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Editorial.

Facts and Figures. As in every science so in agricultural economics the need for reliable statistical data and their sound interpretation is very great. It is therefore very gratifying to note that the Council of the Royal Statistical Society has decided to form a section for the purpose of promoting the application of methods of statistical analysis to problems in Agriculture and Industry. This section will hold regular meetings and a supplement to the Journal of Royal Statistical Society will devote itself to this aspect of statistical science. Here in India the strengthening of the statistical activities of both the Provincial and Central governments is in a measure the response to this general need. The recent requisition of the services of Professor Bowley and Mr. Robertson by the Government of India to help in the inauguration of the Economic Survey is another event of very great importance. They are to help in this task of gathering facts and figures. They have been asked to make recommendations in respect of an organization for keeping current statistical and economic records. The feasibility and methods of starting a census of production are to be examined. This census, when made, will enable both the Government and the representatives of the people, in the words of Sir George Schuster "to keep their finger on the economic pulse of the nation". The task attempted is so vast that

the help and co-operation of bodies like Universities will be sought. Free trade in its old idealism is practically obsolete. The present tendency is towards special agreements of the type recently arrived at with Japan on Cotton. That being so "it is of vital importance that the Government and the public should be in possession of scientific knowledge which will ensure not only that such arrangements are made on sound lines, but that no opportunity for making them is neglected. * * The better the organization for the attachment of accurate knowledge, the better will be the Government's power to devise a wise policy. The more the public appreciates realities, the less will it be in danger of being misled by mere political programmes, designed merely to capture votes."

How supine we have been in the past in the matter of gathering many facts and figures even in matters affecting officialdom will be evident from the following statement appearing in a recent document discussing the feasibility of instituting a partial Provident Fund out of pensionary benefits. "No reliable vital statistics exist for the various classes and grades of Government servants; nor are there statistics by grades of the average number who resign voluntarily, who are dismissed, or who are invalided prematurely; nor are there reliable figures to show how long on the average pensioners of the various grades live to enjoy their pensions. The Government of India have recently made an attempt to find a typical rate of wastage in certain large establishments, but the resultant figures have proved to be contrary to actuarial probability and must be rejected." If this is the situation with the small group of public servants as it affects its pension, the ignorance concerning facts and figures pertaining to vast groups representing Labour, Industry, and Agriculture is better imagined than described. It is therefore quite opportune that on the eve of the inauguration of the reforms the nation that has so far received its inspiration from sentiment, will derive constructive courage to face facts and figures and fashion its economic policy in the light thereof.

A Coffee Conference. The solution of problems relating to the production and marketing of any agricultural commodity should prove a boon to the cultivators. The Coffee Conference held at Bangalore in January under the Presidency of Sir Mirza M. Ismail, Dewan of Mysore, and at which important coffee interests in Mysore and Coorg participated, has not come too soon. Mysore with an acreage of 92,000 and Coorg with 40,000, which together comprise 74 per cent of the total area under coffee in India, are actively interested in the welfare of the industry and any joint action by these major coffee districts deserves the active support and whole-hearted cooperation of the coffee planters situated in Madras. The object of the Conference was to devise ways and means of making the Indian produce better known

both in the home markets and abroad. It may be recalled in this connection that from 1899 onwards several efforts were made mostly through the initiative of the U. P. A. S. I. either to impose a duty on exports or to collect a cess on cultivated area in order to popularise Indian coffee in the Indian and foreign markets. These efforts unfortunately fell through, primarily due to the difficulty of arriving at a formula of taxation acceptable to all parties interested in the industry and the consequent policy of non-interference by the concerned administrations. Now that Mysore has taken up the initiative and has enlisted the cooperation of the leaders of the industry in Mysore and Coorg, it should be possible to arrive at a working scheme. The history of the Balehonnur Coffee Experimental station has shown that despite geographical and administrative obstacles, it is possible to work out a scheme which is acceptable and eventually beneficial to all coffee interests in S. India. The industry is passing through a crisis, due to low prices on the one hand and the inroads of pests and diseases on the other. While the latter aspect is receiving adequate attention, action on the former is long overdue. We trust that in consultation with the administrations of Coorg and Madras, Mysore will take a bold lead in initiating a practical scheme and that before long the marketing of Indian coffee will receive the attention it deserves and coffee growers in South India will reap the reward for concerted action.

The Rubber Industry. Rubber cultivators are passing through the biggest and longest slump in the history of rubber prices. If the steady though slow rise in the price of the raw commodity is to be an index of further improvement, the industry may yet recover and be able to stand on its own legs. The crisis has taught rubber planters a valuable lesson that economies which were not even dreamt of in the days of prosperity could be put into operation and the cost of production could be brought below what was at one time believed to be the irreducible minimum. Perhaps it is not widely known that a few enterprising concerns which resorted to the manufacture of certain raw rubber goods such as crepe soles for shoes, door mattings &c. within their own estate premises have tided the crisis more successfully than those which solely depended on the London market and in some cases were able to make reasonable margins of profit. Now that a silver lining is visible in the sky, it is time that Rubber cultivators should seriously think of utilising their produce by manufacturing rubber goods within the country. The recent action of the Travancore Durbar in investigating the possibilities of manufacturing rubber goods within the State is an opportune move. Expert opinion is reported to have expressed favourably on the suitability of the State for erecting a rubber factory where articles like tyres and tubes, rubber sheets, water proof materials, rubber hoses and a variety of moulded articles like toys could be manufactured. Japan has shown that a ridiculously

low-priced foot-wear which is within the means of India's millions could be produced from crepe rubber sheets and canvas both of which are produced in India. We trust that rubber growers in India and Ceylon will take a bold step in the matter and refuse to live at the mercy of the manufacturer overseas.

AGRICULTURAL EDUCATION—THE NEED OF RURAL INDIA *

BY RAO SAHIB S. V. KANAKASABHAI PILLAI,

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With the illiterate and the ignorant, knowing is through seeing and hearing.
With all, the true ways of learning are by doing.
Practice makes one perfect in his art.

Introduction. I feel highly honoured to be called to present a paper on a great subject, which is life and death to the great mass of rural population. I would crave your indulgence for my shortcomings but I assure you that I am ready to learn from your remarks. We must all put our shoulders to the wheel so that the almost immovable car of our Indian rural masses may start moving. I am confident, once it commences to move, then no one can stop its progress.

The cry of "Back to Village." We hear that our villages must improve if we, as a nation, shall not die. The cry of "Back to village," who has not heard in season and out of season? But what have we done except for a few Rural Reconstruction centres here and there, far and few between. I propose here to present a few thoughts on the spread of Agricultural knowledge and practices among the rural masses to promote their economic uplift.

Awaken the individual rather than provide his needs. The uplift of the rural masses consists in (1) awakening and lifting the man himself, equipping him with more knowledge and inspiring him to greater responsibility and higher character and (2) relieving him from wants and aiding him with more facilities. The latter is only a temporary help while the former is a permanent acquisition to the individual and as such the former should receive greater attention. For example, feeding a starving man is only a relief for the time being; but if he is given sufficient knowledge and a steady habit we help him stand on his legs for all time. If a physically fit beggar is continuously fed, we only ruin him and others of his type for life. In Henry Ford's workshops the lame, the cripple and even the blind are taught to do something to earn their livelihood. Thus if we are to really uplift the rural masses, we ought to help them to help themselves; they should be helped to think for themselves of their real needs, to dream

* Paper read at the 22nd Agricultural College Day and Conference—October 1933.

as to how they can better themselves and to act to the extent they can. Where their needs are beyond their capacity, state and public help should indeed be forthcoming.

A Determined Will, the one thing we lack. What is essential is a determined will on the part of the State and the leaders of the nation to equip the masses as indicated above and until then the State has to bear the responsibility for " spoon feeding " them, also the leaders of the nation have the duty not only to awaken the people but also to press on the State the amount and urgency of the needs of the country. Japan has by the order of the State, removed illiteracy in the course of a quarter of a century and grown into a great industrial and military nation within our memory. China has, by the action of its leaders liquidated 80% of her illiteracy in less than half a century, in spite of her many handicaps; before our very eyes, we see what Soviet Russia is doing with her 5 and 10 year plans for her rustics who were until recently thought to be the most ignorant among European nations. How far they have advanced in cultural, vocational and industrial education is amazing even the western world. On the other hand what has been done in this ancient *punnya* (sacred) land? The last few census reports prove that even our literacy, not to speak of education and industry, is unable to keep pace with the growth of population. What has become of that " watchword of hope " which His Majesty the King Emperor himself gave in 1911, in reply to the address presented by the Calcutta University :—

" It is my wish that there may be spread over the land a net-work of schools and colleges, from which will go forth loyal and manly and useful citizens, able to hold their own in industries and agriculture and all the vocations in life. And it is my wish too, that the homes of my Indian subjects may be brightened and their labour sweetened by the spread of knowledge with all that follows in its train, a higher level of thought, of comfort, and of health. It is through education that my wish will be fulfilled, and the cause of education in India will ever be very close to my heart."

It is pitiable that this noble and pious wish is more a dead letter. Can any other reason there be, but the lack of a determined will on the part of Government and the leaders of the nation, for this state of affairs?

How our resources are frittered away. Probably large sums of money have been spent, on buildings, lands, machinery, but not on the individuals. This institution itself is a good example and I know it is the same with the new College of Engineering at Guindy. I can admire and appreciate the high architectural effects on the inmates and the name it brings from foreign visitors for our land and the British Empire. But if there be only the fixed will as in Japan or Russia, miracles would have been worked! When the Mickado's rescript,

" It is designed henceforth that education shall be so diffused that there may not be a village with an ignorant family or a family with an ignorant member "

was promulgated, the Government did not start building schools and furnishing them but held the classes in the verandahs of houses, as was our old *pial* schools. While Japan achieved her ruler's wish, our King Emperor's words are yet to be acted upon. I am only illustrating my point and not blaming any body. Convenience and comfort are indeed good but holding on to our objective without sliding or faltering is the only sure and sincere way to achieve. Otherwise, we shall wander and squander away our resources in the by-ways without ever reaching our goal.

Agricultural Graduates failing to lead as Agriculturists. The agricultural education given in this college has indeed been highly scientific; and very valuable research work has been done in this Institute which can hold its own in the West or the East. The short duration sugarcane bred at Coimbatore is a bowing of nature before the agricultural scientist, and of which we specially can well be proud. This is neither the time nor the place to narrate the varied valuable achievements of this great college. Under the prospects for students trained in this college, it is stated:—

"In the case of these who return to farm their own lands, the knowledge of farm work, both theoretical and practical which they have obtained will undoubtedly enable them to make larger profits than before. For those who do not own sufficient land for this, there are opportunities as Managers or Agents to Zamindars, Planters and Estate owners, while such minor branches of Agriculture as Dairying, Poultry-keeping or Fruit-growing often prove profitable."

My enquiry is how many have thus turned back to their own or others' lands, venturing to make a living or fortune by testing their knowledge at plough's end. My information is that practically all are seeking Government jobs and failing which are swelling the ranks of the unemployed. Who and what are to blame? I admit it is more a misfit of motives than a misfit of education. The mentality of our men, old and young is mostly responsible for this state of affairs.

Educative Value of the Agricultural Department. In the field of education apart from instruction, the Agricultural Department has indeed many a farm in different localities. They are mostly, if not all, research stations and as such they have been useful to supply seeds of new strains of paddy and other crops. True, these are all excellent. But the average agriculturist enquires "Have you made a profitable crop for me, to follow your example?" The villager bluntly points his finger at the Agricultural Department and says Government can sow gold and reap silver with Government's finance which he cannot afford to do. Agriculture cannot be acadamic if it should benefit the country and the people. Probably some farms, or some crops in the farms might have worked at a profit but it is not sufficiently known. All will be glad to learn if such profitable crops have been raised.

The Suspicion of the Villager at anything new. If a thing, is not known, probably the department cannot be wholly blamed. They are

trying their wits' ends, to see how best to reach the people, with their conferences, exhibitions, demonstrations, leaflets and almanacs. Leaflets, are freely distributed; almanacs are priced an anna each and yet how many care to get these leaflets and almanacs or read them. As we recently ran an Agricultural course of education for the village youths at our Adult Education Centre (Koumara Gurukulam) at Mannargudi we have some experience of the ryots' mentality. They feel that no Agricultural knowledge is needed in this land which is practising this art from time immemorial and which has taught it to other lands. Any attempt to speak about manure, plough, etc., is considered a device for advertising their sales for personal profit. Of course, thoughtful mirasdars do not think so, but they are few and far between. It is the ryots who form the bulk of agriculturists and they seldom budge an inch.

The Example of Denmark Adult Schools. While the bulk of the people are thus suspicious and irresponsive what education will avail them is indeed a problem Probably individual and collective examples and profitable demonstrations with facts and figures may go a long way to help the spread of knowledge. We may probably point to the example of Denmark which will support this point. In that little country there are 22 Agricultural Schools with 2897 students. The schools are all privately owned but receive State grants. Here there is both practical training and the theoretical instruction and the courses are for periods less than a year. The students are practical farmers and farmers' sons. When the people engaged in Agriculture either as proprietors or working managers are keen in their business and desire to learn things, then such schools thrive.

The proposed Agricultural Colony at Mannargudi. What will benefit our villager is a net-work of such practical schools for adults for short terms where the educated unemployed and young villagers can labour and earn their livelihood while under training. Government aid will be necessary in the earlier stages. As Agriculture in India can never be as profitable as in Denmark, progress of these schools must indeed be slow. As the dignity of labour is yet to be understood, there is a great bias to get over. The proposed Agricultural Colony is an attempt for a training school of this type.

The need to train the labourers as well as the landlord. The training should be cheap and open a way for middle class villagers, but it will not be sufficient. The real person who does the work is the cooly and until he realizes the value of the improved farming, whatever it be, any amount of goading from the master will not produce results. The lack of education and training for the cooly is a great block on the way of our economic betterment though the same helps the master to keep him as a good drudge and a slave. We have to decide for ourselves, whether we want industrious fools whom we may

deceive and exploit with low wages and long hours or intelligent and businesslike labourers with square wages and hours. The days of the former are tolled and with the advancing democracy our security rests in uplifting the labourers. *New India* gave the following statistics regarding the capacity of labourers in different countries :—

China	...	1	England	...	18
India	...	1½	Canada	...	20
Germany	...	12	United States		30

No greater eye opener is needed than the above figures. An agricultural country like ours can never compete with an industrial country of the west; yet if our economic interest is to be served, we should help our coolies to do better. What else can help them in this direction, than education and practical training?

Central Elementary Schools with an Agricultural Bias. I am aware that the Government Agricultural farms at different stations train maistries and coolies to a certain extent. The provision thus made is only for 38 at a time for the whole Province. Even these are job hunters. Except for a few who may come from neighbouring villages, does any one avail himself of the training? This can never serve the object in any appreciable manner. The only way to bring up the rural masses to a due understanding of their uplift is to combine Elementary education with Agricultural education. Then it is possible to reach a large mass of rural population. We may leave the three R's to the pial schools. The knowledge of the three R's may remove rank illiteracy but elementary education is something better. It will include certain sanitary, cultural, vocational, social aspects of life. For a certain group of villagers say for a radius of 12 miles, a central Elementary school with an agricultural bias should be run with a small farm which will pay its way from its earnings. The pupils who will be about 12 to 18 years of age may work in the field for certain hours regularly and have their noon meals, if not full boarding and lodging, at the farm. A small fee may be charged for training. While an institution of the Colony type sketched in the previous para may attract fairly upper middle class adults, this elementary School can draw lower middle class and labouring class youths.

The idea is not altogether a dream or a speculation. The American Arcot Mission runs a school of this type at Katpadi and there is a Mission Boarding School for girls near Madura Town rendering similar service. It is a beautiful sight to see these girls transplanting, in their lands, milking their cows and attending to their class lessons. There is no need to purchase land as land may be leased. If only our richer and learned classes realise that "Service to man is worship of God", money will not lack in the land. There is no use expecting any Government to do every thing, while we fold our hands; Government can be expected to aid, if we start in right earnest. This

principle is admitted by the Government too, as they are insisting on garden work being taken in schools. But what is thus attempted in schools is nothing more than children's play and it cannot yield any appreciable useful result.

Experiences of Ages not to be lost in the Pride of the Present. The above proposals may be thrown out by the sceptics as being ambitious but what the foreign missions are capable of, we should be able to do, and the present awakening of the country is a hopeful sign. But even the sceptics should be able to do much simpler things; one such way I will offer now, and let there be no excuse from any quarter. There is already in the country plenty of experience of ages, buried up in the literature of this ancient land. Are we making any use of them? The tendency of the modern is to forget the past in the pride of the present and begin everything anew. This is a great danger to our progress and a great loss to our equipment. Hear the clarion call of Swami Vivekananda:—

"Children of India, I am here to speak to you today about some practical things and my object in reminding you about the glories of the past is simply this. Many times have I been told that working into the past only degenerates and leads to nothing, and that we should look to the future. That is true. But out of the past is built the future; look back, therefore as far as you can; look forward, march forward, and make India brighter, greater, much higher than she ever was."

Let us learn what lessons are locked up in the literature of our land, in Sanskrit and Tamil. They may not have been acquired in the modern way and expressed in the modern formulae; if the modern scientists worked in an artificial laboratory and tested their methods by delicate instruments, the ancient savants learnt their lessons in Nature's laboratory under realistic conditions tested by ages of time.

With the decadence of ancient languages like Sanskrit this experience of the past is being lost, to the country, though it is an easier and cheaper method to reach the heart of the village folk. Telling them "it is in your own books" will always reach the heart of villagers and secure their trust and action. A warning is needed here. This real and reliable knowledge is indeed got so much mixed up with fantastic speculations that an eagle's eye is needed to sift the grain from the chaff. But that cannot be an excuse for throwing the child with the cradle. Many of these are in vogue as proverbs; some are known and in use, many are forgotten. Mr. Benson, lately of the Agricultural Department, is one who has devoted his thought to collect and utilise them. But since his days, this has not received sufficient attention. Particular attention may be given to broad-cast them in leaflets. They are often laconic with limited ideas. But there are more detailed thoughts spread over many a larger volume like the *Puranas* and as far as I can see no attempt has been made to collect them.

Let me give an example or two :—

Symptoms of rains and the Coming floods.

1. ஆற்றுவெள்ளம் காளவரத் தோற்றுதே குறி—மலை
யாள மின்னல் ஈழமின்னல் சூழுமின்னது ;
நேற்றும் இன்றும் கொம்பு சுற்றிக் காற்றடிக்குது—நகணி
நீர்ப்படும் சொறித்தவளைக் கூப்பிடுது ;
சேற்று நண்டு சேற்றைக்கிள்ளி ஏற்றடைக்குது—மழை
தேடி ஒரு கோடிவானம் பாடி ஆடுது ;
போற்று திருமாலழகர் ஏற்றமாம் பண்ணைச் சேரி
புள்ளிப்பள்ளர் ஆடிப்பாடித் துள்ளிகொள்ளுமே.

—முக்கூடற்பள்ளு.

Which may be translated as:—

See the signs! Expect the river in floods to-morrow!
Lightnings envelope in Malayala and Ela lands;
Yesterday and to-day storms twisting the tree branches;
The well toad bedecked with eruptions croaks;
The crab in the mud banks up her hole, with bits of clay:
Hoping for the rain, the lark dances in crores.
Pray to the beautiful Vishnu and dance!
Oh! Pallas of the prosperous farm!

Sowing less seeds and Transplanting singly

வித்தைச்குறைத்து கலக்கத்தெளித்து விறிகடல்சூழ்
இத்தகை நாற்றைத் தனித்தனி ஊன்றி—இளம்பயிரின்
நடுவே சிறுகநீரை ஊடுகதரல்-குத்துப்பருத்திக்
கதிர்பல நீண்டு குலுங்கிடுமே.

Sow the seeds wide, reducing the quantity;
From such a nursery transplant singly;
Irrigate this tender crop gently with little water;
Then will it yield a bumper crop full of many long sheaves.

The former is an extract from a country ballad known as "Mukkudarpallu" but the source of the latter is not known. How very graphic and touching they are! The modern meteorologists have yet to discover such natural signs of weather. The latter puts the modern agricultural experts' case for improved seedlings and transplantation in a nut shell.

Living Word and Living Example, needed above all. Other ways and means for spreading knowledge may be thought out. But this will suffice for the present. All the attempts by the Agricultural Colleges, Schools, the Department and other agencies can only put knowledge into the rural minds. But the mind without the heart is a body without a soul. The spirit of the villager has to be aroused, his emotion and enthusiasm awakened. Enthusiasm is contageous and it can be

stirred only by "Living Word" and "Living Example". Thus we need above all in the villages men who will be an embodiment of knowledge, inspiration and example—persons who can put heart and soul into the despairing rural population. Such patriotic souls, who can pour knowledge as sacrifice at the altar of the Motherland is the greatest need of the hour in India, during these days of renaissance and reconstruction. May they come forth in sufficient number and great speed!

THE BREEDING OF THE THICK TYPE OF CANES FOR INDIA*

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So far as their distribution in India is concerned, the thick or tropical type of canes are grown chiefly in the Madras and Bombay Presidencies, as also in Burma, parts of Bengal, Assam and in the North-West Frontier Province. Besides their cultivation in the above mentioned parts, these canes are grown for chewing purposes in the United Provinces, the Punjab and Bihar. According to the Sugar Committee of 1921, the area under the thick canes, in the United Provinces alone is estimated to be 75,000 acres.

As is well known, the yield from the thick type of canes (*Saccharum officinarum* L.) is considerably more than that of the indigenous North Indian canes (*S. Barberi* Jesw.). In the Madras Presidency, the yield is about 28 tons per acre and in the Bombay Presidency the yields are fairly high and compare favourably with those obtained in Java. The drawback, however, is the high cost of production which is from 7 to 12 annas a maund in Madras and about 12 annas a maund of cane in Bombay, a price which is much higher than in Bihar where it is between 4 and 5 annas per maund. The aim therefore, has been to produce canes of the thick type which should be hardy and whose cost of production would be less. It is proposed to deal in this brief and preliminary note the manner in which the Imperial Sugarcane Station, Coimbatore, is trying to solve this aspect of the Indian Sugar Industry.

The breeding of the thick type of canes was taken up at Coimbatore in 1926 when a separate area of 28 acres was acquired for this purpose. It may be mentioned that in the earlier years (i.e. 1912 to 1914) of the Coimbatore station, 17 seedlings of the thick type were produced, as the thick canes happened to be the only ones flowering at that time. The work on the breeding of this type of canes has also been in progress at Hebbal under the Mysore Department of Agriculture, as a result of which the varieties H. M 320 and H. M. 544 are being grown in the Mysore State as also in certain localities beyond the borders of the State.

* Paper read at the 22nd Agricultural College Day and Conference, Coimbatore—October 1933.

Though the general principles of breeding the thin or thick type of canes are similar, and one familiar with the breeding of thin canes can tackle the problems connected with thick cane breeding and *vice versa*, there is a difference in the details. The thick canes as a class flower earlier in the season than the thin canes and, if the hardy blood of the thin types has to be introduced into the seedlings it becomes necessary to bridge the disparity in the flowering time. The "photoperiodism" and "topping" experiments for solving this problem have been attended with some success.

One of the directions in which very meagre information was available was the male fertility of the sugarcane varieties and particularly of the thick canes. In fact, the attempts to germinate the pollen artificially and thus obtain a criterion of pollen viability had not been successful at Coimbatore and elsewhere. Attention was therefore directed to this problem and a technique has now been developed by which pollen can be successfully cultured. About 70 varieties which are of use in hybridization work have been studied for their pollen fertility. This method developed at Coimbatore is now being successfully used in Mauritius and Hawaii. Opportunity was also taken to study the problem of storage of the sugarcane pollen so as to do away with the disparity in the flowering time of the various groups of sugarcanes. Though a fair amount of success has attended these experiments, it has not been possible to store the pollen beyond 11 days and, as the disparity in flowering time is in some cases over a month and as the storage of pollen has a direct bearing on the breeding of canes, constant endeavour is being made to solve this difficulty.

Success in sugarcane breeding depends to a great extent on the raising of a large number of seedlings. The one great drawback in the thick canes is the poor germination of the seeds as compared with the thin canes in which as a rule a high percentage of germination is obtained. By raising a large number of all possible combinations from year to year, certain combinations have been obtained which repeatedly give a high percentage of germination and are also otherwise desirable. These have been termed bulk-scale combinations and over 100,000 seeds are germinated in these combinations every year besides another 50,000 or so, in what may be termed experimental crosses. The bulk-scale crosses are so designed that the combination of characters is such as to yield desirable type of seedlings.

Disease-resistance and hardiness are the two characters which are constantly kept in view besides yield and satisfactory sucrose. Five years after the starting of the work (i. e. in 1931) on the breeding of the thick canes the first batch of seedlings was distributed for trial at the various Provincial Experimental stations in India. Till now three such batches have been distributed and the main characteristics of these seedlings are given below :—

(1) **First batch of thick cane seedlings—1931 :**

Seedling No.	*Parentage.*
Co. 358	P. O. J. 2727 G. C. (self or possible cross with S. W. 111)
Co. 359	Co. 213 unbagged self.
Co. 360	P. O. J. 2725 × Q. 116
Co. 361	P. O. J. 2625 × B. 3412
Co. 362	Vellai × D. 74
Co. 363	Maur. 1237 × Q. 813
Co. 364	P. O. J. 2725 × Fiji B. (Badila)
Co. 365	P. O. J. 2725 × Q. 813.

Though it is yet early to have the yield data on field scale, from the impression gained by the growth of these seedlings at various stations and from the preliminary reports, Co. 360 appears to be the outstanding seedling in this batch. It combines erect habit, good root system and satisfactory sucrose.

(2) **Second batch of thick cane seedlings—1932.**

Seedling No.	*Parentage.*
Co. 400 Co. 401	Vellai × Q. 813.
Co. 402 Co. 403	Vellai × Co. 243.
Co. 404	Vellai × P. O. J. 2878.
Co. 405	B. 6308 × P. O. J. 2696.
Co. 406	B. 6308 × Co 281.
Co. 407	P. O. J. 2725 × B. 3412.
Co. 408	P. O. J. 2725 × Co. 243.
Co. 409	P. O. J. 2725 × Fiji B. (Badila)
Co. 410	P. O. J. 2727 G. C. (self or possible cross with D. 74)
Co. 411	P. O. J. 2727 × P. O. J. 2878.
Co. 412	P. O. J 2878 × Co. 243.
Co. 413	Co. 290 × 247. B.
Co. 414	Co. 359 × Co. 360.
Co. 415	Maur. 1237 × P. O. J. 1410.

The outstanding seedling in this batch and for which favourable preliminary reports have been received from practically every place to which they have been distributed, are Co. 402 and Co. 408. The first mentioned variety, i. e. Co. 402 is a heavy yielder and scores over certain other canes in its relatively non-flowering habit. Co. 403 is also a heavy yielder and is hardier than the other seedlings. The percentage of flowering is higher than in Co. 402, but the compensating features are (1) higher yield, (2) good root system, and (3) jaggery of high quality.

(3) **Third Batch of Thick cane seedlings—1933 :**

Seedling No.	*Parentage.*
Co. 416,	Vellai × Co. 243.
Co. 417,	P. O. J. 2725 × Co. 290.
Co. 418,	P. O. J. 2725 × Co. 290.
Co. 419,	P. O. J. 2878 × Co 290.
Co. 420,	Karun × Co. 243.

These seedlings are as yet only in the multiplication stage at the various Provincial stations, but the outstanding seedling in this batch would appear to be Co. 419. It combines the good qualities of such famous canes as P. O. J. 2878 and Co. 290.

In this note the main object has been to detail briefly the work done at the Thick Cane Area of the Imperial Sugarcane Breeding Station, Coimbatore, and to indicate the seedlings that, from preliminary reports, appear to be promising The varieties suitable for a particular tract can only be found out by trying them in the tract itself and the credit for finding the varieties most suited for the tract should, of course, go to the officers of the Provincial Departments of Agriculture who experiment on them on a field scale.

SOME TRIALS WITH ERI SILK WORMS

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Introduction About three lakhs of acres of Castor (*Ricinus Communis*) are grown every year in the Madras Presidency. Coupled with this is the fact that the climatic and the weather conditions in this Presidency are such that Eri silk worms can be reared for at least seven to eight months in the year. The Madras Agricultural and Industrial departments are now studying the problem of popularising Eri silk worm rearing as a cottage industry. With a view to getting detailed information under Coimbatore conditions the writer made a few preliminary trials last year and the following is a short account of the information gained so far.

Leaf and Seed Yields of Castor. For yield trials "Central Farm Spineless" variety of castor was used. Leaves and seeds were collected regularly. The yields from an area of one cent (7 yards × 7 yards containing 67 plants) of the above mentioned variety grown in red soil as a rain-fed crop are given below :–

Table I. Comparative yields of 'Leaf picked' and Control plots.

Pickings.	Yield from 'Leaf picked' plot.		Yield of seed from control plot.
	** Leaf.	Seed.	
	lb. oz.	lb. oz.	lb. oz.
1st picking.	55 8	1 4	1 5
2nd ,,	13 8	0 2	0 14
3rd ,,	10 8	2 14½	8 0
4th ,,	4 8	1 1½	1 3
Total.	84 0	5 6	11 6

* The weight of the leaf including the stalk is given in the table. When feeding worms only stalkless leaves are given. Roughly the percentage of blade to stalk is about 70—75 per cent.

It will be seen from the table that four pickings from one cent of Castor gave 84 lb. of leaves. The yield of seeds from the same plot came to 5 lb. 6 oz. as against 11 lb. 6 oz. from the control plot of one cent from which leaves have not been removed. Roughly the yield of seed from the 'Leaf-picked' plot was half that of the control plot. As it is not advisable to calculate the yield of leaf and seed per acre based on one cent of castor, arrangements are in progress to carry out this trial on a bigger scale.

The results of the examination of the seeds both from 'Leaf-picked' and control plots for germination and oil contents tests by the Lecturer in Botany and the Agricultural Chemist respectively are given below :—

Table II. Germination Tests.

Source of seed.	No. of seeds germinated on successive days of test 1.	2.	3.	4.	Mould infected seed.	Total germinated.	Percentage of pure germinating seeds.
From Leaf-picked crop.	43	39	2	–	16	84	
	60	26	3	1	10	90	87·5
	53	33	4	–	10	90	
	51	29	6	–	14	86	
From Control plot.	61	24	4	–	11	89	
	57	24	7	–	12	88	88
	59	18	4	–	19	81	
	54	32	6	2	6	94	

Table III. Oil Content test.

Heads of analysis.	Seed from 'Leaf-picked' plot.	Seed from Control Plot.
Kernel.	74·25 %	73·77 %
Shell.	25·75 %	26·23 %
Oil in Kernel.	63·23 %	63·43 %

Quantity of leaf required for producing one pound of pierced Cocoons. Silk worms especially in the later stages of their growth are very voracious feeders. In one instance 280 worms consumed 4½ lb. of leaves in one day. In one trial 83 lb. of leaves were required to produce one lb. of cocoons. In another trial 75 lb. of leaves produced one lb. of cocoons

Food Plants other than Castor. The first attempt in this direction was to find out whether tapioca (*Manihotutilissima*) and Ceara rubber (*Manihot glaziovii*) both belonging to the same Natural Order as that of Castor viz., *Euphorbiaceae*, could be utilised for feeding the worms. In the course of the feeding trials it was found possible to rear the worms on both the leaves but in the case of *tapioca* there was considerable mortality among the worms and even the few cocoons

produced were very small in size, only about 1/5 the size of the Castor cocoons. In the case of *rubber* the mortality was not so high and the cocoons produced were better than those of tapioca and about half the size of Castor cocoons. In both cases the life cycle was longer by a week to ten days more than that with Castor.

An attempt was also made to feed the worms for the first ten days on Castor and the remaining period on either tapioca or rubber leaves. The cocoons produced by these were in both cases smaller than those reared on castor alone.

Other plants such as papaya (*Carica papaya*) plantain (*Musa paradisiaca*) ground-nut (*Arachis hypogaea*) portia (*Thespesia populina*) Country almond (*Terminalia catappa*), *Cyanotis Cocullata*, *Trianthemi portulacastrum*, *Trianthema decandra* and *Portulaca Oleracea* were tried but the worms did not thrive on these. Slack (1884) has recorded that the worms feed on *Heteropanax fragrans* and that they could thrive in later stages on *Jatropha Curcas*, *Gamelia arborea* and *Zizyphus jujuba*.

Varietal trials with Castor. Advantage was taken of the presence of a number of castor varieties raised by the Oil Seeds Specialist, on the Central Farm, Coimbatore, to study whether the cocoons produced by worms feeding on these different varieties showed any difference in the weight and fineness of silk. Some differences were noticed in the different varieties. As these will have to be confirmed by further feeding trials the results will be given in a further contribution on the subject.

Disposal of Cocoons. As a result of the enquiries made by the writer one firm in Assam has signified its willingness to buy Cocoons at the following rates (per maund of 82 lb.)

Clean cocoons (reversed)	First	quality	Rs. 55.
	Second	,,	,, 50.
Unclean cocoons (pierced)	First	,,	,, 45.
	Second	,,	,, 40.

The price quoted is exclusive of freight charges which work to about Rs. 9 by goods-train from Coimbatore. It may be mentioned here that the prices offered are not very attractive but these are the best available so far.

Acknowledgment. My thanks are due to the Oil Seeds Specialist, the Agricultural Chemist and the Lecturer in Botany for help rendered in connection with these experiments.

ABSTRACTS

Farm Yard Manure—Manurial value. *(Jealott's Hill Agrl. Res. Bull Vol. 3, Page C 12 and 44. Extract from Rothamsted Station Report for 1932).* Experiments were conducted at Rothamsted and Woburn farms in England and the following results were recorded.

1. The effect of the manurial application is not only seen in the increased yield immediately obtained but also in the succeeding crops. It improves the soil and also persists for a longer period than one year.

2. Repeated application of the manure year after year exerts a cumulative effect and the results are higher than those obtained after "one year" application. Besides, the "residual effect" is beneficially felt in several succeeding crops even after the application of the manure had ceased

3. The slow utilization of the nitrogen of the farm yard manure by the crop is due to an accumulation of nitrogen in the soil, a part being subsequently available for the plant. There is also free loss of nitrogen. The fate of 100 parts of nitrogen (in farm yard manure) applied to the soil is somewhat as follows:—

taken by the crop 30 to 20; retained in the soil 40 to 25; lost 30 to 55.

4. Every pound of nitrogen taken up for farm yard manure results in a higher proportion of grain to straw as compared to that of nitrogenous fertilizers (nitrate of soda). A continuous and steady application of farm yard manure during a period of 50 years has established its superiority in maintaining the fertility of the soil. The result obtained is tabulated below.

	Unmanured			Complete Artificials (Plot 6).		Farmyard manure (Plot 11 b).	
	1876	1926	Change in 50 years.	1926	Change in 50 years.	1926	Change in 50 years.
Barley Plots—							
Nitrogen per cent.	0·156	0·094	−0·062	0·109	−0·047	0·151	−0·005
Do. tons per acre.	2 14	1·29	−0·85	1·50	−0·64	2·07	−0·07
Carbon per cent.	1·49	0·90	−0·59	1·07	−0·42	1·50	+0·01
Do. tons per acre.	20·4	12·3	−8·1	14·6	−5·8	20·5	+0·1
Wheat Plots—							
Nitrogen per cent.	0·156	0·109	−0·047	0·104	−0·052	0·145	−0·011
Do. tons per acre.	2·14	1·49	−0·65	1·43	−0·71	1·99	−0·15
Carbon per cent.	1·49	1·23	−0·26	1·07	−0·42	1·52	+0·03
Do. tons per acre.	20·4	16·8	−3·6	14·6	−5·8	20 8	+0·4

S. R. S.

Compost; A cheap organic manure. By Kunwar Narain Singh, Superintendent of Agriculture, Unao (Oudh) (From *The Allahabad Farmer*, January 1934). The author after discussing the importance of a good supply of manure for successful crop growth, describes a new method, recently introduced by Mr. K. G. Allan Director of Agriculture of the United Provinces, of preparing a compost from the vegetable rubbish which gives 4 times the quantity of manure in a quarter of the time ordinarily required for preparing manure by the heap system. This method, according to the author is being found very successful on Government and private farms.

The size of the pits and the quantity of litter etc. can be increased proportionately according to the number of cattle.

For one pair of bullocks, fifteen pits 8 by 5 by 2 feet deep each are made to deposit the litter. The urine is preserved by the 'urine-earth' system. Litter from various sources is spread in the cattleshed 2 to 4 inches deep every morning and removed to the pits after 24 hours. One pair of bullocks will give sufficient litter to fill one pit in six days. The pits are filled one after another in successive order. On the ninetieth day when the fifteenth pit will have been

filled the compost will be ready in the first pit. This is removed and stored in a heap, covered with earth or leaves for preserving it and is used when necessary. The compost has to undergo certain operations during its stay in the pit. Since rapid rotting of all vegetable matter is due to fungus, this is introduced into vegetable matter and air and moisture necessary for its development are controlled and this process of rotting, which takes about a year in the heap system of manure making, is finished in 90 days, and gives a compost of a higher nitrogenous percentage. The fungus is introduced into the litter in the form of a culture solution called glurry, which is prepared by mixing dung ash, urine-earth and fungus-starter with water. Any decomposable vegetable matter which has a kind of white substance on it will serve the purpose of fungus starter. The author further describes in detail how the litter is deposited in the pit and the attention that is to be bestowed on it when it remains in the pit. He also gives an account of how this manure is beneficial for crop growth. U. N. R.

Production Credit for Agriculture. (*U. S. A. Extension Service Review*, November 1933). Mr. S. M. Garwood, Production Credit Commissioner for the Farm Credit Administration is controlling what is found to be a sound co-ordinated production credit system for agriculture. This system consists of 12 production credit corporations in each of the 12 Federal Land Bank districts and hundreds of local production credit associations. These associations are operated and controlled by farmer-borrowers and eventually to be *owned* by them. In the words of Mr. Garwood " It is not a kind of porous plaster that we are attempting to apply to the backs of debt-ridden farmers ; rather, we are providing facilities for a credit system that will constitute in a permanent way to a solution of some of agriculture's financial problems." This system has been organised in the following manner:—

In each Land Bank district production credit corporations are established with a capital of 7½ million dollars each. The money is obtained from the Farm Credit Administration of the Federal Government. Production Credit Associations are organised in every place, operated and controlled by farmers themselves and these Associations are financed by the Corporations which retain the supervisory function and also prescribe rules and regulations for the issue of loans. The Corporations also determine the interest rates and the security that will be required.

Farmers of any place are induced to join and form the credit associations and buy an amount of stock in it equal to 5% of the money they borrow They do not purchase stock until they actually borrow. This carries no double liability and they are entitled to vote at the association meetings. This stock is known as Class B stock. Class A stock is that provided if the Credit Corporations amounting to 20% of the loans to be made. The money obtained from the sale of these stocks is invested and deposited as security with the Federal Intermediate Credit Bank in the district. Interests earned on these bonds become the associations' income. " The money the association lends to farmers is obtained by rediscounting farmers' notes with one of the Federal Intermediate Credit Banks. Ordinarily the Association can rediscount such notes up to from four to six times its capital and surplus." The local production credit associations are important units (comparable to some extent, to our co-operative unions) and they examine all securities and authorise issue of loans to farmers for production purposes. Most of the loans are made for less than a year and no loans are issued for more than 3 years. S. V. D.

Utilisation of Seed-cake in Industry. By V. Subrahmanyam, D. Sc., F. I. C. and N Srinivasan, M. A. (*The Scholar*, October 1933). The authors after describing the present uses of oil seed-cakes for utilisation as articles of diet, feeds for

domestic animals and as organic manures discuss the difficulties of the producer in using them on a large scale. Storing them for a long time ruins the seed-cakes due to rapid deterioration of the stored products in tropical countries as a result of insect attack and fungal growth. Further they become harmful to the animals fed on them by causing pathological conditions of the animal system. They also spoil the quality of the milk and butter. In consideration of this the authors put forth some suggestions for increased use of oil seed-cakes.

Since proteins present in many seed-cakes have properties similar to those of milk casein and in view of the difficulties in the manufacture of the latter the authors are of opinion that these seed-cakes could be used in place of milk casein in the preparation of oil paints, paper making, plastic industry, manufacture of special adhesives, photographic plates, soaps, leather, insecticides etc.

The authors then proceed to give an account of the investigation carried out by them on the preparation of vegetable casein from non-edible seed-cakes and utilisation of the product in a few of the above mentioned industries. Earth Soda (Sodium Carbonate) used as a watery solution (0·1 per cent) was found most suitable for extracting the protein. The powdered cake is heated with the soda solution and after standing for some time, to filter out the liquid on top of which contains the dissolved protein. The operation is repeated a number of times until extraction is complete. The remainder is obtained by pressure of 1 to 2 tons per square inch.

The Soda extract is heated with chalk and white clay (Kaolin) which neutralises the Soda, starts the fermentation of the extract and at the same time separates out together with the protein. The product obtained is clean and white and possesses adhesive properties. U. N. R.

World Rice Supplies and Markets. C J Robertson in the November 1933 number of the International Review of Agriculture (pp. 774–782) summarises the present position of world rice supplies and markets as follows:—

The Eastern Exporters. Burma, French Indo-China and Siam are the important exporters. In Burma the area under paddy has increased in the current year; according to the first forecast 12, 720, 800 acres have been sown for 1933–34, an increase of 26 per cent on the corresponding estimate of last year. The final estimates usually being larger than the October estimates, the record of 13,022,000 acres attained in 1930—'31 may again be touched if not exceeded. In French Indo-China the export of surplus from the 1933—34 crop is likely to be small. In Siam due to the damage caused by floods the area has decreased by one per cent.

As regards the movement of the 1932—33 crop, in Burma shipments from all parts up to end of October may be estimated at about 5,530 million pounds as against 4,854 million pounds in 1932 and at the end of October about 2,200 million pounds of the 1932—33 crop remained to be exported. Exports to eastern markets have declined and the takings of the European market and the United Kingdom are larger. Exports from French Indo-China amounted up to end of September to 2,314 million pounds against the total of 2,032 million pounds of 1932 showing an increase of 14 per cent. This increase is due to the greater exports to France, the total of foreign rice arrived in and afloat for Europe up to 16th November 1933 being 1133 million pounds as against 751 million pounds in 1932. As export duties to all destinations have been reduced on milled rice and brokens by 25 per cent, the export surplus from the last crop would have entirely disappeared by the end of the calendar year. Exports in Siam showed an increase of 10 per cent over those of 1932, exports to Japan, the Netherland East Indies and Europe registering decline, while those to the Straits, China, India and the West Indies showing an increase, the total amounting up to end of September to 3,069 million pounds

leaving a balance of 873 million pounds still to be exported. Movement within the country is checked by the prevailing political unrest.

Thus in the three major exporting countries together at the end of October the surplus to be exported may be estimated at about 3,100 million pounds as against 1,700 million pounds in 1932, and taking into consideration the news of the large crop in Burma and the internal situation in Siam, it seems probable that a large surplus will be carried over into 1933.

The Eastern Markets. In India which is the principal importing market, the area sown for the 1933—34 crop is 0·7 per cent. less than in 1932—33. In China the crop is reported to be a good one and the government intend stimulating production by duties on imported milled rice and ultimately making China self-supporting. In Java, the crop harvested this year is 1·8 per cent. smaller than that of 1932 though remaining 3·4 per cent larger than the average of 1927 to 1931. In Java the monsoon has been favourable and as imports have been controlled since March 1933, reduction in imports from abroad may be expected. Net imports into British Malaya from January to August were five per cent. larger than in 1932. In Ceylon the imports of milled and rough rice in the 9 months ending September were 7 per cent smaller than in 1932. Production of Japanese territories attained almost the record figure of 1930—31 and the supplies available may be estimated at 789 million pounds larger than in 1932.

The Western Exporters. In all three of the leading minor exporters, the United States, Italy and Spain, production has been smaller this year, in every case there being a considerable reduction in area. In Italy, due to increase in the exports to Germany there will be a decline in the exports to other countries. In Spain the exports in the first 8 months of 1933 were 70 per cent less than in 1932. An increase in exports from Egypt may be expected and there has been a great drop in exports from Brazil the leading exporter in South America.

The European Markets. Germany has continued to import rough rice in larger quantities than milled rice, exports of milled rice diminishing by 17 per cent and imports of rice bran being only 32 per cent of last year's figure. France showed an increase in imports of milled whole rice, flour, and bran. The United Kingdom in the ten month period decreased its total rice imports by 10 per cent, there being a considerable increase in unworked-up re-exports and a decrease in exports of rice milled in the United Kingdom.

General Outlook. A general survey indicated that there will be a large carry over in Burma and Siam at the end of December. In Burma as the indications are for another large crop the surplus for export in 1934 is likely to be a large one and in the three major exporters together the total carry over will be much larger than in 1932. The probability of a normal crop in India in 1933–34 will make the marketing of a surplus more difficult for Burma than in 1933, particularly as China is reported to have a good crop. Japan is faced with very large supplies from its own territories and is likely to re-export in the near future. Amongst the producers of Europe and America there have been reduction in area and control of exports. Italy has assured its position by means of quota agreements, and the market position of Spain is difficult. Egypt is striving for a place in the markets with government assistance The four importing countries of North-Western Europe have registered a decline in re-exports so that it is not improbable that there will be a falling off in their takings of rice in the near future. Taking the situation as a whole therefore the available information does not give reason to expect any improvement in the rice market; on the contrary the difficulties of international trade in the commodity appear to be augmenting.

P. S. S.

Gleanings.

Soil Erosion. Erosion has practically destroyed for American Agriculture more than 21,000,000 acres of land formerly in cultivation. Gullying is the visible evidence of the destructive effect of unrestrained rain wash. But the impoverishing effects of sheet erosion are far greater than those of gullying. This slow process, which carries away a part of the soil during every heavy rain, is gradually diminishing the productive capacity of 75 per cent of the crop land in the United States. All the crops grown in the United States annually remove above 6,000,000,000 pounds of plant food from the soil. Erosion annually removes about 21 times as much.

Some 500,000,000 tons of suspended material are discharged into the sea by rivers every year. What reaches the sea is the finest, most minute material. The heavier sand, pebbles, and rocks are stranded somewhere along the way to form sand bars, new river bottoms, or new banks. For every ton of sediment that reaches the sea, at least 2 tons are stranded along the way. At a conservative estimate, 1,500,000,000 tons of eroded material get into our river channels and into the sea every year. To replace all the plant food thus lost would, at current fertilizer prices, cost millions of dollars annually. No nation in history has permitted its farm lands to waste away as rapidly as has the United States. Our Agriculture cannot withstand such losses indefinitely. (*U. S A. Year Book of Agriculture*, 1933.)

Movements of Population. Urban unemployment obviously had much to do with this change in the movement of population. Whether the change will persist after industrial employment revives remains to be seen. Unquestionably, however, it creates new problems for rural communities, and has an important bearing on the land-use problem.

Besides the spontaneous movement of population from cities and towns to the country, there is talk of concerted effort to place unemployed city people on the land. Such projects should not be undertaken lightly. Merely to shift the problem of relieving want is not necessarily to solve it. Moving needy folk from towns and cities to the country may throw a burden on rural communities without simplifying the unemployment problem. People, of course, have a right to move about and to seek opportunity wherever it may exist. But it is another thing publicly to encourage a movement that may have no sound economic foundation. In any event, the movement should be guided in the light of the best information available in order to protect the interest of those who may move to the land and to protect rural communities against having the problem of urban unemployment shifted to them

People ignorant of agriculture and rural life often think farming is easy. Usually they are disappointed. Commonly, the unemployed city dweller seeking land gravitates to the submarginal areas—to precisely the areas that should not be farmed The deceptive cheapness of such land attracts him. Encouraging inexperienced people to go on land that others have abandoned or on land manifestly unsuited to agriculture is neither sensible nor humane. It does not permanently relieve unemployment and checks the development of a rational land-utilization policy.

There are opportunities to absorb unemployed people into agriculture. Thousands having country connections have already returned, and others will do so. In some cities vacant lots and plots of land have been helpfully turned over to unemployed families for gardens. There is a movement of industrial workers to suburban homes with land enough for production of some food. This movement will continue and should be encouraged. But mass migration from the city

to the country is another story. A movement large enough to materially diminish urban unemployment would create serious rural problems. It would go squarely against the need to put our land-use system on a rational basis. (*U. S. A. Year Book of Agriculture*, 1933.)

Reaction of Soils upon Animals. The possible influences of the chemical conditions of soils upon the creatures which exist upon them have not been fully realised, and Dr. Stewart MacLagan has studied the relationship in a series of selected types (Proc. Roy. Physical Soc., Edinburgh, XXII, 107; 1933). Indirectly, even vertebrates may be affected by the composition of the soil, since acid content is reflected in the composition of the herbage and this may be expressed in calcium deficiency, as in the 'bent-leg' disease of sheep. Earthworms and snails are most numerous in soils which are approximately neutral in reaction, and a series of experiments with the primitive insect (Collembola) *Smynthurus viridis*, showed that soil reactions appreciably influenced the duration of the reproductive phase, and profoundly influenced the reproductive capacity of the insect. Since Collembola, like earthworms, swallow soil, it is suggested, from morphological and physiological evidence, that they also may have the power of modifying the 'acidity' of the soil, so that they gradually create a more favourable environment for their own existence. (*Nature*, Vol. CXXXII, September 9th, 1933, p. 412).

African leather dyes. Apart from aniline dyes the chief native dyestuffs for leather are for (1) Red: leaf sheaths of *Sorghum guineense* var. *robustum*, the pigment being apparently similar to "santalin" and soluble in alcohol and in alkaline solutions. A purple-stained variety of *Pennisetum typhoideum* is also used (2) Yellow: (a) root of *Cryptolepis sanguinolenta*, which as the source of the Hausa yellow leather dye is here published for the first time; (b) the turmeric of the East, (*Curcuma longa* Linn); (c) leaves of *Anogeissus schimperi*; (d) occasional use is made of other yellow vegetable dyes, e. g., *Cochlospermum tinctorium* (root), *Sarcocephalus esculentus* (root), and *Enantia polycarpa* (bark), the active principle of the latter being the alkaloid "berberine" (3) Green: Compounds of indigo, both *Lonchocarpus cyanescens* and *Indigofera*, with a yellow dye. (4) Black: (a) Refuse black-smith's slag with vegetable material containing tannin, "sant" pods (*Acacia arabica*), fruits of *Hyphaene thebaica*, etc.: (b) flowers of *Gossypium arboreum* var *sanguineum*. In Morocco, where artificial dyes are now generally used, cochineal and native madder (*Rubia peregrina*) for red leather, and pomegranate rind for yellow leather, are still in use, with alum as mordant. Vegetable acids used are lime juice (*Citrus medica* var. *acida*) and pulp of tamarind (*Tamarindus indica*). These purify the colour and restore tints modified by the alkali used. Details of the native processes and ingredients for each colour are given. (*Biological Abstracts. Vol. I Nos. 2 3.*)

Sensitivity of Fish to Earthquakes. Two Japanese seismologists, Dr. Shinkishi Hatai and Dr. Noboru Abe, observed that catfish (Siluridae) in natural conditions showed signs of restlessness about six hours before earthquake disturbances were registered on their recording apparatus. Since catfish are, ordinarily, placid unresponsive creatures, experiments were made to test this seeming responsiveness (Science Service, Washington, D, C.). Catfish placed in an aquarium were tested three times a day by tapping on the supporting table. When no earthquake was impending, the fish moved lazily or not at all; but about six hours before a shock the fish jumped when the table was tapped, and sometimes swam about agitatedly for a time before settling down upon the bottom again. Several months' testing showed that in a period when 178 earthquakes of all degrees of severity had been recorded, the fish had correctly predicted 80 per cent of the shocks. They showed no descrimination in their movements between

slight local shocks and more serious distant shocks. The experimenters think that the catfish are made sensitive through electrical charges in the earth, since it was only when the aquarium was electrically earthed, through the drain-pipe, that they responded to a coming earthquake. (*Nature, Vol. 132, No 3343, p. 817.*)

Cotton was used as a reinforcing material in making asphalt paving blocks exhibited at a lecture before a Washington audience of the Negro chemist, Professor George W. Carver, who has worked for many years to discover new uses for the agricultural products of the South. About 3½ per cent of the blocks, by weight, consisted of cotton; the reinforcement increases their strength and resistance to wear. Roads made of these blocks would use up forty bales of cotton to the mile. (*Science, Vol. 78, No. 2035, 29—12—33. Supplement—p 8.*)

Research Notes.

Some Seedling Abnormalities in Safflower.

Safflower (*Carthamus tinctorius* Linn.) is a minor oil-seed crop in the Madras Presidency. It is cultivated here and there especially on the black soils of the Ceded Districts. It is frequently sown on the headlands partly to prevent cattle trespass and partly because it can be sown late. The oil is clear and is used for culinary purposes. No dye is manufactured out of it in this presidency. Of the Ceded districts, Bellary has the largest area under cultivation. A detailed study of this crop is being made at the Agricultural Research Station, Hagari, and this note presents one aspect of the work.

Material. The observations recorded were made on the seedlings raised at the Agricultural Research Station, Hagari, in 1933. The samples sown were obtained from the Adoni, Bellary, Guntakal and Siruguppa taluks of the Bellary and Anantapur districts. The abnormalities recorded herein are the result of an extensive examination made both in the ryots' fields and on the Farm. In a bulk crop of one acre, at least 30—60 such plants are found.

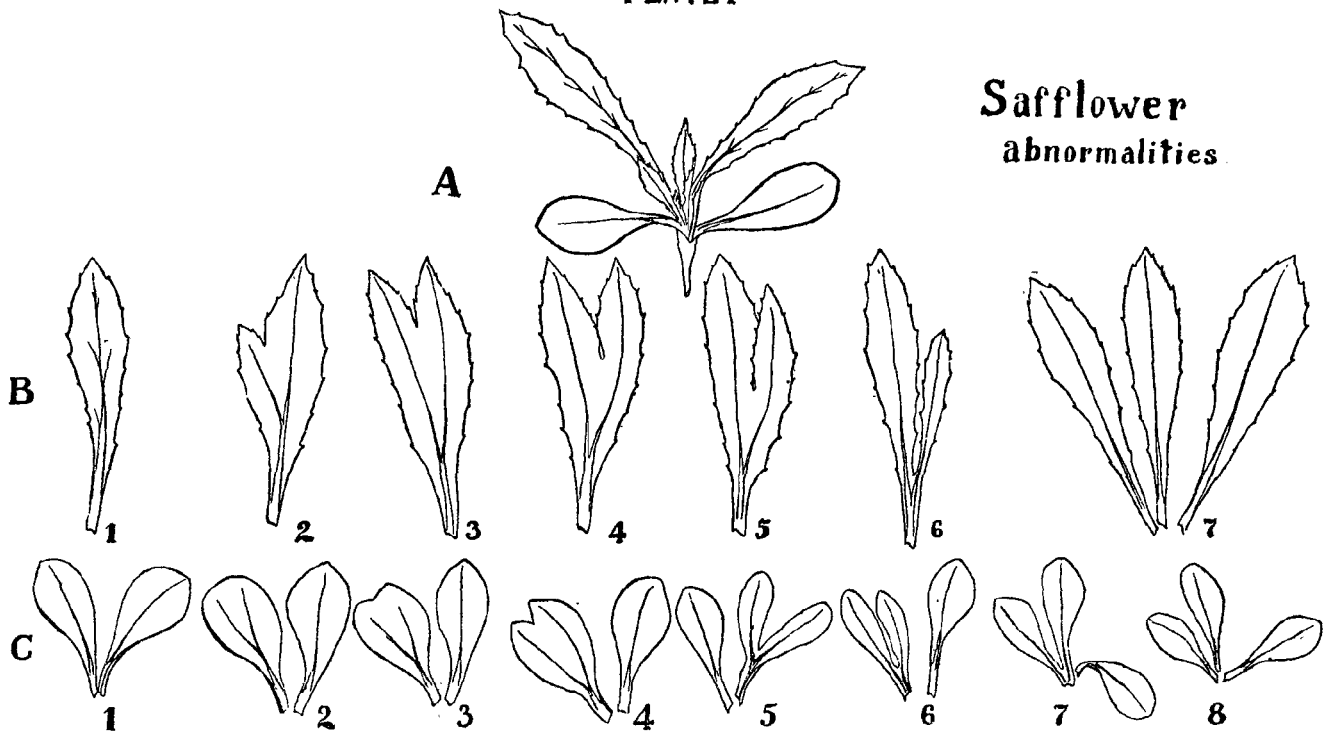
Observations. The seeds begin to sprout in about six to eight days. When the cotyledons unfold, they are more or less orbicular and thick, with a well defined central strand or midrib. There are two cotyledons generally, but in some cases three were noted. A thorough search was made to see if more cotyledons occurred. In no case were more than three cotyledons observed.

The occurrence of more than two cotyledons in a dicotyledonous plant is a rarity and so a closer examination of the seedlings was made to throw light on this phenomenon. In some the midrib was found to fork. The forking occurred anywhere on the midrib. When the forking was towards the apex of the cotyledon, the apical region was either entire or dentate. The depth of the dent at the apex of the cotyledon bore a definite relation to the position of the fork on the midrib. As the forking advanced to the base, the dent also was found to increase, in extreme cases dividing the cotyledon into two. Then it gives it the deceptive appearance of two separate cotyledons. It was also noted that no particular cotyledon was involved in this. Either of the two may show this.

Thus it will be seen that the three apparent cotyledons are really two cotyledons, in which one has become divided into two. All intermediate stages leading to the 3-nate condition were found (Plate I).

The *first* leaf after the cotyledons was also found to behave similarly. Like the cotyledons, either or both (rarely) may show lobing. In some cases, three leaves, instead of two were found. A close examination showed that this anomalous condition was due to the forking of the midrib, as in the case of the cotyledons. This phenomenon was not observed in later leaves.

PLATE 1



A. Normal safflower seedling. B. 1—7. The first leaf after the cotyledons with various stages of lobing and forking.
C. 1—8. The cotyledons with various stages of forking and lobing.

When the midrib begins to fork, the lamina tends to widen out. The widening, after it reaches a certain stage, cleaves the leaf at the apex, giving it a lobed appearance.. The cleavage spreads down, in extreme cases dividing the leaf into two. The leaflets are smaller in size than the normal leaf. One lobe is generally bigger than the other. Thus, as in the case of the cotyledons, the three lobes are only two leaves, one of which has become divided into two.

Conclusion. The foregoing observations tend to show that the 3-nate condition met with in the cotyledons and the first leaf, is the result of the division of either of two cotyledons or leaves into two, thus ushering in the abnormality. This phenomenon may have been the result of some physiological or teratological disturbance in the very early stages of development. The intermediate stages noted in other seedlings amply bear out the facts.

Agricultural Research Station, Hagari.

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Crop and Trade Reports.

Paddy Crop, Madras, 1933-34, Final Report. The average of the areas under paddy in the Madras Presidency during the five years ending 1931-32 represents 13·3 % of the total area under paddy in India.

2. The area sown with paddy in 1933-34 is estimated at 11,576,000 acres as against 11,582,000 acres for the corresponding period of last year and the finally recorded area of 11,533,697 acres in 1932-33. The present estimate exceeds the final area by about 0·4 % and the area of 11,169,600 acres in an average year by about 3·6 %.

3. 1,085,000 acres have been reported as sown since the last December forecast was issued. The extent so sown was large in West Godavari, Anantapur, the Carnatic (281,000 acres), Chittoor, North Arcot, Madura, Ramnad (130,000 acres) and Tinnevelly. The area sown in December and January is less than that sown in the corresponding period of last year by 185,000 acres or about 14·6 %.

The area under second crop paddy is expected to be fairly normal.

4. The yield is expected to be normal or slightly above normal in Ganjam, Vizagapatam, Kistna, Guntur, Bellary, Anantapur, Nellore, the West Coast and the Hills.

The crop was adversely affected by the heavy rains of October in East Godavari and West Godavari, by the untimely rains in the last week of January in Trichinopoly and Tanjore, by cyclonic weather in South Arcot and Tanjore and by the attack of insects in parts of Cuddapah, South Arcot and Trichinopoly. The crop suffered from drought in parts of Chingleput and North Arcot and the rains in December were too late to be of much use. The crop is expected to yield only 65 % of the normal in North Arcot, 66 % in South Arcot, 73 % in West Godavari and 84 % in Chingleput.

The seasonal factor for the Presidency works out to 94 % of the average as against 100 % in the Season and Crop Report of last year. On this basis the yield works out at 101,793,000 cwt. of cleaned rice. This represents a decrease of 5·8 % when compared with the estimate of 108,113,000 cwt. in the Season and Crop Report of last year. The yield in an average year is estimated at 105,170,000 cwt.

5. The wholesale price of paddy per imperial maund of 82—2/7 lb. as reported from important markets towards the close of January was Rs. 2—14—0 in Nandyal, Rs. 2—5—0 in Tinnevelly, Rs 2—3—0 in Cuddapah and Nellore, Rs. 2 in Vizagapatam and Trichinopoly Rs. 1—5—0 in Berhampur and Guntur, Rs. 1—6—0 in Masulipatam and ranged from Rs. 1—8—0 to Rs. 1—14—0 in the other markets.

When compared with the prices reported for December 1933, these prices are stationary in Vizagapatam, Vizianagaram, Bezwada, Nandyal, Cuddapah, Nellore and Tinnevelly. They have risen from 3 to 18 % in Cocanada, Ellore, Trichinopoly and Madura and are lower by 3 to 15 % in the other markets.

Cotton Crop, Madras, 1933-34, Fourth Report. The average of the areas under cotton in the Madras Presidency during the five years ending 1931-32 represents 9 % of the total area under cotton in India.

2. The area under cotton up to the 25th January 1934 is estimated at 2,044,500 acres. When compared with the area of 1,956,100 acres estimated for the corresponding period of last year, it reveals an increase of about 4·5 %.

282,200 acres have been reported as sown since the last December forecast was issued. This extent is made up of 136,900 acres under Tinnevellies, 58,000 acres under Cambodia, 36,600 acres under Salem, 35,700 acres under Northerns and Westerns and 14,200 acres under Cocanadas. The area sown in December and January exceeds that sown in the corresponding period of the previous year by 53,700 acres or by about 24 %.

3. A decrease in area in the current year occurs in all districts outside East Godavari, the Deccan, Coimbatore and Madura. The increase is marked in the Deccan (118,100 acres).

The area under irrigated cotton mainly Cambodia is estimated at 211,000 acres as against 190,700 acres for the corresponding period of last year, an increase of about 12 %.

Picking of the *mungari* or early sown crop in the Deccan is over. The yield is expected to be slightly below normal.

Normal yields are expected in all districts outside Ganjam, Vizagapatam, Nellore, Bellary, South Arcot, North Arcot, Trichinopoly, Malabar and South Kanara.

4. The seasonal factor for the Presidency works out to 98 % of the average as against 95 % for the corresponding period of last year. On this basis, the yield works out to 450,000 bales of 400 lb. lint as against 420,000 bales for the corresponding period of last year. It is, however, too early to estimate the yield with accuracy as the harvest has not yet commenced in the major portion of the area and much will depend upon the future weather conditions and toll taken by insect pests.

The estimated area and yield under the several varieties are given below :—

(Area in hundreds of acres, yield in hundreds of bales of 400 lb. lint.)

Variety.	Area (1st April to 25th January).		Corresponding yield.	
	1933-34	1932-33	1933-34	1932-33
Irrigated Cambodia	1,981	1,765	1,231	1,103
Dry Cambodia	1,357	1,381	288	292
Total Cambodia ...	3,338	3,146	1,519	1,395
Karunganni in Coimbatore ...	1,339	1,143	311	266
Uppam in the Central districts ...	294	387	45	63
Nadam and Bourbon	315	399	16	20
Total Salems ...	1,948	1,929	372	349
Tinnevellies (*a*)	5,049	4,534	1,300	1,246
Northerns and Westerns ...	8,677	8,200	1,052	897
Cocanadas	1,303	1,564	242	289
Others	130	188	15	24

(*a*) includes Uppam, Karunganni and mixed country cotton in the south.

5. The wholesale price of cotton lint per imperial maund of 82—2/7 lb. as reported from important markets towards the close of January 1934 was about Rs. 17—5—0 for Cocanadas, Rs. 15—10—0 for Westerns, Rs. 22—2—0 for Cambodia, Rs. 16—8—0 for White northerns, Rs. 21—3—0 for Karunganni, Rs. 17—13—0 for Nadam and Rs. 20—8—0 for Tinnevellies. When compared with the prices in the previous month, the prices of red and white northerns are stationary. They are higher by about 13 % in the case of Cocanadas and Westerns and by 2 to 5 % in the case of the other varieties.

Gingely Crop, Madras, 1933-34, Intermediate Monthly Report. Sowings of late gingelly are in progress in most districts. In Tinnevelly the season was late by about a fortnight to a month. The condition of the crop is generally satisfactory.

Raw Cotton in the Madras Presidency.

Receipt of loose cott .n at presses and spinning mills.

From 1-2-33 to 31-1-34	1-2-34 to 2-2-34	1-2-34 to 9-2-34	1-2-34 to 16-2-34	16-2-34 to 23-2-34	
Bales	Bales	Bales	Bales	Bales	
472,510	746	4,786	7,021	10,625	As against an estimate of 409, 570 bales of the total crop of 1932-33. As against 37,450 bales of 1933-34.
Receipts in the corresponding period of the previous year 437,376	1,694	3,883	6,243	9,064	
Pressed cotton received at Spinning mills 304,599	1,016	5,597	11 460	16,120	
Exported by sea 160,185	620	2,593	4,239	6,173	
Imported by sea mainly from Karachi and Bombay 47.955	Nil.	49	3,726	3,826	

One bale = 400 pounds.

College News and Notes.

Weather. The weather during the latter half of February was characterised by warm days and cold nights, the difference between the maximum and minimum often ranging between 30° and 40°. On the 27th the maximum was 96·2° and the minimum 56° thus recording a difference of 40·2°. Coimbatore town had a fairly severe outbreak of epidemics and the estate was not free, having several cases of chicken pox and measles. The College authorities have taken prompt measures to check the spread of diseases on the colony.

Students' Club Day. The annual club day came off on Saturday the 24th February. The morning was devoted to sports and games competitions which were largely patronised. Student A. M. Kulandai enhanced his reputation as the champion sports-man of the institution by annexing the first prize in several events. The inter-mess tug of war attracted great interest and was eventually won by the

Andhra mess. In the evening the students entertained their guests at a garden party at which several ladies and gentlemen were present. The disguise competition attracted about 15 entries, the costumes exhibiting a great deal of originality in ideas and get up. The judges had a difficult task to rank the competitors in the order of their merit. The awards went to M. R. Devarajan (charcoal seller), T. Gopal Rao (Sweeper woman) and M. Balakrishnan Nayar (*Masalvadai* seller).

After tea, the gathering adjourned to the Freeman hall where a meeting was held with Mr. P. N. Ramaswamy I. C. S. in the chair. The reports of the club secretary and games secretary recorded all-round progress and development in several directions. Mrs. Ramaswamy distributed the trophies and prizes for the various competitions. The guests were next treated to an excellent variety entertainment got up exclusively by students and which in the words of the president exhibited good taste and a high standard of originality. The programme included vocal and instrumental music, mono-acting, street scenes, 'radio programmes', 'the hostel rag', and a pigmy astrologer. Special mention may be made of Sam Joshua who played an important role in some extremely interesting and ingeniously got up items on the programme.

Award of Colours. The following is a list of students awarded colours for the year. *Tennis.* U. Ananda and G. Venkata Sastri; *Foot-ball.* N. Muthuswamy and M. Joseph. *Cricket.* H. Ramanatha Rao, S. Albuquerque and K. Lakshmanan. *Hockey.* P. C. Sahadevan, B. Suryanarayanamurti and A. M. Kulandai. The Vengail Nayanar Cup for the best allround Sports-man was awarded to A. M. Kulandai of Class II.

Cecil Wood Tennis Tournament. The finals of the Cecil Wood Tennis Singles Tournament was played between U. Ananda and G. Venkata Sastry. It was creditable of Ananda to have eliminiated M. Joseph the reigning champion in the earlier rounds. The match drawn out into four sets was eventually won which was by Ananda. The scores were: 8—6, 4—6, 6—4, 6—4.

Earthquake Relief. An amount of Rs. 180 was collected from the College and Research Institute and remitted to the Viceroy's Earthquake relief fund. It is learnt that a sum of Rs. 230 was collected at the Imperial Sugarcane breeding Station, Coimbatore and sent to the same fund.

Electrification. The erection of poles and laying of wires, are in full swing for the electrification of the roads and some buildings on the colony. It is learnt that the students' hostel, Freeman building, rest-house farm buildings and all the roads on the estate will be lighted before April. Arrangements are also in progress to provide electric pumps for two wells on the farm.

Ladies' Club. At a general body meeting of the club, the following ladies were elected as office bearers for the year. *President*, Mrs. Cheriyan; *Vice-President*, Mrs. Karunakar; *Secretary*, Mrs. Shiva Rao. With a habitation of its own, the club is more popular than ever.

Indian Officers' Association. At a general body meeting held on the 9th March, Dr. T. V. Ramakrishna Ayyar and Mr. K. Krishnamurti Rao were elected President and Executive committee member respectively, vice, Rao Bahadur T. S. Venkatraman and Mr. G. N. Rangaswami Ayyangar resigned.

Association of Economic Biologists. It is understood that a meeting under the joint auspices of the Association of Economic Biologists, Coimbatore, Association of Biological Chemists, Bangalore and the Indian Chemical Society (Madras branch) will be held at the Indian Institute of Science, Bangalore during the Easter holidays.

University Examinations. The examinations for the I, II and III B.Sc. Ag. Students are programmed to commence on the 4th April.

Visitors. Among distinguished visitors to the College and Research Institute were Rao Sahib N. K. Sawhney, Cotton Research Botanist, Hyderabad, Mr. Mehra, Publicity Officer, Indian Central Cotton Committee, Sir David Devadoss, Retired Judge, Madras High Court, Mr. Nadimuthu Pillai, M. L. C. (Tanjore), Dewan Bahadur C. S. Rathnasabapathy Mudaliar, M. L C. (Coimbatore) and Mr. V. S. Rathnasabapathy, Provincial Scout Organising Secretary.

Weather Review (FEBRUARY—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	0·0	−0·7	0·0	South	Negapatam	0·5	−0·1	7·7
	Berhampore *	0·0	−1·1	0 0		Aduthurai *	0·0	−2·6	5·0
	Calingapatam	0·0	−0·5	0·0		Madura	0·3	+0·4	3·2
	Vizagapatam	0·0	−0·8	0·0		Pamban	0·0	−0·7	10·6
	Anakapalli *	0·0	...	0 0		Koilpatti *	0·0	−0·7	5·0
	Samalkota *	0·0	−0·3	0·0		Palamkottah	0·0	+0·8	6·7
	Cocanada	0·0	−0·3	0 0					
	Maruteru *	0 0	−0·3	0·0					
	Masulipatam	0·0	−0·4	0·0	West	Trivandrum	0·0	+0·6	4·4
	Guntur *	0·0	−0·9	0·0	Coast	Cochin	0·0	+0·8	2·7
						Pattambi *	0·0	−0·8	2·2
Ceded	Kurnool	0·0	+0·2	0·0		Calicut	0·0	−0·2	0·4
Dists.	Nandyal *	0·0	−0·2	0·0		Taliparamba *	0·0	...	2·3
	Hagari *	0·0	...	0 0		Kasargode *	0·0	−0·3	1·7
	Bellary	0·0	−0·2	0 0		Nileshwar *	0·0	...	1·9
	Cuddapah	0·0	−0 2	0·0		Mangalore	0·0	...	1·2
	Anantapur	0·0	...	0·0					
Carnatic	Nellore	0·0	−0·1	0 9	Mysore	Chitaldrug	0·0	+0 1	0·1
	Madras	0 0	+0·3	2·1	and	Bangalore	0·0	−0·2	0·3
	Cuddalore	0·0	−0·4	1 8	Coorg	Mysore	0·7	−0·3	1·1
	Palur *	0·0	−0 4	1·9		Mercara	0·0	−1·3	0·2
	Palakuppam *	0 0	−1·1	3·7					
					Hills.	Kodaikanal	0 0	+7 9	14·0
Central	Vellore	0·0	−0·4	2 6		Coonoor	0·0	...	12·3
	Salem	0·0	+0·2	1·3		Kallar *	0·0	−3·3	7·5
	Coimbatore	0·0	−0·3	1·7		Ootacamund *	0·0	−0·7	5·9
	Coimbatore Res. Inst. *	0 0	...	1·6		Nanjanad *	0·0	−0 5	4·6
	Trichinopoly	0·0	+0 6	5·2					
	Hosur cattle farm *	0·0	...	1.5					

* Meteorological Stations of the Agricultural Department.

Summary of general weather conditions. Dry weather prevailed all over the country but for a few scattered falls of rain reported from South-east Madras on the 20th and in parts of Upper India under the influence of a low pressure wave and a depression which occurred there after the middle of the month.

The cold wave which was prevalent during the last week of January in north India extended to Bengal and kept the temperature below normal in Northern and central India and northern Deccan till the 7th. But the temperature however rose in North-west due to the extension of a western disturbance which passed away eastwards after causing light showers of rain in Kashmir on the 8th.

The next western disturbance caused a further rise of temperature along the North-west Frontier and in the Punjab maintaining the maximum 10° to 15° above normal at most of the stations till the end of the month.

A low pressure area appeared on the 12th over South-west Punjab and the adjoining districts of Sind and persisted there till the 15th. Then moving eastwards over South Punjab and North Rajputana on the 16th it filled up rapidly on the 18th over East United Provinces after causing widespread local showers along its course. But the low pressure area continued to be felt over Chota Nagpur and Bengal till the 18th and filled up there on the 19th after causing widespread thunderstorms in Assam, Bengal and the adjoining districts of Bihar and Orissa.

A western disturbance which caused an extension of clouds in Kashmir on the 19th, passed away eastwards after causing light showers. Another western disturbance accentuated as a low pressure area over Sind which had appeared there on the 20th. In connection with high temperatures over North-west India it caused a few light showers in Kashmir on the 20th. This low pressure passed over Upper Sind and South Punjab on the 22nd and merged into the low pressure trough extending from North-west Frontier to the head of the Bay of Bengal and persisted there, becoming unimportant by the 26th. The trough of low pressure which was prevailing on the 24th from the Punjab to Chota Nagpur accentuated into a depression over Upper Sind and South-west Punjab which filled up on the 27th over North Punjab after causing local rains and thundershowers in its course. This latter depression was fairly widespread and dust storms occured along the North-west Frontier which brought down the temperature to normal in North-west India.

In the Peninsula humidity was generally in defect, the maximum temperature above normal and minimum below normal during the month.

Weather Report of the Research Institute Observatory :

Report No. 2/34.

Absolute Maximum in shade	96·2° F.
Absolute Minimum in shade	55° F.
Mean Maximum in shade	90° F.
Mean Minimum in shade	61° F.
Total Rainfall	Nil.
Mean daily wind velocity	2·7 M. P H.
Mean 8 hours wind velocity	2 9 M. P. H.
Mean humidity at 8 hours	72·1 %
Total hours of bright sunshine	295·7 hours.
Mean daily hours of bright sunshine	10·6 hours.

Summary of weather conditions. The pressure distribution was quite normal for the month. The average humidity and the mean daily wind velocity were slightly above normal. The maximum temperature attained was 96·2° (27th) and minimum 55° (12th). The diurnal variation was 40°, being the highest on record so far noticed at this part of the year. The days were particularly hot and nights extremely chill. Fine breeze was experienced throughout the month during the day which had a moderating influence on the high day temperatures.

C. V. R. & T. S. L.