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QUARTERLY

Vol. V, No. 4

OCT. - DEC. 1955



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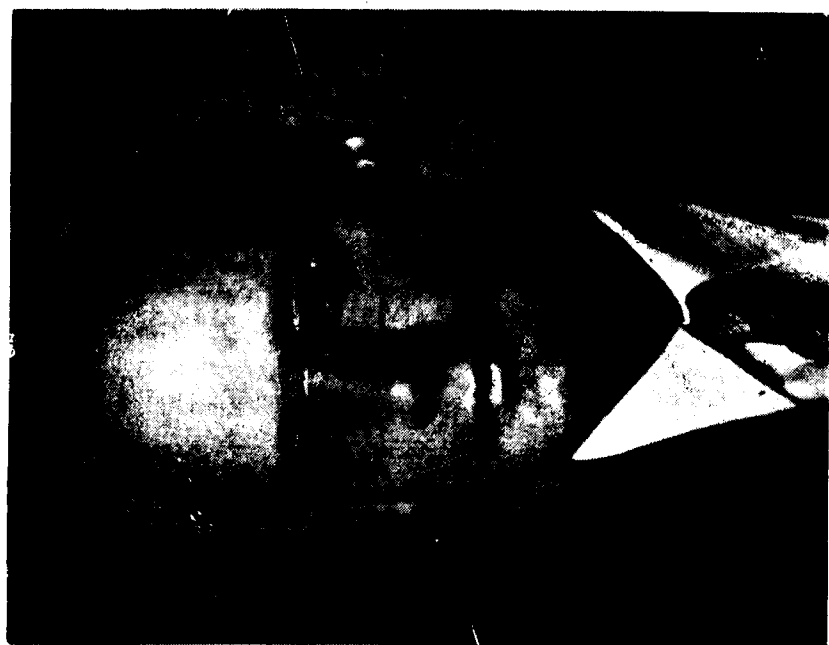
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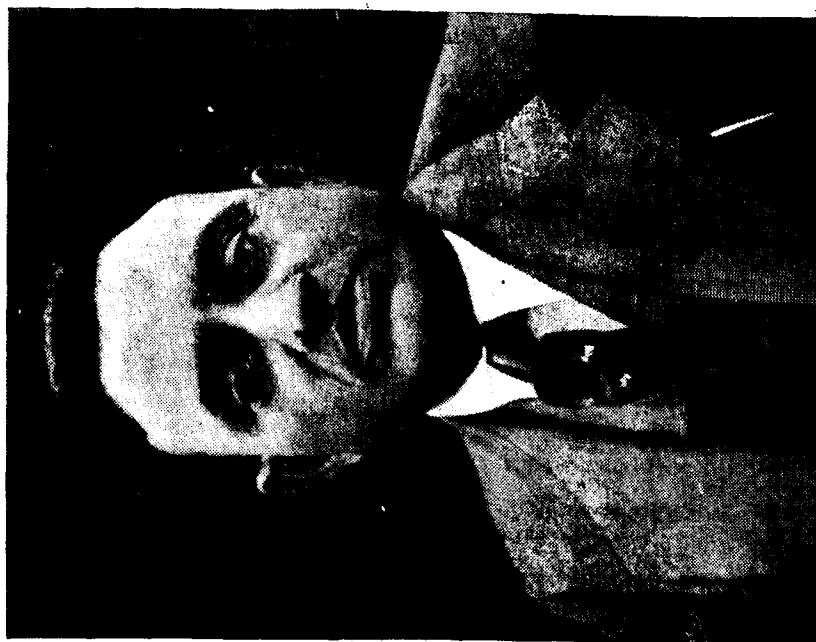
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## Origin of Tobacco and its Uses through The Ages\*

It is a well known fact that tobacco already existed in Asia during the XIIth century, though quite unknown elsewhere. Certain people of Asia, such as the Persians and the Indians, considered it a sacred plant just as the Callic considered the mistletoe. It was a herb used not only to procure an agreeable drugged state and cure all ills, but was also used to inspire anguities and omens, assist in invoking the Great Spirit, and as a demonstration of reverence to divinity. It also served, however, when an expedition was decided, it was then burnt in the war calumet, a long pipe in earthenware and painted wood, and all the warriors aspired a puff of its smoke before setting forth.

Its narcotic qualities were only discovered by chance nearly four centuries later, that is to say in 1492, by Christopher Columbus, during a return journey from Persia when he was in service for Spain; this is exactly how it happened.

After several days of heavy sea and bad weather, the explorer decided to break his journey so as to give his crew a badly needed rest on the little island of Tobago. Before leaving, he visited the island in company of an officer and a few men of his crew. They were greatly surprised to see everywhere the natives showing an evident pleasure in sniffing a powder obtained from a piece of dried up leaf, which they pulverished in a very rudimentary fashion in the middle of their

hand by means of their index and thumb, whilst they saw others holding between their lips a roughly made roll of dried up leaves, which they lit at one end, and of which they aspired the smoke with obvious pleasure. They blew out the smoke immediately by their mouths or by their nostrils, and at intervals they would hold the thing under their noses and smell its aroma as an expert would.

Wishing to find out more about what astonished them so much, they endeavoured to ask these men, half savages at the time, and they learnt that the powder and 'cigars' they so keenly enjoyed were made from the leaves of a plant they called 'tobaccos', which got its name from the island, and which later became known as tobacco.

The explorer, as well as his men, could not resist the temptation to try for themselves these 'tobaccos' leaves. They liked the kind of intoxication they produced, and immediately perceived that this was something new which could be exploited. This discovery was strongly underlined by the explorer in his log book. An ample provision of these leaves, as well as an important quantity of seeds were brought back with the intention of getting them to grow in Spain on a large scale.

It was therefore the Spanish on the one hand, who after having succeeded in

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growing the tobacco in their own country, were the first to introduce it in Europe, where it became known as 'nicotiane'. On the other hand, the Cubans, imitating the Spanish, introduced its use to the two Americas as well as to a large part of Asia, where it was known as "Petun".

It was tobacco reduced to a fine grain or in the form of powder which became popular in these parts of the world, especially as from 1559, when Jean Nicot, who was then Ambassador for France at Lisbon, sent to Catherine of Medicis who suffered a lot from headaches, some of this powder which was supposed to cure her. Its success then became such, owing to its calming effect, that it began to be called by the most flattering names, such as: the sacred herb, the saints herb, the queens herb, the Ambassador's herb, medicine, and many more.

It then became the fashion, for both men and women, to take snuff after the imperial and royal courts, as well as every class of society had led the way. Afterwards, added to the inclination to take snuff, there came the pleasure of smoking cigars, which became very rapidly a real craze in Europe as well as in part of Asia. This craze was so pronounced that it was soon followed by strong reaction on the part of the leaders at the time. However, failing in its effect, this soon turned to persecution. It was then when Louis XIII in France forbid the sale of tobacco; when James I in England wrote his "Misocanos", or pamphlet of hate against smokers; when in 1628 the Pope Urbain VIII forbid the use of snuff in churches; and in certain countries where civilization

was lagging behind, this persecution turned into tragedy. All this in an endeavour to stop such a craze.

In general, however, where the tobacco craze had implanted itself, its pleasure was such that some even ran the risk of death, whilst nobody could resist it. So all these measures had only a very slight effect. Everybody continued to smoke in private.

Tobacco was then smuggled into where it was so much appreciated, by the Spanish and the Cubans, this was quite easy at the time, owing to the Customs being very badly organized.

After this, realizing the failure of the measures applied, the Governments involved became much wiser and took the most sensible view of the matter, reaping as a result a very nice income from the craze of the people for tobacco. This idea was first put into practice in France, by Colbert, a Minister of Louis XIV, who helped to strengthen the monopoly of tobacco in his country. This example was followed little by little elsewhere, especially by means of taxation and duties to be paid, and today, the first is even more enforced than ever.

Since then tobacco has been smoked freely, and besides its two first ways of use, another came into being towards the end of the XVIth century, which was that of smoking it in strends in pipes of all shapes and types. It was the people of the North of Europe who first introduced this new way of using tobacco. This also brought about the first factories for pipes and other gadgets for smokers.

However, this way of enjoying tobacco, which became very widespread during the XVIIth century, even enticing many of the snuff and cigar smokers away from their habit, was greatly reduced for a time during the XVIIIth century, being used only by the popular classes because of a return into fashion of snuff boxes and the smoking of cigars in the higher classes.

It was only many years later that its chewing and smoking in the form of cigarettes and cigarillos became known.

This is how the three last ways of using tobacco came to be found:

Two French Zouaves, belong to different regiments at the battle of Alma in 1854, during the Crimean war, were unfortunate enough to lose their pipes. One having lost his, the other having had it blown out of his mouth by a bullet which left him unhurt. Both these men were heavy smokers and needed it to stimulate their bravery, so they both found a way to satisfy their need. The first by putting a small quantity of tobacco in his cheek; whilst the second, remembering that he had in his wallet a little booklet of gummed sheets of paper serving as letter-paper and envelope combined, took one of these, layed some tobacco on it and then made a rough kind of roll which he lit at one end and put the other in his mouth and aspired the smoke. He found this most successful, and so the cigarette was born.

These two new ways of using tobacco were first practised in the four countries

having been to war against the Russians of Mentchikov, it was rapidly spread by the soldiers and it was not long before it passed from one country to another, and so throughout the world. Chewing was especially taken up by the popular classes, whilst the cigarette became a favourite of all classes, the handmade ones as well as the machine-made, as the paper for making cigarettes had immediately been thought of, and it was not long before an automatic machine was invented for making hand rolled cigarettes.

As for the cigarillo, a sort of cigarette made entirely in tobacco, it was first introduced by the Spanish. Afterwards it was imitated and made in all tobacco factories all over the world.

It was towards the middle of XVIIth century that the use of tobacco, which at first had been limited to three ways of use and to certain parts of world, began to spread all over the world. However, it was only during the XIXth century, when the three other ways of use came to be known, that its use grew in an extraordinary way, and now today, there does not exist a single country where it has not become the accustomed pleasure of a large portion of its population.

If tobacco has, in its six different forms, become a daily habit to millions of people, it is mainly due to the satisfaction and feeling of well-being that it gives. Smokers of the fair sex prefer the cigarettes.

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## The Snuff Industry of Saurashtra

By  
**Purushottamdas M. Dholakia\***

### Introduction

Many are familiar with the wonderful powder which is known by the name of 'SNUFF' in English. The rich and the poor equally enjoy this powder. Its popularity may however not be so great as the other products like Biris and Cigarettes, but it is as economical as it is enjoyable. It is said that the original natives in America considered tobacco as a divine gift and they used tobacco as *Ahuti* or *Bali* (an offering in fire) during their religious rites. At the time of scarcity of rain, they threw up the snuff to the wind as an invocation to the gods. A Franciscan Monk, who accompanied Columbus in his second world voyage was reported to have seen the Red Indians snuffing some unknown powder which might be the original form of our modern snuff.

Jean Nicot, the French Ambassador in Portugal whose name is commemorated in *Nicotiana*, first came across the tobacco plant in the garden of a Lisbon Botanist. From him, he procured leaves, dried them and crushed them into dust, and that is perhaps the arrival of snuff in Europe. Nicot sent the samples to Catherine de Medici and she too adopted its use. Thus came the Snuff.

We get reference about tobacco in the description of the court of Akbar, the Great, by the Portuguese Missionaries.

From that it can be gathered that the people were using tobacco in the days of Akbar and that the Portuguese were the first who introduced tobacco in India. The first sowing of tobacco was made in South India.

The various uses of tobacco began with the propaganda for the same. Among them are smoking in Hookah or as Cigarettes, Cigar or bidi, smelling it in Snuff, using as tooth powder and for chewing purposes. All these uses are in vogue in small or large proportion throughout India. If anything has contributed to the development of the tobacco cottage industry in India, the credit goes to a large extent to the snuff and bidi manufacturing industries.

### Snuff industry in Saurashtra:-

At the time when the snuff was not so widely used as to-day, the people prepared the snuff for their home consumption by pounding and grating the tobacco in their own homes according to their necessity and taste. As the time went on and with the increasing use of snuff, shops for manufacturing and selling snuff came into existence and the people began to buy the ready-made snuff.

The raw tobacco for the snuff made in Saurashtra is imported from Gujarat, because snuff tobacco is not cultivated in Saurashtra.

\*Secretary, Tobacco Traders & Manufacturers Association, Sihor, Saurashtra.



There is a great difference between the present and the past methods of the manufacture of snuff in Saurashtra. Formerly, when there was not great demand for snuff, the dried fermented tobacco was first pounded and rubbed in the earthen vessels with the help of a large (about five feet long) and thick (about five to six inches in diameter) wooden club; then it was sieved with a fine cloth and filled in the earthen vessels and sold. This old method consumed more time and labour. A man could hardly prepare two or four pounds of snuff though he worked for the whole day and that too was not of the good quality. The snuff which is in the form of very fine powder is more preferred by the people for use as tooth powder. So the snuff prepared by pounding with hand was not convenient for tooth powder and cannot be produced in larger quantity. There was therefore no scope for export to other parts of the country.

#### **Importance of Sihor :**

To-day the snuff industry in Saurashtra is better developed in big cities like Sihor, Bhavnagar, Botad, Mahuva, Morvi, Dhrangadhra, Jasdan, Bagasara, Limbdi, Surendranagar, Rajkot and Babra. But except in Sihor and Bhavnagar, this industry is not on large scale. This industry has been established in Sihor since hundred and twenty five years and no other town or city in Saurashtra can stand the competition in the manufacture of snuff with Sihor. Every year thousands

*Fig. 1. Rubbing with a wooden club.*

*Fig. 2. Grinding the snuff in the stone hand mills.*

*Fig. 3. Process of sieving the snuff by thin cloth.*

*Fig. 4. Process of sieving the snuff by metal sieve.*

*Purushottamdas M. Dholakia*

of maunds of snuff are exported from Sihor to other parts of India.

The author has compared the quality of English and American snuff with that of Saurashtra, and found that the foreign samples are of inferior quality. Given the proper publicity through literature, posters and attractive packing, the snuff of Saurashtra can also be popular in foreign markets.

There are also other snuff manufacturing centres in India, viz. Madras, Mangalore, Poona, Gidharhwa-Mandi (Punjab), Biawar and Pali in Rajasthan and Gujarat. At every place, the snuff is prepared according to the local taste. Madras snuff is minced, black coloured and mixed with menthol. Mangalore snuff is yellow and is prepared with the mixture of the lime, ghee or butter. The snuff of Gidharhwa-Mandi is of blue colour, nicely pounded and mixed with the various kinds of fragrance. All these preparations are for snuffing purposes only, whereas the snuff of Sihor is used both as tooth-powder and for smelling purposes. It is also used for medicinal purposes e. g. for healing the ulcers and wounds, and as a plaster on stomach. But for all such purposes it should be quite pure and unadulterated.

#### **The manufacture of snuff in Saurashtra :**

To-day the method of snuff manufacture in Saurashtra is as follows:—

After the leaves are dried in the sun and pounded, the foreign materials like dust, sand and petals are removed by different methods. After drenching them

in the water they are fermentated and dried in the sun. After further cleaning, they are powdered in the form of fine, delicate snuff and sieved.

The powder is filled in big and small packs and is ready for the market. The manufacture of well-known brands of snuff is very laborious and the different intricate processes are kept secret. The manufacturers of Saurashtra and especially those of Sihor have vast experience in the preparation of the best quality snuff and this accounts for the fame of the snuff of Sihor both in India and abroad.

Out of different preparations of Sihor snuff, the perfumed snuff is more famous. The perfumed snuff is not prepared simply by mixing perfume of any type in the prepared snuff. It will be only a risk and wastage of labour and capital in preparing the perfumed snuff if the manufacturers have no knowledge of what kind of perfume can appropriately mix with a particular type of snuff. It is essential to have the knowledge of aromatic chemistry for getting the sound knowledge of the perfumery.

Especially the snuff manufacturers in Sihor are familiar with this scientific knowledge and that is why the perfumed snuff of Sihor, than that of other places is widely preferred.

#### **The novelty in packing :**

Just as there is preparation of different kinds of snuff in Saurashtra, its packing is also done in a novel way. Especially, the packing in Sihor, in the form of round

balls of the "PALAS" leaves is quite attractive. Such packing contains from ten tolas to forty pounds. It is packed by hand and is so strong that neither air nor water can penetrate.

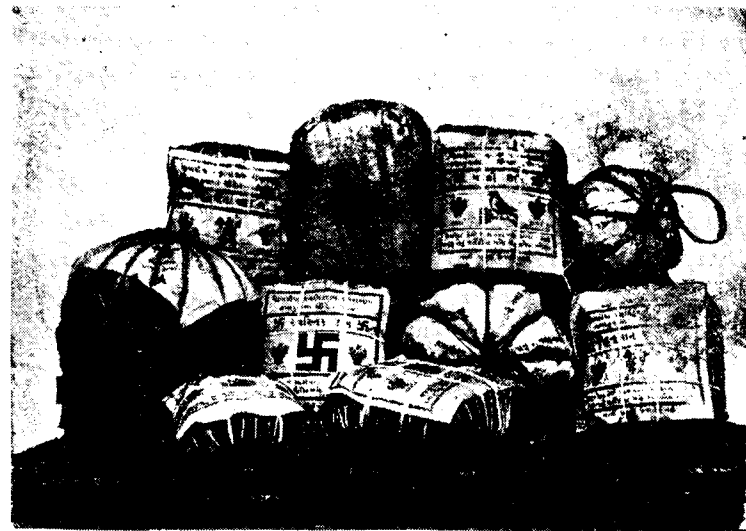


Fig. 5. Round balls & Square packets of snuff made from the leaves of "PALASH" tree.

There are many other tobacco preparations in Saurashtra like the chewing tobacco well-perfumed for chewing with betel-leaves, hookah, biri and pipe tobaccos.

#### Importance as a cottage industry :

The importance of the snuff industry as one of the cottage industries of Saurashtra is very great. The large part of the work is done with hand-labour without the help of machinery. Any lay man or woman can learn it soon and easily.

One man can easily earn two or three rupees per day. The large part of the work is done by women who have no other

means of livelihood. It provides maintenance to hundreds of people mostly belonging to scheduled and backward classes. A capital of nearly 5 million to 7.5 million rupees is invested in this industry, Sihor and Bhavnagar contributing 50 %.

#### The present position of the industry :

The essential factors for the beginning and the development of any industry are as under :—

Local production of raw material and the absence of other competitors; climate conducive to the industry; cheap and easily available labour; deep and studied experience; spirit of risk and zeal; easy and cheap transport for export and import; fair taxation and Government help and encouragement.

Local production of the raw materials is the most important of all these. This is totally absent in Saurashtra, and yet the snuff industry has developed in large proportion. The ability to work with zeal, the inherited experience and the risk taken by all the snuff manufacturers of Saurashtra, are the main factors. As social life changed with the times, so all the methods of appreciation and manners pertaining to the life changed. Thus, today, there is a great difference or change in the things which were considered in those days necessary for the development of this industry.

The causes which hinder the progress and the development of this industry can be summed up as follows :—

(1) The tobacco for manufacturing snuff is produced in Gujarat only and so the manufacturers of Gujarat get more advantages than those of Saurashtra, who have to pay for transport etc. of raw tobacco from Gujarat to Saurashtra. The manufacturers of Saurashtra have to pay the expenses for the ware-houses, curing, brokerage etc. besides the travel and halting expenses in Gujarat for a period of time. Besides these, the manufacturers of Gujarat have not to pay any local taxation like octroi and such other taxes, while the manufacturers of Saurashtra have to pay such kinds of local taxation over and above the excise duty, the railway freight and the cartage for transport etc. The latter have also to bear the loss in transit.

(2) Due to excise duty on raw tobacco, the manufactured tobacco becomes very dear. The excise duty is to be paid even on the dust as well as on the unused stems and stalks of tobacco. If the excise duty is imposed only on the manufactured snuff, instead of those not used for manufacture, the product will be available at very cheap rate and the trade will increase. The excise rules are interpreted differently according to the discretion of the local excise officers. Moreover, the merchants have to understand and follow the new instructions and rules every time, according to the interpretation of the concerned officer. The result is, the merchants and the manufacturers are confused. After the tobacco excise rules came into force,

the merchants have to keep the tobacco separately according to the permit, even though duty had been paid on that tobacco with the result more storage space is required at increased rent. If they have to sell even one-fourth lb. of the duty paid unmanufactured tobacco, they have to issue a sale-note (a kind of permit). If the duty paid tobacco is to be taken, even from one godown to the other, the permit of the range officer is necessary and if the range officer happens to be away in the district, merchants have to wait for the officer's return and to that extent the merchants are put to loss.

There is no publication explaining in regional language the scope and extent of the excise rules for the benefit of the traders and manufacturers; and in its absence they have to rely on the differing interpretations of the excise officials. They are also unable to take advantage of the concessions and rebates allowed under rules.

(3) The quick transport for the export and import of the goods is a necessary factor in the development of any industry. The rail booking for Saurashtra from Gujarat is not easy. So the tobacco is mostly transported through bullock carts at a great cost. Same is the condition regarding export of the manufactured tobacco from Saurashtra. More often the merchants have cancelled their orders for want of booking arrangements and the snuff industry in Saurashtra has thereby suffered much.

(4) At first, the Indian Government exempted tobacco and its products from

the sales tax, because it was already taxed with the excise duty. But, with the imposition of the inter-state sales tax, the State Governments have exercised their right to levy the sales tax on tobacco and its products. The snuff trade of Saurashtra has received a great set-back, because the Saurashtra snuff is largely exported to other States. Till recently, the State Government of Saurashtra had exempted tobacco and its products from the levy of the sales tax; but from the current year, it has imposed the sales tax at the heaviest rate on tobacco and its products. This will cripple the industry's power of resisting the acute competition which it is already facing. It will create unemployment among thousands of people of Saurashtra who are solely dependent on this industry.

(5) There are many other stringent laws affecting this industry keeping it on par with big industries. Such cottage industries should be encouraged to function without hindrance.

This industry demands intellect as well as ceaseless labour. The manufacturer himself has to keep constant supervision and even labour himself in the several

processes of snuff manufacture. Otherwise, any slight mistake or carelessness will impair the quality of the product and his reputation. But the various laws at present made applicable to this industry, do not allow the manufacturer to devote his whole time and energy to his business. On the other hand he has to sacrifice his precious energy and time in the observance of these laws. It can be safely said that if the manufacturers were not encumbered with these laws, they would have certainly developed this industry and employed twice the number of the people at present in this industry.

There are many other matters besides these which hinder the growth of this industry.

As this industry is a very important cottage industry, if it is given the necessary facilities and encouragement at present given to other cottage industries by the Government, the snuff industry of Saurashtra can develop and flourish on healthy lines, enrich the State of Saurashtra and make its valuable contribution in solving to some extent, the great question of unemployment which is facing the Nation at present.

#### **RENEWAL SUBSCRIPTION**

of a considerable number of our readers becomes due, after 31st December 1955. They have been notified individually. They may kindly renew their subscriptions for 1956 by remitting Rs. 3-0-0.

## **Tobacco Research Projects of The Future\***

By

**W. E. Colwell**

Though all of us are familiar with the statistics on the volume of tobacco that is produced for export in terms of pounds or dollar value, another basis of comparisons is also very impressive. It is this: The farm value of tobacco produced in North Carolina for export is roughly equivalent dollar-wise to the farm value of all the corn grown in the state, plus all the wheat, plus all the soybeans, plus all the peanuts. It is only proper that our aims and objectives in a tobacco research program should reflect this importance of export tobacco if our efforts are to serve well the total tobacco industry.

It is my purpose here to review, very briefly, some of the principal components of our total tobacco research program, emphasizing phases we sometimes overlook as we become so involved in our day-to-day production problems.

Our work includes burley as well as flue-cured. Many of the same principles apply to both and my remarks will deal primarily with flue-cured.

A clear picture of 1955 and today's research needs requires that we take a hasty glance into the past. We might ask what has been the biggest single threat to tobacco production in the last fifteen

years? I would say that it has been the combatting of pests to stay in the business at all. Up to the present time, and even now, we are directing a very high proportion of our research efforts to combatting various hazards of production. Perhaps black shank is the most striking example but it is not the only example. There is wilt, there is the whole nematode problem, the matter of adequate fertilizer balance, soil conservation, curing, or the control of hornworms, wireworms, flea beetles, budworms and many others. Virtually all of our limited research resources have necessarily been directed to meet these and many other practical problems of farm production if we were to survive. In my opinion, we are indebted to the accomplishments along these lines for the very maintenance of the tobacco industry in our area.

But let us look to the future. One thing is clear. The combatting of pests and hazards is a never-ending job. The practical production problems become more serious each year and there can be no let-up on efforts to meet them. With the many important changes taking place, it's a real struggle to keep new technology coming along fast enough. With irrigation and soil treatment for nematodes, new poisons, weed control, spread of diseases,

Extracts from a talk given at the Annual Meeting of the Leaf Tobacco Exporters Association, White Sulphur Springs, West Va. on June 17, 1955 by Dr. W. E. Colwell, Assistant Director, N. C. Agricultural Experiment Station, in charge of Tobacco Research.

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new varieties, their development and evaluation, and many other important changes taking place, greater effort than ever before expended is required to keep pace.

\* \* \*

If all we can do is to combat hazards to stay in production and go no further to really improve it, then our sights are set too low. In an aggressive research program we should lay plans for real gains in the period ahead, and not be satisfied with maintenance of *status quo*.

\* \* \*

I would like to consider a moment just what are the changing conditions in the tobacco world that we need to consider as fundamental in building our plans for the future. What does the handwriting on the wall tell us? If the signs are not as pleasant as we would have them, let's face them squarely anyway. What key points in today's affairs single themselves out as being paramount in research planning for tobacco? I think there are two: 1. Increasing costs of labour and other production expenses and 2. Need for improvement in character of tobacco for greater consumer acceptance.

First, let's discuss the labour situation. Just this month we are seeing history in the making in Detroit. First with Ford and now with General Motors. Also, under Washington dateline, we have this month read much about the \$1.00 minimum wage. In North Carolina, 169,200 workers will be affected by the 25 cents boost. Aside from the direct affects on tobacco processors, this means off-the-farm employment will now be more attractive. In Forsyth County last year 53 per cent

of the underplanting was due to lack of labor. Each day new opportunities for farm workers are provided by industry, large and small which is moving into the South. A week ago today, our governor announced his own personal contribution of \$1000 to the newly created "North Carolina Business Development Corporation," the purpose of which is to provide capital to start small industries. These are signs of changing times.

In our case, we need to find ways of individual the productivity of the individual tobacco worker. One hundred years ago a farm family could handle between 5 and 6 acres of tobacco; today a farm family handles between 5 and 6 acres. Though more pounds per acre are produced today than in 1855, the fact still remains that the productivity of the worker hasn't increased much. Slaves were introduced from Africa in 1619, to meet this high labor requirement in tobacco, only nine years after John Rolfe landed in Jamestown and planted the first seeds of *Nicotiana tabacum*. Today we have the same high labor requirement but not the slaves. If a research program is really adequate there will be explored every reasonable means of substituting mechanical power for the human hand in the plant bed-transplanting and cultivating - topping and suckering - at harvest, both in priming and at the barn in sorting and preparing for market. Yes, on the warehouse floor too the opportunities for saving labor should be examined. The most serious problem is no doubt at harvest. It is not a question of can you mechanize the harvest. It's a matter of having to do it. The exact manipulations and the best



Fig. 1.

tools to do the job are yet to be devised, though a start has been made. This matter of mechanization and productive capacity of worker is directly linked with the price a farmer must receive to make a decent living.

You know much more about world competition for fluecured tobacco than do I but the decline in our relative position in the world market is surely not unrelated to this matter of price and cost of production. I would ask if you can name any other single crop with as high a hand labor requirement as tobacco, that is produced successfully in the United States in competition with foreign countries where labor is so cheap. I believe this labor and cost of production matter constitutes one of our major problems. I am just as firmly convinced, however that its solution is possible. I believe the necessary tools and techniques can be developed. We should not fear departures from convention

if such are necessary to attain the desired labor efficiency. Convention isn't necessarily adequate any more in a changing labor market. There's no question at all as to whether or not a machine can prime tobacco leaves off the stalk. We have an experimental model with a series of rotating rubber fingers that will do it and the leaf is untouched by human hand. The model is rough and crude in design and it is some distance from practical use. Some of our varieties aren't well suited for mechanization so we need to breed for this factor as well as disease resistance. Ideally, one wants a variety which ripens

from bottom to top more nearly at the same time or one whose ripe leaves assume horizontal positions, and in the green state a vertical position close to the main stalk. Interestingly enough, there exists a variation in some of the breeding material with respect to this factor. That's encouraging for it indicates the idea isn't just a dream but is a realistic possibility in due time. The two aspects of breeding and mechanization need to be developed simultaneously. We can profit from the experiences of cotton mechanization where breeding for mechanized harvest lagged behind the mechanical improvements. As to the tobacco barn and stringing, we should face up to the fact that it's time to liberate the women from this stringing operation. Last week I heard this statement in my county. "Joe can get a job at the new Westinghouse plant and he'll make as much there as all of us do put together here raising tobacco."



Fig. 2.

In loading the barn it is a real job to lift those 8000 pounds of green tobacco to the proper tier. Electrical power is cheap. Man power is expensive. I don't have the blue print at hand. We are convinced, however, that barns can be designed to reduce this labor requirement or old barns remodelled in some way. It's even possible that the stem should be discarded earlier than it now is to avoid expense in handling it. It costs heavily to dry that stem.

Many of you, no doubt, have built new homes in the last 5 to 10 years. It's highly probable you live no one floor and that with a modern system of temperature control each room is heated or cooled,

as the case may be, even though it is some distance from the source of energy. Improvements in heating over the old wood fireplace of George Washington's time or the pot bellied stove of the early 1900's have not been explored as fully in case of tobacco curing as have they in home building, for example.

You know the statistics of production in Canada, India, Southern Rhodesia and other countries. But do you realize how vigorously they are expanding their research? In Southern Rhodesia, for example, they are spending around \$264,000 per year. Their staff numbers 35 and in 1954 they carried out more than 100 field experiments involving approximately 2500 plots. A modern office and laboratory building with adjoining green houses have been occupied about a year. These are located on a 500 acre tract of land purchased in 1952 or 1953.

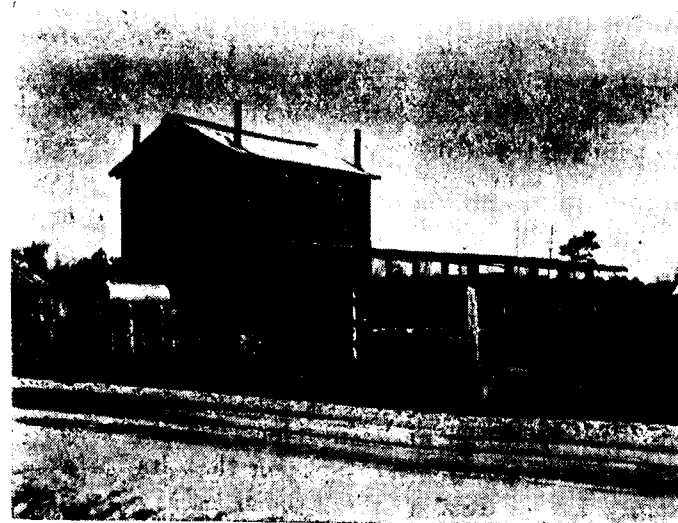


Fig. 3.

In India the annual research budget since 1945 is one million rupees, approximately \$200,000. On the basis of purchasing power this is more nearly comparable to one million dollars. Professional staff with Master's or Ph. D. degrees receive between \$1000 and \$2000 per year. Labourers receive the equivalent of 35 cents per day. At our Oxford Station, labourers receive \$7 to \$8 per day. The Indian research program is extensive. Both it and that in Southern Rhodesia are young but we can expect to see results of benefit to them soon.

I mention these things to point out that with a given quality of product we have some real improvements to make in production efficiency to keep ahead of our competition.

The second point - improving the character of our tobacco. The foregoing discussion has been based on a given quality of tobacco. Now let us turn our attention to the improvement of that quality, improvement that will lead to greater acceptance of cigarettes made from it. It's the combustion products of a cigarette that consumers buy. It's the taste and the aroma upon burning and the physiological reaction derived therefrom that makes consumers spend their money for our product. You and I might prefer a variety with a certain leaf shape, or other growth characteristics, but it's the consumer preference we want to meet. I seriously doubt if the consumer would care if the leaf were square. He wants flavour and satisfaction and judging from recent happenings, he wants a cigarette free from indictment of

injury to his health. I am confident people in the U. S. and around the world as well would smoke more cigarettes if we could give them a produce they liked better. Please keep in mind that nowhere have research talents been so specifically directed to quality improvement as they have to combatting hazards.

Even though tax schedules are high there would seem to be quite a market potential in foreign countries, judging from the low per capita consumption of cigarettes in these countries. The United Kingdom, with a per capita consumption of 3.8 pounds per year is below that of the United States with 5.8 pounds. Other countries are much lower, as you know, around 2 pounds per year. The question is, in spite of the high tax rate on cigarettes there, and the relatively low wage rates, would an improved tobacco, improved from consumers' viewpoint, cause people in these countries to spend a larger share of their incomes for cigarettes? I am sure General Motors is selling more Chevrolets this year than they would have through the same advertising energy put on their old model. The new product, with superior performance and decorated with bright colored paint and chrome, evidently meets consumer preference for people spending at rates reaching an all time high.

We should ask ourselves, then, what can be done research-wise to reflect consumer preference and really improve our product. I believe the problem is susceptible to attack. A very logical starting place is the building up of a backlog of knowledge on the chemical and

physical characteristics of tobacco and its combustion products. It's doubtful if there was ever a time when we needed to know more of what there is to know about tobacco. For example, we need to know how to measure aroma. In this way the breeder could select out those lines with strong aroma.

If a soil fumigation treatment for nematode control, for example, decreases the aroma, it should be replaced by another treatment. If one curing procedure destroys aroma, it should be discarded. The grade limitation is our lack of knowledge on aroma and how to measure it. But this gap in knowledge should be closed. It calls for intensive research. The total role of chemistry is very great and through chemistry, new yardsticks of quality will be discovered. Yardsticks we don't even know about today. We've leaned pretty hard on the old standbys of yield and money value. In the period ahead the emphasis on yield *per se* can be decreased with more energy placed on some of these quality criteria. There is no good reason at all why a variety with multiple disease resistance can't at the same time be superior in other respects too. In the samples of two new resistant lines on display here you will find evidence of an export quality superior to that of Dixie Bright 101 for example.

The possibilities of improvement in characters over and above disease resistance are tremendous. I'm going to tell you about a friend of ours at the University of California - a botanist Dr. E. R. Clausen, who has spent his entire professional life in fundamental research in

tobacco genetics. He has the world's most complete collection of all species of the genus *Nicotiana* around 60 in all. This includes wild types that hardly resemble tobacco as we know it. They have come from all over the world and there is no other tobacco collection like it. Yet these wild species have been examined scarcely at all to determine what desirable properties they may possess - properties that could be transmitted through breeding to our common varieties. It's a virgin field. Dr. Clausen has agreed to give to our institution his entire collection, with the understanding that we perpetuate it and improve upon it.

We now have 30 species which are about half the collection, and in addition, over 300 crosses involving these wild species with one another, making in all around 350 separate genetic lines now growing at the McCullers Station near Raleigh. Genetic material will thus be available soon for whatever chemical or physical evaluation can be made on it. It will be available to other states and to the U. S. Department of Agriculture and leaf from it will also be available to tobacco manufacturers for any studies they wish to make. Though our own chemical laboratory staff is not adequate at this time to take full advantage of the potentials it holds in store, a start will be made as our resources permit.

I mention this for it serves to illustrate the kind of projection in mind for improvement in tobacco leaf. It's a long range program but one which we feel holds great promise for changing in a positive way the character of tobacco offered at

the warehouse floor. Needless to say, before any practical benefit is forthcoming, a new line or variety would be evaluated thoroughly by manufacturers here and abroad. On the health angle, if there is ever isolated a constituent in tobacco that is harmful, and assuming there is a natural variability in this constituent in the available germ plasm, geneticists could then determine the location of genes carrying the desired factor and from that point on it is a matter of incorporating that factor into standard usable varieties.

Evidence that this whole projection is sound is provided by limited experience we have already had as early as 1951. At that time one of our staff visited Dr. Clausen and brought back two of the wild species. A variability in nicotine and non-nicotine was found and to make a long story short, today we can develop a variety with almost a predetermined level of nicotine. Similar results are expected to be forthcoming for other constituents as laboratory procedures are developed to assay what we have. And if none of these species provides us with the variability needed in a single chemical constituent, we have the nuclear reactor there on the campus and seeds of different species can be irradiated to induce artificially, mutations in chemical or physical make-up.

But I don't want to give the impression it's all variety. It's not. In the matter of poisons, for example; if our customers don't want toxaphene or lead arsenate

residues then our job is to find substitutes for these and then get them used. Better still is to find ways of controlling insects and other pests with no residues at all through their natural enemy parasites. This is a promising field of work. The whole problem of stored tobacco insects merits additional inquiry.

The system of cure could also come in for discussion in this connection. If there are differences in the quality of the end product from one procedure of curing to another, it's important to know the facts and then to base our actions on those facts even though you and I might have to adjust our own personal viewpoints on how best to cure tobacco. Our own preferences should be subordinated to those of our customers if a change will improve the product from the consumer viewpoint. If foreign purchasers want a light colored midrib, then it is our job to give it to them.



Fig. 4.

In closing I should point out that studies along all lines are not being undertaken currently. We have attempted to envision a total program even though funds were not in sight to activate all parts at this time. The inauguration of the complete program we have estimated to cost near \$ 500,000 and it would gradually build beyond this figure. Our present resources on state appropriations are approximately \$ 300,000. We are ready to move forward gradually and in an orderly manner as resources become available, attacking the most logical components first. In our judgement, the

opportunities and needs are so great that we can't afford to postpone this work too much longer if we are to keep pace with world conditions affecting the well being of the industry.

We need now to plan positively on the tobacco problem and put into motion those essential forces for improvement before our decline, which may have already set in, takes on too definite a form, and before people in foreign countries lose their taste for our tobacco and become accustomed to so-called substitute "Virginia".

### COMPLETION OF 10 YEARS BY THE INDIAN CENTRAL TOBACCO COMMITTEE

The Tenth Anniversary of the inauguration of the Indian Central Tobacco Committee was celebrated on 28th November, 1955 with great enthusiasm by all the officers and staff at the Committee's Secretariat, Central Tobacco Research Institute and the Research Stations. The day was marked by meetings of the officers and staff at these various centres when the progress of the work was reviewed, achievements of the Committee so far made in various spheres were taken into stock and the programme of work for the future outlined. They also rededicated themselves to the service of the Committee with renewed zeal and vigour in the coming years.

## Growth Characteristics of Cigar Tobacco Plant\*

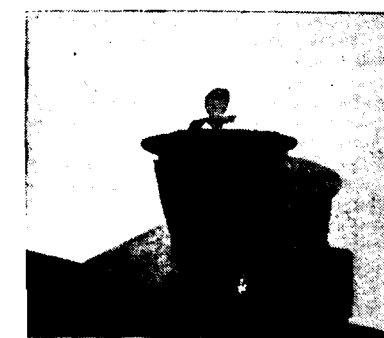
K. G. Tejwani,<sup>1</sup> C. K. Ramakrishna Kurup<sup>2</sup> and K. V. Venkataraman<sup>1</sup>

It is essential to know the growth pattern of a crop for formulating intelligent fertilizer practices with particular reference to the quantity, source and time of application of fertilizers and for obtaining maximum yields. A study of the growth pattern of the cigar tobacco plant as grown in South India, was therefore undertaken at the Cigar and Cheroot Tobacco Research Station, Veda sandur.

### Experimental

Cigar tobacco seedlings (of the local variety *Vellavazhai*) of eight weeks growth and having three leaves and a growing point were transplanted on ridges at a spacing of 2½' between rows and 2' between the plants. The crop received a basal dose of farm yard manure at 50 lbs. N per acre. The crop was irrigated from a well and received the usual cultural operations of weeding (including a shallow hoeing) and mummati digging (deep hoeing and earthing up with a spade) 3 and 6 weeks after transplanting respectively. The crop was topped at 14 leaves soon after the inflorescence had emerged about 10 weeks after transplanting. Photographs of 5 different stages of the crop are given in plate 1, (Figures 1 to 5).

Plant samples were collected at weekly intervals for recording the accumulation of green and dry matter. The plants were uprooted and the roots cut off. The leaves were then primed and the green weight of



CIGAR TOBACCO SEEDLING



CIGAR TOBACCO PLANT  
AT THE TIME OF WEEDING  
— 3 weeks after transplanting



CIGAR TOBACCO PLANT AT THE  
TIME OF MUMMATI DIGGING  
— 6 weeks after transplanting

Figs. 1 to 3

\* A detailed paper is being published elsewhere.

1. Formerly Chemist at the Cigar & Cheroot Tobacco Research Station, Veda sandur (S. India.) at present Pedologist at the Central Tobacco Research Institute, Rajahmundry.

2. Chemical Assistant, & 3. Junior Scientific Assistant at the Cigar & Cheroot Tobacco Research Station, Veda sandur (S. India).

leaves and stalks recorded. The leaves were then dried in a steam oven at 95°C. and weighed to obtain the weight of dry matter. When a leaf from a particular position on the stalk matured prior to the date of rooting, the corresponding leaves from all the plants in the sample were primed before they turned yellow and weighed green and after oven drying. This weight was added to the weight of the leaf samples of subsequent weeks to obtain the total green and dry matter produced by the plant.

### Results and discussion

The data for green and oven dry weight for the entire plant, leaf and stalk are summarised on the next page.



Fig. 5. Cigar tobacco plant at the time of harvesting—13 weeks after transplanting.



Fig. 4. Cigar tobacco plant at the time of topping—10 weeks after transplantation

The data would indicate that the maximum weights of green and dry leaf and total plant are produced during the 9th and 10th weeks after transplanting. The grand period of increase in the weight of the green stalk occurs a week later than that of the leaf or total plant, i.e., during the 10th week. The dry matter in the stalk continues to increase progressively upto the time of harvesting indicating that the stalk continues to grow even after the active growth of the leaf stops. It would be further observed that the production of green and dry matter takes place in four phases related to the cultural operations done on the crop. The crop grows very little upto six weeks after transplanting (the time of mummatti

TABLE I  
GREEN AND DRY MATTER (lbs. per acre) OF CIGAR TOBACCO AT WEEKLY INTERVALS.

| Growth period.                                | Weeks after transplanting. | Whole plant (leaf, stalk, tops, and suckers)         |        |                                                    |        | Leaf.                                                |        |                                                    |        | Stalk.                                               |        |                                                    |        |
|-----------------------------------------------|----------------------------|------------------------------------------------------|--------|----------------------------------------------------|--------|------------------------------------------------------|--------|----------------------------------------------------|--------|------------------------------------------------------|--------|----------------------------------------------------|--------|
|                                               |                            | Green matter.                                        |        | Dry matter.                                        |        | Green matter.                                        |        | Dry matter.                                        |        | Green matter.                                        |        | Dry matter.                                        |        |
|                                               |                            | Growth in each period as % of ultimate green matter. | Yield. | Growth in each period as % of ultimate dry matter. | Yield. | Growth in each period as % of ultimate green matter. | Yield. | Growth in each period as % of ultimate dry matter. | Yield. | Growth in each period as % of ultimate green matter. | Yield. | Growth in each period as % of ultimate dry matter. | Yield. |
| I. Transplanting to weeding. (3 weeks)*       | 2                          | 49                                                   |        | 4.2                                                |        | 37                                                   |        | 3.3                                                |        | 12                                                   |        | 0.9                                                |        |
|                                               | 3                          | 74                                                   | 0.19   | 6.7                                                | 0.24   | 63                                                   | 0.22   | 5.8                                                | 0.30   | 11                                                   | 0.11   | 0.9                                                | 0.11   |
| II. Weeding to mummatti digging (3 weeks).    | 4                          | 250                                                  |        | 15.9                                               |        | 230                                                  |        | 14.4                                               |        | 20                                                   |        | 1.5                                                |        |
|                                               | 5                          | 865                                                  |        | 65.9                                               |        | 800                                                  |        | 61.1                                               |        | 65                                                   |        | 4.8                                                |        |
|                                               | 6                          | 1719                                                 | 4.31   | 125.6                                              | 4.26   | 1610                                                 | 5.48   | 115.9                                              | 5.69   | 109                                                  | 0.99   | 9.6                                                | 1.03   |
| III. Mummatti digging to topping (4 weeks).** | 7                          | 4828                                                 |        | 336.0                                              |        | 4379                                                 |        | 305.1                                              |        | 449                                                  |        | 30.9                                               |        |
|                                               | 8                          | 8749                                                 |        | 549.3                                              |        | 7677                                                 |        | 484.7                                              |        | 1072                                                 |        | 64.6                                               |        |
|                                               | 9                          | 18713                                                |        | 1086.9                                             |        | 15344                                                |        | 901.8                                              |        | 3369                                                 |        | 185.1                                              |        |
|                                               | 10*                        | 30645                                                | 75.71  | 1767.8                                             | 58.89  | 22341                                                | 73.42  | 1346.6                                             | 63.62  | 8304                                                 | 83.10  | 421.2                                              | 48.77  |
| IV. Topping to harvesting (3 weeks).          | 11*                        | 33312                                                |        | 1993.2                                             |        | 24804                                                |        | 1441.8                                             |        | 8508                                                 |        | 551.5                                              |        |
|                                               | 12*                        | 33388                                                |        | 2349.4                                             |        | 24158                                                |        | 1630.0                                             |        | 9120                                                 |        | 709.1                                              |        |
|                                               | 13*                        | 38207                                                | 19.78  | 2788.7                                             | 36.61  | 28235                                                | 20.88  | 1934.4                                             | 30.39  | 9862                                                 | 15.80  | 844.0                                              | 50.09  |

\* 10th, 11th, 12th and 13th week yields for total plant include "tops" in addition to leaves and stalk.

\* 12th and 13th week yields for total plant include suckers in addition to leaves, stalk and "tops".

\* 10th, 11th, 12th and 13th week yields for stalk include "tops".

\* Weeding includes a shallow hoeing given 3 weeks after transplanting. \*\* Mummatti digging is a deep hoeing & earthing up with a spade.

Green matter leaves.

767.45

S. E. —

C. D. at 5 %

Conclusion.

Dry matter leaves.

40.50

115.7

13 12 11 10 9 8 7 6 5 4 3 2

digging) and then accumulates very large quantities of green and dry matter upto topping which is usually done 10 weeks after transplanting. During these four weeks the plant develops more than 60 per cent of the total leaf area, produces 50 to 60 per cent of leaves and accumulates 60 per cent of total dry matter. It may, therefore, be concluded that, from the point of yield of leaf and stalk, this four week period from 'mummatti' digging to topping is the most important and therefore for successful cultivation of cigar tobacco attempts should be made to provide optimum conditions to the plant during this period. Plant samples have been collected to study the rate of uptake of various nutrient elements by

the crop. The results when available will indicate the source, quality and time of application of fertilizer.

#### Acknowledgement.

The authors wish to express their thanks to Dr. B. S. Kadam, former Director, Tobacco Research, and Dr. N. R. Bhat, Director Tobacco Research, for giving necessary facilities for work at Cigar and Cheroot Tobacco Research Station, Vendasandur, and helpful suggestions during the course of the work, and to Dr. D. M. Gopinath, Botanist, Cigar and Cheroot Tobacco Research Station, Vendasandur, for taking the photographs.

### NEXT MEETING OF THE INDIAN CENTRAL TOBACCO COMMITTEE

The next meeting of the I—C—T—C—will be held from 9th to 11th February 1956 at the College Hall, Institute of Agriculture, Anand (W. Rlys).

The Programme for the three days will be as follows:—

| Date                | Time                   | Name of the Sub-Committee                                             |
|---------------------|------------------------|-----------------------------------------------------------------------|
| 9th February 1956   | 10 a.m. to 1 p.m.      | Agricultural Research and Development Sub-Committee.                  |
|                     | 2-30 p.m. to 5-30 p.m. | Marketing and Technological Sub-Committees.                           |
| 10th February, 1956 | 10 a.m. to 1 p.m.      | Finance Sub-Committee.                                                |
|                     | 2-30 p.m.              | Scientific Appointments Sub-Committee.                                |
| 11th February, 1956 | 10 a.m.                | Special Meeting followed by Eighteenth meeting of the full Committee. |

## Morphological Classification of Chewing Tobaccos of The Madras State

By

D. M. Gopinath\* and N. J. Hrishi\*\*

In a study of chewing tobaccos collected from various parts of Coimbatore, Madurai and Tanjore districts it was observed that the cultures raised from different samples varied to a great extent in their morphological features. Even samples coming from the same village differed greatly. To get the required biotypes a classification was attempted and some distinct types of chewing tobacco have been evolved. It is the purpose of this note to describe the morphological features of these types of tobacco.

#### Type A:

Untopped plants are usually 4½ to 5' in height. The stem is fairly thick and internode long. Auricle is present and is very heavy. The leaves are elongate and are found arranged in whorls approximately at 45° to the main stem. What is known as the petiolar region does not have a free petiole but the auricle extends and merges with the lamina. The basal portion of the leaf is constricted, while the middle portion is expansive, gently tapering towards the apex. The margins of the leaf are slightly wavy and flap down while the portion along the mid rib is elevated. At the region of the apex the leaf gently droops down. The mid rib is flat but very prominent at the base and tapers gently towards apex of the leaf

becoming almost inconspicuous. It is yellowish green in colour. The side veins are at an angle of 60 to 70° to the mid rib and are very inconspicuous. Puckering is present to a considerable degree. Matured leaf appears rather crinkly because of puckering. The colour is dark green and there is present a heavy resin deposit on the leaves at the time of maturity.

#### TYPE B:

In height and internodal characteristics there is not much difference between types A and B. Leaves are slightly broader than in type A. The petiole is at approximately 45° to the main stem. Auricle is present and extends to the petiolar region. There is a close resemblance between type A and type B excepting for the puckering habit which is discernable even in very young leaves. In older leaves puckering is very heavy and gives the entire leaf an appearance of a crocodile hide. The leaves are usually darker green in colour.

#### TYPE C:

Plants are usually 3½ to 4½' high when not topped. The stem is very thick and internodes shorter than in types A and B. Auricle is present though it is not very heavy. The leaves are broad and almost ovate with a very short tiny projection in

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the apical region. The whorls of leaves twists characteristically to a side resembling the whorls of leaves in an open cabbage head. The basal portion of the leaf has the extension of the auricle but not to a great extent. The margin of the leaf is entire but the leaf itself, towards the middle portion of the lamina, twists giving the characteristic appearance. The mid rib is flat and yellowish green in colour. Veins start bifurcating from the mid rib itself. This actually is the distinguishing feature of the type. There is very heavy puckering and this puckering in between the veins makes the lamina shrink and gives the whole leaf a folded appearance.

#### TYPE D :

Plants are usually  $4\frac{1}{2}$  to 5' in height. Stem thick. The auricle is very heavy. The leaves are characteristically long and become broad, roughly at about  $\frac{1}{3}$ rd the length from the petiole. The leaves stand almost at a right angle to the stem even though the petiole has an angle of  $45^\circ$  to the stem. This is because of the bend the leaf takes

above the petiolar region. The extension of the auricle produce flaps on the petiole. Nevertheless, the petiolar region appears constricted when the whole leaf is viewed. Margin of the leaf is wavy. Mide rib is not very conspicuous and has a yellowish green colour. Veins do not bifurcate but are very regular. The dorsal surface of the leaf is characteristically flat and never droops which is its distinctive character. Marginal drooping too is not very conspicuous. Puckering intensity is rather low. Colour of the leaf is lighter green and resin deposit not profuse.

#### Type E :

Plants are usually dwarf in appearance growing not more than about 3'. The distance between the nodes is very short. The auricle is not very prominent but extends towards the petiolar region appearing there almost as a frill. The leaves are linear and narrow and have a tendency to fold upwards along the mid rib. Leaves have a tendency to grow veritcal at the nodal region but droop at about the mid region of the lamina. At the apical region they characteristically roll back



towards their ventral side. Mid rib is not prominent. Veins do not bifurcate and are inconspicuous. Puckering is very heavy and this character with the thickness of the leaf gives it the appearance of the skin of a crocodile. The leaves are yellowish green in colour.

#### Type F:

Plants are about 4 to 4½' high with thick stem and medium internode. Auricle is heavy at the internodal region. The leaves are rather long and boat shaped with the margin rolling towards the ventral side of the leaf. There is a tendency towards tapering. The auricle which extends to the petiolar region is heavy at this region and therefore gives the base of the leaf a flappy appearance. Margin is entire. Mid rib is very prominent. Flat on the dorsal and roundish on the ventral surface. The veins are quite irregular and bifurcate profusely. There is not so much of puckering in this type. Consequently the leaves appear rather smooth in contrast to the appearance in some other types resembling that of a crocodile or an elephant hide. The leaves are dark green in colour and resin deposit is moderate.

#### Type G:

Plants are usually not very tall, seldom reaching a height of 3½'. Distance between the nodes is very short. Leaves are broad and very flat. They have a tendency to be arranged on the axis at an angle of not more than 45°, so much so that the whorls of leaves look stiff and erect. The auricle expands so profusely at the

petiolar region and mid ribs with the lamina of the main leaf that it becomes impossible to distinguish the auricle from the lamina. This, therefore, does not give constricted appearance at the petiolar region. On the other hand, the appearance of the lamina is quite extensive, a character which is very much desired by many farmers. The mid rib is not extraordinarily conspicuous being flat on the dorsal surface and round on the ventral surface. Veins do not bifurcate. Puckering is present to a moderate degree. The colour of the leaf is green and the texture thick. The margin is entire. There is fairly good amount of resin deposit on the leaves when the leaves are quite mature.

#### Type H:

Plants are very short reaching not more than about 2½' in height. The distance between nodes is very short. Leaves are very narrow, linear and lanceolate with an entire margin. The apex is pointed. The auricle extends to the petiolar region, but is not very conspicuous. The mid rib is not very prominent. Veins are irregular. The colour of the leaf is yellowish green. Puckering is moderate, and resin deposit very poor.

#### Type I:

Plants are about 3 to 3½' in height with very thick stem and short internodes. Leaves are broad, long and drooping. At the marginal region they fold back towards the ventral side as in type A. This type has a great resemblance to type B except for the marginal drooping towards the ventral side. The auricle extends to

the petiolar region. The puckering is moderate. The colour of the leaf is dark green and texture thick. Resin deposit is found to a moderate extent.

#### Type J:

Plants are usually about 4' tall. The stem is thick and the internode medium. The auricle is present but is not very

heavy. The plant resembles type F to a certain extent. Leaves are broad at the middle region, but taper towards the apex. This has a close similarity with type C in regard to bifurcation of the veins, but is certainly distinct from it in other features. Puckering is present, but is not very profuse. Leaves have light green colour with a poor deposit of resin.

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# Laboratory Tests on the Toxicity of Dieldrin 50% W. P. to the Tobacco Ground Beetles

By  
**Annamma Philip\***

The Tobacco ground beetle, *Opatroides frater* (Fairm) is found to be one of the major pests of Virginia tobacco cultivation in Andhra State. Considerable damage has been reported due to this pest, which causes gaps in the newly transplanted tobacco field, by either nibbling or cutting down the seedlings. As in the case of other soil insects, it has been found difficult to estimate with any precision the actual kill of these insects in the field after applications of insecticides, mainly due to their hiding habits. Therefore, it is found essential to run laboratory experiments for ascertaining toxicity while laying out field experiments for the control of this pest. Both types of experiments are in progress at the Central Tobacco Research Institute, Rajahmundry.

Recently, a number of tests were conducted in the laboratory to determine the percentage mortality of ground beetles with Dieldrin,† one of the soil insecticides that was found to give promising results in the field. The following experiment was an attempt to find out the LD/50 (lethal dose for 50 per cent mortality) of this insecticide under controlled conditions.

## Materials and methods

The insecticide was Dieldrin 50% W. P. The powder was used in distilled water in

4 different concentrations. In all, 240 beetles, all adult males of almost the same size were used for the 4 tests conducted. Five lots of 12 beetles each were used for the 4 dosages and check, 60 beetles for each test. Sixty beetles were found to be approximately 2.2 gms.

The chemical and the beetles were weighed in an electrical balance to ensure accuracy. The insecticide was dispersed in distilled water and used at the dosages of 3.7 mg., 7.4 mg., 11.1 mg., and 14.8 mg., per gram body weight of the adult male, respectively. Distilled water was used as check. An hypodermic syringe of 1 cc. vol. calibrated upto 1/10 cc. was used to make a measured volume of the insecticide to contact the ventral side of the thorax of the beetles. The beetles were kept in open glass troughs soon after treatment to prevent them from escaping. Observations were taken every 30 minutes for the first 5 hours and every 24 hours thereafter. The symptoms of mortality were taken to be the inactivity of the beetle in the prostarte condition and immobility of the antennae and legs even after pricking with a needle.

The method of maximum likelihood was used to calculate LD 50% values, as given by Finney (1952).

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† Dieldrin is a chlorinated hydrocarbon insecticide, manufactured by the Shell Chemical Corporation, U. S. A., and supplied by the Burma Shell Co., India.

TABLE 1.

Percent mortality and LD/50 values of Dieldrin 50 % W. P. for ground beetles.

| Dosages per gm. wt. of the body of the beetles. | Percent mortality after                    |                                             |                                            |
|-------------------------------------------------|--------------------------------------------|---------------------------------------------|--------------------------------------------|
|                                                 | 24 hours                                   | 48 hours                                    | 72 hours                                   |
| 3.7 mg.                                         | 15                                         | 27                                          | 54                                         |
| 7.4 mg.                                         | 13                                         | 42                                          | 63                                         |
| 11.1 mg.                                        | 21                                         | 50                                          | 71                                         |
| 14.8 mg.                                        | 27                                         | 61                                          | 88                                         |
| Topical toxicity LD/50                          | 83.38 + 2.4<br>(mg./gm. wt. of adult male) | 11.48 + 0.75<br>(mg./gm. wt. of adult male) | 3.65 + 0.13<br>(mg./gm. wt. of adult male) |

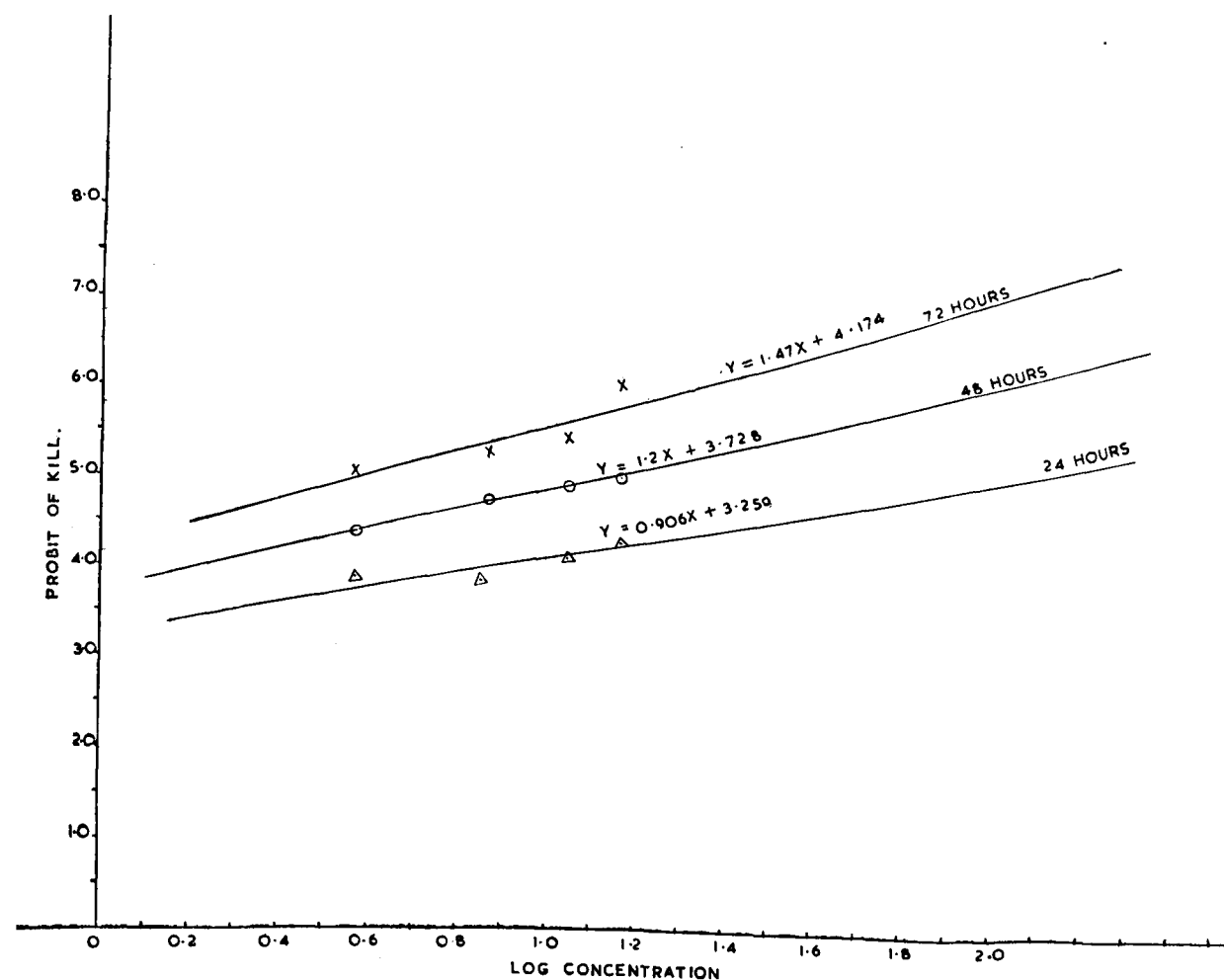


Fig. 1.

### Results and discussion

Table 1 and Fig. 1 summarise the toxicity results of different dosages of Dieldrin 50% W. P. used against the tobacco ground beetles. The topical toxicity of the insecticide in terms of LD/50 was found to be 83.38 mg./gm. wt. of the adult male upto 24 hours, 11.482 mg./gm. body weight of the adult male after 48 hours and 3.65 mg./gm. wt. of the adult male after 72 hours. There was 100% knock down after 4 hours of treatment in all the dosages. The time taken was as small as 2½ hours for knock down in one of the tests at the highest dosage of 14.8 mg./gm.wt. None of the beetles recovered after the knock down symptoms of toxicity were found to be the same as that of cocroaches. The beetles were found to be in a prostrate condition (lying on their

backs) as soon as they were knocked down, with the leg muscles showing very vigorous contractions. Mortality in water treated checks was negligible.

### Acknowledgements

The author wishes to express her thanks to Dr. N. R. Bhat, Director, Tobacco Research, for encouragement and for suggestions given. The author also appreciates the valuable help rendered by Sri V. N. Murty, Statistician, Central Tobacco Research Institute, Rajahmundry for analysing the data of the experiment.

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### Translation of the opening words of the play 'DON JUAN' by Moliere, given in Antwerp on the 19th & 20th May, 1955

(Translated by Mrs. A. Thomson Nalaskowska)

SGANARELLE (holding a snuff box). Whatever Aristotle and every Philosophy have to say, there is nothing equal to tobacco; it is the passion of honest people, and who lives without tobacco is not fit to live. Not only does it rejoice and purge human brains, but it also teaches the souls virtue, and with it one learns to become an honest man. Cannot you perceive, how as soon as one takes some, the obliging way one has towards everybody, and how pleased one is to give to left and to right, wherever we are? We do not even wait to be asked, but run towards the wish of others; so true is it that tobacco inspires sentiments of honour and virtue to all those who use it. But this is enough on this subject. Let us return to our discussion...

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## **Research Notes**

Seminar at the Central Tobacco Research Institute, Rajahmundry

The third seminar at the Central Tobacco Research Institute was held on 3rd November, 55, Dr. N. R. Bhat, Director Tobacco Research presiding.

By way of introduction, Dr. Bhat explained the nature of statistics and observed that the tests of statistical significance have proved very useful in research in which, usually, the data from a limited number of restricted experiments are used to arrive at generalisations. He pointed out that the four tests of significance, viz.,  $c$ ,  $t$ ,  $X^2$  and  $Z$  (or  $F$ ) developed by mathematicians to suit different sample sizes and situations were but ratios of two variances or standard deviations and were all inter-related. He compared experimental error with the common balance. The balance is required to be firstly a correct one and secondly very sensitive for its efficient use. Similarly the experimental error should be firstly valid and secondly very small in magnitude. Randomisation would ensure its validity while its magnitude could be reduced by proper lay-out and replication. With these remarks he requested Sri V. N. Murty, Statistician of the Institute, to acquaint the audience with the latest developments in the tests of significance.

Sri V. N. Murty, Statistician, thanked the President for giving him an opportunity of placing before the seminar some of the modern developments in tests of significance. After explaining the principles of 'specification', 'estimation' and

'testing of hypothesis', the speaker illustrated these principles by means of a very interesting example due to Sir Ronald Fisher. The nature of any null hypothesis and level of significance in any test of significance were dealt with. The geometric interpretation and the related idea of critical region and the choice of a best critical region for a test of significance were explained.

The  $F$  test in the analysis of variance tests the hypothesis of equality of means of different treatments used in the experiment. When this test is satisfied it only indicates that the treatment means are different, but does not state which particular treatment means differ and if they do in what direction. In short, it is an over-all test of significance. A recent development of this  $F$  test of analysis of variance known as the 'multiple  $F$  test' due to D. B. Dunkon was explained with the help of a numerical example.

Instead of using the quantitative data, ranks could be used for purposes of statistical analysis. The various methods that are being used in the analysis of ranks were discussed. While discussing the rank analysis by methods due to M. G. Kandal, an interesting example was presented and the principles involved therein were explained.

An interesting discussion followed on the appropriate use of the new tests of significance in field experimentation and

the speaker stressed the limitations and usefulness of these tests of significance in the agricultural field.

In his concluding remarks, Dr. Bhat stated that Sri Murty's exposition of the new tests of significance were very enlightening and useful. Referring to the test given by Dunkon which the speaker had explained in detail, he observed that it would improve the multiple comparisons between more than two treatments or varieties which had so far to be done as 2 by 2 comparisons. He said that, though it was a fact that statistics could not replace commonsense, procedure and technique, it had justified itself as an extremely useful tool in the planning of experiments and interpretation of their results. One need not either too rigidly insist on statistical significance since small genuine differences between varieties or treatments could not be proved significant in their comparisons in the field where soil heterogeneity could not be reduced below a certain minimum. What was needed was a healthy co-operation between the experimenter and the statistician and mutual appreciation of each other's point of view which would promote the efficiency of research.

High temperature all the year round burns out the organic matter in the soil quickly. Heavy soils as well as light soils are benefitted by the addition of organic matter. The former become less sticky and more porous, while latter become more retentive of moisture.

—I. C. A. R. Farm News Release No. 133

#### POUDRETTE—MAKING A New Method

Research has shown a new method of making poudrette manure from night soil. It consists of adding such material to the night soil as can easily and quickly turn it into a dry state.

Saw dust and borken leaves have a high capacity for absorbing water and are ideal for mixing with night soil.

For preparing poudrette, night soil is treated in a trench a foot deep and of suitable length and breadth. A layer of the absorbing material is spread in the trench over which the night soil is spread out. A long iron or wooden rake can be used for the purpose. Additional absorbing material is thrown over the night soil and mixed with the rake, until the mixture is reduced to a powdery form.

The material is then piled up in a heap to dry further in the sun. It can be disposed of as manure a few days after, or stored in a pit or heaped in a shed until required.

The method is ideal for adoption in small towns and villages. It requires a small area, quickly disposes of the night soil, controls fly-breeding and foul smell. It produces a rich manure which is suitable for direct application without needing further fermentation.

—I. C. A. R. Farm News Release No. 138.

#### PLOUGHING FOR SEED-BED— Optimum Needs

Recent experiments have shown that the normal depth of ploughing of four to five inches is sufficient for the preparation of the field of sowing crops.

Experiments with maize and wheat were conducted to find out what the best frequency of ploughing should be. For maize, best results were obtained with two ploughings followed by three hoeings. For wheat, when three, six, nine and twelve ploughings for seed-bed preparation were tried, best results were obtained from plots that received nine ploughing.

Farm experts say that the normal depth of ploughing as is obtained by bullock-drawn implements is the most practicable depth for seed-bed work. They feel that inversion of soil is more important than deeper ploughing. Just enough cultivation to keep down weeds and maintain the soil in a condition that can absorb and hold water is, they say, ideal.

They stress that timely and not frequent cultivation should be the rule on farms.

—I. C. A. R. Farm News Release No. 141.

#### ARTIFICIAL FERTILIZERS— Precautions in Application

When applying fertilizers to crops, farmers should ensure that there is enough moisture in the soil.

There should be sufficient organic matter also in the soil, as otherwise beneficial results are not obtained from the use of fertilizers.

When a fertilizer containing nitrogen is to be applied as a top-dressing to a standing crop, it should be mixed with five parts of soil or farmyard manure, so that the fertilizer is diluted and does not burn the leaves on which it may drop.

Top-dressing with nitrogenous fertilizers is best done after one to two weeks of the germination of the crop or the establishment of a transplanted crop.

Large doses of nitrogenous fertilizers should not be applied to sandy or gravelly soils.

—I. C. A. R. Farm News Release No. 75.

#### COMPOST FROM CANE TRASH— Easy Manure to Prepare

A manure of a very good quality can be prepared from cane trash. Sugarcane trash on farms is, at present, mostly wasted by being used for burning purposes.

For preparing manure from cane trash, dig a pit three feet in depth and of sufficient length and breadth to hold all the trash produced on your farm. Moisten the trash and spread it evenly in the pit in nine inch layers alternating with two to three inches layers of a thick slurry of cowdung in water. Fill up the pit this way till the heap rises to 1½ feet above the ground level. Make the top dome-shaped. After a week, cover the heap with an inch or 1½ inches thick layer of loose earth.

The manure will be ready for use in about six to eight months.

Instead of cowdung, horsedung may be used. Old compost can also be used, in which case the layer of compost over the trash should be 4½ inches thick.

—I. C. A. R. Farm News Release No. 143.

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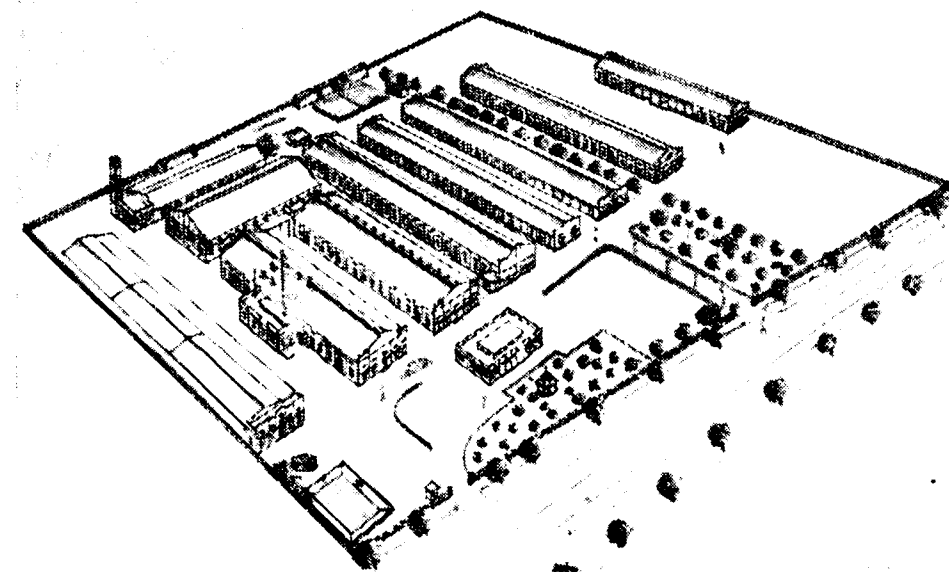
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