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Editorial.

Welcome to H. E. Lord Linlithgow, the Viceroy. On behalf of the Madras Agricultural Students' Union, we offer our hearty welcome to H. E. Lord Linlithgow who has taken over the reins of Government in India this month. As Chairman of the Royal Commission on Agriculture he has acquired a very clear picture of the agricultural conditions and problems in every province. That he will take an abiding interest in the rural uplift is amply evident from his recent utterances in England prior to his leaving for India. His monumental industry, his tireless attention to details, and the thoroughness and quickness of grasp with which he tackles problems, are all familiar to those who have watched him during his Chairmanship of the Royal Commission in India. We are sure that during his regime as Viceroy of India there will be a great stimulus given not only to the development of Agriculture, the primary industry of this vast continent, but also to several well thought out measures intended to ameliorate the condition of the vast masses who depend on land for their bare existence.

Agricultural Associations. Among the agencies thought of, to supplement the propaganda work of the Agricultural Department, the Agricultural Associations might be considered quite important. There is no doubt that such associations could be utilised to disseminate knowledge of agricultural improvement. In our own province, even 30 years ago, there were in existence several District Agricultural Associations with a Central Committee in Madras. Although in the flush of enthusiasm, some useful work was done by these

associations in the beginning, the enthusiasm soon waned and it was found difficult to get the Associations to undertake any practical demonstration of agricultural improvements advocated by the Department. The movement was probably premature and the Central Agricultural Committee had to be wound up, the district associations soon following suit. Among the causes for such failure might be mentioned:— (1) the associations consisted generally of men who did not have a direct interest on land, (2) the associations tried to cover too big an area to permit of the concentration of a particular activity in a definite area, (3) the associations were brought into existence by the enthusiasm displayed by one or two particular individuals rather than by a general desire on the part of the people in the villages (4) Due to the paucity of trained staff in the Agricultural Department the associations could not get much of the technical help necessary. The last difficulty has to a certain extent been overcome by the expansion of the Agricultural Department in recent years, there being roughly one Agricultural Demonstrator for each revenue taluq of a district. The only means of overcoming the other difficulties would be to make the association really rural, the actual cultivators making up its strength. We are glad the Director of Agriculture, Madras, in his opening speech at the Nellore District Agricultural Association rightly pointed out the need for starting the associations first in villages, which alone would result in real work connected with rural uplift being done. The experience gained in other Provinces also points out definitely that the smaller the area for which the association is intended the greater are the possibilities of its doing really useful work. If we should benefit from our early experiences it is necessary that we should begin first at the bottom by forming village or *firka* associations and later co-ordinating their work by linking them up with taluq or district associations.

With the increasing interest paid to Agriculture in recent times, the question of forming agricultural associations has again come up for consideration in several parts of the province. Among the several Government Departments, the Revenue Department naturally weilds considerable amount of influence and regard among the land-owning classes and there is no doubt, that any association with the revenue officials actively co-operating in its work, is bound to be more productive of results. Sir Charles Souter, the Revenue Member to the Government of Madras when he presided over the Agricultural Conference in Coimbatore last August drew pointed attention to the necessity of the officers of the various Departments interested in rural welfare, actively co-operating and seeking the advice and help of the Revenue Officials. We are glad to note that a beginning has been made in some districts to carry into effect the suggestions of the Revenue Member. The Deputy Director of Agriculture Second Circle, had approached the District Collectors in his Circle to form

Agricultural Associations one in each revenue *firka* of the district. His suggestion to make the revenue inspector of each *firka*, the President of such association, has been accepted by the District Collectors and the Board of Revenue and a number of associations have been recently brought into existence in Guntur District. The members of these associations are all influential and bonafide ryots actually interested in the improvement of agriculture. The example set up by Guntur is, we understand, being followed by other districts in the Second Circle, Kistna and Nellore.

The main objects of these associations are stated to be:—(1) to introduce better methods of cultivation, (2) to introduce heavy yielding strains of crops recommended by the Agricultural Department and also to actually test new strains of crops in the locality to supplement the results obtained at the Government Research Stations, and (3) to arrange, if possible, for the proper marketing of the produce of the ryots. The associations will get the technical help of the Demonstrators, and the Demonstrator usually having the jurisdiction of a whole taluq will have a number of trained demonstration *maistries* under him, probably one for each firka. The programme of work for the associations will, we expect, be drawn up by the officers of the Agricultural Department who are familiar with the local conditions. If only the members of these associations take a living interest in the work and undertake to carry out the improvements suggested by the Department, we are sure some tangible results can be achieved. Probably, after some time these associations could be utilised to bring about improvements in the village in other spheres as well, as for example, rural sanitation, public health, education, etc., the members of the concerned Government Departments working through these associations. In course of time there should be a large number of groups of villages trying their best to help themselves in all rural welfare work. We wish all success to the new venture undertaken in the second circle which we hope will be copied and extended to all the districts in the Presidency.

It was a surprise to see that a member of the local legislative council during the recent budget session criticised the work of the Agricultural Department by stating that the Department had done 'next to nothing'. While several of his sweeping statements can be readily refuted by actual facts, he was inclined to blame the Agricultural Department for all the difficulties which the cultivator is labouring under in these days of general depression. We are gratified, however, that another member of the council while commending the work of the Department stressed upon the necessity for the co-operation of the non-officials in the propaganda work. We are glad he particularly mentioned about the work of these newly formed agricultural associations and recommended the extention of such activities in other districts.

INHERITANCE OF GLUME LENGTH IN *RAGI*, *ELEUSINE CORACANA* (Gaertn), THE FINGER MILLET

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The earhead of *Eleusine coracana* is a terminal whorl of digitate spikes radiating from the apex of a culm. Each of the spikes consists of two rows of sessile spikelets. The spikelets usually contain 5 to 10 glumes each, of which the two lower-most are barren and the rest are paleate, each enclosing a complete flower. When the grains set and develop, they peep out of the glume and present the seriate appearance characteristic of this earhead.

The average length of the glumes in the spikelet of a normal type of cultivated *ragi* in South India, is as follows from bottom to top.

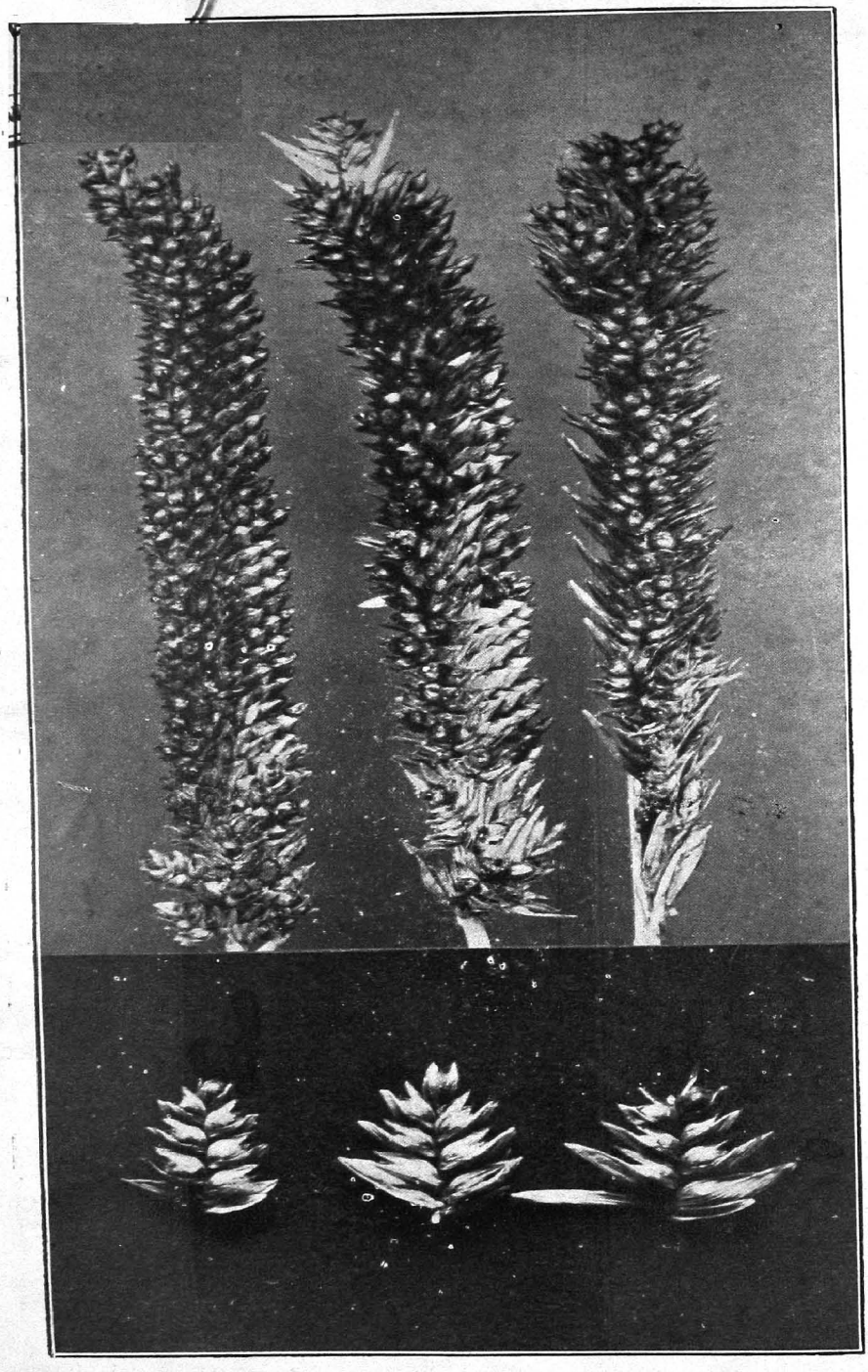
Table I.

		Average Length in mm.
Glume	I	4·0
,,	II	5·0
,,	III	4·5
,,	IV	4·5
,,	V	4·0
,,	VI	3·5
,,	VII	3·5
,,	VIII	3·0
,,	IX	3·0
,,	X	3·0

It will be noticed that the first is shorter than the second. The second is the longest glume. There is a gradual reduction in this length towards the top glumes. This trend in glume length may be said to be general in all the *Eleusines* including the wild ones, *E. indica* and *E. aegyptiaca*. In the wild *Eleusines* the grains are small and long, and are well enclosed by the glume and palea. In the cultivated *ragi* the grain is a bit longer than the wild ones and considerably thicker, so that the spherical grains push apart the glume and the palea, and get visible.

In M. S. 1567, an African variety of *ragi* from Nyassaland, a type was noticed where the glumes of the spikelet were longer than normal short ones. The spikelet, (due to the long glumes) presented a chaffy look and had an obovate appearance instead of the usual ovate of the common *ragi*. This type was suspected to be an abnormality, possibly pathological. But as the growth and appearance in subsequent years was the same, it was put down to be a varietal characteristic surviving in the original habitat of this "African Millet". The relative glume and palea lengths of this type and that of the local cultivated *ragi* are given below:—

GLUME LENGTHS IN RAGI,
(*ELEUSINE CORACANA*, GAERTN).



Short. Medium. Long.

Table II. *Length of Glumes and Palea.*

	Local—Short Glume.		African—Long Glume.	
	Glume.	Palea.	Glume.	Palea.
	mm.	mm.	mm.	mm.
Glume I	4·0	—	4·0	—
,, II	5·0	—	8·0	—
,, III	4·5	4·0	8·5	4·0
,, IV	4·5	3·5	7·0	4·0
,, V	4·0	3·0	6·0	4·0
,, VI	3·5	3·0	5·0	4·0
,, VII	3·5	3·0	4·5	4·0
,, VIII	3·0	3·0	4·0	3·5
,, IX	3·0	3·0	3·5	3·5
,, X	3·0	2·5	3·0	3·0

It will be noted that the variety from Nyassaland has glumes definitely longer than the normal. It is remarkable that this glume length notwithstanding, the length of the palea remained the same in both the Indian and African varieties. The same equality in size was noticed in the grain also. It will thus be seen that the difference lay in the length of the glumes only. It is the large glume of the African variety that partially hides the grain and gives the earhead its chaffy look.

The inheritance of this "Glume Length" character was pursued. In crosses between normal and long glumes, the first generation plants had the normal Short glumes and in the second generation the following segregations of the glume lengths, Short, Medium and Long (see Fig.) were obtained.

Table III. *Inheritance of Glume Length.*

F_2 Family No.	Segregating for glume lengths. Short.	Medium.	Long.
E. C. 2953	152	122	34
,, 2958	142	155	53
,, 2961	131	124	40
,, 2962	124	128	42
,, 2963	116	125	42
Total	665	654	211

To interpret these ratios, 90 selections were carried forward from family E. C. 2958 to a third generation. The behaviour of these selections is given below:—

Table IV. *Family E. C. 2958*—F_3.

Character of Selections.	Number of Families.	Behaviour in F_3 Short.	Medium.	Long.	(χ^2)	P value.
	1	203				
Short	2 (3 : 1)	105	42	—	·9	·3<P<·5
(14)	3 (9 : 6 : 1)	205	166	32	4·1	·1<P<·2
	8 (27 : 27 : 10)	276	255	98	·8	5<P<·7
	10		532			
Medium	27 (3 : 1)		1639	538	·1	·7<P<·8
(52)	15 (9 : 7)		446	321	1·2	·2<P<·3
Long						
(24)	24			1509		
Total	90					

The long glume is about twice the length of the short glume and juts prominently beyond the grain. The length of this glume and the comparatively hidden grains, gave the earhead a characteristic chaffy look, which afforded a dependable qualitative guide in the grouping of the segregates.

Table IV reveals that in Table III we had the rather rare 27 : 27 : 10 ratio whose P value is between ·1 and ·2. A study of Table IV shows that there are three factors determining glume length. These may be designated Gl_1, Gl_2 and Gl_3. All the three factors should be present to give a normal Short glume. Any two of them make a Medium glume. Each one of them or none produces a Long glume. The general fit of the figures in Table IV to the theoretically expected behaviour will be evident.

A Long glume connotes wild affinities and economic disabilities. In this closely pollinated millet there must have been Longs of many races and of different genetic constitutions. When these came together, they also brought together supplementary factors, whose joint effect was an inhibition in glume length. Any two of the three factors for glume length might bring about the first stage of the desired reduction. The Medium lengths being thus brought about, they needed only an additional factor to bring about the normal glume length with its visible grains. This additional factor could be available in many of the sister Mediums and some of the original Longs. There are thus afforded many opportunities at a supplementary endeavour, which neutralize in some measure the paucity of chances at cross pollination and subsequent selection. A shortening thus secured, selective forces must obviously have helped to perpetuate the normal Short glume with its visible grain. This triple play of factors offers, therefore, a decent chance for an elimination of the undesirable length in the glume. This phenomenon gives a glimpse of one of the many ways in which genetic factors play on each other, towards an evolutionary advance.

Summary. The *Short* length of the glume in a normal cultivated *ragi* is due to the presence of three dominant factors Gl_1, Gl_2 and Gl_3 functioning as inhibitors of glume length. Any two of the above three, increase the length of the glume and give a *Medium* length. Each of them singly, or none, gives a *Long* glume. The inter-play of these factors results in a 27 : 27 : 10 ratio of Short : Medium : Long glumes.

NOTE ON THE METHOD OF COMPUTING CROP FORECASTS

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Forecasts reports of area and yield are framed for nine crops, viz., paddy, sugarcane, groundnut, gingelly, castor, cotton, pepper, ginger and senna. The estimates relate to all the districts in which the respective crops are grown.

Approximately two-thirds of the cultivated land in the Madras Presidency is Government or ryotwari land and has been carefully surveyed. All the village officers therein are appointed and controlled by Government officials. In the ordinary course of his work, the village accountant sends by the 25th of each month to the Revenue Inspector, i. e., the officer in charge of a group of villages varying in number, a detailed cultivation statement of the sowings of crops and the outturn of harvested crops in his village in terms of annas, under the separate heads, 4 to 7 annas, 8 to 11 annas, 12 annas and 13 to 16 annas (12 annas standing for a normal crop). The Revenue Inspector records in a separate forecast register which he maintains, the distribution of area and the expected anna yield for each crop in each village in the firka and strikes a total of the areas and an average of the anna outturns based on the village accountants' figures and his personal experience. In the month in which a forecast report is due, the Tahsildar compiles the figures of area under the crop sown to-date since the beginning of the forecast year and also the expected average anna yield figure from the firka registers submitted to him by the Revenue Inspectors. He then strikes a total of the areas sown in the several firkas and an average anna estimate of the outturn for the whole taluk, based on the figures reported by Revenue Inspectors and his personal experience. The return so prepared is sent to the Board of Revenue.

Nearly a third of the Presidency is whole inam and zamindari of which only a part has been accurately surveyed and for which somewhat similar returns are prepared. In every case, the Tahsildar or Deputy Tahsildar estimates the area and yield as well as he can from his own knowledge and from reports of the estate officials as the village accounts are not carefully maintained in the estate villages. The figures for whole inam and zamindari areas are included but shown separately in the reports sent by Tahsildars to the Board of Revenue.

The Indian States of Pudukkottai and Banganapalli send similar reports direct to the Board of Revenue for cotton only.

Thus some 240 reports for each of the forecast crops except senna, pepper and ginger are received in the Board's office. The

reports received are scrutinised in the first instance and the figures are then tabulated in the forecast registers.

It must however be understood that the figures of area reported for the forecasts are not complete owing partly to a certain percentage of village accountants and Revenue Inspectors failing to report in time and partly to the fact that *karnams* sometimes fail to book the entire area under cultivation up to a stated period. The reported area has therefore to be subjected to a correction in the Board's office. The correction applied is mainly to secure that the corrected area may represent as closely as possible the actual area sown in the period to which the forecast relates. The correction has in the first instance to take into account the liability to under-estimate or over-estimate the area by certain *Tahsildars* as revealed by a comparison of the areas reported in the final forecasts with those in the G-returns (*Jamabandi* return) over a series of years. It has also to take into account the liability to under-estimate or over-estimate the area on the part of *Tahsildars* contrary to what the state of the season as revealed in the weekly season reports by collectors and the reports of Deputy Directors of Agriculture would warrant.

The yield of a crop in a district is the product of three factors, namely (1) the area under the crop in acres, (2) the normal yield per acre and (3) the seasonal factor or the condition figure which expresses the relation in the form of a percentage of the actual crop to the normal crop.

(1) has already been dealt with. As for (2), the figures of the normal yield per acre for the several crops are given in Appendix VIII to the season and crop report. The normal yields for crops were fixed by the Director of Agriculture in 1919.

As regards the seasonal factor, the procedure adopted in the Board's office is as follows:—

The average anna figure of each crop in the district is first determined.

Let A acres be the total area under a crop made up of

a_1 acres under 0 to 3 annas.
a_2 acres under 4 to 7 annas.
a_3 acres under 8 to 11 annas.
a_4 acres under 12 annas.
a_5 acres under 13 to 16 annas.

so that $A = a_1 + a_2 + a_3 + a_4 + a_5$.

The average anna figure (reported) will then be

$$Y = \frac{(a_1 \times 1\frac{1}{2}) + (a_2 \times 5\frac{1}{2}) + (a_3 \times 9\frac{1}{2}) + (a_4 \times 12) + (a_5 \times 14\frac{1}{2})}{A} \text{ annas.}$$

The equivalent percentage figure will be

$$p = \frac{Y}{12} \times 100 \text{ as 12 annas is equivalent to normal } (=100).$$

The village accountant's pessimism will now have to be allowed for. For the main crops whose yields are calculated and entered in the season and crop report, figures of p are available from 1902—3 or some later year. If the accountant were not a pessimist, his p's for any crop would be a series whose average over a number of years would equal or approximate to 100, for an average crop is the best approximation to a normal crop.

It has been found that the actual averages of p's for various crops and districts are however always less than 100, and in fact range from *70* to *90*.

The method of interpreting the accountant's report is as follows:—

Let 80 be the average of *p*'s for paddy in a district. If 75 is the *p* for the year in question, the corrected percentage (condition factor) will be entered as

$$\frac{75 \times 100}{80} = 93{\cdot}75.$$

$\frac{100}{80}$ is called the correcting factor and this figure varies for each crop and each district.

SATHGUDI ORANGE CULTIVATION NEAR TIRUTTANI AND PUTTUR, CHITTOOR DISTRICT

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Introduction. *Sathgudi* is one of the best varieties of tight skinned oranges in South India. It must have been introduced in these parts from Sathgur—the original home in Gudiyatham taluk, North Arcot District. The area is about thousand acres in both the divisions and the extent is more in Puttur than in Tiruttani division.

The average area owned by an individual grower is about one acre. There is a great demand for this fruit and consequently the area is gradually increasing every year. Inadequate water-supply in the irrigation sources however seems to be the limiting factor in the extension of the area.

Details of cultivation. *Soil.* The best soil suited for raising this fruit tree is ' *Erragulaka* ' or (*Erraregada*), red soil up to a depth of three feet with well-drained sub-soil, not less than seven feet.

Seed and sowing. Generally healthy seeds are collected during November and December from well-developed and ripe fruits borne by old trees yielding profusely. The nursery bed is dug with *mamutties* three or four times and brought to a fine tilth. Usually red-soil is preferred for raising seedlings. Fresh seeds are dibbled in the nursery, two inches apart. On every alternate day the seed bed is watered. It takes about a month for the seeds to sprout.

One-year-old seedlings are taken out of the nursery and transplanted in a separate nursery one foot apart, the seedlings being then about a foot high. Before planting this second nursery the soil is dug a number of times and a heavy dose of sheep, goat or cattle manure is applied. Well-powdered *neem* cake is supplied to seedlings to prevent insect attack and to induce dark foliage.

Plantation. Two to four year old seedlings are planted during August—September or January—February in pits dug (six months previously) 15 to 21 feet apart soon after the cessation of the North-East or the South-West monsoon. Just before transplanting the side branches are pruned. Grafts are not generally planted because the belief is, that grafted trees do not yield for a long number of years.

Irrigation. Plants receive irrigation once in three or four days immediately after planting. When watering is done by pots, plants are watered once in two days. After the seedlings are well established they are irrigated twice a week. During the rainy season i.e. (September—December) irrigation is given only if the subsoil is dry. Generally, copious irrigations are given once in four days from February to August in gardens where the trees are bearing.

After Cultivation. Mamutti hoeing is resorted to once in four months round the plants up to a distance of three feet from the trunk when the plants are young. When the trees are bearing the whole garden is ploughed two to three months after the cessation of rains depending on the nature of the soil and young secondary roots are removed to encourage growth of buds. In some cases digging round trees to a width of a foot without injuring roots (except fibrous roots) and removing the soil to a depth of 6″ to 1′ is practised occasionally. Farmyard manure, sheep and goat manure or green leaf compost, tank silt or redsoil is applied round each tree after the resting period (i.e.) about January, the quantity varying according to the age of the plant. Sheep manure is generally preferred. Dead branches are pruned in December—January and the cut ends are tarred. Draining away excess water is also done in ill drained gardens during the monsoon.

Bearing period. The usual flowering season is January to March. Generally trees begin to bear on a commercial scale from the 10th year after planting i.e. when the plants are over 10 years old and they continue to yield up to 40 years. Trees aged over 15 years yield fruit in abundance and continue to do so for a further period of 15 years, when the yield drops.

Yield. Each tree bears on an average 150 fruits. The fruiting season commences in July and lasts till December. In rare cases trees yield fruits from March to June.

Marketing. Fruits are usually exported to Madras packed in bamboo basket. They are sold at the rate of Rs. 3—0—0 per hundred

at the garden. Generally merchants buy from gardeners and export, but a few gardeners directly export the fruits to Madras and sell them wholesale or in retail.

Cost of Cultivation per acre.

	Rs.	A.	P.
Preparatory cultivation ; —			
Digging pits :–Three feet cube 18 ft apart. 135 pits at 0-1-0 per pit.	8	7	0
Manuring and Manures :—			
Green leaf or cattle manure @ 0–3–0 per tree including application.	25	5	0
Seed and sowing :—			
Three year old seedlings @ the rate of Rs. 50 per 100 including labour for planting	68	8	0
After cultivation :—			
Digging round plants by mamutti up to a distance of 3' four times—10 men @ 0–4 -0 each	10	0	0
Trenching round each plant @ 0—0—3 per plant per year ...	2	1	0
Irrigation :—			
Irrigation once in 4 days from February to August (8 × 7=56) @ Rs. 1—8—0 per irrigation	84	0	0

Assuming the life of a garden to be 45 years.

Cost of cultivation per year.

Preparatory cultivation (proportionate cost)	0	3	0
Manures and manuring	25	5	0
Seed and sowing (proportionate cost)	1	8	0
After cultivation	12	1	0
Irrigation	84	0	0
Watchmen @ Rs. 3—0—0 per 4 months	12	0	0
Average assessment	10	0	0
Total ...	145	1	0
Yield :—			
150 fruits per tree on an average @ Rs. 3—0—0 per 100 for 135 trees.	607	8	0
Deduct cost of cultivation	145	1	0
Net profit per acre per annum	462	7	0
or Rs.	460	0	0

The writer acknowledges with thanks the suggestions given by Mr, M. Kanti Raj, Assistant Director of Agriculture, Vellore in preparing this article.

THE FIRST GENERATION OF AN INTERSPECIFIC CROSS IN SOLANUMS, BETWEEN *SOLANUM MELONGENA* AND *S. XANTHOCARPUM*

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Towards the creation of 'larger' variations interspecific hybridisation is often resorted to. The use of wild forms in breeding crop plants, particularly to obtain vigour and resistance to diseases, has come to be well recognised. The present note deals with such a cross in *Solanum* species.

Reciprocal crosses between *S. melongena* and *S. xanthocarpum* were made in the winter of 1934—35 at the Agricultural Research Station, Maruteru. The flower buds were emasculated the previous evening, and crossing effected on the succeeding day when the bud would bloom. The buds after emasculation were enclosed in small muslin covers tightly secured to the peduncle. Crosses with the *S. xanthocarpum* as the pistillate parent were successful, while the reciprocal cross was a failure. As the flowering of the *S. melongena* parent at that time had almost drawn to an end it was then presumed that the late season flowers might be lacking in vigour to set seed. This feature is, however, being investigated. The crosses and the parent seed were sown in well prepared beds on 17—7—1935, and the seedlings transplanted on 6—9—1935.

Characters of Parents. While the detailed botanical description of the parents is reserved for a later publication some of the chief characteristics are mentioned here.

Solanum xanthocarpum, Schrad and Wendl. The plant is a conspicuous herb common in black cotton soils. It has a deep-seated, elaborately branched woody root system, sometimes attaining a length of even three feet. The numerous long greenish yellow spines all over the plant make it very prominent. The stem is somewhat round and covered with sparsely distributed stellate hairs and spreads on the ground. The leaves are simple alternate and pinnately lobed. Secondary lobing from primary lobes is a definite characteristic of this parent. The flowers are rather showy and purplish blue in colour. The flowers are dimorphic with respect to the length of style—long-styled and short-styled flowers. Invariably the two bottom flowers are long-styled ones, while the top ones are short-styled. The plant is highly medicinal and forms one of the '*Dasa mulikas*' of the Ayurvedic medicine. It is largely used in mixtures for colds, coughs, and chronic asthma. The researches in indigenous drugs taken up by the Bengal School of Medicine have confirmed its high place in the medical field.

Solanum melongena—(Brinjal). "This species is an annual erect branching herb, finally becoming subwoody, wooly or scurfy and spiny". The root system is composed of a long tap root with a crown of secondary roots spread in the superficial layers of the soil. Branches are spreading and zig zag due to the sympodial nature of growth. The leaves are simple alternate, sinuately lobed, ovate or ovate-oblong, thick, densely felted stellate hairs. Inflorescence is cymose, extra-axillary, cymes consisting of 4 to 6 flowers. The inflorescence is occasionally represented by solitary flower. Flowers are big, light purple in colour. The flowers are dimorphic with respect to length of style as in the other parent. The solitary i. e., the flower attached in the

bottom of cyme is long styled and the rest are short styled. Tender fruits of this species commonly used as vegetable needs no mention.

Description of the Hybrid. The hybrid is very vigorous, quick growing and spreading. The development of the root system is very interesting. In the seedling stage, the long tap root system with comparatively fewer secondaries resembling that of the *melongena* parent is evident, while in the later stages, an extremely elaborate secondary root system similar to that of the *xanthocarpum* parent appears to develop. Thus the F_1 has the root system of both the parents. The production of the secondary root system however, commences at a later stage than in the *S. xanthocarpum* parent.

The shoot is profusely branched, spreading and prostrate on the ground, studded with thick sharp spines rather more sparsely distributed than in the *S. xanthocarpum* parent. The shoot is sympodial in growth. The stem is round and covered with stellate hairs, whose density of distribution is intermediate between the two parents, *S. melongena* being the denser of the two.

Leaves are simple alternate, pinnately lobed, depth of lobing being intermediate between that of the two parents, deeper lobing being found in the *S. xanthocarpum* parent. Evidences of secondary lobing as in the *S. xanthocarpum* parent are also to be found. The leaf measurements along with the depth of lobing as measured by the perpendicular distance from the midrib to the bottom of the lobe are given below.

Particulars.	Mean length cms.	Mean maximum width cms.	Perpendicular distance from midrib to the bottom of the lobe.	
S. melongena parent	21·69	18·11	5·76	5·55
Hybrid	16·50	10·59	2·88	2·73
S. xanthocarpum parent	11·10	7·14	1·23	1·23

Spines along the midrib, secondary veins and along the petioles of the leaves are present as in the *S. xanthocarpum* parent. The lamina is rather incurved, a feature common in the *S. melongena* parent, but the degree and persistance of this nature is more marked in the hybrid than in the *S. melongena* parent. Stellate hairs are studded as in the stem to an intermediate degree of intensity.

The inflorescence is extra-axillary, cymose, each cyme consisting of 3 to 6 flowers. The extra-axillary nature of the cymes in the *S. xanthocarpum* parent has been exclusively emphasised in the F_1. The stalk of the cyme and the pedicels of the flowers are sparsely studded with spines. In the cross, the two kinds of arrangement of flowers as occurring in the two parents are to be found in almost equal proportions. The flowers are dimorphic as in the two parents.

The flower is intermediate in size and is of the same morphology as that of the parents. But, the corolla is bent backwards, a behaviour

inherited from the *S. xanthocarpum* parent. The stamens are intermediate in size. The ovary is round ; fruit, globose berry with the characteristic check pattern design like that on the berries of the *S. xanthocarpum* parent, the purple heading to an intensity from the top of the ovary to the stalk end. The fruits are only slightly bigger than the *xanthocarpum* parent.

Setting on the fruits is poor both under natural pollination and artificial self-pollination. Back crosses with the two parents are fairly successful, using the hybrid as the pistillate parent.

Pigmentation. The inheritance of the pigment in the several parts of the plant is noted below :

Particulars.	*S. xanthocarpum* parent.	Hybrid.	*S. melongena* parent.
Stem	Light purple	Medium purple	Light purple
Leaves and veins	Green	Purple	Purple
Spines	Green	Purple	No spines
Corolla	Medium violet	Deep violet	Light violet
Fruit	Light green with dark green check pattern design at the distal end.	Same as in *S. xanthocarpum* parent with purple wash all over.	Purple

The partial sterility of the hybrid, while necessitating further investigation of the controlling factors, sets a handicap to the progress of the inheritance study.

NUTRITION, INTERNATIONAL AND NATIONAL

By W. R. AYKROYD, M. D.,

Director, Nutrition Research, I. R. F. A., Coonoor.

During the last year the subject of nutrition has received considerable attention from the League of Nations and the related organisation, the International Labour Office. As a result of international discussions, comprehensive schemes for the study and attack of the problem have been formulated, which are likely to have a considerable influence in the spheres of economics, agriculture, and public health.

In the Report of the Director of the I. L. O. to the Nineteenth Session of the International Labour Conference (June 1935), we find the following passage :—

"Though there is still considerable controversy among physiologists as to the minimum needs for healthy subsistence and as to the rations of calories, proteins, mineral salts and vitamins required in different climatic conditions, it is not open to dispute that large masses of people are at present under-fed or wrongly fed. .....Every country is faced by a problem of this kind, but its exploration is only just beginning. It may be compared with the problem of medical treatment and maternity care, for which much has already been done wherever a sound system of health insurance has been established..... If the cure and prevention of disease is a communal affair, housing and feeding, which are the primary requisites of healthy living, are hardly less so. They were certainly not excluded from the purview of the International Labour Organisation by the Preamble to the Constitution, which lays down the provision of an

adequate living wage' as one of its objectives and declares it urgent to improve conditions of labour involving hardship and privation."

"Looked at from another angle, it is evident that a higher and more variegated standard of food consumption would go far to solve the problem of agricultural over-production....."

"This question of consumption is not only national but international in its scope. If it is agreed that the only real solution of the problem of economic balance is not through scaling down production but in levelling up consumption, then it follows that the best hope of finding a way out of the present troubles is to raise the standards of the millions who are now underfed, under-clothed and under-equipped. The cares of the American, Argentine, Australian, Canadian or Eastern European farmer would be conjured away if the urban population of Europe and America could eat even a little more bread, butter and meat per head..... When all other remedies have been clearly seen to fail, it is in this direction that thought will eventually be directed, unless a general regression towards lower standards of living is accepted as the ironical but inevitable outcome of a civilisation condemned to decline through the excess of its own creative ingenuity and technical perfection."[1]

An interesting discussion of the questions raised in these paragraphs ensued at the Conference, in the course of which various delegates stressed the importance of nutrition in relation to agriculture, economic policy, and the purchasing power and health of industrial workers. The Conference adopted a resolution instructing the Labour Office "to continue its investigation of the problem, particularly in its rural aspects in collaboration with the health and economic organisations of the League of Nations, the International Institute of Agriculture and other bodies capable of contributing to its solution, with a view to presenting a report to the 1936 Session of the Conference."

During the Sixteenth Session of the Assembly of the League of Nations (Sept. 1935), delegates of 12 countries, including the United Kingdom, Australia, the Argentine, Chile Italy, and Sweden, addressed a letter to the President proposing that "the question of the relationship of nutrition to the health of the population, which has become a social and economic problem of widely accepted significance, and is recognised as having an important bearing on world agricultural problems, should be placed on the agenda of the current Session of the Assembly."

This was accordingly done, and the discussion raised lasted three days in the Second Committee—a somewhat remarkable fact when one remembers that the 1935 Assembly was perturbed by the tragedy of the Italo-Abyssinian war. A few months previously a report had been published in the *Quarterly Bulletin of the Health Organisation of the League of Nations* entitled "Nutrition and Public Health,"[2] by Dr. Et. Burnet of Paris and myself. This report, which marshals evidence to show that malnutrition is prevalent throughout the world and outlines the far-reaching implications involved, was to a large extent used as a basis for discussion In opening the debate, Mr. Bruce, the Australian delegate, used the memorable phrase "marry health and agriculture", which served to crystallise ideas previously nebulous. Other delegates who spoke were in general agreement that the time has come for vigorous action on a national and international scale, and the bearing of the ideal of "improved nutrition" on the economic life of the world was reemphasised. Increase consumption of agricultural products and the purchasing power of the agriculturist must rise, to the benefit of industry and world trade in general. As a result of its discussions, the Assembly set up a "Mixed Committee" including agricultural economic, financial, and health experts, who are to submit a general report on the whole question, in its health

and economic aspects, to the next Assembly, and further, it instructed the technical organisations of the League to "collect, summarise, and publish information on the measures taken in all countries for securing improved nutrition."

The next necessary step was to define "optimum nutrition" in the light of modern knowledge. This was done in November, 1935, by a Technical Commission, convened by the Health Organisation of the League, which included leading nutrition workers from U. S. A. and various European countries. Its report, entitled "The Physiological Bases of Nutrition,"[3] defines in simple language a series of optimum dietary standards. Those interested should study the report in the original. Among the points emphasised by the Commission were the following:— the importance of a high milk intake, particularly for children and expectant and nursing mothers; the value of green and leafy vegetables, fruit, eggs and unmilled cereals; the undesirability of a high consumption of milled cereals and sugar. It was subsequently pointed out by various authorities that the general adoption of a diet of the type recommended by the Commission would mean, even in a comparatively well-fed country like England, a very great increase in the demand for dairy products, eggs, fruit vegetables, etc., and that such a demand would enormously stimulate the agricultural industry. The ideas of our 'over-production' in agriculture, and of restricted production as a way out of the economic depression, seem to be finally defunct. It has become ludicrous to talk of the 'over-production' of food-stuffs a world, a great proportion of whose inhabitants are living on a diet far below optimum standards.

The fundamental problem (as far as the countries of Western civilisation are concerned) is therefore to stimulate food consumption in the right direction, and this clearly is a problem with many aspects each requiring intensive study. First, there is the question of educating the mass of the people in rational dietetics. There is great scope for advance here, but difficulties should not be underestimated. The average human being is not very teachable about his diet, being convinced that he knows all there is to know about the subject already. Untiring effort is required to make scientific knowledge, even in a rudimentary form, the property of the man in the street. Then there are difficulties inherent in the commercial organisation of the world; vested interests are quick to turn to their own advantage any new movement of this kind, and ingenious advertising of expensive and unnecessary food products might tend to drown the less sensational propaganda of the hygienist.

At best, however, the possibility of improving nutrition by purely educational means is limited. Poverty is a more basic cause of malnutrition than ignorance. To a large extent, as far as the poorest classes in many countries are concerned, diet is determined by income, and without increase in purchasing power no great improvement is possible. Obviously, purchasing power cannot be raised by a wave of the hand. But at least it is possible to investigate on a wide scale the relation between income, the "cost of living" and food consumption, and correlate the consumption of a minimum wage with that of a minimum adequate diet. There are questions of special interest to those concerned with labour problems, and they are at present being actively studied by the International Labour Office.

In countries like England, the subsidising of certain branches of the agricultural industry (e. g., dairy products, eggs, fruit and vegetables) would stimulate production, and lower prices to the benefit of the consumer. Again, an increased national expenditure on unemployment, benefit, the supply of milk and nutritious meals to school children, pregnant and nursing mothers, etc., an improvement in the feeding of residential institutions under governmental control, would ultimately have a beneficial effect on the health of a large section of the population, and at the same time put more money in the farmer's pocket.

The "Mixed Committee" of the League, which met in February, 1936, under the presidency of Viscount Astor, included representatives of the International Institute of Agriculture, the International Labour Office, and a number of distinguished nutrition, economic, and agricultural experts. In an interesting opening speech Viscount Astor outlined the enormous range and implications of its proposed activities. On the whole he was optimistic :—

"I believe that our final recommendations can and will make an overwhelming appeal to the common sense of the world..... If starting from the aspect of public health and continuing our enquiries through the fields of national agriculture, of world trade, of industrial employment we come to the conclusion that welfare, using this word in its widest meaning, can be immeasurably raised through the application of the results of science, we shall open up a new era of progress to a suffering world."

It is clear that this promising international activity closely concerns India and the East. Before long India will be drawn into the orbit of the investigation, and will be able to benefit from the results of enquiries carried out elsewhere. As a preliminary there is a great deal of work to be done in India to clarify the general situation as regards nutrition. It is first of all necessary to correlate and compare agricultural production, etc., with the food requirements of the population, and incidentally to throw light on the so-called population problem. This, in my opinion, is infinitely the most urgent and important task to be undertaken in connection with nutrition in India ; in the absence of this basic information, the possibility of improving the diet of the people on a wide scale cannot be assessed.

On the economic side, investigations among both urban and rural groups are called for ; any study of the economic condition of population groups indirectly throws light on diet. In the sphere of public health, more active educational and propaganda work is needed, and a great deal of further research, involving many areas of the country, into the effects of malnutrition of the individual, should be set on foot.

Present League activities centre round the ideas that the diet of the mass of the population in almost all countries falls below "optimum" standards, that increased demand for nutritious food will result in increased production, and that the world as a whole is capable of a very much greater production of foodstuffs, and in particular of the physiologically most valuable foodstuffs. It is proposed that national and international "food policies" should be boldly constructed on the principles implied in Mr. Bruce's phrase—"marry health and agriculture". If India is considered as a self-supporting unit, the problem takes on a somewhat different complexion ; many consider that there is little possibility of the country producing an improved diet for its rapidly increasing population. We need, however, much more information on this point. If, on the other hand, we regard India, not as an isolated unit, but simply as part of the world, the ideas formulated at Geneva seem to become more applicable. It is conceivable, for example, that increase of wealth and purchasing power would enable the country to benefit, by importation of the kind of foodstuffs she most needs, from a world-wide boom in agriculture. At all events, there is no reason why an attempt should not be made, when the fundamentals of the situation have been more fully investigated, to formulate a "food policy" on a national or provincial basis. (*Current Science*, March 1936.)

1. International Labour Conference. Nineteenth Session, Geneva, 1935, Report of the Director, pp 83–84.
2. June, 1935, Vol. IV, No. 2.
3. *C. H.*, 1197, Geneva, December 1935.

Gleanings.

A Golden Jubilee. On 6th December 1935, the Society of Plant Pathology and Agricultural Entomology of France, held at the Natural History Museum in Paris, a meeting to celebrate the memory of Professor Millardet and the Fiftieth Anniversary of his discovery of Bordeaux Mixture in 1885. (*Int. Review of Agri.* Jan. 1936).

Hear this about the white Elephant! A white elephant with pink eyes--a true albino—was killed not long ago by a game warden on the plains of Laikipia, in Kenya colony, South Africa. Like all white elephants, the animal was in reality gray, but every hair on its body was white. The Kenya game warden's report relates terrible effects on wild life, of three years of drought. There are records of elephants falling into wells and perishing, because they were too weak to get out again. A number of rhinoceroses, and many buffaloes have also died in their frantic efforts to get water. In northern Kenya, herds of wild elephants hid behind cattle while natives dug for water, and when it was found, stampeded forward to get the first drink.

Soaking Seed Cane before Planting. Two experiments were made to investigate the effect of soaking on the germination of cuttings and on the final yield of cane, both plant and first ratoon. There were five treatments: (1) soaked in a saturated solution of lime; (2) soaked in a solution of lime containing also one pound of magnesium sulphate per 50 gallons; (3) soaked in a complete nutrient solution containing all plant food; (4) soaking in water alone; (5) no soaking. In one experiment the soaking was for a period of 8 hours, in the other 16 hours.

In both experiments the yield of cane from the seed cane that had been soaked in (1) the lime, and (2) the lime and magnesium sulphate solutions, was significantly better than the yield of cane grown from seed cane that was not soaked and also better than from the treatments (3) and (4). There was no significant difference between soaking in lime solution alone, and lime solution plus magnesium sulphate. Hence preference is given to the method of soaking in saturated lime solution, because it appears to be the simplest. Both experiments were extended to include the first ratoon crops from all treatments. In the plant cane the increase of yield from the cane soaked in lime water was about 25 per cent., in the ratoon crop about 17 per cent.

The author has made some investigations with a view to finding an explanation of why soaking the seed pieces results both in a better germination and a larger yield of cane. It was first thought that the soaking would initiate a rapid hydrolysis of sucrose, which would speed up the germination process. It could not be shown that soaking had any marked effect on the rate of hydrolysis. It was then thought that the nature of the solution would have some effect on the amount of water absorbed by the seed pieces. By experiment it was found that the pieces actually absorbed significantly more water from the lime solution than from pure water, and this appears to provide the answer to the question. The pieces that have been soaked in the lime solution have absorbed more moisture, and therefore germinate faster when planted; this rapid germination assures a more vigorous growth.

While soaking in the lime solution resulted in an increased percentage of germination, there was still a certain number of failures. By a special investigation it was found that the most uniform stands (lowest percentage of blanks or misses) were obtained when the planting material was taken from young cane, or the top portions of old cane; this means that the best planting material is that

containing the largest percentage of invert sugar. Obviously when such material is soaked in lime water, one condition will be provided that will help to give the best stand and the largest yield. (Extract from *Facts about Sugar*, Vol. 30, 12, 1936).

Germination studies on Sugar cane. Pieces of seed cane were soaked for 24 to 48 hours in solutions of various materials; among these, extract of ashes and a saturated solution of lime and magnesium sulphate (1 : 50) showed a more favourable effect on percentage of germination than water alone, and a much better germination than was obtained with unsoaked seed pieces. The more mature parts of the cane stalk benefited most from soaking. It has been found useful to keep canes standing vertically in drums with their cut ends wholly immersed in in water to ensure uniform germination of middle and top pieces.

Germination tests with material cut every month and kept in an incubating chamber maintained at 72—78°F. show that the best germinations obtain in monsoon from young canes. High glucose ratio and moisture per cent in cane seem to have a significant bearing. Critical point of moisture percentage in cane seems to be 50·3, below which very poor germinations were realised. Critical point of moisture percentage in cane buds of Co. 213 was, however, found to be only 40·0. On further dessication they lose power to revive even on soaking. Younger buds borne on the top of cane shrivel up and dry more quickly than mature buds, which dry up comparatively slowly. Form and shape of bud and its position on the stalk also influence to a certain extent rate of dessication. Other points studied show relationship between wax or bloom present on cane-stalks and germination. Varieties having a thicker coating of wax show tardier germination under low soil moisture conditions. With high moisture content, differences are, however, less marked.

Capacity of absorption at surface varies with the qnantity of wax present and the hardness of rind, and seems positively correlated with high germination. Similarly, rapidity of sugar hydrolysis on soaking seems to indicate whether variety would result in quick germination. (K. L. Khanna, *Dip. Agri. Bihar and Orissa, Bull. 6.* (1934)—Abstracted in "*Sugar*" Feb. 1936).

Paper from Maize stalks. Difficulties in the manufacture of paper from maize stalks arise from the structural peculiarities of the stems. The cortex contains fibres shorter than those of the most commonly used woods, but, nevertheless, of paper-making quality; whereas the soft, spongy, inner pith consists chiefly of thin walled cells of little use for paper-making. Furthermore, hard nodes occur in the cortex and must be crushed in order to obtain an evenly cooked pulp. An excessive amount of dirt is also liable to be present.

A series of laboratory and semi-commercial tests were carried out, using the material in three different forms, viz. (1) the stalks in 1 in. lengths (2) the shredded stalks, (3) the separated and washed cortex. Papers were made by the lime, caustic soda and sulphate processes, and details are given of the yield of pulp and the qualities of the paper obtained in each trial. The cleanest, strongest, best working papers were produced from the separated cortex, which yielded only 5 per cent less pulp (expressed on the original baled stalks) than was obtained from treating either the cut or the shredded stalks. As moreover the original material requires twice the quantity of chemicals and twice the digester capacity needed for the cortex, which amounts to only 43 per cent, of the original material, the advantage and economy of using the cortex only is evident.

It is estimated that 5·2 tons of maize stalks would be required to give enough cortex to produce 1 ton of pulp suitable for white papers. Assuming that the price of the stalks at the mill is 7·15 dollars per ton and that $1 per ton must be allowed for the separation of the cortex, the cost of the stalks would be 42·38 $. per ton of pulp. This is about 60 per cent. greater than the cost of the spruce

wood required for a ton of sulphite pulp, and in addition the conversion and handling costs would be higher.

In conclusion, the authors express the opinion that, on account of the relatively high cost of the raw material and the expense of converting it into pulp, the manufacture of paper from maize stalks is not at the present time a commercially feasible venture. Only if sufficiently profitable uses could be developed for the pith and fine fibrous material left after separating the cortex, could the stalks become of interest to the paper-maker. (*Bull. Imp. Inst.*, Jan. 1936).

This is Japan's way. Japan has come forward with a new plan to bring relief to her unemployed. We understand that the Japanese Bureau of Social Affairs has recently established a scheme of camps for men engaged on unemployment relief works. The object is to give the unemployed the instruction they require, particularly with a view to occupational re-training. Expenditure on the scheme in 1936 will amount to 3,570,000 yen. About 90,000 unemployed workers without means drawn from the six largest cities of Japan, will be engaged on the relief works for at least six months and housed in the camps. Arrangements have been made for 60 teachers to supervise camp life and instruct the men. The authorities will do their best to provide men leaving the camps with employment corresponding to their newly acquired abilities; and special steps will be taken to encourage them to emigrate. (*Mys. Ec. Journal*, Jan. 1936).

Production of Artificial Silk continues to increase. The German Artificial Silk Industry, concerning which official figures have now been published, experienced a further marked up-swing. Total production was 48·2 million Kg. or an increase of 42 per cent. over 1933 and 62 per cent. over 1932..... Sales of German establishments have increased considerably, indeed from 33·6 million Kg. in 1933 to 52·3 million Kg. in 1934 or round about 56%. Exportation has however, declined. (*Ind. and Eng. Chem.*, Vol. 14, No. 3, P. 38).

For the Fads.

Methusaleh ate what he found on his plate,
And never, as people do now,
Did he note the amount of calorie count.
He ate it because it was chow,
He was not disturbed, as at dinner he sat,
Destroying a roast or a pie,
To think it was lacking in granular fat
Or a couple of vitamins shy,
He cheerfully chewed every piece of food,
Untroubled by worries or fears,
Lest his health might be hurt by some fancy dessert,
And he lived over nine hundred years!

(*Scient. Amer.*, March 1936, P. 120).

What an escape! It is fortunate for human beings that one ancient insect became extinct. Fossil remains discovered near Elmo, Kansas, by Dr. Frank M. Carpenter of the Howard Museum of comparative Zoology, show that this particular dragon fly which lived 150,000,000, years ago, was nearly two and a half feet long. (*Sc. Amer.*, March 1936).

ABSTRACTS

Studies on the coconut palm III. Husk. A. The manurial value of coconut husk ash. by M. L. M. Salgado—*Trop. Agri. Cey.* March 1936, P. 131. A paper that records the analyses of coconut husk ash carried out in order to assess its manurial value. The author finds that the coconut husk ash contains as much as

35% of water soluble potash and about 2% of phosphoric acid, in addition to other ingredients like calcium (2%) carbonates (13%) Magnesium (2%) Sodium chloride (23%) etc.

Further as the result of an interesting experiment, in which coconut husks were ashed before and after retting them, it was found that as much as 50% of the potash present in the husk, was lost during retting, (ie.) by mere solution in the retting water. The author therefore advises that where husks have to be ashed for use as a manure, they must be husked when they are fresh and not after undue exposure, as monsoon rains received during the period of storing the husks in a corner of the garden, are likely to leach out the soluble potash.

The author computes that according as the soil is loamy or gravelly the yield of potash from 1000 husks, will vary from 10 to 15 lbs. M. R. B.

Review.

Principles of Forest Entomology : By S. A. Graham. Pages 1–339 (with figures) 1929 (First Edition). Published by *Mc Graw-Hill Book Company Inc.*, New York and London.

This book forms one among a series of Mc Graw-Hill publications in the Zoological Sciences edited by A. Franklin Shull ; and is intended for all interested in the protection of forests and forest products.

The subject matter of the book is divided into 17 chapters as follows :— *Chapter I.* Introduction wherein the author deals with the importance of forest entomology, losses due to forest insects, scope and sub-divisions of forest entomology ; *Chapter II.* Historical review of the development of Forest Entomology in Europe and in America ; *Chapter III.* Biotic Potential dealing with rate of multiplication, sex-ratio and calculation of Biotic Potential ; *Chapter IV.* Environmental resistance such as physical factors, nutritional factors, plant physiological factors, and biotic factors ; *Chapter V.* Insect abundance dealing with biotic balance and devices to increase abundance ; *Chapter VI.* Direct control of tree insects dealing with purpose and cost of control and classification of control measures, direct control by biotic methods ; *Chapter VII.* Direct control by chemical methods dealing with feasibility of chemical methods, application of insecticides and the classification of insecticides ; *Chapter VIII.* Indirect control of tree insects dealing with control by modification of food-supply, modification of moisture conditions, and modification of temperature ; *Chapter IX.* Indirect biotic methods and silvicultural practices dealing with indirect biotic methods such as the use of competition, control by parasites and by predators and silvicultural practices ; *Chapter X.* Leaf eating insects dealing with defoliation, Lepidopterous leaf eaters, Coleopterous leaf eaters and Hymenopterous leaf eaters ; *Chapter XI.* Meristem insects of the terminal parts dealing with groups of meristem insects, insects feeding on the tips and feeding on the roots ; *Chapter XII.* Meristem insects of the cambium region dealing with cambium borers and bark beetles ; *Chapter XIII.* Cambium-wood insects viz., pests of living trees and pests of drying trees and logs ; *Chapter XIV.* Wood destroyers such as unseasoned wood insects, moist dead-wood insects, marine wood borers and dry wood insects ; *Chapter XV.* Sapsucking insects such as Hemipterous insects, some Homopterous insects and scale-insects ; *Chapter XVI.* Insectivorous parasites such as entomophagous micro-organisms and parasitic insects ; *Chapter XVII.* Insectivorous predators viz., predatory insects and other predators.

At the end there is an exhaustive bibliography (pages 306—317) given chapter by chapter, about 300 references in all. And there is an index running from pages 319—339.

The author himself says at the outset in the preface that the book instead of being primarily a text book "should be of interest not only to students and teachers of forest entomology, but also, to economic entomologists, ecologists, foresters..... The book does not in any way deal with classification, structure, anatomy, metamorphosis etc.. as a text book usually does, but deals on some broad principles on which economic entomology is based from an ecological point of view " supplemented by a study of certain insect species carefully selected to illustrate how these principles apply in individual instances ". Even from a run at the subject dealt with in the several chapters it can be seen that the book is more or less of a general nature and consequently forms a convenient hand book for an economic entomologist, whether he be a forest entomologist or one who has to deal with agricultural crop-pests. And it can form a companion volume to Folsom and Wardle's "Entomology with reference to its Ecological Aspects."

The following insects are dealt with in the course of the work viz; the Spruce Bud-worm the gypsy Moth, the cankerworms, the Elm Leaf beetle, the poplar Leaf beetle, the Larch saw-fly and the pine sawflies among the leaf eating insects; the Pine Tip moth, the Pales weevil, the white pine weevil, the white gribs and other small root insects among the meristem insects of the terminal parts. The pine Pitch mass borer, the sugar maple borer, the two lined borer, other species of Agrilus among the cambium borers and the Black Hills beetle and the pine Bark beetle among the bark beetles; the Locust borer, the Aspen borer and the carpenter moth, among pests of living trees and the flat headed borer and the small pine sawyer among the pests of drying trees and logs; the Ambrosia beetles and Horntails among the unseasoned wood insects, the carpenter Ant and the *parandra* borer among the moist dead wood insects; the shipworms and the wood Louse among the marine wood borers; and the Termites and the powder post beetles among the dry wood insects; the plant bugs and the Lace bugs among the Hemipterous insects; the periodical cicada, the Aphids and the Adelgids among Homopterous insects; and the Oyster-shell scale, the cottony Maple-scale and the European Elm-scale among the scale insects.

One interesting feature in the book is that beginning from chapter X, dealing with the different kinds of insects, at the end of each insect under reference, are found questions on literature pertaining to such points as the outbreak of the pest, food plants, secondary insect pests usually associated with the primary one, the period of attack on the tree, nature and extent of attack, susceptibility to or resistance from injury, introduction of parasites and their establishing, important parasites met with, control measures such as spraying, tree banding whether the pest is indigenous or otherwise, geographical distribution, environmental factors, biotic potential, the different broods, details as regards life-cycle which have got a bearing on controlling the insect pest. The questions in themselves would suggest the lines on which any insect problem can be tackled.

The chapters on biotic potential, environmental resistance, insect abundance, and those dealing on control methods are very illuminatingly written in such a small compass. While dealing with other indirect control measures the author gives a short account on ' control by parasites " and the portion is worth reading, for he has brought in a nutshell the different aspects of biological control and adduces the several factors on which the effectiveness of a parasite in controlling insect pests depends. And in order that a given parasite may be effective its requirements have been summed up thus " it should have a high biotic potential; it should be synchronized with its host in such a way that the adult parasites are flying during the time when the susceptible state of the host is available; it should be able to feed upon more than one species of host; it

should not be restricted in its multiplication by the necessity of spending an alternate generation in a host that does not occur abundantly; it should be able to compete successfully with other parasites when double parasitism occurs; finally it should be able to reach and parasitize a large proportion of the potential hosts.

He makes an interesting observation to the effect that "The success of fungus and bacterial diseases in reducing insect abundance depends so much upon favourable weather conditions that the use of these organisms offers comparatively little promise at the present time."

The get up of the book is on a par with other publications in the same series. V. M.

Research Notes.

The Occurrence and Inheritance of Yellow Coloured Anthers in the Italian Millet—*Setaria italica* (Beauv).

In *Setaria italica* two fresh anther colours are met with, viz., brownish-orange and white. These, when dry and seen *en masse* appear brownish-black and buff-yellow respectively. These colours form a simple Mendelian pair, with orange dominant (G. N. Rangaswami Ayyangar and T. R. Narayanan, 1932, Ind. J. Agric-Sci. 2 : 59).

In the course of further work yellow coloured anthers (drying brown) have been met with in the following varieties :—

Number.		
S. I. 102	...	From India.
S. I. 2657	...	,, Russia.
M. S. 3422	...	,, China.

The relationship of these yellow coloured anthers to the other colours, brownish-orange and white, has been determined by suitable crosses.

TABLE I.

Yellow anther X Brownish-orange anther, F_1—Brownish-orange anther.

Cross No.	F_2 Family No.	Segregation for	
		Brownish-orange anther.	Yellow anther.
(S. I. 102 × S. I. 419)			
S. I. CCCLXXXIX	S. I. 2679	216	83
S. I. CCCXCI	S. I. 2680	187	60
	S. I. 2681	191	69
(S. I. 2657 × S. I. 2120)			
S. I. CCCXCII	S. I. 2682	184	72
S. I. CCCXCIII	S. I. 2683	138	54
	Total	916	338
	Expected 3 : 1	940·5	313·5

$x2 = 2·6$ P > ·05

TABLE II.

White anther X Yellow anther, F_1—Yellow anther.

Cross No.	F_2 Family No.	Segregation for	
		Yellow anther.	White anther.
(S. I. 2528 × S. I. 2657) S. I. CCCXCVII	S. I. 2684	160	45
	S. I. 2685	83	27
	S. I. 2686	94	31
	Total	337	103
	Expected 3 : 1	330	110

$x^2 = \cdot 6$ $P > \cdot 05$

It will be noticed from the above that yellow anthers are dominant to white anthers and recessive to brownish-orange anthers. This new character adds to the list of varietal characters helping in the classification of varieties of Italian millet.

Millets Breeding Station.
Coimbatore, March 4, 1936.

G. N. Rangaswami Ayyangar.
P. V. Hariharan.

College News & Notes.

Students' Corner. The students being busy about their examinations, which are held during this month there was a lull in their athletic activities. On 19—3—36, the students of I & II year were at home to the final years, and speeches were made by the Principal, the representatives of two classes, and others bidding them farewell and wishing them success in their examinations. The teaching staff. gave them a tea, on 29—3—36, and the Warden, Mr. H. Shiva Rao on 4—4—36.

Badminton and Bridge Tournaments. The Badminton Tournament organised by the Sugarcane Club, Chettipalayam, and the Bridge Tournament organised under the joint auspices of the Sugarcane Club and the Officers' Club, came off during the Easter Holidays, and were a great success. Messrs. Viswanatha Iyer and Srinivasa Iyengar of the Officers' Club won the Bridge Cups, Mr. Naick and partner being runners up. The following were the winners and runners up in the badminton tournaments :

Fives :	M. Y. M. A., Coimbatore	(Winners).
	Coonoor	(Runners up).
Doubles :	Viswanatha Iyer & Sankaran Nair	(Winners).
	Ramachandran & Ramawami	(Runners up).

Joint Easter Session. The Joint Easter Session of the Indian Science Academy. the Association of Economic Biologists, the Indian Chemical Society, was held at Bangalore and a few representatives from Coimbatore visited Bangalore in this connection.

Obituary. We regret to record the deaths of Mr. V. Muniappa Pillay, Veterinary Officer, who was for sometime lecturer in our College and Mr. Kalingarayar, Zamindar of Utukulli. one of our esteemed Patrons.

Visitors. M.R.Ry. Rao Bahadur D. Ananda Rao Garu, Director of Agriculture, and M. R. Ry. P. H. Rama Reddy Garu, Secretary, Indian Central Cotton Committee are on a visit to Coimbatore.

Weather Review (MARCH 1936).

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

* Meteorological Stations of the Madras Agricultural Department.

@ From average rainfall for the month calculated upto 1935 (published in Fort St. George Gazette).

Summary of Weather Conditions. During the first half of the month the weather was generally dry in the Peninsula except for a few thunder showers in Malabar and Cochin. The humidity was generally in defect. The skies were lightly to moderately clouded. The maximum temperatures were generally below normal and the minimum above normal.

During the second half of the month thunder storms have caused general rain in Malabar, local rain in South and South East Madras and a few showers in North Madras. The skies were moderately to heavily clouded during this period.

Weather Report for Research Institute Observatory.

Report 3/36.

Absolute Maximum in shade	97°F.
Absolute Minimum in shade	62·8°F.
Mean Maximum in shade	94·1°F.
Departure from normal	− 0·4°F.

Mean Minimum in shade	+70·5°F.
Departure from normal	+ 1·1°F.
Total Rainfall	1·72″
Departure from normal	+ 0·92″
Heaviest fall in 24 hours	1·10″ (Recorded on 18th).
Total number of rainy days	2 days.
Mean daily wind velocity	1·5 M. P. H.
Mean Humidity at 8 hours	73·4%
Departure from normal	+ 3·7%

Summary. Dry weather prevailed during the first two weeks of this month. The minimum temperature was above normal by 1·1°F. The humidity was in excess of the normal by 3·7%. Local thundershowers yielded 1·72″ of rain during this month. The skies were moderately to heavily clouded.

Departmental Notifications.

Gazette Notifications. M. R. Ry. S. Dharmalinga Mudaliar to be offg. Supt., A. R. S., Maruteru, Vice, M. R. Ry. K. Venkataraman on leave.

Mr. P. Krishnamurti, A. F. M. Anakapalle, l. a. p. for 3 months from 15—4—36 with permission to prefix Easter holidays.

Transfers. Mr. M. Kandaswamy, Offg. Agricultural Demonstrator, Coimbatore is posted to Annur Sub Circle. Mr. K. C. Thomas to Tirupur. Mr. S. S. Kachapeswara Iyer to Tirupur as Temporary Secretary, Tirupur Market Committee for a period of 6 months. Mr. Krishna Hegde, A. F. M. Pomological Station, Coonoor, to Botanical Garden, Octacamund.