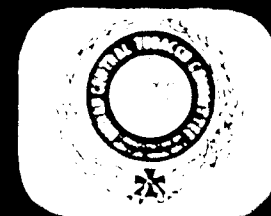


Indian TOBACCO



INDIAN CENTRAL TOBACCO COMMITTEE
MADRAS



*National Tobacco Company
of India Limited*

PACKERS AND EXPORTERS - ALL TYPES
OF INDIAN LEAF TOBACCO

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LIGHT AND DARK AIR-CURED
BURLEY

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GUNTUR · BICCAVOLE · CALCUTTA

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INDIAN CENTRAL TOBACCO COMMITTEE

122, MOUNT ROAD

MADRAS-6

Telegrams : "TABAC", MADRAS

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Articles should be as concise as possible and generally with appeal to the lay public. Titles of the articles should be short. Articles on scientific research need not contain the details of experiments conducted, and should avoid, as far as possible, scientific formulae and technical terms. Where technical terms are unavoidable, they should be explained in the text in simple language. Statistical tables should be restricted to the absolute minimum and should be typed on separate sheets with their positions marked in the text. Appropriate mention in the article of the economic value of the results of research and methodological studies will enhance its usefulness. Original articles should conclude with a short summary of the main facts and conclusions.

2. Reference to literature which must be restricted to the very few of importance, should be given in the text wherever possible in chronological order—only the names of authors and years of publication in brackets being given. They should be stated in full after the summary, authors' names following in alphabetical order, as under :—

(i) Name or names of author(s).

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3. Information of a miscellaneous nature and of interest to the general public, facts, observations,

etc.; relating to TOBACCO are also received for publication.

4. Manuscript should be neatly typed with double spacing on one side of the paper only and with wide margin. Three copies should be sent. Drawings, diagrams, etc. should be done in Indian ink. Coloured illustrations are not required.

5. All papers should be carefully revised by the authors and should be absolutely in final form for printing.

6. In addition to one copy of the Journal, in which their articles appear, 25 complimentary copies of the reprints of only the original articles will be supplied to their respective authors free of cost on request. If there are more than one author, these 25 copies will be distributed among them. Authors should intimate, while sending their articles for publication, whether they require their reprints. Additional copies of reprints can be supplied on payment at printer's cost price if intimation is given while sending the articles for publication.

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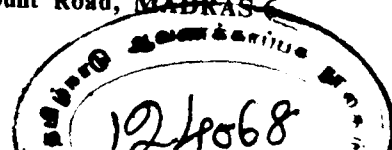
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INDIAN TOBACCO

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THIS ISSUE

Introduces Shri K. C. Chetty, B.Sc. (Agri.) Edin., formerly Deputy Secretary to the Government of India, Ministry of Food and Agriculture, as new Secretary of the Indian Central Tobacco Committee to the readers in its first article, followed by a short biographical sketch of the out-going Secretary.

A brief informative note about the inauguration of the new laboratory building at the Committee's Tobacco Research Station at Hunsur appears along with an article on tobacco in Mysore State.

Besides, there are articles on indigenous tobacco, *Jati* (*N. tabacum*) grown in North Bengal and on the possibilities of tobacco development in the Maldives Islands.

It also includes a report on the impressions of the Andhra tobacco growers to North Gujarat where Indian Leaf Tobacco Development Company has initiated for the first time developmental projects in respect of flue-cured Virginia tobacco.

EDITOR.

INDIAN TOBACCO

OUR NEW SECRETARY

Shri K. C. Chetty, B.Sc. (Agri.) Edin., until recently Deputy Secretary to the Govt. of India, Ministry of Food & Agriculture, took over as Secretary, Indian Central Tobacco Committee on the 27th November, 1961.



After graduating from the University of Edinburgh in June 1929 with distinction in Agriculture, Agricultural Chemistry, Agricultural Entomology and Genetics, Shri Chetty took up post-graduate research work under Professor Crew in the Animal Breeding Department of Edinburgh University. After his return to India he served the Chilean Nitrate Committee as a Regional Propaganda Officer for about a year. He then joined the Madras Government in the Department of Agriculture and worked in the Agricultural Research Institute, Coimbatore, on cotton and oilseeds. In 1935 he was selected by the Federal Public Service Commission as Assistant Marketing Officer in the Central Agricultural Marketing Department, Delhi. He conducted surveys on the marketing of groundnuts, linseeds, castor and coconut and published the All India Marketing Reports. He was in charge of quality control of Agmark products. He also formulated contract terms for oilseeds and drew up grade specifications and standard samples for Virginia Flue-cured Tobacco and initiated the grading of tobacco under the 'Agmark' before export in 1943.

In 1947 he was appointed as the first Secretary of the Indian Central Oilseeds Committee and had to organise the Committee's office and the field of work of the Committee. The activities of the Committee during the period he was its Secretary, were praiseworthy.

In 1950 Shri Chetty was selected for the Central Secretariat Service by the Union Public Service Commission and was appointed as Under Secretary in the Ministry of Food & Agriculture. In 1955 he was promoted as Deputy Secretary in the same Ministry. In that capacity he was in charge of the Grow More Food Schemes including Schemes of minor irrigation, seed farms, development of local manurial resources and procurement and distribution of fertilisers. He was also a member of the Fertiliser Distribution Enquiry Committee which studied the system of distribution of fertilisers in different States and have suggested improvements.

As Shri Chetty comes to this Committee with rich and varied experience both in the technical and administrative side, we hope that under his guidance the Indian Central Tobacco Committee and the Indian tobacco will make very good progress.



Dr. M. S. Patel, M.Sc., Ph.D. (N. Carolina), Secretary, Indian Central Tobacco Committee, from February 1950 to November 1961. Now Secretary, Indian Central Oilseeds Committee.

After obtaining the degree of B.Sc. (Agriculture) with Honours from the University of Bombay, he passed M.Sc. and took Doctorate from the University of North Carolina (U.S.A.).

He held the posts of Agricultural Officer, Tobacco Research Station, Nadiad and Tobacco Marketing Officer, Indian Central Tobacco Committee, before his appointment as Secretary of the Committee, in February 1950.

He was mainly responsible for bringing out the Committee's four periodicals, namely *Indian Tobacco*, *Tobacco Bulletin*, *Pogaku* and *Tambaku* and *ad hoc* publications like *Indian Tobacco — A Monograph*, *Tobacco Directory*, *Indian Tobacco Statistics*, and *Indian Tobacco Atlas*, besides many leaflets in different regional languages.

He went on trade delegations to Eastern countries and then to West Asian and African countries to boost up tobacco export trade. He was deputed by the Government of India to advise the Government of the Maldives on the possibilities of growing tobacco there.

INDIAN STANDARDS INSTITUTION

Press Note No. 400/61

Date of Despatch :
29 November, 1961

SNUFF

(A Draft Indian Standard for Wide Circulation)

The Indian Standards Institution has prepared a draft Indian Standard Specification for Snuff, which prescribes the requirements and methods of test for snuff manufactured in India.

The draft standard will be circulated shortly to interested producers, consumers and technologists for eliciting technical comments. The comments will be taken into consideration before the draft standard is finalized.

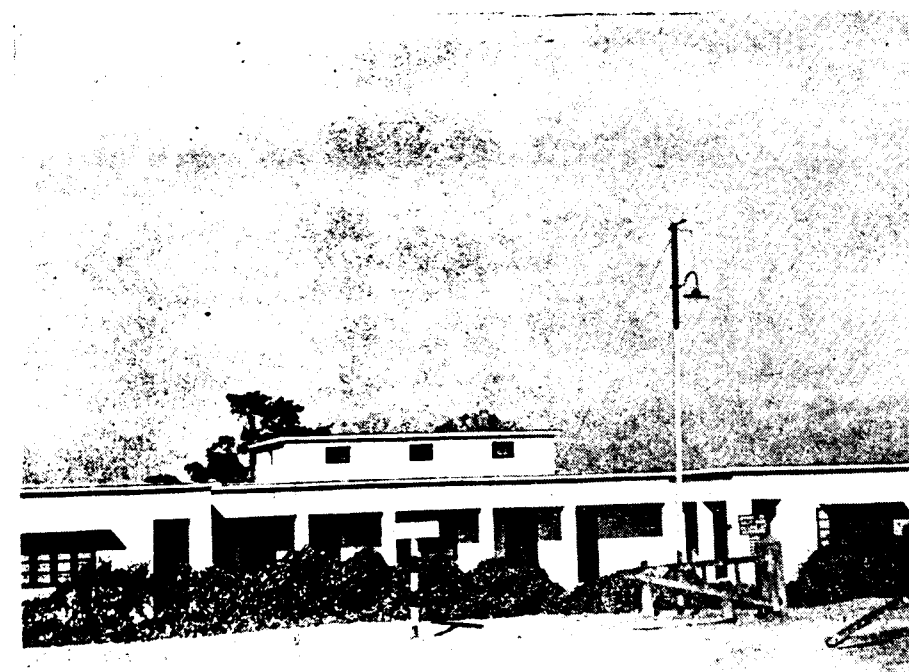
Copies of the draft standard will be available free on request, from the office of the Indian Standards Institution, Manak Bhavan, 9 Mathura Road, New Delhi-1 and from its Branch Offices located at Bombay, Calcutta, Madras and Kanpur.

Tobacco Research Station of Indian Central Tobacco Committee at Hunsur (Mysore)- Opening of Laboratory Building

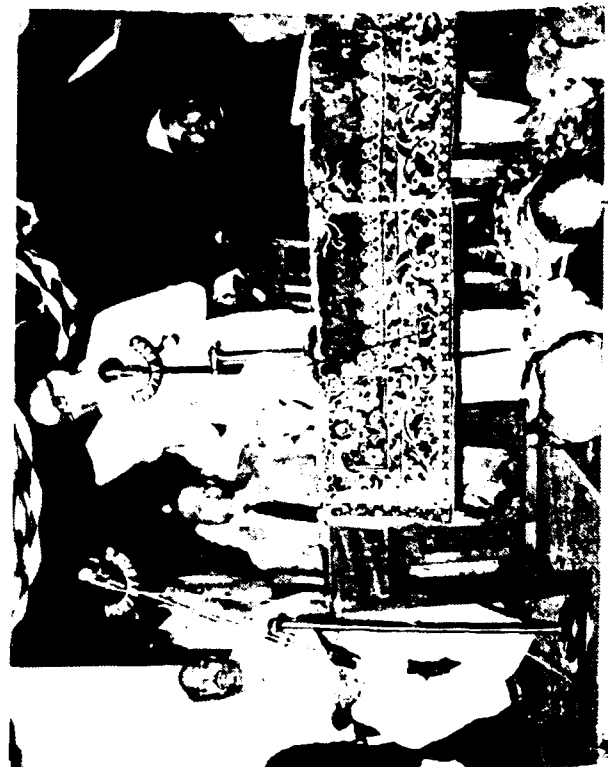
The laboratory building of the Tobacco Research Station, Hunsur, was declared open by Shri N. Rachiah, Hon'ble Minister for Agriculture, Mysore State on the 8th October, 1961 by lighting a lamp specially made for the occasion.

This Research Station was established by the Indian Central Tobacco Committee in 1957 under the Second Five Year Plan. The laboratory building was constructed by the Mysore State Public Works Department.

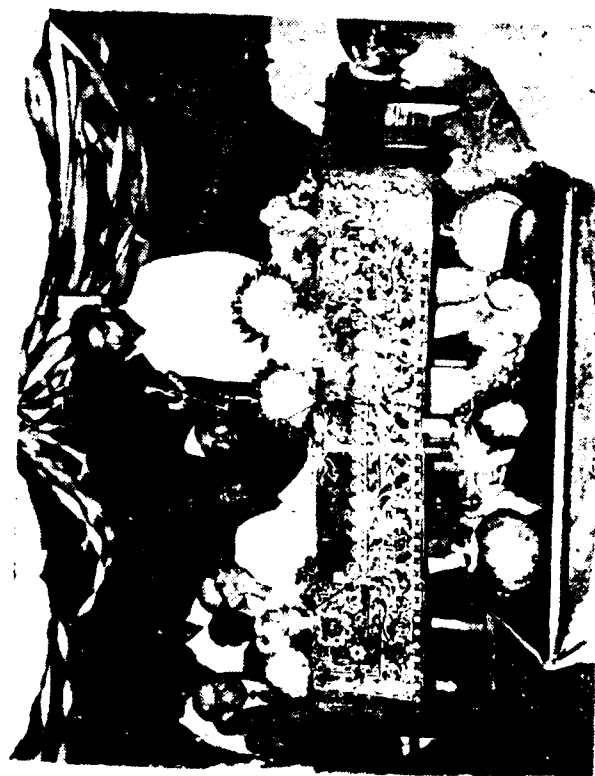
The Minister in his address thanked the Committee for establishing this Research Station for research and development work on cigarette tobacco with special reference to the conditions obtaining in the Mysore State which are quite different from those in the area in Andhra Pradesh where production of this tobacco is concentrated. The Minister added that he heard with great interest Dr. J. S. Patel's account of the various achievements of the research station within a very short time of its existence. Mysore State was the third largest tobacco growing State pro-



Tobacco Laboratory, Research Station, Hunsur, opened on 8-10-1961.



↑
The Hon'ble Minister lighting the lamp to declare
open the laboratory building.



The Vice-President delivering the Presidential Address.

↑
The President welcoming the Hon'ble Minister.

Opening of Laboratory Building

ducing 1/10th of the country's total outturn of tobacco. Hence it was quite befitting that this State should have a Research Station with facilities for advancement of tobacco research.

He also paid tribute to the work of the Mysore Tobacco Company in the development of Virginia cigarette tobacco cultivation in the State and thanked the Company for their keen interest evinced in the establishment of this research station.

The Minister then went on to give an account of the economic role played by tobacco in India and traced the history of the introduction of tobacco in the country and in Mysore State. He appreciated the work done by the Indian Central Tobacco Committee for the expansion of research on tobacco for the improvement of its yield combined with quality and was satisfied that tobacco research and development work would be considerably intensified during the Third Five Year Plan. He hoped that with the added facilities of laboratory and its equipment the Tobacco Research Station would expand the field of its activities and the peculiar problems facing tobacco growers and traders of the State would be solved to the benefit of the State Tobacco Industry.

Earlier Dr. J. S. Patel, Agricultural Commissioner with the Government of India and President, Indian Central Tobacco Committee, welcomed the chief guest and requested him to declare open the laboratory building. He gave an account of the various important achievements of the Research Station and described in detail as to how the research station was serving the interests of the growers. He thanked all those present and evinced interest in the development of the Research Station.

Shri T. Venkatappaiah, Vice-President of the Committee who presided over the function, thanked one and all and gave an account of his intimate association with the Committee. He hoped that the Research Station would serve the tobacco growers more and more and they would get fair prices for their produce. He wished the Mysore State all success in the tobacco development work which would bring name and fame to the State, to the Indian Central Tobacco Committee and to the Nation.

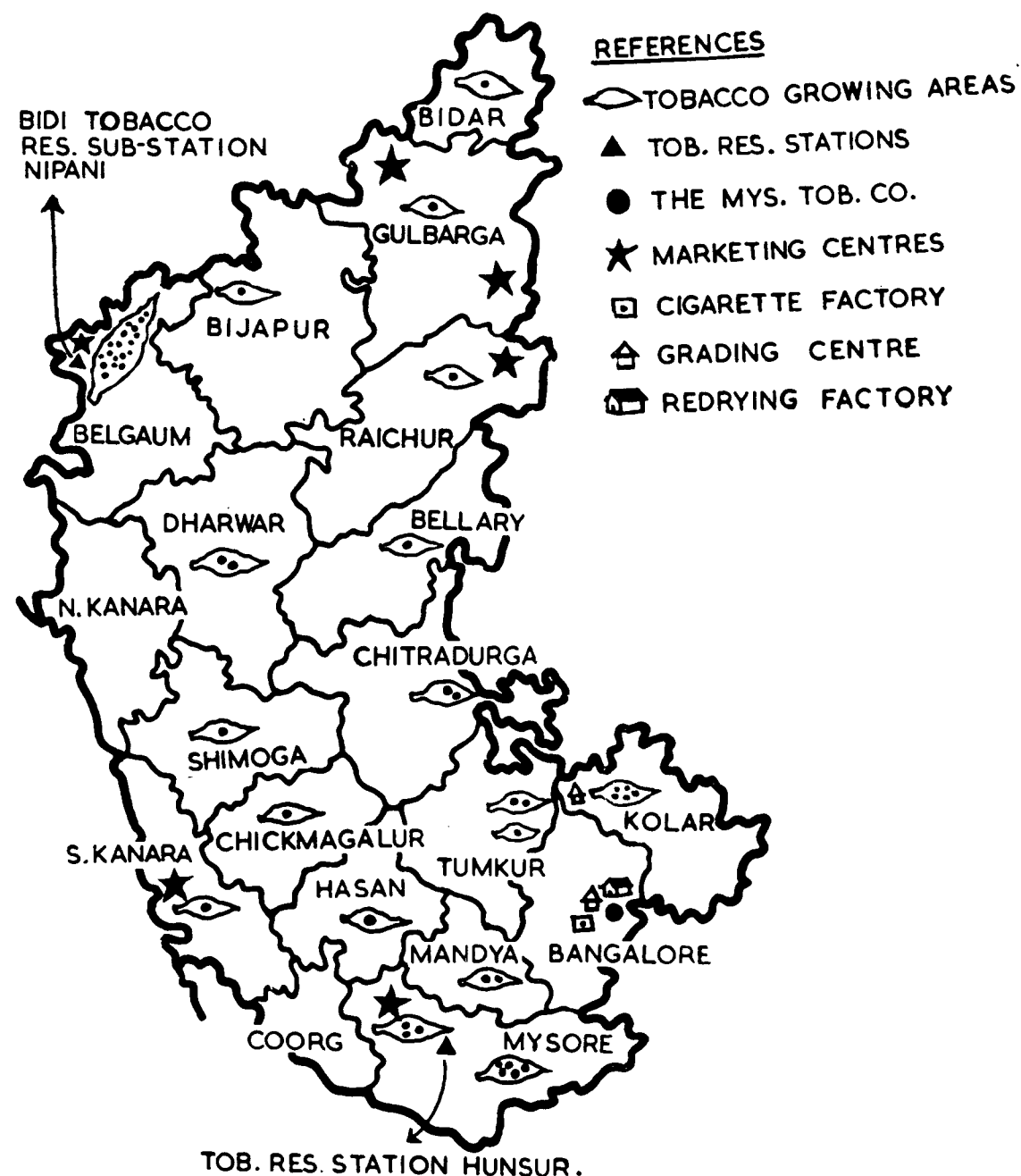
The function started with prayer. About a 1,000 persons including tobacco growers, workers in the tobacco industry and important State officials attended it. Prominent among them were Shri Mallaraj Urs, the Director of Agriculture, Mysore, Shri B. P. Balakrishna of the Mysore Tobacco Company, Officers of the Central Food Technological Research Institute, Mysore and Dr. G. S. Murty, Director, Tobacco Research.

Messages wishing the function all success were received from the Ministers of the Mysore State and important personages such as Shri M. A. Parikh, Shri S. Mehta, former Vice-Presidents of the Indian Central Tobacco Committee and from Members and other officials of the State and Central Governments.

The function concluded with a vote of thanks by Dr. M. S. Patel, Secretary, Indian Central Tobacco Committee followed by the singing of the National Anthem.

Special publications pertaining to Tobacco Activities in Mysore State etc., were brought out on the occasion by the Secretary, Indian Central Tobacco Committee which were very much appreciated.

TOBACCO MAP MYSORE STATE



Tobacco in Mysore State

After reorganisation, the State of Mysore with an area of 74,122 sq. miles occupies the eighth place among the 15 reorganised States of the Indian Union in the vastness of its length and breadth. The agricultural resources of the State have since increased considerably. As regards total area under cultivation, she ranks fifth in importance in the country. She holds the first position in respect of the production of Coffee, Cardamom and Ragi, second in that of Coconut, Castor and Arecanut and third in that of Tobacco, Cotton and Jowar. The acreage under Cereals, Groundnut, Chillies and Oranges has increased considerably after the reorganisation of the State.

Mysore is the third most important tobacco producing State in the Union.

Tobacco, particularly the bidi tobacco, plays a very prominent role in the economy of Mysore. Its share in the country's total production of tobacco is about 9%. During the year 1959-60, about 56,000 lb. of tobacco were produced from an area of 103 thousand acres.

A table showing the acreage and production of tobacco during the years 1956-57 to 1959-60 in the reorganised Mysore State together with the percentage to the total produced in the country is given below :

Year	Area in thousand acres	Percent to the total area in the Union	Production in thousand lb.	Percent to the total production in the Union
1956-57	135	13.1	47,040	7.1
1957-58	105	12.0	44,800	8.4
1958-59	102	11.4	53,760	9.2
1959-60	103	11.0	56,000	8.9

* M. S. PATEL, M.Sc.,
Ph.D., (U. S. A.)

(Courtesy : Directorate of Economics and Statistics, New Delhi).

* Ex-Secretary, Indian Central Tobacco Committee and Member, Tobacco Export Promotion Council.

Tobacco in Mysore State



(Top) Sowing Seeds

(Bottom) One month old F.C.V. tobacco crop



When compared to other important tobacco growing States, the yield per acre of tobacco grown in Mysore State is not only low but well below the All-India average of 675 lbs. More than 75% of the total production is confined to Mysore and Belgaum districts, the latter alone contributing about 50%. Mostly *Nicotiana tabacum* is grown in the State of Mysore while *Nicotiana rustica* is grown in some places to a limited extent. Belgaum, Mysore, Kolar, Tumkur, Chitradurga, Dharwar, Mandya and Hassan are the important districts for tobacco. Of *Nicotiana tabacum*, Virginia type is grown in Kolar, Mandya, Mysore, Tumkur, Bangalore, Belgaum and Chitradurga districts and other types mainly in Mysore and Belgaum districts. *Nicotiana rustica* is grown to a limited extent in the districts of Tumkur, Belgaum and Hassan and to a lesser extent in Chitradurga, Mysore and Bijapur.

It is due to the concerted and systematic efforts of the Mysore Tobacco Co. Ltd., which was floated in the year 1937, that Virginia tobacco cultivation developed in the Mysore State. The acreage under this type is not uniformly distributed but concentrated in certain areas in the State.

The Virginia tobacco is grown in Mysore in a season different from that of Guntur (Andhra Pradesh) which is the most predominant tobacco growing zone in the country. In Mysore, early and late plantings are grown under irrigated conditions in rotation with paddy or sugarcane. Quite a large percentage of the tobacco area in Bangalore and Mysore districts is grown under rainfed conditions in dry lands. It is also observed that paddy grown after tobacco comes up very well. The nurseries are prepared in February and March and seedlings are planted in April, May and June and the leaf is cured usually during July and October. The Company chalk out

their programme of sowing and growing over a longer period.

The farmers grow Virginia tobacco under an agreement with the Mysore Tobacco Company Ltd. at prices fixed at the beginning of the year. There are farmers who enter into contract mainly for the supply of green leaf to the Company's centres and there are others owning barns who supply cured leaf to the Company at prices fixed at the beginning of the year.

The growers who register with the Company receive seedlings and also fertiliser mixtures according to the terms of the contract. Their fields are periodically inspected by the staff of the Company and they are advised to carry out different cultivational operations such as earthing, weeding, irrigation and priming at proper times. Great attention is paid to the control of diseases which cause considerable damage to the crop every year. They are also provided with material for plant protection on credit.

The picking of the leaf is arranged only after inspection and issue of picking permits. The mature leaves are picked in the presence of the field staff and carted to the curing centres in the early morning. The leaves are weighed and valued according to the quality of the leaf. The best quality leaf judged by its light yellowish green colour is paid the highest price and the dark green leaf is paid the lowest. Immature, diseased and damaged leaves are discarded. Leaf unsuitable for flue-curing is purchased for air-curing.

The quantity and value of green leaf are entered in the pass book issued to each grower. The pass book contains all details of credit transactions with the Company and the grower's supplies of green leaf. Payment to ryots is made at suitable intervals. The green leaf is graded carefully and sent to the barns which are usually double-furnaced. The best



(Top) Flue-cured Virginia after two primings
(Bottom) Green leaf being collected.



growers are given prizes at the end of the season for supply of quality leaves.

Some of the private curers who supply cured leaf also receive credit facilities from the Company. Every facility necessary for flue-curing tobacco is provided to the registered grower. The Company assists the private curers by lending them the services of trained curers for attending to curing and for training the grower's staff in curing and handling tobacco. Many private curers are also assisted in constructing leaf-handling sheds and leaf stores through the material aid given by the Mysore Tobacco Company Ltd. The cured leaves of the private curers are roughly graded first at their own premises and supplied to the Company in the dealwood packing cases supplied by the Company for transport. Each case has a net weight of 250 lbs. of tobacco. These cases are weighed at the curer's premises and despatched to the Company's grading stations at Gowribidnur and White-field.

The cured leaves are taken in the Company's lorries to the grading station, where they are graded in the presence of the curers, and a grading report is furnished to the private growers on the results of grading. Payment is made on the basis of these at prices already agreed to. The payment on low grades of tobacco is made at the end of the year after the sale of these is concluded. The Mysore Tobacco Company Ltd. strives to dispose of all grades of tobacco produced by the grower relieving him of the problems of marketing low grade tobacco to others.

The other companies which operate in Mysore State also buy tobacco on the basis of the graded quality at the premises of the growers.

The quantity of Virginia tobacco grown in Mysore State is comparatively lesser than that of Andhra Pradesh. Due to the strenuous efforts of the Mysore Tobacco Company Ltd.,

which cover all aspects of tobacco production from the nursery to the curing and marketing of tobacco, the demand for Mysore Virginia tobacco is increasing by leaps and bounds not only within the country but also on the Continent. This is due to the better quality of the product and systematic methods of sale.

A few acres of Turkish and White Burley tobaccos are also grown in the Mysore State.

The bidi tobacco is mainly grown in the district of Belgaum. The bidi tobacco from this place is of good quality.

The principal and popular varieties are Nipani, Mirji, Sangli and Jawari.

The bidi leaf produced in other parts of the State is yellowish brown in colour, medium in texture and strength.

There are only two varieties — broad leaf and narrow leaf — each of which is known by different names in different localities, like Anekivi, Chavatikudi, Kongumadari, Krigal-madari, Kathekivi, Balepatte, Jerebandi and Motubandi. These varieties are also used for chewing.

The demand for bidi tobacco is the highest during the months immediately after harvest. The demand commences to rise in January with the arrival of the fresh crop in the market and is at its peak during February and March. Over 80% of the tobacco produced is sold during the period extending from February to May.

Bidi tobacco is sold mostly in the form of flakes (bhuko or chura) and to some extent in the form of leaf bundles used for chewing, bidi and chilum smoking. For preparing bidi tobacco powder, the entire plant is harvested by cutting it above 2" to 3" from the ground and in the Hunsur area about 6" above the ground. The plants thus cut are kept in the field and exposed to the sun. They are



(Top) Old and Young at work in rough grading of flue-cured Virginia tobacco
(Bottom) Cured leaf



Tobacco in Mysore State

removed to the threshing yard for making powder after 4 to 6 days.

The manufacture of bidi is an industry widely spread over the country. There is practically no area in India where bidis are not manufactured to a greater or lesser extent. Mysore is one of the important States where bidis are manufactured. It can very roughly be estimated that about 800 to 1000 crore bidis are produced annually in the State i.e., about 5 to 6 per cent of the total bidi production in the country.

TOBACCO MANUFACTURING INDUSTRIES

There is one up-to-date redrying plant in the Mysore State owned by the Mysore Tobacco Co. Ltd., with a normal rated capacity of 1,500 lbs. per hour of straight laid leaf and strips and 2,500 lbs. of tied leaf (hands) per hour. Out of the 14 cigarette factories in India, there is one fairly big factory in the city of Bangalore. The chewing tobacco industry is also located in the State, though on a smaller scale.

Within the State, different types of tobacco are cleared for home consumption for different purposes. The following table gives the comparative figures of the quantity of unmanufactured tobacco cleared for home consumption in the Mysore State as well as for the Indian Union and percentage to the total during 1956-57 to 1959-60.

Year	Mysore	Indian Union	Percentage to the total
	(in million lbs.)		
1956-57	36.4	583.8	6.2
1957-58	33.7	595.9	5.7
1958-59	34.4	620.0	5.6
1959-60	34.2	621.4	5.5

(Courtesy : Central Board of Revenue, New Delhi.)

Total quantity of different types of tobacco cleared for various uses in the State during 1959-60 is given below :

No.	1959-60 Types	Quantity (in million lb.)
1.	Flue-cured Virginia ..	9.9
2.	Other than Flue-cured Virginia but used for cigarettes and smoking mixtures ..	3.3
3.	Bidis ..	7.9
4.	Snuff ..	0.4
5.	Hookah ..	0.6
6.	Chewing ..	5.5
7.	Agricultural purposes ..	3.1
8.	Stalks and stems ..	3.2
	Total (including others) ..	34.2

(Courtesy : Central Board of Revenue, New Delhi.)

Of the total tobacco cleared after paying excise duty in the State in 1959-60, about 38.6% was for cigarettes, 23.1% for bidis, and 16.1% for chewing.

The important manufactured tobacco products in India are cigarettes, cigars, cheroots, bidis, snuff, chewing and hookah tobaccos. Bidis, snuff, chewing and hookah tobacco and to some extent cigars are manufactured as a cottage industry. Bidi and chewing industries are common in Mysore State.

Raw tobaccos from other States are brought to the State for consumption purposes. The inter-state transport is usually carried out through rail and by road. The transport of tobacco by two-wheeled bullock carts is an important means usually employed for carrying tobacco. Lorries are also used whenever there is difficulty in transporting through rail.



Unstringed cured leaves of flue-cured Virginia tobacco being taken for baling.
(Bottom) Bidi Tobacco Crop (full grown)



M. S. Patel, M.Sc., Ph.D. (U.S.A.)

Tables showing the extent of inter-state trade of tobacco during 1956-57 to 1959-60 are given below.

Exports (by rail etc.) of tobacco from Mysore State to different trade belts of India.

Year	Quantity in million lb.
1956-57 ..	5.3
1957-58 ..	3.7
1958-59 ..	1.7
1959-60 ..	1.3

Imports of tobacco into Mysore State by rail etc. from different trade belts of India :

Year	Quantity in million lb.
1956-57 ..	7.9
1957-58 ..	4.7
1958-59 ..	4.3
1959-60 ..	7.2

(Courtesy : Department of Commercial Intelligence and Statistics, Calcutta.)

Only about 14% of the total production of tobacco in India is exported and the rest is consumed within the country. Out of the 14%, a major portion is of unmanufactured Virginia tobacco produced mainly in Andhra Pradesh. The tobacco produced in Mysore State is mainly consumed within the country. Although India is manufacturing crores of bidis, most of them are consumed within the country and only a small quantity is exported. Bidi tobacco and bidis are generally exported to Aden, Malaya, Singapore, Ceylon, Oman, Zanzibar, Afghanistan, etc.

In the year 1960-61 only about 2.9 million lbs. of bidis and bidi tobacco worth about 1.0 crores of rupees were exported. Ceylon imported a major portion of Indian bidis. Quantitative restrictions existed for bidi, bidi leaf and bidi tobacco for which destination quotas were fixed every half year by the Government of India. Since March, 1955, these restrictions have been withdrawn and exports of hand-made bidi, bidi leaf and bidi tobacco are licensed freely.

The Indian Central Tobacco Committee, a corporate body set up by the Government of India, is trying to improve the quality of tobacco grown in India. There are at present two research stations in Mysore State : (1) Bidi Tobacco Research Sub-Station, Nipani (Belgaum district) and (2) Tobacco Research Station, Hunsur (Mysore district).

The Bidi Tobacco Research Sub-Station at Nipani came into existence in the year 1937-38 having small area of 5 acres at Nipani proper. Later it was shifted to an adjoining site at Saundalga in the year 1942-43 and was functioning till 1960-61. In 1961-62 the station has again been shifted to Nipani. The Indian Central Tobacco Committee has taken the technical control of the station since 1949. The main function of the station is to carry out improvements in the varietal and cultural aspects of bidi tobacco. Under the Second Five Year Plan, two schemes, namely, training in the improved methods of tobacco cultivation, handling and curing and production and distribution of pure seeds were undertaken. These schemes will further be intensified during the Third Five Year Plan. Besides the annual recurring expenditure granted by the Committee, an amount of Rs. 25,000 was spent by the Research Station during the Second Five Year Plan on the aforesaid schemes. Annually about 300 lb. of seed and

5 to 10 lakh seedlings of the improved S.20 variety bidi tobacco are distributed among the growers and about 100 farmers have been trained under the schemes. Besides short term courses are also given to the staff of the State Department of Agriculture and to that of the Excise Department.

The Tobacco Research Station at Hunsur was established as a scheme under the Second Five Year Plan by the Indian Central Tobacco Committee in 1957 with the main objects to study the production aspects of Virginia Cigarette Tobacco and indigenous tobacco under conditions peculiar to the Mysore State, which are entirely different from those prevailing in Andhra Pradesh where the cultivation of Indian Virginia tobacco is largely localised. The Station which is in existence from 1957-58 season onwards had done during the course of four years considerable work for laying out the different experimental plots. Field experiments on cigarette and country tobacco are also being conducted. Investigations such as Agronomic, Botanical, Entomological and Plant Pathological are being carried out at the Station. Remarkable results have been obtained so far which will go a long way in encouraging the farmers and the others connected with it to revive their activities. An amount of Rs. 2.5 lakhs was spent on the Hunsur Station during the Second Five Year Plan period under the various schemes.

The Tobacco Laboratory of the station opened on 8th Oct. 1961 will give further impetus to the station to do better work.

Besides, a scheme for control of powdery mildew, partly financed by the Committee

was also carried out by the Government of Mysore.

For the benefit of tobacco growers in Mysore State, leaflets in Kannada language on "Manuring, Transplanting and Care of Virginia Tobacco", "Control of Orobancha", "Curing of Virginia Tobacco", "Important pests of tobacco and their control with a field-key for their identification", "New methods bring handsome profits in flue-cured Virginia tobacco" and "How to construct the improved type of Flue-curing barns" were printed and distributed freely by the Indian Central Tobacco Committee.

From the above it is clear that — *Mysore is a potential producer of quality tobacco suitable not only for internal consumption but also for export to foreign countries.*

The Mysore Tobacco Co. Ltd., which is an important organisation in the country, is making Herculean efforts to develop and improve the yield of Virginia tobacco in the State. The modern redrying plant which redries tobacco and the grading hall at Whitefield are well maintained by the Mysore Tobacco Company Ltd. Besides, a big cigarette factory which manufactures quality cigarettes is an asset to the famous industrial city of Bangalore.

ACKNOWLEDGMENT

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Photographs furnished by M/s. Mysore Tobacco Co. and Tobacco Research Centres at Hunsur and Nipani

Studies of Indigenous Tobaccos II. Variability in LANKA Tobaccos

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and

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The experimental work in the improvement of *lanka* tobacco based on a survey of 1950 and the breeding of an improved variety DR.1, was presented in an earlier article.* In 1957, another survey of the Godavari *lankas* was conducted in areas not covered in the previous collection with a view to obtaining fresh sources of genetic variability and maintaining them at the Central Tobacco Research Institute, Rajahmundry, for further breeding work. Such a study is also necessary since the spread of DR.1 is likely to eliminate these sources of germplasm.

The second survey was extended also to the Krishna *lankas*. Forty bulks were collected from farmers' fields at 15 locations in these regions covering the river islands of both Krishna and Godavari and were grown during 1957-58. Selections were made on the basis of vigour, and these were compared with DR.1 as control in the subsequent years. After two generations of selfing, twenty lines were isolated from the bulks. Some of these lines still show some variation for both leaf and flower characters. The morphological and agronomical description of these lines is given in Annexure.

The description brings out the significant fact that the lines from Krishna *lankas* are genetically quite distinct from those of Godavari *lankas* in morphology, in response to topping, to agronomical practices such as irrigation, and in their capacity to withstand drought conditions. The amount of variability in the Krishna *lankas* is also high to permit the establishment of lines differing in leaf shape, leaf number, internodal length and maturity.

The formation of *lankas* in the Krishna river is very different from that of Godavari *lankas*. Due to the rapid flow of the river and the undulating terrain for nearly 100 miles preceding the anicut in the Krishna

(Continued on Page 236)

* Murty, G. S., Murty, B. R. and Anantharaman, R. (1961). Studies of indigenous tobaccos. I. Improvement of *lanka* tobacco. (Under publication)

Morphological and Agronomical Characters

Selection	Region of original bulk	Habit	Maturity	Leaf charac-
				Untopped
(a)	(b)	(c)	(d)	(e)
1. Patamata, (Krishna district.)		Nearly 5½ ft. in height; panicle is ½ of the total height; close internodes compared to other Krishna <i>lanka</i> types; semi-open habit; phyllotaxy 5/13.	Late flowering (February 1st week), i.e., 75 days after planting; late in maturity (15 weeks); heavy in suckering.	Leaves sessile, dark green, and darker than <i>lanka</i> types of Godavari; lamina is thrown into folds like <i>Thokaku</i> ; highly puckered; leaf narrow and lanceolate like <i>natu</i> of Guntur; auricles clasping the stem; angle of venation is 45°; out of 25 total number of leaves, 17 to 18 are curable.
2. Gunadala, (Krishna uplands.)		5 to 5½ ft. in height; semi-open panicle, 20 to 25 per cent of total height; close internodes; semi-open habit; phyllotaxy 5/13.	Mid-late in flowering, i.e., 65 to 70 days after planting; late in maturity (15 weeks); low suckering.	Leaves sessile, very dark green, semi-erect but easily droop in wind; lamina puckered; leaf long and narrow; wavy margin; tip drawn out but not as in <i>Thokaku</i> ; short auricles not thrown into folds; angle of venation 30° to 40°; out of 25 total number of leaves 15 are curable.
3. Thotlavallur-1, (Krishna <i>lanka</i> .)		Medium height, 4½ to 5 ft.; panicle length is about 30 per cent of the total height; close internodes; semi-open habit; phyllotaxy 3/8.	Medium in flowering, i.e., 55 to 60 days after planting; medium in maturity (14 weeks); medium in suckering.	Leaves sessile, light green, semi-erect; leaf broader than Patamata and Gunadala; marginal surface undulating; auricles pronounced and clasp the stem; angle of venation 60°; 15 curable leaves out of a total of 20 to 22 leaves per plant.
4. Thotlavallur-2, (Krishna <i>lanka</i> .)		Medium height; panicle is about 20 per cent of total height; internodes medium in length; semi-open habit; phyllotaxy 3/8.	Medium in flowering, i.e., 55 to 60 days after planting; late in maturity (15 weeks); heavy in suckering.	Leaves sessile, light green; leaf surface and margin undulating; tip more acuminate than other Krishna <i>lanka</i> types; auricles medium sized and prominently clasp the stem; 15 curable leaves out of a total of 22 leaves per plant.

of Lines isolated from Lanka Tobacco

ANNEXURE

eristics	Flower and capsule characters	Incidence of pests and diseases	Variability and any special remarks
Topped			
(f)	(g)	(h)	(i)
Good body; medium in gum; uneven puckering; priming better than whole-plant harvest.	Flowers long and narrow; corolla tip acute and folded back; colour of corolla pink, fading to light pink; throat prominently green; outer side of corolla greenish; stigma above the anthers; capsule light brown; 50 per cent of the capsule covered by calyx; capsule spindle shaped with pointed tip unlike the blunt tip of the Godavari <i>lanka</i> types.	Susceptible to leaf curl and aphids.	Variability of puckering of lamina; uniform for other characters.
Good body and gum; leaves become more or less erect after topping; suitable for priming only.	Similar to Patamata.	Highly susceptible to mosaic but very little to leaf curl; highly susceptible to aphids but very little to caterpillars.	Uniform for all the characters examined.
Medium body and gum; highly puckered with pronounced thickening and erectness; leaf is boat-shaped when mature; suitable for priming only.	Flowers shorter than in Gunadala; light pink corolla; stigma and anthers exerted out of the throat.	Susceptible to aphids.	Variation in internodal length, angle of insertion of leaf, and flower colour.
Good body, medium in gum, tip becomes hooked; pronounced puckering; plants look like stand-up type after topping; suitable for whole-plant harvest.	Flowers long and thin; throat and outside of corolla greenish; stigma below anthers, much deeper in the corolla tube; lighter coloured capsules with prominent tip; 75 per cent of the capsule is covered by the calyx.	Susceptible to leaf curl and caterpillars; little aphid attack.	Uniform for all characters except maturity for which there is variability.

Morphological and Agronomical Characters

(a)	(b)	(c)	(d)	(e)
5.	Pillanka, (Godavari lanka.)	Medium height upto 5 ft. half the total plant height is the size of panicle; long internodes; open habit; drooping leaves 'Donebaru' type; phyllotaxy 3/8.	Variable in flowering from 55 to 75 days; medium maturity (13 weeks); heavy suckering.	Leaves green with long and clean petioles; broadly lanceolate lamina with the lamina base folding into a heart shape; surface puckered; margin wavy; tip pointed but abrupt; auricles rudimentary to nil; angle of venation 45°; 10 to 12 curable leaves out of nearly 20 leaves per plant.
6.	Muramalla, (Godavari lanka.)	Short to medium in height, 4½ ft.; open panicle, length nearly 50 per cent of the total height; close internodes; open habit; 'Etakubaru' type; phyllotaxy 5/13.	Early flowering, i.e., 45 to 55 days after planting; early maturing (12 weeks); heavy in suckering.	Leaves green with short clean petioles; leaf lanceolate, tip acute; rudimentary but fringed auricles; angle of venation 45°; 13 to 15 curable leaves out of 22 leaves per plant.
7.	Inavalli-1, (Godavari lanka.)	Short, 3 to 3½ ft. in height; panicle size is nearly 50 per cent of the total plant height; close internodes; semi-open habit; 'Donebaru' type; phyllotaxy 3/8.	Very late flowering, i.e., 90 to 95 days after planting; late maturity (16 weeks) but not uniform; heavy in suckering.	Broadly lanceolate, good sized leaves with clean petioles; margin entire, tip slightly drawn out; auricles rudimentary and fringed; 13 to 16 curable leaves out of 24 leaves per plant.
8.	Inavalli-2, (Godavari lanka.)	Medium height; open panicle which is nearly 50 per cent of the plant height; semi-open habit; 'Donebaru' type; phyllotaxy 5/13.	Early flowering, i.e., 45 to 55 days after planting; but late in maturity (17 weeks).	Leaves with clean and long petioles, dark green; a symmetry of lamina prominent; leaf broadly lanceolate to triangular; surface slightly puckered; wavy margin, tip drawn out; auricles rudimentary; 12 to 13 curable leaves out of 20 leaves per plant.
9.	Manepalli-1, (Godavari lanka.)	Short, 3½ to 4 ft. in height; semi-open panicle which is 35 per cent of total height; long internodes; open habit; 'Donebaru' type; phyllotaxy 3/8.	Medium to late in flowering, i.e., 65 to 80 days after planting; late in maturity (15 weeks and more); medium in suckering habit.	Leaves light green (lightest among the lanka types in our collection); petiole 5 to 6 inches in length; wing completely absent; leaf broadly lanceolate, medium in size; lamina smooth; margin entire, tip acute; leaves drooping or semi-erect; auricles rudimentary or nil, when present the auricles closely adhere to the stem but without any frills; out of 25 leaves only 10 to 12 are curable per plant.

of Lines isolated from Lanka Tobacco—(continued)

(f)	(g)	(h)	(i)
Poor body, but good in gum; suitable for whole-plant harvest.	Flowers short; light pink corolla; throat whitish green; stigma below anthers; capsules conical with a blunt tip; calyx covering the capsule almost completely.	Susceptible to leaf curl and aphids.	Leaf shape varying from broadly lanceolate to lanceolate; auricles rudimentary or completely absent; variable in flowering time from medium to late.
Good in body and gum; leaves become semi-erect after topping; cannot stand whole-plant harvest.	Light pink corolla with greenish throat; stigma on a level with anthers; 75 per cent of the capsule is covered by calyx.	Susceptible to leaf curl and aphids.	Uniform.
Good body and gum; heavy puckering and increased leaf size after topping; stand-up type; cannot stand whole-plant harvest.	Pink corolla with greenish throat; stigma on a level with anthers; nearly 75 per cent of the capsule is covered by calyx.	Susceptible to leaf curl, aphids and caterpillars.	Variable for flowering time and maturity.
Body medium, good gum; pronounced puckering.	Flower shape like Harrison Special with slightly fluted and pink corolla; throat light green; stigma on a level with anthers; 50 per cent of the capsule covered by calyx.	Susceptible to leaf curl, aphids and caterpillars.	Uniform.
Medium in body and poor in gum; topped plants develop characteristic boat-shaped leaves which tend to be semi-erect and moderate in puckering; suitable for priming only.	Short flowers; calyx teeth more pointed than in other Godavari lanka types; wheel-shaped corolla, acute corolla teeth, pink colour; throat faint green; anthers fully exerted from the throat; stigma well below anthers; nearly 75 per cent of the capsule is covered by calyx.	Highly susceptible to leaf curl, mosaic and aphids.	Variable for flowering time, maturity and development of auricle.

Morphological and Agronomical Characters

(a)	(b)	(c)	(d)	(e)
10. Manepalli-2, (Godavari lanka.)	Short to medium in height; semi-open panicle; with a length of nearly 50 per cent of the total height; close internodes; semi-open habit; intermediate between 'Etakubaru' and 'Donebaru' types; phyllotaxy 3/8.	Medium in flowering, i.e., 60 to 65 days after planting; medium in maturity (13 weeks); heavy suckering.	Leaves petiolate, petiole short, wing absent; lamina surface smooth; leaf shape lanceolate to broadly lanceolate, good in size, margin entire; auricles rudimentary but prominently thrown into folds; venation 45°; 13 to 15 curable leaves out of 24 leaves per plant.	
11. Nagullanka-1, (Godavari lanka.)	Tall in height, 5½ ft.; panicle about 50 per cent of the total height; internodal length medium; 'Donebaru' type; open-habit; phyllotaxy 5/13.	Medium in flowering, i.e., 60 to 65 days after planting; late in maturity (16 weeks); low production of suckers.	Leaves petiolate without wing, dark green, good sized, lower part of leaf is cordate with edges curving in while the rest of the lamina folds back; leaf broadly lanceolate, tip acute but less pronounced; auricles rudimentary but not fringed; venation 60°; 10 to 12 curable leaves out of 20 to 23 leaves per plant.	
12. Nagullanka-2, (Godavari lanka.)	Medium height; panicle nearly 50 per cent of the total plant height; internodes medium in length; open habit; 'Etakubaru' type; phyllotaxy 3/8.	Medium in flowering, i.e., 60 to 65 days after planting; medium in maturity (13 weeks); suckering low.	Leaves petiolate, petiole 6 to 8 cm. long with a thin wing; leaf lanceolate, medium sized, surface of lamina smooth, margin entire, open and drooping; auricles rudimentary and frilled; venation 45°; 13 to 15 curable leaves out of 23 to 25 leaves per plant.	
13. High level submergible Nagullanka, (Godavari lanka.)	Short, 4 ft. in height; nearly 40 per cent of the total height is accounted by the panicle; medium internodes; open habit; 'Etakubaru' type; phyllotaxy 3/8.	Mid-late flowering, i.e., 65 to 70 days after planting; medium in maturity (13 weeks); medium in suckering.	Leaves petiolate without wing, green; leaf narrow lanceolate, semi-erect with puckered surface, margin wavy, tip acute and drawn out; rudimentary and frilled auricles; 12 to 15 curable leaves out of 21 leaves per plant.	
14. Seethanagaram-1, (Godavari lanka.)	Short, 3 to 3½ ft. in height; open panicle, nearly 30 to 40 per cent of the total plant height in size; close internodes; semi-open habit; 'Donebaru' type; phyllotaxy 3/8.	Medium in flowering, i.e., 55 to 65 days after planting; early in maturity (12 weeks); heavy suckering.	Leaves petiolate, healthy dark green; petiole short without wing; leaf broadly lanceolate, semi-erect; surface slightly puckered; auricles rudimentary and frilled; 13 to 16 curable leaves out of 23 leaves per plant.	

of Lines isolated from Lanka Tobacco--(continued)

(f)	(g)	(h)	(i)
Good in body and gum; puckering moderate; good response to topping; leaves very well developed, particularly the top leaves; margin becomes wavy in certain topped plants; leaf becomes boat-shaped after topping; suitable for whole-plant harvest.	Smallest flowers in Godavari lanka types; calyx teeth less pointed; corolla light pink, fluting prominent; stigma and anthers fully exerted out of the throat; capsules large and pyramidal in shape; 50 per cent of the capsule is covered by calyx.	Moderately susceptible to mosaic, leaf curl, aphids and caterpillars.	Variable for height, internodal length and length of panicle; a vigorous and desirable population.
Good in body and gum; uniform puckering; good response to topping; auricles thrown into folds in certain topped plants; suitable for whole-plant harvest.	Pink flowers with pointed calyx teeth; light green throat and inconspicuous fluting; stigma on a level with anthers; about 75 per cent of the capsule covered by calyx.	Highly susceptible to mosaic, leaf curl and caterpillars; moderately susceptible to aphids.	Uniform.
Body thin compared to DR. 1, gum moderate; uniform in maturity and puckering of leaves; responds well to topping with increase only in size; suitable for whole-plant harvest.	Flowers short; calyx teeth acute; corolla light pink, acute, slightly fluted; throat light green; stigma on a level with or slightly below anthers; capsules ovoid with 85 per cent of the capsule covered by calyx.	Susceptible to leaf curl, <i>Alternaria</i> leaf spot, and aphids.	Variations for wing development.
Good in body and gum; pronounced puckering; suitable for whole-plant harvest.	Flowers with pink colour localised to tips and rest of corolla light pink; faint green throat; stigma on a level with anthers; 75 per cent of capsule is covered by calyx.	Susceptible to leaf curl and aphids.	Uniform.
Very good body and gum; good response to topping; pronounced puckering; leaves become erect and stiff after topping; suitable for whole-plant harvest.	Flowers light pink; greenish throat; stigma on a level with anthers; nearly 75 per cent of the capsule is covered with calyx.	Susceptible to leaf curl; mosaic not found; susceptible to aphids.	Uniform; a very good selection.

Morphological and Agronomical Characters

(a)	(b)	(c)	(d)	(e)
15.	Seethanagaram-2, (Godavari lanka.)	As in Seethanagaram-1, but longer leaf.	Late maturity (15 weeks); other features similar to Seethanagaram-1.	As in Seethanagaram-1.
16.	Katavaram-1, (Godavari lanka.)	Very short, 3 ft. in height; panicle short and compact and is only 30 per cent of the total height; medium sized internodes; semi-open habit; intermediate between 'Donebaru' and 'Gummadibaru' types; phyllotaxy 5/13.	Late in flowering, i.e., 75 to 80 days after planting; late in maturity (15 weeks); heavy suckering.	Leaves dark green petiolate, petiole short; leaf semi-erect broad, size larger than DR. 1, heavily puckered surface; auricles rudimentary and fringed, some plants do not have auricles at all; 15 to 16 curable leaves out of 21 leaves per plant; top leaves larger and number of curable leaves more than in DR. 1.
17.	Katavaram-2, (Godavari lanka.)	As in Katavaram-1, but very close internodes.	As in Katavaram-1, but late in maturity (16 weeks).	Similar to Katavaram-1, but leaves are darker green.
18.	Kotipalli, (Godavari lanka.)	Short to medium in height, 3½ to 4 ft.; open and much branched panicle, length of panicle nearly 50 per cent of total height; close internodes; open habit; 'Donebaru' type; phyllotaxy 3/8.	Medium in flowering, i.e., 55 to 65 days after planting; late in maturity (16 weeks); heavy suckering.	Leaves petiolate, dark green and good sized; petiole has a thin and fringed wing; leaf broadly lanceolate; surface slightly puckered; margin entire; auricles rudimentary and fringed; angle of venation 60°; 14 to 16 curable leaves out of 20 leaves per plant.
19.	Katavaram-3, (Godavari lanka.)	Short, 4 ft. in height; open panicle nearly 50 per cent of plant height; close internodes; open habit; 'Donebaru' type; phyllotaxy 3/8.	Medium in flowering, i.e., 55 to 60 days after planting; late in maturity (16 weeks); medium suckering.	Leaves petiolate, green, medium sized; petiole without wing; leaf broadly lanceolate, surface slightly puckered, margin wavy; auricles rudimentary and frilled; 12 to 14 curable leaves out of a total of 20 leaves per plant.
20.	DR. 1, (Godavari lanka.)	Short, nearly 4 ft. in height; large open panicle which is nearly 60 per cent of the total plant height; close internodes; 'Donebaru' type; phyllotaxy 3/8.	Medium in flowering, i.e., 55 to 60 days after planting; early in maturity (12 weeks); heavy in suckering.	Leaves petiolate, dark green, petiole flat, wing absent; leaf broadly lanceolate but narrower than Katavaram-1 and 2; base of lamina asymmetrical and flat; surface slightly puckered; auricles absent; 12 to 14 curable leaves out of 21 leaves per plant.

of Lines isolated from Lanka Tobacco—(continued)

(f)	(g)	(h)	(i)
As in Seethanagaram-1.	As in Seethanagaram-1.	Susceptible to leaf curl, leaf spot and aphids.	Variable in maturity; a good selection.
Very good in body and gum; pronounced puckering; very good response to topping; leaf remains green on plant for a longer time without drying; suitable for whole-plant harvest.	Flowers large; localised pink in corolla tips and light pink for the rest of corolla, prominently fluted; throat light green; stigma below anthers; 75 per cent of the capsule covered by calyx.	Susceptible to leaf curl, mosaic and aphids.	Variation in the development of auricle and wing of petiole.
As in Katavaram-1.	As in Katavaram-1.	Susceptible to leaf curl and aphids.	Slightly variable for auricle and wing development; a good selection.
Medium body, good in gum; puckering moderate even after topping; leaves drooping even after topping due to inadequate body corresponding to the leaf size; suitable for whole-plant harvest.	Short flowers with a large calyx; corolla uniform pink; stigma below anthers; 75 per cent of capsule covered with calyx.	Susceptible to leaf curl, mosaic, aphids and caterpillars.	Uniform.
Good body and gum; leaf becomes stiff after topping; suitable for whole-plant harvest.	Medium sized flowers; corolla light pink; stigma on a level with anthers; 75 per cent of the capsule covered by calyx.	Susceptible to leaf curl and aphids.	Uniform.
Good body and gum; uniform in maturity and puckering; leaves develop prominent puckering and lamina folds back due to good development; suitable for whole-plant harvest.	Medium sized flowers; corolla light pink, fluted; throat light green; stigma on a level with anthers; nearly 75 per cent of the capsule covered by calyx.	Susceptible to leaf curl and mosaic.	Variable in height and uniform for other characters.

(Continued from Page 227)

river, these *lankas* are not as stable as those of the Godavari river where the flow is more even for nearly 150 miles beyond the mouth of the river. Further, the Godavari *lankas* are rich in alluvial deposits and fine sand whereas the Krishna *lankas* do not have such deep deposits of silt and have more of coarse sand fraction.

The *lanka* tobaccos in Krishna are closely related to the *natu* tobacco grown in the upland areas of those regions whereas the *lanka* tobaccos of Godavari have no such relationship with the other tobaccos grown in the neighbourhood. From this, it would be clear that the factors influencing the genetic com-

position of the bulk populations are different in these two regions. Since the agronomical practices for *desi* tobaccos in the Krishna region are quite different from those in the Godavari region and since response to some common cultural practices is also different in these two categories of material, it is necessary that the work of breeding improved *lanka* tobaccos for the Krishna region is taken up as a separate programme, in the area of their distribution. It may further be pointed out that the extent of genetic variability in the tobaccos of Krishna *lankas*, as brought out in this paper, is high enough to make such a programme worthwhile. The results of the present studies constitute the basis for further breeding work in these populations.

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Effect of Some Cultural and Manurial Treatments on the Yield and Quality of *Jati* (*N. tabacum*) Tobacco in North Bengal*

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* Paper read at the Second Conference of Tobacco Research Workers in India held at Anand on 18/19-12-1959.

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INTRODUCTION

In the State of West Bengal about 16,000 acres are annually planted to *Jati* tobacco. About 75% of this acreage is concentrated in the northern districts of Cooch-Bihar and Jalpaiguri.

No experimental work is known to have been done in the past on the cultural and manurial requirements of this tobacco. An experiment was, therefore, planned at the Wrapper & Hookah Tobacco Research Station, Dinhata, during 1955-56 to broadly determine the optimum requirements of *Jati* tobacco with regard to such important factors as time of planting, manuring, spacing and topping. The results obtained are presented in this paper.

MATERIAL AND METHODS

(i) SITE AND SOIL

The experiment was conducted at the farm of the Wrapper & Hookah Tobacco Research Station, Dinhata, during 1955-56 and 1956-57 seasons. In each season a new site was selected. The land was freshly brought under tobacco cultivation. In order to accommodate the experiment, small plots were merged together to form bigger plots and were levelled up. The soil was alluvial sandy loam and low in fertility.

(ii) EXPERIMENTAL

The experiment was laid out in a split-plot design with three replications. Dates of planting, manures, and spacing-topping combinations were assigned to main plots, sub-plots and sub-sub-plots respectively. The ultimate net plot size was $6' \times 18' = 0.248$ cent.

Main-plot treatments (Planting dates)

D₁ — Last week of October.

D₂ — Second week of November.

D₃ — Last week of November.

The specific dates of planting during the two seasons were as follows :—

Dates of planting	1955-56	1956-57
D ₁	22nd October	28th October
D ₂	7th November	12th November
D ₃	22nd November	Dropped

During the 1955-56 the crop planted in the last week of November made very poor growth. This treatment was, therefore, dropped during 1956-57. In the data presented in this paper only the first two planting dates have been considered.

Sub-plot treatments (Manures)

M ₁ — Farmers' practice—25 cartloads f.y.m. per acre (1 cartload = 1,000 lbs.)	
M ₂ — 10 cartloads f.y.m. + 0 lbs. N/acre.	
M ₃ — -do- +50 -do-	
M ₄ — -do- +100 -do-	
M ₅ — -do- +150 -do-	
M ₆ — Dhaincha green manure + 0 lbs. N/acre	
M ₇ — -do- +50 -do-	
M ₈ — -do- +100 -do-	
M ₉ — -do- +150 -do-	

Single super phosphate at 1 md. (82 lbs.) per acre was applied to Dhaincha at the time of sowing. The same dose was applied to all other plots also except M₁ — farmers' practice.

Sub-sub-plot treatments (spacing-topping) All combinations of

Spacings	Toppings
S ₁ — 2' × 2'	T ₁ — 6 leaves per plant
S ₂ — 2' × 3'	T ₂ — 8 leaves per plant
S ₃ — 3' × 3'	T ₃ — 10 leaves per plant

Farmyard manure was applied about two weeks before planting and mixed in the soil by four ploughings each followed by planking. Dhaincha for green manure was sown in the last week of May and ploughed in with light soil turning ploughs after about seven weeks'

growth. Bulk of the green matter remained at the surface only. Nitrogen in the form of ammonium sulphate was applied in shallow rings around the plants three weeks after planting. The variety planted in the experiment was a coarse type of *Jati* conforming to type No. 10 (Patel *et al.* 1959).

All the cultural operations done in the crop conformed to the local practices. The crop was irrigated once during late December — early January period in both the seasons.

(iii) OBSERVATIONS

Observations included (i) total yield of cured leaf per plot, (ii) yield of first grade leaf per plot, and (iii) length and breadth of all leaves from three sample plants per plot at maturity.

SEASONAL WEATHER

Dinhata is situated in the sub-Himalayan region of West Bengal. The climate is warm and humid. The average annual rainfall is about 2,865 mm. May, June, July and August are months of heavy rainfall. Intensity of monsoon rains diminishes in September and the rainy season is normally over by the end of October. In abnormal years, however, there may be practically no rains during October or heavy showers may be received at the end of the month. November, December and January are practically rainless. In February and March, there may be few light cyclonic showers, and pre-monsoon rains usually commence in late April.

January is the coldest month with mean monthly temperature of 62·70°F. The minimum temperature rarely drops below 50°F. The mean temperature is 74·8°F in the last week of October and 78°F in the last week of March. The mean relative humidity in the last week of October is 75% and gradually drops to about 61·5% in the last week of

TABLE 1. Rainfall, temperature and relative humidity at Dinhata during tobacco growing season.

Meteorological weeks		Rainfall						Mean* temperature °F	Mean relative humidity %
		1955—56		1956—57		Mean 1942-43 to 1955-56			
		Rain-fall mms.	Rainy days	Rain-fall mms.	Rainy days	Rain-fall mms.	Rainy days		
Oct.	1-7	54.9	1	41.9	4	79.8	2.7	82.5	80.4
	8-14	..	..	77.2	3	26.5	1.3	82.1	80.0
	15-21	..	..	202.7	6	41.8	1.4	78.3	77.0
	22-28	..	..	..	..	19.5	0.8	77.6	74.3
	29-4th Nov.	..	..	33.3	4	13.5	0.4	74.8	75.0
Nov.	5-11	..	..	..	..	..	..	73.6	74.0
	12-18	..	..	..	..	0.9	0.1	72.1	70.4
	19-25	..	..	..	..	0.2	0.1	70.8	69.8
	26-2nd Dec.	..	..	..	..	1.6	0.3	69.9	71.8
Dec.	3-9	..	..	..	..	1.0	0.1	67.3	71.0
	10-16	..	..	..	..	..	..	69.7	71.4
	17-23	..	..	..	..	..	..	64.9	73.1
	24-31	..	..	..	..	..	..	63.8	72.3
Jan.	1-7	..	..	..	..	4.1	0.4	62.4	72.6
	8-14	..	..	91.2	4	0.5	0.4	62.9	76.8
	15-21	..	..	..	..	0.9	0.3	62.9	71.1
	22-28	1.8	1	..	..	3.3	0.3	62.8	73.8
	29-4th Feb.	8.6	2	6.6	1	5.3	0.6	63.2	71.8
Feb.	5-11	10.2	1	..	..	2.9	0.4	64.4	67.9
	12-18	..	..	..	..	0.1	0.1	65.9	63.1
	19-25	..	..	..	..	5.1	0.4	68.1	62.8
	26-4th Mar.	..	..	5.3	1	3.7	0.4	70.6	62.8
Mar.	5-11	10.2	1	8.9	1	2.3	0.3	70.3	62.2
	12-18	13.7	2	1.0	1	7.7	0.9	76.1	56.4
	19-25	24.1	1	..	..	9.2	1.1	78.3	56.8
	26-1st Apr.	19.1	1	1.0	1	12.2	1.2	78.0	61.5
Total		142.6	10	469.1	26	242.1	14.0		
Totals for the year		3,710.7	125	3,073.1	107	2,865.5	113.5		

* Average of five years (1953-54 to 1957-58)

March. The principal growing season for Jati tobacco covers the period from late October to the end of February. The weather data for 1955-56 and 1956-57 seasons according to meteorological weeks is given in Table 1.

It would be seen that rainfall during the crop season of 1955-56 was considerably below normal. Rains ceased early in October and the crop planted late on 7th November, experienced moisture shortage. During 1956-57, rainfall during the crop period was much higher. Heavy showers were received late in

October and moisture was plentiful at planting time. Again during January, there was good rain which benefited the crop particularly the late planted one.

Considering the amount of rainfall and its distribution the 1955-56 season has been termed as 'dry' and 1956-57 as 'wet' season.

EXPERIMENTAL RESULTS

(i) LEAF SIZE

The length and breadth data are presented in Table 2.

TABLE 2. Final length and breadth of leaves in inches under various treatments. (Average of measurements on all leaves of 3 plants per plot in 3 replications).

Treatments	1955-56		1956-57		Mean	
	Length	Breadth	Length	Breadth	Length	Breadth
<i>Planting dates :</i>						
D ₁	15.40	8.78	16.24	9.05	15.82	8.92
D ₂	13.91	7.66	16.61	9.46	15.26	8.56
<i>Manures :</i>						
M ₁	15.58	8.56	16.34	9.04	15.96	8.80
M ₂	14.03	7.71	15.98	8.77	15.00	8.24
M ₃	15.24	8.60	17.52	9.94	16.38	9.27
M ₄	15.61	8.89	17.49	9.90	16.55	9.40
M ₅	15.51	8.95	17.41	10.12	16.46	9.54
M ₆	13.65	7.51	14.93	8.31	14.29	7.91
M ₇	14.07	7.84	15.74	8.88	14.91	8.36
M ₈	14.47	8.23	16.25	9.28	15.36	8.76
M ₉	13.67	7.70	16.16	9.09	14.92	8.40
<i>Spacings :</i>						
S ₁	14.06	7.81	15.92	8.88	14.99	8.35
S ₂	14.69	8.26	16.50	9.30	15.60	8.78
S ₃	15.19	8.60	16.85	9.59	16.02	9.10
<i>Toppings :</i>						
T ₁	14.83	8.54	16.80	9.57	15.82	9.06
T ₂	14.84	8.30	16.52	9.29	15.68	8.80
T ₃	14.27	7.83	15.95	8.91	15.11	8.37
Mean	14.65	8.22	16.42	9.26	15.54	8.74

* Breadth of leaves corresponds to the maximum width of lamina across the mid-rib.

Leaves in the wet season were considerably larger than in the dry season. Late planting reduced the leaf size in the dry season and no such effect was observed in the wet season.

Fifty lbs. N per acre markedly increased the leaf size over no nitrogen but higher doses did not bring about further increases. In fact in the dry season more than 100 lbs. N in combination with green manure seemed to reduce the leaf size. Response to nitrogen was larger with farmyard manure than with green manure. 10 cartloads of farmyard manure alone also produced leaves larger than green manure alone.

As compared to farmers' practice, none of the treatments carrying nitrogen with green manure produced larger leaves, but all treatments carrying nitrogen with farmyard manure produced as big as or even larger leaves than farmers' practice.

Closer spacing as well as higher topping tended to reduce the leaf size progressively.

(ii) CURED LEAF YIELD

The data on the effect of various treatments on the cured leaf yield per acre are given in Table 3.

The effect of seasons and planting dates on the yield was not significant although in the dry season of 1955-56 late planting tended to depress the yield.

50 lbs. N per acre with 10 cartloads of farmyard manure or dhaincha green manuring generally increased the yield significantly over no nitrogen but higher doses did not bring about further increase. In fact during the dry season, the yield tended to decline when more than 100 lbs. N was applied with dhaincha green manure. Farmyard manure alone at 10 cartloads per acre produced somewhat higher yield than dhaincha green manure. Response to nitrogen was also significantly better with farmyard manure than with green manure.

The increases in yield due to the application of nitrogen were considerable in close spaced high topped crop and small in wide spaced low topped crop. Under S₁ T₃ treatment 150 lbs. N with 10 cartloads of farmyard

TABLE 3. Yield of cured leaf in lbs. per acre under various treatments.

Treatments	1955-56	1956-57	Mean
<i>Planting dates :</i>			
D ₁	927	832	880
D ₂	778	853	815
C.D. at 5%	N.S.	N.S.	N.S.
<i>Manures :</i>			
M ₁	893	778	836
M ₂	726	757	741
M ₃	888	980	934
M ₄	988	912	950
M ₅	1008	1014	1011
M ₆	698	628	663
M ₇	816	791	803
M ₈	871	856	864
M ₉	783	862	823
C.D. at 5%	127.97	148.07	95.96
<i>Spacings :</i>			
S ₁	1048	1045	1047
S ₂	855	836	845
S ₃	653	644	649
C.D. at 5%	37.33	28.73	27.63
<i>Toppings :</i>			
T ₁	733	714	724
T ₂	865	862	863
T ₃	959	950	955
C.D. at 5%	37.33	28.73	27.63
Mean	852	842	847
C.D. at 5% for seasons		N.S.	

manure produced a significant increase in the yield over 50 lbs. N. On the other hand under $S_3 T_1$ all doses of nitrogen failed to increase the yield significantly over no nitrogen.

Nitrogen in combination with dhaincha green manure did not yield higher than the farmers' practice in both the seasons. But with 10 cartloads of farmyard manure in the wet season of 1956-57, 50 lbs. and 150 lbs. N were superior to farmers' practice, whereas during the dry season even 150 lbs. N failed to reach significant level over farmers' practice.

Closer spacing and higher toppings brought about significant increases in the yield. On an average when the plant population, due to closer spacing, was increased by 50% and 125% the yield increased by 30% and 61% respectively. Similarly, increases of 33% and 66% in the number of leaves per plant, due to higher topping, increased the yield by 19% and 32% respectively.

(iii) YIELD OF FIRST GRADE LEAF

The first grade leaf yield per acre under various treatments is given in Table 4.

The effect of seasons on the quality of leaf was very marked. In the dry season the yield of good grade leaf was only 29% of that in the wet season. Late planting in the dry season deteriorated the leaf quality still further but no such effect was observed during the wet season.

Nitrogen in general improved the yield of first grade leaf but doses more than 50 lbs. N did not bring about further substantial improvement. All treatments carrying nitrogen were considerably better than farmers' practice.

Spacing and topping treatments did not materially affect the yield of first grade leaf in the wet season but in the dry season close spacings and high topping seemed to exert a deleterious effect.

TABLE 4. Yield of First Grade Leaf in lbs. per acre under various treatments.

Treatments		1955-56	1956-57
<i>Planting dates :</i>			
D ₁	..	79	396
D ₂	..	22	369
<i>Manures :</i>			
M ₁	..	38	214
M ₂	..	11	267
M ₃	..	48	504
M ₄	..	69	427
M ₅	..	66	557
M ₆	..	27	203
M ₇	..	63	323
M ₈	..	69	495
M ₉	..	61	451
<i>Spacings :</i>			
S ₁	..	44	389
S ₂	..	56	409
S ₃	..	51	349
<i>Toppings :</i>			
T ₁	..	55	360
T ₂	..	56	404
T ₃	..	39	382
Mean	..	50	382

DISCUSSION

Planting in the second week of November tended to decrease the yield over earlier planting during 1955-56 but no such effect was observed during 1956-57. The depression in yield under late planting was obviously due to the low level of soil moisture. In 1955-56 the rains ceased early in October and the moisture status of the soil would have progressively decreased as the season advanced. The early planted crop therefore grew more rapidly and was ready for topping about 40 days earlier than the late planted crop. This lag in the growth of late planted crop could not be made up at the end of the season due to approaching warm, dry weather of Febru-

ary. As a result, the leaves remained smaller and the yield decreased. During 1956-57, rains continued till the end of October and the earliest planting could not be done before 28th October. The crop planted on 12th November also therefore, started with adequate moisture in the soil. Moreover, rains in the second week of January created conditions for continued growth, and the late planted crop also could put up as much growth as the early planted one. It therefore appeared desirable that *jati* tobacco could be planted as early as possible soon after the heavy rains were over. Late plantings are to be avoided in seasons when rains have ceased early in October.

50 lbs. N per acre substantially increased the yield over no nitrogen. This indicated that the soil was low in its content of available nitrogen. In combination with 10 cartloads of farmyard manure, 50 lbs. N also yielded higher than the farmers' practice in the wet season of 1956-57.

Ten cartloads of farmyard manure proved somewhat better than dhaincha green manure. The response to inorganic nitrogen was also better with farmyard manure than with green manure. Similar trends were also observed in another experiment with *motihari* tobacco having the identical manurial treatments as in this experiment. It is, therefore, evident that the crop in green manure plots was not able to produce yields comparable to farmyard manure plots even when inorganic nitrogen was present in abundance. It seemed that the organic matter added by farmyard manure to the soil created more favourable soil conditions for the nutrition and growth of tobacco plants. Dhaincha green manuring apparently failed to exert such an influence because under conditions of the experiment the green manure could not be adequately buried and it rotted on the surface. The more succulent parts like bark and leaves would have rapidly

decomposed and washed away by heavy rains leaving behind only the woody portions that did not become an effective part of the soil humus during the growing season.

The crop did not respond to more than 50 lbs. N even with 10 cartloads of farmyard manure but there were indications that more than 50 lbs. N could be effective if the plant populations and number of leaves per plant were increased. On the other hand the response to even 50 lbs. N was not significant when the plants were spaced wide and topped low. It may therefore be concluded that under the conditions of this experiment with medium spacing-toppings the variety planted did not need more than 50 lbs. N per acre.

In general the size of leaves and the yields of tobacco under various manurial treatments were parallel to each other. The higher yields in close spacing-high toppings were obviously due to larger number of leaves contributing to the yield in these treatments. The slight reduction in size and quality of leaf observed in these treatments was also due to the same reason.

It appeared that the spacing of 3' × 3' adopted by the farmers was much too wide for the variety tried in this experiment. It could be reduced to 2' × 2' with advantage provided the crop was fertilised with 50 lbs. inorganic nitrogen per acre in addition to 10 cartloads of farmyard manure. The practice of topping the crop at 7 to 9 leaves per plant depending upon its vigour was quite sound.

CONCLUSIONS

Results of a field experiment with *jati* tobacco (*N. tabacum*) conducted at the Wrapper & Hookah Tobacco Research Station, Dinhata (West Bengal) are presented. The treatments were 2 dates of planting, nine manures involving combinations of ammonium sulphate with farmyard manure or dhaincha

green manure, three spacings and three topplings. The important findings were as follows :—

1. Late planting in the second week of November tended to decrease the yield in dry seasons but not in wet seasons.

2. Fifty lbs. N in combination with 10 cartloads of farmyard manure per acre increased the yield and improved the leaf quality over no nitrogen. This treatment was also superior to farmers' practice during the wet year. Higher doses of N did not bring about further appreciable improvement in yield or quality.

3. Green manuring with dhaincha was inferior to 10 cartloads of farmyard manure and decreased the response of the crop to inorganic nitrogen.

4. Reduction in the spacing of plants from $3' \times 3'$ to $3' \times 2'$ or $2' \times 2'$ and increase in

the height of topping from 6 leaves to 8 or 10 leaves per plant progressively increased the yield without materially affecting the leaf quality.

ACKNOWLEDGEMENTS

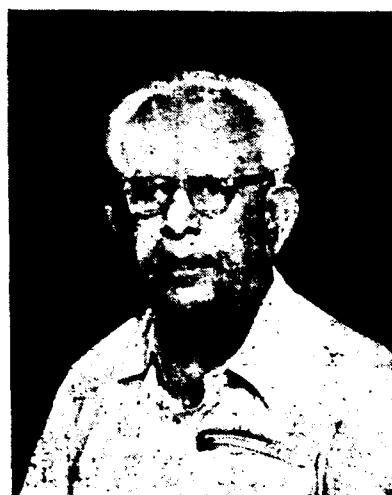
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REFERENCE

- Patel, G. C., Singh, M. & Das, R. (1959). Natural viability and morphological classifications of Hookah & Chewing tobaccos of North Bengal. 1. Jati tobacco. (*N. tabacum*). *Indian Tobacco*, IX(2).

OBITUARY

Shri T. M. Rangachari, B.A., B.L.



We record with deep regret the sad demise of Shri T. M. Rangachari on the evening of the 31st December, 1961 at his residence in Madras. He was a member of Indian Central Tobacco Committee since its inception in November, 1945. Besides, he was a member of the Southern India Chamber of Commerce, Madras, Indian Merchants Chamber, Bombay, and London Chamber of Commerce, London, for over 30 years; undertook several foreign tours to find markets for Indian tobacco; took prominent part in the introduction of AGMARK grading in tobacco trade and in the conclusion of trade agreements on tobacco with various countries.

He was also a member of Tobacco Export Promotion Council since its inception in 1956 and was its Vice-Chairman for 2 years.

Laboratory Studies on D. D. T., Rhothane and Endrex and their residual Effect against the Tobacco Caterpillar *Prodenia Litura* F.

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Prodenia litura F. commonly known as the tobacco caterpillar is a major pest in tobacco nurseries and newly planted tobacco fields. The damage is caused by their feeding on tobacco leaves. These caterpillars are voracious feeders and are capable of defoliating the whole nursery within a week, if suitable control measures are not taken in time. Shri Thirumala Rao (1956) observed that the outbreaks of these caterpillars were of such magnitude that they developed swarming instinct and marched in huge bands from nursery to nursery causing devastation. Such heavy infestation is reported by him to have occurred in East Godavari District in 1925 and 1934 and in Guntur District in 1948 and 1955.

Generally the medium sized ones, i.e., the caterpillars of the 3rd and 4th instars, cause more damage as they are voracious eaters. In the early stages they are found in numbers on the underside of the leaf. It is not rare to find 200 to 300 tiny caterpillars mining the underside of the leaf. When they are nearing pupation i.e. in the 5th instar, they don't feed much but prefer to go in the soil for pupation.

In the experiments conducted at the Central Tobacco Research Institute nursery for two years (1954 to 1956) to study the comparative effect of D.D.T. and Rhothane on the control of this pest, these insecticides were significantly better than control of water spray and no-spray, though there was no significant difference between them. In the field, D.D.T. spray proved to be significantly better than Rhothane spray. So the use of Guessorol 550 (D.D.T. 50% W.P.) was recommended for the control of these caterpillars in nursery and field. (A. Philip and B. G. Joshi, 1958). However, inspite of this recommendation, many cultivators were using Endrex. So it was felt necessary to re-examine the earlier recommendation and modify the same if required. It was therefore decided to test

both D.D.T. and Rhothane along with Endrex under controller conditions in the laboratory.

MATERIAL AND METHODS

The main insecticidal treatments included in the study were, D.D.T. 50% W.P. (Guesorol 550), Rhothane 50% W.P. and Endrex 20 E.C. These were tested in pots in laboratory for 2 years (1958-59 and 1959-60) against the tobacco caterpillars. Other treatments included were, (1) One spray and caterpillars introduced before first spray, (2) One spray and caterpillars introduced a day or two after the 1st spray, (3) Two sprayings and caterpillars introduced before 1st spray and (4) two sprayings and caterpillars introduced a day or two after first spraying.

Seven caterpillars were introduced per pot at the time mentioned above. The treatments were replicated 3 times in the first year and 4 times in the second year. In the first year 3 pots were kept as control and 7 caterpillars were released per pot. Since more than 90% damage was observed during the first year of trial in control, no controls were kept in the second year, as insecticides were effective. The observations were taken on total number of seedlings per pot and number of seedlings damaged by caterpillars per pot. The data are given in Table 1.

RESULTS AND DISCUSSION

From the data it could be seen that all the three insecticides tested were more or less equally effective in preventing the damage of the seedlings by these caterpillars. No significant differences were observed between the number of sprayings. Spraying before or after the introduction of caterpillars had the same effect i.e. there was no difference found in the contact or stomach action of the insecticides.

RESIDUAL EFFECT STUDIES

For the control of these caterpillars in the nursery, it is always advantageous to use the insecticide which retain residual effect for more number of days as to reduce the number of sprayings and keep the interval between two sprayings longer. With this object in view, studies were made in the laboratory for finding out the residual effect of the three insecticides (D.D.T., Rhothane and Endrex) used in the spraying trial and the number of days their residual effect lasted.

MATERIAL AND METHODS

For these studies, the caterpillars were fed with the treated seedlings. From each treatment, one treated seedling was taken and fed to 5 caterpillars. The treated seedlings were fed to the caterpillars on 3rd, 6th, 9th, 12th, 15th, 18th, 22nd and 25th day. Each time 12 seedlings were used to feed 60 caterpillars. The caterpillars used were all reared in the laboratory to make sure that they had not fed before on any treated leaf. Each time mortality observations were taken 24, 48 and 72 hours after their feeding on the treated seedlings. The mortality observations are given in Table 2.

RESULTS AND DISCUSSION

The mortality observations showed that 3 days after spraying, all the three insecticides showed more than 90% mortality. Six days after spraying, D.D.T. 50% W.P. showed the same mortality as it showed 3 days after spraying, but there was decline in mortality in the case of Rhothane and Endrex. Beyond this trend, there was a decline in mortality in all the three insecticides. On the 12th day, 5 caterpillars were dead in D.D.T., 2 in Rhothane while in Endrex no mortality was observed at all. One caterpillar died in DDT on 15th day also. These studies clearly

showed that DDT had more residual effect than either Rhothane or Endrex.

From the experiments described above, it could be said that it is advantageous to use DDT against the caterpillars than Endrex, since it is not only as effective as Endrex in the beginning, but also retains its residual effect for more number of days. In addition to its having longer residual effect, DDT is more safe to use than Endrex, as its mammalian toxicity, expressed in terms of L.D.₅₀ value for acute oral toxicity for male rats is 250 mg./kg., while that of Endrex is 12-25 mg./kg. Apart from all the above mentioned points in its favour, DDT is also cheaper (Rs. 3/- per lb.) than Endrex which is Rs. 75/- per gallon. To spray one acre of nursery at the rate of 7 gallons per 100 square yards, DDT costs Rs. 20/- while Endrex will cost Rs. 40/-. The expenditure for labour required being common, two sprayings of DDT could be given for the same amount required to give one spray of Endrex.

Therefore, it can be concluded that DDT 50% W.P. spray can be effectively and economically used to control the caterpillars compared to other insecticides used.

SUMMARY

Prodenia litura F. commonly known as the tobacco caterpillar is a major pest in the nursery and newly planted tobacco fields. The damage is caused by their feeding on tobacco leaves.

Experiments were carried out for 2 years to test the comparative effect of DDT, Rho-

thane and Endrex on the caterpillars. It was observed that all the three insecticides were equally effective in controlling the damage caused by the caterpillars.

In the residual effect studies, the residual effect of DDT, Rhothane and Endrex was observed to last for 15, 12 and 9 days respectively.

The use of DDT 50% W.P. is recommended as it is cheap, more safe, and also not only as effective as Endrex in the beginning, but keeps its residual effect for more number of days than Endrex.

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REFERENCES

- (1) Thirumalarao, V. (1956). Stray notes on some crop outbreaks in South India. *Indian J. Entomology*, 18 : 123-26.
- (2) Annamma Philip and Joshi, B. G. (1958). Investigations on the control of tobacco caterpillars in the nursery and field. (Popular Summary). *Indian Tobacco*, 8 : 249.

TABLE 1. Average percentage of seedlings damaged by caterpillars per pot (1958-59 & 1959-60).

Treatments	Sprayings				Mean
	1	2	3	4	
	1958-59 1959-60	1958-59 1959-60	1958-59 1959-60	1958-59 1959-60	
D.D.T. 50% W.P. at 2 lbs./100 gallons of water	33.33 26.03	40.00 17.70	41.10 26.43	23.37 16.28	34.45 21.61
Rhothane 50% W.P. at 2 lbs./100 gallons of water.	50.00 40.33	21.10 23.45	26.67 27.95	21.10 18.85	29.72 27.64
Endrex 20 E.C. at 20 oz./100 gallons of water.	34.43 21.45	32.23 38.88	46.67 24.40	42.20 21.63	38.88 26.59
Mean	39.36 29.27	31.11 26.68	38.14 26.26	28.89 18.92	34.25 25.28

S.E. % for 1958-59 — 35.28

S.E. % for 1959-60 — 45.52

C.D. at 5% for insecticides — N.S. for both the years.

C.D. at 5% for sprayings — N.S. for both the years.

TABLE 2. Residual Effect studies—Mortality observations.

	3 days after insecticide spraying			6 days after insecticide spraying			9 days after insecticide spraying			12 days after insecticide spraying		
	Mortality of caterpillars after			Mortality of caterpillars after			Mortality of caterpillars after			Mortality of caterpillars after		
	24 hrs.	48 hrs.	72 hrs.	24 hrs.	48 hrs.	72 hrs.	24 hrs.	48 hrs.	72 hrs.	24 hrs.	48 hrs.	72 hrs.
RI A ₁	5	5	5	5	5	5	5	5	5	5	5	5
RII A ₁	5	5	5	5	5	5	5	5	5	5	5	5
RIII A ₁	5	5	5	5	5	5	5	5	5	5	5	5
RIV A ₁	3	3	4	5	4	3	4	5	4	5	5	5
RI B ₁	5	5	5	5	5	5	5	5	5	5	5	5
RII B ₁	5	5	5	5	5	5	5	5	5	5	5	5
RIII B ₁	5	5	5	5	5	5	5	5	5	5	5	5
RIV B ₁	5	5	5	5	5	5	5	5	5	5	5	5
RI C ₁	4	5	5	5	5	5	5	5	5	5	5	5
RII C ₁	4	4	4	5	4	2	2	3	5	5	5	5
RIII C ₁	3	4	5	5	5	4	4	4	5	5	5	5
RIV C ₁	5	5	5	5	5	5	5	5	5	5	5	5

A — D.D.T. 50% W.P. at 2 lbs./100 gallons of water.

B — Rhothane 50% W.P. at 2 lbs./100 gallons of water.

C — Endrex 20 E.C. at 20 oz./100 gallons of water.

TABLE 2. Residual Effect studies — Mortality observations—(contd.)

	15 days after insecticide spraying						22 days after insecticide spraying						25 days after insecticide spraying					
	Mortality of caterpillars after			Total No. of caterpillars kept			Mortality of caterpillars after			Total No. of caterpillars kept			Mortality of caterpillars after			Total No. of caterpillars kept		
	24 hrs.	48 hrs.	72 hrs.				24 hrs.	48 hrs.	72 hrs.				24 hrs.	48 hrs.	72 hrs.			
RI	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RII	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RIII	0	1	1	5	1	0	0	0	0	5	0	0	0	0	0	5	0	0
RIV	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RI	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RII	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RIII	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RIV	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RI	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RII	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RIII	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0
RIV	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0

The Possibilities of Tobacco Development in the Maldives

GEOGRAPHY

The Maldives are a chain of thousands of coral islands and tiny islets grouped in clusters commonly known as Atoll. According to the Maldivian report, these Atolls lie in a line in the south of Laccadives in the Indian Ocean and extend from Latitude 7° 6' North to Latitude 0° 42' South, between Longitudes 72° 33' and 73° 44' East, with about 115 square miles of land spreading over 470 miles in length. The islands consist mostly of low-lying corals.

In the Male atoll which is the Capital island there are no mountains, lakes or rivers. Farming is scarce. The coconuts, mangoes, breadfruits, plantain, drumstick are found in abundance. But there is no organised cultivation. The daily necessities of life and other commodities are imported.

SOILS AND CLIMATIC CONDITIONS

In Male atoll the soil is brownish black, rich in humus, formed by shedding leaves, twigs and vegetation which have composted with the grass growing wildy. At places such brownish black soils are 1' to 2½' deep. Down below is pure white sand like corals. These soils are considered fit for agriculture. A statement giving soil analysis of samples collected from several Male atoll is given in Table I. It will be seen therefrom that the soils are highly calcareous. They are fairly rich in nitrogen and organic matter. Except some, the samples are also rich in phosphate. There is practically no accumulation of soluble salts and the pH value is normal. Surveys of physical features of some of the many islands which are thickly vegetated generally point out strong possibilities for agriculture and good farming.

M. S. PATEL, M.Sc., Ph.D.
(N. Carolina)*

* Ex-Secretary, Indian Central Tobacco Committee and Member Tobacco Export Promotion Council.
OCTOBER-DECEMBER 1961

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TABLE I. Analysis of Maldivé Island Soils (on air-dry basis).

S. No.	Sample Details	Colour	pH soil : water 1 : 5	CaCO ₃ P. C.	Organic P. C.	CaCO ₃ P. C.	Total Nitrogen P. C.	Total P ₂ O ₅ P. C.	Total K ₂ O P. C.	NO ₃ (mgm/ 100 gm.)	Available R ₂ O ₅ by Olsen's method (mgm/100 gm.)
1.	Hulule (1)	Ashy grey	7.7	0.092	5.18	94.5	0.16	0.04	0.15	1.10	0.23
2.	Hulule (2)	Light ashy grey	7.8	0.065	3.36	95.0	0.13	0.71	0.12	0.58	2.07
3.	Hulule (3)	Light ashy grey	7.7	0.092	3.64	95.5	0.14	0.11	0.33	0.43	2.07
4.	Doonidoo (1)	Light brownish grey	7.8	0.098	3.75	0.94	0.18	1.49	0.19	0.50	8.18
5.	Doonidoo (2)	Brownish grey	7.7	0.087	5.84	71.0	0.27	3.38	0.09	0.58	29.46
6.	Doonidoo (3)	Ashy grey	7.6	0.071	5.64	81.0	0.25	3.57	0.12	0.58	10.16
7.	Willingilli (1)	Dark ashy grey	7.8	0.058	4.08	92.5	0.20	1.38	0.14	1.98	3.83
8.	Willingilli (2)	Light ashy grey	8.1	0.049	2.86	96.0	0.10	0.08	0.17	1.18	0.23
9.	Vihamanafuri (1)	Dark ashy grey	7.8	0.068	4.08	95.0	0.13	0.73	0.14	0.33	3.62
10.	Vihamanafuri (2)	Dark ashy grey	8.1	0.051	2.90	90.0	0.10	2.25	0.18	0.65	22.36
11.	Himafuri	Light ashy grey	7.9	0.056	2.98	95.5	0.15	0.17	0.18	0.58	0.72

Remarks :—Practically there is no acid-insoluble matter and the soils are practically free from soluble salts. Organic matter content is fairly high. The soils are very highly calcareous, and fairly rich in nitrogen. Except Nos. 1, 8 and 11 all the soils seem to contain fairly good amounts of available phosphorus.



Soil examination and lush green coconut background.



Author examining the soil.



People of Maldives



A Maldivian lady enjoying hookah smoke.

RAINFALL

There are two monsoons, South-West and North-East. Total annual rainfall is 254 mm. to 317.5 mm. The highest rainfall is from South-West Monsoon. Heavy rains of intermittent duration also occur in November-December. Last two years' data indicate that besides South-West Monsoon in May to September, September to November months were also rainy. December to March is a period of comparatively low rainfall.

May to September winds in South-West Monsoon season are from the West with much rain and squalls. June-July-August winds are usually with rain and squalls.

TEMPERATURE

The small islands are surrounded by water and being nearer to the equator, the temperature variation is small. The variation ranges between the minimum of 24°C. and the maximum of 31°C. Sometimes during the South-West Monsoon the range narrows down within 1.1°C. The temperature outside the reef and within the lagoon do not vary beyond 2.8°C.

TOBACCO IMPORTS AND USAGES

Tobacco is not grown in the Maldives at present. No systematic attempts appear to have been made so far in this direction. The Maldivians, both males and females, however, use tobacco with relish. It is consumed in different forms, viz., Cigarettes, Cigars, Bidis, Hookah (Good-Gooda) and Chewing.

Cigarettes are mostly imported from India and Ceylon. Lal Mahal is popular. 555, Black and White, 3 Roses, Players are also in demand. Cigars come from both India and Ceylon. Hookah, popularly called Good-Gooda, is preferred by the ladies. The Hookah tobacco comes from Calcutta (India) and some from Ceylon.

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As regards Chewing tobacco, Motihari (*Nicotiana rustica*) which is strong in taste is mostly imported from Calcutta, India. Very small quantity of Chewing tobacco from Jaffna, Ceylon, is also imported. Tobacco is chewed alone or with pan (Betel leaf) and neatly sliced arecanut. This is liked by all sections of the population.

Sometimes bidis are rolled using newspapers as wrappers. Bidis usually contain strong rustica tobacco and are smoked with relish. 'Tendu' the indigenous Indian Bidi wrapper is not found in the islands. Before the Second World War, it was imported from India in abundance and bidis were rolled in Maldives.

The rates of import duty *ad valorem* are given below :

Types	1958	1959	1960
Cigarettes	100%	100%	100%
Bidis	100%	100%	100%
Cigars	100%	100%	100%
Chewing	40%	40%	40%
Hookah			
(Good-Gooda)	100%	100%	100%

Source :—Ministry of Food & Commerce, Maldives.

It will be seen that except for the Chewing tobacco, import duty on all other types of tobacco is cent per cent.

At present the imports of tobacco are regulated and restricted. The demand would rise if the imports are liberalised. On the other hand it would give to the Government more revenues by way of import duty.

TECHNICAL OBSERVATIONS

(1) Taking into account all the available information, the climatic and soil conditions and the existing vegetation, it is to be con-

cluded that there is no reason why tobacco could not be grown there.

(2) The question however has to be examined from the view point of the possibility of growing tobacco economically and commercially.

(3) Before entering into a venture of large scale plantation and investing considerable outlay of capital, it would appear advisable to grow tobacco initially on an experimental scale at a few selected places in some of the developed islands like Hulule, Willingilli, Vihamanafuri and Himafuri to ascertain favourable sowing, transplanting and curing seasons and to study factors unknown so far which are likely to come in the way of successful cultivation of tobacco. This would help determine the suitability of soils for selective types of tobacco.

(4) The other consideration which must also be weighed carefully is whether such a venture, if in the end successful, would remuneratively recompensate the financial outlay and make the island self-sufficient in tobacco or whether the financial outlay in the venture would be heavier than the implications involved in imports of country's requirements.

(5) For Flue-cured Virginia tobacco, a curing barn will be necessary, a curer will have to be engaged and other preliminaries will have to be completed and attended to. At least a clear area of about 7 to 8 acres would be necessary to run a barn economically. In view of these initial difficulties, flue-cured Virginia may be tried out at only three places and sun-cured in the first instance. This will give preliminary information whether or not it is possible to grow Virginia tobacco. If it can be grown, the humidity and other meteorological conditions during the curing period will have to be studied very carefully. After this, the problem of conditioning it and manufacturing it or exporting it will have to be en-

countered with. There is little possibility of attaining it in its present condition in the Male atoll.

(6) Bidi tobacco could also be tried but the problem of rolling bidis with tender leaves would have to be solved. The possibility of growing it for industrial purposes seems to be remote as the islands do not seem to possess favourable condition for growing it, nor would it be an economical proposition to have it imported for the purpose. In view of this, it would neither be economical nor convenient to grow this type of tobacco.

(7) Two other forms of tobacco used are Hookah (Good-Gooda) and Chewing tobacco. A series of trials could be undertaken for growing these types.

In conclusion it may be said that in spite of the present limitations like the technical know-how and facilities, potentialities for developing tobacco on certain well developed islands could be explored with expert help.

ACKNOWLEDGMENT

The author wishes to express his sincere thanks to the Maldivian Government and its officers for providing all the facilities to carry out his work.

The author will be failing in his duty if he does not mention the Maldivian National Trading Corporation, its Directors Mr. Ali Maniku and Mr. P. M. Nair, who readily furnished all the information they had at their disposal.

NOTE :—At the instance of the Government of Maldives and with the approval of the Government of India, the author of the present paper, visited the Maldivian Islands in October-November 1960 to survey the islands with a view to explore the possibility of growing and developing tobacco in these islands.

Andhra Tobacco Growers' Tour of North Gujarat

At the suggestion of Indian Central Tobacco Committee and with the approval of the Government of Andhra Pradesh, Messrs. Indian Leaf Tobacco Development Company were kind enough to sponsor a tour by the following tobacco farmers to North Gujarat :

1. Shri P. Ramanadha Rao, B.Sc. (Ag.), Asstt. Tobacco Extension Officer, Guntur—Officer-in-Charge of the delegation.
2. Shri T. Chakrareddi, Ongole, Guntur District.
3. Shri M. Ankayya, Etukur, Guntur District.*
4. Shri M. Padmanabha Rao, Ibrahimpatnam, Krishna Dt.
5. Shri K. V. Rama Rao, B.Sc., Kovvur, West Godavari Dt.
6. Shri Veeramachineni Venkatarathnam, Kamalapuram, Warangal District.

The delegation left Guntur on 4-1-1961 and returned to Guntur on 15-1-1961.

A report on the tour is reproduced below for the benefit of the readers of this journal.

* A separate report in this regard was received from him which has been incorporated in this report.

INTRODUCTION

In 1945, approached by the Commissioner of Agriculture of Baroda, M/s. I. L. T. D. Co. were reported to have initiated the cultivation of Flue-cured Virginia in the State and the crop was grown with 5 to 6 barns to start with. Gradually M/s. I. L. T. D. Co., through its enterprising efforts succeeded in bringing the area under Flue-cured Virginia tobacco to about 5,000 acres.

The systems of tobacco cultivation, manuring, harvesting, grading, marketing, etc. are almost perfect and mechanical so that the growers, curers and buyers are highly benefited from the Flue cured Virginia tobacco industry.

The normal grower is a small land-holder cultivating not more than 2 to 3 acres of tobacco. He has not the capital either to construct a barn or to dig a well for irrigation. So he gets his irrigation water from wells dug by the Government of Gujarat. The barn holder is the Capitalist-Curer who gives fertilisers costing about Rs. 30/- and seedlings worth about Rs. 20/- free of cost to the grower and by this way the small grower is obliged to sell his green leaf to the Curer. The Curer has his own cultivation of F.C.V. besides purchasing green leaf from small land holders. He is bonded to the I. L. T. D. Co. by agreements to sell his cured leaf to it, graded and non-dried for which he gets on credit coal, fertilisers and furnace materials for barns. The value is repayable by sale of cured leaf in the same season in instalments whenever he sells his leaf.

SOILS AND RAINFALL

The soils are sandy loams and alluvial. The p^H of the soils is from 7 to 7.5 and reported to be responsive to manuring and irrigation. The rainfall varies from 25 to 30".

The kharif crops sown are Bajara, Jawar, oil-seeds, etc. and tobacco (Bidi and F.C.V.



types), Wheat, Cummin, etc. are the Rabi crops. Soils being sandy in nature the late crops are all irrigated. The water is generally 80' to 150' deep below ground level and available only in bore-wells. The Government of Gujarat did a yeoman service in digging a series of bore-wells in a number of villages of N. Gujarat. The water is lifted by means of oil engines as electricity is not easily available on a large scale. There are many wells dug by big land-holders also.

ROTATION

The benefits of crop-rotation are reaped by almost all the growers. Sometimes the crops of Bajara and Wheat are followed by Tobacco. At times Fennel or Jawar alone precedes Tobacco. But usually Bajara is grown in the Kharif season and tobacco in the Rabi season. A few ryots grow Sanhemp in the Kharif season and plough it in after 4 to 5 weeks as a green manure crop. Since tobacco is irrigated and irrigations can be given to a green manure crop for proper decomposition, no adverse effects are reported.

VARIETIES GROWN

Harrison Special, Delcrest and Hicks Special are the 3 main varieties grown in the tract. Of the 3 varieties, Delcrest seems to have admirably suited to this area as it gives higher yield and good coloury grades. The area under Delcrest occupies nearly 60% of the total F.C.V. area and the area under Harrison Special is getting gradually reduced. This year the area is not more than 200 acres.

SOILS AND MANURING

The soils are ranging from 7 to 7.5 pH and are sandy to sandy loams in nature. Necessary irrigations are given to the soil making them responsive to manuring. The growers feel more the manure, better the crop. The recommended dose is a basal dressing of 5 to 10 cartloads of Farm-yard manure and application of Chemical fertilisers after planting by pocket method as a mixture containing 20 lb. N, 80 lb. P_2O_5 , 60 lb. K_2O and 10 lb. MgO per acre.

IRRIGATION

The water retentive capacity of the soils is very poor and as such in a normal year about 7 irrigations are given and in a drought year upto 14 irrigations are given at weekly intervals.

The water table is very low ranging from 80 to 150 ft. The Government of Gujarat have rendered signal service by digging tube wells in a number of places and by introducing the use of oil engines for bailing the water. The bullock power is sparingly used. The watering is done through furrows made by the plough.

Irrigation helps the crop in giving better yield and quality.

HARVESTING AND CURING

The crop is picked and harvested by means of daily labour only and no contract labour is engaged. The daily wages paid to a labourer, are Rs. 1.50 per woman cooly and Rs. 2/- per man cooly. The growers are very careful in picking only 2 leaves at a time and this is very scrupulously observed. Sand leaves are kept separate. As most of the barns are situated in the tobacco fields, the leaf is very carefully handled and brought to the barn site either on head loads in bamboo baskets or in bullock carts. There is practically no bruising in handling. In case there is no barn space available for loading, the leaves are allowed to remain on the plant and it is found that even if the leaf is kept on the plant to a little over ripe stage, the curings come up well. It is not out of place to mention here that 'Delcrest' as a variety is admirably suited for such delayed pickings and is curing well.

The green leaf is usually graded into unripe leaf, ripe leaf and over ripe leaf. The leaves are then tied in bunches to the sticks, 15 on

The manures are supplied on credit by Messrs. I. L. T. D. Co. to the Curers at the beginning of the season by way of mixtures and recovered at the time of sale of cured leaf. The Curers have their own holdings where the manure is applied, besides those of bonded ryots who sell the green leaf to them. The growers get free of cost one or two bags of manure mixtures from the Curers, the cost of which generally does not exceed Rs. 30/- to Rs. 50/- per acre.

PLANTING AND CULTURAL OPERATIONS

Planting of tobacco is done in 3 stages. (1) Early (2) middle and (3) late. This is adopted to check plant diseases like 'leaf curl' and 'leaf spot' and to have a continuous curing for nearly 5 months mainly due to shortage of barn space. The early planting is done in August, the mid-planting in September and late planting in October.

Harrison Special was found to be tolerant to leaf spot and thereby suitable for early planting. Hicks Special was found to be useful for mid-planting and Delcrest for late planting.

The spacing generally recommended is 30"×30" or 48"×24". The later spacing is good in rich soils where the plants grow very tall and put forth long and wide leaves and here the aeration is better.

Interculturing is done both by a plough and hoe 'Papatam' once in a week to remove weeds, stir up the soil and earth up the plants. Furrows are made between the rows of plants and through them irrigation water is let in. Weeds are removed and the crop is kept in perfect sanitary condition.

The crop is topped at a lower level keeping about 18 to 20 curable leaves on the plant. Removal of suckers is periodically carried out.

either side, each bunch having 3 leaves only with the dorsal ends meeting together. This helps in proper drying and sponging is rarely noticed. These sticks are loaded with unripe leaf at the top, ripe leaf in the middle and the over-ripe leaf at the bottom. Usually 600 sticks are loaded into a single barn. The curing practices are normal and there is not much to comment on them.

The cured leaf is very flashy, good bodied, very long and free from sponges or blemish. Leaves of 40" length and 24" width are commonly seen.

DISEASES AND PESTS

The important pests and diseases noticed are. (1) Leaf curl (2) Leaf spot (3) Leaf eating caterpillars (*Prodenia*).

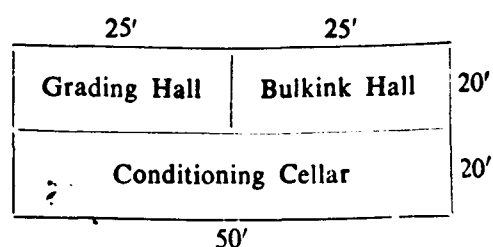
The leaf curl appears from the top leaf and is present in the late planted crop whereas leaf spot starts from the bottom leaf and is present in early planted crop.

Much attention seems to be necessary to control these disease especially the leaf curl which is particularly rampant this year affecting 20 to 90% of the plants in the fields.

It is possible that the leaf curl is carried by the white fly which is harboured in the live fences grown all round the fields.

HANDLING, BULKING, GRADING

The main problem of the North Gujarat F.C.V. cultivation is handling and bulking. The relative humidity is absolutely less and it is reported to range from 30 to 40 as against 80 to 90 during the months of January and February, in the coastal districts of Andhra where F.C.V. is cultivated. This therefore necessitates the creation of artificial humidity by keeping the cured leaf immediately on racks in underground cellars. A rough sketch of the bulking, grading and handling shed is given below :—



The pits are usually 8' to 10' below ground level and the roofing is 10' to 12' above the floor or 2' above the ground level. Pucca brick walls are constructed on the sides of the cellars with either Katcha roofing or zinc sheet roofing with some straw covering over the zinc sheet to reduce heat in summer.

The grading of cured leaf is always done as per M/s. I.L.T.D. standards (IM, ID, IBF, IX, IS, ICF, etc.) and in hands. The material for packing is all supplied by M/s. I.L.T.D. and it is usually packed in bales with gunny covering.

MARKETING

There is absolutely no problem in marketing of F.C.V. Tobacco in N. Gujarat. All the curers are treated as Master farmers by M/s. I.L.T.D. and they are assured of the disposal of their tobacco. The cured leaf (non-redried) but graded as per M/s. I.L.T.D. standards and packed in cases are brought to the M/s. I.L.T.D. platform in Vijapur and placed on the buying court for passing. The cases are duly labelled by the curers. The grading done by the curers is almost perfect and consequently the grades are normally passed by the buyer as per the grade specifications of the curer and purchased at the specified rates already contracted.

In case a package is not passed as not up to the mark, the curer is either requested to take it back and regrade it or it is sometimes accepted as the next lower grade by mutual agreement, so as to avoid loss in rehandling and transport.

ACREAGE, YIELD, INCOME AND PROFIT

The present area under F.C.V. Tobacco is estimated at 5,000 acres distributed in over 100 villages. The average yield of green leaf is about 90 maunds (Bengal maunds of 82 2/7 lb.). The price of green leaf ranges from Rs. 4/- to Rs. 4.50 nP. per maund (Bengal maund). The output of cured leaf ranges from 1,000 to 1,200 lb. per acre and yields upto 2,000 lbs. per acre are also recorded. Upto 80% of top grade leaf is also recorded in very favourable years.

The cost of cultivation of the F.C.V. Tobacco is given below :

Preparatory tillage	Rs.
(5 ploughings + harrowings)	.. 39
Manures and manuring — 5 cart-loads of Farmyard Manure	.. 40
2 bags (320 lbs.) fertilizer	
3 N, 11 P ₂ O ₅ and 8 K ₂ O	.. 56
Application of fertilizers	.. 6
Seedlings	.. 20
Planting	.. 7
Interculturing 6 times	.. 27
Weeding — Twice	.. 25
Irrigation 12 times	.. 120
Topping and suckering	.. 20
Picking 10 times	.. 40
Transport to barn	.. 15
Green leaf stringing	.. 50
Loading and handling	.. 20
Curing — Cost of coal, oil, battery, Drivers' wages etc.	.. 200
Conditioning and bulking	.. 10
Grading and packing	.. 45
Marketing and transport	.. 8
Total	.. 748

Rent on land	.. 50
Depreciation on structures and Materials	.. 100
	898 or 900
Yield of Green leaf	.. 8,000 lbs. per acre
Cured and graded leaf excluding scrap	.. 1,100 per acre
Average cost of production of cured leaf	.. Rs. 0.82 nP.
Gross income per lb. of cured leaf	.. Rs. 1.25 nP.
Net profit on 1 lb. of cured leaf	.. Rs. 0.43 nP.

REDRYING

The Flue-cured Virginia Tobacco Growers have formed themselves into a private limited company called "The Gujarat Leaf Tobacco Redrying Co.", and have erected a redrying factory at Vijapur with an authorised capital of Rs. 10 lakhs. The grower-members have paid Rs. 3 lakhs and M/s. Indian Leaf Tobacco Development Co. were kind enough to supply a redrying plant costing Rs. 4 lakhs on loan to be repaid in 7 yearly instalments. The machinery started redrying in 1959-60. The charges of redrying are only 7 nP. per lb. All the leaf purchased in the Vijapur area is redried in this factory by M/s. Indian Leaf Tobacco Development Co., and then exported to their manufacturing centres.

MAIN FEATURES OF F.C.V. TOBACCO OF NORTH GUJARAT

1. Soils are sandy loams and respond to good manuring and irrigation. The lease on land is particularly low and this results in low economic returns.

2. Delcrest, Hicks Special are the most important varieties grown in the area. Area under Harrison Special has slowly come down. Delcrest seems to have been admirably suited to the tract.
 3. Only two leaves are picked at a time.
 4. Green leaf grading of leaf is invariably done.
 5. Careful handling is done with the result that the cured leaf is neither sponged nor blemished.
 6. Judicious topping and balanced manuring resulted in production of leaf having good body, flashy colour, open grains and upto 80% top grades.
 7. Due to want of proper relative humidity in the atmosphere the handling, conditioning, bulking and grading has to be done in underground cellars.
 8. Proper grading as per Indian Leaf Tobacco Development Co. standards is responsible for getting assured returns.
 9. The yield of cured leaf averages 1,200 lb. per acre and gross income Rs. 1,500 per acre.
 10. 'Delcrest' has been found to be a cosmopolitan variety suitable under varied conditions.
- In spite of the several advantages and good profits being obtained, elasticity of leaf and good burning are still a problem. Still good work has to be done in the matter of control of leaf curl as vast areas are found to be devastated by this, which may probably be due to the fact that live fences are grown where the insect carrier white fly may be suspected to breed in the off season.

SUGGESTIONS AND CONCLUSION

The experience gained in this tour suggests that it is possible to grow 'Delcrest' under irrigated conditions in Andhra Pradesh wherever such facilities exist. The villages situated on either side of the Godavari river right from Lottipitta Gandhi to Polavaram may be suitable for a similar type of cultivation. Again soils in Narasaraopet, Vinukonda and parts of Gurazala may be suitable to grow F.C.V. Tobacco after the advent of Nagarjuna Sagar Project.

INDIAN TOBACCO STATISTICS

1939—59

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Write to:

The Secretary, Indian Central Tobacco Committee,
122, Mount Road, Madras-6.

AFDC 13 at the Fifth Meeting of Tobacco Products Sectional Committee held on 26th September 1961 at Manak Bhavan, New Delhi-1.

Welcome

Address

by

Dr. M. S. PATEL,

*Chairman of the
Tobacco Products Sectional
Committee*

"It may be recalled that the fourth meeting of AFDC 13 was held at Bangalore on 15th December 1960. At that meeting, the two drafts Indian Standard Specifications for Cigars & Cheroots, and Chuttas (Country Cheroots) were finalized for publication. I am glad to announce that they have since been published as Indian Standards, as TS:1769-1961 IS and 1770-1961 respectively. I am sure by now you would all have received a copy of the same. From the agenda, you will see that some comments have been received on the 'description' of the cigars and cheroots. You may like to consider them and arrive at a decision.

At our last Bangalore meeting, the proposed Indian Standard for Bidis was also considered and approved for wide circulation both in English and Hindi to all the interests to elicit the technical comments for its improvement. This draft has completed its wide circulation and is now before you for finalization in the light of the comments received and the recommendations of the Bidis and Bidi-Cigarettes Sub-Committee, AFDC 13:2 which met yesterday to formulate its recommendations for the Sectional Committee. The recommendations of AFDC 13:2 may be endorsed or if the members including those of the Sub-Committee, choose, they may like to discuss them further. In fact, such a thing is welcome because some of the members who are not members of AFDC 13:1, may like to suggest some modifications to the recommendations of the Sub-Committee for further improvement.

The proposed draft Indian Standard Specification for Snuff as formulated by the Hookah, Chewing and Snuff Tobaccos Sub-Committee, AFDC 13:4, at its meeting held on 8th and 9th June 1961 at Anand is also for our consideration. This draft may be examined and suggestions deemed necessary may be made for wide circulation for eliciting technical comments for its improvement before it is finalized.

Item 6 of the Agenda viz. Data on woody stalk/Hard Midribs for Cigarettes and Smoking Mixtures. Problems of similar nature are bound to occur at all occasions of the standardization of tobacco products of bidi, hooka, snuff, zarda, chewing tobaccos etc. Discussion on item 6 might help us to evolve some common approach to their common problems which will make our future task easier.

*Item 9 of the Agenda :—*Standardization of Raw Tobacco at the International Level commands our interest on the ground that it offers us an opportunity to provide lead, thereby creating a sound platform for comparison in the interest of international tobacco trade. Our country is the third largest tobacco producing country in the world and fifth in importance in the field of tobacco exports. It has been claimed that the introduction of the Agmark system has helped the Indian tobacco trade. On account of this, the trade is getting financial accommodation from the banks which was not available previously.

The question of including raw tobacco as one of the subjects in the work of ISO/TC 34 —Agricultural Food Products was raised by the Indian delegates at the first meeting of ISO/TC 34 held at Budapest in April 1958. India was interested in the subject as the export of the product amounted to about Rs. 15

crores annually. ISO/TC 34 decided to refer the matter to ISO Council for decision as to whether the subject should be taken up by ISO/TC 34 or by a new Committee. The ISO Council, after having taken the cognizance of the problem raised by ISO/TC 34 decided that the subject of raw tobacco should be dealt with by a separate technical committee when a specific proposal in this regard has been received. This point may be discussed thoroughly and if India has to sponsor the proposal on the subject then the committee should formulate India's reply on the various points included in Model Form 'A' given in the agenda.

We have before us the Model Form 'A' to submit the proposal, to the International Organization for Standardization, ISO. We are required to lay down the title, scope, explanation, justification for the study and programme of work etc. I shall welcome your comments. Yesterday, we had the benefit of the views of Dr. Ghosh, Acting Director, ISI, on the subject, who could not be present today as he was to be out of headquarters.

In addition to the above, we have a few administrative items to discuss.

We shall now take up for consideration the various items of the Agenda which is before you."

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SEMINAR NOTES

TOBACCO POWDERY MILDEW AND ITS CONTROL MEASURES

(Seminar at the Central Tobacco Research Institute, Rajahmundry, August, 1961)

The seminar group of the Central Tobacco Research Institute, Rajahmundry met on 23rd August, 1961. Shri N. S. Murty, Pathological Assistant gave a talk on the above subject.

The speaker in the beginning presented a systematic account of the powdery mildew disease of tobacco (*Erysiphe cichoracearum* var. *Nicotianae* Marcelli) in relation to its occurrence, etiology, host range, symptomology and life-history of the fungus.

Powdery mildew (ash disease) usually starts 4 to 6 weeks after planting and spreads in the following 3-4 weeks. Its spread is more severe when relative humidity is high. The disease is more prevalent in low-lying areas, irrigated fields and the areas where tobacco is grown in monsoon season (Mysore State).

Discussing the control measures tried at the Institute, it was said that priming or removing 2 or 3 lower leaves, reduced the infection to some extent. Sulphur powder when applied to soil at the rate of 40 lbs. per acre gave satisfactory control of the disease. One spraying of 0.5% Thiovit (Wettable powder) and 0.1% Karathane (dinitro capryl phenol cronate as main active ingredient) considerably reduced the infection. Sulphur spraying affected the quality of the leaf and Karathane did not show any apparent effect.

It was further said that so far no tobacco variety was found to be resistant and some of the species of *Nicotiana* were resistant. Work on testing interspecific crosses and progenies will be taken up in near future.

INFLUENCE OF DEPTH OF SOWING ON GERMINATION, ELONGATION OF THE HYPOCOTYL AND EARLY GROWTH OF TOBACCO SEEDLINGS

(Seminar at the Central Tobacco Research Institute, Rajahmundry, September, 1961)

The seminar group of the Central Tobacco Research Institute, Rajahmundry met on 25th September, 1961. Shri M. Bangarayya, Physiological Assistant gave a talk on the above subject.

In the beginning the speaker discussed the current practices of nursery sowing and point out that the practice adopted in raising the tobacco nurseries is to broadcast the seed on the surface of the prepared beds and to work into the soil by raking with fingers. A roller is often used to compact the soil. By this method the seed gets distributed at various depths. The seed which lie on the surface of the bed may be lost due to beating of rains and the seed that goes to considerable depths may fail to produce seedlings. The result is uneven germination. Results of experiments conducted to find out the influence of depth of sowing on germination, elongation of the hypocotyl and early growth of tobacco seedlings were then presented and discussed.

Tobacco seeds were sown at depths ranging from surface sowing to 2 cm. It was found that with increased depth of sowing, the seedlings took longer time to appear above the soil surface and the time lag was about 3 to 4 days between surface sown seeds and seeds sown at 1.5 cm. depth. At 2 cm. depth of sowing the seeds failed completely to appear above the soil surface. The number of seedlings appeared on the soil surface were inversely proportional to depth of sowing. It was found from growth observations that the seedlings from 1.5 cm. depth of sowing were smaller as compared to 0.25 cm. or surface sown ones, and this set back in growth had persisted even upto one month. There was not much difference either in germination or in growth among the treatments, where the seeds were sown on the surface, 0.25 cm. and 0.5 cm. depth.

The seedlings from various depths were removed carefully and the root and hypocotyl lengths were measured. It is interesting to note that with increased depth of sowing the length of the hypocotyl also increased and the length of the root decreased. The maximum hypocotyl length of 1.9 cm. had resulted in 2.0 cm. depth of sowing and the root length at that depth was 0.3 cm. The probable cause for this might be that as soon as the radicle comes out of the seed coat, it grows to a certain length and then stops growing further. The hypocotyl then begins to grow till the cotyledons are air-borne. Then only further growth of the radicle takes place.

In this connection the data of the field experiments conducted for two years were also presented and it was shown that seeds sown at about 0.25 cm. depth of sowing consistently resulted in giving more number of transplants compared to other sowings.

It was therefore suggested that in order to get good and uniform germination and transplantable seedlings, nurseries should be sown with seed at a depth of about 0.25 cm.

LABORATORY STUDIES ON THE BIOLOGY OF THE TOBACCO GROUND BEETLE — *MESOMORPHUS VILLIGER BLANC*

(Seminar at the Central Tobacco Research Institute, Rajahmundry, October, 1961)

At the seminar meeting held at the Central Tobacco Research Institute, Rajahmundry on 27th October, 1961, Shri B. G. Joshi, Entomologist gave a talk on the above subject.

In his introductory remarks, the speaker pointed out that three species of Tenebrionid beetles, belonging to the order Coleoptera, viz., (1) *Mesomorphus villiger* Blanc, (2) *Opatriodes frater* fairum and (3) *Sceleron latipes*. Guer have been found to damage the freshly transplanted tobacco seedlings in the flue-cured Virginia tobacco growing areas of Andhra Pradesh. The damage is caused by their nibbling or gnawing the base of the stem causing subsequent death of the seedlings in most cases. When the damage is heavy, replanting becomes necessary. Practically very little is known about the biology of these beetles in our country. Experiments were therefore undertaken at the laboratory of the Entomology section of Central Tobacco Research Institute, Rajahmundry, during 1957-60, to study the biology of *Mesomorphus villiger* Blanc, a tenebrionid most commonly found in this area.

Summarising the results of the experiment, it was said that in respect of the developmental periods, 4 clearly marked stages were observed, viz. egg, larva, pupa and adult. The egg and pupal periods were found to be short between 2-10 days. The larval and adult periods were variable and long. Out of 48 beetles studied, 45 beetles had larval period between 31 to 120 days, the remaining three had between 121 to 150 days. 38 beetles had the adult period between 2 to 120 days, remaining 10 between 120 to 190 days. Total life period varied between 61 to 280 days. Maximum mortality of 75.13% was observed in larval period. The number of instars in the larval period varied from 9 to 14 though the mean was 9.60.

The preoviposition, oviposition and postoviposition periods for a female were 59.18, 40.41 and 72.91 days respectively. Out of 22 beetles studied for egg record, 14 laid between 1 to 20 eggs, 4 between 40-80, 3 between 80-100 and one laid more than 100 eggs. A beetle could lay as many as 22 eggs in a day.

The female adult lived longer than male adult. The mean number being 171.6 and 123.3 days for females and males respectively. The sex ratio was observed to be 57% males to 43% females.

12 to 6 P.M. was most favourable time for egg laying followed by 6 P.M. to 6 A.M. 6 A.M. to 12 noon was found to be least favourable.

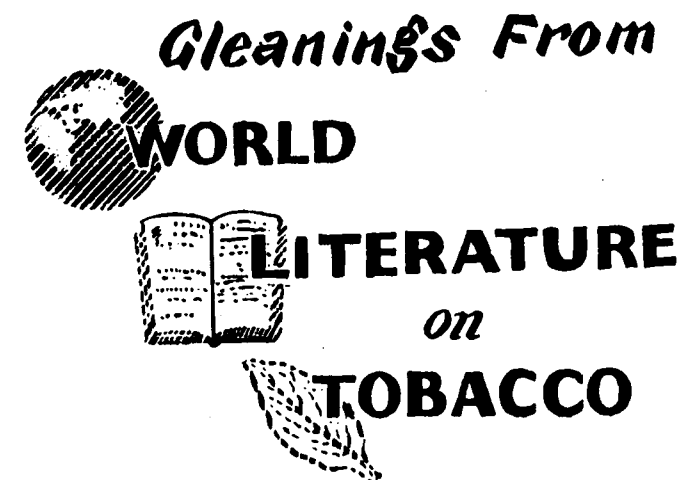
CIGARS AND CHEROOTS

(An Indian Standard Published)

The Indian Standards Institution has published IS : 1769-1961 Specification for Cigars and Cheroots, which prescribes the requirements and the methods of test for cigars and cheroots, manufactured in India.

Depending upon the leaf tobacco used, the processing employed and their finish, different qualities of cigars and cheroots are manufactured in this country; and it is necessary to lay down certain standard specifications. The broad objective of this standard will be not only to enable the Indian consumer to get the standard product, but it will also be of help in promoting the export of these products.

The standard published in English is priced at Rs. 4.00 and its copies are available from the office of the Indian Standards Institution, Manak Bhavan, 9 Mathura Road, New Delhi-1 and from its Branch Offices located at Bombay, Calcutta, Madras and Kanpur.



CHEMICAL AND PHYSICAL PROPERTIES

KULLER, R. : Atherische Ole des Tabaks. I. Einfluss von bewegter Luft bei Zimmertemperatur auf die atherischen Oele im Schnitt — und Blatt-Tabak unter Berucksichtigung der qualitätsgrade. (Essential oils of tobacco. I. Effect of circulating air at room temperature on the essential oils in cut tobacco and in leaf tobacco with reference to grade quality.) Dresden. Inst. f. Tabforsch. Ber. 7(2) : 198-215. 1960 tables. (German). SB273 A2D7.

The better grade of the tested Oriental and flue-cured tobaccos from China always contained more essential oils than the lower grades. In unfermented condition a native cut tobacco showed a lower essential oil content, which was still further reduced during machine warm room fermentation. This reduction is not caused by the influence of temperature or fermentation, but was due to chemical conversion to which the essential oils are subjected during fermentation. Tobacco of higher quality loses larger amounts of essential oils when subjected to a continuous flow of air at room temperature. The losses in cut tobacco are higher than in leaf tobacco. The lower grades showed little or no reduction when subjected to an air flow, and practically no difference could be ascertained between cut and leaf tobacco. The same also obtains for native cut tobaccos in fermented and unfermented condition. The assessment of the aroma of the tobacco and the smoking test with cigarettes treated in the manner described showed that a reduction in quality could be noted only with high-grade aromatic tobacco. This coincides with the reduction of the essential oil content of high grade qualities. All of the other tobaccos either showed improvement

of quality or no significant changes occurred. Tobaccos with a certain disagreeable aroma could be improved by the influence of air flow. (From English summary).

BIRCH, E. C. ; VICKERY, L. S. : Effect of maleic Hydrazide on certain chemical constituents of flue-cured tobacco. Canad. J. of Plant Sci. 41(1) : 170-5, Jan. 1961. tables. S1 C285.

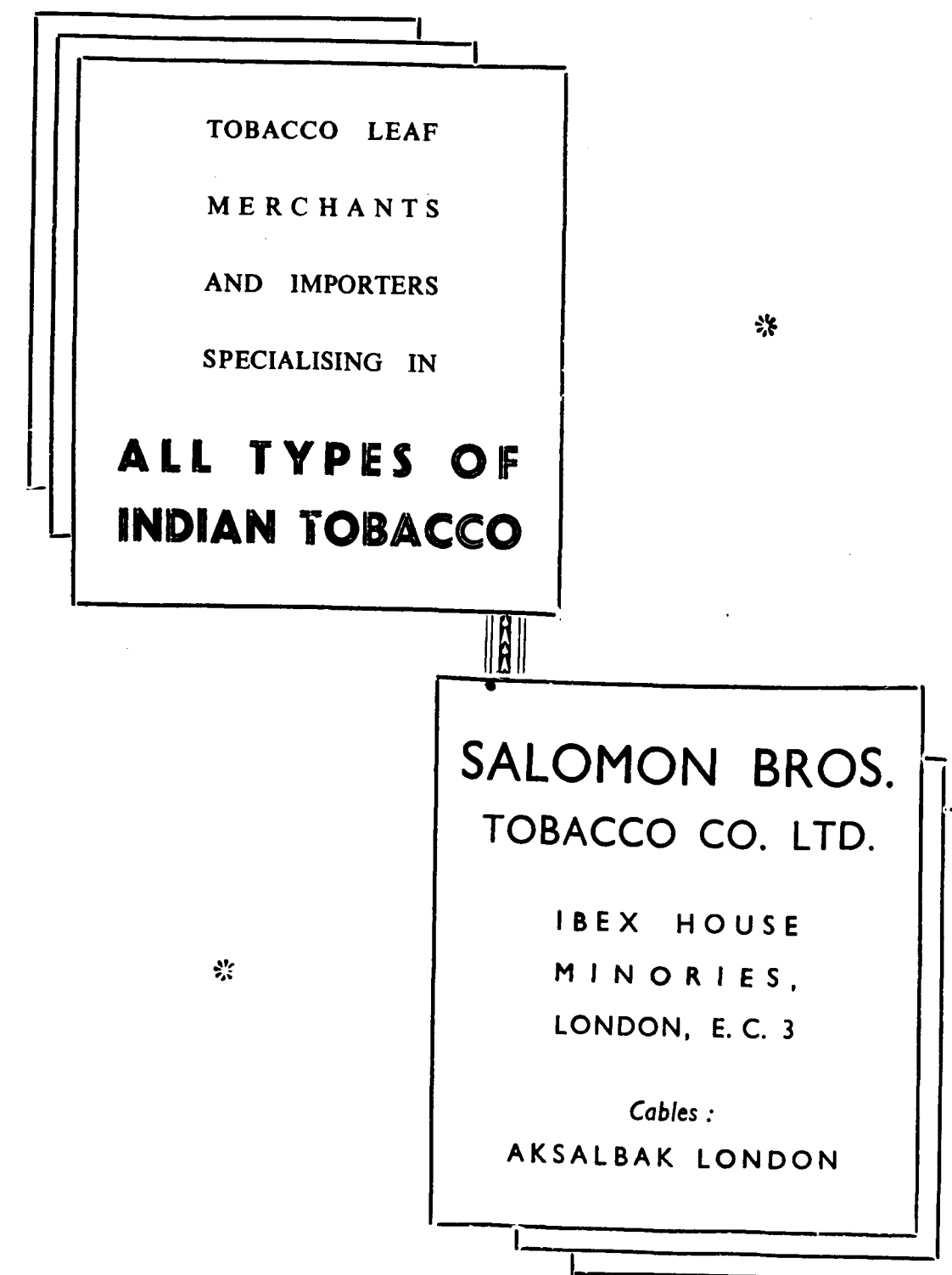
Maleic hydrazide applied to flue-cured tobacco at topping time at 5 different rates, ranging from 0.75-3.75 lbs. of the actual chemical/ac, increased the total sugar and reducing sugar content throughout the plant. The total alkaloid content in the upper part of the plant was decreased more by low rates than by high rates of the applied chemical. The total ash, calcium, magnesium, phosphorus and chlorine content was reduced in the upper part of the treated plant, whereas the potassium content was not affected. (Abstract).

ELLIOT, J. M. ; VICKERY, L. S. : Effect of chlorine on the hygroscopicity of flue-cured tobacco. Canad. J. of Plant Sci. 41(1) : 195-8, Jan. 1961. tables. S1 C285.

Chlorine from 20-50 lbs/ac had no effect on yield or leaf-grade quality of flue-cured tobacco grown on a Fox Loamy sand. Increased applications of chlorine increased the chlorine content, moisture uptake, and decreased the rate of burn of the cured leaf but had no effect on the amount of total sugars. (Abstract).

CULTURAL PRACTICES

ENGLE, H. B. ; MC MURTRY, J. E. JR. ; BROWN, D. E. ; MARY : Land tobacco — an evaluation of



field cultural practices and their interactions. College Park, Md. Agr. Expt. Sta. B. No. A-110, June, 1960. 21p. graphs, illus., tables. (NCS).

In experiment I, close-spaced tobacco in double rows (24"×25") grown on a ridge or on the level yielded significantly less than that grown on ridge, level, or hill at 34"×34" spacing and that grown in single rows at 68"×17" spacing. Quality and burn were not affected by the various ridge — or level-culture treatments. Leaf size under crowded conditions was not significantly different from leaf size under normal conditions, with the same population and fertilizer/unit area. Burn was not correlated with quality. In this experiment, burn was notably better the first season (1942) following a natural weed fallow than in either of the succeeding years, one of them dry and the other relatively wet. There was no advantage in side placement of fertilizer over mixing in the row, as far as yield or value/ac was concerned. In experiment II, the 2000-lb rate of 4-8-12 fertilizer caused a highly significant increase in yield, value/ac, and moisture capacity of the cured leaf. The 750-lb rate significantly improved quality and increased the duration of burn and unit dry weight of leaf tissue. The 33"×36" row spacing increased yield, value/ac, and duration of burn over the 26"×45" spacing. A population increase of 38% increased yield 28% and ac value 30% and reduced unit dry weight of leaf tissue. The only significant interaction took place between population and fertilizer rate. Yield and ac value were relatively greater for a high population receiving increased fertilizer than for a standard population. Topping improved quality and increased ac value and dry weight of leaf over no topping. High topping increased yield and ac value over no topping and low topping, and increased dry weight of leaf over no topping. Low topping improved quality over high topping, and increased the unit dry weight over high topping and no topping. No topping led to improved burn. Suckering at intervals increased dry weight of leaf over one pre-harvest suckering. Delaying suckering until harvest improved quality. (From Summary).

KLARNER, S.: Wplyw gestosci sadzenia na rozwoj roslin i plon lisci odmiany tytoniu Mocny Skroniowski. (Influence of Planting distance on the development of plants and the yield of tobacco leaves of the variety Mocny Skroniowski.) Roczn. Nauk Roln. 81A(4): 919-33, 1960, tables. (Polish). Q4 R62.

The following spaces of transplantation were compared: 70×60 cm, 60×50 cm, 50×50 cm and 50×40 cm. The results led to the following conclusions: (1) The more compact the seedlings are transplanted, the higher is the leaf yield/unit areas. However, the leaf yield/plant decreases when using smaller spaces between the plants. (2) Compact transplanting has a tendency to decrease the percentage of top quality leaves. (3) The more the plants are compacted, the later is the time of their flowering. (4) Compact planting decreases the length and the width of leaves. (5) The content of nicotine in the leaves decreases as the result of using more compact transplanting: but the average content of nicotine does not fall below 2% in the range of the compared plant spacings. (From English summary).

MATUSIEWICZ, E.: Badania nad potrzebami pokarmowymi machorki (*Nicotiana rustica* L.) ze szczegolnym uwzglednieniem plonu i jakosci nasion. (investigations into nutrient requirements of *N. rustica* with special consideration given to crop yield and seed quality.) Roczn. Nauk Roln. 81A(4): 819-28, 1960, tables. (Polish). Q4 R62.

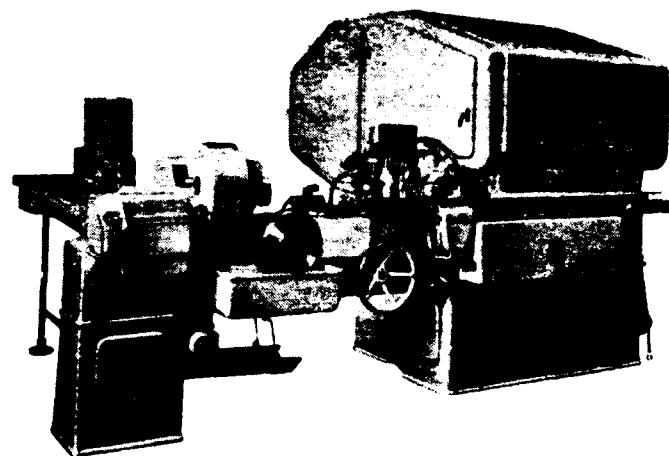
Two years of experiments with vegetative fertilization were indicative of the influence of N, P and K upon *Nicotiana rustica* leaf and seed yield and their quality. The effect resulting from exclusion of 1 of the nutrient constituents while increased portions of others were administered was examined. Lack of additional doses of phosphorus in the increased doses of nitrate-potassium fertilizers hampered the development of the plants in the first growth stage. The influence of potassium was felt least. During inflorescence the highest growth was obtained with increased doses of NK; when the combination NP was applied the plants were slightly shorter and by the combination of PK distinctly shorter still. Leaf size depends first on the quality of nitrogen doses, then of phosphorus, the smallest results being obtained when using potassium. Deficiency of phosphorus caused a remarkable increase in the length of the leaf-stalk. Leaf yield was lowest when nitrogen was excluded from combined additional doses of fertilizers. The highest yields were obtained after treatment with nitrate phosphorus. The highest absolute quantity of dry leaf yield was obtained by applying phosphorus potassium fertilizers. The quantity of seed pods on a plant and their weight depended on the height of nitrogen doses, then on phosphorus and last on potassium.

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A similar dependence was noted in the yield of seed. There was no noticeable relationship between the use of fertilizers and weight/1000 seeds, except when nitrogen was lacking in the compound, which resulted in a decrease of weight. The percentage of oil content was lowest in combinations where additional potassium was excluded, and highest in combinations where nitrogen was excluded. (From English summary).

GENETICS AND VARIETIES

URATA, U.: Cytogenetic study of the dwarf-variegated phenotype in *Nicotiana*. Diss. Abs. 20: 3481, 1960. (Abs.)

In certain F_2 and F progenies of *Nicotiana langsdorffii × *N. sanderae* dwarf plants appeared which had mottled leaves and spotted flowers, exhibited variable bud fall and were completely sterile. Segregation in the hybrid was extremely irregular and did not conform to any common ratios. The dwarf-variegated phenotype occurred only in lines in which a specific group of *N. sanderae* plants was used as parent. Trisomy was not related to this character. While several types of dark : light and dark : white twin-spots occurred in normal and dwarf-variegated plants, these were infrequent in the former and very frequent in the latter. Flowers with twin spots always exhibit single spots of the types which comprised the twins; many of the dark single and twin spots were heavily mottled and it is concluded that some type of breakage-fusion bridge is responsible for this phenomenon since bridge formation is common in somatic divisions in dwarf-variegated plants. Cytological investigations showed sterility to be caused by asynapsis; chromosome fragmentation was frequently associated with asynapsis in the meiotic cells of dwarf-variegated plants. In mitosis a great increase in laggard formation, somatic micronuclei, polyploid cells and bridges was observed; the prophase-metaphase ratio was also altered, metaphases being more frequent in dwarf-variegated than in normal plants. It is suggested that increase in spotting, increase in somatic cytological aberrations, change in prophase-metaphase ratio, and meiotic asynapsis and chromosome fragmentation in the dwarf-variegated plants may be due to the abnormal synthesis and accumulation of a chemical or chemicals capable of causing c-mitotic and radiomimetic effects. PBA 31(1): No. 729, Jan. 1961.*

AHMAD, N.; TERMAZI, S. A.: Heterosis in tobacco. Pakistan J. of Sci. 12(2): 74-82, Mar. 1960. illus., tables. (NCS).

Twelve inter-varietal crosses of *Nicotiana tabacum* (Harrison's Special × Noki and its reciprocal, Kavitrutrum × Puccard Medium and its reciprocal, Kavitrutrum × Deep Coloured and its reciprocal, Deep Coloured × Puccard Medium and its reciprocal, Harrison's Special × Gold Dollar and its reciprocal, and Gold Dollar × Kavitrutrum and its reciprocal) were made to study the manifestation of heterosis in F_1 and 9 important plant characters were employed for the study of hybrid vigor. It was seen that all characters with the exception of thickness of stem were found to show marked hybrid vigor. The number and final yield of leaves registered a marked increase along with an increase in the height of plant in most of the cases. In the light of the fact observed with regard to heterosis in tobacco the "linked gene theory" of East (1936) was found to offer the best explanation. (From abstract).

PHYSIOLOGY AND BIOCHEMISTRY

DAWSON, R. F.; SOLT, M. L.; CHRISTMAN, D. R.: Nicotine and its botanical sources. N.Y. Acad. of Sci. Ann. 90: 7-12, Sept. 27, 1960. Q11 N58.

Nicotine is produced by the tobacco plant from 2 extremely useful biochemical intermediates, ornithine of the arginine cycle and nicotinic acid of the pyridine dehydrogenase systems. Looking at the process of synthesis rather than the product, a close rate dependence between nicotine production and the growth of the plant root was discerned. Evidence is presented for the view that both root growth and nicotine synthesis are paced by the same rate-limiting step. Identification of this step can be of first-rate importance for further understanding of the still obscure biochemistry of growth as well as of the biochemistry of alkaloid formation. Whatever the significance of the tie between nicotine production and growth, at present nicotine can be regarded as an indicator of root growth, the actual amount present at any given instant representing a rather exact measure of the amount of growth that has occurred. (From summary and conclusions).

SEEDLING PRODUCTION

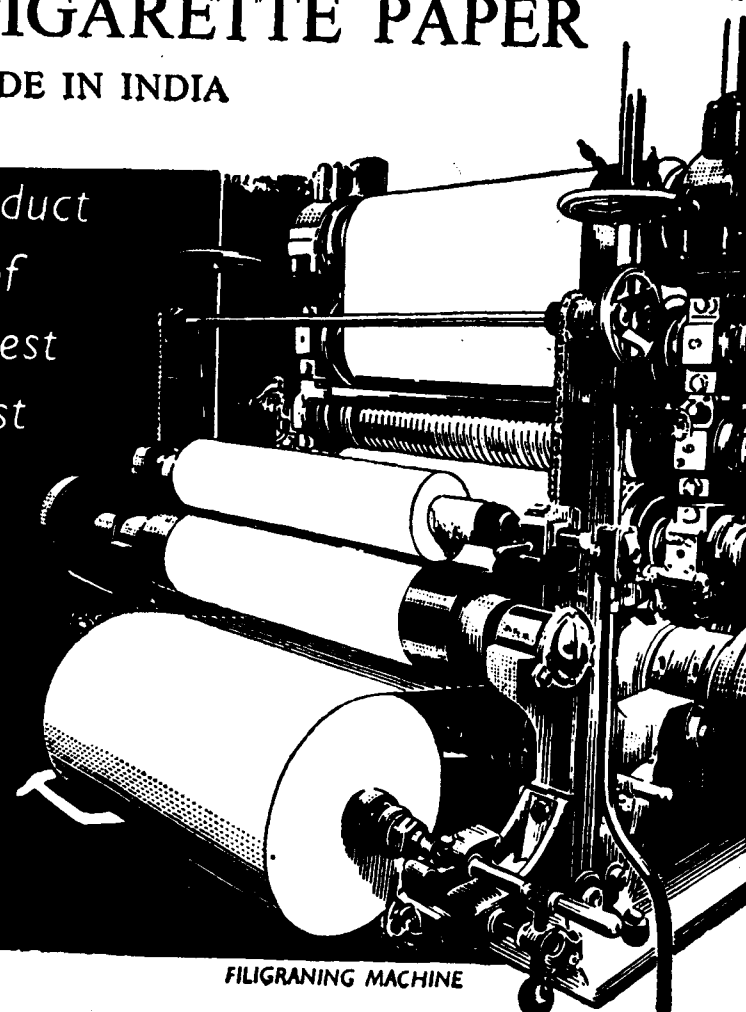
DE CASTRO, S. P.: Comparative study of efficiency of the different seedbed covers for tobacco. Arjenta J. of Agr. 7(2): 129-49, Apr./June, 1960. illus., tables. S1 A67.

The best cover found was polyethylene, followed by nipa, then coco-crudo and last, the cut talahib

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grass. Even distribution of light throughout the bed has played an important role in the uniformity of the growth of tobacco seedlings as proved by the polyethylene cover. When using the nipa cover, efforts should be made that every seedling should receive equal amounts of increasing light intensity. The nipa cover gave the highest percentage of germination but only placed second in growth. The talahib grass cover was the poorest of all either in germination or in growth. Polyethylene and nipa covers produced most leaves. The control (talahib grass cover) did not only show poor germination but also gave non-uniform development with some plants characterized by stunted growth. However, the plants that developed normally were the few most stocky plants. Covering with talahib grass would require a large area of seedbeds to plant a hectare of tobacco. Although the germination of the seeds covered with polyethylene was delayed 2 days, they grew faster later on and thereby shortened the seedling stage by 5 days. In general, the seedbed work was successful as all the Golden Simox seedlings planted for seed production were provided by 16g of seeds sown in the 16 seedbeds. (From summary and conclusions).

JANKOWSKI, F.: Badania nad wpływem warunków przechowania na żywotność nasion tytoniu. (Effect of storage conditions on the viability of tobacco seed.) Roczn. Nauk Roln. 81A(4): 739-55, 1960, tables. (Polish). Qk R62.

Seeds of Machorka Pomorska (*Nicotiana rustica*) and puawski Szerokolistny (*N. tabacum*) of Polish origin were used. In dry places such as the seed store, the attic, the laboratory, seeds may be kept for a period of 11-12 years without damage to germination. In such places it is better to keep seeds in cloth bags or paper envelopes than in hermetically sealed glass tubes (stoppered vials). In moderately dry places with constant tempera-

ture (25°C) seeds may be kept in any one of the mentioned containers for 9-10 years. In seeds kept out of doors under a roof in cloth bags and paper envelopes a considerable deterioration of germination sets in after only 2 years (Puawski Szerokolistny) or after 3 years (Machorka Pomorska). Seeds in stoppered vials may be kept out of doors for 9-10 years without any injury to germination. The decisive factor in retaining germination capacity is moisture of the environment and its fluctuations; temperature and its vacillations are of minor importance. In average moist places (dry cellar) and very moist ones (damp cellar), seeds may only be kept in stoppered vials. In cloth bags and paper envelopes their germination capacity soon decreases and loss of germination occurs; in a dry cellar in Machorka seeds a drop in germinating percentage takes place after 4 years, while after 10 years only an insignificant percentage of seeds is able to germinate. The germinating ability of seeds of Puawski Szerokolistny tobacco in these conditions is lowered after 3 years and loss of germination sets in after 8 years. In a damp cellar seeds germinate poorly after a year, after 4 years they mold and do not germinate at all. (From English summary).

MANUFACTURING TECHNOLOGY

KASAI, Z.; KONISHI, S.: Behaviour of calcium in the maturation and death process of tobacco plant. Kyoto. Res. Inst. Food Sci. Mem. 20: 14-21, 1960.

High contents of Ca⁴⁵ were found in the lower leaves, decreasing in amount in the high leaves of *Nicotiana tabacum*. This remained constant throughout 32 days of treatment and growth. There is no evidence that Ca is removed from dying leaves and transported to leaves further up the shoot. IABS 20(1): no. 1888, Jan. 1961.

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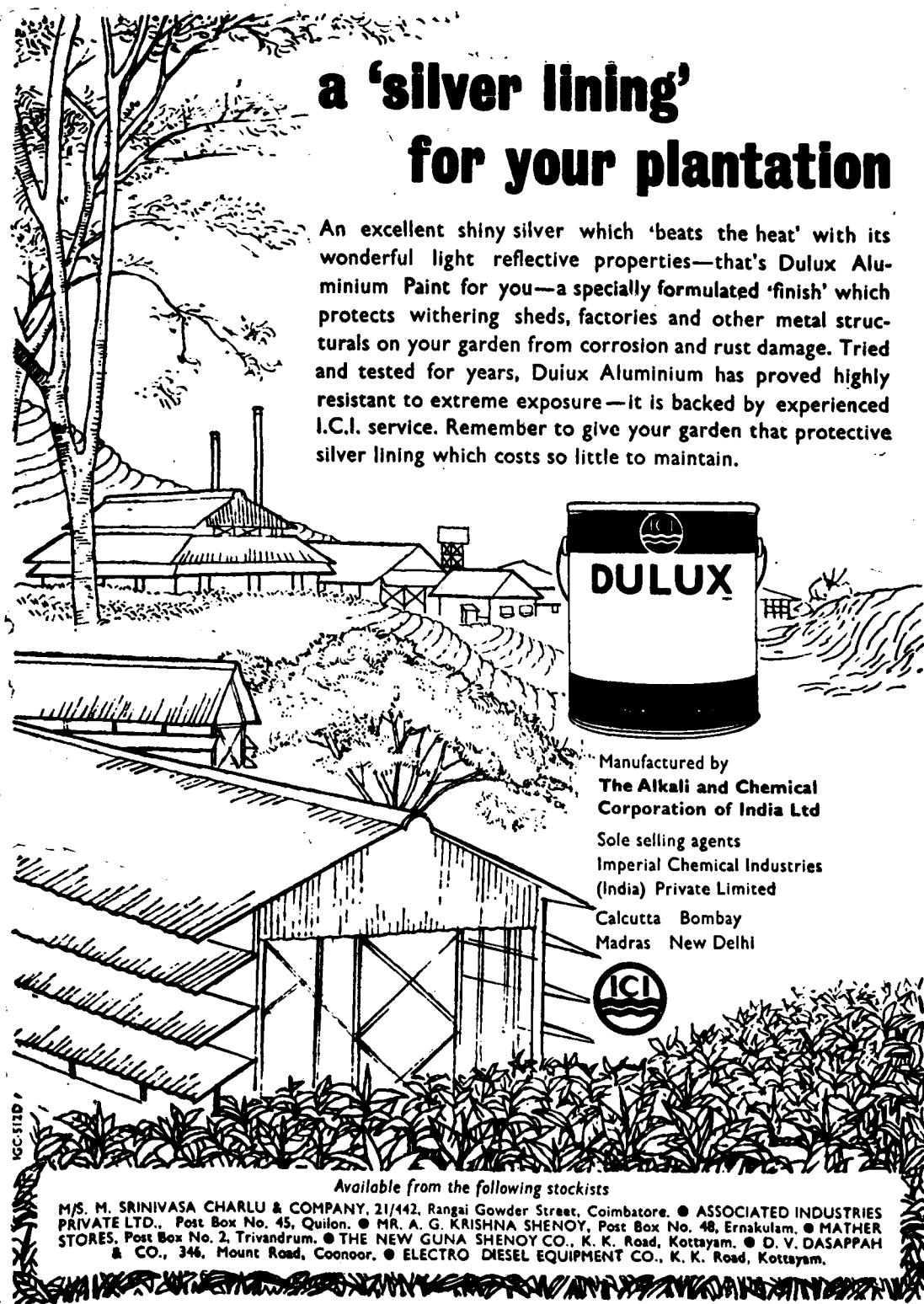
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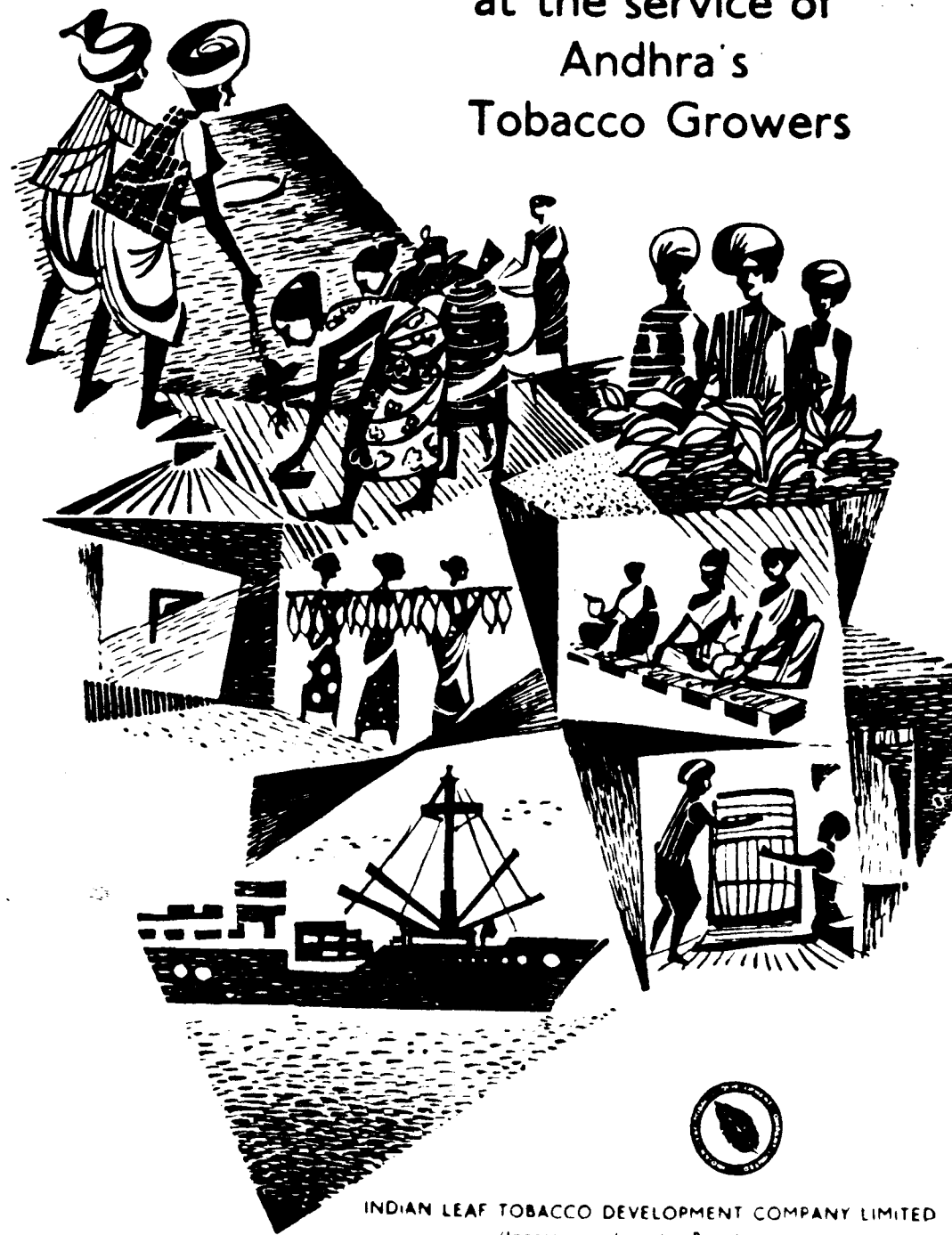
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