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Editorial.

The Human Element. Reuter recently cabled the discovery of a new chemical element, "Number 93" by the young Italian scientist, Professor Enrico Fermi, and his assistants. It was said that No. 93 was outside the series existing on earth and was obtained by a bombardment of a nucleus of Uranium (No. 92) with Neutrons. It is claimed for the new discovery that it went to prove that the formation of new elements proceeded automatically in the universe with the result that the world was actually in the process of rejuvenating itself.

Mr. S. V. Ramamurti, I. C. S., Director of Agriculture, Madras, who recently returned after a tour of study in Europe, in the course of which he visited Italy and Russia, remarked in a recent lecture "In the Agricultural Department here they were trying to improve everything but the man. They have been trying to improve manure, seed, agricultural implements and all sorts of things, but the missing link in their agriculture was the man." This sad lack of attention to the human element is deplorably true. Ninety three elements might be discovered and the number might mount up to a century, but the most important element in any scheme of things is the human element. This human element unlike No. 93, is not outside the series existing on earth. It

permeates the world and is the vehicle through which the whole universe comes under purview. This human element is progressing in numbers and rapidly so, but unlike the optimism heralding the perennial rejuvenation of the earth which element No. 93 evokes, this human element has tended to cloud all optimism and deaden all endeavours at a decent existence, much less rejuvenation. The bulk of our brothers live in ignorance and squalor. If democracy as is often paraded, means the rule of the people, by the people, for the people, the chronic state of actual things is a parody on this theoretical ideal. Improvements do not become such merely on paper. As Mr. Ramamurti said "The mind of our villagers has not been reclaimed. As swamp land needs to be drained and irrigated, so does the mind. The only way to do it is by the removal of illiteracy. There is nothing of which an Indian feels more ashamed in Europe than the 90 per cent illiteracy of his country. If we have to depend on money to teach our illiterates, we shall never be able to do so. The only way is to make it obligatory for our literates to teach our illiterates and to utilise the unemployed educated to satisfy our largest need, which is just what they are most fitted to do." What he proposes to do is a conscription of educated young men and women to work on the land and conduct a campaign against rural illiteracy. He noted that Germany had decreed that every young man who wanted to go to the University, must work for 6 months in an agricultural camp in order to create sympathy among towns-people for country life.

In the Industrial world also it is getting to be increasingly recognised that the human element needs as much care and attention as the machines. As Robert Hyde, Director of the Industrial Welfare Society expressed it, " Since the most perfect machine is available to any country in the world today, that country will survive the struggle which makes the most effective use of its man-power. * * * The ordinary working man does not grasp the theories about which we all hear so much to-day—rationalisation, mechanisation, technicological unemployment and automatisation, but what he can understand are life's simple satisfactions—work in congenial surroundings, an adequate reward for honest labour, relief from undue strain and the hope of security when the day is done."

It will thus be obvious that the human element is the most important element in the premier industry of our country viz. agriculture. What is needed is an intense bombardment against illiteracy and sloth, so that these deterrent accretions are dropped off village life, and the country folk are rejuvenated to a perception of what is their rightful heritage, namely a contented rural life amidst rural plenty, rural simplicity and rural charity. Any organisation that seeks to launch this bombardment at Indian village life will, if it misses the human element, be like the classical stupendous irrigation scheme of

our poet Tagore, perfect in every detail of organisation and equipment, only lacking in water.

Mr. Ramamurty's campaign envisages an army of educated young men mobilised to the service of the country-side. An army will be a rabble without leadership and trained guidance. We have been turning out of our Agricultural Colleges a number of young men whose training fits them for leadership of this kind most eminently. They are remaining idle, without the opportunities for which they hanker. It behoves these young lieutenants in Agriculture to enthusiastically respond to our Director's call and gather round his banner in the projected attack against mass illiteracy in our country. We doubt not they will do so.

The Indian Academy of Sciences. The inauguration of the Indian Academy of Sciences on the 31st July at Bangalore by the Dewan of Mysore is an event of profound significance and interest to us in India. Launched under powerful auspices and under the presidentship of Sir C. V. Raman, the academy should prove a force of major magnitude in our scientific advancement. To us at the Agricultural Institute the starting of this academy will provide wide and frequent contacts with brother workers in India. We wish the Academy all progress and a career of usefulness.

Rao Bahadur B. Viswanath. We offer our felicitations to Rao Bahadur B. Viswanath, F. I. C., F. C. S., Government Agricultural Chemist, on his appointment as Imperial Agricultural Chemist, Pusa. His promotion is an apt recognition of his scientific attainments and experience. The Agricultural Research Institute, Coimbatore, has spared many scientists to other parts of India, and the latest appointment is not the least among them. We are proud that Mr. Viswanath is going to a wider sphere and we doubt not that with his keen intellect, abundant energy, and wide grasp, he would easily make a mark in his new theatre of activities. To us, members of the Union, his departure is a personal loss as we would miss one of our warm well-wishers. His services as Secretary of the Union and Editor of the Journal are fresh in our memory. We wish Rao Bahadur Viswanath all success and prosperity at Pusa.

The Crop Planning Conference. The retiring Finance Member, Sir George Schuster, conceived the happy idea of convening a conference of representatives of Provincial Governments and Administrations in April last to discuss the economic situation in the country. This conference which met at the headquarters of the Government of India discussed many problems connected with the basic industry—agriculture—and its operative—the agriculturist in his rural setting. The most important of the problems considered were rural indebtedness and ways and means of giving tangible relief to the cultivator in

the present condition of world slump and international trade. Several allied problems were also passed in review, such as economic surveys, creation of a council of industrial research, appointment of trade commissioners and development of home markets. The immediate result was the appointment of a marketing officer and the starting of an investigation into the best method of working the agricultural credit department of the Reserve Bank of India to the unmistakable advantage of the ryot.

Some of the measures suggested like the expenditure on works, were really beneficial, but could at best be considered only as palliatives. It therefore remained a knotty problem for the conference to determine what would actually bring about an improvement in the present condition of affairs and at the same time conduce to the lasting benefit of both the cultivators and the country. The recommendation which this Provincial Economic Conference thought best to make under the circumstances was therefore the convening of a conference of experts. This conference of experts met at Simla in June and was composed of the Directors of Agriculture and non-officials from the provinces and the experts of the Central Government.

The Finance Secretary, Mr. H. M. Hood, the Director of Agriculture, Rao Bahadur D. Ananda Rao, Messrs C. V. S. Narasimha Raju, Ex-President, Legislative Council, Rao Bahadur C. Tadulingam, Retired Principal, Agricultural College and the veteran statesman Dewan Bahadur T. Raghaviah, represented Madras.

It was the express desire of the Government of India that all possible steps should be taken to co-ordinate a plan of agricultural production for India as a whole and that this conference of experts should discuss what measures can be taken in this direction and such measures as are immediately possible should be taken before the sowing season in the next cold weather. The Government of India were led into this position by the repeated references both in the press and on the platform that there was over-production of staple products and increased importation of rice and wheat into the country. The *ad hoc* wheat conference convened on May 10 came to no definite conclusions and only served to assist the bigger conference on Crop Planning in June, as this latter dealt in detail with all aspects of production, distribution and the raising of the price level of India's crops. It was however felt by the wheat conference that so far as wheat was concerned, India was more or less isolated from the rest of the world markets.

A preliminary meeting of some of the members of the Imperial Council of Agricultural Research and of the Government of India in the concerned Department was held on 5th June and it was decided that the note submitted by the Finance Department should form the

basis of discussion at the bigger meeting and that a co-ordinated and comprehensive plan of production of the two crops—wheat and rice alone should be worked out so as to help the ryot to avoid drifting and the adoption of make-shift methods in the absence of a clear-cut programme and definite lead by Government.

In the preliminary meetings it was made clear that the original object of devising a plan for adoption before the next sowing season was not attainable and that the conference should deal with the question of improving crop planning in general in future and its relevant economics.

It was hinted that the preferences permissible under the Ottawa agreement had not been utilised; it was suggested that crops like linseed and barley might be grown and that thus the system of mixed or diversified cropping advocated in the past might be emphasised.

This view received added support from the examination of the existing situation of cropping and values estimated at the present depreciating prices as compared with 1930, viz.,

Crop.	Area in millions of acres.	Value in Crores of rupees.
Rice	82	278
Wheat	32	48
Cotton	22	22
Jowar	22	80
Oilseeds	21	41
Sugarcane	3·8	37

Distribution of areas in the country as shown below was also advanced as an argument in favour of the curtailment. No less than 78 per cent of the area sown in Bengal grows rice, Burma has 71 per cent under this crop, Assam 70 per cent, Behar and Orissa 46 per cent, Madras 32 per cent, Central Provinces 25 per cent and United Provinces 14 per cent. All aspects of the problem were discussed and the conference passed the resolution *that the present world conditions in the matter of rice production should be borne in mind by Provincial Governments which may be contemplating increase in the present area under rice.*

This resolution sums up the present intentions of Government also and admirably suits the economic conditions of rice growers and rice consumers. This leaves the door open for any measures to be taken up in the interests of the cultivator, without jeopardising the position of the country in the world market.

INSECT PHOTOTROPISM AND ITS ECONOMIC IMPORTANCE IN INDIA *

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Introduction. Studies on the behaviour of organisms, and especially on that of Insects, have formed the theme of many eminent zoologists in the past and yet there exist numerous points in the different aspects of the subject which offer avenues for further investigations. The study of insect tropisms is one of these, and though a good deal of work has been done by eminent workers like, Loeb. Wheeler, Morgan and Jennings in the west, the study of the complex tropic reactions of insects in the Indian region has received hardly any serious attention so far. This paper is the result of some preliminary studies recently started to study the aspect of one of the various insect responses, viz., '*Phototropism*' with special reference to South Indian insects, and indicate in what way it has an economic bearing on Agricultural Entomology.

To an agriculturist the study of entomology is solely a utilitarian one, particularly with an aim to control his crop pests. Next to a knowledge of the life-history of the insect pests, the study of their behaviour, their adaptations and response to environments, and external stimuli forms one of the main lines of work for finding ways and means of control on scientific and economic lines.

Tropisms. The behaviour of insects in different ways may be attributed to three different sources—instinct, intelligence and tropisms; while the two former are generally the result of some internal stimuli, tropic reactions are generally the result of environmental influences. Some of the external factors such as atmospheric temperature, humidity, light, certain chemical substances, etc, often direct the activities of some insects, and the responses of the latter to such external stimuli are usually known as Tropisms. All these phenomena "are responses of the protoplasm to definite stimuli and are almost as inevitable as the response of a needle to a magnet" Of these *Chaemotropism* the different responses to stimuli from chemical substances, which in the words of Wheeler "are among the most potent factors in the lives of Insects", and *Phototropism* the response to stimuli from light, have offered very useful lines of research and have contributed factors for extensive application in pest control. Some of the other tropisms known are, Hydrotropism and Anemotropism the responses to water and winds.

* Paper presented at the Agricultural Section of the Indian Science Congress, Bombay, in January 1934.

Phototropism. It is a familiar phenomenon, especially just before and soon after first summer rains, to find thousands of insects dashing to our lights and often hovering around them in clouds; this is particularly so, around bright gas or electric lights in highways and railway stations. Enthusiastic insect collectors taking advantage of this habit, frequently adopt attracting insects by lights, just in the same way as some entomologists collect insects by what is called 'sugaring' baiting with some chemical mixed with syrup. It will, however, be found by experience that it is not all insects that exhibit this tropic attraction to come towards lights. Those that have this striking character are known to be positively phototropic and others which have a marked tendency to shun and move away from the source of light are said to be negatively phototropic. There are various factors influencing these strongly opposite and varying grades of phototropism; the direction of rays of light, the color of the light rays, and their intensity, varying metabolic conditions and even other tropisms have been noted to come into play in such phenomena, and some of these therefore account for such striking habits of familiar insects like moths and butterflies, the former nocturnal and often phototropic, the latter diurnal and generally heliotropic (attracted and influenced by sunlight). Among these which display a strikingly positive response to lights are the cockchafer beetles of different kinds, winged ants, winged white ants (termites), crickets and long-horned grasshoppers, leaf-hoppers of different kinds (especially ljassids), some aquatic bugs especially the giant electric-light bug, *Belostoma* (the largest bug known which comes to light in numbers in steamers and boats in some rivers), and moths and beetles of different kinds. Among those which generally avoid lights may be mentioned the day-flying butterflies, cutworm moths, the bed bug, thysanoptera and some beetles.

Phototropism among Insects in S. India. Though the experience during the past decade or more has given the writers some idea of the kinds of insects that exhibit photographic reactions in different parts of S. India no organised attempts were made till recently to make a special study of our phototropic insects. About two years ago when the senior author planned some intensive work on the bionomics of one of our common pests—the paddy stem-borer *schoenobius incertellus* which exhibits positive phototropism, it occurred to him that experiments with light traps throughout the year would, in addition to adding to our data regarding the chief insect concerned, help us in gathering a good deal of information regarding other phototropic insects. With this hope, light traps were kept in Coimbatore Central Farm right through the year from 1931 and the results have not belied our hopes. The following is a rough statement of the important representatives of the different orders of Coimbatore insects so far

noted, showing positive phototropism. Among moths, the most important are some of the crambine pyralids like the paddy stem-borer (*Schoenobius incertellus*) and other borers like *Chilo, Diatroea Ancylolomia*, etc., the groundnut surul (*Stomopteryx*), the ragi white borer (*Saluria inficita*), the hairy caterpillar moths (*Amsacta, Estigmene*, and the sunnhemp moth (*Utetheisa*), the agaristid (*Aegocera*) a very common phototropic insect, some psychids, limacodids and hawk-moths. Of the coleoptera, among the common ones trapped were, the chafers of different kinds including dung rollers, scarabaeids, Ruteline, etc., stray dynastids, numerous green and blue blister beetles, staphylinids, glow-worm beetles, the longicorn beetle *Dorysthenis*, the leaf-like tenebrionid *Cossyphus* and stray tiger beetles, ground beetles and weevils. During certain years, the beettle *Dorysthenis* comes to light in swarms during October—November rains in Coimbatore. The hymenoptera include chiefly winged ants (including *Dorylus*) and occasionally some parasitic wasps and the honey bee. Among diptera, gall flies, some syrphids, stray tabanids and chironomids are the ones usually found. Among orthoptera trapped are crickets of numerous kinds (the mole cricket *Gryllotalpa* being very common), locustidae, some cockroaches and some of the tettigidae and surface grasshoppers. Winged termites, ephimerids, stray dragon flies and ant-lions and occasionally the chrysopa form the neuroptera. Among the Rhynchota, are the jassids of different kinds, some fulgorids and the pentatomids-chiefly the green plant bug *Nezara* and the black *Cydnus*. In addition to these, several insects of minor importance are frequently seen trapped. The number and frequency of the catches of these insects give us an idea as to their seasonal occurrence and emergence periods; it is needless to add that such data collected for fairly long periods will contribute to our knowledge of the local phototropic fauna. Detailed records on these catches are being made with the idea of utilising them in other ways.

Economic Importance of Phototropism in Insects. Apart from the academic and purely biological interest created by a study of insect phototropism, there is the economic aspect of the matter, which gives one some ideas as to how far the agriculturist can take advantage of the phototropic responses exhibited by some insects which have some economic importance. Especially in the control of some moth or other borers, the light trap forms one of the useful means of destroying large numbers of insects. The method of trapping such insect pests with lights of various kinds has been in vogue in other countries. Lawson (6) records that 126 species and varieties of leaf-hoppers were collected and an average of 1000 insects were captured in 70 nights. In Japan, light trap has proved one of the most efficient means of control against the rice borer *Chilo simplex*, Buk (9) A cotton bollworm (*Diparopsis castanea, Hmpn.*) in Nyassaland (8) is reported to

be freely captured in a 200 candle power acetylene light which is described as effective over a square of about 10 acres. In the Punjab (7) the cane borers such as *Diatroea auricilia*, Dudg., *Chilo*, *Scirpophaga*, and *Emmalocera* have been recorded in large numbers at light. It is also reported from the Punjab (7) that light traps have proved very effective against the hairy caterpillar (*Amsacta*) and some 300,000 are recorded in light catches in one season from two districts.

In S. India, the phototropic reaction of some important insect pests attracted the attention of entomological workers many years ago. As early as 1906, when the senior author had opportunities of studying two of the pests of groundnut in S. Arcot area, viz., the hairy caterpillar and the *surul poochi*, it was found that both these creatures had very strong attraction for lights. Similarly the phototropic response and other observations made by him on the paddy stem borer (*Schoenobius incertellus*) in 1907 when the earliest investigations were started on that insect in S. India have been recorded in his note on South Indian Insects in 1921 (1) In the same note may also be found his record of the phototropic hairy caterpillar moth (*Asura conferta*) which is a nasty domestic pest, all along the submontane tracts of the West Coast during the post-monsoon months. Similarly another phototropic moth (*Ancylolomia chrysographella*) was first noted by him as a pest on paddy in 1908 (2) The attraction to light of most of our cockchafer beetles, some of which are pests both as larvae and adults is very well known. During the summer of 1915, when the senior author was investigating the white grub pest of cinchona seedlings in the Nilgiris, species of *Serica* and *Helotrichia* were found attracted to light in thousands. The cockchafer beetles attacking grape-vines, roses and sundry other garden plants are also attracted to lights. Among our other insects of economic importance showing this habit are the ragi white borer moth *Saluria inficita* first noted as pest in 1908 in the Coimbatore farm, the blue and green blister beetles often found on flower heads of millets; the injurious paddy jassids of which the green spotted one (*Nephotettix*) and the white species (*Tettigoniella*) are the commonest in S. India, are often caught at light traps in shoals. Gall-flies of which the paddy Cecidomyid (*Pachydiplosis*) is the chief, are also trapped at lights in numbers. Thus it will be found that we have some insects of economic importance for which the setting up of light traps may be tried as one of the practical measures of control.

Light Trap Mechanism. While it is found that lights like bonfires of rubbish heaps, torches and other naked lights do attract phototropic insects, for a regular study of insects, thus trapped it is necessary to have a contrivance which, while attracting insects, would help in collecting them without being burnt or destroyed. There are numerous such traps known and used by workers in different parts of the world. An insect light trap in its simplest form is

a light suspended over the middle of a tray containing water mixed with a few drops of kerosene spread as a thin film on the surface. All insects attracted by the light dash against it, drop into the oiled water below and get killed. Such a simple trap suits quite well the purpose of the farmer, but scientists who make a special study of the species obtained, make use of more powerful lights and arrangements to catch, kill and preserve the specimens without damaging them. Most commonly electric lights or acetylene lights are employed and instead of a tray of water a funnel with a killing bottle at bottom is attached to receive the insects dry. Such mechanisms could be made in many ways by maintaining the underlying principle of the apparatus. A good hurricane lantern will serve the ordinary purposes of a light trap. If, however, it becomes an economic proposition to use brighter lights a high power gas lamp will be found to trap more insects. Further investigations have to be made to get some data as to the kind of light, the area a light would command and other factors in this direction.

Light trap with special reference to paddy stem borer. A few remarks may be added with regard to the trials so far made with light traps for the paddy stem borer (*Schoenobius incertellus*) in some of our rice areas. Recent observations on the light trap catches have made it abundantly clear that the paddy stem borer is by far the more easily attracted and the more numerous of the many forms captured. The catches of moths of this borer during the different parts of the year at Coimbatore, Pattambi, Maruteru and Aduthurai were as follows:

	Total	
Coimbatore	4013	(3362 females ; 651 males) in 83 nights December 1932 to March 1933.
Pattambi	5341	(2806 g. females ; 369 males 2176 s. females) in 29 nights. June 1933 to August 1933.
Maruteru	16427	(9090 g. females ; 5038 males 1299 s. females) in 106 nights from September 1932 to February 7th, 1933.
Aduthurai	5090	(in 15 days—November 32 to February 1933—Maximum 879 on 6—1—1933.

(The writers are indebted to the Farm Superintendents at Pattambi and Maruteru for helping them in making light trap trials and giving figures of the catches.)

From the preliminary observations so far made it has been found that (1) at every fresh brood the insect comes to light in very large numbers (2) that at the peak of emergence it is highly phototropic and comes to light at all hours of the night even in moonlit nights, (3) the percentage of gravid females is always greater than the spent ones, (4) the proportion of females to males varies in different localities and at the same locality during seasons and (5) during the paddy season the insect makes its first appearance in the trap during transplantation.

Conclusion. In applying phototropism to practical entomology the study of the meteorological conditions affecting insect activity has also to be followed since changes in the atmosphere induce increased or decreased phototropic activity among insects. It has been observed that on a windy moonlight night very few insects are caught, so also during nights of heavy rain and storm, whereas in warm still dark nights the insect catches are abundant both in variety and number. For termites, which are recorded in large numbers on certain nights at lights, rain followed by sunny weather and warmth appear to be very favourable conditions. In the matter of the application of the light trap method as control against any insect, investigations have to be made on numerous factors such as the relation between the crop and the broods, the conditions of weather favourable for emergence of the broods, the relative percentage of the pest population attracted to light, the percentage of gravid female coming to light, the attractive capacity of the different kinds and colors of lights, the maximum distance from which the insect comes towards a particular light and numerous allied points. It is the intention of the writers to carry on detailed investigations on these and many other points which may, not only help us to effectively deal with this important pest of paddy, but might give us numerous facts and data for use against similar phototropic insects in the future.

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NOTE ON BURA SUGAR MANUFACTURE IN CHITTOOR & N. ARCOT DISTRICTS

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Introduction. In the Season and Crop Report for 1932—33, it is stated that the area under sugarcane in Chittoor and North Arcot districts was 10,995 and 9,041 acres respectively. The chief cane growing districts in the Presidency arranged in order of rank are, Vizagapatam, with its 33,606 acres topping the list, then Chittoor, South Arcot, North Arcot, Coimbatore, Bellary, East Godavari, Trichinopoly, Salem, Ganjam, South Kanara, Anantapur, Madura and West Godavari. According to the above list, Chittoor holds the second and North Arcot the fourth place in the Presidency. Many varieties of cane are cultivated viz., red and striped Mauritius, Nanal, Fiji B (Badila) J 247, Rasadali and Hebbal varieties. J 247 occupies a small area in both districts, while in North Arcot district in Gudiyattam and Vellore taluks almost the whole area of cane is of this variety. Ryots are just beginning to take to it, in view of its drought resisting quality and indifferent treatment which it can stand, but the main drawback seems to be the hardness of the rind which is very keenly felt by bulls while crushing. This is the chief reason for its low acreage. In 1933, in both districts Co. 213 variety of cane was tried on a small scale and this year the trials are repeated along with two more varieties viz., Co. 281 and Co. 290.

Ratooning is not commonly practised but it is seen being done in isolated patches by very poor cultivators. From December to May every year, there is practically no rain worth mentioning in both districts and the crop has to be maintained by irrigation. Though from May to August the rainfall is slightly better, the crops are not much benefitted by it, owing partly to uneven distribution and partly to excessive evaporation of moisture due to high temperature and strong winds. On account of this difficulty, the extent cultivated by individual ryots is very limited, the average may be about half an acre per head. A good beginning has been made by the introduction of some Coimbatore varieties noted for extreme drought resistance. The average yield of cane in North Arcot district is about 20 tons while in Chittoor district it is about 25 tons per acre. Cattle manure is universally applied in varying quantities, and in some cases depending on the economic condition of the ryot, oil-cakes are applied, though the quantity may not be adequate. Artificial manures may practically be said to be not used at all, though the writer has come across a few cases. Besides the basic dose of cattle manure in Chittoor district, *Pungam* (*Pongamia glabra*) leaves and flowers are universally applied and cases are not rare in that district where 40 tons of cane are easily

obtained per acre. In Chittoor district canes are wrapped and propped up universally while in North Arcot district the practice is unknown.

Methods of Manufacture. Two methods are in vogue viz., (i) the primitive method by the use of water weed *Vallisneria spiralis* and (ii) the modern method with the aid of centrifugal machine.

(i) The old method is confined to Punganur taluk in Chittoor district and there are eleven concerns engaged in manufacturing *Bura* sugar. The weed grows naturally in tanks where water is found throughout the year. In recent years, owing to dearth of rainfall the tanks get dried up completely in many cases. The manufacturers are finding it very difficult to procure the requisite quantity locally and therefore they are forced to cart the weed from places as far as fifty miles away. The process of manufacture is very simple but laborious. *Rab* after it is purchased from ryots in mud pots is stored for about a week and then transferred to bamboo baskets (3 feet high and 3 feet in diameter). They are kept in a room over a bamboo platform with special arrangements made underneath to catch molasses that drain out. The top layer of the *rab*, up to a depth of three inches is well cut with a sharp knife to break lumps formed by crystals adhering together and over it a thin layer of weed is evenly spread and left undisturbed for about a fortnight. The moisture held by the weed is slowly let out, the brown colour of the rab is bleached and it turns white.

The thin layer of weed is removed on the sixteenth day, the bleached rab is taken out of the basket and well dried before storing. The process is repeated every fourth day thereafter till the entire quantity in the basket is bleached. This may take about 30 to 40 days depending on (i) quantity of rab (ii) colour of rab (iii) quantity of weed used daily (iv) moisture content of weed and (v) the depth up to which the rab is well cut with a sharp knife. The bleached rab stored after drying, which will be similar to centrifugal sugar, is boiled, mixed with water, in open pans under a steady fire. Dirt is frequently removed from the boiling solution by sprinkling a few drops of cow's or buffaloe's milk, diluted with water. When the solution comes to a thick syrupy stage the pan is removed from the fire and the contents are made to cool rapidly by stirring vigorously with laddles. This process helps in breaking lumps formed by crystals adhering together. The sugar is then removed from the pan and dried. When it is completely dried it is spread evenly on a clean flooring and two or three men tread on it to break the lumps. After this process the stuff is ready for the market to be sold as *Bura* sugar. The keeping quality is extraordinarily good, the jaggery smell does not appear even if it is kept for one year.

Molasses are converted into jaggery by adding lime if necessary to remove dirt. The "Mollassein" jaggery is sold in the market for about half the price of ordinary jaggery prepared direct from cane juice.

(ii) In the modern method, *rab* purchased from ryots is stored for about a week before it is put into the centrifugal machine. The crystals are well broken either by squeezing them with hand or by cutting them with a sharp knife. After charging the centrifugal with the prescribed quantity of *rab* it is allowed to rotate by mechanical power. When molasses cease to trickle down, white sugar is scraped out of the centrifugal basket and dried well before storing. The further treatment of centrifugal sugar in converting it, into *Bura* is similar to the one already described under the old method.

According to the third method, white crystalline sugar and brown sugar are dissolved in water in definite proportions and boiled, the rest of the process being the same. This method was practised in Pernampet village, Gudiyattam taluk of North Arcot district. Ever since the rise in price of white crystalline sugar, this method of manufacture of *Bura* has been abandoned.

Output of Sugar. In Chittoor and North Arcot districts there are five and eight centrifugals respectively, working since last year. The manufacturers send their agents to help ryots in preparing clean rab by addition of lime. They enter into agreement with ryots for the supply of rab and advance money. The rab is purchased at the prevailing market rate for jaggery. The average output from 100 maunds of rab is as shown below :—

according to (i) primitive method—	45 to 48 maunds of *Bura* sugar and 28 maunds of jaggery while the rest goes as waste.
(ii) modern method—	45 to 50 maunds of *Bura* sugar and 28 maunds of jaggery while the rest goes as waste.

Rab prepared from J 247 variety of cane is preferred by Centrifugal factory owners since the size of crystals is big and the sucrose content is higher than in the local variety. In Ambur Co-operative Centrifugal factory, the writer has seen from records maintained that 50 to 55 maunds of *Bura* sugar are obtained from 100 maunds of rab. The factors responsible for increased output are (i) clean rab, (ii) presence of big sized crystals (iii) rab from one and the same variety of cane instead of different varieties (iv) higher sucrose content of cane from which rab is prepared (v) steadiness of centrifugal while spinning and (vi) rab of good consistency.

Marketing. *Bura* sugar is sent to Gadag, Hubli, Dharwar and Gulbargah of the Bombay Presidency where there are good markets for this type of white sugar and to a certain extent to Madras, Vellore and other big towns in the Presidency. The price ranges from Rs. 2—12—0 to 3—2—0 per maund, ex-factory. The "Molassein" jaggery is sent to Madras where there is a good market for it. The *Bura* sugar is sold at Rs. 3—6—0 to 3—8—0 per maund while the crystalline

sugar is sold at Rs. 3—3—0 to 3—4—0 per maund in the open market. An attempt was made to work out the cost of manufacture by the above two methods but the manufacturers were rather reluctant to furnish figures for fear that the existing duty might be enhanced.

Excise Duty and its Effects. According to the Sugar (Excise duty) Act of 1934 a duty of excise at the rate of ten annas per cwt. is levied on sugar produced by Centrifugal factories on or after 1st April 1934. No mention is made in the Act about sugar produced by the use of water weed. Such concerns cannot come under the definition of factory since 'factory' has been defined in the Act as premises in any part of which any manufacturing process connected with the production of sugar is being carried on or ordinarily carried on with the aid of power. It remains to be seen whether the levying of excise duty will interfere with the establishment of further Centrifugal factories. There is no likelihood of increase in the number of concerns following the old method since the supply of water-weed is limited.

THE VELLORE MUNICIPAL SEWAGE FARM

By M. K. SWAMINATHAN, L. Ag.,

Agricultural Demonstrator, Vellore.

The Vellore Town Municipality maintains 58 heads of working cattle for conservancy purposes and the annual budget allotment for maintaining these bulls comes to about Rs. 4000 which is spent mainly on the purchase of fodder etc. They were being fed till very lately with the following rations per head per day :—

Paddy straw, 15 lbs.
Rice bran, 3 Madras measures.
Agathi leaves, 1¼ lbs.

Contracts were given to dealers to supply the above food materials and it was found that the quality of bran supplied was very poor due to the presence of husk, etc. It was therefore a problem to the authorities how to change the rations given to their working animals omitting bran. The Municipality consulted the Agricultural Department. It was suggested to them, to utilize a small area of their sewage farm for raising fodder crops such as lucerne and elephant grass. The suggestion was taken up immediately.

The Municipality owns about 25 acres of land on the banks of the Palar and this area is irrigated by sewage water, taken through pucca drains, sieved in many places, stored in big wells and finally pumped out by gas engines direct to the fields. This farm is divided into plots of one acre each and leased out to ryots. The average lease amount works at Rs. 100 per acre per year. Sewage water is supplied to the plots, free of cost for 6 hours a week, ryots mostly raise kitchen garden

crops such as brinjals, chillies, onions etc. since they are easily marketable at Vellore town. They rotate these crops with maize, ragi, cholam and tobacco. Intensive cropping is done and the plots are never kept fallow. Manuring is done to a very little extent as the ryots are quite aware that the sewage water is rich in manurial ingredients.

In this sewage farm, an area of 1·80 acres was tackled by the Agricultural Department for raising lucerne and elephant grass, and the council sanctioned Rs. 50 towards the expenses. The plot was ploughed by Cooper ploughs, levelled by buckscrapers and manured with well-putrified night-soil at the rate of 10 cartloads per acre.

Lucerne was sown on 24—12—33 in a plot of 60 cents and elephant grass slips were planted on 10—1—34 in trenches 2 feet apart in another plot of 1·20 acres. Sewage water was regularly applied twice a week during the first month and later on once a week. The germination and the growth of these crops were excellant and the lucerne plot was ready for cutting on 22—2—34 (i. e.) 60 days after sowing. On an average, 90 lbs. of lucerne were cut every day. Elephant grass was ready for cutting on 22—3—34 (i. e.) 70 days after planting. On an average 1300 lbs. of grass were cut each day. With the availability of lucerne and elephant grass a change in the existing rations of the conservancy bulls was effected and the following is the revised rations per head per day :—

Paddy straw, 10 lbs.
Lucerne, 1½ lbs.
Elephant grass, 18 lbs.

The change was made rather gradually, slowly reducing the quantity of straw, bran and agathi leaves, and gradually increasing lucerne and elephant grass By a series of trials every day during the first fort-night of the change, it was found that for a reduction of 5 lbs. straw, 2 Madras measures of bran and 1¼ lbs. agathi, each bullock required 18 lbs. elephant grass and 1½ lbs. lucerne. During the first fort-night, some of the animals showed signs of dysentery, but in a few days the digestive system correcte1 itself to the new rations and now the animals are free from the trouble and look hale and strong.

In the first cutting, lucerne has given an acre yield of 6,545 lbs., while elephant grass has given an acre yield of 37,400 lbs. Coming to the economic aspect of the question, the Municipality is saving Rs. 120 per month. The details of the saving are tabulated below :—

Name of fodder.	Daily reduction per head.	No of heads	Saving per day.	Saving per month.	Rate per rupee.	Amount saved. Rs.	as.	ps.
Paddy straw.	5 lbs.	58	290 lbs.	8700 lbs.	110 lbs.	79	1	5.
Bran (paddy).	2 m. m.	58	116 m.m.	3480 m. m.	126 m. m.	27	9	10.
Agathi leaves.	1¼ lbs.	58	72½ lbs.	2175 lbs.	160 lbs.	13	9	6.
					Total.	120	4	9.

Deducting a maximum expenditure of Rs. 100/- per year over a watchman and Rs. 40/- per year towards manuring, weeding etc., the net saving to the Municipality will be Rs. 1,300/- in a year from the budget allotment towards the purchase of fodder for conservancy cattle. Other Municipalities or Unions or Panchayat Boards who have similar facilities may with advantage copy the action taken by the Vellore Town Municipality.

The writer's thanks are due to Mr. M. Kanti Raj, Assistant Director of Agriculture, Vellore, for instructions given in carrying out the work and suggestions given in preparing this note.

AGRICULTURE UNDER THE FASCISTS *

By S. V. RAMAMURTI, M.A., I.C.S.,

Director of Agriculture, Madras.

I have much pleasure in accepting the invitation of the Madras Agricultural Students' Union, to speak this evening about the many things I have seen in Europe, particularly in Italy, under the new regime. I had the advantage of going to Italy with a request sent by the Madras Government to the Government of Italy, to give me official facilities for seeing the work there, both by way of agricultural research and by way of other agricultural organisation ; and the Italian Government were extremely kind, and showed me great courtesy and consideration in giving me full facilities for seeing the work that was being done there. Italy, I have visited thrice—I was there in 1922 before Signor Mussolini became head of the Government ; I was there again in 1927, and the present was my third visit—and, every time I found an enormous change had very emphatically shown itself in the spirit of Agricultural Research in Italy.

The general level of research work in Italy, and even in Europe, is about the same as that obtains in India. In fact, except in Russia, the quality of research work done at Coimbatore is second to none. The great difficulty in India has however been, that in spite of the large accumulation of results of research work, we are not making headway actually in the application of those results. I wanted to see whether in Italy, which approximates somewhat to the conditions of India, people having small holdings can adopt the results of scientific work in practice and if this had been successful I wanted to study the methodology of how this was being done and I may say, that I did get indeed a few ideas.

What was called the wheat campaign was started in Italy in the year 1925 by Signor Mussolini and it went on for five years. It was

* Lecture delivered under the auspices of the Madras Agricultural Students' Union, on Monday 10th July 1934, at the Agricultural College, Coimbatore.

started under the chairmanship of Mussolini with representatives of various agricultural federations, which has branches all over the country. The campaign was successful to the extent of raising the average yield of wheat by something like one-third,—not only that, it also increased the area under cultivation. There are now a million acres of wheat in Italy, and wheat costing about six crores of rupees, is now produced in the country itself and not imported as before. That, you would admit, is an appreciable result, and I doubt whether in India we will ever be able to achieve such results. I therefore wanted to study the methodology behind this wheat campaign and see how they were able to spread results of scientific research, to an extent that we in India have not been able to do.

In order to increase the production of wheat in the country, not only sustained efforts were made to raise the yield of wheat per acre, but land considered previously as unfit for agriculture, was reclaimed. Round about Rome, there was and had been, large areas of swampy land, which several centuries of Italian Government have tried to reclaim without any success. The Fascist Government tackled this problem with all vigour, applying to it, what they call, the principle of 'Integral action' (i. e.) studying the problem in all possible aspects and taking measures to deal with them all. The principle which the Italian Government recognised was, that land reclaimed on a large scale, was of value not only to the individual cultivator, but was of value to the nation as well. In Italy, the problem after the war was the large number of discharged soldiers for whom suitable work could not be found. These wanted to settle on land but there was no land available. Therefore a land-reclaiming society consisting of ex-soldiers, called '*Opera Nationale*' was formed towards which the state contributed 7 crores, and 1½ crores were raised by public subscription throughout the country. This society bought land and reclaimed it with the help of the state, which contributed 87 % of the cost. The state also paid 25 to 37½ % towards the cost of agricultural improvements or advanced loans for such purposes at an interest of 2½ %. From the second year onwards the state recovered half the produce of the land, from which advances were deducted. For four years, the Commissariate of Internal Immigration paid from Rs. 400 to 800 a year for the maintenance of the cultivator, and after four years, the cultivators were offered purchase of land in 15 years' instalments. In this way, an area of 2½ million acres has been reclaimed in Italy during the last few years at a cost of 600 million rupees, and, about 15 million acres are still proposed to be reclaimed. I had the good fortune to visit two of the reclaimed areas. The hydraulic reclamation (i. e.) the cutting up of the land, draining it, and making it healthy for settling—was started in 1926 and completed in 1929. The agrarian reclamation which started in 1929 is still going on, and roughly it takes two years on the average for grain to grow on the reclaimed land.

Towards the Rs. 4000 required for reclaiming each acre of this land, the state gave Rs. 3500, and the society Rs. 400 ultimately to be paid by the cultivator himself. The Government also spent Rs. 500 per acre for preparing the land for cultivation, for building houses etc. One might consider that a sum of £ 40 million is perhaps too large an amount to spend on land reclamation, although 2½ million acres of cultivable land more have been added. But, larger sums than these have been spent in Europe on wars without any tangible gains, while reclaimed land ensures increased production of food, less expenditure to the state, and incidentally solves the problem of unemployment, illhealth, cost of export etc. The state takes a large view of its economic duties, and does not hesitate to incur expenditure, which it believes, will be justified in the long run.

Next to reclamation, comes agricultural research. Of course agricultural research in Italy is very much the same as in other countries. But the present regime was the first in Italy to take hold of research work done and make use of it. Prof. Strompelli who has been working for thirty years on wheat, has several improved varieties, which in special regions have yielded as high as 6000 lbs per acre. Prof. Novelli has similarly been working on rice for many years, as a result of which, the production per acre, which, before 1860 was only 1300 lbs, now averages 3600 lbs, with the maximum having gone to even 8000. At the Institute of Agricultural Chemistry, Rome, Prof. Thomasi has been putting his principle of 'supercultivation' into practice (i. e.) intensive irrigation, dense semination, manuring, cutting at comparatively young stage—methods which have succeeded in raising the acre yield of wheat in an experimental area to 11000 lbs, and by methods which aim at the maximum conservation of moisture in the soil, he has made it possible to raise seven crops a year.

The fascists have also re-organised vocational education including agricultural education. Agricultural propaganda is ordinarily the duty of what are called 'Ambulating chairs'. An officer holding such a place was available for each of the 92 districts of Italy, a district being generally called the Province. These Ambulating Chairs are responsible for giving technical advice to agriculturists for doing propaganda, for arranging special courses, for holding exhibitions, for calling together conferences of agriculturists and for making representations to political authorities. They are semi-official and are maintained by the local Council in charge of the district or province. There are also under the control of the Ministry of Agriculture, and the Director-General of Agriculture. A national wheat victory competition has been organised with a prize list of Rs. 4 lakhs, and prizes of Rs.2½ lakhs are also given for improvement of livestock. The prizes are awarded annually in Rome at a ceremony where all the members of Government are present and the prizes are presented by Sgr.

Mussolini himself. A wheat motor train of 8 exhibition vans is sent out as a travelling exhibition carrying samples of seeds, fertilisers, machines, cattle-food, etc., and the train before start was personally inaugurated by Sgr. Mussolini. A list of 10 commandments has been drawn up for the wheat grower and propaganda is being made in respect of them. Numerous agricultural films have been made by the Luce Institute in Rome and they are exhibited in different parts of the country. As regards manure, orders of the Government make it compulsory for cultivators to keep manuring pits of approved design, otherwise they are fined and they lose financial facilities for livestock.

The price of wheat is kept up by means of a tariff so that the producer of wheat gets a reasonable return for his wheat. Agricultural credit is provided for by the putting up of warehouses where the cultivator can store his produce and obtain advances. Institutes and banks which provide agricultural credit for Rs. 50 crores are available, of which the State furnishes 37½ per cent. In each local area, a syndicate has been formed one for the cultivators, one for direct owners and one for indirect owners. There is a federation of syndicates for each district and a confederation for the whole country. Wages and conditions of work are fixed by local syndicates. A male labourer gets about Rs. 3 a day, and a woman labourer about Rs. 1½.

Although the campaign was specifically undertaken for the production of wheat, they have generally improved the whole structure of agricultural production. There is also a philosophy behind the methodology of the wheat campaign. The methodology by itself could not have been successful even if the Government had undertaken all these farsighted measures of organisation. It was one of the declared objects of the fascist party that they looked forward to the ruralisation of Italy. They wanted to create an agricultural conscience and raise the prestige of the agriculturist. They regarded the agriculturist in the same position as the civil servants for whose essential work to the community they were paid. The Agriculturist also produced food which was essential for the community. He had, therefore, his rights and duties. And with such an enhanced prestige for agriculture they started a movement of "back to the land". They believed that an agricultural population was more healthy and sane than an urbanised population.

The cry of ' back to the land ' in Italy is not, however, the cry that you have in this country and elsewhere. In Italy 'back to the land movement' is worked on the principle of what may be called 'extension and tension', that is to say from a central area which provides amenities, radiate activities all round in connection with the improvement of the land. Progress is spiral not circular and you not merely go back to agriculture, but go back to improved agriculture.

When I had the pleasure and privilege of seeing Sgr. Mussolini he told me three things, that they attached great importance to agriculture, that they attacked problems of agriculture on a wide front, and thirdly, that they were able to get their cultivators to accept the results of science. These three things sum up what the wheat campaign has done. It was the Government that organised and backed up the campaign. The problem to them was how to make the individual do something which to himself was not much, but to the community was much. At the back of this economic organisation was the spiritual background. In the Agricultural Department here they are trying to improve everything but the man (laughter). They have been trying to improve manure, the seed, agricultural implements and all sorts of things. But the missing link in their agriculture was the man. Two things we require; one was stimulus in the shape of organisation on the part of Government and non-official agencies, and the other the spirit of the people. We might increase the strength of the economic stimulus but we must also re-arouse the spiritual life of the people.

Research Notes.

On Crossing Tobacco.

Tobacco is both a self and cross pollinated plant. The technique of crossing in tobacco is simple as the flower is fairly big and handled easily. The method described here is a modification of G. L. C. Howard's.

The colour of corolla is a reliable indication of the development of the stamens and stigma inside the flower bud. The corolla lobes of the flower buds that will open on the next day exhibit light pink colour In a young flower bud the stamens are much below the stigma and the filaments grow very rapidly as the bud develops. During anthesis, the stamens occupy one of the three following positions viz. a little below the stigma; flush with the stigma: or a little above the stigma depending on the type of the tobacco. Dehiscence of anthers takes place even before the flowers open. This character is not associated with any type in particular for the flower buds with both the burst and unburst anthers can be noticed in the same inflorescence on the same day at the same time in the various types of tobacco. In no case however, were the anthers observed to dehisce at the time of emasculation. Under Guntur conditions the receptivity of the stigma follows the bursting of anthers. The flowers commence to open from 8 A. M. and the bursting of anthers takes place usually from 8-30 or 9 A. M. to 4 P. M.

Crossing:—The male and the female parents are selected at the first instance and the flowers that are to open on the following day are protected by enclosing them in tissue-paper bags. The corolla tube of the flower to be pollinated is scissored off just above the stamens and stigma. Two V shaped bits at the top of the scissored corolla tube are removed from either side thereby thoroughly

Fig. 1.

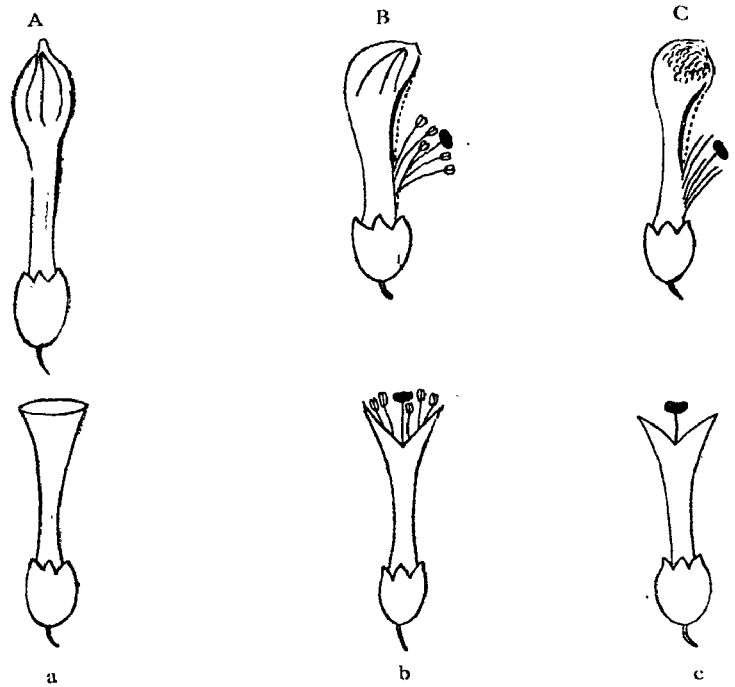

Fig. 2.

Ref:—

A. Flower bud with the slit.
B. Flower bud with the pressed out stamens.
C. Emasculated flower bud.
a. Flower bud with the corolla tube cut.
b. Flower bud with the V shaped slices taken.
c. Emasculated flower bud.

exposing the stamens and the stigma (figure II). With the help of a pair of forceps the anthers are removed and the emasculated flower is covered with a tissue-paper bag. As a safe measure before emasculating a fresh flower, the tips of the scissors and forceps are dipped in denatured spirit so as to kill any stray pollen grains that may be sticking on. On the following day the stigma of the emasculated flower is dusted with the pollen of the male parent at about 9 A. M. The correct stage can be fixed by examining the surface of the stigma. If it is in a receptive state the surface will be glistening with a gummy liquid which it exudes. The protected flower of the male parent is removed from the inflorescence and one of the burst anthers along with a portion of the filament is removed with the forceps and the burst anther is gently and thoroughly rubbed against the surface of the stigma. By this means the deposition of a large number of pollen grains on the stigma is ensured. It must be remembered that the ovary of the tobacco flower contains numerous ovules and therefore the number of pollen grains deposited should be considerably large. Several methods of dusting are in vogue but the one mentioned above is found by experience to be easy and better than others. The present method differs from the one described by G. L. C. Howard in that the corolla tube is split up very carefully with a scalpel from a little over the calyx right up to the lobes. The stamens and the pistil are fully

exposed by gently pushing back the corolla (figure 1). The pushing back of the corolla can be effected by gently pressing the top of the split flower bud. Under Guntur high temperature conditions the split corolla gets withered in no time and shrivels considerably pressing on the pollinated stigma. Besides the above, the dusted stigma, when it is put back into the corolla may at times rub against the split edges of the corolla tube, resulting in the partial loss of the dusted pollen. The crossed flower is once again protected by enclosing it in the tissue-paper bag. The mouth of the bag is tied up with a soft thin copper wire and the bag is allowed to remain for four days when the corolla tube along with the stigma dries up and sheds. The receptivity of the stigma was observed to be 36 hours on the Agricultural Research Station, Guntur, while the longevity of the pollen lasts for more than four days. On the fourth day the paper bag is removed and the fertilised ovary is allowed to develop under field conditions. As a mark of identification the crossed flowers are tagged with dated labels on which are marked the parents of the cross. After crossing the required number of flowers in the inflorescence, the rest of the flower buds and capsules if any, are removed.

The special advantages of this method are:—(1) The manipulation of the whole process is very easy and can be done with one hand. (2) On account of the exposing of the stamens and stigma there is no chance of missing any anther at the time of emasculation. (3) The corolla tube remains turgid for one and half days without either shrivelling or pressing on the stigma as in the case of G. L. C. Howard's method. (4) The dusted stigma remains in the middle of the tube and there is no chance of losing the dusted pollen, as the sides of the corolla tube do not come in contact with or rub against it and hence pollination and fertilisation is invariably effective. (5) In a limited space of time greater number of flowers can be handled than by adopting the other method.

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Mites on Sugarcane.

In July 1933 mites were reported on Sugarcane, in Coimbatore in the Government Mycologist's experimental plots in the Central Farm. The variety concerned was *Co. 213*. Due to prompt destruction of mites at their first appearance the infestation failed to spread.

Again this year symptoms of a mild infestation were reported a fortnight ago on canes grown in the Government Mycologist's pot culture house. In addition to *Co 213* mites were found also on *Poovan* and *P. O. J. 2878*.

The mite in question was examined and found to be the same as the Cholam Mite, *Paratetranychus indicus*, Hirst. The symptoms of attack on sugarcane are the same as those on Cholam (Sorghum) a description of which appeared in the Madras Agricultural Journal (Cherian M. C. (1933) "The Cholam Mite" Madras Agri. Jour. XXI, No. 1 pp. 1—6.)

I have to thank Mr. C. S. Krishnaswami, B.A., B. Sc. Ag. Assistant to the Government Mycologist for collecting and sending specimens of mites on cane.

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Gleanings.

Care in Cooking Prevents Loss of Vitamins. Loss of vitamins during cooking takes place in several ways. They may be destroyed by heat and oxidation, or they may dissolve out in the cooking water which is later discarded. The exact extent of these losses depends upon the length of time of cooking, upon the presence of air, and upon the solubilities of the vitamins concerned, says the Bureau of Home Economics, United States Department of Agriculture.

Vitamins B, C and G are readily soluble in water. Vitamin G is easily destroyed by heat and oxidation. Vitamin B is destroyed by long-continued heating but undergoes little destruction when heated at the boiling point of water for as long as one hour. Both vitamin B and vitamin C are more rapidly destroyed in an alkaline medium than in an acid medium.

Vitamin A is only slightly soluble in water and is not readily affected at the ordinary temperatures of boiling and baking. It is destroyed, however, at higher temperatures such as those that obtain in frying. It is also destroyed when heated in the presence of oxygen. Vitamins D, G, and E are fairly stable to heat and are not destroyed at ordinary cooking temperatures.

The value of any cooked food as a source of vitamins depends largely, of course, on its original value in the natural state Tomatoes are an excellent source of vitamin C even after they have been cooked. This is explained by the fact that during cooking the acidity of the tomato preserves to a great extent its naturally high vitamin C potency.

In general, the destruction of vitamins is less when the foods are heated at high temperatures for short periods, than when they are heated at low temperatures for long periods. There is also less loss when a small quantity of water or no water at all is used. For this reason it is recommended that foods be cooked for as short a time and in as little water as is practical.

If any cooking water is left it should be used for gravies or soups unless it is so strongly flavoured that this is out of the question. Steaming is one of the preferred methods for cooking since the time required is short and little water is used. (Scient. Amer. Vol. 151, No. 1, July 1934).

Control of Ants—A Recipe. "Take 1 pound of sugar, 1 quart of water, and 125 grains of sodium arsenate. Make a solution and bring to a boil. Saturate a piece of sponge with the solution and place it at the hole where the ants go in and out of the hill. Pin the sponge down with a piece of wire. The ants that have visited the sponge will go into the hill but not come out again." (Lawn Care, Vol. VIII. No. 3, 1934).

Unemployment and Poverty in India. In a recent article in the Karachi Daily Gazette, Capt. Petavel, formerly Lecturer on the Poverty Problem at the University of Calcutta, strongly advocates the formation of co-operative colonies as a solution of the problems of unemployment and poverty in India. He suggests that the colonies should be open not only to those who have merely their labour to offer, but also to those who would contribute capital, land or equipment. All would be co-operators in their way, and would have a share of the products. The workers' remuneration would be mainly in kind, but part might be in money. This would enable the more ambitious to save, and in time to launch out on any small undertaking they might fancy. If they failed, they could return to the colony, which would thus provide opportunity with security. As the colonies developed they could adopt a system of 'exchange tickets' redeemable in the

produce of the colony. Thus it is claimed purchasing-power would always be commensurate with productive power. People could always get work in the colony, because they would get a ticket to take away what they had produced. To reinforce his argument, the author refers to the Swiss Labour Colony at Witzwil and that at Llano in Louisiana. In the former, even people classed as 'unemployables' have been made self-supporting. In India he suggests a start could most easily be made with an educational co-operative colony in which young persons could work and receive their education. Elderly persons might also be included to act as leaders, or to work in departments of their own. In order to start a fund for experiment on the lines advocated by Capt. Petavel, the Mayor of Karachi has announced that he will give Rs. 5,000 and 50 acres of good land near Karachi. (*Nature*, May 1934, pp. 716 and 717).

Treatment of Diabetes with *Vinca rosea*. Each day boil twenty-seven leaves in three and a half cups of water for fifteen minutes, then strain. Take one cup after each meal; one hour afterwards as much bicarbonate of soda as can be got on a six pence in half a glass of warm water. Diet consists of all green vegetables, meat three times a day, game, fowl, or bacon for a change, some apples. Avoid ordinary bread. (*Vinca Rosea*, by White C. T., Government Botanist in the Queensland Agri. Journal, Vol. XLI, Part 6, 1934).

Chemical Changes through Sounds. Sounds well within the audible range, if they are intense enough, will produce a chemical change in various substances, it has been found by Drs. Earl W. Flosdorf and Leslie A. Chambers, of the University of Pennsylvania School of Medicine. An egg was coagulated as though soft boiled by these audible sounds. Ethyl acetate was broken down to produce acetic acid, vegetable oils were "cracked" with the generation of acetylene gas, and starch was to a slight extent decomposed to produce glucose. The sound vibrations used ranged in frequency from 1,000, about two octaves above the middle C on the piano, to 15,000, which is a very shrill squeak. (*Science*, Vol. 76 No. 2037, Jan. 12, 1934. suppt. 8).

Sex Hormones of Plants. A substance identical with a female sex hormone, *theelin*, has been obtained from palm nuts by Professor A. Butenandt and Prof. H. Jakoby, of the University of Gottingen. Sex hormones, like *theelin*, are spread throughout the whole animal kingdom from the highest down to the lowest singlecelled organisms. Similarly-acting substances are also found in plants. It has been known for some time that the plant hormones could stimulate sexual activity in animals and that the animal hormones affected the plant's development, stimulating ripening and blossoming. The reason for this, it appears from the work of Professors Butenandt and Jakoby, is that the sex-stimulating hormone in both plants and animals is the same substance. While the investigation was restricted to palm nuts, it is probable that the sex hormone of all plants is the same. (*Science*, Vol. 79, No. 2038, Jan. 19, 1934. Supplement page 8)

ABSTRACTS

Chinese Market Gardening. H. J. Simpson and Lan Sing Nam. (*Malayan Agri.* Jrl. Vol. XXII. No. 3, pp. 119—124). It is well known that no nation in the world has excelled the Chinese in the cultivation of vegetable crops. A Chinese market gardener converts the poor lands in the course of a few years to one of a very high degree of fertility. It can be truly said that "Whatever he touches turns to Gold". The secret for the successful working of such land lies in the abundant use of organic manures, chiefly applied in the liquid form, and frequent deep and thorough cultivation. Another important factor for such good crop growth is the judicious irrigation and watering of the crops. The plot selected

for gardening is thoroughly dug to a depth of 1 to 2 feet, all weeds are collected and burnt. The soil is turned over two or three times to completely remove the weeds. Then ridges and furrows are formed. Small vegetable seeds are first raised in nurseries and then only transplanted on a field scale. The most commonly used manures are pig manure, night soil and prawn sweepings. The usual method of applying the pig manure and night soils to vegetables is as a liquid top dressing, the manure being first diluted with about 8 parts of water. This diluted mixture is poured round the plants at intervals of about 7 days throughout the growing period. The method of watering the crops is so well observed that a Chinese market gardener seems to possess an inborn knowledge of irrigation and water requirements of crops. By merely looking at plants he decides when and how much to irrigate: and when and how often to water the young plants. Pot watering is common; and during summer, flooding the fields by letting water in the furrows is done where water is available in plenty. Seed selection to improve the quality of stock and also "Crop Rotation" are regularly followed. S. R. S.

The effect of Saline and Alkaline Waters on Domestic Animals (*Oklahama, Agri. Exp. Stn. Bull. 217—1933*). In several localities, the water from wells is saline in character, saturated with chlorides and sulphates of sodium, calcium and magnesium. Besides, carbonates and bi-carbonates of these elements are also present. Water from such a source has been found harmful for drinking purposes. The effect produced seems to be more 'osmotic' in reaction than due to any specific "ion". Chloride salts are less injurious than sulphates. Even though the animals are less susceptible to salts than plants, salt water containing more than 1·7% salt cannot be given to animals with safety. S. R. S.

Economic Progress in the U. S. S. R. (Soviet Russia) Dr. Louis Segal, *Chemistry and Industry*, 1st June 1934. What was once a typically agrarian country, backward in literacy and conditions of living, Soviet Union is now one of the foremost industrial country with every kind of modern improvement In the field of agriculture vast changes have been effected. The collectivisation of peasant holdings and the starting of State farms have progressed so much that at present over 80 per cent. of the area is cultivated in this manner and the rest only by private farmers. Rationalisation in agriculture has taken rapid strides. Modern labour-saving implements are used including over 2,00,000 tractors and thousands of Combine-harvesters. The yield per acre in 1933 has been it seems, a record for the last thirty years. The area under crops has increased by about 40 per cent. from 1933 to 1934. For the past four years the income of the farmers in the collective farms has been doubled.

On the industrial side the improvement has been equally remarkable. Over a thousand industrial concerns have been started in the last five years and some of these metallurgical combines in the Ural mountain area are some of the largest in the world. Several tractor works turn out more than 50,000 tractors per year. The agricultural machinery plant in Rostov is said to be the largest in Europe. The automobile factories produce over 200.000 lorries and cars a year. Other chemical, aluminium, paper, rubber, textile etc., factories are unequalled in Europe in equipment and lay out. The fertilizer industry has been developed tremendously, side by side with the increasing demand due to scientific and intensive agriculture. The total production of fertilizers was in 1932 over 15 times that in 1913. Soviet Union now occupies the fifth place in the world in the production of fertilisers, whereas formerly it was occupying the twelfth place. Researches in manuring and the manufacture of new fertilisers are being carried out with great vigour. Progress in the electrification of the country is

equally remarkable. A number of large electric stations has been built and the total capacity of these stations comes to about four and a-half million Kilo-watts.

In the field of transport, particularly railways, the development has been very rapid as can be seen from the increase in the total length of lines constructed. From 58 162 km. in 1913 it has been increased to 83,000 km. in 1933. A number of other lines are now under construction so that the total length of railway in 1937 will exceed 94,000 km. Large portions of the track have been electrified and doubled The transport facilites were utterly inadequate and not worth the name in 1921 soon after the civil war and other disturbances. The development of transport facilities as they are today are indeed a very great achievement by the Union in such a short time. There is no unemployment problem in this country which alone is unique in itself at the present time. The number of persons receiving education has been trebled and the general economic well being of the people of the Soviet Union is of a high standard not to be found in any other country in the world. S. V. D.

Potatoes. By A. L. Marlatt. (Special circular issued by the University of Wisconsin, U. S. A.) *Journal of Agriculture of South Australia*, 15th May 1934. The potato contains valuable proteins, minerals and vitamins in addition to starch and has a much better muscle repairing content than cereal foods such as wheat and oatmeal. During famines in Ireland when potatoes were the only food, there was no scurvy, and in Poland and Russia where potato is very largely used in rural parts, such diseases as pellagra and scurvy are unknown.

In comparing the value of potato with wheat bread, one 3 oz. potato is equal to 2 slices of white bread or ten medium-sized potatoes will equal 1 lb. loaf of bread. The main heat-producing value is in the starch. Steaming seems to be the most satisfactory method of cooking where potato is used as one of the main foods. even upto about 3 lb. in the diet. The potato however lends itself to all methods of cooking. The problem is to reduce any loss of the mineral matter in the process of cooking. Studies in the laboratory have shown that steaming or baking or cooking without water in the water-less cooker are all better than boiling the potato in the skins or boiling it after peeling. In the latter case the percentage of loss in both mineral matter and protein may be very high. Recent work indicates that loss of manganese may, through pressure cooking or boiling in moderate amount of water, be as high as 9 per cent. Manganese is now known to be an important element along with calcium, phosphorus, iron etc.

In careless cooking of the potato as high as 30 per cent. of its food value may be wasted. This loss is greatest in the muscle-building material (protein) and mineral matter. Such loss occurs in the following methods of cooking:—

1. Peeling and slicing the potato, allowing it to stand a long time in water before cooking.

2. Placing the peeled potato without previous cooking in cold water and bringing the water quickly to boiling point.

3 Placing the peeled potato at once in salted boiling water and boiling the water rapidly.

Baking or steaming with the skin on or cooking unpeeled potato without water in a heavy covered vessel over the direct heat are methods in which no loss occurs The skin should be removed after cooking and then cut according to requirements. If roughage is needed in the diet the baked potato should be eaten with the skins on. If peeled and cooked in boiling water, the water in which it is cooked should be used with the potato or saved to be used in making soup.

S. V. D.

The effect of a varying moisture supply upon the development and composition of the Maize lant at different periods of growth. Miller, M. F., & Duley, F. L. (*Missouri Agri. Exp. Stn. Res. Bul. 76. 1925*). Corn was grown in

fertile soil in large protometers, with varying amounts of moisture during three different periods of growth. Optimum (28%) and minimum (13%) moisture treatments were supplied to the crop in all possible combinations with the three periods of growth. The moisture supply during the second period, or from the time the plants set their ninth leaves until about tasselling time, had by far the greatest effect upon the total dry weights of the plants. Plants stunted by minimum moisture during the first period were able to recover and produce good plants if conditions were favourable during the last two periods, but the time for maturing was somewhat prolonged. Minimum moisture during the third period gave a greater weight of root growth than optimum moisture In all periods, minimum moisture gave a greater root growth in proportion to tops than did optimum even though the actual weight was less during early growth. Optimum moisture during the third period gave, considerably greater production of grain than did the low soil moisture content. The amount of water transpired per unit of dry matter produced, varied greatly during the different years due to variation in the climatic conditions. The variation in the transpiration ratio between different treatments was not great, but was slightly less with low soil moisture. Chemical analyses showed that in practically all cases the maize plants contained a higher per cent of nitrogen and mineral elements where the moisture contents of the soil was low. (*Authors' Abstract*).

Correspondence.

The Sindewahe Double Furnace.

Rao Sahib K. M. Singaravelu Mudaliar, Kalavai, N. Arcot, writes:— In the correspondence section of your journal of January 1934 I came across a note deprecating the utility of the Sindewahe Furnace with multiple pans (two). I am having a furnace of this type working in my farm and I must give my experience of its working. It was able to work as much juice as three to four pairs of good bullocks were able to crush, during a period of twelve complete hours. In fact, the pans have to be kept idle for some time because the working was so quick that the supply of juice was not sufficient. This is not only my experience in my own farm, but the experience of uneducated ryots in the surrounding villages, hereabouts Any gentleman interested in this, can see one working in one Ramaswamy Mudaliar's Farm at Nethapakkam, a village fifteen miles from Ranipet Railway Station, M. S. M. Railway. Another place in which four to six of these furnaces have been worked with satisfactory results is Tythambatti, a village five or six miles from Ambur Railway Station. Mr. Ramachandra Reddiar, who raises about 25 to 30 acres of sugar cane crop every year, and crushes the same by machine, uses the Sindewahe Furnace for converting the juice into jaggery. So, I am unable to concur with the correspondent that the Sindewahe furnace gives poor results.

Crop & Trade Report.

Note on the production of sugar refined from gur in India, 1933. R. C. Srivastava, B. Sc., Sugar Technologist Imperial Council of Agricultural Research. *The Indian Trade Journal*, 7th June 1934.

The grant of protection and low prices for *gur* were responsible for the marked increase in the number of factories refining *gur* during 1933. Out of 25 new cane factories ten also refined *gur* in the off-season during 1933. The following

table shows the number of factories refining *gur* in the different provinces during the last two seasons.

Provinces.	Season 1933 New	Old	Total.	Season 1932.
United Provinces	8	8	16	11
Bihar and Orissa	2	1	3	2
Punjab	1	3	4	2
Madras	–	4	4	2
Total.	11	16	27	17

In the U. P. 11 factories also manufacture sugar direct from cane and this is the case with 3 factories in Bihar and Orissa, and one in each of Punjab and Madras.

The following table gives the quantity of *gur* melted by factories during 1933.

Particulars.	United Prov. Tons.	All others Tons.	All India Tons.
Maximum	25,715	13,298	25,715
Minimum	630	1,245	630
Mean	6,436	4,390	5,602

The following table shows the total production of sugar and molasses by concerns in India, in tons.

Particulars.	Season 1933. Old Factories.	New Factories	Total.	Season 1932. Total.
Gur or raw sugar melted	125,077	26,192	151,269	126,157
Sugar manufactured	67,323	12,783	80,106	69,539
Molasses obtained	45,345	10,894	56,239	46,600
Recovery of sugar per 100 tons *gur*	53·82	48 80	52·95	55·10
Recovery of molasses per 100 tons sugar	36·25	41·59	37·17	36·90

The total quantity of sugar made direct from cane is 158,581 tons for 1931—32 and 290,177 tons for 1932—33. The quantity produced in 1923—24 was 38,312 tons or only about one-eighth of that made in 1932—33. This shows the remarkable increase in sugar production in India for the last decade. The production of sugar from *gur* has increased only by about 50 per cent., the quantities being 56,406 tons in 1923—24 and 80,106 tons in 1932—33. The number of factories that produced sugar direct from cane was 23 in 1923—24 and 57 in 1932—33 and the number that refined *gur* was 13 and 27 respectively. The number of factories refining *gur* during the current year shows a large increase over that of last year.

The following table shows the average percentage recovery of sugar from *gur* during the season 1933 :—

Particulars.	United Provinces.	All others.
Maximum	54·8	66·2
Minimum	42·8	45·0
Mean	51·2	56·6

The highest recovery for the season was 66 2 per cent. as against 65·2 during the preceeding season. The quantity of *gur* melted in the U. P. during the season was more than double the quantity melted in all other provinces put together.

The *gur* refining industry is subject to great fluctuations. The quantity refined in any year greatly depends on the relation between the prices of *gur* prevailing during the purchasing season (January to May) and the market price for

sugar refined from *gur*. The following table gives the monthly average prices of *gur* in Siswa Bazar and that of special sugar (refined) at the Cawnpore market.

Month	1929 per Md.				1930 per Md.				1931 per Md.				1933 per Md			
	gur		sugar		gur		sugar		gur		sugar		gur		sugar	
	Rs.	As.	Rs.	As.	Rs.	As.	Rs.	As.	Rs.	As.	Rs.	As.	Rs.	As.	Rs.	As.
January	3	9	10	6	—		—		2	14	10	5	2	10	9	2
	to 4	6							to 3	7						
February	3	2	10	6	4	2	10	4	2	14	8	13	2	8	9	0
	to 3	14			to 5	4			to 3	5						
March	4	1	10	7	4	6	10	4	2	15	9	0	2	8	8	11
	to 4	12			to 5	7			to 3	11						
April	4	4	10	7	4	8	10	4	3	0	8	14	2	8	8	4
	to 4	14			to 5	8			to 3	10						
May	—		10	5	4	11	10	2	3	0	8	12	2	12	8	6
					to 5	8			to 3	12						

The average price for *gur* for 1933 was Rs. 2—9—0 per maund and for sugar it was Rs. 8—10—0. Even with these low prices there was a very fair margin of profit and the quantity of *gur* refined during the year was the highest on record.

However on account of increasing competition from cane factories and the imposition of the excise duty on sugar, the refining of *gur* is likely to decline. The *gur* refining industry is a relic of the past and in spite of improvements effected in the manufacturing process, the future of the industry is uncertain as the quality of *gur* does not improve and the recovery of sugar is as low as 5½ per cent. on the basis of the original cane. Co-operation between the producers of *gur* and the refiners is necessary to effect improvements in the quality thus ensuring better return to the grower and better prices for the refiner.

S. V. D.

College News & Notes.

Students' Club. Athletic activities were very much in evidence during the month, and there were a number of matches in all games. With our *maidan* scoring as the venue for some of the matches in connection with the Abraham Memorial Football Tournament, large crowds turned up to see the matches, from Coimbatore town.

Cricket. There were, three practice matches, the first on the 5th. between two home elevens, on the 11th. when the second eleven met the Forest College and the match ended in a draw and on the 12th. when the first eleven convincingly defeated the combined schools, by a huge margin. The chief interest was centred in the tournament match for the Y. M. C. A. Rondy Shield on the 18th. against the New Mysore Sports Club, the holders. The match started sensationally, the Students' Club who batted first, wrung two good wickets in the first over, with but a bye boundary on the board, and although Messrs. Shiva Rao and Thomas stemmed the tide for sometime, it was not until Ramanatha Rao and Albuquerque became associated for the fifth wicket, that the supporters of the home team began to breathe a sigh of relief, with the score mounting steadily and passing the century; after this partnership was dissolved there was again a set back, but B. S Moorthy rattled up a breezy 22 in double quick time, so that when the last wicket fell, the score had gone up to the respectable total of 148 made in just under three hours. The chief contributions were Ramanatha Rao (54) who faced the bowling with confidence, Thomas (20), B. S. Moorthy (23), Lakshmanan

(13), Albuquerque (13) and Shiva Rao (10). B. S. Krishna Moorthy for the visitors bowled remarkably well, taking 7 wickets for 41 runs.

Venturing out in their turn, the visitors started as disastrously losing a wicket for no run for the second ball bowled, and another two, with but thirty on the board. Muthuswamy and B. S. Krishna Moorthy, however, made a stand and then Shanmugham and B. S. Krishna Moorthy, till the score was 120 for 5 wickets; and it looked as if the holders would easily snatch victory. Then came a change and Thomas coming on to bowl, had B. S. Krishna Moorthy adjudged l. b. w. and this practically decided the match, for the remaining 4 wickets fell for the addition of only 4 runs, so that the Students' Club won by 24 runs. B. S. Krishna Moorthy contributed an invaluable and chanceless 52, Muthuswamy 18, and Shanmugam 27, Lakshmanan for the home team captured 4 wickets for 39 runs and Thomas 3 for 12.

Football. Our College met the Union High School team in the first round of the Abraham Memorial Tournament on the 7th and the match ending in a goalless draw, was replayed on the 8th, when the college was beaten by 3 goals to 1 after an early lead. Muthuswamy at centre half put up a plucky fight, but his efforts were unavailing,

The Government College met the Municipal High School on our grounds on the 10th and this match also resulting in a draw, was replayed on the 17th when the Govt. College won by one goal.

Hockey. There were four matches, three against the Anglo Indians, and one against the Papanaickenpalayam eleven. The last was won easily by 5 goals to nil, the scorers being Kulandai (3) Narasimhamurthy (1) and Rajagopalan (1). The first match on the 2nd with the Anglo-Indians ended in a narrow defeat by 2 goals to 3, B. S. Moorthy taking credit for the two goals scored by the Students' Club. The second on the 4th ended in a draw of 2 all, B. S. Moorthy and Kulandai, sharing a goal each. The last match on 10th ended in a defeat by 5 goals to nil, but the college team was not fully represented. The hockey team has good material, but the half-back line needs a little more strengthening.

Tennis. On the 17th, the Students' Club met the Officers' Club in a Tennis match, three pairs representing each club. The Students won by 5 matches to 4, Moncey and Rathakrishna Rao winning all the three matches, while the other two pairs, Venkataramiah and Satyanarayana Reddy, Albuquerque and B. S. Moorthy, won only one match each.

The Inaugural Address of the Students' Club was delivered on the 4th by the Hon'ble Mr. V. C. Velingiri Gownder, the subject of the address being 'Agricultural Education'. M. R. Ry. Rao Bahadur, D. Ananda Rao Guru presided on the occasion.

Officer's Club. Electric installation at the Club having been finished, the lights were switched on, on the 11th. On the 16th there was a general body meeting, and the draft rules of the club, revised and pending for a number of years, were passed with great enthusiasm prevailing. On the 2nd the Officers' Club played a volley ball match against the Y. M. C. A. team and were defeated in straight games.

Personal. Rao Bahadur B. Viswanath, who has been transferred to Pusa, handed over charge to Mr. P. V. Ramiah on the 13th. He was the recepient of a number of 'teas' before he left:— Indian Officers' Association (4th), Association of Economic Biologists (9th.) and Officers' Club (10th). On the 13th there was a very large crowd of officers and students at the Railway Station to give him and Mrs. Viswanath a send off and a dozen or more friends even accompanied him as far as Podanur.

Mr. G. N. Rangaswamy Ayyangar, B. A., I. A. S., Millets Specialist, has been invited and has accepted to join the Editorial Board, 'Current Science', Bangalore.

Association of Economic Biologists A meeting of the above association was held on on the 23rd when Messrs. P. D. Karunakar and M. C. Cherian contributed papers on "Inoculati..g the soil with a Saprophyte for checking the footrot fungus on paddy" and 'Some mites and ticks of economic importance' respectively.

Weather Review (JULY—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	13·0	+6·9	18·2	South	Negapatam	1·0	−1·4	11·9
	Berhampore *	11·9	+3·9	16·9		Aduthurai *	0·7	−0·7	9 6
	Calingapatam	6·4	+0·8	9·9		Madura	1·2	−0·7	9·9
	Vizagapatam	8·3	+3·9	11·7		Pamban	1·0	+0·5	12·6
	Anakapalli *	6·4	−0·2	14·7		Koilpatti *	...	−0·7	12·8
	Samalkota *	9·0	+0·9	10·8		Palamkottah	...	−0·3	12·1
	Maruteru *	5·1	−5 0	7·4					
	Cocanada	9·3	+3·3	13·3					
	Masulipatam	9·3	+3·1	12·8	West	Trivandrum	5·3	−2·0	36·9
	Guntur *	12·3	+7·3	16·7	Coast	Cochin	11 9	−10·5	70 2
						Calicut	17·4	−12·4	73 8
Ceded Dists.	Kurnool	5·1	+0·3	13·2		Pattambi *	13·0	−12·6	56·8
	Nandyal *	6·4	+0·8	14·7		Taliparamba *	29·8	−16·5	82·4
	Hagari *	5·3	+3·3	10·4		Kasargode *	29·4	−10·0	95·9
	Bellary	4·4	+2·7	7·5		Nileshwar *	26·9	−11·5	80·9
	Anantapur	4·6	+2·4	7·0		Mangalore	28·8	−9·2	78·3
	Cuddapah	5·2	+1·2	9·8					
Carnatic	Nellore	1·8	−0·8	3·7	Mysore	Chitaldrug	2·2	−1·0	12·8
	Madras	2·0	−0·4	6·6	and	Bangalore	1·4	−2·7	11·3
	Palur *	6·3	+3·9	10·1	Coorg	Mysore	1·6	−1·0	11·9
	Palakuppam *	3·4	+2·2	10·1		Mercara	32·8	−8·8	60·6
	Cuddalore	4 6	+1·5	7·1					
Central	Vellore	3·3	−1·1	11·3	Hills.	Kodaikanal	3·0	−1·3	36·1
	Hosur cattle farm *	2·5	+0·7	10·5		Coonoor	1·1	−2·6	24·7
	Salem	3·4	−0·3	12·9		Ootacamund *	5·4	...	23·1
	Coimbatore	1 0	−0·1	10·3		Nanjanad *	7·5	−4·5	26·3
	Coimbatore Res. Inst. *	1·0	...	10·6					
	Trichinopoly	0·5	−1·1	8·4					

* Meteorological Stations of the Agricultural Department.

Summary of General Weather Conditions. The weather during the month was dominated by unsettled weather in the Bay. The monsoon was generally weak on the West Coast. The bay depression which appeared at the end of last month moved westwards and crossed the coast near Balasore on the 3rd and then weakened. A second depression appeared in the north-west angle of the Bay on the 7th and crossed the coast and lay over Bengal and Behar on the 9th and filled up by the 11th. The third depression appeared off the Arakan Chittagong coast on the 19th and moving westwards passed inland as a low pressure wave and had merged into

the seasonal trough of low pressure over the Indo-Gangetic plain by the 21st. Conditions became unsettled off the Circars coast about the 24th but failed to develop, and induce a flow of monsoon winds over the Peninsula and determined widespread rain over the central parts of the country. On the 31st conditions were again unsettled off the Circars coast.

Rainfall was in large excess in the Circars and Deccan, in large defect on the West Coast and nearly normal elsewhere.

No heavy falls of rain occurred during the month.

Weather Report for the Research Institute Observatory.

Report No. 7/'34.

Absolute Maximum in shade	92·5
Absolute Minimum in shade	67·5
Mean Maximum in shade	88·0
Departure from normal	+ 1·8
Mean Minimum in shade	71·3
Departure from normal	- 0·7
Total rainfall	0·97 inches.
Departure from normal	- 2·0 ,,
Heaviest fall in 24 hrs.	0·32 ,,
Total No. of Rainy days	4
Mean daily wind velocity	6·1 M. P. H.
Mean humidity at 8 hrs.	70·9%
Departure from normal	- 2·0%
Total hours of bright sunshine	177·7
Mean daily hours of bright sunshine	5·7

General Summary. The monsoon was weak almost throughout the month and rainfall was in large defect. Day temperature was above normal.

Departmental Notification.

Appointments, Postings, and Transfers. The following officiating appointments in the Madras Agricultural subordinate service—class I, upper subordinate III grade (75—105) are ordered with effect from 22nd June 1934:—Mr. T. Devasigamony, B. Sc, Ag. Agricultural section, to report for duty to Dy. Director III circle Bellary. Mr. Venkatachalam, B. Sc. Ag, Agricultural section vice Mr. V. N. Subbana Acharya on leave, to report to duty to F. M., A. R. S., Samalkota. Mr. M. Bhavani Shankar Rao, B Sc. Ag, Agricultural section vice Mr. K. Sitarama Iyer on leave, to report to duty to F. M., A. R. S., Kasargode. Mr. R Guruswami Naidu, B. Sc, Ag, Science section, vice Mr. C. Vijayaraghava Acharya on other duty in the Madras Agricultural service to report for duty to the Millet Specialist, Coimbatore. Mr. P. Gopalakrishnan, Science section, vice Mr. Balakrishnan on other duty to report for duty to the Government Agricultural Chemist, Coimbatore. Mr. C. K. Ramachandran whose officiating appointment terminated on 27—7—34 will continue to officiate till further orders vice Mr. S. Dharmalingam Mudali.r on other duty and will continue to work in the cotton section. Mr. V. Achyutha Pantulu, A. A. D. transferred to I circle is posted to Amalapuram. Mr. M. Narasimham A. D. Amalapuram is transferred to Chodavaram.

Mr. N. M. Bhukta on relief by Mr. M. Narasimham is posted to Vijianagaram. Mr. V. Tirumala Rao on the expiry of his leave will rejoin duty in the I circle. Mr M. S. Kylasam on relief by Mr. V. Tirumala Rao will return to Coimbatore. Mr. G. Sitarama Sastri on joining duty is posted to Vinukonda. Mr. K. Hanumantha Rao A. A. D., on leave is reposted to Rajampet with headquarters at Nandalur.

Leave. Mr. K. Ramanujachari F. M. A. R. S., Guntur, leave for 2 months from 16—8—34. Mr. T. Narayana Rao. Millet Assistant, Guntur, leave for 5 months from 6—8—34. Mr. V. Suryanarayana, F. M., Kalahasti, leave for 8 months from 15—8—34. Mr. E. Achyuthan Nair, A. A. D. leave on m. c. for 2 months from 5—6—34.