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Editorial.

Mr. S. V. Ramamurti. We note that Mr. S. V. Ramamurti, I.C.S., who has been the Director of Agriculture, Madras, since January 1932 will soon be relinquishing his office. In earlier years, the Department had been under the control of distinguished civilians like M. E. Couchman, D. T. Chadwick, G. A. D. Stuart and L. D. Swamikannu Pillai but the principle of making departmental officers, heads of the Department having been accepted by Government as a result of the recommendations of the Royal Commission on Agriculture, from 1920, for a period of 12 years we have not had a civilian to administer the Department. With Mr. Ramamurti's appointment this principle got broken and though this might have been considered an unwelcome departure from the point of view of men in service in the department, from what we now know of Mr. Ramamurti no one need feel sorry for the change we have had.

Mr. Ramamurti is well known in South India as a brilliant mathematician with high intellectual attainments. As Secretary to the Development Department, he was in a way familiar with the work of the Department even before he became its Director. His broad outlook and keen enthusiasm for the development of agriculture had given him ample opportunities to display his talent. There is no doubt that the Department has come to be better known to the public during his regime. His was a personality that would make even the most indifferent to stir up to activity.

As Director, Mr. Ramamurti gave full scope to one and all of the officers under him to show what might be done towards the

advancement of South Indian Agriculture. He was easily accessible to his subordinates and endeared himself to one and all by his sympathy, suave manners, and general courtesy that there is no doubt that his impending departure is keenly regretted by everyone. With an unbounded faith in the enormous possibilities of developing agriculture he gave encouragement to the subordinate staff and one always returned with a refreshed feeling after a few minutes talk with him. He spared no pains and never let slip an opportunity to make the activities of the Department known to the public and to convince them of the very useful work being done in Coimbatore and in the districts.

Mr. Ramamurti has been an important member of the Imperial Council of Agricultural Research representing Madras, and it was due to his persuasive eloquence and convincing arguments that a large number of schemes involving the grant of several lakhs of rupees have been sanctioned for Madras. He persued a well-thought-out policy of progress in the activities of the Department and both research and propaganda have made considerable progress during his regime. The introduction and trial of a large number of new crops and plants at the several agricultural research stations. are due to his initiative.

During his directorship he went to Europe on six months' leave and made a special study of the advances made in agricultural research and propaganda in the several European countries, particularly in Italy and Rusia, and we are familiar with the lectures he delivered at Coimbatore and elsewhere about his experiences there. He has evinced a great interest in the rural uplift work and he believes in tackling this problem on a comprehensive plan co-ordinating the activities of a number of Government departments. It is during his regime that the institution of short courses at Coimbatore in subjects relating to agriculture for the sons of landlords has been brought to fruition.

In Mr. Ramamurti's departure we are losing a strong advocate of agricultural development in the country and we do hope that his experience will soon be available in a still wider sphere. He has been taking a keen interest in the activities of the Union and we are sure we can always count in him, wherever he may be, a sympathetic and benovolent helper.

The New Director. We are glad that Rao Bahadur D. Ananda Rao has been appointed to succeed Mr. S. V. Ramamurti as Director of Agriculture, Madras, and we offer our hearty congratulations to him

Mr. Ananda Rao started service in 1909 as Assistant Director of Agriculture and continued as such for over 5 years chiefly in the Telugu Districts. He was posted to the Agricultural College as Assistant Principal in 1914, where he was for a long time connected with the teaching of agriculture to the College students. On his

promotion to the Indian Agricultural Service in 1921, he went back to the districts as the Deputy Director of Agriculture, iv circle, where he continued to serve until 1929. In 1929 he was apointed to the newly created post of Headquarters Deputy Director and during the period of nearly five years he held this post he acted as Director on two occasions. He was transferred to the College as Principal last July.

With his long experience and his intimate acquaintance with local agriculture and the work of the Department we can be sure that the destinies of the department are in safe hands.

We are particularly glad of Mr. Ananda Rao's appointment as he has been an old boy of the Madras Agricultural College and one of the founders of the Union. We are looking forward to his helpful guidance in furthering the activities of the Union in the development of which he has been taking a keen interest for the last 20 years and more.

Rao Sahib Dr. T. V. Ramakrishna Iyer. Among the recipients of King's Birth Day Honours we are glad to note the name of Dr. T. V. Ramakrishna Iyer on whom the title of Rao Sahib has been conferred. He has been an active member of the Union, was the Editor of its journal for two years (1932—33) and its Vice-President during 1934. The recognition has come none too soon as Mr. Iyer is due to retire from service in a month. We offer our hearty congratulations to him.

Stricken Quetta. We have not had time to forget the disaster that befell Bihar, and news comes of a more serious disaster caused by earthquake to Quetta. Both in respect of loss of life and damage to property the Quetta disaster is considered a far more serious one. The deathroll which is estimated to exceed 40,000 is nearly 5 times the loss of lives incurred in Bihar. The shock having been confined to a comparatively smaller area (nearly 2,600 sq. miles) than in Bihar it has been much more violent. Harrowing tales of suffering and bereavement are daily coming in.

The magnitude of the distress caused has been such as to evoke the sympathy of the whole world and voluntary subscriptions towards relief are pouring in from all quarters. Though the affected areas have all been evacuated and no further loss of life need be expected, it is stated that tremors continued to be felt even 10 days after the violent shock

One of the members in the House of Commons raised the question whether the minor tremors which usually preceded earthquake shocks and were detectable could not be made use of to warn the public. He also suggested the appointment of a technical commission to make proposals for the construction of shock-proof buildings on sites liable to quake. We are sure that this question will engage the serious attention of the Geological and Meteorological departments.

THE BIONOMICS OF THREE SHORT-DURATION VARIETIES OF RICE

(With reference to effecting economy in the cost of cultivation.)

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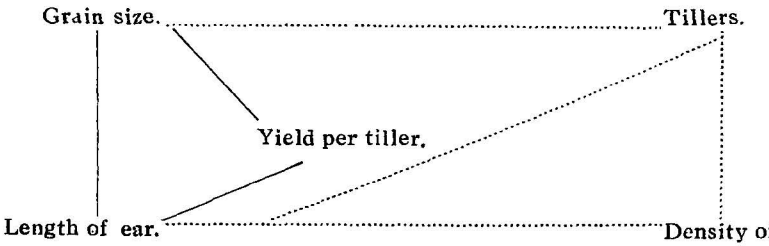
Introduction. In the evolution of high-yielding strains of a variety, a study of the latter to find out its response under varied conditions of farming is of the utmost importance. Unless its behaviour is previously known the selection will have to be based only on the empirical methods of selecting well tillered and long eared plants.

Popular requirements may vote for an attractive ear while tillering may carry weight with considered judgment. But this cannot be said to hold true as a general principle in all varieties of the same duration and much less in those of different durations. The nature, number and mode of tillering though partly a genetic manifestation are a function of the life-period. It has always been the experience in cereals that to make a selection for high yield is no easy task, though many useful characters are correlated. Some of the important correlations are diagramatically represented below.



Lines denote positive correlation while dotted lines indicate negative correlation.

The number and intensity of correlations and the number of factors interacting will be increased in a segregating population, thus adding to the already existing difficulties of the plant breeder. Further this behaviour is common to all cereals. Hunter (1931) states that in oats, large seeded varieties do not usually possess high tillering propensities. This is in conformity with the observations in rice. Myers in wheat finds only a slight correlation between the number of culms and weight of grain per culm. Leighty found in oats that as the number of ears borne by the plants increased the amount of grain from each culm would also increase.

It is therefore obvious that the ordinary ryot is fairly justified in having his own apprehensions about the prospects of a variety newly introduced into his tract.

The peculiarities of the local climate are important factors in determining the suitability or otherwise of a new variety; but in the case of strains of a local variety, considerations on this score are not expected to be of much moment unless the strains be remarkably divergent from the parent variety, in being either very early or very late or in some other character of agricultural importance. The study of the bionomics of a strain therefore becomes immediately important.

But nevertheless the economic aspect of raising a crop should not be lost sight of and efforts should be made as far as possible to economise material and expenditure at every stage.

Material. In view of the above work on three short duration varieties, viz., *Wateribune*, *Swarnalu*, and *kasi pichodi* was started as a preliminary to further studies on strains and new varieties. The experiment was conducted at the Agricultural Research Station, Maruteru. A brief description of the habits of the three varieties will not be out of place.

Wateribune is a variety imported from New South Wales. Though it was a 4 to 5 months variety in its home, change of habitat reduced its duration to about 3 months. A primary flush of poor ears and a rich bountiful crop of secondary good sized ears on taller culms is a feature of this variety.

Swarnalu is a local variety grown in both the seasons—main and second crop seasons—wherever a short duration crop is required. The number of tillers in this variety is great and they are set wide as opposed to the scanty and close set tillers of *Wateribune*.

Kasi Pichodi is a variety with a fine grain and with a larger number of erect tillers set close together.

Details of the experiment. Though it is a common belief that closer planting tends to give greater yields with short duration varieties, attempts at reduction of cultivation expenses without impairment of yield necessitate the finding out of methods to economise seedlings. The experiment was designed as below:

Treatment.	Particulars.
I.	4″ × 4″—Single seedling per hole.
II.	7½″ × 7½″— ,, ,, ,,
III.	do. —Three seedlings ,,
IV.	12″ × 12″— Six ,, ,,
V.	15″ × 15″— Ten ,, ,,

Excepting the last treatment in *Wateribune* all the treatments were tried in the three varieties.

Economy effected.—The number of seedlings planted out in an unit area of 5′ × 5′ works out in the five treatments as below.

Treatment.	Number of seedlings planted.	Percentage economy in seedlings.
I.	256	—
II.	81	68·4
III.	243	5·1
IV.	216	15·6
V.	250	2·4

It is obvious that in treatments I, III and V, there is practically no economy in the number of seedlings required. Treatment II is again a drastic economy in the number of seedlings by two-thirds while treatment IV embodies economy in labour and in about one-sixth of the seedlings required.

Characters studied. (i) General.—The close planted units were lighter in foliage colour and grew taller than the wide planted ones. The latter bushed out very well and presented a sturdier appearance without any lodging as distinguished from the others.

(ii) *Tillering.*—(a) *Number of tillers.*—For purposes of this study only ear-bearing tillers were considered. The following gives the number of plants studied in the several treatments.

Treatments.	Number of plants in 5′ × 5′.		No. of blocks observed.	Total.
I.	256	×	2	512
II.	81	×	2	162
III.	81	×	2	162
IV.	36	×	4	144
V.	25	×	4	100

As the sample is pretty large, random errors due to fluctuation are reduced to a minimum.

The tiller counts were reduced to a uniform plot size of 5′ × 5′ for facility in comparsion and are set out in table 1.

Table 1. *Number of tillers per unit area, per hole and plant.*

Particulars.	Treatments.				
	I	II	III	IV	V
Wateribune.					
Tillers per 5′ × 5′.	744	583	705	698	
per cent.	100	78·3	94·8	93·8	
,, per hole.	2 9	7·2	8·7	19 4	
,, per plant.	2 9	7·2	2·9	3·23	
Space enjoyed per plant in sq. in.	16	56 25	18·72	24	2-·5
Proportionate no of tillers per 16 sq. in.	2·9	2·05	2·48	2·15	
Per cent.	100	70·7	85 5	74·1	
Swarnalu.					
Tillers per 5′ × 5′.	1036	770	900	874	854
,, per cent.	100	74·3	86·9	84·4	82·4
,, per hole.	4 05	9·51	11·11	23·44	34·16
,, per plant.	4·05	9·51	3 70	3·91	3·42
Proportionate no. of tillers per 16 sq. in.	4·05	2·70	3·16	2·61	2 43
Per cent.	100	66·6	78·02	64·1	60·0
Kasi Pichodi.					
Tillers per 5′ × 5′.	1231	894	1145	1052	1126
,, per cent.	100	72·6	93·0	85·5	91·5
,, per hole.	4 81	11·04	14·13	29·14	45·0
,, per plant.	4·81	11·04	4·71	4·84	4·5
Proportionate no. of tillers per 16 sq. in.	4·81	3·14	4·03	3·23	3·23
Per cent.	100	65·3	83·7	67·1	67 1

It is clear from the table that (i) no other treatment yields as many tillers as the 4″ planted singles; (ii) economy in the number of seedlings result in the reduction of total number of tillers per unit area as restated in Table 2.

Table 2. *Economy in seedlings and reduction in the number of Tillers per unit area.*

Treatment.	Percentage economy in seedlings.	Percentage reduction in the total number of tillers in		
		Wateribune.	Swarnalu.	Kasi Pichodi.
II.	68·4	21·7	25·7	27·4
III.	5·1	5·2	13·1	6·9
IV.	15·6	6·2	15·6	14·5
V.	2·4		17·6	8·5

Though direct proportion cannot be strictly applied, the number of tillers per plant expressed to a uniform space of 16 sq. in. in the several treatments indicates their relative merit. The percentage loss of tillers per plant in an unit space is set out as below.

Table 3. *Percentage loss of tillers per plant on unit area basis.*

Treatment.	Percentage economy in seedlings.	Percentage loss in			Tillers per plant in Trt. I.
		Wateri-bune	Swarn-alu	Kasi Pich-odi	
II.	68·4	29·3	33·4	34·7	Wat. 2 9
III.	5·1	14·5	22·0	16·3	Swar. 4·05
IV.	15 6	25·9	35 6	32 9	Kasi P. 4·81
V.	2·4		40·0	32·9	

(iii) Tables II and III bring out that the amount of loss in the number of tillers per unit area and number of tillers per plant depend on the percentage economy effected and on the tillering capacity of the varieties. This is amply illustrated by comparing the amount of loss in *Wateribune*, a poor tillerer, against that in *Swarnalu* or *Kasi Pichodi*.

It will therefore appear that the tillering suffers more in profusely tillering varieties than in poor tillering ones under any unfavourable conditions. It will also be observed from Treatment II that greater spacing affords scope for greater loss in the number of tillers per unit area and the occurence of gaps in a field will further add to the loss in the tillers per unit area. The yield will consequently be reduced though it is believed that the neighbouring plants will make up for the gaps to some extent.

(b) *The composition of the population.* The composition of the population in the different treatments according to the tiller classes—1-tillered plants, 2-tillered plants, etc.—merits consideration. On the dissection of some stools it has been found that the constitution of the

same tillered class varied to some extent. For instance, a 5-tillered plant may be of the constitution of—

(i) $T_0 - T_1 - T_2 - T_3 - T_4$.

(ii) $T_0 - T_1 - \underset{t_1}{T_1} - \underset{t_2}{T_1} - T_2$.

(iii) $T_0 - T_1 - \underset{t_1}{T_1} - T_2 - T_3$.

(iv) $T_0 - T_1 - T_2 - \underset{t_1}{T_2} - T_3$.

(*Note:* T_0 — Primary tiller.
$T_{1,\,2,\,3,\,4,}$ — Secondary tiller.
$\underset{t_{1......4}}{T_{1......4}}$ — Tertiary tillers).

The different constitutions have obviously different yield potentialities in as much as a daughter tiller of a secondary tiller (say $\underset{t_1}{T_2}$) may not yield as much as that of a late secondary tiller, say T_4 or T_6. A most important point that remains unattempted is whether a 5 tillered plant for instance will have the same constitution in the different treatments of spacing and crowding. Ordinarily, spacing will encourage tertiary tillers, while crowding in a hole, resulting in the lengthening of the bottom internodes may encourage tillers of only the secondary phase. The data gathered on the composition of the population is set out in Table 4.

Table 4. *Details of the tillering composition of the population.*

Particulars.	Treatments.				
	I	II	III	IV	V
Wateribune.					
Range from—to.	1—4	4—16	3—12	7—26	
No. of classes in the range.	4	13	10	20	
Mean tillers per hole.	2·9	7·2	8·7	19·4	
P. E.$_m$	±·057	±·174	±·150	±·314	
C. V.	30·7	36·1	28·9	32·8	
Swarnalu.					
Range from—to.	1—8	3—13	5—19	15—36	21—45
No. of classes in the range.	8	11	15	22	25
Mean tillers per hole.	4·05	9·51	11·11	23·44	34·16
P. E.$_m$	±·115	±·164	±·270	±·312	±·509
C. V.	49·1	29·0	34·9	20·6	21·9
Kasi Pichodi.					
Range from—to.	1—13	5—15	4—22	23—40	23—48
No. of classes in the range.	13	11	19	18	26
Mean tillers per hole.	4·81	11·04	14·13	29·14	45·04
P. E.$_m$	±·153	±·199	±·226	±·303	±·481
C. V.	57·2	29 5	30·5	15·9	17·6

The probable error of the mean, as may be seen from the table, is relatively small in all cases thereby giving greater confidence in the averages obtained.

It will be noted here that the observations of Mitra (1924) on the variation of tillering in broadcasted *aus* (short duration varieties) confirm those arrived at in these varieties. The variation in tillering in about 56 to 59 varieties observed for three years in broadcasted *aus* was found by him to vary between 19·0 and 25·7 % with a mean tillering of 2·7.

(c) *Effect of crowding on tillering.* Previous experiments at Aduturai, on short duration varieties, [Srinivasa Ayyangar, 1925] have shown, that, given the same spacing, crowding in a hole reduced the number of tillers per plant as per data given below.

Treatment.	No. of tillers per hole.	No. of tillers per plant.	n	o	P. E. m	P. E. d	D / P. E.$_d$
3″ × 3″ — singles.	2·13	2·13	987	0·82	·018	0·034	$\frac{0·305}{0·034}$ 9·0
6″ × 6″ — 4 plants per hole.	7·30	1·83	483	0 95	·029		

Note:—Differences between means highly significant.

Dionisio Calvo (1927) arrived at the same conclusion in a study of the Philippine varieties. An observation of the same fact made Londsdale (1909) to surmise "that due to this practice of planting most varieties in bunches the varieties lose their power of tillering but this can be regained if the seedlings are planted singly year after year." An analysis of the effect of crowding on tillering is given in Table 5.

Table 5. *Effect of crowding on tillering.*

Particulars	Treatments. III	IV	V	Remarks.
Wateribune.				
No. of tillers observed.	8·7	17·4		No. of tillers in 4″ × 4″ is 2·9 per plant. Calculated according to the above rate of tillers for plant.
do. calculated.	8·7	19·4		
Deviation.	—	+2·0		
Std Dev.	2 24	4·69		
D/S. D.	—	0·43		
Swarnalu.				
No. of tillers observed.	11·11	23·44	34·16	No. of tillers per plant in 4″ × 4″ is 4·05.
do. calculated.	12·15	24·30	40·5	
Deviation.	−1·04	−0·86	−6·34	
Std. Dev.	4 03	4·96	7·60	
D/S. D.	0·26	0·17	0·83	
Kasi Pichodi.				
No. of tillers observed.	14·13	29·14	45·04	No. of tillers per plant in 4″ × 4″ is 4·81.
do. calculated.	14·43	28·86	48·1	
Deviation.	−0·30	+0·28	−3·06	
Std. Dev.	3·35	4·5	7·14	
D/S. D.	0·09	0 06	0·43	

Reviewing Table 5 it will be noted that in all cases the deviations of the observed from the calculated number of tillers per hole are not significant. It will therefore follow that the plants in wider spacings of treatment III, IV, and V have behaved as regards the tillering aspect

as though they are the members of a field of 4″ × 4″ spacing. Whether this will also amount to mean that the increased spacings of 18·72, 24·0 and 22·5 sq, inches (Table I) per plant in treatments III, IV and V have compensated for any depressing effects is not clearly known. Hence the crowding and the increased spacings per plant in the above treatments have apparently counteracted each other.

(iii) *Flowering.* A note of passing mention may be made with reference to flowering. The closer planted units flowered earlier than the wider planted ones the range being shorter in the former than the latter.

Table 6. *Mean and Range of flowering dates.*

Particulars.	Treatments.				
	I	II	III	IV	V
Wateribune.			August		
Range of flowering.	8–14	8–20	8–23	8–24	
,, ,, in days.	7	13	15	17	
Mean flowering date.	9th	12th	10th	13th	
Swarnalu.					
Range of flowering	8–16	9–21	8 26	9–25	9–25
,, ,, in days.	9	13	19	17	17
Mean flowering date.	11th	14th	13th	15th	15th
Kasi Pichodi.					
Range of flowering.	9–16	9–21	9–21	9–21	12–24
,, ,, in days.	8	13	13	13	13
Mean flowering date.	12th	13th	13th	15th	17th

With the wider planted units the flowering occured in two to three spells at intervals of two to three days. Much can be said in favour of a short flowering period; but generally the prolonged flowering is not viewed with the same spirit of welcome as the former. Sharpness of flowering in good weather ensures uniform ripening and a clean harvest; while prolonged flowering does not result in uniform ripening. Consequently losses occur due to shedding of over ripe grain when the crop is detained on the field for the under ripe grains to mature. In inclement weather sharpness of flowering has equal chances to escape loss due to weather or to get badly affected. But prolonged flowering ensures good harvest of at least a portion of the crop. This is the ryot's point of view who always wants to risk the least by avoiding "to put all the eggs into one basket to hatch." This appears to deserve some notice especially in these days of 'Economic Depression'.

(iv) *Length of ear.* The length of ear is an important attribute in all studies of yield. Though the "weight of ear" is the one that is directly concerned with the yield, the handling of this attribute entails more labour and involves other difficulties as the sheding of grain etc. The weight of ears will be seen below, is proportionate to the length of ear. Srinivasa Ayyangar arrived at the following figures in the Kuruvai variety.

Table 7. *Density of Ear.*

Spacing.	Mean length of ear. in cm.	Mean weight of grain per ear in gm.	Density.	Remarks.
3″×3″	17·8	1·18	0·0669	
4″×4″	18 7	1·62	0·0866	
6″×6″	20·0	1·54	0 0770	
8″×8″	20·8	1·64	0·0778	
6″×12″	21·6	1·78	0 0824	
12″×12″	23·4	1·98	0·0846	
No. of plants per hole, spaced 6″×6″				
2	20·0	1 54	0·0770	
3	20·5	1·46	0·0712	
4	19·1	1·36	0 0712	
5	18·7	1·32	0·0706	
6	19 1	1·24	0·0649	

Examining the density of ear in the three varieties in this experiment with reference to the length of ear, the coefficients of correlation in two of the varieties are

Wateribune	+ 0·34	± 0·05
Swarnalu	+ 0·36	± 0·05

Though the coefficient of correlation obtained denote a tendency to positive relationship between the two factors it is not high enough to warrant serious consideration. The third variety *Kasi Pichodi* could not be handled as the grains were shedding when the ears were kept for drying. The figures of Srinivsa Ayyangar (loc. cit) also show that the density of ear remains constant within limits except when the environment, eg. space, has been economised too much as in the case of very close planting or too much crowding in the hole. Therefore the density of the ear has been found to be constant under the usual spacing. Thus the "length of ear" appears adequate for the study of yield in this problem.

(*a*) *Mean length of ear.*—The mean length of ear along with the statistical coefficients is given in table 8.

Table 8. *Mean length of ear.*

Particulars.	Treatments.					Remarks.
	I	II	III	IV	V	
Wateribune.						
Mean in cm.	20·5	20·7	20·6	20·4		
Per cent.	100	100·97	100·6	99 3		
P. E.m	± ·184	± ·187	± ·219	± ·171		
C. V.	13·9	14·1	15·5	12 8		
Swarnalu.						
Mean in cm.	19·7	22·4	20·4	21·1	20·4	
Per cent.	100	113·7	103·5	107·1	103·5	
P. E m	± ·207	± ·179	± ·289	± ·223	± ·241	
C. V.	15 6	12·0	13·6	15·5	13 3	
Kasi Pichodi.						
Mean in cm.	21·2	22·4	21·9	21·7	21·8	
Per cent.	100	106·7	103·3	102·3	102 8	
P. E.m	± ·199	± ·186	± ·171	± ·187	± ·178	
C. V.	13·8	12·3	11·4	12·7	12·05	

It will be noted that the mean length of ear does not vary significantly in general except in the case of *Swarnalu* treatment II and IV, and *Kasi Pichodi* treatment II.

The range of ear length with the corresponding mean minimum and maximum is given in table 9.

Table 9. *Range of ear length in cm.*

Variety.	Treatments.				
	I	II	III	IV	V
Wateribune.					
Mean, min. and max. range.	18·2–22·6 4·4	16·6–24·4 7·8	16·3–24·0 7·7	15·6–24·5 8 9	
Swarnalu.					
Mean. min. and max. range.	16 8–22·1 5·3	18·2–25·6 7·4	16 2–24·3 8·1	14·3–25·7 11·4	13·7–25·6 11 9
Kasi Pichodi.					
Mean, min. and max. range.	18·4–23·8 5·4	17·9–25·5 7·6	16·9–24·9 8·0	16·3–25·8 9·5	15·9–26·1 10·2

From the table it will be observed that as the spacing increases the range also increases ; and it will be interesting to note that the wider range in increased spacing is brought by the lowering of the minimum with a simultaneous rise of the maximum.

(c) *Tillering and the range of ear length.*—The range of ear length is next studied with reference to the several tiller classes in the population as given in Appendix A (i, ii, and iii). On working out the relationship between the tillering and the range of ear length in each of the treatments the following coefficients of correlation are obtained.

Table 10. *Coefficient of correlation between the number of tillers and the range of ear length.*

Treatments.	Wateribune.	Swarnalu.	Kasi Pichodi.
I	+0·94±·045	+0·88±·062	+0·89±·049
II	+0·74±·092	+0·41±·186	+0·38±·173
III	+0·67±·113	+0·29±·179	+0·73±·091
IV	+0·47±·136	+0 63± 134	+0·45±·189
V			+0·59±·155

It is obvious from the table that the range of ear length bears in general a fairly high positive correlation with tillering, i.e., with the increase of tillering per hole the range of ear length is also increased. Further it is of interest to note that the same high positive correlation is obtained with plants crowded in a hole as with plants planted singly wide apart. This will therefore give an impression that plants crowded in a hole behave collectively and as regards earing are comparable to a well-tillered plant. It will be recalled that these plants crowded

in a hole have behaved, as regards tillering like plants of 4"×4" spacing, as regards ear length and its relationship with tillering, they resemble a single plant spaced wide apart.

Significance of the co-efficient of correlation. Working out the probable error of r, we find that r is significant in 9 cases out of 13. But the application of Fisher's table 16 reveals a level of significance between P=·05 and P=·01 in only 5 cases out of 13. The probable causes of such a discrepancy may be due to (i) limitation of the attribute under study, (ii) errors of random sampling.

(d) *Tillering and mean ear length.* Before we proceed to analyse the range of ear length in greater detail it may be incidentally observed that the mean-ear length bears no significant relationship to tillering,

Table 11. *Coefficient of correlation between tillers and mean ear length.*

Treatment,	r. Tillers. Mean ear length,		
	Wateribune.	Swarnalu.	Kasi Pichodi.
I	−0·48±·297	+0·20±·263	+0·32±213
II	−0·05±·202	−0·37±·194	+0·28±·188
III	−0·11±·200	+0·51±·144	+0·54±·137
IV	−0·01±·174	+0·56±·153	−0·33±·211
V		+0·39±·202	−0·39±·199

(e) *Relation of the components of range of ear length with tillering.* It is found that the range increases with spacing and with tillering as well. The fact that increased range is brought by lowering the minimum and raising the maximum keeping the mean almost unaffected, has also been observed.

Analysing the range into its components, their relation with tillering is obtained by the following coefficients of correlation.

Table 12. *Tillering related to maximum and minimum ear-lengths.*

Treatments.	r. Tillers Minimum.			r. Tillers Maximum.		
	Wateribune.	Swarnalu.	Kasi Pichodi.	Wateribune.	Swarnalu.	Kasi Pichodi.
I.	−0·77±·158	−0·76±·114	−0·64±·141	+0·19±·376	+0·79±·103	+0·81±·080
II.	−0·50±·152	−0·37±·195	−0·10±·201	+0·64±·119	−0·04±·225	+0·70±·103
III.	−0·43±·166	+0·30±·178	−0·52±.141	+0·53±·146	+0·58±·129	+0·76±·081
IV.	−0·53±·126	−0·46±·177	−0·19±·229	+0·17±.169	+0·76±·094	+0·34±·211
V.		+0·06±·237	+0·26±·218		+0·50±·238	−0·58±·155

It is obvious from the table that increase in tillering is associated with lowering of the minimum and raising of the maximum ear length.

Yield. The several treatments were laid out for comparison of yield in randomised blocks. The yield results are set out in the following table.

Table 13. *Plot yields of treatments*

Variety.		Treatments.					Fisher's Z.
		I	II	III	IV	V	
Wateribune	Mean yield of four repetitions	496·5	442·75	459·5	424·25		Observed = 0·4457 Expected at P = 0·05 is 0·6757
	Expressed as percentage	100	89·2	92·5	85·4		
Swarnalu	Mean yield of four repetitions	446·5	481·0	477·0	420·5	402·25	Observed = 0·0999 Expected at P = 0·05 is 0 5907
	Expressed as percentage	100	107 8	106·9	94·2	90·1	
Kasi Pichodi	Mean yield of two repetitions	618	510·5	520·5	548·5	462·5	
	Expressed as percentage	100	82·7	84·2	88·8	74·8	

Since the number of replications in the third variety, *Kasi Pichodi*, is inadequate for statistical purposes the calculations have not been attempted. It is presumed that the same amount of error exists in this experiment as in the case of the other two varieties,

A glance at the table given above shows that the differences between the treatments are not statistically significant, as the observed Z is much less than that expected at P = ·05 level of significance. But on the other hand the variation in yield from treatment to treatment closely follows the variation in the percentage of the total number of tillers per unit area (Table I) in the case of *Wateribune* and *Kasi Pichodi* and length of ear (Table 8) in the case of *Swarnalu*.

Conclusion. The fact that differences in yield between the several treatments are not significant obviously explains how a substantial economy can be effected (1) in the labour required for planting and subsequent operations by planting in bunches at wider spacing as per treatment IV and V and (2) in the number of seedlings required as per treatment II with its attendant savings in the seedbed facilities of a holding.

But yield is the resultant of complex interactions between the environment and the plant. The effects of environment are reflected in the different attributes of "yield of the plant" which itself bears a further set of complex relations with the "yield per acre" with which the ryot is concerned. Economy of labour and material result in more space per plant. Spacing promotes the tillering capacity of the plant to the extent to which tillering is inhibited by the competition of plants in the same or adjacent holes. It has further been shown in

Table 5 that the plants in a hole are no more benefitted by extra space per plant available in wider spacings than they are affected by crowding. Consequently conclusions in Table 2 indicating that the percentage reduction in the total number of tillers per unit area closely follows the percentage economy effected in the number of seedlings planted, are quite valid, while varietal differences regulate the amount of loss in the tillers per plant per unit area in the several treatments.

Adverting to the attributes of the ear, though the mean length in the several treatments is not statistically different, it has been observed that the range between the longest and the shortest ears increased with the spacings adopted. The " tillers per hole " have been found to bear a significant positive correlation with the range between the ear lengths, thereby showing that the individual plants in a hole act conjointly as if they were a single well tillered plant.

Percival says " Thus tillering may result either in an increase or decrease in the yield per acre when compared with a crop in which each plant has produced a single ear on account of being thickly planted. While increased tillering leads to the production of more straw per plant, the number of straws per acre decreases with tillering, a paradoxical statement which depends for its truth upon the fact, that the smaller the number of plants the greater the tillering, at the same time this does not compensate for the loss of plants incurred by wide planting."

Inspite of the fact that under special circumstances, wide planting may succeed in practice, it is found to be less hazardous to attempt to obtain an adequate number of ears per acre by close planting. It will therefore be seen that the yield of short duration varieties is at its best in close spacing. The important factor in yield appears therefore to be the number of tillers per unit area.

Therefore, in all efforts towards improvement of yield, endeavour must be made to increase the number of tillers per unit area either by close planting or by increasing the tillering capacity of the individual plant. Since the latter cannot be improved beyond a certain limit the improvement of individual tillers either by planting in proper season, manuring, or most fundamentally by 'breeding' demands the most immediate attention.

Acknowledgments. I am very much indebted to Mr. C. R. Srinivasa Ayyangar L. Ag., Superintendent, Agricultural Research Station, Maruteru, for the facilities provided and to Dr. B. P. Pal, Imperial Second Economic Botanist for his help in the presentation of results.

Appendix A (i). *Range of ear length in tiller classes in Wateribune.*

No. of tillers per hole.	Range of ear length cm. in treatments.			
	I	II	III	IV
2	3·3			
3	3·9		2·0	
4	6·5	4·5	4·5	
5		6·7	7 5	
6		9·7	8·8	
7		7·9	8 0	6·0
8		8·4	7·5	7·0
9		6·9	5·8	5·5
10		5·8	7·9	—
11			7·0	6·2
12		10·0	7·9	7 5
13		10·0	10·0	5·0
14				13·5
15		10·0		10·0
16		11 0		6·5
17				12·5
18				9·9
19				8·0
20				
21				
22				9 5
23				9·0
24				
25				
26				10·0

Appendix A (ii). *Range of ear length in tiller classes in Swarnalu.*

No. of tillers per hole.	Range of ear length cm. in treatments.				
	I	II	III	IV	V
2	4.5				
3	5·2	4·1			
4	4 1	—			
5	6·4	—	6·4		
6	8·2	6·0	—		
7		6·6	6·0		
8	8·4	8·0	13·0		
9	—	9·5	7·0		
10		7·8	8·2		
11			8 5		
12		8·2	7·0		
13		7·5	9·0		
14			7·0		
15				9·5	
16			9·5		
17			7·1		
18					
19			11·3		
20				11·2	
21				9·0	12 0
22				12·7	
25				8·8	
26		7·5		12·2	
27				14·0	13·0
29					10·0
31				11·5	
32					12·5
35					10·0
36				14·3	
37					13·0
44					12·2
45					11·5

Appendix A (iii). *Range of ear length in tiller classes in Kasi Pichodi.*

No. of tillers per hole.	Range of ear length cm. in treatments i				
	I	II	III	IV	V
2	4·5				
3	5·2				
4	4·8		5 3		
5	6·7	4·4			
6	7 0	5·2	6·0		
7	5·0	11·0	4·6		
8		4·6	4·6		
9	7·2	7·0	7·6		
10		8·1	7·7		
11		6 5	8 8		
12		9 5	7·0		
13	12·3	11 0	7·0		
14		8 0	8·2		
15		6·3			
16			9 8		
17					
22			10 0		
23				8.2	11·0
29				11 2	
28				8·9	
29				10·1	
30				9·6	
31				8·5	
32				9·0	
36					10·5
40				11·2	12·0
41					10·5
44					10 0
45					8·6
47					8·2
48					10·0

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INDIGENOUS GOATS OF THE PRESIDENCY AND THEIR ECONOMIC IMPORTANCE

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Introduction. There are 7,406,018 goats in the Madras Presidency, according to the information available in the latest copy of the Season and Crop Report (1933–34). Their distribution in various districts arranged in order of rank is, Trichinopoly—which tops the list,—with 6,59,557 goats, Salem, Coimbatore, Tanjore, Chittoor, Madura, Nellore, South Arcot, Vizagapatam, Anantapur, Malabar, Ramnad, North Arcot, Tinnevelly, Cuddapah, Kurnool, Ganjam, Bellary, Chingleput, East Godavari, Guntur, Kistna, West Godavari and South Kanara with 27,711 goats which takes the last place.

In 1932, when the writer visited the American Arcot Mission Agricultural Institute, Katpadi, for the first time, the Principal Mr. J. J. De Valois, showed him two breeds of goats viz, the Janma-Pari and the Surati, he had imported with a view to improving the local stock. It was then suggested by the writer that it was worth while submitting a breeding scheme to the Imperial Council of Agricultural Research, requesting financial help. A draft scheme was prepared and submitted through the Government of Madras. In the preliminary remarks of the scheme Mr. J. J. De Valois stated " In connection with my activities in Rural Reconstruction in the villages of South India during the past twelve years, I have been impressed with the fact that the depressed classes and the smaller ryots find it almost impossible to raise and maintain a decent breed of milch cattle. They cannot afford the initial outlay nor take the chance or mortality resulting from numerous diseases and difficulties arising from present village conditions and communal grazing. As milk is such an essential item in the diet I am persuaded to remark that goat the " poor man's cow " should receive more attention. No systematic improvement has yet been undertaken by any agency either official or non-official. Much prejudice exists against the use of goat's milk which can only be broken down by a vigorous educational programme with actual demonstrations ".

Proposed Research Work. The American Arcot Mission Agricultural Institue, Katpadi, is well equipped to carry out the proposed research work. In 1922 the Government of Madras, alienated to the Mission one hundred and seventy-five acres of land to be utilised for an Agricultural school and demonstration farm. Of this area, fifty acres have been brought under cultivation, thirty five acres have been devoted to buildings, play grounds, poultry runs, etc., leaving a considerable area for grazing purposes which can well be utilised for goats.

The institute is located four miles from the Katpadi railway station, on the Madras—Bangalore line, and is quite accessible to the public who may be interested in following the results of the proposed breeding scheme. Mr. J. J. De Valois, who is a graduate in Agriculture and Animal Husbandry of Iowa State College with special training in genetics, live-stock breeding, judging and feeding will supervise the research work.

The main lines of the proposed research work are:—

(a) Selective breeding of a few types of indigenous goats, (b) cross breeding and grading of a few types of indigenous goats with the Jamna-Pari males (dual purpose breed from the United Provinces) and (c) cross breeding and grading of a few types of indigenous goats with the Surati males (breed noted in Bombay Presidency for the quantity of milk given.)

In the case of (b) and (c) the does of first and subsequent crossess will be graded by mating with the bucks of the imported breeds. The three flocks mentioned above will be kept separate to determine after a definite period which type of goat is most suitable for South Indian conditions.

In addition, the following points also will receive attention about each flock:—

(i) Yield of milk in the various crosses and selected animals.
(ii) Hardiness and prolificacy of each type of cross.
(iii) Age of maturity in each type.
(iv) Milking longevity.
(v) Interval between two successive kiddings.
(vi) Yield and value of wool, hide and carcass.
(vii) Suitability of various concentrated foods and fodders for goats in S. India
and (viii) Observation on diseases and their treatment with the help of the Madras Veterinary Department.

The scheme is spread over ten years and details of expenditure will be:—

A. Non-recurring. Capital exependiture (purchase of stock office and dairy equipments).	...	Rs. 5 480.
B. Recurring. Staff. (One assistant, one clerk, one maistry and coolies).	...	26,928
Feeding charges. ...	...	45 564.
Contingencies (farm and Office). ...	...	6,200.
Total for ten years.	...	Rs. 84,172.
Estimated expenditure. ...	...	Rs. 84,172.
Expected revenue. ...	...	16,890
Net Expenditure.	...	Rs. 67,282.

The scheme has been approved by the Advisory Board of the Imperial Council of Agricultural Research at its March meeting.

Indigenous breeds of goats. Recognising the difficulty of ascertaining the different indigenous breeds and their economic importance a circular was at the instance of the Director of Agriculture, Madras, sent to all the Demonstrators in the Presidency and the information obtained is summarised below :—

(a) Age at which the doe starts kidding for the first time.

This depends greatly on the feeding the doe receives. If the feeding is good the doe takes the buck when it is about four months old, and the period of gestation being five months, the first kidding will be in the ninth or tenth month. This seems to be the earliest age at which it is possible for a doe to kid first time. If the feeding is poor, the kidding will be delayed and as the reports show it may vary between two and three years.

(b) Interval between two successive kiddings.

Generally a doe comes to heat between one to three months after kidding, so that the interval between two kiddings will vary from six to nine months, this being the minimum period. In this case also if the feeding is poor, the interval may be over one year.

(c) Yield of milk.

Feeding plays a considerable part on the yield of milk. If the doe is well fed the quantity of milk given is more and vice versa. In the case of breeds that produce more kids, the yield of milk is also more.

(d) Number of kids produced per year.

As mentioned in item (b) there is a possibility of having two kiddings in a year. In the first kidding generally there is one kid and in subsequent kiddings twins are very common, triplets less common, and quadruplets rather rare. A correlation seems to exist between milk yield and number of kids. Here also feeding appears to govern the number of kids produced. If the feeding is good more kids are produced.

(e) Distribution of breeds.

As regards distribution, the Presidency can be divided into three zones viz. (i) In the first zone—consisting of the Ganjam district there is no breed with any special importance; (ii) In the second zone—consisting of the districts of Vizagapatam, Godavari, Kistna, Nellore, Guntur, Bellary, Anantapur, Kurnool, Cuddapah and parts of Chittoor district there are two breeds of some importance, viz., *Kanchi meka* and *Pedda meka* the latter also known as *Puri meka* (iii) In the third zone consisting of parts of Chittoor, North Arcot, South Arcot, Chingleput, Tanjore, Trichinopoly, Madura, Ramnad, Tinnevelly, Salem and Coimbatore districts there are two breeds of some importance viz., *Vella adu* and *Palla adu*.

In the west coast, Surati breed of goats noted for its high yield of milk is found. These have been imported from the Bombay Presidency. Bucks of this breed have also been imported into parts of Coimbatore and other districts and crossed with the local breeds with great success in improving the quantity of milk given by the local breeds.

(f) Economic importance of the indigenous breeds.

Name of breed.	Noted for	Where found.
1. *Pedda meka.*	Meat.	Vizagapatam, E. Godavari, W. Godavari, Kistna, Nellore, Guntur, Bellary, Anantapur, Cuddapah, Kurnool, and parts of Chittoor district.
2. *Kaunchi meka.*	Milk. (⅛ to ¾ Madras measure (½ to 3 lb) per day.)	Do.
3. *Vella adu.*	Dual purpose—meat and milk.)	Parts of Chittoor district, N. Arcot, S. Arcot Chingleput, Tanjore, and Trichinopoly districts.
	Meat.	Madura, Ramnad, Tinnevelly, Salem and Coimbatore districts.
4. *Vella adu*	Dual purpose.	Tanjore and Trichinopoly districts
	Meat.	Parts of Chittoor, district, S. Arcot, N. Arcot and Chingleput districts.
	Milk. (⅛ to ¾ Madras measure per day)	Madura, Ramnad, Tinnevelly, Salem and Coimbatore districts.
5. *Kodi adu.*	Meat.	Tanjore district.

Surati goats found in Malabar and S. Kanara districts yield to 1 to 1½ Madras measures (4 to 6 lb) per day.

The writer acknowledges with thanks the information furnished by all the Demonstrators in the Presidency.

THE EFFECT OF NAPHTHALENE ON GERMINATION OF PADDY SEED

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It is a common practice in breeding stations to store the large number of single plant selections and various type collections in tin-screw-top bottles aud preserve them against the attack of paddy moths with a ball of naphthalene. This practice, however, did not seriously affect the vitality of paddy seeds as was observed in our sowing operations. Seeds preserved in naphthalene appeared for all practical purposes to germinate and grow normally. To get more accurate and definite results, a series of experiments were carried out at the Agricultural Research Station, Aduturai, to determine the effect of

naphthalene on a number of paddy varieties in dry and moist conditions. The investigations consisted of determining the effect of naphthalene (1) on dry paddy seeds, and (2) on seeds soaked in water and on those saturated with atmospheric moisture.

Rangaswami Iyangar and Vijayaraghavan (1926)* have investigated the effect of naphthalene on dry millet seeds and come to the conclusion that dry seeds preserved in bottles are not affected by any amount of naphthalene added to them. Similar experiments conducted with the Coimbatore paddy varieties at Coimbatore some years ago, also revealed that naphthalene had no effect on paddy seeds in the dry condition up to two years.

The action of naphthalene on dry paddy seeds. The experiments consisted of two series. In one, varying quantities of naphthalene powder were added to the same quantity of dry paddy seed contained in 4 oz. bottles with screw-tops. In the other, definite quantities of six important Aduturai varieties were packed in small gunny bags along with fixed quantities of naphthalene powder. This series was included to simulate the ryots' condition of storage. The main difference between the two is that in the former the seed is not subject to the play of atmosphere, whereas in the latter the seed is subject to the influence of atmospheric moisture.

(i) *Subjecting dry seeds to varying quantities of naphthalene.* Three Aduturai strains, Adt. 2, 3, and 4 and a scented variety, *Jeeraga sanna bhatta* (AEB. 178) were selected for this experiment. Definite quantities (65 grams) of well dried seeds were taken in each variety. The quantities of commercial naphthalene used were 1, 2, 3, 4 and 6 grams. Naphthalene was used in powdered form, so that it may volatalize sooner than the balls. The naphthalene powder was placed at the bottom of the 4 oz. bottles and the seeds were prevented from actually coming into contact with naphthalene by placing a blotting paper between the two. This precaution was taken to reduce to a minimum, the bad effects, if any, of the naphthalene coming in direct contact with the seed. In each variety there was a control without any naphthalene.

Germination trials were conducted once a month for each variety and the trials on each occasion were carried up to the 7th day to ensure maximum germination.

The results of the germination tests of two varieties Adt. 2 and Adt. 3 only are given in Tables I and II, the results of Adt. 4 and AEB. 178 being not different. To avoid too many entries in the table only two stages of germination are given in each month's trial, namely, the percentage germination on the third day after starting the test and the total germination. It may be noted that the total germination

* The Madras Agricultural Department. Year Book—1925.

was not affected to any appreciable extent in all the varieties during the period of treatment, but a definite fall is noticed in the rate of germination on the third day, after a particular period for each variety. In all the varieties tried, the varying quantities of naphthalene seem to have no effect on the ultimate germinating capacity when the dry seed was tested. In the case of AEB. 178 it was noted that the vitality of the control was much higher than the treated samples when the rate of germination up to the third day was taken into account.

The low rate of germination on the third day in the first two months of trial (January and February) in the case of Adt. Nos. 3 and 4 and in the fifth month (May) of trial in the case of Adt. 2 is not explicable. As the germination trays were placed in a wooden box and not in an incubator, it is possible that a uniform temperature was not obtained, and the changing weather conditions have had a fairly large play upon the rate of germination ; thus the cold weather in the months of January and February might have brought about a decrease in the rate of germination. The fall in germination in the months of October, November, and December in the different varieties may also be due to cold weather, in addition to the loss in viability resulting from long storage.

(ii) *The effect of naphthalene on paddy stored in gunny bags.* Definite quantities, $2\frac{1}{2}$ lb., of the strains Aduturai Nos. 1, 2, 3, 4 and 5 and AEB. 65 (Nellore samba small grained) were stored in small gunny bags, along with 6 grammes of powdered naphthalene packed in blotting papers and placed inside each bag. There was also a control bag in each case without naphthalene. The results of the monthly germination trials are given in Tables III and IV.

During the ten months' trial, the high percentage of total germination is kept up both in the control and in the treated seed up to the ninth month, while the rate of germination on the third day has perceptibly fallen after the seventh month of storage. Aduturai strains Nos. 3 and 4, however, indicated high percentage of germination even after the ninth month.

It appears that germination is more rapidly affected when paddy varieties are stored in gunnies with naphthalene than when stored in bottles. This is probably due to the fact that the seeds in the former are exposed to the atmospheric moisture which appears to increase the harmful effect of naphthalene.

The action of naphthalene on moist paddy seeds. Naphthalene balls ordinarily used as a preservative for seeds in bottles are generally taken out of the bottles before the seeds are soaked in water, but it sometimes happens that by oversight the balls are left in the bottles themselves. It was therefore decided to test the effect of naphthalene in soaked seed.

(i) *Germination trials with paddy seeds soaked in water with naphthalene.* Two samples in each of Adt. Nos. 1, 2, and 3 were soaked in separate bottles and to one, powdered naphthalene was added, at the rate of 2 grammes for each bottle leaving the other as control. Naphthalene was allowed to act upon the seeds for 24 hours, the usual period for soaking paddy seeds, and the germination trials were carried on for all the six units after removing them from the influence of napthalene. It was observed that the total germination on the third day was not affected by soaking seeds with naphthalene for one full day.

(ii) *Subjecting germinating paddy seeds to the continued influence of naphthalene vapour.* In this experiment germinating seeds of Adt. 1 were subjected to the action of naphthalene vapour, by placing powdered naphthalene in the bottom tray of the ordinary germination apparatus, taking care not to spill the powder over the upper tray. The germination was observed to be 95%. It was observed that the tender radicles grew to a length of 0·1 of an inch and then stopped growth ; similarly the plumules also grew to a length of 0·1 of an inch and eventually both of them showed signs of death, whereas in the control where there was no naphthalene the growth, both of the radicle and the plumule was normal.

It is therefore clear that some of the volatile substances escaping from napthalene must have retarded the growth of the embryo,

(iii) *Influence of naphthalene on paddy seeds saturated with water vapour.* Then the action of naphthalene on paddy varieties saturated with water vapour was sought to be determined. No doubt the latter state of things may be a little abnormal and may not be obtained even in the case of storage in gunny bags which are exposed to the atmosphere, but this may certainly throw some light on the retarding effect of naphthalene on the paddy seeds saturated with misture.

Two varieties of paddy, Adt. 2 and Adt. 4 were each placed inside two bell jars in one of which there was a tray of water to saturate the atmosphere inside the jar with moisture and in the other naphthalene powder was placed in addition to the tray of water. The seeds were taken each week and tested for germination and the results are given in Tables V and VI. It may be observed from the tables that the results of the trials with Adt. 2 and Adt. 4 (naphthalene treatment) the viability is kept up until the fourth week in the case of Adt. 4, and in the case of Adt. 2 there was a distinct fall in viability even on the third week after starting the experiment. In the case of Adt. 2 it was also observed that the germination began to be affected by the fourth week and it was almost completely destroyed after a period of $2\frac{1}{2}$ months. The controls in all these cases also lose their germination capacities by storage in moisture-laden atmosphere for a long time, but not to such an extent as under the additional influence of naphthalene.

Summary of results. (1) Varying quantities of naphthalene did not affect the germinating capacity of dry seeds of Aduturai Nos. 2, 3 and 4 for a period of one year, after which period indications of deterioration in the vitality of seeds were visible, while in the case of *Jeeraga sanna bhatta*, (AEB. 178) a scented variety, the fall in vitality was brought about much earlier, about six months, by naphthalene treatment.

(ii) Paddy varieties stored in gunny bags along with naphthalene are not affected for a period of seven months, after which period the germination becomes prolonged.

(iii) Naphthalene left with the seeds soaked in water before sowing did not injure the growing embryo, but if the seeds are subjected to the influence of naphthalene vapour after the germination had started, the tender radicle and plumule are injured and finally signs of death are noticed.

(iv) The combined action of naphthalene vapour and the saturated atmosphere seriously affect the viability of paddy seeds within a much shorter period than when they are left under the influence of saturated atmospheric moisture alone.

Table I

Germination trials with Adt. 2. (White Sirumani) dry seed with different quantities of naphthalene

Treatment.	3rd month of trial		4th month of trial		5th month of trial		6th month of trial		7th month of trial		8th month of trial		9th month of trial		10th month of trial		11th month of trial		12th month of trial		13th month of trial		14th month of trial		15th month of trial	
	Germination on third day	Total Germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination	Germination on third day	Total germination
Control	78	98	94	97	84	100	97	99	96	97	96	96	95	99	100	100	95	97	96	97	94	98	90	98	84	96
1. Gr. naphthalene	86	97	92	100	70	98	99	99	91	99	93	97	94	98	92	95	96	97	92	96	89	97	66	98	65	91
2. „	93	99	92	98	65	98	97	99	94	95	88	98	96	99	87	96	92	94	89	97	88	99	73	98	62	88
3. „	93	100	91	99	70	97	97	99	93	96	95	100	95	98	95	98	94	97	94	98	95	100	74	95	75	93
4. „	91	99	93	100	75	97	100	100	95	99	97	97	96	99	92	97	81	95	94	97	80	94	62	95	60	90
6. „	87	100	99	100	80	100	99	99	92	99	97	97	94	96	94	97	92	94	96	97	89	94	73	96	70	90

Table II.

Germination trials with Adt. 3 (early Kuruvai) dry seed with different quantities of naphthalene.

Treatment.	4th month of trial.		5th month of trial.		6th month of trial.		7th month of trial.		8th month of trial.		9th month of trial.		10th month of trial.		11th month of trial.		12th month of trial.		13th month of trial.		14th month of trial.	
	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.	Germination on third day.	Total germination.
Control.	50	99	70	99	98	100	98	99	86	96	100	100	89	100	87	100	98	100	60	98	67	100
1 gm. naphthalene	42	99	60	99	96	99	93	97	90	100	94	98	89	99	70	99	85	99	60	98	67	100
2 „	36	100	70	99	94	99	93	100	99	100	94	98	90	98	64	98	81	100	66	100	55	98
3 „	50	100	60	99	92	98	93	99	84	89	95	99	86	100	70	96	83	98	45	97	54	100
4 „	45	100	64	97	96	98	94	100	89	99	95	99	87	98	66	98	88	100	52	99	50	99
6 „	46	96	67	99	87	98	93	99	92	95	91	98	88	98	61	98	83	99	50	100	53	98

Table III

Germination trials with the varieties Adt. 1, 2, 3, 4, 5. and AEB 65 preserved in gunny bags without naphthalene.

Varieties.	2nd month of trial		3rd month of trial		4th month of trial		5th month of trial		6th month of trial		7th month of trial		8th month of trial		10th month of trial	
	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination
Adt. 1 Control	95	99	100	100	96	98	95	98	100	100	90	95	70	91	20	76
„ 2 „	94	98	96	100	99	100	98	99	99	99	99	99	91	97	8	65
„ 3 „	96	99	98	100	96	100	97	100	96	98	97	100	51	99	9	92
„ 4 „	96	100	98	99	99	100	98	100	99	100	99	99	80	98	12	81
„ 5 „	97	98	97	100	98	99	99	100	99	99	98	100	80	91	13	56
AEB 65 „	93	96	100	100	96	99	95	99	94	95	98	99	72	87	6	33

Table IV.

Germination trials with the varieties Adt. 1,2,3,4,5 and AEB 65 preserved in gunny bags with naphthalene.

Varieties.	2nd month of trial		3rd month of trial		4th month of trial		5th month of trial		6th month of trial		7th month of trial		8th month of trial		10th month of trial	
	Geaminntion on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination	Germination on third day	Total Germination
Adt. 1 Naphthalene	95	98	97	97	96	97	99	99	98	99	96	98	77	97	6	87
„ 2 „	95	98	10)	100	98	99	97	99	98	99	97	99	80	95	3	56
„ 3 „	94	100	98	99	98	99	100	100	98	99	86	100	50	99	4	92
„ 4 „	96	100	98	98	100	100	98	100	99	100	97	98	80	100	9	81
„ 5 „	98	100	96	99	96	98	97	99	100	100	96	98	80	98	3	36
AEB 65	97	99	96	99	98	99	96	98	99	99	100	100	70	82	2	12

Table V

Germination trials with Adt. 1 preserved in a saturated moist chamber.

Period of testing.	Adt. 1 (control).					Adt. 1 (naphthalene treated)				
	3rd. day of trial	4th day of trial	5th day of trial	6th day of trial	Total Germination	3rd day of trial	4th day of trial	5th day of trial	6th day of trial	Total Germination
3rd week	94	5	1	...	100	16	39	26	2	83
4th ,,	91	5	2	...	98	...	3	10	20	33
5th ,,	97	1	...	...	98	...	2	5	3	10
6th ,,	92	2	1	1	96	...	...	...	...	...

Table VI

Germination trials with Adt. 4 preserved in a saturated moist chamber.

Period of testing.	Adt. 4 (control).					Adt. 4 (Naphthalene treated).						
	3rd day of trial.	4th day of trial.	5th day of trial.	6t day of trial.	Total Germination.	3rd day of trial.	4th day of trial.	5th day of trial.	6th day of trial.	7th day of trial.	8th day of trial.	Total Germination.
1st week.	99	...	...	...	99	97	2	...	...	...	...	99
2nd ,,	99	1	...	...	100	99	...	...	...	...	...	99
3rd ,,	95	4	1	...	100	45	48	1	1	...	...	95
4th ,,	100	...	...	...	100	8	47	24	...	9	...	88
5th ,,	99	1	...	...	100	...	...	11	8	13	4	36
6th ,,	95	4	...	...	99	...	...	...	1	2	6	9
7th ,,	86	10	1	...	97	...	..	...	...	...	...	...

SOME SOUTH INDIAN VILLAGE STUDIES *

(A Preparatory Study of " Villur " Village No. 119, in Tirumangalam Taluk, Madura District, Madras Province).

BY P. S. SESHADRI

Animals

(a) *Bullocks.* In the whole district, the average area tilled by a pair of bullocks is largest in Tirumangalam taluq. The indigenous cattle of the district being small sized, bullocks are generally bought at high prices at Madura and other places. In Villur, on account of the precarious rainfall, the produce obtained does not justify the maintenance of costly bullocks and the people are too poor to afford the initial cost. Only a few cultivators go in for these, while the others have to remain content with the inefficient locally bred animals. Naturally they are overworked and worked at too early an age.

* Continued from page 188, May issue.

A good pair of bullocks can cultivate 5 or 6 acres of wet or garden lands, or 10—12 acres of dry lands. In 1920 there were 1080 cattle, of which half were cows and buffaloes. The present figures are just the same. There are no more than 300 pairs of bullocks for the whole village of 1074 holdings. The number is very inadequate for the requirements. Most of the small cultivators keep only one head and pool their resources when necessity arises. During the season abont 500 ploughs are engaged from outside for 4 or 5 days.

(b) *Other cattle* Cows giving more than half measure of milk at a time are rare, and buffaloes yield a trifle more. Milking is done twice a day. The milking period of the animals varies from 4—6 months. As milk and milk-products are not very common articles of diet among the cultivators these animals are neglected. One or two individuals used to keep stud bulls. At present, however, there is no good bull in the village or nearby, and all animals breed indiscriminately.

(c) *Maintenance of Cattle.* Fear of theft prevents them from being left in the fields as is done in other taluqs. All cattle are generally kept in sheds inside the house compound. There is no flooring and the place is ordinarily very dirty and foul-smelling. Nothing by way of litter is provided. In the rainy season particularly the condition is very bad. Occasionally the animals are washed in one of the ponds. No land is set apart for communal grazing. Cattle graze on patta lands, unoccupied assessed lands and porambokes. The green fodder available in these places is meagre. Samai, varagu and cumbu are rarely used. Cholam, ragi and paddy-straw are generally used as dry fodder, and the first is often grown for the purpose. A quantity of straw is put in the feed box in the shed just after the cattle return from the fields and replenished as often as necessary. Cotton seed is the only oil-seed used. This is soaked in water overnight, ground next morning in a stone mortar and given in a tub mixed with rice-washings, etc. Groundnut cake is also used now. The cleanings of the cereals and pulses and rice-washings are freely used. No distinction is observed in the feeding of different animals. Bullocks require no tending. Cows and buffaloes are tended by cowherds during the day for a small fee (four annas per head per month). There are about 10 individuals tending from 30 to 50 or 60 heads each.

(d) *Cattle diseases.* Infectious diseases are very rarely found.

(e) *Sheep and goats.* Sheep and goats are better cared for than cattle. They numbered 1635 in the year of resettlement and this strength is apparently maintained. Those who keep sheep and goats generally look after them themselves. Occasionally when the owner has got more animals than he can manage himself, he employs a shepherd for the purpose. The animals belong to the ordinary breeds of the locality and fetch good prices in the market. The skins obtain good

value. Here also the question of rationing is neglected. The animals are given whatever fodder is available and the trees on public lands are defoliated for the purpose.

Miscellaneous Crops. In the year of resettlement there were 40 acres of fruit and other trees. Enquiry reveals that in the past the area was greater, and in a flourishing condition. The fruit gardens consisted of different varieties of citrus, mango, guava, pomegranates, bassia, etc. A good deal of enthusiasm has been displayed in the cultivation of cocoanut which does not easily grow in this locality. But no attempts have ever been made towards marketing the produce. Regular markets are not available. Tirumangalam, Virdhunagar and other small towns have only recently developed while Madura is too far away. Recently a pomegranate garden was let out to a fruit-seller in Madura on an annual contract. The produce of old gardens seem to have been used solely for domestic consumption by the owners. Similarly flowers like rose and jasmine were grown. The gardens belonging to the temples are still in existence and the tenant in these is able to sell a portion, after meeting the temple requirements. The demand for flower is considerable in this locality and a good deal is brought from outside during particular seasons. Green vegetables are also grown in garden lands and in tank-beds. Brinjals, sweet potatoes and gourds are common, but no effort is made to make market gardening a dependable source of income. The markets are not studied and nothing is known about sorting, dressing and packing of commodities for sale.

The Babul (*Acacia arabica*, willd) grows freely everywhere. Besides serving as fuel, it is put to many uses. The timber is valued for its hardness and durability and is freely used in the manufacture of wooden parts of agricultural implements. The bark, leaves, seeds, and gum are used for industrial and medicinal purposes.

Leisure and side Industries. Some cultivators do carting in the off season. The villagers keep a few fowls, and pigs but poultry rearing and pig keeping as such are not practised. No cottage industry or handicraft of any special nature is known to have existed in the place, even the handspinning industry having died out. The majority of the villagers are idle for six months in the year.

Marketing and trade.

(a) *Roads and communications.* Madura, Tirumangalam and Virudhunagar are all accessible by rail directly from Kalligudi. These towns are on the metalled road from Madura to Tuticorin and Villur and Kalligudi are being connected to this road. At present there are country-cart fair-weather roads to all these towns, but they are very uneven, and take a long time to cross. Bullock carts are the only vehicles available for travel and transport of commodities but these are not always available in sufficient numbers to cope with the traffic.

(b) *The markets.* The chief market, Virudhunagar, is 8 miles distant and Tirumangalam, a smaller one, is at the same distance in the opposite direction. There are two weekly fairs at Kallupatti and Kalligudi, each four miles distant. Because Madura is 20 miles off, the cultivator does not find it possible to go there. The conditions actually obtaining in these places are not fully known to the cultivators in the village. Sometimes sale by auction takes place in the weekly fairs. Many classes of persons frequent these fairs—dealers, millers and brokers – all more or less acquainted with the art of buying and selling. In such an assemblage a farmer, unless he is exceptionally capable or has a special class of grain to offer, is at a disadvantage. There is no doubt that many of them lose a good deal in the transactions they make here. Brokers easily dupe them with false weights and measures.

(c) *Commodities marketed.* Cotton, betel-leaf, groundnuts, chillies and green vegetables are the main crops produced. Usually brokers come and purchase these at wholesale rates. Betel leaf is daily taken in small bundles to the villages, and sold by the growers themselves. Oil seeds are sold to local oil mongers for crushing. Green vegetables are purchased by the brokers at the gardens. Milch cattle are rarely available for sale. Milk and milk products are scarce. Sheep and goats are disposed of by the cultivators themselves at the weekly fairs. The milk of these animals is seldom utilized. Eggs or poultry are very rarely taken to the weekly fairs.

(d) *Local transactions.* There are about half a dozen whole-time retail shops and several smaller part-time shops. They deal in the daily necessaries such as rice (increasingly of late), cloth, spices, salt, kerosene oil, which are brought almost exclusively from Virudhunagar. The stuff sold is inferior but the price is always kept up as high as possible. Things are often sold for credit and interest is charged on out-standing balances. The practice of exchange and barter rarely occurs. Labourers in the gardens get their wages paid in kind which are exchanged for rice or other necessaries.

Joint activities, common property, etc.

(a) *Co-operation.* It is recorded in the resettlement register that "the customary labour or irrigation works—*Kudimaramat*—will be performed by the ryots as usual". No one seems to worry about this important part of the village work and it is neglected. Another joint activity which has died away is the system of *kaval* by which the safety of the crops was secured for a small contribution in kind. While this and similar co-operative efforts are working well in the surrounding places, their absence at Villur affects greatly the extent and nature of the cultivation.

Co-operation for traditional and communal purposes still exists to a great extent among the different communities, particularly

Ahambadiyas and Chettis. The co-operative spirit among the Vellalas is seen in the cultivation of pan. About 20 or 30 or even more people carry out the cultivation in one garden. It is also usual for two or three men to join in the local trade business. Efforts towards productive purposes on modern lines, have however, never been made in the village. The Panchayat Court which has been in existence for the last 10 years only aims at arbitrating minor offences and even this work is not discharged to the satisfaction of all.

(b) *Common or public property and income.* There appears to have been no land set apart for common social or economic purposes at any time. No mention of it occurs in either of the settlement reports. Within the village there are a few *chavadis* belonging to the different communities, which are used for communal purposes. There is great difficulty felt in finding space in the season for threshing grain. Any vacant site is pitched upon and momentarily converted into a threshing floor, right in the middle of the village, in front of houses, in the back yards or anywhere. The crops have to be carried to long distances. The grains get mixed with sand and other impurities. Generally the *poramboke* which has a total area of 713·85 acres serves for all common purposes. The villagers are totally indifferent to these properties. The fishery rights of three of the irrigation tanks is sold annually in public auction and five smaller tanks are taken on lease by the ryots who pay a fixed rent of Rs 0--2--9 per every cultivated acre. There are several ponds whose water is used for drinking and other purposes. Fishing is not allowed in these. When these ponds dry up, people scrape away the sediments for manurial purposes but no regular cleansing is done. Some game birds are found in small numbers, but nobody cares for them. Snipe can be had in good numbers. Teals are found on the tanks when they are full. Big trees which formerly adorned the wayside and *porambokes* are disappearing and replanting is neglected and there are no wind break to protect the crops against wind. Some money is raised by auctioning the right to collect a tax (' *mahimai* ') imposed by common consent on articles of certain classes bought or sold in the village. This sum does not now seem to be utilised for common good but is spent for communal purposes for the Ahambadyas alone.

Tests for agricultural prosperity.

(a) *Ease with which land revenue is paid.* The regular cultivators being very submissive to authority, arrears in the annual revenue collection are rare. That great difficulty is felt at the time of paying taxes is evident. Money is often borrowed at usurious rates of interest. Land-owners do not find it easy to make the tenants (who are usually Ahambadiyas) pay the tax according to contract.

(b) *Rise in land value, rental, prices of agricultural produce.* The present prices are much lower than what prevailed before and are

further decreasing. The agriculturnl produce from this village never obtained any special price for their quality.

(c) *Increase in the number of plough cattle, ploughs, carts.* There has been no increase in any of these, though obviously necessary. A good deal of the ploughing of this village is paid for and generally the lands are ploughed inadequately.

(d) *Improvements in methods of cultivation.* No new crops have been introduced and the methods of cultivation are the same since time immemorial. On the other hand there is a good deal of neglect in the existing practices.

(e) *Extension of area under cultivation.* About 22 acres of cultivable lands remain unoccupied. Moreover about 30 or 40 acres of dry lands have been recently relinquished by the owners as not worth the cost of keeping. All the lands are not equally well cultivated even according to the prevailing standards. General poverty, ignorance, lack of facilities, all play their part, so much so that in the same type of lands yields vary considerably. Though wells were dug in rapid succession some years back, the activity has received a set-back now.

Sources of help for the village.

There are no societies or private organisations in or near about the village interested in rural welfare. Some *chavadis* and wells have been erected by private benevolence and temple functions used to have been permanently endowed in the past.

Tirumangalam, the taluq head-quarters, is the chief place for this village from the point of view of official help. Besides the usual administrative offices, the agricultural demonstrator, a minor irrigation overseer and a P. W. D. overseer, are stationed here. The offices of the Taluk Board, Deputy Inspector of Schools, Vaccinator, Health Inspector, and an indoor dispensary are also located here. The Village Development Committee, the District Educational Council and Office, the Deputy Registrar of Co-operative Societies are all at Madura.

The needs of the Village. Before constructive attempts are made towards the improvement of the village the following preliminaries have to be accomplished. The disturbances due to scoundrels and thieves must be put an end to if necessary with the help of the police, and a full sense of security afforded to all peaceful cultivators. The several manure pits that are even now existing can be easily converted into rough latrines, by putting a screen round the pit and a few planks across. The ponds and wells used for drinking or other toilet purposes should be set apart for the different uses and properly maintained. The people themselves are no doubt aware of these follies and it will not be difficult to effect the necessary arrangements with a little active persuasion. The following improvements and the

methods of effectng them are suggested from the point of view of the small cultivator in order of their importance:

1. If one condition is more necessary than another for good crops, it is a suitable supply of water, for no amount of manuring or other treatment of the soil will make up for a deficient rainfall. There are no rivers or canals nearby, wells are therefore most important. It is besides within reach of the individual cultivator. The points that require consideration in this connection are:

(a) *Water lifting.* The prevailing rate of hiring a *kavalai* (the best of the existing methods) for a day is between Rs 1—8—0 and 2/-. The cost will be slightly less for the owner as he will have other advantages such as manure and availability of the bullocks for other work. But half the small cultivators do not own any animals and those who do and have sufficient lands and wells do not find it advantageous to put them to full use. Calculations show that the same work could be done in less than half the time by a small portable pumping set consisting of an engine of 1½ h. p. and 2″ pump at a cost not exceeding twelve annas. Operating a set like this is not very technical and must be quite easy for the cultivator to learn. The only consideration is the initial cost which is about Rs 500/-. There are many other advantages and greater output low rate of depreciation. It is therefore worth the trial for any cultivator who possesses one or more wells and sufficient lands; or he must hire the set when free; either individually or on a co-operative basis.

(b) *Improvement and construction of wells.* To determine the extent to which the existing wells can be improved, location of new wells, etc., it is necessary to have an estimate of the quantity of underground water available every year, and its general layout. An efficient and cheap method of constructing wells is another important requirement.

2. **Manures.**

The following considerations are necessary in determining the choice of type of fertiliser, the amount to be used and the time and method of application.

(a) *Production.* The existing method of utilising farm-yard manure is much wasteful. Trials may be made for manufacturing compost by the *Indore process*, which is said to be quite easy for the cultivator to practise, and by which the manure will be at least doubled in quantity and improve in quality. The fine powdery character of the compost is a great advantage. When farm-yard manure is treated in this way it ceases to be foul-smelling and the sanitation will be greatly improved as all waste products are used up. If the present insufficient number of cattle could be conveniently increased (see below) more farm-yard manure will be available. A larger quantity of green manure can also be had by increasing the growth of crops for this purpose.

(b) *Local purchase.* Sheep-penning, oil cakes, etc., are available in the village itself and it is to the advantage of the village as a whole that they should all be used.

(c) *Chemical manures.* Though the cost of these is a serious deterrant at present, their use is inevitable under intensive cultivation. Recourse must be had to them whenever soil fertility is desired to be increased. When the particular crops to be grown for the market are determined, the outturn can only be raised above ordinary by the judicious application of chemical manures, The chief manurial requirements of this village will be in the form of phosphates and potash.

3. **Cattle.**

Having regard to the fact that no land is set apart for grazing and that adequate maintenance is not possible for cattle throughout the year, the present number of animals seems too great. On the other hand, it is insufficient to meet the work in the village. Arrangements for grazing have therefore to be made. Though there are 713 acres of poramboke, no portion of it can be conveniently used for grazing. The 22 acres of unoccupied land are distributed in several plots. However as almost the whole of wet and dry lands remain uncultivated after the winter crop, arrangements could possibly be made for grazing in them, if a suitable variety of grass could be grown.

Co-operation. For the small holders and the landless co-operative credit is indispensable. It is not only the most suitable form of joint effort to begin with, but easy credit facilities are not available and the need is very great during the seasons. It affords an excellent training in the handling of money, in expending it on productive purposes and in the elements that combine to build up sound credit. It readily lends itself to organisation for mutual help. The beginning must be made with a small number of chosen members.

Joint effort is also necessary for carrying out the minor improvements or repairs to tanks —'*kudimaramat*'—, prevention of field pests and such matters. There is also great scope for co-operative undertakings in small machinery such as flour mills, oil mill and rice huller.

Side Industries. Sheep farming exists to a sufficient extent but it is essential that a proper system of feeding should be established. Cow-keeping and poultry farming are useful and readily-available side industries in this village. The market for these is sufficiently big and breeding of milking animals may itself prove a valuable occupation. Supply of milk to the towns can be profitably undertaken. Fish is consumed freely in the locality and there are several private and public tanks, besides wells. A great scope for a profitable industry exists in this line if it could be determined what kind of fish grows under the conditions. Carting may afford a part-time occupation when agricultural and horticultural conditions develop.

Horticulture. The adoption, or substitution in place of ordinary food crops wherever desirable, of horticultural crops is the ultimate means by which the cultivator can become really prosperous. Such crops require much more labour than the ordinary ones and hence this form of cultivation is particularly necessary to this village where cheap labour is plentiful. A number of vegetables, different kinds of fruits and flowers have been and are still grown to a small extent. Their cultivation is neglected and preparations for sale are unknown. In these crops the quality is more important than quantity and early maturity is often advantageous. With fruit and vegetables the utmost importance is attached to freshness and the packing may be made more attractive. Another important consideration is the sorting into grades and uniformity in bulk.

Marketing. There has been no real marketing or market-growing up till now. As regards the production of vegetables, fruits and flowers, these have to be adjusted according to the seasonal demands and prices prevailing at those times. It would be ideal if a co-operative buying and selling agency could be created in the village.

Organisation of labour. Labour is one of the main problems of this village as it is the source of maintenance for at least a third of the population. The prevailing wages conditions are fair for the locality, but sufficient work is not available. Organisation is therefore essential for its improvement. If the time and extent of inside as well as outside requirements could be fairly known and approximated, the quality of particular kind of labour can be increased or maintained with confidence and with the improvement in agriculture, wages must also rise.

Crops. The present practice of growing short term paddy broadcast should be restricted and the transplanted varieties reintroduced. This will give more work to the cultivators, better grains and more produce. As diseases due to bad seeds are common, procuring good seeds is very important. No change in the existing crops will be necessary for some time to come, excepting that their purity should be kept up by proper selection.

Agricultural practice. There are many details in the general cultivation methods which are grossly neglected. Preparation of the soil, especially proper and timely ploughing, requires greater attention because rainwater which falls upon the soil should be made to enter it and percolate rapidly through the interstices. Crop rotation must also be properly adhered to.

Soil improvement. The soils are on the whole good, and wherever necessary tank-silt is freely applied. Removing the saline ingredients is necessary in case of many lands. As sufficient water to wash away these salts is not available, growing of suitable plants in

them may be tried. The '*karuvel*' tree appears to be quite good for the purpose. It should not be cultivated longer than has been found necessary to neutralise the salt, because it is an exhaustive crop. In fact the moment it has taken a hold of the soil the improvement may be regarded as established and it should be early removed.

The best way of effecting the above improvements would be to provide a model small cultivator in the village who will serve as an example and a guide in all these matters. He will have just as much land as any small cultivator, distributed in the different soils, with a well or two and necessary animals and implements. While conducting the cultivation under the best of existing practices, he will seek help from the proper experts and authorities (already referred to) for the various problems that arise.

Research Notes.

The Relation Between the Size of Seed and the Development of the Plant Resulting from it in Rice.

The nature of the influence of seed-weight on the vigour and yield of the resultant crop is still a mooted question among investigators of field crops. Results obtained by different workers on wheat, oats, rice etc., in different countries are not all uniform. It has been stated that rice growers of Japan, Formosa and Italy usually grade the seeds before sowing so as to eliminate the lighter seeds. The rationale of this practice was tested at the Paddy Breeding Station, Coimbatore with two pure lines of rice, Co. 4 (six months' duration) and Co. 10 (four months' duration). A small sample of seed from each of these was graded into three groups light, medium, and heavy, based on the weights of individual grains. About 100 plants in each group were planted in randomised blocks with regular spacings, the seeds having been sown in special pots previously.

The heavier seeds in both the varieties germinated earlier and the seedlings showed greater vigour. The early differences, however, gradually evened out in the case of the long duration variety Co. 4. When the final yields were recorded for each group separately there was no difference among the three groups. In the case of the early variety, Co. 10, the greater vigour of the plants from the heavier seeds was maintained to the end. The yields of the plants from heavier seeds were also significantly more than those from the light seeds.

The different groups of seed in the two varieties are genetically identical as they are all from a pure line but while in a long duration variety there is no advantage to be gained by separating the seed into light and heavy, there appears to be a definite gain in weeding out the light seed from the sample in a short duration one.

The experiment was conducted only on a small scale and the results require further confirmation. If the results of the short duration variety were to be confirmed, it should be an easy matter to increase the output by the elimination of all light seed in a sample.

K. Ramaswami,
Asst. to the Paddy Specialist.

ABSTRACT

The Planting of Sugarcane by A. C Edmonds. *Bulletin No. 38, Madras Agri. Department.* Price 4 as. Mr. Edmond's bulletin on 'The planting of sugarcane' is to be welcomed by all interested in the cultivation of sugarcane and has come out at an opportune moment when there is a general tendency to increase the area under sugarcane due to the impetus given by the levy of duty on imported sugar and the starting of a number of sugar factories.

This bulletin gives in an instructive manner, a concise account of the local practices in the planting of sugarcane and the results of researches carried out at the various agricultural research stations in the Presidency.

Problems concerning the propagation and the preparation of seed canes which are of fundamental importance to a sugarcane grower, are discussed. The different methods of providing seed material aud the new system of raising a seed crop by 'short planting', are described. Attention is also drawn to the importance of the organisation for seed supply.

The selection of stalks, the kind of setts to be used, their cutting, treatments, storage and germination have been fully dealt with.

The use of mould board plough (Cooper plough No. 26) in the preparatory cultivation, planting in lines and in trenches, use of longer furrows wider apart and the adoption of scientific system of laying out plots (explained with a diagram) are some of the improvements suggested.

A very useful data concerning the quantity or the weight of crop required to plant an acre of sugarcane is also appended. K. H.

Gleanings.

The Government's Responsibilities in Science.

Russia, seeing what science has done in raising the standard of living in other countries is centering her whole economic program on science. She has used, as the central feature of this program, the Academy of Science, founded by Peter the Great. Under this have been established more than two hundred great Research Institutes for work in pure science and engineering. Her annual appropriations for these institutes are reported to be larger than any other items in her budget—even the military and defence item. Many of her scientific laboratories rank among the best-equipped laboratories in the world at the present time. Though short of trained workers, they are already turning out some first class work, and a well-considered program of selecting and training research workers has been instituted.

Great Britain also has taken decisive steps to utilize science for social and economic improvement, despite the fact that she was harder hit than America by the war, her unemployment crisis came sooner, her taxes are higher. She has called her leading scientific men to advise her privy council on scientific and technical policies, through three advisory councils composed of Britain's most noted scientists. It is on advice of these councils that the programs and budgets of the government's scientific bureaus are determined. The government, furthermore, appropriates about a million rounds annually, to be used for research. On advice of the advisory council, appropriations are made to governmental scientific bureaus and grants for research are made to educational institutions and scientific societies; also for research fellowships, and for support of industrial research

by trade associations, provided these associations match the grants with similar contributions from their own funds. In this latter way, programs of research have been inaugurated in twenty one of the most important industrial associations.

Italy has mobilized her research facilities in a broadscale effort to rehabilitate her economic position and to counteract her deficiency in raw materials through application of her "brain power" to the most effective use of what she has. The Government has appropriated large sums for the better equipment of university research laboratories and all work in these institutions and in governmental laboratories is supervised by a National Research Council. Furthermore, no governmental financial assistance is given to industries unless this Research Council certifies that the industry maintains a progressive policy of research and development.

Until recently Germany led the world in her sustained efforts to maintain a strong economic position through scientific research, notably in the fields of chemistry and metallurgy. Every one knows the success of this policy, until it was largely wrecked by other circumstances. Her scientific strength, however, is still probably Germany's strongest economic asset.

Japan for years, has been bending every effort to introduce western technology into her industrial procedures. Begun as a policy of copying technical processes and products which had been developed elsewhere, it was accompanied by an intensive program of scientific education of her own scholars. She is now in a position to lead as well as to follow in scientific work of high quality, and this is bearing fruit in her industrial position.

What is needed is a bilateral program for putting science to work for the national welfare. There is needed on the one side the co-operation of the scientists of the country generally, to assist the government in putting the work of its scientific bureaus on a scale of maximum efficiency and value. There is needed on the other hand a new type of government leadership whereby the scientific men of the country may be brought together to make an intelligent and co-ordinated attack on the great problems which are facing the country at those points at which science may offer hope of alleviations or solution.

Under these circumstances it seems certain that scientists will have to play an even more important role in the future than in the past. The problems to be solved are more complex, greater intelligence is needed in handling them, the scientific approach rather than the political or opportunistic approach is demanded. (*Science* Vol. 81, No. 2102, p. 353—355].

The Vitamin B Requirements of Man. What is believed to be the first exhaustive study of any of the vitamins from the point of view of how much a human being needs has been made at Yale University by Dr. George R. Cowgill, associate professor of physiological chemistry. Dr. Cowgill has devoted his research to the vitamin B requirements of man and has established a measure by which nutritionists can determine whether an individual's diet contains enough of this important food factor. The results of Dr. Cowgill's study have been published by the Yale University Press for the Institute of Human Relations.

Deficiency of vitamin B in the diet has long been known to be the cause of beriberi, a disease which constitutes one of the most serious medical problems in the Far East. The greatest significance attaching to vitamin B for people living in North America is the fact that it may be a cause of various chronic conditions summarized under the vague term "ill-health". In these instances the shortage of the vitamin may not be great enough to result in beriberi, but sufficient to produce a complication difficult to recognize and one which

therefore escapes treatment. Various gastro-intestinal disorders, such as gastric ulcers and colitis, can be related to vitamin B deficiency; certain heart disorders and various neurological conditions may have their beginings in a diet lacking sufficient amounts of this vitamin.

Body weight and vigour of vital processes (metabolism) were found by Dr. Cowgill to be the most important variables determining vitamin B requirement. In approaching the problem, he made studies of diets associated with beriberi and diets not associated with disease. Among the former were those of families in Labrador, Newfoundland and Calcutta ; prison diets in the Far East, notably at Manila, Selangor and Singapore, and diets of various seamen and soldiers. A study of limited diets not associated with beriberi included a variety such as those of American white and Negro families, rations allowed by the German Government for civilians during the winter of 1916—1917 and the dietaries of workers on sugar and cacao plantations in the East and West Indies.

He has established that the ratio of the amount of the vitamin to the energy yielding value of the diet correlated with the body weight and metabolism expresses the adequacy of the diet in vitamin content. Thus the diets associated with beriberi showed an average ratio of 1·74, while in diets where the disease did not occur, the ratio was 2·18. Men require more vitamin B than women. Dr. Cowgill states that "students of the beriberi problem have frequently commented on the fact that this disorder is pre-eminently a disease of young adult males. As an explanation of this it has been suggested that beriberi is chiefly an 'institutional disease.' that is to say. a disorder found in jails, asylums, groups of laborers and the like, and that the conditions in society which operate to form these groups affect men more than women. The results of the present study suggest another explanation The formula derived from these quantitative studies indicates that the two most important variables determining the vitamin B requirement are the body weight and the metabolism. Now it is generally known than males have a distinctly higher rate of metabolism than females, and being usually heavier and more active, consequently consume greater quantities of food. Therefore, males have a higher total energy exchange per day. Under conditions where the vitamin B content of the ration proves to be very close to that required by the organism there is little or no factor of safety against beriberi, and this sex difference in total metabolism may be the chief factor determinating whether beriberi shall develop. Under such circumstances it is obvious that the males should be more liable to the disease.'.

(Science Vol. 80 No. 2085 p 8—9.

Agricultural Research. Success or failure in agriculture as in every other art or industry, depends on the 'comparative efficiency'. The farmer succeeds or fails in proportion as he produces the better article and produces it more economically than his competitor producing a similar article. The better quality product produced in greater quantity to the acre beats the inferior and less 'economic' product off the market. And as in industrial production the race is never won. It is continuous and everlasting. Every day the research worker is breeding more efficient plants, is breeding and feeding a more economic domestic animal. Success is to those in the vanguard of this perpetual progress, failure to those that lag behind. We cannot afford to resist this law of change or disregard the ever-expanding discoveries of the scientific worker.

Organised agricultural research has usually begun as defence against plant and animal disease. Some pest or fungus attacks a crop and we seek the help of the bug hunters (Entomologists) and mould fighters (Mycologists) to protect our crops from these attacks just as we go to a doctor when we are ill. Now just as 'Preventive medicine', sanitation etc., is seen to be more important than the

cure of pathologieal conditions so in agricultural research the best protection of plants and animals against disease is a robust constitution and disease resistant factors which can be bred or maintained by special feeding.

The bulk of the higher modern agricultural research work in the world has developed into three main types of scientific effort, the work of the geneticist or breeder, the work of the physiologist and work of the nutritionist or feeder.. Perhaps I ought to add the 'ecologist' the man who studies the environment of a plant or animal and seeks to establish what are its optimum conditions of climate, soil (in the widest sense). light supply etc. Of course, the process of 'Seed selection' cross breeding of animals, manuring of plants and special feeding of domestic stock have always gone on in agriculture But nowadays, often these chancy or empirical advances of the past have been superseded by the more scientific, fundamental and long range research of the geneticist and the nutritionist.

The agricultural research stations which seem to be making the most remarkable advances in new discovery, to be leading in the race for agricultural efficiency are those 'One-Crop' stations where a team of specialist workers concentrate on the improvement of the economic efficiency of one crop. In them with the geneticist leading the plant physiologist, the biochemist, the ecologist, the entomologist, and the mycologist set out to solve problem after problem with a view to producing new types and new varieties of greater economic efficiency than the existing ones and of controlling or supplying the environmental conditions under which that efficiency can best be realised.

The scale and range of some of these stations is enormous including as they do not merely the creations of new varieties but all the problems of manuring. irrigation and improved technical handling of the crop. Probably the largest and in many way the most remarkable are the new sugar beet and potato research stations in Soviet Russia. In the tropics the research stations in Java and especially the great sugar cane research station at Passaruan are the most up to date and successful.

What both Governments and farmers frequently fail to realise is that we have now reached a stage of knowledge and experience in these matters where the making of further advances as regards many of the world's staple crops involves the organised team work of many specialists over a series of years. The demand of the layman is for quick results for expenditure in research. This demand is often quite impracticable and its mere existence has often diverted the team of workers from what they know to be the better and ultimately more useful but longer, piece of work in favour of something shorter in time but less important in result. For there must be no misunderstanding that the most important advances are nearly all the result of uninterrupted work on a problem for anything from five to ten years.

Research is necessarily expensive. Not only is the whole apparatus of the agricultural research worker a fairly expensive business but the worker himself has nowadays to go through a long period of University and post graduate literature and translations from contributions by other workers in the field in many different languages And above all the supply of the really qualified men is pretty limited. There is somewhat of a vicious circle at present in this last matter. There are few men because there are few jobs offering. On account of the world wide commodity slump at this moment there are more men capable of good research work than there are jobs at any rate in the British Empire overseas, a strange contrast to conditions obtaining a few years ago.

It is not easy to bring home to the average citizen of the British Empire with his general and most universal tradition of literary and classical education the

significance of modern science. Even where he has included in his education some smatterings of modern science, his knowledge in the main is linked to physics and chemistry. For most British people biology is either a closed book limited to a little botany or zoology. Some decimal of one per cent may have heard of Pasteur, a smaller decimal of the Abbe Mendel. Genetics, even plant genetics is still something under taboo as a school subject. Consequently the politician and the administrator, the Treasury Controller and general public don't begin to know what the agricultural research worker thinks about. They don't begin to comprehend his language still less to understand the character of his work. This ignorance is a serious danger to the whole economic future of those parts of the Empire that are dependent on agriculture and particularly on the export of agricultural products in competition with world markets. We are skilled in handling legal transport and industrial problems but tiros at modern biology. Our research institutions in the Colonial Empire are few, small and short of money and personnel. The few we have are good especially the College and the Cotton Research Station in Trinidad. Trinidad in a few short years has already made a real difference but we are behind the vanguard in the race and we cannot henceforth afford to leave it to the Dutch, the Russian and the Americans to lead us. We are already suffering in competition from a want of knowledge and a want of intelligent imagination in this whole subject. Our whole educational curricula have been based on an old stable civilisation and on conditions that are fast changing. The most serious gulf to be bridged is the intellectual gulf between the actual research worker and the people with power who alone can provide him with the support and opportunities without which the research worker cannot help them. [*Journal S. African Society*. January 1935].

THE PARITY OF INDIAN COTTON *

When Principal Antia invited me to speak on a subject connected with cotton and sent me word that Mr. Haridas Madhavdas was to preside, I felt that that no better subject could be selected than the parity of Indian cotton not only because there was a lot of popular misunderstanding of this subject but also because you or I could find no better man than Mr. Haridas to tell us a few home truths on this subject. In a way, this is a subject which deals with the price problems of Indian cotton, in all its aspects, and so, should be of interest not merely to the student of cotton but also to the student of Indian economics.

The most usual question I am asked as a cotton merchant, not merely by laymen but also by people who ought to know better, like people in charge of mills or of Government Departments, is, what is the normal parity of Indian cotton? They imagine that there is a fixed parity or a fixed relationship between, say, the price of New York Futures and Broach, or Broach and Oomras, or Bengals and Broach—that if there is a disturbance of this fixed relationship—which, by the way, must be a carefully guarded trade secret—it would be a profitable operation to sell what is higher in price and buy what is lower in price. Unfortunately, there are many people who imagine such relationships do exist and then operate on the same, to find themselves saddled with losses, when what they considered low in parity goes lower and what they considered high in parity goes higher. They then declare that it must be the fault of somebody else and end by blaming the authorities, say, the Government or the East India Cotton Association. Or they hit upon some technical market factors like the operation of Teji-Mandi or of some big Marwari speculator who happens or appears to be making money

* Speech delivered by Mr. R. G. Saraiya at the Sydenham College of Commerce and Economics on 26—2—35. Published with the kind permission of the author.

and pass on all the blame for their losses to such technical factors. Psychologically speaking, this is the conscious or sub-conscious complex behind a lot of things you read in the press. As students of commerce, and in the cold light of reason, you should learn to assess all this criticism at its true value and learn to separate the chaff from the grain. If I succeed, in even a small degree, in helping you to this end, I have no doubt I will have spent a useful half-hour with you.

The expression 'parity of cotton' is used to denote comparative or relative price, just as the expression 'naval parity' is used to denote comparative strength. When you speak of the parity of Indian cotton, you speak of the comparative price of Indian cotton. It is understood that you are speaking of the price of Indian cotton in comparison with the price of American cotton, because America is, as you know, the largest single producer of cotton. It is usual to compare the two prices by comparing the quotation of New York Futures with the quotation of Broach, i.e., the most important Indian contract.

But before we can compare two prices, we must be in a position to reduce them to a common denominator or to express them in the same terms. And to do this, we must be in a position to understand what the different contracts mean. Half the troubles of the cotton speculator would vanish if he always had at the back of his mind what these different contracts represented. Broach A/M means the price of Broach cotton per candy of 784 lbs. expressed in rupees, for delivery in April or May at the seller's option, with the additional right to the seller of tendering certain specified growths like Dolleras or Surats at market differences—the Broach cotton to be of average staple and fully-good standard Similarly New York may mean the price, in cents per lb, of American cotton, 7/8" staple and middling standard, delivered in May, with the option to the seller of tendering a certain fairly wide range of standards and staple lengths at market differences. Similarly the Liverpool May contract means the price of the same cotton delivered in Liverpool, with the same option to the seller.

Further, the New York Futures contract represents cotton delivered in New York or any one of eight ports in the U. S. A. Liverpool cotton is understood to represent cotton in Liverpool and Broach contract is understood to represent cotton in Bombay.

In comparing the prices, therefore, the first thing to do is to reduce them to the same terms. In Bombay, we have the price expressed in so many rupees per candy, in New York in so many dollar cents per lb. *gross weight*, in Liverpool in so many pence and hundredths of pence per lb. *net weight*.

The comparison can be made by reducing the pence per lb to rupees per candy, or vice versa, taking the current rate of exchange; or the cents per lb. to rupees per candy, taking the Re. — cent exchange; and allowing for the fact that the New York price is the gross price and includes the tare conventionally estimated at 6%. Taking New York at 12·80 and the Rupee-Dollar Cross rate at 2 70. we arrive at a price of New York of Rs. 271 per candy, which comes to Rs. 287 if allowance is made for the net and gross weights. So Bombay is Rs. 287 minus Rs 236: Rs. 51 lower than New York. Or taking Liverpool at 6·80 and Bombay at Rs. 236, we arrive at the price of Rs. 296 per candy at 1/6 exchange. Bombay is Rs. 60 lower than Liverpool.

You will notice that while the New York contracts work out to Rs. 287, the Liverpool contract works out to Rs 296; i. e. Rs. 9 higher. This is explained by the cost of carrying cotton from the U. S. A. to Liverpool, and may be considered normal. We need not enter into the further details of the Liverpool-New York straddle here.

We had examined so far the crudest way of expressing the parity. But this is the most usual. We have assumed that Bombay is Rs. 60 lower than Liverpool, but not lower in parity. We have still to make allowances for the difference in the spinning performances of the two cottons. The Broach staple is shorter and weaker, and let us hypothetically assume that Broach should be Rs. 50 lower because of its inferior performance. Then it would be a correct thing to say that Broach is Rs. 10 lower in parity with Liverpool Americans.

But this is after all a very crude method of expressing things. The difference in the value of Broach and Americans is assumed at Rs. 50 and this is pure guesswork—and what is more—it is not an absolute quantum but a variable function.

If Liverpool cotton was a shilling a pound, the value of Broach would not be Rs. 50 lower but possibly Rs. 100 lower. We have, therefore, to refine our ideas and methods of working out parities, and try to express them as precentages. We may suggest that Broach cotton is intrinsically 10% lower in value than American, and the relative parity should be watched accordingly, and if Broach is 15% lower than American in absolute price, we may say that Broach is 5% lower in parity.

The parity or the difference in price can be expressed in pence per lb., as explained above. In the above case, we have Broach Rs. 236 with Liverpool at 6·80. Broach at Rs 236 works out to 5·42d per lb., so that the parity difference is 1·38d. If broach is Rs. 242 and Liverpool 6·85 as on December 30, the difference is 6·85 minus 5·55 i.e 1·30. In the Bombay Cotton Annual, you will find the parity worked out in this manner from 1922 to 1933, month by month. The narrowest parity was reached in March 1932 when Broach was only 0·17d lower than Liverpool, or a percentage difference of just over 3 per cent. This was due to the short crop in India in 1931–32. The widest parity was in December 1923 when it was as much as 5·99d or a Liverpool quotation of 20d or a percentage of 34·95. The present parity works out to a percentage of about 20. It would seem that the parity tends to widen, not only in absolute differences but also in percentage differences, when the price level is very high. But it would be dangerous to generalise, for reasons which will be explained hereafter.

In the adjoining Table, * I have worked out the difference in price between Liverpool and Bombay as a percentage, the difference being expressed as a percentage of the price of Liverpool futures. You will notice that the percentage is as high as 30 in January 1934 and as low as 3·2 in February 1932. So here is something to think about for the people who believe in a "fixed parity" between Liverpool and Bombay; by the way, it may be pointed out that in January 1924, Liverpool futures were nearly 20 d. and Broach Rs. 626– while in February 1932, the former were down to 5 d. and the latter to Rs. 206.

The figures I have compiled will repay close study and I want one of you gentlemen of the Cotton Section to plot them in a graph showing

1. the price of Liverpool futures expressed in pence per lb. (Cotton Annual No. 15, p. 128).
2. the price of Bombay futures, reduced to pence per lb. at current rates of exchange. (Cotton Annual No 15, p. 128).
3. the difference between the two, expressed as a percentage of the Liverpool quotation.

If you take the trouble to compile these graphs and then write a note on same, I shall be glad to help you to find out the correct reasons for all the variations you notice.

* Not attached.

But our difficulties have not stil ended. They have just begun The relative value is not a fixed percentage but a variable function which is ultimately determined by so many factors, such as :—

1. The relative supply and demand.
2. The relative character of each year's crops.
3. The cost of transport to the point of consumption.
4. Exchange restrictions and tariffs.
5. Artificial price regulations etc.
6. Technical factors like attempts to corner etc.

It would fill up a book to speak at length on all these factors. But a few illustrations will show the working of each of these If there is a small crop in India let us say, and a large crop in the U. S. A, Indian cotton is bound to rule higher in parity than American cotton, to the point to which the comsumption of Indian cotton is restricted and the consumption of American cotton is expanded, so as to bring out an adjustment of the demand to the supply. The reverse is equally true in case the Indian crop is a large one as in 1924—25 and 1925—26, when the Indian crop was actually very nearly 7 million bales and Broach April/May ruled nearly Rs. 100 lower than Americans at one time or other. In 1932, when we had a small crop, Broach at one time ruled about as high as American cotton or only a few points of lower. When Indian cotton was cheap or too cheap, one heard all sorts of criticisms about the working of the East India Cotton Association, the Indian Government and what not. I will try to put my position in another way. If the Bengal crop is small, the price of Bengal will go up in relation to Broach, as the world must have, say, a certain number of cotton blankets and no amount of previous statistics will help to keep down the price of Bengals, which will go up till the demand for blankets is reduced and the manufacture thereof becomes no longer profitable

The next factor is the character or quality of the crop. If the crop of a certain year shows better staple, it will spin higher counts, and its price in the world's crops will be relatively higher. This is no doubt obvious.

The third factor is that of transport—in a more general sense than the mere cost of transport. The relative adjustment of parity is brought about ultimately by the competition of similar growths of cotton at the points of consumption. As you know, a substantial portion of the Indian crop has to be exported and has to compete in the world's markets with American and other growths. We have therefore to take into account the cost of transporting Indian cotton to the world's markets—like Japan, Europe etc.,—and the price of Indian cotton as laid down in these markets is decided by the price of American or other cotton which is brought there for consumption. It is because of this fact that the Indian crop as a whole cannot benefit by the import duty on raw cotton.

But the case of Indian staple cotton is different. Here the total Indian supply is smaller than the total Indian requirements, with the result that the price of Indian staple cotton, like Navsari, can go up till it reaches the level at which American cotton can be laid down in India. This, as you know, has to pay an import duty of Rs. 24/8 per candy, and so, Indian staple cotton cannot be said to be too high in parity under present circumstances, till it becomes dearer than American or other foreign cotton laid down in India, duty paid. But should the Indian staple cotton crop exceed our requirements, it would have to be exported, and it would have to rule at the level at which it could compete with American cotton in the common markets like Japan. The relative price would then be lower than the American price at which American cotton can be laid down in Bombay, plus Rs. 24/8 duty, plus the cost of transporting Indian cotton to the

foreign markets. In fact, these two points would denote the maximum and minimum price at which Indian staple cotton will rule in India.

The above illustration also shows the importance of tariffs etc., exchange restrictions or discriminatory quotas would play a similar part in determining the relative price levels.

Further, we have the most important recent price factor, viz., the American attempts at price stabilisation. This year, America is financing some 7 million bales at 12 cents per lb., so that American cotton could not very well sell for long under the equivalent price of this loan. When Indian cotton which had no such support continued to decline even after American cotton was stabilised, there was a hue and cry in India. But Indian cotton continued to decline till her sur plus supplies were absorbed and has now recovered—thanks first to the American policy and next, to the reduction in the size of the Indian crops.

Finally, we have such purely technical or local factors, affecting either Indian or American cotton, and unduly raising or lowering it. Among these may be included attempts to corner, or to "bear raid", attempts to tamper with one particular contract by manipulating spot rates, or the machinery of an exchange. As explained at the very start, the effect of such factors is generally always exaggerated, ninety-nine times out of a hundred, such attempts fail, as world forces are stronger than any technical factors. Bodies like the East India Cotton Association can regulate markets and see that a fair deal is exercised between buyer and seller, but they cannot stabilise prices unless they have money or the right to create paper money, like the American Government.

You will thus see what a large number of factors is involved in the working out of the parity of Indian cotton. The number of factors, ponderable and imponderable, is in fact, so large that they cannot be reduced to an algebraic equation. And that glorious uncertainty and that world-wide outlook—which are so necessary to the cotton trader—constitute the chief intellectual attraction of the cotton game.

Before concluding, it would be of interest to you to note a few maxims which should guide you, or rather, the cotton merchant, in his operations. The first is that the cotton market, as a whole, is wiser than you individually, in spite of all your learning. The market quotations, therefore, should be treated always with respect, as they represent in tabloid form the essence of the world's thought on same. If you wish to make money, you must follow the market or swim with the current, whether it is up or down. Swimming against the current is dangerous, and even Governments have failed in the attempt. And here is where the operator on the cotton exchange makes his money, and gets the better of the man of theory and statistics. You must, therefore, in spite of all your learning, bow down to the market tendency, which is the force of world prices as expressed in futures quotations.

Crop and Trade Report.

Cotton Raw, in The Madras Presidency. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February 1935 to 7th June 1935 amounted to 241, 307 bales of 400 lb. lint as against an estimate of 445, 600 bales of the total crop of 1934—35. The receipts in the corresponding period of the previous year were 252, 644 bales. 145, 614 bales mainly of pressed cotton were received at spinning mills and 62,662 bales were exported by sea while 24,609 bales were imported by sea mainly from Karachi and Bombay.

FIFTH CONGRESS OF THE INTERNATIONAL SOCIETY OF SUGARCANE TECHNOLOGISTS

(Brisbane, Australia, August, 1935)

The International Society of Sugarcane Technologists is to meet at Brisbane in Australia on the 27th August. 1935. This society, which generally meets once in three years and alternately in the Eastern and western hemispheres, has already held four sessions—viz., in Hawaii, Cuba, Java and Puerto Rico. The one at Brisbane is to be the Fifth Congress of this body.

Visits to experiment stations and excursions to factories and sugar plantations have been important adjuncts to the meetings of the Congress. While the actual sessions at Brisbane are to last about a week from 27th August, excursions are to occupy a fortnight after the meeting. We learn that leaders of the Sugar Industry in Australia are to deliver addresses at Brisbane so as to give the delegates to the Congress a true perspective of the special conditions obtaining in the Australian Sugar Industry. One special feature of the Industry in Australia is the employment of White labour alone.

The Congress is to consist of eight different sections representing the various aspects of the Sugar Industry. In the manufacturing section a special feature will be "Sugar boiling with particular reference to the refining quality of raw sugar". Plot technique is to receive attention on the agricultural side; and we learn there is to be a symposium of the very important subject of selection of useful types in sugarcane breeding. Australia is said to be a land of diseases and the Pathological section—including virus diseases and quarantine—is expected to be particularly instructive. Testing of new varieties for disease resistance and control of disease by cultural operations are two of the rather attractive items in the programme of the Congress

The Australian Government and the Sugar Industry are doing their best to render a visit to the Congress both comfortable and instructive In India there are as many as 28 members of this Society representing the various lines of Sugar Research in the country and the Industry in all its aspects. About half a dozen delegates from India are expected to attend the Brisbane Congress.

College News and Notes.

Reopening. The College reopened after the summer recess on the 14th instant. The II and III B. Sc. classes are in full swing The selection of students for the I. B. Sc. took place as usual at Samalkota, Madras and Coimbatore. Rao Bahadur D. Ananda Rao who is an *ex-officio* member of the selection committee left for Samalkot on the 15th instant. It is understood that the number of applications for admission to the College was low this year, evidently due to the general unemployment among agricultural graduates.

Weather. After several weeks of dry and warm weather, the temperature has cooled down with the advance of the monsoon on the Malabar coast. Cool winds and occassional drizzles of rain were the features of the latter half of June. Coimbatore has, however, to congratulate itself on the comparatively tolerable weather it experienced even during the months of April and May, as the temperature never topped 100 when several other districts in the Presidency recorded temperatures between 106 and 120 for several days.

Staff changes. Consequent on the appointment of Rao Bahadur D. Ananda Rao as Director of Agriculture, Mr. R. C. Broadfoot has been appointed Principal

and Mr. C. Narayana Iyer as Headquarters Dy. Director of Agriculture. Rao Sahib Dr. T. V. Ramakrishna Iyer who is due to retire in July, has taken a month's leave and Mr. M. C. Cherian, Lecturer in Entomology is in additional charge of the duties of the Entomologist. Mr. V. Suryanarayana, B. Sc has been appointed assistant lecturer in Agriculture in place of Mr. S. Narayaniah, appointed Assistant Director of Agriculture. Mr. V. T, Subbiah Mudaliar assistant lecturer and Secretary of the M. A. S. U. has been transferred to Salem as Assistant Director of Agriculture.

M. Sc, Degree. It is gratifying to note that among seven candidates who were awarded the M. Sc. research degree of the Madras University this year, two are members of the Madras Agricultural Departmant. We offer our congratulations to Mr. T. Rajagopala Iyangar of the Chemistry section and to Mr. K. M. Thomas of the Mycology section on their success.

Union Secretary. On his appointment as Assistant Director of Agriculture, Salem, Mr. V. T. Subbiah Mudaliar, Secretary of the M. A. S. Union tendered his resignation and Mr. C. S. Krishnaswami has been appointed in his place.

Delegates to International Conferences. It is learnt that Rao Bahadur T. S. Venkataraman, Government of India Sugarcane Expert will be proceeding to Brisbane in August to attend the fifth Congress of International Society of Sugarcane technologists and Dr. (Miss) E. K. Janaki Ammal, Geneticist, Imperial Sugarcane station will be proceeding to Amsterdam to attend the International Botanical Congress to be held in September.

Corrigenda. We regret that by an oversight the name of a successful student in the recent B. Sc. Ag. examination was left out from the list published in the May number of the Journal. He is Mr. Kunhirama Kidavu.

Foreign study. We are glad to note that Messrs N. Parthasarathy, B A., B. Sc, and S Ramanujam M. A. of the Paddy Specialist's section and Mr. R. Kochukrishna Pillai, B.A. of the Chemistry section have been granted leave for 2 years for prosecuting higher studies in the United Kingdom.

Official changes. Rao Bahadur M. R. Ry. D. Ananda Rao, took charge as Director of Agriculture on 20th inst. and Mr. R. C. Broadfoot took charge as Principal Agricultural College on the 22nd inst.

Visitors. The committee for selection of students for the college consisting of Rao Bahadur M. R. Ry. D. Ananda Rao, Mr. R. C. Broadfoot, Diwan Bahadur M.R.Ry. T. Raghaviah and Mr. N. Sivaraj visited Coimbatore on the 21st inst and interviwed the candidates.

Rao Bahadur M. Vaidynathan, Statistician to the Imperial Council of Agricultural Research who was on tour visited the Research Institute and Breeding Stations.

At home. On the 22 instant the Officers' club and the Ladies' club, Agricultural College were at home to Mr. & Mrs. Ananda Rao, respectively on the eve of their departure from the estate.

College Day and Conference.

The twenty fourth College Day and Conference will be held during 2nd & 3rd August, 1935. All the members and well wishers of the Union are requested to attend, and contribute to the success of the function.

The Programme of the College Day and Conference is fixed as follows:—

Friday, 2nd August	... ...	Conference.
Saturday, 3rd August	... ...	Sports.
Sunday, 4th August	... ...	Business Meeting.

Members desirous of bringing forward amendments to rules, or any other proposition before the general body meeting are requested to give notice of the same before the 15th July to the Secretary—in writing.

Weather Review (MAY 1935).

Dry weather prevailed over the peninsula for the first half of the month with occasional local falls of rain in Mysore. An advance of the South West monsoon occurred in the Andaman Sea on the 17th and caused widespread rain in Lower Burma. A few falls of rain also occurred in South East Madras and North Madras coast. The monsoon receeded into the south Bay of Bengal on the 19th and remained fairly active till the end of the month. It caused widespread rain in Burma and local thunderstorms occurred in South Madras and Malabar.

Rainfall in the Presidency was largely defective and particularly so in the West coast.

Maximum temperature began to be above normal in the last week of the month. The hig est temperature recorded was 115°F at Hanamakonda on the 25th and 30th and at Cocanada on the 29th.

The severe earthquake at Quetta was recorded by the Bombay Observatory at 03 hours, 06 min. I. S. T. on Friday the 31st May, having its origin 960 miles away from Bombay.

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	−2·0	1·6	South	Negapatam	0·0	−1·6	10·1
	Berhampore *	0·1	−1 6	3·0		Aduthurai *	0·0	−2 5	3 9
	Calingapatam	0·2	−2·3	1·3		Madura	0·1	−2·8	3·3
	Vizagapatam	0·8	−1·1	0·9		Pamban	0·0	−0·8	10 5
	Anakapalli *	0·0	0·0	0 0		Koilpatti *	0·2	−1·8	4·6
	Samalkota *	1·4	+0·2	3 8		Palamkottah	1·1	−3·0	8·3
	Maruteru *	0·0	−1 3	0 2					
	Cocanada	0·0	−1·5	1·4					
	Masulipatam	0·5	−0·9	2·0	West	Trivandrum	0·8	−7·7	12·3
	Guntur *	0·3	−2·1	1·3	Coast	Cochin	2·3	−9·4	5 8
						Calicut	2·1	−6·5	5·8
Ceded Dists.	Kurnool	0·0	−1·0	1·1		Pattambi *	0·9	−9·1	3·4
	Nandyal *	0 8	−1·1	2·4		Taliparamba *	1 4	−6·9	5·6
	Hagari *	0·2	−1·8	1·8		Kasargode *	1·3	−6·2	5·1
	Bellary	0·4	−1·6	0 9		Nileshwar *	1·0	−9·0	3 0
	Anantapur	0·6		1 9		Mangalore	0 9	−5·3	1·2
	Cuddapah	0·5	−1·0	0·8					
Carnatic	Nellore	0·0	−0·8	1·3	Mysore	Chitaldrug	1·0	−2·0	2·7
	Madras	0 0	−1·1	0·6	and	Bangalore	2·3	−2·1	3 6
	Palur *	0··	0·0	0·0	Coorg	Mysore	6·6	+1·4	9 7
	Palakuppam *	0 0	−1·8	3·4		Mercara	3·0	−2·6	6·4
	Cuddalore	0·0	−0·7	3·4					
Central	Vellore	0·1	−2·3	2·2	Hills.	Kodaikanal	1·2	−4·8	15·2
	Hosur cattle farm *	0·0	0·0	0·0		Coonoor	1·9		17·7
	Salem	0·2	−4·5	3 1		Ootacamund *	3·2	−4·5	7·4
	Coimbatore	0 2	−2·2	3·2		Nanjanad *	5·5	−0·7	19·6
	Coimbatore Res. Inst. *	0·7	−2·5	4·2					
	Trichinopoly	2 6	−0 5	8·4					

*Meteorological Stations of the Agricultural Department.

Weather Report for the Research Institute Observatory.

Report No. 5/35

Absolute maximum in shade	...	99·8°F.
Absolute minimum in shade	...	71·2°F.
Mean maximum in shade	...	97·6°F.
Departure from normal	...	+3·3°F.
Mean minimum in shade	...	74·9°F.
Departure from normal	...	+1·0°F.
Total rainfall	...	0·72"
Departure from normal	...	−2·49"
Heaviest fall in 24 hours	...	0·44"
Total number of rainy days	...	1
Mean daily wind velocity	...	3·1 m. p. h.
Mean humidity at 8 hours	...	65·2%
Departure from normal	...	−6·2%
Total hours of bright sunshine	...	272·6
Mean daily hours of bright sunshine	...	8·8

General Summary.

On the 3rd and 13th there were dust storms lasting for about half an hour in each case. The wind velocity during gush was 24 m. p. h. on the 3rd & 16 M. P. H. on the 13th.

Maximum temperature was above normal and rainfall defective.

A. S. R. & A. S.

Departmental Notifications.

Gazette Notifications.

(1) M. R. Ry. Rao Bahadur D, Ananda Rao, Principal to be Director of Agriculture, Madras. (2) Mr. R. C. Broadfoot, Headquarters Dy. Director to be Principal, Agricultural College, Coimbatore Vice 1 and 3 Mr. C. Narayana Iyer, Dy. Director iv circle, to be Headquarters Dy. Director of Agriculture Vice 2,

Dr. Rao Sahib T. V, Ramakrishna Iyer l. a. p. for one month from 5th June 1935, and Mr. M. C. Cherian, Lecturer in Entomology to be in additional charge.

Promotions.

Madras Agricultural Subordinate Service—Upper Subordinate-Science Section-Promotion ordered.

The following promotions of Upper Subordinates in the Science Section are ordered with effect from 1st April 1935;—

From III grade (Rs. 200/–) to II grade (Rs. 225/-) G. Ganapathy Ayyar, Assistant in Chemistry without prejudice to his officiating appointment in the Madras Agricultural Service.

From IV grade (Rs. 120—10—170) to III grade (Rs. 200/-.) 1. S. Dharmalinga Mudaliar, Assistant in Paddy without prejudice to his officiating appointment in the Madras Agricultural Service. 2. C Krishnan Nayar, Assistant in Mycology. 3, K. Govindan Nayar. Assistant in Chemistry. 4. T. S. Ramakrishna Ayyar, Assistant Lecturer in Mycology. 5. P. Vishnu Somayajulu. Assistant in Mycology. 6. T. K. Balaji Rao, Assistant in Paddy. 7. S. Ramachandra Ayyar, Assistant in Entomology.

From V grade (Rs. 85—5—120) to IV grade (Rs. 120--10—170) 1. S. M. Kalyana rama Ayyar, Assistant in Cotton. 2. G. Venkatanarayana Assistant in Oilseeds

3. N. Parthasarathy, Assistant in Paddy. 4. R. Balasubrahmanya Ayyar. Assistant in cotton without prejudice to his temporary appointment in the Madras Herbaceum Scheme. 5. C. Jaganatha Rao. Assistant in Cotton. 6. C, S. Krishnaswamy Ayyar. Assistant in Mycology. 7. P. Gopalarathnam, Assistant in cotton. 8. V. Gomatinayakam Pillai, Assistant in millets. 9. M. R. Balakrishna Ayyar, Assistant in Chemistry without prejudice to his temporary appointment in the Fodder Cholam scheme. 10. V. Tirumala Rao, Assistant in Entomology. 11. M. B. Venkatanarasinga Rao, Assistant in Paddy without prejudice to his temporary appointment at the Rice Research Station Berhampur. 12. K. B. Viswanathan, Assistant in Paddy without prejudice to his temporary appointment at the Rice Reseacrh Station, Berhampore.

Consequent on the retirement of M. R. Ry. Rao Sahib V. Muthuswami Ayyar Avl. the following promotion of Upper Subordinate in the Agricultural Section is ordered (with effect from *16th December 1934.*)

I grade—Rs. 250. L. Narasimha Acharya, Provisionally substantive I grade to be substantive in the I grade.

From II to I grade. Rajagopal G. Mal *vice* L. Narasimha Acharya promoted substantively to I grade *To take effect from 16th December 1934.*

From III to II grade (i) A. Gopalan Nayar *Vice* Mr. K. Ramanuja Acharya promoted to II grade substantively *To take effect from 1st April 1935.*. (ii) M. P. Kunnikutti *Vice* A. Gopalakrishnayya Nayudu promoted to II grade substantively without prejudice to his temporary appointment in the Madras Agricultural Service.

From IV to III grade. K. M. Jacob, Filled in III grade against a vacancy in the II grade.

L. Sankarakumara Pillai, Upper Subordinate, Agricultural Section, V grade is promoted to IV grade (*provisionally substantive*) with effect from *4th June 1935.*

II grade—Rs 225. 1. T. R. Venkaswami Rao Avl., provisionally substantive in II grade to be substantive in the II grade. 2. K. Ramanuja Acharya Avl, provisionally substantative in the II grade to be substantive in the II grade. 3. A. Gopalakrishna Nayudu Garu provisionally substantive in the II grade to be substantive in the II grade without prejudice to his offg. appointment in the Madras Agricultural Service.

III grade Rs 200 K. Govinda Nambiar provisionally substantive in the III grade to be substantive in the III grade

IV grade Rs. 120—10—170 1. M. Gopalachetti provisionally substantive in IV grade to be substantive in the IV grade. 2. P. Kesavanunni Nambiyar, provisionally substantive in IV grade to be substantive in IV grade. 3. L. Sankarakumara Pillai, provisionally substantive in IV grade to be substantive in the IV grade.

From V grade Rs 85—5—120 to IV grade Rs. 120—10—170. 1. A. Yesudesan, 2. S. Venkatarama Ayyar, 3. M. Eggiaswami Ayyar, 4. K. K. Subrahmanya Ayyar. To be permanent substantive in IV grade. 5. Viriyala Suryanarayana, 6. M. Narasimhan, Provisionally substantive in the IV grade from 1—4—35 and substantive permanent from 21—4—35. 7. M. Satyanarayana, Provisionally substantive IV grade from 1—4—35. 1. P. S. H. Narayanaswami Nayudu, 2 K. Ramaswami Ayyar, To be provisionally substantive in IV grade from 21—4—35.

The Lower Subordinates (in class II Madras Agricultural Subordinate Service) named below are appointed as Upper Subordinates Class I Madras Agricultural Subordinate Service in the III grade Rs. 75—7½/2—105 on probation with effect from 1st April 1935.

1. A. Kondayya Sarma, Lower Subordinate III grade working in I circle. 2. R. Narasimha Ayyar, Lower Subordinate IV grade Assistant Agricultural Demonrrator in Mycology, IV circle. 3. I. Kurma Rao, Lower Subordinate V grade Assistant Farm Manager, Anakapalli. 4. P. K. Kannan Nambiyar, Lower Subordinate V grade Assistant Farm Manager, Nileshwar. 2. The above subordinates will be on probation for a total period of two years on duty. During probation they will draw only the pay admissible to them in the Lower Subordinate Service. 3. No. (i) has not yet passed the Account test. He is required to pass the Account test for Subordinate Officers Part I within his period of probation. Failure to pass the test within the time limit will entail the termination of his probation.

Sub: Madras Agricultural Subordinate Service—Class II—Lower Subordinates—grade promotions ordered.

The following promotions of Lower Subordinates—Class II Madras Agricultural Subordinate Service are ordered with effect from *1st April 1935:*

From III Grade Rs. 100 to II Grade Rs. 110. 1. M. Ramaswamy Pillai, Sub-Assistant, Paddy Section, *Coimbatore.* 2. T. D. Eswara Ayyar, Assistant Farm Manager, Sim's Park, *Coonoor.*

From V Grade Rs. 45—3—75 to IV Grade Rs. 75—4—95. 1. V. Viswanatha Ayyar, Assistant Farm Manager, Central Farm. 2. L. K. Narayana Ayyar, Assistant Agricultural Demonstrator, V Circle, Trichinopoly. 3. P. S. Suryanarayana, Assistant Agricultural Demonstrator in Mycology, V Circle, Trichinopoly. 4. M. Gopala Rao, Assistant Agricultural Demonstrator, I Circle, Vizagapatam. 5. R. Narasimha Acharya, Assistant Agricultural Demonstrator in Entomology, IV Circle, St. Thomas Mount. 6. P. Lakshminarayana, Assistant Agricultural Demonstrator, I Circle, Vizagapatam. 7. V. Achyutam Pantulu, Assistant Agricultural Demonstrator, I Circle, Vizagapatam. 8. G. L Narasimha Rao, Assistant Agricultural Demonstrator, II Circle, Guntur. 9. C. A. S. Ramalingam Pillai, Assistant Agricultural Demonstrator, VI Circle, Madura. 10. J. David, Assistant Agricultural Demonstrator, Microtome Section. 11. N. Krishna Menon, Sub-Assistant, Entomology Section, Coimbatore. 12. T. R. Naganatha Ayyar, Sub-Assistant in Botany. 13. S. Ponnuswamy Nayudu, Assistant Agricultural Demonstrator VI Circle, Madura. 14. T. V. Cheriyakku, Sub-Assistant in Mycology. 15. K. Soopi Haji, Assistant Agricultural Demonstrator, VII Circle, Tellichery. 16. R Subbayya Kavandan, Sub-Assistant in Paddy.

Confirmations.

Madras Agricultural Subordinate Service—Class I—Upper Subordinates—Probationers—confirmation ordered.

The undernoted Probationers in the Madras Agricultural Subordinate Service—Class I-Upper Subordinates—who have completed their probation are confirmed in the *Agricultural Section* in the posts indicated against each with effect from the dates noted against him. 1. M. K. Gopalan, Agricultural Demonstrator, III circle Provisionally substantive from 3rd January 1934 to be substantive permanent from 21st April 1935. In a permanent vacancy caused consequent on the retirement of Mr. V. Muthuswamy Ayyar. 2 G. Venkatakrishnan, Agricultural Demonstrator, VI circle. Provisionally substantive from 4th June 1934 to be substantive permanent from 1st May 1935. 3. D. Achyutarama Raju, Agricultural Demonstrator, II circle. Provisionally substantive from 4th June 1934 and substantive permanent from 1st May 1935. 4. U. B. Muhammad Abbas, Agricultural Demonstrator, IV circle. 5. M. Satyanarayanamurthi, Agricultural Demonstrator, 1 circle. 6. R. Kolandavelu Nayakar. Agricultural Demonstrator, V circle. 7. D. Shanmugasundaram. Agricultural Demonstrator, VI circle. 8. M. Venkoba Rao, Assistant

in Cotton without prejudice to his offg. appointment in the Cotton Section. 9. T. K. Mukundan, Agricultural Demonstrator, IV circle. 10. K. Hanumantha Rao, Assistant in Paddy without prejudice to his offg. appointment in the Paddy Section. 11. M. Damodara Prabhu, Agricultural Demonstrator, VIII Circle. 12. K. Narayana Nayar, Millet Assistant without prejudice to his offg appointment in the Millet Section. 13. A. Gulam Ahmed, Agricultural Demonstrator, III Circle. 14. N. V. Kalyanasundaram, Agricultural Demonstrator, IV Circle. 15. S. Anantapadmanabha Pillai, Farm Manager, Guntur. 16. D. V. Krishna Rao, Chemistry Assistant—without prejudice to his offg. appointment in the Chemistry Section. 17. K. Veerabhadra Rao, Chemistry Assistant—without prejudice to his offg. appointment in the Chemistry Section 18. K. Kumaraswami Chetti, Oilseeds Assistant—without prejudice to his Temporary appointment under the Government of India. 19. S. Rajarathnam Chetti, Farm Manager, Nanjanad. 20. A. Muhamad Ali, Farm Manager, Palur. 21. V. K. Appaji, Farm Manager, Palur. 22. M. J. David, Agricultural Demonstrator, V Circle, 23. L. Krishnan, Agricultural Demonstrator, VIII Circle. 24. P. P. Syed Muhammad, Agricultural Demonstrator, VIII Circle. 25. T. K. Thangavelu, Agricultural Demonstrator, VIII Circle. 26. K. Kuppumuthu, Farm Manager, Hosur.

New Appointments.

Madras Agricultural Subordinate Service—class I—Uupper Subordinates offg. appointments--ordered.

The following officiating appointments in the Madras Agricultural Subordinate Service-class I-Upper Subordinates III grade, in the scale of Rs 75—7½/2-105 are ordered with effect from *19th June 1935*:— 1. Y. V. Narayana Ayya, B. Sc., Ag., to officiate as Assistant in the Chemistry Section till further orders in one of the temporary posts created in G. O. No. 1700 Mis. Dev. dated the 7th December 1934—to report himself for duty to the Government Agricultural Chemist, Coimbatore. 2. Uchil Anandan B. Sc , Ag., to officiate as Upper Subordinate, Agricultural Section, *Vice* Mr. V. K. Kunhunni Nambiyar on leave or until further orders—to report himself for duty to the Farm Manager, Agricultural Research Station. Kasargod. 3. K. K. Krishna Menon B. Sc., Ag., to officiate as Assistant in the Chemistry section till further orders in one of the temporary posts created in G. O. No. 1700 Nis. Dev. dated the 17th December 1934—to report himself for duty to the Government Agricultural Chemist, Coimbatore. 4. S. Varadarajan B. Sc., Ag., to officiate as Assistant in the Chemistry Section till further orders in one of the temporary posts created in G. O. No. 1700 Nis. Dev. dated the 17th December 1934—to report himself for duty to the Government Agricultural Chemist, Coimbatore. 5. I. Sambasiva Rao Nayudu B. Sc., Ag., Village Investigator, Burja, Vizagapatam Dt. to officiate as Upper Subordinate, Agricultural Section till further orders *Vice* Mr. R. Vasudeva Rao Nayudu on other duty at the Sugarcane Station, Gudiyattam—to report himself for duty to the Superintendent, Agricultural Research Station, Anakapalli. 2 All the above candidates should join duty in their respective places on *19th June* 1935 without fail.

Transfers.

(i) T. A. Rangaswami Ayyangar, Assistant Agricultural Demonstrator. Namakkal to V circle to report himself for duty to the Dy. Director of Agriculture, V Circle, Trichinopoly.

(ii) P. Kannan Nambiyar, Assistant Farm Manager, Pattukottai on the expiry of his leave on 7th June 1935 to VIII Circle.

Viriyala Suryanarayana, Farm Manager, Kalahasti is posted as Assistant lecturer in Agriculture, Agricultural College, Coimbatore.

The following transfers of Upper Subordinates are ordered: -

1. K. Rangaswami Ayyangar, Assistant, Agricultural Research Station, Maruteru to the Agricultural Research Station, Ankapalli to officiate as Botany Assistant *Vice* Mr. S. Ramaswami Ayyar transferred to the Sugarcane station, Gudiyattam.

2. C. Ekambaram, Farm Manager, Agricultural Research Station, Palur to the Sugarcane Station Godiyattam to officiate as Farm Manager in one of the temporary posts created in G. O. No. Mis. 681 Dev. dated the 10th May 1935.

Leave.

S. Ramanujam, Assistant, Paddy Section, Coimbatore is granted *leave out of India* on half average pay for 24 months from 1st September 1935 for the purpose of higher studies in Great Britain.

M. Parthasarathi, Assistant, Paddy Section, Coimbatore is granted *leave out of India* on half average pay for 24 months from 1st September 1935 for the purpose of higher studies in Great Britain.

V. Satagopan, Agricultural Demonstrator, Coimbatore., on Leave Average Pay for 4 months from 27—6—1935.

T. A. Rangaswami Ayyengar, Assistant Agricultural Demonstrator is granted leave on average pay on medical certificate for 3 weeks in continuation of leave already granted in this office R. O. C. 45/35 dated 21—4—1935.

S. Varadarajulu Naidu, Agricultural Demonstrator, Royadrug iii circle is granted an extension of leave on average pay without medical certificate for one month in continuation of the leave already granted to him for two months from 18th March 1935.

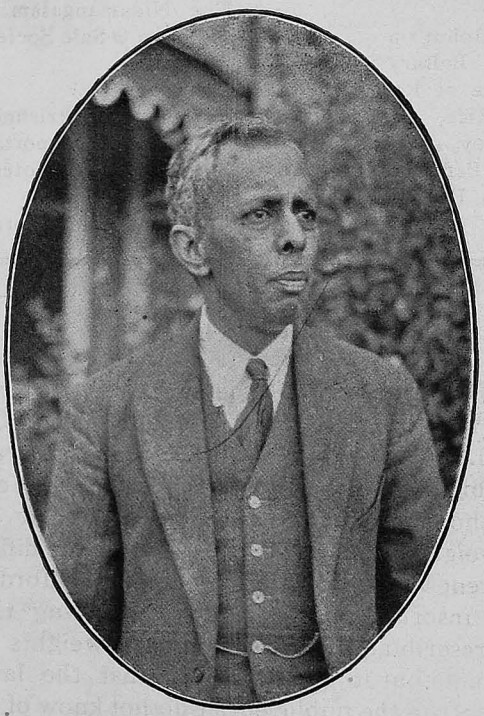
THE CECIL WOOD MEMORIAL

Mr. V. T. Subbiah Mudaliar writes :—

All the members of the Cecil Wood Memorial Committee, who were elected originally, have been transferred from Lawley Road. As the last member and secretary so transferred I have handed over the secretaryship to M. R. Ry. K Ramiah Avl., Paddy Specialist and all contributions to the Cecil Wood Memorial Fund may hereafter be kindly sent to him.

OBITUARY

We regret to inform the readers of the Journal of the demise of Mr. G. Sundaresan, B. Sc.Ag. a former student of the College, and some-time Assistant to the Cotton Specialist. The deceased was a keen sportsman, but was of a retiring and shy disposition. Our heartfelt sympathy goes to his bereaved relatives.



Rao Sahib T. V. RAMAKRISHNA AYYAR, B.A., Ph. D.