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CONTENTS

Editorial.

Back to the Land. Back to the Land—that is the slogan. This cry of back to the land is at present closely associated with the unemployment of the educated youth of our country. There is a school of thought that would find a solution to the current unemployment in the settlement of the educated youth on the land. Mother earth is all embracing in her kindliness. She nourishes us. We were born on her bosom and to her bosom we return. No wonder when we are in distress we look to her for succour and think that all will be well if we go back to her care and keeping. This hope gives the movement an optimistic tinge.

There is another school of thought which is of the opinion of Bernard Shaw when he declared: "As I am not a born cockney I have no illusions on the subject of the country. The uneven, ankletwisting roads; the dusty hedges; the ditch with its dead dogs, rank weeds and swarms of poisonous flies; the groups of children torturing something; the dull, toil-broken prematurely old agricultural labourer; the savage tramp, the manure heaps with their horrible odor etc." This opinion, generally reflected in the intelligentia of the land, found expression

in a recent utterance of Dewan Bahadur A. Ramaswami Mudaliar when he observed that for a solution of the unemployment problem he could not fully agree with the slogan "Back to the Land." In the first place the kind of life they had been living in the cities made them unfit for such a work. Secondly they had been brought up to a certain standard of living and they had been educated with a view to their keeping to that standard and thirdly agriculture was not paying and they were painfully aware that many agriculturists were keeping acres of land uncultivated because the price of produce had fallen below the cost of production. This line of thought finds an echo in the words of Mr. K. Bhashyam Ayyangar, B.A., B.L., Advocate, and President of the First Conference of the Educated Unemployed of the Tanjore District. He is reported to have said that with stocks of paddy and grain rotting in the graneries without any scope to sell them with advantage, and with the creditor at the doors demanding payment of the debt and the Government pressing for their taxes, the lot of the cultivator was not an enviable one. Greater interest in the village holding as an economic unit in India, was urged by Mr. H. Calvert, C. S. I. in an address to the Conservative India Committee of the House of Commons. He said that the cultivator would have to bear most of the extra burden of the reforms. The yield per acre had shown little, if any, increase, the cultivated area per head had generally diminished, credit has been gravely abused and almost exhausted and powerful urban interests had sought advantages at the expense of the poor classes. None of these pictures is bright enough to afford exhilaration to the would-be settler.

As Sir T. Vijiaraghavachariar has indicated, the "Back to the Land" movement noticed on the continent of Europe might have had its origin in the desire to build up a robust community who could, in the event of a war breaking out, supply the man power necessary to defend their vast land front. It might also be the result of the pursuit of the ideal of national self-sufficiency which each State has now set to itself. Unlike present day Germany decrees are not easily issued by the Ministry of Labour to the effect that a man works on a farm or starves. State and Municipal welfare authorities are not so easily informed here, as in Germany, that all able bodied men in cities who are unemployed and who refuse to go and work on the farms should be denied unemployment relief. It is no wonder that Hitler participates in harvest festivals near Hanover with three quarters of a million peasants treated to military music and mock battle. He could afford to bitterly attack intellectuals and the over estimation of mental work. So with Signor Mussolini. Seated on a raised tribune in one of the main squares of Milan he witnessed a procession of fruits from the plains of northern Italy. Fifteen thousand participated in the procession including farmers and peasants, carrying spades or scythes, while

sixty carts drawn by long-horned oxen filled with grapes, wines, corn and silks were brought as an offering to him. This intense and imposing display of rural gratitude is but a visible expression of the abiding interest that the Duce has been taking in matters agricultural ever since he came to power. The back to the land movement is a very real and live one in Italy.

In an address before the East India Association, Sir John Megaw estimated that the population of India might reach 400 millions by 1941 and advocated educative propaganda among the populace towards efforts at check. Sir George Newman who presided pointed to the fact that England's population had increased over 33 millions in the last century but England was still the healthiest nation in the world. In this question of back to the land and the land reclamation that it involves we can do no better than study the illuminating address of Mr. S. V. Ramamurty, I. C. S., on "Agriculture under the Fascists", published in the August issue of our Journal. The principle of integral action and of extension and tension referred to therein deserve the earrest consideration of our Government. In these schemes of reclamation it is best to go about it as we do in town-planning schemes, providing all facilities and attractions so that the land is settled quickly and with the minimum discomfort. It requires a bold stroke of statesmanship to visualise the possibilities in this direction and we doubt if this aspect of development can afford to be missed by the nation-building departments. With this support and encouragement the educated unemployed will not only go back to the land but back to improved agriculture.

Any scheme of land settlement must be based on sound economic and well-planned lines. Attempts at relieving urban unemployment should not result in shifting the troubles to rural areas. Any settlement that is not sound will react so adversely that the whole movement will get a set-back. What is needed is a thorough survey of all land not at present under cultivation but available for new settlements. The latest statistics show that in Madras there are over thirteen million acres of cultivable waste. A map of such areas should be prepared roughly along lines indicated in a recent bulletin of the Vermont Agricultural Experiment Station on Land Utilization as a Basis for Rural Economic Organisation. In this bulletin is given a thorough survey suited to American conditions round about Vermont. The localities at which population must best be concentrated are shown. They indicate the limitation and possibilities of agricultural development round each town. Roads, schools, forest reserves, parks, fishing grounds and the equipment of the human element are thoroughly gone into. What we need prior to the preparation of similar data for our conditions is a mass of facts and figures. The need for such regional surveys in India was brought out clearly in the course of a lecture

under the suspices of the Geographical Association by Mr. B. M. Thirunarayanan. He said that in no part of India was a thorough and systematic regional survey made, though such surveys existed in other parts of the world. From a regional survey, one could determine the amount of rainfall in a particular area, the nature and yield of crop in that area, the variations in underground water supplies and the fertility of the soil. Such a regional survey on a large scale should be concluded on a voluntary basis. Such surveys should be the first step that should be taken in any "Back to the Land "campaign. In Great Britain as also in the United States such measures are taken on a co-operative basis, school masters taking the leading part. The first step in the British programme has been to make a minutely detailed survey of the entire Island and building a large-scale map. In this work 22,000 volunteer surveyors have been engaged, and in addition nearly a quarter of a million young people, mostly students, have had some part. It is our earnest hope that a similar endeavour will be made under the joint auspices of the Economic and Geographic Associations and the sound beginnings of the "Back to the Land" campaign inaugurated.

ADVICE TO NILGIRI RYOTS *

BY RAO BAHADUR M. R. RAMASWAMI SIVAN,

Retired Principal, Agricultural College, Coimbatore.

I am thankful to the Agriculturists' Association for giving me an opportunity for meeting you, the real cultivators of the District—and addressing you. I am glad to note that, judged from the Report of the Secretary, the Association has done good work for the first year, and that it is something achieved that the agents of the S. I. R. and M. S. M. R. have agreed to lessen the freight on consignments of potatoes exported from the district. I am also glad that the Association is getting help and guidance from the agricultural officers in the district.

Just over a century ago, this land of *Todas, Badagas* and other hill tribes, came to be occupied by the Britishers. All the improvements in the district, in the shape of easy and excellent communication, better sanitation, the growth of cities, the development of coffee and tea estates, the erection of factories, and the latest achievement, the Pykara Hydro-Electric Scheme, are due to British advent and British administration. The natural scenery and excellent climate attracted the Englishman to this land of latent wealth, and there were serious proposals in the earlier years to colonise the Nilgiris into a European Settlement. Spasmodic efforts were made, now and then, to study the agricultural possibilities of the district and improve the methods of cultivation. It was left, however, to H. E. Lord Napier to take the first step in this direction, in 1871. He directed Mr. W. R. Robertson,—the Superintendent of the Farms in the Presidency, and later also the Principal of the Agricultural College at Saidapet—to proceed at once to Nilgiris and submit a detailed Report. Mr. Robertson spent several months, in different seasons, in the district, made detailed local enquiries into existing conditions and submitted an exhaustive Report in 1873 with his recommendations on the following points:—

1. The Agricultural conditions, capabilities, and prospects of the district, especially with regard to (a) the breeding of horses, cattle and sheep; (b) the establishment of Farms on the European system; (c) the planting operation in coffee, tea and cinchona; and

2. The improvement of husbandry of the hill tribes.

In this Report, Mr. Robertson—reputed to be one of the most sympathetic officers alive to Indian interests—discussed the possibility of colonising the district with European and Eurasian settlers, retired military men, and even English and Scotch farmers, rather than with

* Abstract of a Presidential Address in Tamil at the First Annual Meeting of the Nilgiris District Agriculturists' Association, held at the Blue Mountain Theatre, Ootacamund, on 17th September 1934.

Indian settlers whom he considered at the time to be fit only to serve as labourers.

Times have changed, and the viewpoints of British administrators have also changed in that there is nothing to prevent the natives of the soil from being actual *mirasdars*, if they choose to.

Out of a total area of 630,000 acres in the district, the net area sown in 1931—32 was only 84,000 acres, i.e., 13%, while culturable waste and current fallow amounted to 30 per cent. It may be that the original settlers,—coffee and tea planters—obtained land from Government or by purchase from the hill tribes, at comparatively easy terms. But I appeal to the authorities to assign waste lands, in future, to the natives of the soil as far as possible.

The district of Nilgiris is very well favoured, so far as rainfall is concerned, as copious rain falls during the S. W. and N. E. monsoons and during the hot weather, and as the rainfall is spread over a larger number of days in the year than happens on the plains. To that extent, the cultivators of the Nilgiris district are more fortunate than their brethren on the plains, whose first requirement for crop production is water and whose ingenuities for getting water for irrigation, are so many and so varied.

The soils of the Nilgiris are varied and extreme in their richness or poverty of plant-food. Soils in the lower slopes and in the valleys are richer than the soils in the plains, while the fine soil on the steeper slopes has been washed away in mountain streams; and, unless an elaborate and costly system of terrace cultivation is practised, few crops can be grown. The soils in the Nilgiris are generally well supplied with all fertilising ingredients except lime and have plenty of organic matter.

Regarding the crops grown during 1931—32, tea and coffee occupied 53,000 acres, and as these were mostly in the hands of European planters, who have invested large sums in their estates, who have organised themselves well and who appreciate scientific guidance, tea and coffee bring in comparatively more profits. The cereal grains grown by the ryots, *samai*,[1] *korali*,[2] *ragi*,[3] wheat, and barley, do not occupy more than two to three thousand acres each, and, generally speaking, they receive scant attention and yield poor crops. Fruits and vegetables, however, are grown over 12,000 acres, the bulk of which is occupied by the potato. It is, therefore, necessary that the attention of the ryots and of the Agricultural Department should be more closely directed in future to the production of fruits and vegetables, which are in such great demand in the plains.

Government have organised two Departments, on what may be termed altruistic basis, for the special benefit of the agricultural classes, namely the Co-operative and the Agricultural Departments; they are interdependent. When the cultivators are particularly poor, as is

1. *Panicum miliare.* 2. *Setaria glauca.* 3. *Eleusine coracana.*

the case in the Nilgiris, it is evident that they will get increased profits and incidentally attain to better standards of living, only if co-operative methods are adopted, not only in banking through credit societies, but also in production and distribution, purchase and sale and transportation and marketing of produce. I particularly appeal to you to be a little more ambitious than being content always to serve as coolies to those who settle in the district, and to create in yourselves sufficient self-confidence for working out your own salvation.

There are two obstacles in the way, illiteracy and drink. The Nilgiris district is one of the most backward in education. Let alone higher education for which probably there is no scope with the limited population in the district, the people must utilise the facilities now available for secondary education and must ask for compulsory elementary education and take full advantage of it. As regards drink, it may be remarked that as there are no coconut or palmyra trees in the district, there is no manufacture of toddy, the usual drink of the working classes in the plains. The advent of civilization has brought in the evil of drink among the hill tribes in the shape of the more harmful distilled liquors. Some one remarked that the drink habit is much less now, but it is staggering all the same to note that, in the year 1930—31, the excise and opium revenue was over six lakhs of rupees, while the land revenue was less than two lakhs.

The Government Agricultural Station at Nanjanad has been established solely for solving the potato problem in all its aspects for the benefit of the Nilgiri cultivator. A large number of experiments has been conducted there, and fruitful results have already been achieved. It is well to remember that, in a Research Station, some experiments may yield positive results, while others may give doubtful or even negative results. It is only the successful and profitable methods, proved beyond the stage of experiment, that are recommended to the ryots for adoption. Of such successful results, the following may be mentioned as the most important :—

(1) Improvements in preliminary cultivation by the use of ploughs and light field implements with bullock labour, in the place of manual labour which is always slower and more costly.

(2) The necessity for adequate manuring of an exhaustive crop like the potato, the dose recommended being 5 tons of Farmyard manure and 15 cwts. of a specially improvised manure mixture, containing 80 lbs. of nitrogen, 234 lbs. of phosphoric acid and 108 lbs. of potash, these quantities being relatively the amounts of fertilising ingredients removed by a good potato crop. The farmyard manure has been found necessary for potato, as without it, the manure mixture does not give a proper yield. To procure farmyard manure, you must keep cattle, and the maintenance of cattle will induce the Nilgiris cultivator to resort to the use of ploughs and light field implements.

(3) Wider spacing of furrows and wider planting of seeds in the rows, 20 to 24 inches and 9 to 12 inches being recommended, instead of 15 inches and 6 inches, respectively, now adopted by the ryot.

(4) Medium and big seed potatoes, weighing 1½ to 2 oz. the size of a hen's egg recommended in the place of chats, weighing ½ oz,, as is now the practice.

(5) Selections of varieties, suitable to the district, resistant to the disease and yielding relatively a larger fold.

(6) Adoption of rotation of crops, not only to recuperate the soil, but also to avoid diseases, incidental to potato cultivation.

(7) Planting lesser seed rate at 7 to 8 bags per acre, instead of 25 to 30 bags now used by the cultivators.

(8) Improvements in harvesting, storing, and selection of seed for the next crop.

All these improvements are worthy of immediate adoption by the ryot without any hesitation whatever.

I am glad to hear that the Nanjanad potato has penetrated throughout the district and that a few demonstration farms are run by the ryots with the help of the officers of the Agricultural Department, with a view to grow their own seed-potatoes. Much more remains to be done. The Deputy Director of Agriculture, the Superintendent of the Nanjanad Farm and the Agricultural Demonstrators are always ready, working as they do in a missionary spirit, to help the cultivators.

Utilise the services of these officers to the fullest extent. How many of you have visited the Nanjanad Farm? If you have not yet done so, take the earliest opportunity to go there, see for yourselves what is being done there and ask the staff to explain the nature of the different experiments. Ask for their help in laying out suitable Demonstration Farms in your own villages. Seek their co-operation in the working of your Agriculturists' Association on the model of the Mysore Experimental Union, in which the ryots and officers are working in sympathetic co-operation.

I have to reiterate that the Indian cultivators of Nilgiris, are so poor that they cannot make great progress, unless they co-operate and organise themselves for their own benefit. I fail to see why it should not be possible to supply, more copiously than is now the case, the people of the plains, at least those in the neighbouring tamil districts, a lot of produce peculiar to the hills, e.g. English vegetables, apples, pears etc , when it is seen that the Himalayan apples and pears are delivered by post at the southernmost end of the Peninsula. What is wanted is organisation, and it is a recommendation to the Nilgiris Agriculturists' Association to tackle the question in all seriousness, as there is plenty of trade and money in it.

I notice that the loans taken by the ryots under the Land improvement and Agriculturists Loans Act have been diminishing during the last 5 faslis, being Rs. 27,000 against Rs. 42,000 five years ago. It is not known whether such loans are taken by the Indian cultivators or the European cultivators. I advise you to take advantage of the facilities afforded and at the same time emphasise the need for speedy and sympathetic compliance, with loan applications, on the part of the Revenue authorities.

I am glad to hear of the Rural Re-construction Centres, established at Edapalle and Dhavani where poultry-rearing, bee-culture and agricultural improvements in general are being demonstrated. I am equally glad to be informed that arrangements are in progress to purchase and distribute the special manure mixture on a co-operative basis.

It is a happy augury that the Minister for Development, who is in charge of both the agricultural and co-operative portfolios, should open this conference, to-day because the Hon'ble Mr. P. T. Rajan is himself an agriculturist of some standing and is sure to give a sympathetic consideration to the legitimate demands and requirements of the Nilgiris cultivators.

"INSECTICIDES AND THEIR USE IN INDIA"

BY T. V. RAMAKRISHNA AYYAR, B.A., Ph. D.,

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Introduction. From those very early days when prehistoric man gave up his nomadic and predatory habits and began to raise crops and tend cattle the struggle between nature and man must have commenced in right earnest, man upsetting the normal conditions prevailing in the universe, and nature asserting herself every time to re-establish her supremacy. Gradually, through centuries of civilization, as this protracted struggle continued, one of the most important changes effected has been a pronounced re-adjustment of the relations that originally existed between man and the lower forms of life. Under the numerous artificial conditions brought about by human agency, what is known as the "balance of life" in nature is constantly upset especially among the lower animals like insects and one of the various resulting phenomena which frequently happens is an abnormal increase in the number of some lower forms of life which affect men—in other words, there is an outbreak of pests. Man has, of course, recognised this self-inflicted but inevitable evil through past decades and in all countries he has been compelled to devise various methods of minimising the toll levied by pests of different

* Paper read before the Agricultural Section of the Indian Science Congress at Bombay, January 1934.

kinds especially insects. In the beginning, practically all such measures were of an empirical nature without a correct knowledge of the aetiology or nature of the malady; these included among others, faith cures and indiscriminate use of sundry drugs, decoctions and miscellaneous recipes of various kinds as has been pointed out to a certain extent in a paper * read before this congress in 1921. It is needless to add, however, that while, perhaps, a few of these rule-of-thumb operations possessed the nucleus of some of our modern effective measures, the bulk of them have been found to be quite ineffective. Though the idea of controlling insect and other pests by application of medicines, etc.. has been in existence from the very early days, it was not, however, until the discovery of Paris green as an effective remedy for the Colarado beetle in the United States and of Bordeaux mixture for vine mildew in France, during the latter half of the last century that the use of reliable drugs and chemicals came into use on scientific and rational lines Since then, numerous insecticides and proprietary preparations have been discovered and at the present day, the use of insecticides has practically become a routine operation in pest infested fields in most of the regions of the world where scientific methods of agriculture are in vogue.

In this paper, it is the writer's idea to briefly indicate some of the fundamental facts regarding insecticides with the peculiar conditions prevailing in India in relation to this subject, briefly summarise the experience gained so far with insecticides and finally indicate the lines which would help in encouraging and increasing future possibilities of insecticidal methods in India.

Insecticides and Indian Conditions. Some fundamental facts regarding modern insecticides and a few remarks on the general agricultural conditions peculiar to India in this connection might help us to indicate the future potentialities of insecticidal measures in this country. Though the word insecticide literally connotes any substance that kills insects, it has nowadays gained a wider meaning and has generally come to be applied not only to different drugs and chemical preparations that are actual insect killers but also to those substances which have a deterrent effect on pests and it is in this latter comprehensive sense that the term is used in this paper. According to the nature of their action insecticides are conveniently grouped into two kinds. Against biting insects which take solid food the insecticides generally used are known as " stomach poisons "; these when eaten with the plant tissue kill the insect by absorption through the alimentary canal. In the case of sucking insects which take only liquid food, a stomach poison spread to the plant surface will not be able to reach the stomach since they get their food in the shape of sap from within the plant tissue; hence the insecticides used for such insects are

* Some local practices prevalent in S. India in the Control of Insect Pests *Agricultural Journal of India* XVI, pp. 40—51. 1921.

such which will kill them by coming into actual contact with the body surface; these are called "contact insecticides." Besides these two main groups of insecticides there are others called "Fumigants" which kill insects by affecting the respiratory system in the form of a volatile poisonous gas. There is, in addition a fourth group of substances used against insects called "deterrents" which make the plant distasteful to the insect or which by their peculiar properties repel the creature from the plant. The above grouping, though convenient, is more or less an arbitrary one; for in some cases the same insecticide may function both as a stomach and contact poison or as a contact poison and a fumigant. Most of the stomach insecticides now in use everywhere are arsenic compounds which are poisonous and the important and effective fumigants are substances which evolve gases highly poisonous or inflammable or both, such as 'Potassium cyanide' and 'Carbon bisulphide'. Such substances which are poisonous have therefore to be handled and used only by properly trained persons to prevent the risk of endangering the lives of men and domestic animals. In a country like India where the majority of the cultivators are illiterate, such remedies in their hands are likely to cause more harm than good. The recommendation of such dangerous and risky substances, however effective in their own way as pest controls, is a matter which demands very serious and weighty considerations. Leaving aside this aspect of the question for the present we have first to examine and find out whether it will be advantageous to the average farmer of the Indian plains to adopt insecticidal measures of pest control against all his pests. Every one who has any correct ideas regarding agricultural conditions prevailing in India, especially regarding the comparatively small size of the Indian holdings, their proverbial poverty and the equally poor returns got out of such staple food crops like paddy and millets, can at once find out that insecticidal measures against pests on such field crops are quite impracticable and uneconomic. On the other hand, experience has shown that the use of insecticides to fight pests infesting valuable and well paying crops of different kinds is quite a practical and economic proposition. The rapid spread in these days of fruit growing, horticulture, kitchen gardening with trials of other remunerative crops is beginning to offer a very wide and encouraging scope for the adoption of insecticidal methods. The frequent transport and importation of seeds, bulbs, cuttings, fruits, etc., which take place at present especially in our ports of entry and embarkation also demand the use of insecticides for quarantine purposes. As such, the future prospects for insecticides in India do not appear so gloomy as it might have shown two or three decades ago and therefore it is a subject which demands some special attention at present.

Early trials with Standard Insecticides. Apart from the various references in early works to all sorts of local insect-killing

preparations and drugs and latterly in Watt's Dictionary of Economic products, the regular use of well tried insecticides might be said to have been started for the first time by Government gardens and owners of coffee and tea estates in the hills during the eighties of the last century. We find that London Purple was used in the Botanical Gardens, Saharanpur, for the citrus caterpillar in 1889, and the trials with Kerosene emulsion and sulphur preparations for the coffee green bug and the tea mite were started in the hill plantations of S. India, Assam and Ceylon. References to such attempts with insecticides like Chiswick compound, Gondal fluid, McDougall's insecticide, etc., and crudely-made spraying machines form interesting reading in the pages of the Indian Museum Notes (from 1891—1903) the earliest Indian periodical to record reliable facts on Economic Entomology, and in the valuable manual* on Tea by Watt and Mann. With the creation and organisation of separate departments of Agriculture in the various Indian provinces and the establishment of the Agricultural Research Institute at Pusa in the early years of this century, the different aspects of scientific agriculture including the subject of insecticidal measures to check pests received a favourable stimulus and considerable encouragement for rapid progress. The regular trials with insecticides on various crops on an organised scale and investigations in the direction of discovering suitable preparations for the different kinds of pests, were formally started on the initiative of the famous economic entomologist who sacrificed his valuable life on an insecticidal investigation in 1925—the late Professor Maxwell Lefroy who was the first Imperial Entomologist under the Government of India and under whom the writer had the unique privilege of serving his probation and picking up his first lessons in Economic Entomology nearly thirty years ago! It was Mr. Lefroy who introduced Lead arsenate into India for the first time and invented 'Crude oil emulsion' so well known and popular at present as a standard contact insecticide; the former substance was first tried for the gipsy moth caterpillar in the eastern states of America and the latter is an improved recipe on the common Kerosene emulsion. These two preparations are at present two of the best known and widely used insecticides in India. Some of Lefroy's trials with insecticides in Pusa are to be found in his bulletin of 1908.‡ Recognising very well the properties of the common stomach insecticides like Paris green, London Purple and Lead arsenate and realising the risk in recommending such substances to the Indian farmer, Professor Lefroy struggled hard to find out a material to replace such dangerous substances and after numerous experiments described in his memoir† and

* Watt and Mann "Pests and Blights of Tea" (1903).

‡ Treatment and observation of crop pests on the Pusa farm by Lefroy and Misra—Bull. No. 10—1908.

† Enquiry into the Insecticidal action of some mineral and other compounds on caterpillers—*Ent. Mem. Pusa* IV(5), 1913.

trials in the laboratory and the fields hit upon *Lead chromate* as a stomach poison and as a fairly equal substitute to the arsenic compounds. Recent trials with this material, both in India and elsewhere, have not, however, shown very encouraging results. Lefroy continued his valuable experiments in India until he resigned his job and left India in December 1912.

Recent Experiences with Insecticidal Measures. Ever since the impetus given by Professor Lefroy in this direction and the publication of his valuable book* on Economic Entomology, educated farmers all over the country have been evincing considerable interest in this line of pest control work; the entomological staff at Pusa and in the provinces have also been engaged in testing various insecticides and recommending those that have been found effective in every way. Speaking of the numerous agricultural pests of India it is found that the majority of them are biting and chewing forms like grasshoppers, beetles and caterpillars of different kinds. The treatment of such of these forms which are amenable to insecticides can only be done under the present circumstances with arsenic compounds; and though this method is found satisfactory, in some of these cases it is felt that the conditions prevalent in India have not yet sufficiently improved to recommend the use of such poisons on a wider scale to our ryots. Until the standard of literacy improves or other non-poisonous substitutes are discovered it will not be quite safe to entrust such stomach poisons into the hands of our layman farmers. The trials with such insecticides, therefore, have been made so far only by Government departments or by educated farmers and hill planters. Experiments with stomach poisons in different places for a variety of pests have been more or less successful though in some cases they have been found impracticable. Jhaveri (i) tried Lead arsenate for hairy caterpillars in Gujarat and did not find the same effective. The writer had Calcium arsenate tried for the red hairy caterpillar in S. India last year and the results were far from encouraging. On the other hand, in the case of some of the cut worms and other caterpillars like the cotton leaf roller, arsenic compounds have been found very effective. Husain (ii) in the Punjab has found Paris green and Lead arsenate quite suitable against the pumpkin leaf beetle (*Aulacophora*). In S. India, the use of Calcium arsenate for the brinjal *Epilachna* has been found so effective that during the past two years there was widespread demand for this insecticide from numerous vegetable gardeners. The tobacco caterpillar and the castor semi-looper have also been frequently checked by these arsenic compounds in different parts of S. India. It has, however, been found to be often difficult and impracticable to use such arsenic compounds to control actively moving and

* H. M. Lefroy—Indian Insect Pests, 1906.

(i) Report of 3rd Ent. Meeting, Pusa, 1919, p. 148.

(ii) Ent Memoir, Pusa.

polyphagous creatures like locusts and grasshoppers of sorts except in very valuable experimental plots and small nurseries where proper care can be taken to prevent risks. As already referred to before, one great disability in the use of poisonous drugs like arsenicals in the open fields of the plains is the risk of poisoning cattle; for, unlike as in many other countries, especially America, where the areas are fenced round, our fields are open, contiguous and freely accessible to stray cattle and other domestic animals.

Speaking of contact poisons and their use, however, it has to be admitted that, during the past few years, the use of this class of insecticides has not only become very popular but is spreading widely and rapidly. In orchards, kitchen and ornamental gardens and on industrial crops which pay well, sucking insects of various kinds have begun to be controlled by various contact preparations. Substances like Crude oil emulsion and Fish oil rosin soap came into use about fifteen years ago against the mango hopper and the writer's early experience with such insecticides may be found in his paper published on the subject in 1918.* The manufacture of Fish oil soap at the local Government soap factory at Calicut formed an additional impetus to the popularity of spraying for such common pests as plant lice, scales, mealy bugs, tingidids and mealy wings. In 1915—16 Misra (i) tried spraying with contact poison for the sugarcane leaf hopper (*Pyrilla*). Since the years 1917—18, when the use of tobacco decoction was given a good trial and suggested by the writer* for the plant lice pest on tobacco, this remedy has been adopted very extensively in the South Canara, Coimbatore and Guntur areas where the tobacco *aphis* often appears as a serious pest. The use of contact washes for scales was tried on a fairly large scale by the writer (ii) and Fish oil soap was found very effective against the persistent and very common scale pest (*Pulvinaria maxima*, G) of the nim tree in Coimbatore. In 1927—28, Husain ‡ found tobacco decoction and soda rosin wash effective against the citrus Psylla in the Punjab. Two years ago the writer started the application of dry tobacco as a dust for thrips attack on chillies and onions as an alternative to spraying with Crude oil emulsion and tobacco decoction and this dry method has been found to be not only more effective but also to be more economic. Crude oil and allied contact materials are also now being used to check underground insects as soil fumigants, as cattle washes and as a deterrent against the fruit sucking moth. The above are some of the more conspicuous of the recent experiences with insecticides and in many of the Government

* "The mango hopper pest and its control in S. India" in "Tropical Agriculturist," Ceylon. (1918).

(i) Ent. Memoir. V. p. 130—1916—On *Pyrilla* by Misra.

* The Insect pests of tobacco in South India—Departmental pamphlet by T. V. R. Ayyar. (1918)

(ii) Ent. Memoir. VIII. (1925) on Nim scale by T. V. R.

‡ Ent. Memoir. X. p. 24, 1927.

research stations the use of insecticides has now-a-days become a regular routine and at the present day many private gardeners and orchardists have started stocking insecticides and appliances and carry on insecticidal operations as a regular agricultural practice. One such garden I have noted is an excellent and well conducted orchard in Panyam in Kurnool district.

A word or two may be added regarding fumigation with insecticides. Though this process has not as yet been started by individual farmers, a considerable amount of work has been done by the agricultural department all over India. In 1921, the Imperial Entomologist appears to have fumigated with success with cyanide a big cigar factory which was badly infested with the cigar beetle (*Lasioderma*). During the past two years over 300 consignments of various kinds of seeds, cuttings, plants, tubers, etc., have passed through this operation in the office of the writer for purposes of quarantine and issue of pest free certificates for commodities either going out of the country or being imported into it. The bulk of the work has been done with Carbon bisulphide and only on one or two occasions has cyanide fumigation been tried, this latter method being adopted to fumigate buildings to rid them of insect pests and other vermin. It is not unlikely that such fumigation may come into greater use when people begin to think of some effective remedy to get rid of bugs and other pests from public resorts and conveyances.

Present Position and the Future Outlook. It may be seen from the above that an increase in demand for insecticidal measures and consequently a proportionately greater need for insecticides are sure to arise in the future. It might be, therefore, advantageous to examine the different aspects of the subject, pointing out at the same time the essential needs and the existing difficulties in the matter and then put forward some suggestions for the future. In the first place there are certain important items which the party that attempts to adopt insecticidal measures should keep prominently in view to ensure success. These are, to start the operation at the proper time, use the proper material and apply it thoroughly. While it is certainly the look out of the gardener to get the necessary knowledge to judge of the correct time by gradual experience, he is practically powerless at present with regard to the other two factors—the proper material and thorough application ; for, they depend a great deal on the quality of the insecticide and the efficiency of the appliances he is able to procure. Let us consider these aspects for a moment. The success of any such insecticidal measure depends mostly on the merits of the insecticides used. In the opinion of the writer the fundamental pre-requisites of any insecticide are (a) efficiency in killing or deterring the pests for which it is intended, (b) safety of the insect infested plant, (c) easy availability, and (d) comparative cheapness. The first two may be

together termed insecticidal efficiency. From the point of view of the farmer it is very important that any material which claims to be a good insect killer should not only justify its claim to that property but it should at the same time be absolutely harmless to the plant to which it is applied; otherwise the remedy will be worse than the malady. Speaking of efficiency, the important characters of insecticides in general and stomach poisons in particular are that they should be insoluble in water, incapable of being absorbed by the plant and stable in quality both while kept in stock or after application on any plant; the physical and chemical properties of the various oil preparations and emulsifying agents such as viscosity, volatability, wetting and spreading qualities, etc., are also important in the way. Now-a-days when the demand for insecticides is gradually on the increase there is naturally a tendency on the part of commerial concerns dealing in drugs and chemicals to put on the market different kinds of stuffs with all sorts of absurd claims as to their insecticidal and other properties. The purity of the ingredients of the various nostrums advertised go untested and at present Government have no control over such charlatanistic ways. In the opinion of the writer, it is none too early for the authorities to come to the rescue of the poor and credulous farmer who is sure to be dodged and cheated by unscrupulous vendors of quack nostrums. If the present state of affairs is allowed to continue the position with regard to this matter of insecticides will reach a very deplorable stage; all sorts of worthless substances will flood the market and agricultural journals with attrative advertisements of useless and untried wares and the agricultural public which has often a tendency to patronise anything that is loudly advertised goes in for such stuffs and get disappointed. Apart from misleading the public in various ways, such a position may, in course of time, affect the credit not only of reliable insecticides of tried merit but would even create some want of confidence in agricultural officers. This was the condition in the United States of America before the year 1910 and to avoid such consequences, the United States Government passed a Federal Insecticide Law in 1911. The outstanding features of this act were (1) All manufacturers of stomach poisons like Lead arsenate and Paris green should conform to the standard specifications laid down in the Act, (2) All insecticides shall bear a label containing a statement as to percentage of active and inert ingredients in the material, (3) Insecticides containing arsenic should show in the label the percentage of arsenic in different forms. (4) Criminal proceedings will be started against those for advertising substances with false or misleading labels, (5) All insecticides should be up to the standard under which they are sold, and (6) No insecticide shall contain any substance which may be injurious to vegetation. To work these provisions properly, inspectors are appointed who analyse and test samples of various proprietory remedies and institute the

usual proceedings against law-breakers. In this way the pubic have been protected to a considerable extent from being swindled in various ways by unscrupulous vendors of quack preparations. It is needless to add that such action on the part of the authorities will go a great way in popularising really effective insecticidal measures and helping the farmer substantially in his pest control work. In 1928, the U. S. Government brought together these insecticide laws with the food and drugs regulations and since then, a Department of Food, Drug and Insecticide (Fungicides included) administration has been in existence. The case of insecticides and fungicides is exactly on a par with Fertilizers for which legislation is often called for.

Coming to easy availability and comparative cheapness, they depend a good deal on the possibilities of getting insecticides locally made as a result of local talent and indigenous manufacture. At present many of the insecticides come from outside the country and are naturally dear and often beyond the reach of the poor ryot. There are, however. signs to show that attempts are being made here and there both by official and private chemists and entomologists to discover and introduce insecticides of different kinds from locally available materials and it is highly necessary that such attempts should be encouraged in every way. One very notable example of this kind is the attempt to make use of indigenous fish poisons as insecticides as recently described in a paper * by the Mysore Entomologist Mr. T. V. Subramaniam. There is no doubt that as years go by, numerous such discoveries will be made and cheap, safe and easily available insecticides will come into use. Until then it would be advisable, in the opinion of the writer, to stock fairly good quantities of some of the well known insecticides and appliances in agricultural co-operative societies in central villages and make these available to local farmers at reasonable prices; it is also desirable that a similar small stock should form part of the paraphernalia of the rural agricultural demonstrator in every tract. Unless insecticides are readily available at the shortest notice the opportunity for adopting the measure and saving the crop would be certainly lost in most cases. To avoid this delay to a great extent, methods of preparing home made remedies like Kerosene emulsion, Tobacco decoction, Bordeaux mixture and similar preparations, might be advised to the villagers not only by means of vernacular leaflets but by actual demonstration by the local agricultural officer.

The writer believes that, if at least some of the above suggestions placed before this gathering of agriculturists receive some attention in the future, it would contribute substantially towards the more effective and economical use of insecticidal methods in India.

* The insecticidal properties of indigenous Vegetable fish poisons--Journal of the Mysore Agricultural and Experimental Union—XIII. pp. 57—61, 1932.

THE METHODS OF CURING TOBACCO FOR CIGARETTE PURPOSES PRELIMINARY TO THE CONSTRUCTION OF FLUE-FITTED BARNS

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Introduction. In response to the article on "The Position of Madras in the Tobacco Industry of India" published in this Journal, July 1934, there have been some enquiries from tracts of probable suitability for growing cigarette tobaccos. The enquirers want to know whether there are any methods to find out whether the tobacco of a particular tract is suitable for cigarette purposes before they can commit themselves to the construction of costly flue-curing barns. In reply to this enquiry the following information is furnished with the hope of kindling greater and wider interest in the trial of cigarette tobaccos.

In view of the co-ordinated programme of research on tobacco under the aegis of the Imperial Council of Agricultural Research in all the provinces, the possibilities of all the tobacco-growing tracts of a province have to be thoroughly explored; and for this purpose the provision of only a pair of flue-curing barns in each province by the Imperial Council of Agricultural Research may not be found adequate to tackle all the tracts. Hence the necessity and importance of such methods cannot be over-emphasized. Even if the tobacco were to be unsuitable for cigarette purposes we do yet require some methods of finding whether the tobacco of a particular tract can be cured for export because we find that a large quantity of Indian exports is used in the manufacture of pipe tobaccos.

At the outset it may be stated that growing tobacco for cigarette purposes is an art by itself. Many of the precautions and instructions were given in the Bulletin No. 187 of the Imperial Department of Agriculture. However a few hints may be included here Light sandy loams, preferably silted. should be grown with cigarette tobacco types H. 142, 177 of the Botanical Section, Pusa. Variety Harrison Special of the Indian Leaf Tobacco Development Co. may also be tried. Better results will be obtained in curing, if the crop could be grown on soil moisture alone without supplementing it with irrigation. But if the soil and local conditions require irrigation the number of irrigations may be as few as possible and may be restricted only to the earlier period of the crop. The manuring is best done with 1- 2 cartloads of well powdered farm yard manure compost mixed with a manure mixture containing 5 lb. nitrogen, 30 lb. phosphoric acid, and 45 lb. potash per acre. It is to be applied in the furrows opened for planting tobacco seedlings. The compost is prepared by stacking farm yard manure

with an equal quantity of soil or silt in a pit for an year or two, when it is taken out and powdered for use. The nitrogen may be obtained one-third from organic manures and two-thirds from mineral manures. The exact dose of manure required can be judged by preliminary trials in the localities concerned. If a crop is found to grow rank due to unavoidable circumstances the crop may be allowed to flower to reduce the rankness of the leaf.

Curing Methods. The methods suggested here are not meant to replace the method by flue-curing. But they are only as preliminary tests to find out the suitability of the tobacco of a particular tract for cigarette purposes. The tobacco cured by these methods does not equal the flue-cured tobacco in all qualities but makes a near approach. How far this would occur in a particular tract with its own peculiar limitations can best be estimated by a trial.

All over South India, the tobacco crop comes to maturity in February—March. But the cigarette tobacco types are earlier to mature than the local varieties in as much as the leaves are not to get thickened. Further the planting should be so arranged that the ripening process should be complete by the end of January so that there is no stimulation to new growth when the temperature begins to rise in February. The season therefore imposes very definite limits for the growth of the tobacco. The leaves shall have to attain their full size by the middle of December. During the cold weather the ripening process shall have to take place. If late planted, tobacco does not complete its growth till the end of January when the crop again begins to grow with the rise of temperature. The plant endeavours to make suckers and as such cannot be induced to ripen off sharply. The rise of temperature synchronises with the setting in of the "corn wind" called *Pyru gali* in the Northern Circars and *Uppam Kattu* in the Southern districts.

The mature leaves should be stripped from the plant as in flue-curing, but the stage at which the leaf should be picked is that it should be "almost fully ripe" whereas for flue-curing it should be "fully ripe". This difference can be recognised after some experience. The leaves should be strung on to bamboo stakes and hung up in tiers in a shed. It is most essential from considerations of safety that the shed is one of galvanised iron sheets the sides being covered by the same. To reduce the cost of the shed the covering of the sides may be done by mud plastered bamboo thatties. Provision should be made in the roof for escape of moist vapours from the leaf by inserting small chimneys made of galvanised iron sheet. Provision can also be made in the original construction by a double roof along the length by providing cross raftered couples. The 1 foot space between the top and bottom roofs may be closed at will by canvas *purdahs* hanging down from the top roof. Trenches may be dug in the ground 15 inches wide and 9 inches deep to take in the charcoal. The details of the

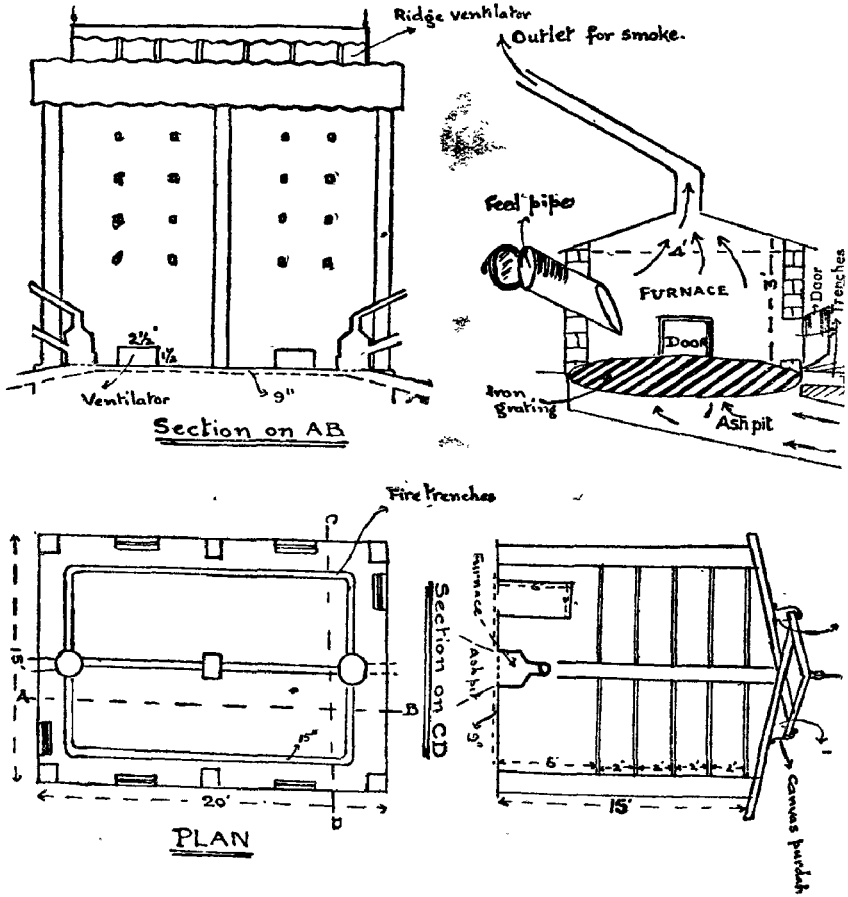
arrangements for feeding the fuel and leading off the smoke are shown in the plan.

As regards the fuel to be used, experiments in America have proved that charcoal is much better than other kinds of fuel, which seem to posses the disadvantage of fire hazard and the need of relatively frequent attention. Further the charcoal possesses the unique advantage of being available even in the smallest village and it can be easily prepared by burning some wood in a pit.

When the charcoal is fed into the pits, there will be some smoke given out which will be led away by the provision made. After the smoke ceases the red hot charcoal may be distributed in the trenches by dragging it with a long-handled spade.

If new sheds are going to be put up the following plan may be adopted. Otherwise in make-shift arrangements the provision for the fundamental needs e.g., for fire, escape of smoke and moist vapours and inlet of air may be made as best as the shed needs.

Plan of Curing Shed.



The tiers may be so arranged that the distance from the tip of the leaf of the lowest tier to the ground is about 4 to 4½ ft. This arrangement for a preliminary trial can be conveniently fitted up in any pucca shed of a farm, e.g., an unused store or a cattle shed etc. The bamboo stakes supporting the leaves are to be spaced at 9″—12″ in the top tiers and 6″—9″ in the lower tiers for aiding free circulation of air. As the season of curing advances and the atmosphere becomes hotter the stakes may be kept closer. The purdahs at the top should be closed. The leaf becomes yellow within 4 to 5 days. If the nights are heavily dewy at this time small fires may be maintained to help the leaf to continue the yellowing process without any check.

The yellowing process takes place best between 85° and 95°F. The humidity at this stage may be maintained from 95 to 85. The humidity will automatically adjust itself at these temperatures. The temperature at 8 a. m. during the months of January, February will be about 73° to 75° F. in most parts. The mean temperature of the day at this period will be about 80°F. So the temperature of the shed should be gradually raised to 85°F. within 24 to 36 hours after loading the shed. The temperature will then have to be gradually raised to 95°F. within 36 to 48 hours. This temperature of 95°F. is to be maintained for 6 to 12 hours according to the condition of the leaf. It is during this stage that the yellowing becomes uniform all over the leaf. It is the slow and steady yellowing that contributes a good deal towards the body, grain and texture of the leaf.

After this stage the purdahs on the top should be kept open. When about 85 to 90% of the leaf has yellowed the temperature may be briskly run up from 95° to 105° F. within 6 to 12 hours. The humidity during this stage drops down from 85 to 65. Then the bottom ventilators are to be kept half open to drive off the moisture in the shed. Though this will make the temperature fall down a little the temperature will have to be rapidly increased from 105°F. to 125°—130°F, within 8 to 10 hours. The humidity falls from 65 to 35. It is only during this stage that all efforts to increase the temperature and lower the humidity will help to fix up and retain the yellow colour obtained. Otherwise the resulting product will be dark coloured. The only test to find out whether the fire is properly maintained or not is that the tips of the leaves of bottom tiers should not wilt away prematurely before the base of the leaf has dried.

This temperature of 125°—130°F. may be maintained for about a week till the midrib of the leaf gets dry. If it is possible to increase the temperature it is better; if not this temperature has to be maintained till the midrib is completely dry. A rough test for this is only the brittleness of the leaf midrib when broken between fingers. Afterwards the fire may be put out and the shed allowed to cool. When the leaf has become soft after absorbing some moisture from the atmosphere, the leaf may be removed, unstrung, tied into hanks and bulked up.

Under ideal conditions the leaf cures to a moderately bright yellowish mahagony colour. Every little precaution taken from the beginning of the crop till the curing process in maintaining the leaf thin and controlling the curing will help a great deal to secure bright coloured product. A modest price for such a cured stuff may be between Rs. 125 and 150 per candy of 500 lbs. Two candies of cured leaf per acre may be obtained realising about Rs. 250 -300.

An easier but less paying method is the combination of this method with sun-curing. The leaf is kept in the shed as above till yellowing when it is removed out into the sun for drying. The leaf after being thoroughly dried may be tied into hanks and bulked. The method is not feasible when the weather is cloudy and moist. This can however be used only for the top leaves when the season has become pretty hot.

Conclusion. The production of a desirable quality of tobacco depends quite as much upon the curing process as it does upon the growth of the crop in the field. The potential quality of the crop may be developed to its highest point, or the crop may be badly damaged during the curing process, the success of the cure depending upon the conditions of temperature and humidity maintained in the shed. In the natural or air-curing method, the air conditions are largely determined by the prevailing weather, except in so far as they are modified by the protection afforded by the shed and any artificial heat provided during the curing process. The air conditions which influence curing are essentially temperature and humidity.

The curing process is often regarded as an art which may be developed to a high degree by some, but which is more generally lacking in the average grower. There are good reasons to believe that the best methods in present use may be improved, but the greatest value accrues by the adoption of better practices by the average grower, who now depends largely upon crude methods. It must be admitted that any attempt to determine definitely an optimum set of conditions is beset with many difficulties. It would be hazardous to conclude that all types of cigarette tobacco or qualities of leaf can be cured most favourably at a certain temperature and relative humidity. Approaches to optimum conditions will be obtained by gradual experience of the crop of each locality.

Now-a-days growing of new crops especially those which require specialised treatment for the product is beset with fears and suspicion from many points of issue. Firstly the crop may not be suitably adapted to the tract; the yield may not be commensurate: and the methods of preparing the product may require special adjustments to suit local conditions. Secondly the question of making initial investments on speculative crops will not be easily favoured by the ryot apart from the availability of the money the pinch for which he always

feels. Thirdly the prospects of attracting the attention of the buyers may present problems of its own which are further complicated by the existing conditions in these days of economic depression. The preliminary experiences may be gained by planting about half an acre of cigarette tobacco types For such small areas, small cattle sheds or temporary sheds may be used. Even if a new one is to be put up it can be done at a small cost on rented material. It is better to have two sheds for this purpose so that by the time the leaf is ready on the field after 7 to 10 days after loading the first shed, the second may be loaded with another picking of leaves. By this the work runs concurrently without having to allow the leaf to overmature in the field.

With the encouragement of the small scale trials by make-shift arrangements, permanent sheds may be constructed. Wider and larger scale trials for about 2 or 3 seasons will determine whether the tobacco of that tract is suitable for cigarette purposes or not. Later on when typical flue-curing barns are constructed these sheds will serve as godowns, bulking sheds etc. Thus there is very little that is lost in these preliminary trials. This will lead to the gradual replacement of a major portion of the area under country tobacco with that under cigarette tobacco which fetches better returns per acre.

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Research Notes.

The Fungus which causes 'Foot-Rot' of Paddy in South India.

In an earlier communication[1] the writer stated that the 'Foot-rot' of Paddy (*Oryza sativa*) was caused by a species of Fusarium and that attempts were being made to determine its exact identity. From the time the disease was first noticed in S. India in 1930, a vigorous search was made to discover the perfect stage of the fungus and several attempts were made to induce the development of the perfect stage in a variety of cultures. These efforts have not met with any success so far. The identity of the fungus has therefore been made from a prolonged study of the conidial stage. Despite some important differences mentioned in the previous paper, there were several points of resemblance between 'Foot-rot' and the 'Bakanae' disease of rice in Japan so that it was considered not improbable that the 'Foot-rot' fungus and the 'Bakanae' fungus might prove identical or very closely allied. Though originally called by different names, the 'Bakanae' fungus has now been established to be *Gibberella fujikuroi* (Sawada) Wr. and its conidial stage *Fusarium moniliforme* (Sh.) var. *majus* Wr. & Rg. In

1. Thomas K. M. (1933) *Madras Agri. Jour.* XXI No, 6.

August 1932, representative specimens of the disease and pure cultures of two isolations obtained from two different parts of S. India (Maruter and Coimbatore) were sent to a prominent Japanese worker on 'Bakanae' for favour of reciprocation and opinion. Failing to obtain any reply, similar consignments were sent in 1933 to the Director of the Department of Agriculture and Forestry in Japan, the Director of the Imperial Mycological Institute, Kew and Prof. Wollenweber of the Biologische Reichsanstalt fur Land und Forstwritschaft, Berlin. Prof. Ashby of the Imperial Mycological Institute whose reply was received earliest expressed the opinion that both cultures were *F. moniliforme* (Sh) var. *majus* Wr. & Rg. though they differed from the type culture in their failure to produce blue-black selerotia. He opined that based on precedent, it would be justifiable to create a new type under the variety *majus*. Prof. Ashby very kindly supplied sub-cultures of three strains of *F. moniliforme* for comparative study at Coimbatore. They were (1) *F. moniliforme* (Sh.) isolated by Bolle from Pokka-boeng of Sugarcane in Java (2) *F. moniliforme* var. *majus* Wr. & Rg. and (3) *Gibberella fujikuroi* (Saw.) Wr. isolated from rice by Sawada in Formosa.

Of the above, the second fungus alone produced blue-black sclerotia at Coimbatore.

Prof. Wollenweber who examined the two Indian isolations also noted the absence of blue-black sclerotia but observed that one of the two (Maruter) developed shorter conidia whose dimensions agreed with the type *F. Moniliforme* Sh. while the other (Coimbatore) more nearly approached the variety *majus*. In his opinion, the production of sclerotia was a variable factor to which great significance need not be attached. Prof. Wollenweber also very kindly supplied a culture of *Gibberella fujikuroi* (Saw.) Wr.

Dr. Nisikado of the Ohara Institute of Agricultural Research, Japan, to whom the Japanese Dept. of Agriculture and Foresty transferred the specimens and cultures from Coimbatore has recently written to say that he made a comparative study of the Indian and Japanese fungi but 'no valid morphological differences' were observed between them. Pathologically they were similar in that both produced the 'overgrowth' of rice and corn seedlings. In the meanwhile cultural studies and inoculation experiments were carried out at Coimbatore with five strains of *F. moniliforme* obtained from different sources. They were (1) Coimbatore strain, (2) Maruter strain, (3) Pokkaboeng (4) Majus and (5) *G. Fujikuroi* (Sawada's isolation). All the strains caused foot-rot of rice, but the Coimbatore strain was more virulently parasitic than all the rest. Under Coimbatore conditions, these fungi do not produce the overgrowth of corn. On sugarcane (variety P, O. J. 2878) all the fungi are wound parasites 'Pokkaboeng' strain being more perceptibly active. In cultures, all the fungi produced saltants which varied in colour, rate of growth, nature of mycelium, production of Conidia &c. Leonian [2] and Kurosawa[3] who have made extensive studies on this species have observed that the saltants of the fungus differ not only in morphological characters but also in their parasitism. In view of these experiences and the failure to obtain the perfect stage of the Indian fungus, there does not appear to exist sufficient justification to create a new variety or type in a species which apparently enjoys a world-wide distribution. The general consensus of opinion favours the adoption of the name *Fusarium moniliforme* (Sh.) var. *majus* Wr. & Rg Should further studies reveal the necessity for a taxonomic change, the subject will then be discussed in the light of those observations.

Agricultural Research Institute,
Coimbatore.
25th September 1934.

K. M. Thomas.

2. Leonian H. Leo. (1932) *West Virg. Agr. Exp. Sta. Bull* 248.
3. Kurosawa E. *Jap. Jour. Bot.* IV Abstract 286.

VILLAGE TANNING

Village tanning is as ancient as India itself. No one can say when tanning became a degraded calling. It could not have been so in ancient times. But we know to-day that one of the most useful and indispensable industries has consigned probably a million people to hereditary untouchability. An evil day dawned upon this unhappy country when labour began to be despised and, therefore, neglected. Millions of those who were the salt of the earth, on whose industry this country depended for its very existence, came to be regarded as low class and the microscopic leisured few became the privileged classes, with the tragic result that India suffered morally and materially. Which was the greater of the two losses it is difficult, if not impossible, to estimate. But the criminal neglect of the peasants and the artisans has reduced us to pauperism, dullness and habitual idleness. With her magnificent climate, lofty mountains, mighty rivers and an extensive seaboard, India has limitless resources, whose full exploitation in her villages should have prevented poverty and disease. But the divorce of the intellect from body-labour has made of us perhaps the shortest-lived, most resourceless and most exploited nation on earth. The state of village tanning is, perhaps, the best proof of my indictment. It waa the late Madhusudan Das who opened my eyes to the great crime against a part of humanity. He sought to make reparation by opening what might be called an educational tannery. His enterprise did not come upto his expectations, but he was responsible for the livelihood of hundreds of shoemakers in Cuttack.

It is estimated that rupees nine crores worth of raw hide is annually exported from India and that much of it is returned to her in the shape of manufactured articles. This means not only a material, but also an intellectual, drain. We miss the training we should receive in tanning and preparing the innumerable articles of leather we need for daily use.

Tanning requires great technical skill. An army of chemists can find scope for their inventive talent in this great industry. There are two ways of developing it. One for the uplift of Harijans living in the villages and eking out a bare sustenance, living in filth and degradation and consigned to the village ghetto, isolated and away from the village proper, This way means part re-organisation of villages and taking art, education, cleanliness, prosperity and dignity to them. This means also the application of chemical talent to village uplift. Tanning chemists have to discover improved methods of tanning. The village chemist has to stoop to conquer. He has to learn and understand the crude village tanning, which is still in existence but which is fast dying owing to neglect, not to say want of support. But the crude method may not be summarily scrapped, at least not before a sympathetic examination. It has served well for centuries. It could not have done so, if it had no merit. The only research I know in this direction is being carried on in Santiniketan, and then it was started at the now defunct Ashram at Sabarmati. I have not been able to keep myself in touch with the progress of the experiment at Santiniketan. There is every prospect of its revival at the Harijan Ashram, which the Sabarmati Ashram has now become. These experiments are mere drops in the ocean of possible research.

COW PRESERVATION

Cow preservation is an article of faith in Hinduism. No Harijan worth his salt will kill cattle for food. But, having become untouchable, he has learnt the evil habit of eating carrion. He will not kill a cow but will eat with the greatest relish the flesh of a dead cow. It may be physiologically harmless. But psychologically there is nothing, perhaps, so repulsive as carrion-eating. And yet, when a dead cow is brought to a Harijan tanner's house, it is a day of rejoicing

for the whole household. Children dance round the carcass, and as the animal is flayed, they take hold of bones or pieces of flesh and throw them at one another. As a tanner, who is living at the Harijan Ashram, describing the scenes at his own now forsaken home, tells me, the whole family is drunk with joy at the sight of the dead animal. I know how hard I have found it working among Harijans to wean them from the soul-destroying habit of eating carrion. Reformed tanning means the automatic disappearance of carrion-eating.

Well, here is the use for high intelligence and the art of dissection. Here is also a mighty step in the direction of cow preservation. The cow must die at the hands of the butcher, unless we learn the art of increasing her capacity of milk-giving, unless we improve her stock and make her male progeny more useful for the field and carrying burdens, unless we make scientific use of all her excreta as manure and unless, when she and hers die, we are prepared to make the wisest use of her hide, bone, flesh, entrails, etc.

I am just now concerned only with the carcass. It is well to remember here that the village tanner, thank God, has to deal only with the carcass, not the slaughtered animal. He has no means of bringing the dead animal in a decent way. He lifts it, drags it, and this injures the skin, and reduces the value of the hide. If the villagers and the public knew the priceless and noble service the tanner renders, they will provide easy and simple methods of carrying it, so as not to injure the skin at all.

The next process is flaying the animal. This requires great skill. I am told that none, not even surgeons, do this work better or more expeditiously than the village tanner does with his village knife. I have inquired of those who should know. They have not been able to show me an improvement upon the village tanner. This is not to say that there is none better. I merely give the reader the benefit of my own very limited experience. The village tanner has no use for the bone. He throws it away. Dogs hover round the carcass, whilst it is flayed, and take away some, if not all, of the bones. This is a dead loss to the country. The bones, if powdered fine, apart from their other uses, make valuable manure What remains after the dogs have taken away their share is transported to foreign countries and returns to us in the shape of handles, buttons, etc.

The second way is urbanising this great industry. There are several tanneries in India doing this work. Their examination is outside the scope of this article. This urbanisation can do little good to the Harijans, much less to the villages. It is a process of double drain from the villages. Urbanisation in India is slow but sure death for her villages and villagers. Urbanisation can never support ninety per cent. of India's population, which is living in her 700,000 villages. To remove from these villages tanning and such other industries is to remove what little opportunity there still is for making skilled use of the hand and the head. And when the village handicrafts disappear, the villagers working only with their cattle on the field, with idleness for six or four months in the year, must, in the words of Madhusudan Das, be reduced to the level of the beast and be without proper nourishment, either of the mind or the body, and, therefore, without joy and without hope.

Here is work for the cent. per cent. Swadeshi lover and scope for the harnessing of technical skill to the solution of a great problem. The work fells three apples with one throw. It serves the Harijans, it serves the villagers and it means honourable employment for the middle class intelligentsia who are in search of employment. Add to this the fact that the intelligentsia have a proper opportunity of coming in direct touch with the villagers.

—M. K. Gandhi in the *Harijan*.

ABSTRACTS

The Jute Industry. By Alexander R. Murray. (*The Journal of the Royal Society of Arts, Vol LXXXII, No. 4263, August 3, 1934*). In a paper on "The Jute Industry" read by Sir Alexander R. Murray before the Royal Society of Arts is sketched in brief, the history of the establishments and gradual development of the jute industry in India with Calcutta as its headquarters since the days of the East India Company. The unique place of Bengal as the world's jute producing centre is too well known to need emphasis. The pioneers of this industry had to surmount a good deal of initial difficulties to introduce and popularise jute yarns in the west where prior to 1835 jute was "looked upon with suspicion by users of linen goods" which bore the guarantee seal "warranted from Indian jute." The early history of jute industry was one of dire competition with the other well known and copiously used textile fibres like flax and hemp which were gradually suppressed almost to extinction. From the first inception of a power loom jute factory of 192 looms in 1859 on the banks of the Hugli, the Calcutta Jute Mill Industry steadily progressed in three quarters of a century until in 1933, over 60,000 looms were under operation in the whole of Bengal. Some 50 years ago the managing agents of the various mills constituted themselves into a body now known as the Indian Jute Mills Association with a view to protect and promote the interest of all those engaged in this industry. "For many years Indians have been investing largely in jute mill shares and the bulk of the capital now in the industry belong to Indian investers, although the management of the concerns continues largely in the hands of old-established agencies, who draw freely on Dundee and other home centres for the necessary expert assistance."

The place of Bengal as world's monopolised jute centre is statistically expressed thus: "In recent years the world production of jute has reached about 2,000,000 tons, all grown in India with the exception of, say, 12,000 coming across the border from Nepal, and perhaps 5,000 tons from Formosa and Japan." Sir Murray adds "Besides growing practically the whole of the jute supply of the world, India for the past 20 years has been manufacturing more than half the total crop into bags and cloth mainly for export to other countries. The jute export trade is of the greatest importance to India. In some years these exports of jute, raw and manufactured, represent 25 per cent. of India's total exports of merchandise." The world wide economic collapse since 1930 coupled with over-production has naturally created great anxiety in those concerned in this gigantic industry. As a result of the analysis of its present position the "Indian Jute Mills Association are now considering a programme of research with a view to expanding markets and finding new uses for jute products," and thus trying to maintain its position in the world trade. This slump in the world trade has now compelled the associated mills to reduce working time by about a third, sealing down 15 per cent. of the total looms, and the universal adoption of single shift working with a consequent slow retrenchment of 21 per cent of workers, a half of which are women employees—all this calculated to bring supply into line with demand.

In the 25 years that have gone by "the producing capacity of the mills on the banks of the Hugli has increased 100 per cent." Sir Murray further observes "Notwithstanding the drastic curtailment of working hours and probably largely because of the intense production therefrom there was a steady increase in output from Calcutta mills right down to the year 1930. Indeed, until then, but for the tempo'ary post-war set back, continued expansion has been a feature of the Calcutta Jute Mill Industry....." A great bulk of the production of Calcutta mills is exported outside India both as raw jute and manufactures about equal quantities by weight for consumption, the maximum weight being 898 thousand tons of raw jute for 1928—29 and 958 thousand tons of manufacture for

1929–30, and it is interesting to note from the figures in the Annual Accounts relating to the Sea-borne Trade and Navigation of British India for the last 15 years that the weight of manufactures exported, exceeded that of raw material with the exception of a short period round about 1928, when the two sides of the export trade ran week to week" and in the year 1933—34 ' when exceptionally low prices ruling have tempted over-seas buyers to lay in heavy stocks of the raw material." It is mentioned that during the year ended 31st March 1926 (a year of high prices) the total exports value was 96·78 crores of rupees. Computing at the then current declared value of raw jute exports of Rs. 586 a ton the net amount realised for cultivators, balers and dealers in jute was 85 crores. The position is quite different in 1933—34 with a total of 32·30 crores of rupees, the declared value of raw jute having fallen to one-fourth of the 1925—26 value "What a difference this reduction in the amount of money circulating must make to all concerned!"

The United Kingdom, Germany, France, Italy and Belgium are steady importers of Indian raw jute for purposes of converting it into piece-goods, bags, carpets, rugs and other sorts of jute goods which are placed on world markets, in competition with India's exports of manufactured articles. Regarding other new uses successfully attempted by manufacturers at Dundee, Sir Murray observes, "One must give this country credit for extending the use of jute goods to the linoleum and furnishing trades, to the tailor trades, to the boot, shoe and slipper trades, to the cable industry, and for various other purposes, including even roadmaking."

Bengal with an area of over 3½ million acres under jute and an estimated yield of 121 million bales (405 lb. a pucca bale) produces 90 per cent. of India's raw jute. "Jute is the only crop which the average Bengal Cultivator can sell to obtain money for rent, clothes, bullocks, and other necessities of life. He spends little in cash in producing the crop. Rent, he must pay and he may have to buy seed, but he only employs outside labour in years of exceptional prices. It is only when the price of paddy exceeds that of jute that the cultivator can expect to obtain a greater gross return from paddy as an alternative crop." (Review of Agricultural Operations in India, 1929—31). India is the cheapest fibre producer mostly suitable for general packing and transport requirements.

The periodical wide fluctuations in the prices of jute both raw and manufactured is a serious handicap and has not infrequently compelled "cement manufacturers to turn to paper bags and wheat growers to elevators and bulk handling where convenient." The cause of these unsteady prices is traceable mainly "to the size of the jute crop which, being a seasonal one, provides opportunities for forward operations by speculators." But of late authorities are being induced to take measures "to control gambling elements and minimise the risk of violent market fluctuations in price." The chief management of the jute industry as represented by the Indian Jute Mills Association is in the hands of a Jute fraternity, both European and Indian." The members of this happy association, while enthusiastically trying to retain the existing trade, are also initiating a policy of research with the object of discovering fresh markets and new uses for Indian jute. Japanese competition in this line though nascent is a serious problem for the future and it is suggested to Government to provide in time adequate tariff protection to the local industry. Mr. J. Goodman while discussing this paper conveys warning in a nut-shell when he says "If Japan developed the industry they might find she was a greater competitor to the jute trade in Bengal than she was at present to the Indian cotton industry in Bombay." P. V. H.

The Farm of Conception of Economics, by Sir J. C. Coyajee, Andhra University, Waltair. *Indian Journal of Economics, July 1934.* This is a learned discussion of the development of economic thought under the Fascist regime in Italy. As

the author says at the outset of the article, the Fascist Economic theory has not yet crystallised itself. Controversies are still going on between the old school of economists and the new. The economic doctrines and principles as developed and expounded by the leading Fascist Economists like Gaetano Napolitano, Arias, Fovel and others are here examined and discussed. These Fascist economists are as it were a new school in Europe. In the social aspect, economics can be divided into individualist economics and collectivist economics. The Fascist conception seems to be a via media between the two. The theoretical bases for many of the new doctrines show a new phase as a result of the Fascist policy and many of the accepted concepts of economic theories have been eschewed to its advantage. This does not mean that there had been any revolution in the economic principles adopted. It may be said that the attempt has been to reform the accepted principles to the altered conditions, always having in mind the fact that "corporative conscience is the essence of Fascist economics."

Fascism has digested other schools of thought and adopts a selective course which is remarkably successful. Fascism allows certain amount of freedom of industrial development in the country adjusting at the same time capitalism "on the lines of centralisation and rationalisation." Fascism agrees with Socialism in some respects particularly in condemning the present economic system. The Fascist economists adhere to what is called the Corporative System.

The State is the all important body and the individual is only a part of it. The importance of the individual has been considerably diminished though not entirely. When the ideal is the achievement of maximum satisfaction the State comes to the forefront and has to intervene in many of the activities of the members and groups comprising the State. The national as well as the individual aspects have been well emphasised under the Fascist conception. The interests of the State are surperior to those of the individual. The State is there not only to make laws etc., but also to undertake production which implies economic planning. This seems to be a very important aspect with reference to the functions of the State. However Fascist economists assert that there must be a limit to the sphere of State intervention. Due place has been given to the enterprise of the individual under the Fascists. The individual and the State may be held to be complimentary forces. Fascists stand for State intervention for the benefit of society wherever it should side by side with individual effort.

In the broad sense the State itself is one of the factors of production. The position of the numerous Syndicates comprising of private individuals has not been made clear. The "productive categories" of capital and labour form the factors production for the syndicate organisations. The Corporations, which are State organisations, are on the high road to become factors of production themselves.

There is less room for monopoly under the Fascists. When there is State control of production to a great extent, co-ordinating group or individual enterprise, the competitive element is greatly eliminated. However competition has not been ousted completely which is not practicable nor entirely wholesome. It will be proper to say that competition has been restricted under the Fascists. The Fascist economists are alive to the beneficial results of free competition and monopoly.

The Fascist conception has been summed up in the five doctrines given below. (1) "All economic phenomena are subordinated to the State's objects." (2) All the economic activity in the country promoted by the State should be interdependent. (3) All private property has got a "public" character and even individual economic life is not free from this taint. (4) According to the Fascists all economic phenomena have to be explained "from the objective fact of the aims of the

State" rather than in the usual way from the individualistic aspect. (5) Free competition and monopoly should give place to a "more profound idea of economic liberty." Above all it is interesting to note that the Fascist concept lays emphasis on the interdependence of the nations and the essential unity of the economic world. S. V. D.

A new Dip for Potato Scab. Magee C. J. *Agri. Gas. N. S. Wales*, Vol. XLV, pp. 441-442. The New Zealand Department of Agriculture is now recommending an acidulated corrosive sublimate dip for seed potatoes which was originated by Dr. G. H. Cunningham as a control against Rhizoctonia disease but was subsequently found to be good against Scab *(Actinomyces scabies)* and more efficient than the old time standard corrosive sublimate dip. The acidulated dip is prepared according to the following formula, 25 gallons of which will be enough to treat one ton of seed and will cost about 3 sh.

Corrosive sublimate (Mercuric chloride) 4 oz.
Commercial hydrochloric (Muriartic) acid 2 pints.
Water (to make up) 25 gallons.

The corrosive sublimate is dissolved in the hydrochloric acid contained in a glass or glazed earthenware vessel by stirring. This stock solution is diluted with water in a wooden barrel or vat to make up 25 gallons. The time of treatment in the new dip is only 10 minutes as against 1½ to 2 hours in the old standard dip. The solution loses its strength more slowly than the old dip and can be used for 10 dippings. After 10 dippings, the solution may be utilised for another 5 dippings, provided the time is increased to 15 minutes. The potatoes should be placed directly into the solution and not dipped in bags. A very convenient method is to place the potatoes in a wooden crate which is built to fit snugly inside a large wooden barrel and to dip the seed in crate-fuls. The potatoes should be treated uncut and before they commence sprouting. They should be rapidly dried after treatment to avoid injury to the 'eyes.'

The dip kills the fungus on the seed and does not claim to exert any protective effect on the young tubers nor to take the place of crop rotation which is as important in the control of Rhizoctonia and Scab as seed treatment.

Being a deadly poison, the dip should be handled with caution. The hands should be rubbed with fat to avoid irritation due to frequent wetting with the dip. Treated tubers should not be fed to stock. K. M. T.

Some factors affecting the inactivation rate of the virus of tomato spotted wilt. By J. G. Bald, M. Agr. Sc, (*Annals of Applied Biology*, Vol. XXI). The author noticed decrease in the virulence of the virus 3 hrs. after the infective juice containing it was left at room temperature. This was examined quantitatively by the primary lesion method, which when graphed showed a logarithmic curve. Stirring of a 1-20 sample of inoculum was found to increase the rate of inactivation of the virus. When air and N were bubbled through two samples of 1-20 inoculum, it was found that the inactivation was more rapid in the former case. Chloramine T., at a strength of 0·1% rendered the inoculum inactive immediately. H_2O_2 at a strength of ·1% gave fairly good results. Of the 6 reducing agents tried 4 increased inactivation and 2 decreased it. Work of Pedrau showed possible increase of active virus particles soon after adding a reducing agent. This author noticed such effects in his experiments also, but not when inactivation was complete. This reactivation may be due to the reversal in the first stages of a chemical reaction causing inactivation.

S. V. P.

Gleanings.

Honey—A Food and a Medicine. Mr. H. Willoughby Lance, Apiculturist, Department of Agriculture, Western Australia, summarises the value of honey as a food under six headings: (1) It is the only natural sweetening substance, everything else like cane sugar and beet sugar having been refined from other materials during which process all else that is not plain sugar is removed. (2) It has already been changed or digested by the bees and is almost immediately assimilated into the body. (3) It is an energy producing food. (4) It contains mineral and other substances so necessary for the maintenance of health. (5) Its hygroscopic properties make it almost impossible for disease germs to live in it. (6) It is pleasant and attractive to the taste. In addition to these it is a well known cure for colds on the chest, influenza, sore throat etc., if taken with hot milk or lemon. As a cure for constipation a dessert spoonful in a glass of hot water night and morning always nearly cures this trouble. It is a wonderful remedy for boils, carbuncles, septic poisoning etc. For toothache Emmet Baxter (Philadelphia) says, "I have sold numbers of people honey for this specific purpose and every one of them without exception has told me that it worked like a charm". "Just take a big swallow in the mouth and hold around the affected tooth for a while. It usually does the trick in a few minutes." Honey is an excellent cure for bee stings and inflamed and sore eyes. Equal parts of honey and cream mixed together is an excellent cosmetic, softening and beautifying the skin. (*Queensland Agricultural Journal*—Volume XLII—pages 314—316. 1934).

Sources of Milk. Although the cow is probably the most widely used source of milk for human food, many other species are likewise employed by man. Goats supply milk for the Arabs, South Europeans, Latin Americans, and the Spaniards. The camel supplies the Egyptians and the Arabs; the mare, the Tartars and the Mongols: and the reindeer, the Lapps and Eskimos The inhabitants of Asia, especially those of India, milk the zebu, or Indian cow; and the Chinese and the Filipinos use the water buffalo. Sheep are milked in the Netherlands, in Greece, in Czechoslovakia, in Italy, and in the Balkan States. The yak, belonging to the bison family, supplies the natives of Mongolia and Tibet, and milk from the llama, a relative of the camel, is used extensively in South America. However, in many countries even these substitutes for the cow are lacking. Under such conditions the tendency is to prolong the period of normal nursing, sometimes to an extraordinary extent, thus the mothers in some Indian tribes, among the Eskimos, and the poorer Chinese and Japanese nurse their children four to six years, or even longer.

In recent years evidence has accumulated rapidly to show that milk contains substances indispensable to life. (*The Journal of the Department of Agriculture of South Australia*, February, 1934.)

Kerosene Emulsion—its Preparation and Use. As a general spray for scale insects on citrus and deciduous fruit trees kerosene emulsion has been largely superseded by miscible white or red oil. It can still be recommended, however, for the control of thrips and for fowl tick, fowl mites, fleas, and other vermin, states a departmental leaflet. The formula is as follows:—

Hard soap, 1½ lb.
Kerosene, 1 gallon.
Water, 1 gallon.

Cut up the soap and place it in 1 gallon of water and heat until dissolved. Remove from the fire and immediately stir in the kerosene and mix until thoroughly emulsified.

For the control of thrips, aphids, &c., add this stock solution to 18 gallons of soft water (1 pint stock to 9 pints water). For fowl tick, fowl mite, and fleas, the stock solution should be added to 8 gallons of water (2 pints stock to 8 pints water). The stock solution may be diluted at once with cold water, but if allowed to stand until cold it must either be reheated or else hot water must be used to dilute it.

As kerosene is injurious to rubber, a warm solution of soda should be passed through the hose after using. (*Queensland Agricultural Journal*, Vol. 42, Part II, P. 311).

A World Search for Useful Plants. Plant explorers of the U. S. Department of Agriculture are now making an intensified search at home and abroad for plants that will help to control soil erosion Two parties are abroad—one in Russia and one in Japan—and other parties will search the western half of the United States.

H. L. Westover and C. R. Enlow will visit Russian Turkestan, Persia and Afghanistan, looking for all kinds of soil-holding plants which show possibilities for the Southwestern United States. Five years ago Mr. Westover spent a year in Turkestan and Persia and brought back several strains of wilt-resistant alfalfa which are being used to build up resistance to this disease in our domesticated alfalfas

The Russians, according to Knowles A Ryerson, chief of the Bureau of Plant Industry, have a highly developed program of plant introduction under the direction of N. I. Vavilov, who is also head of the Agricultural Academy at Leningrad. A party of Russian Horticulturists has been in the United States since the first of the year, studying our citrus industry. Two years ago when the department had two men in South America for a few months searching for disease-resistance potatoes to use in breeding work the Russians had several men there for a year for the same purpose The second party of foreign plant explorers, including H. G. MacMillan, a veteran plant explorer, and J. L. Stephens, a forage crops specialist, is now in Japan. They expect to cover as much territory in the Far East as possible during the next eighteen months. They will search for plants in the fringes of the Hingan Mountains, a region which has never been explored for grasses. Frank Meyer, of the department was there many years ago in search of fruits. Because of the extremes in temperature in this region it is hoped that the search will yield promising plants. While both groups will be particularly interested in plants that can be used to prevent soil erosion they will also collect seeds and fruits of any other plants, especially promising trees and shrubs.

The hunt for useful wild plants in the United States is the first correlated effort to make the beginning on a nation-wide inventory of our own unused plants. For this reason it is hoped that valuable plants may be found in the United States. Workers at the state experiment stations and those employed by the Department of Agriculture have frequently discovered and domesticated valuable wild plants. but such work has been incidental. One party of ten trained botanists is at work in Washington and Oregon. Another group will soon begin work in Arizona and New Mexico. Other parties will work in Texas and Oklahoma and in North Carolina and Tennessee. (*Science* Vol. 60, No. 2064, P. 65).

Vitamin C in Chillies (*Capsicum annum*). In 1932 Prof. Szentgyorgyi succeeded in isolating vitamin C from the outer skin of capsules of *Capsicum annum* and identified it with ascorbic acid. Following up this discovery, M. S. Tompos (Kiserletugyi Kozlemenyek, 1934, No. 4—6), studied the vitamin C content of several fruits and fresh peppers. One gramme of juice from the skin of a well

developed but not fully ripe fresh pepper contained 2·1 to 3·4 mgm. of vitamin C (ascorbic acid). Other plant foods contained the following quantities of vitamin C.

1	Gramme of juice of	cucumber	0·09	Milligrammes.
1	,, ,,	apple	0·14	,,
1	,, ,,	plum	0 26	,,
1	,, ,,	Onion (Mako)	1·3	,,
1	,, ,,	Sweetbriar fruit	4—5	,,

If it is considered that the content in water of the last was 50%, whereas pepper contains 85 to 90%, it is realised that pepper has the highest content in vitamin C in relation to dry matter of the fruits studied.

It would appear that the content in this vitamin varies greatly in different plants. It would therefore be of use to select the kinds of pepper having a high content in vitamin C particularly as with the values already known it would be profitable to produce vitamin C in bulk from pepper. (*Int. Review of Agriculture, Rome*, Vol. XXV, No. 5, P. 216.)

Correspondence.

Markets for Eri Silk Worm Cocoons.

Mr. M. C. Cherian, Officiating Lecturer in Entomology, Agricultural College, Coimbatore writes:— As I am getting a number of queries regarding the maketing of Eri Silk Cocoons. I shall be glad if you will kindly publish the following in your valuable Journal.

The quotation given in my paper on "Some trials with Eri Silk-worms" published in the Madras Agricultural Journal, Volume XXII, No. 3 are from Messrs. Ganeshdas Badrinarain & Co., Silk Merchants, Gauhati P. O., Assam. Since publishing the paper another firm, Messrs. Surajmul Haribuksh, Fancy Bazaar, Gauhati P. O., Assam, has also agreed to buy Cocoons. Since prices are liable to fluctuate, it is better to get their latest quotations.

Review.

Note on an Enquiry into certain Public Health Aspects of Village Life in India and Population and Health in India—The Real Problem—by Major-General Sir John Megaw, Director General, Indian Medical Service. pp. 18. This is a small pamphlet in two parts. In the first part is recorded the results of an attempt to make a broad survey of certain aspects of village life which have a bearing on the health of the people. The data was obtained by issuing a questionnaire to a large number of doctors whose dispensaries are situated in typical agricultural villages scattered throughout British India. The following conclusions are drawn from the results of the enquiry. The average size of a family varies from 5 in Central Provinces and Madras to 6·4 in the Punjab, the average for the whole of India being just under 5·5. The average area of land per head of the agricultural population ranges from 0·72 acres in Bengal to 2·63 acres in Central Provinces. With regard to physical condition of the villagers, taking India as a whole 39 per cent. are well nourished, 41 per cent. poorly nourished and 20 per cent. very badly nourished. This is attributed to the poor quality of the food rather than to the quantity consumed. Very little alcohol is consumed by the average villager and the percentage of people who take alcohol at all works out at 12·3 for the whole of India. The percentage increase in population for the period 1921–31 is recorded as 8·5 as against the census estimate of 10. The average span of life is less than half of what it might be. In spite of the excessively high death rate the population is increasing much more rapidly than the

output of food and other commodities. Periods of famine or scarcity of food have been occurring in one village out of every five during a ten year period in which there has been no exceptional failure of the rains Young girls who ought to be still at school are forced to become wives and mothers, many of whom are doomed to die in child bearing. Epidemics of cholera, plague and small-pox are commonplace occurrences; and malaria is constantly present throughout the greater part of India. Other diseases surveyed are rickets, night-blindness, syphilis, gonorrhoea, leprosy, tuberculosis, insanity and blindness.

The second part deals with the real problem of population and health in India. A short resume of the basic principles of the population problem is given. Variations in populations through the years and how these are brought about is described with reference to certain countries—England, Ireland and Japan. Whereas in England the conditions of Public Health have improved considerably, in Japan the reverse is the case, in spite of determined efforts towards its solution. This is attributed to a higher birth rate compared to increase in production of commodities. In India also reproduction is increasing more rapidly than production: and the remedy, therefore, lies in controlling population--whether by celibacy, delayed marriage or contraception. The evils of India are due to ignorance of life planning and the remedy for this consists in education directed definitely towards teaching the people how to make a success of life. This can be done by well organised propaganda by such means as the cinema and broadcasting.

M. A. S.

Crop & Trade Reports.

Cotton Crop, Madras,—1934-35—intermediate report. *Last year's crop.* The yield of the second or summer pickings of the 1933—34 crop is expected to be generally normal.

2. *Current years's crop.* The main season for sowing is not yet over in most parts of the Presidency. The sowings of *hingari* or late cotton in the districts of Bellary and Anantapur have been delayed for want of rains

The *mungari* or early crop in parts of the Deccan is reported to be suffering for want of good rains.

2. The wholesale price of cotton lint per imperial maund of 82 and 2/7 lb. as reported from important markets towards the close of August 1934 was about Rs. 20—8—0 for Cocanadas, Rs. 20—6—0 for red northerns, Rs 21—0—0 for white northerns, Rs. 16—5—0 for (early crop) westerns, Rs 25—14—0 for cambodia, Rs. 24—7—0 for Coimbatore karunganni Rs. 24—10—0 for Tinnevelly karunganni. Rs. 24—2—0 for Tinnevellies and Rs. 21 for Nadam

When compared with the prices in the previous month these prices reveal a rise of 3 to 25% for all varieties of cotton except Cocanadas. The rise was 25% in the case of northerns, red and white. The price of Cocanadas fell by three per cent.

Pepper Crop, Madras—1934—First Report The area under pepper up to the 25th August 1934, in the districts of Malabar and South Kanara is estimated at 94,400 acres (86,000 acres in Malabar and 8,400 acres in outh Kanara) as against 95,000 acres (87,000 acres in Malabar and 8 000 acres in South Kanara) estimated for the corresponding period of last year. The condition of the crop is good.

2. The wholesale price of pepper per Imperial maund of 82 and 2/7 lbs. as reported from important markets towards the close of August 1934 was Rs. 22 in Calicut, Rs 19—11—0 in Tellicherry and Rs. 19—3—0 in Cochin.

Ginger Crop, Madras—1934. First Report. The area under ginger up to the 25th August 1934 in Malabar is estimated at 11,000 acres as against 10,000 acres for the corresponding period of last year. The condition of the crop is fair.

2 The wholesale price of dry ginger at Calicut rose from Rs. 7—10—0 per imperial maund of 82 and 2/7 lb. towards the close of December 1933 to Rs. 12—14—0 towards the close of August 1934.

Groundnut Crop, Madras—1934. Third Report. The average of the areas under groundnut in the Madras Presidency during the five years ending 1932—1933 has represented 49·9 per cent. of the total area under groundnut in India.

2. The area sown with groundnut upto the 25th September 1934 is estimated at 1,937,300 acres. When compared with the area of 3,211,200 acres estimated for the corresponding period of last year, it reveals a decrease of about 40 per cent.

3. The decrease is general outside East Godavari and Chingleput and is due to the insufficiency of rains at sowing time and to the fall in the price of groundnut. The decrease is marked in Guntur, the Deccan, the Central districts and the South. In Bellary, the area fell from 369,000 acres to 142,000 acres

4. The summer crop throughout and early crops in Salem and Coimbatore, have been harvested. The yields were generally below normal.

5. The condition of the crop is not satisfactory outside Vizagapatam, Kurnool, Cuddapah, Chittoor and North Arcot The crop was affected by heavy rains in Ganjam and by drought in the other districts. The crop is reported to be withering in parts of Guntur and Salem and to have withered in parts of Bellary, Anantapur and Tanjore.

6. The wholesale price of groundnut shelled, per imperial maund of 82 and 2/7 lbs. as reported from important markets towards the close of September 1934 was Rs. 4—14—0 in Cuddalore, Rs. 4—3—0 in Vizagapatam, Rs. 4—2—0 in Guntur and ranged from Rs. 3—8—0 to Rs. 4 in the other districts. When compared with the prices reported towards the close of July 1934, these prices reveal a rise of 60 per cent. in Nandyal, 49 per cent in Salem, 42 per cent in Cuddapah, 34 per cent. in Cuddalore, 33 per cent. in Adoni, 24 per cent. in Vizagapatam and 12 per cent. in Guntur.

Sugarcane Crop, Madras—1934. Second Report. The average of the areas under sugarcane in the Madras Presidency during the five years ending 1932—'33 has represented 3·7 per cent of the total area under sugarcane in India.

2. The area planted with sugarcane up to the 25th September 1934 is estimated at 114,710 acres. When compared with the area of 113,500 acres estimated for the corresponding period of last year, it reveals an increase of one per cent.

3. There has been an increase in area mainly in Kistna, Guntur, and South Arcot, partly set off by a large reduction in area in Bellary, Chittoor and North Arcot In Kistna and Guntur, the area rose from 800 acres to 3,400 acres due chiefly to the impetus given by the prospect of the opening of sugar factories.

4 The condition of the crop is satisfactory except in Ganjam, Vizagapatam, Bellary, Anantapur, Salem Trichinopoly and Tanjore. The crop suffered from prolonged drought in the summer and subsequent heavy rains in Ganjam and Vizapatam and from deficient rain-fall in the other districts. The crop is affected by "Smut" disease in parts of Trichinopoly. If the season happens to be normal during the rest of the growing period, the yield is estimated at 319,280 tons of Jaggery as against 3,22,250 tons for the corresponding period of last year.

5. The wholesale price of Jaggery per imperial maund of 82 and 2/7 lb., towards the close of September 1934 was Rs. 10—5—0 in Erode Rs. 7—13—0 in Cuddapah, Rs. 7—11—0 in Nandyal; Rs. 7—6—0 in Vellore and Rs. 7—0—0 in Trichinopoly. It ranged from Rs 6—6—0 to Rs. 6—13—0 in the other markets. When compared with the prices of the previous month, these prices reveal a rise of 72 per cent in Erode, 40 per cent in Trichinopoly, 12 per cent in Nandyal, and 6 per cent in Cuddapah and a fall of 22 per cent in Vizagapatam, 15 per cent in Vellore, 11 per cent in Ellore, and 10 per cent in Guntur.

Sugarcane Crop, Madras—1934—Intermediate Report. The sugarcane crop suffered from drought in the districts of Ganjam, Vizagapatam, Bellary, Anantapur, South Arcot, Trichinopoly and Tanjore. In the Salem district the crop was attacked by disease in the Cauvery—channel area, due to the intensive cropping of superior varieties year after year without paying any heed to rotation. Normal yield can be expected in the other districts if the present conditions continue.

2. The wholesale price of jaggery per Imperial Maund of 82 and 2/7 lbs as reported from important markets towards the close of August 1934 was Rs 8—11—0 in Vellore, 8—2—0 in Vizagapatam, 7—10—0 in Ellore, 7—6—0 in Guntur and Cuddapah, 6—14—0 in Nandyal, 6—0—0 in Erode and 5—0—0 in Trichinopoly. When compared with the prices of the previous month, these prices reveal a rise of 97 per cent. in Vizagapatam, 78 per cent. in Vellore, 65 per cent. in Ellore, 51 per cent. in Cuddapah, 53 per cent. in Guntur, 7 per cent. in Trichinopoly and 9 per cent. in Nandyal. The price was stationary in Erode.

Gingelly Crop. Madras—1934-35—Second Report. The average of the areas under gingelly in the Madras Presidency during the five years ending 1932—33 has represented 12 per cent. of the total area under gingelly in India

2. The area sown with gingelly up to the 25th September 1934 is estimated at 405,000 acres. When compared with the area of 532,200 acres estimated for the corresponding period of last year it reveals a decrease of about 24 per cent.

3. The decrease in area occurs in most districts and is due to the insufficiency of rains at sowing time The decrease is marked in Ganjam (—10,000 acres), Vizagapatam (—10 000 acres), East Godavari and West Godavari (—15,000 acres in each) Coimbatore (—15, 00 acres), Trichinopoly (—29,000 acres) and Tinnevelly (—12,500 acres). There has however been an increase in area in Salem due to early sowing rains.

4. The early crop of gingelly has been harvested in parts. The yield was generally below normal. The standing crop has been affected by drought to some extent. The crop is reported to be withering in Guntur for want of rains.

FINAL YEAR STUDENTS ON TOUR

BY NARASINGA RAO U. (B. Sc. Ag. iii).

The long expected tour to the South of the Presidency, through the States of Travancore, Cochin and South Malabar had after all come to pass! It was on the 1st of October that the students of the final year class started on a tour to places of agricultural interest accompanied by the Principal Rao Bahadur D. Ananda Rao and two Assistant Lecturers Messrs. S. Narayaniah and T. S Ramakrishna Aiyer. It lasted a fortnight—a fortnight spent in circumventing the dry tract of Southern India and coming up by the West coast visiting places like Koilpatti, Trivandrum, Nagercoil, Cochin, Ernakulam, Trichur and Pattambi.

We were a batch of 31 and we started by the night train for Koilpatti. We arrived at this place and took the first opportunity of going round the Farm which has both black and red soils. The Superintendent explained to us the differences in cultivation in either of them and an outstanding inference they have drawn from their experiments on the Farm is that in black soils cotton after cambu was better yielding than cotton after cholam in the matter of rotation of crops. A neighbouring village—Avalnatham—then shared our attention where we acquainted ourselves with the local agricultural practices.

We left for Trivandrum on the 4th and as we packed ourselves among the passengers on our seemingly dreary journey in a crowded train little did we think

that the prospect of a scenery par excellence where Dame Nature shines with her virgin beauty and "where every prospect pleases and man alone is vile" would be unfurled before us, for we had passed Tenkasi when the summits of the Sahyadri were wound in fathomless ravines, craggy peaks almost hidden in fleecy clouds and all the mountain sides covered with giant trees and prospects of green everywhere—all these under a blazing tropical sun whose rays scarcely penetrate t ese virgin forests. The wind howled as it gushed through the trees; and those tunnels too which the 'iron-horse" entered with a suddenness as startling as it left them, the winding track which alone bespoke of man's activity in those primeval forest heights—all these stirred us deeply. The eye never seemed to tire and this manifestation of all that is beautiful and sublime in nature which stirred our ancestors to an awe-inspiring pitch (as it did in us now) left us in that mental tranquility not unlike of one who sees God eye to eye.

And now in Trivandrum. This town struck us as a place daily growing in importance with laid asphalt roads. The whole town had put on a festive appearance in readiness to welcome His Highness the Maharajah of Cochin who was due to arrive in a day or two. We paid a visit to the Government Farm at Kodappanakkunnu and to our pleasant surprise we saw Scindhi cattle flourishing here on the West Coast ever notorious for its inhospitality to cattle in general. Accompanied by the State Director of Agriculture we saw for the first time a Rubber plantation orty acres in extent and the latest collection was also seen.

Opportunity was taken at this stage to visit "the land's end" the Cape Comorin where the two seas meet and surrounded us on three sides. Two miles from here is the State Fruit Farm which impressed us considerably with its good lay out On our way back, at Nagercoil where we spent a few hours the local Government Paddy Farm was visited. We were given to understand that the land was reclaimed out of marsh by systematic and scientific methods of cultivation. Then again in the capital of the premier South Indian State, the Zoo, the School of Arts and the Museum also claimed our interest.

Quilon was the next place where we broke our journey in that land of cocoanuts—Travancore. Here we found ourselves in Motor boats bound for Alleppy along the famous back waters. Palm fringed these great highways of the State are unique and the pleasure of that journey can only be imagined.

And then up to Ernakulam where we put up in the Maharajah's Guest House we had crossed the man-made boundary of one State to another but the land remained the same. There was oriental splendour in Cochin, the pinnacled palaces the Royal garden and further away was the product of occidental skill—the Cochin Harbour. The coconut farm of Ernakulam was visited and a peculiar system of intercultivation was explained. The soil was heaped in mounds at various places before the monsoon set in and then distributed over after the rains. This system seems to keep down weeds, bring about sub-soil weathering, and prevent soil erosion. Cochin is a place of considerable industrial activity and the coir factory of Messers Pierce Leslie and Company was visited. The 'cocogem' manufacture, soap works and various oils and cake works at the Tata Oil Mills Company were seen at Ernakulam.

Next we were in Trichur where the Government Farm noted for its extensive area under fruit trees was visited. It was managed by only three officers with creditz. A private Rubber plantation belonging to Rao Bahadur Kochu Govinda Marar—a Saidapet old boy was visited and all the processes starting from the drawing of the latex from the tree to that of making it ready for export were studied.

One point of general importance noted was that the sowings for the second crop paddy were delayed due to prolonged drought.

In the Government Farm at Trichur in contrast to what was noted at the Trivandrum Government Farm, the Ongole breed of cattle was found to be thriving well.

Pattambi in South Malabar was our turning point in the tour where the Farm set an example to neighbouring ryots as to how to improve and get better profits from poor land usually known as 'Modan' land locally.

We returned to Coimbatore on the evening of the 14th with mixed feelings of joy and sorrow—joy because we were getting back to our dear College, sorrow because such an interesting and instructive tour had come to an end all too soon, and to get again into the routine of everyday lessons in the Lecture Halls and in the fields with cattle and crops This most enjoyable tour by Rail, by Motor, and by Boats, on plains, over hills and on the back-waters opened our vision and we bear with us a multitude of ineffable impressions, a wealth of enriching experience and a store of graceful memories. We had filled our note book and we had talked with all sorts and conditions of men. The cultivator was cross examined in the field. the dairyman in the milking shed, the orchardist among his fruit trees. Ours really was wonderful experience these days the tour lasted.

Let us finish here this catalogue of fine things well enjoyed with a very sincere and hearty thanks to our beloved Principal and his Assistants who severally and jointly contributed a good deal to the comfort and the acquirement of useful instruction of the students of our class.

Finally, to the various gentlemen all over the places visited by us who gave us the best possible help in the matter of collecting agricultural information first hand our heartfelt thanks are due—The Superintendents of farms, the Directors of Agriculture in Travancore and Cochin with their assistants, the various private landed proprietors and in fact all who in one way or other helped to make our tour of study quite enjoyable.

College News & Notes.

Games tour. The members of the students' club who went on a games tour during Michaelmas, to Bangalore, Mysore and Hosur opened with a hockey match on 15—9—34, against the Central College, Bangalore, and lost by 5 goals to 2, B. S. Moorthy and A. M. Kulandai sharing a goal each. On the 16th, they played a cricket match against the Engineering College, who scored 287 for 6 and declared K. S. Ramamurthy (110) only Kulandai of our bowlers, meeting with any success taking as he did 3 wickets in 6 overs, conceding 26 runs. Our team was all out for 74, only Shiva Rao (21) and Thomas (19) making a stand against their bowlers, among whom Safi Darasha, the Presidency player, took 5 wickets for only 11 runs. On the 17th, our team played the Agricultural School at Hebbal, at football, tennis and cricket. The first was lost by 2 goals to nil, the second was won both in singles and in doubles, and the third was drawn, the College making 171 for 8 and Hebbal 65 for 7; Shiva Rao 38, Thomas 28 and Narasinga Rao 32, were the principal scorers, while of the bowlers Narasinga Rao's performance (2 for 16) was the best. On the 18th, a hockey match was played with the Hebbal School, resulting in a win for us, by 5 goals to 2, B. S. Moorthy (2) A. M. Kulandai (2) and Narasimhamurthy (1) being the scorers It is pleasing to record our thanks to Dr. Badami Shiva Rao, an 'old boy' of our College, who was our host and made our stay at Hebbal quite happy and comfortable. On the 18th we played the Central College, Bangalore, at tennis and though the doubles was lost, the singles was won comfortably, Moncy Joseph coming off with flying colours.

After Bangalore, Mysore was visited, where, on the 19th, our team lost by one goal a hockey match with the Maharajah's College. On the 20th we again lost to the same College at cricket, they rattling up 192 for 6 and declared, while our College were all out for 78, only Shiva Rao (30) making any stand against Y. S. Ramaswami, the googly bowler who represented All-Mysore against the M. C. C. Albuquerque also made a useful 14. In hockey we again had to meet defeat, being beaten by 3 goals to 2 (B. S. Murthy 1, and Albuquerque 1). In tennis, we partially retrieved our reputation, for although we lost the doubles, Moncy Joseph again gave a fine exhibition of drives and well placed shots and ran out a convincing winner.

At Hosur, the place next visited, a foot-ball match played on the 21st against a team including Ramanna the All-India player, who recently returned from South Africa, we fought gamely but were beaten by 2 goals. Muthuswami played an excellent game at defence and kept Ramanna well under check, otherwise we should have been beaten by a larger margin. On the same day, we played a cricket match against Mr. Murari's team and were beaten therein also. We were all out for 74, (Albuquerque 20, and Shiva Rao 17) and Hosur made 141 for 3, Mr. Murari hitting up a brilliant 60.

Tennis Matches. Radhakrishna Rao and Moncy Joseph played the Forest College, in doubles, once at their grounds and the return match on our court, and in both the encounters, our players won. Against the Kerala Club on 14th September, the same pair winning in the best of three sets, again maintained our tennis reputation.

Inter-tutorial Matches. The cricket matches in connection with the Krishnamurthy Rao Memorial Cup and the Tadulingam Cup are going on.

The Officers' Club Day. The Club Day came off on 20-10-34 and was celebrated with great enthusiasm, the several features being as usual, Sports, Dinner & Entertainment. Mr. G. N. Rangaswami Iyangar, the President, graciously presented a Silver Cup for a Handicap Doubles Tennis Tournament, for the members which was won by Messrs. M. C. Cherian and S. V. Doraiswami, Messrs. K. Krishnamurthy Rao and K. S. Subba Rao being the runners up. The Padmanaba Memorial Shield instituted for the best pair in Bridge, by Mr. T. S. Ramasubramanya Iyer in memory of the late Mr. Padmanaba Iyer, an old and respected member of the club, was won by Mr. Ramasubrahmanya Iyer himself and his partner Mr. M. S. Kylasam, while Messrs. C. S. Krishnaswami and K. Krishna Menon were the runners up.

Visitors. Mr. S. V. Ramamurthy, M. A., I. C. S., Director of Agriculture, Mr. K. Unnikrishna Menon, Dip. Agri. Dy. Director of Agriculture, Madura, Mr. K. Parameswaran Pillai, B. A., B.Sc. (Edin.) F. C. S. Director of Agriculture, Travancore, Mr. K. Krishna Warrier B A., B. Ag., Superintendent of Agriculture, Cochin, Mr. S. R. Gandhi, Assistant Horticulturist, Bombay, Dr. T. Ekambaram Prof. of Botany, Presidency College, with a party of students. and Mr. Dharma Raja of Rajapalayam, an Honorary Visitor, visited the College during the month.

Lectures. Under the auspices of the Association of Economic Biologists, Mr. S. R. Gandhi gave a very instructive lecture on *Improved methods of Horticultural Practices*. Under the auspices of the students' club, Mr. S. V. Ramamurthy spoke on the 27th on '*The Cultivation Mind*'.

Indian Academy of Sciences. We understand that Rao Bahadur T. S. Venkataraman, Dr. T. V. Ramakrishna Iyer and Messrs. K Ramiah and G. N. Rangaswami Iyangar, have been elected as Foundation Fellows of the Indian Academy of Sciences, Bangalore.

Weather Review (SEPTEMBER—1934)

RAINFALL DATA

Division	Station	Actual for month	Departure from normal	Total since January 1st	Division	Station	Actual for month	Departure from normal	Total since January 1st
Circars	Gopalpore	9·1	+1·6	36·0	South	Negapatam	0·7	−3·1	12·7
	Berhampore*	7·4	−1·9	29·1		Aduthurai*	1·9	−1·2	14 6
	Calingapatam	3·5	−4·3	21 1		Madura	1·4	−3·6	12·0
	Vizagapatam	5·7	+1·2	23·6		Koilpatti*	...	−2·0	12 8
	Anakapalli*	4·7	−1·6	28 1		Pamban	...	−1·2	12·6
	Samalkota*	2·4	−3·0	26·2		Palamkottah	...	−1·3	12·1
	Maruteru*	3·0	−3·2	20 2					
	Cocanada	1·1	−4·6	26·9					
	Masulipatam	4·9	−1·4	21·7	West	Trivandrum	0·5	−3·6	41 6
	Guntur*	6·3	−0·6	26·7	Coast	Cochin	1 9	−7·1	79 2
						Calicut	1·8	−6 0	89 1
Ceded Dists.	Kurnool	2·0	−4·2	17·5		Pattambi*	0·6	−8·7	70·3
	Nandyal*	6·3	+0·3	24·3		Taliparamba*	3·4	−6·7	115·4
	Hagari*	0·2	−5·5	10·9		Kasargode*	6 1	−3·1	11·5
	Bellary	0·2	−4·9	8 9		Nileshwar*	4·4	−5·1	116·5
	Anantapur	0·1	...	7·3		Mangalore	6·0	−4·4	107·0
	Cuddapah	4·0	−2·4	15·5					
Carnatic	Nellore	0·4	−4·3	6·7	Mysore	Chitaldrug	1 6	−2·9	16·5
	Madras	2 0	−3·0	15·8	and	Bangalore	0·3	−7·1	14·3
	Palur*	1·3	...	15 7	Coorg	Mysore	2·1	−2·9	17·6
	Palakuppam*	2·2	−1·7	18·5		Mercara	7·2	−3·6	99·3
	Cuddalore	2·3	−3·7	18·3					
Central	Vellore	2·8	−4·4	16·5	Hills.	Kodaikanal	0·6	−6·8	39·1
	Hosur cattle farm*	0·4	−3·9	11·8		Coonoor	0·0	...	27·5
						Ootacamund*	0·7	−3·1	27·8
	Salem	1·3	−5·3	18·3		Nanjanad*	0·6	−3·9	31·2
	Coimbatore	0 0	−1·5	10·5					
	Coimbatore Res. Inst.*	0·0	−2·4	10·7					
	Trichinopoly	2 3	−2 5	11·3					

* Meteorological Stations of the Agricultural Department.

Summary of General Weather Conditions. The weather during the month was abnormal in character. the pressure distribution being of the South West monsoon type with the seasonal trough of low pressure persistently over the North of the Peninsula and high generally above the average to the South. Such a pressure distribution determine rainfall in the belt of the country extending Northwestwards from the Circars coast, and dry weather over the rest of the Peninsula. Conditions tended to become more normal towards the end of the month. The monsoon was generally weak almost throughout the month. Rainfall in the Deccan, and South was in consequence markedly below normal, and temperatures generally above normal.

Two disturbances originated in the Bay of Bengal, the first depression being centred about 17° N and 88° E on the 6th, but failed to develop and passed inland on the next day and lay as a low, over the Eastern Central Provinces and Ganjam. It moved into East Central India and finally to the East United Provinces and became unimportant by the 11th. Rainfall associated with the low was widespread and locally very heavy in and around the regions it traversed. The second depression appeared off the Chittagong—Circars coast on the 16th, and

developed into a depression on the next day, and after remaining practically stationary, intensified into a storm, and crossed the Orissa coast on the morning of the 20th. The storm weakened rapidly and filled up over the West Central Provinces on the 24th. This depression also occasioned widespread rains along its tract.

Rainfall was markedly below normal in the Ceded, Central and Southern districts, several stations having received no precipitations at all; locally in excess in the Circars and in moderate defect elsewhere.

Temperature was markedly above normal in the South Peninsula, maximum of 100° being of frequent occurrence.

eather Report for the Research Institute Observatory. September 1934.

Report No. 9/1934.

Absolute Maximum in shade	96.0° F.
Absolute Minimum in shade	64·6° F.
Mean Maximum in shade	92·1° F.
Departure from normal	+ 3·1° F.
Mean Minimum in shade	69·2° F.
Departure from normal	− 1·4° F.
Total rainfall	0·03 inches.
Departure from normal	− 2·41 ,,
Heaviest fall in 24 hours	0·03 ,
Total number of rainy days	Nil.
Mean daily wind velocity	4·7 M. P. H.
Mean humidity at 8 hours	68·4%
Departure from normal	− 6·6%
Total hours of bright sunshine	264·3
Mean daily hours of bright sunshine	8·8

General Summary. Monsoon was very weak. Rainfall during the month is in large defect departure from normal being—2·41" and actual precipitation 0·03". Humidity is in defect by 6·6% from normal Between 2 and 4 P. M. on the 21st September there was squally weather, the wind velocity during gusts reaching 20 M. P. H.

Departmental Notifications.

Gazette Notifications Dr. J. S. Patel, Oil seeds Specialist, Coimbatore, is recalled from leave. Mr. D. G. Munro, Deputy Director of Agriculture, VIII circle, granted leave out of India for 8 months and 15 days from 3-1-35, with permission to prefix Christmas and New year Holidays.

D. A's Office Orders. The following officiating appointments in the subordinate service—class i, Upper subordinate, (Agricultural sections) iii grade are ordered with effect from 24—9—34 till 29—9—34. Mr. S. G. Aiyadurai, B. Sc., Ag., to officiate as Upper subordinate vice Mr. P. Subrahmanian on other duty to report to the Dy. Director of Agriculture IV circle. Mr. W. Tirumala Rao, B. Sc. Ag; vice Mr. P L. Narasimham, on leave, to report to the Dy. Director of Agriculture I circle; Mr. M. Rama Reddy B Sc Ag. vice Mr. A. K. Annaswami Iyer on leave to report to the Dy. Director III circle; Mr V. Tejappa Chetty, B. Sc. Ag. vice Mr. C. S. Madyih on leave, to report to the Dy. Director of Agriculture VII circle. Mr. V. V. Jaganatha Rao, B. Sc. Ag. vice Mr. K. T. Bhandary on other duty to report to Dy. Director of Agriculture, I circle. Mr. Subba Reddy B. Sc. Ag, vice Mr. K. Jaganatha Rao on leave, to report to Dy. Director of Agriculture II circle. Mr. K. Venkitaswami B. Sc Ag. vice Mr. S. V. Ramachandran on leave to report to Dy. Director of Agriculture VIII circle. Mr. Seetharama Raju, B. Sc. Ag, vice

Mr. T. Lakshmipathi Rao on leave. to report to the Assistant Director of Agriculture, Rajahmundry. Mr. P. Parthasarathy, B. Sc. Ag vice Mr. T. Rangabrahma Rao, to report to the Dy. Director of Agriculture, IV circle. Mr. M. Bhavani Shankar Rao. whose officiating appointment will terminate on 3—10—34 will continue to officiate vice Mr. C. S. Madiah on leave, and will continue to work as F. M., A. R. S Kasargod. Mr. E. J. Varghese, officiating Assistant, Chemistry section to continue to officiate in the same section vice Mr. M. R. Balakrisha Iyer on other duty.

Mr. K Ramanuja Acharya, F. M., A. R. S. Guntur, on return from leave on 16—10—34 to district work in the II circle. Mr. A. K. Annaswami Iyer, A. D. Kandukur, on the expiry of his leave on 2—11—34 to A. R. S Guntur. Mr. K. Rama Rao, A. D. Cuddappah to be District Agricultural Supervisor, Bellary, and on relief by Mr. V. N. Subbana Acharya is posted as F. M. in charge, A. R. S. Nandyal. The posting of Mr. V. N. Subbana Acharya as F. M. Nandyal is cancelled and he will rejoin duty as District Agricultural Supervisor, Bellary, on the expiry of his leave on 5—10—34 Mr. S. Rama Rao A.D. IV circle is transferred to III circle. Mr. J. S. C Antony, A. A. D. V circle on the expiry of his leave on 23—11—34 is posted to officiate as Farm Superintendent, Agricultural School, Usilampatty vice Mr. P. R. Subrahmanya Iyer granted leave.

Postings and Transfers. Mr. W. Tirumala Rao, B. Sc. Ag. is posted as A. D. Narasapatam vice Mr. P L. Narasimham granted leave. Mr. V. V. Jaganatha Rao is posted to Chatrapur sub circle. Mr. M Ramamurti on relief by Mr. M. L. Narayana Reddy is transferred to Tuni sub-circle. Mr. T. Seshachalam Naidu, A. D. Tuni, on relief is transferred to Narasapur sub-circle. Mr. S. Rama Rao transferred from IV circle to III circle will join duty at Cuddapah as A. D. Cuddapah. Mr, S. Ramachandran A. D., Villupuram to be A. D. Chidambaram. Mr S. Venkatarama Iyer, A. D. Chidambaram to be A. D. Conjeevaram. Mr T. V. Srinivasacharlu, A. A D Conjeevaram to be A. A. D. Villipuram. Mr. D. Shanmuga Sundaram Pillai, F. M., A R S. Koilpatti is posted to join duty as A. D. at Periakulam. Mr. K. Venkataswami posted to Coimbatore circle will report to A. D. Coimbatore. Mr. A. Chidambaram Pillai on return from leave will be A. D. Omalur.

Leave. Mr. P. R. Subramania Iyer. Farm Superintendent, Agricultural School, Usilampatti, is grnnted l. a. p. for 2 months and 21 days from the date of relief. Mr. T. Lakshmipathi Rao. F. M., A. R. S., Maruteru is granted l. a. p for 4 months from 24—9—34. Mr. K. T. Bhandary, Offg Superintendent, Central Farm, Coimbatore is granted l. a. p. from the date of his reversion to 22—12—34 Mr. K. Govinda Nair, Chemistry Assistant, Coimbatore, is granted extension of leave on half average pay on m c. for 3 months from 26—9—34. Mr. V. Chidambaram Pillai A. D. Srivaikuntam is granted extension of l. a. p. on m. c. for 3 months in continuation of the 2 months leave granted to him. Mr, S. V. Ramachandran A. D. Tirupathur is granted l. a. p. for 2 months from date of relief. Mr. P. Kannappa Pillai, A. D. on leave is granted extension of leave on m. c. for 2 months.