacco is grown during cloudy weather. In the month of May, the duration of sunshine ranges between 6.5 to 9 hrs and gradually decreases in the succeeding months of tobacco cultivation; this favours the cultivation of the crop even with a lesser amount of rainfall. Further, the duration of sunshine increases in September and continues in October with short spells o rainfall, which favours harvesting and the curing process. The occasional strong winds and hailstones rarely cause any damage to the crop, and only to a limited extent.

STRUCTURE OF THE TOBACCO REGION

The structure of tobacco region is illuminated by the rainfall, villages growing tobacco, area devoted for its cultivation, and the number of farmers engaged in the production process. The varied spatial rainfall pattern has induced zonal variability of area under toacco cultivation. The mean annual rainfall vaaries from west to east wth 1015.33 mm.in western, 815.60 mm in the central and 701.81mm in the easter zone. Along with the amoun, the variability computed as, $CV=\frac{SD\times100}{\text{mean}}$ also increase from west to east as .the amount of variability is 24.57.38.72.and 29.

MEAN

In the respective zones from west to east. The western wet marginal zone with highest amount of annual rainfall has lower variability. The eastern dry marginal zone wit lesser amount presents higher variability. Located in between the marginal zones, the central transitional lies in between these extremities in relation to the variegation of rainfall.

Tobacco is purely rain fed crop as such it is incoetitive in the cropping patterns of irrigated tracts. So the percentage if area devoted for tobacco cultivation ins calculated in relation to total cultivated are underrained condition in the particular village. The place of tobacco in the three mcro qones and the important characteristics o the zones are presented.

THE WESTERN WET ZONE

Include 81 villages or 17.4 percent of all tobacco growing villages, 17.1 percent of the total area devoted for tobacco cultivation, involving 14.5 percent of the total tobacco cultivators in the district and is demarcated by the 900 mm in east. The mean annual rainfall of this zone is 1015.33 mm with comparatively lowest variability of 24.57. The central transitional zone located in between marginal zones is the core part of the tobacco region. It is bounded by 900 mm. isohyets in the west and 750 mm isohyets in the east. With a mean annual rainfall of about 815.60 mm is followed by a variability of 28.72 it includes 346 tobacco growing villages (68.6 percent)47.7 percent of the total area of tobacco cultivation and 76 percent cultivators involved in the cultivation of this crop in the district.

Zones of tobacco Region	Villages	Geographical area KM (approximate)	Area of tobacco in Ha	No.of cultivators	Densty of cultivators per KM	Density of tobacco area per km
Western wet marginal zone	81(17.4)	1316 (22.6)	1967(17.1)	1103 (14.6	0.84	1.49
Central transitional zone	346(68.6)	2774(47.7)	8528(74.4)	5829(76.8)	2.40	3.07
Easterndry marginal zone	65(14.0)	1721(29.7)	970(8.5)	654(8.6)	0.38	0.56
The tobacco region	456(100)	5812(100)	11465(100)	7586(100)	0.66	1.97

A PROFILE OF THE ZONE OF TOBACCO REGION

1. The eastern dry marginal zone is bounded by the isohytes of 750 mm the west and 700 mm in the east. It includes 65 tobacco growing villages or 14 percent of the tobacco villages in the district, 8.5 percent of the total area devoted for the cultivation of tobacco, involving 8.6 percent of the cultivators producing tobacco in the district. This zone is characte3rized with annual mean rainfall of about 701.81 and the coefficient of variability is 29.29.
2. The density of tobacco cultivators in the wet transitional and dry zone is 0.83,2.10 and 0.38 per km respectively. His analysis reeals the predominance of central transitional zone in the cultivation of tobacco. The western wet and eastern dry marginal zones have gradual ascendancy towards the central zone. The area, as well as cultivators and the number of villages culminates at the central zone. The tobacco region in the district as a qhole which includes six western taluks has 465 tobacco growing villages. The total Geographical area is about 5812 km. of which about 11465 hectares of area is devoted for the cultivation, involving about 7586 cultivators.
3. The aforesaid analysis has revealed the spatial distribution of tobacco in Mysore district in relation to agronomic conditions along with the details of tobacco varieties, harvesting and curing methods practiced in the country. As the crop distribution is strongly controlled by environmental factors, the tobacco region was delineated by super imposing of the maps representing rainfall and soil patterns. Further, the tobacco region has been sub-divided into three zones n the basis of crop density in relation to rain fall patterns. These three micro zones of tobacco region forms the basis for comparative analysis in the proceeding papers.

CONCLUSION

The aforesaid patterns of rainfall and soil clearly indicate their influence in the distribution of area under tobacco in this region. The areal of tobacco cultivation is found in between the isothytes 70 mm 1100 mm. the rainfall is highest in the west amounting g to more than 1100 mm. and sharply decreases towards east to 700 mm which marks the eastern limit of the area of tobacco cultivation. The areas of heavy rainfall in the western portion has low concentration of the crop and the area of tobacco increase towards east and culminated to the between 750 to 900 mm of rainfall in the red sandy and red loamy soils. Even in this belt of high concentration, the patches of black mixed soils have low concentration of the area under tobacco cultivation. The eastern portion of the transitional belt is marked by about 750 to 700 mm of annual rainfall and the decreased amount of rainfall has its clear impact resulting in declined concentration.

The profile of this transitional zone clearly indicated the correlation between rainfall patterns and area of tobacco cultivation. Thus the middle zone which lies in between 750-900 mm with highest degree of concentration accompanied with production and yield, proved to posses the most ideal and optimum environmental conditions. Further, an analysis of the area of tobacco cultivation from northwest to southeast indicates the distribution of this crop along the eastern margin of the eastern Ghats and also along the forest region of the Malnad. The sandy loams of the Northwest has highest concentration while the red loamy soils towards Southeast and east have low

concentration under tobacco crop. The area under this crop is not only tappering towards east and southeast, but also the cultivation is scattered in few villages in the southern taluks of the region. It is interesting to note that the highest concentration belt at the centre is followed with low concentration on either side, both in the west and in the eastern margins. The western portion is characterized with high amount of rainfall and eastern zone with lower rainfall than the central. On this basis the western portion of low concentration is considered as 'Western wet marginal zone' and the low concentration in the east as 'Eastern dry marginal zone. The intermediate central zone with highest area under tobacco as Central Transitional zone.

The analysis shows that the amount of rainfall and soil patterns are the dominant determining factors , in the spatial pattern of tobacco cultivation. The density of tobacco cultivation is highest in the central portion and lowered towards eastern and western margins of the central belt. The highest concentration is represented by the number of villages, number of cultivators and area under tobacco which indicates concentration in the North west of the region and decreasing towards east as well as South east.

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