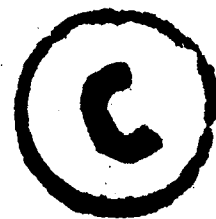


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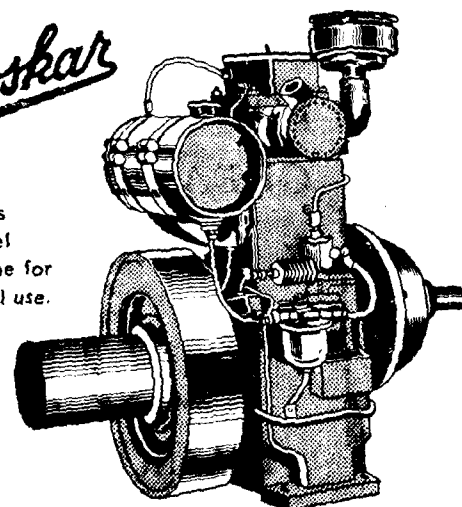
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ADDENDUM

Dr. K. Ramiah was also intimately associated with the Association of the Economic Biologists referred to in the welcome speech of Dr. S. Krishnamurthy, Dean, Agricultural College and Research Institute, Coimbatore in paragraph 3 of page 379 of M. A. J., Volume 47, September 1960.

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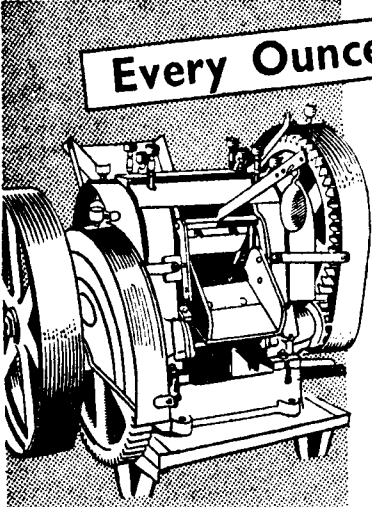
Page 385, September 1960 — Under obituary.

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The Madras Agricultural Journal

Vol. XLVII

October 1960

No. 10

Editorial

105

Panchayat Raj and Agriculture: On October 2nd a further step in the establishment of Panchayat Raj in the state has been achieved by the inauguration of the Madras Panchayat Act 1958. The establishment of 75 Panchayat Unions covering the National Extension Service and Community Development Blocks should be welcomed as a step forward increasing agricultural development by local effort in these areas.

Panchayat Raj is only old wine in new bottles. The system of administration of villages by panchayats of five members is said to date back to Chola times. This system had, however, taken on a different colour and function under the British Government, the emphasis having been shifted to the collection of revenue rather than the welfare of villages, or the improvement of agriculture. Mahatma Gandhi visualized that the government of the village by panchayats as envisaged in olden times should form the basis for the self edification and improvement of villages. According to him it had to be a republic in itself and interdependent on others only to the extent necessary.

After attaining independence India was well set for attaining its objective of Panchayat Raj. The Madras Village Panchayats Act 1950 brought into force 269 class I and 315 class II Panchayats in townships and villages. Elected members ranging from 5 to 15 were to improve the villages in all directions. However the difficulty of obtaining trained personnel and finance for carrying out their projects stood in their way.

The new Panchayat Act has been ushered in as a cementing factor for the Town and Village panchayats by the establishment of Panchayat Unions in the place of the old District Boards. There are to be 374 such unions in the state by 2nd October 1961. Among the duties assigned to the unions improvement of agricultural stock and holding of agricultural shows have been included. The

Block development officer assisted by the Panchayat Union is to actively assist in the execution of the projects of the Third Five Year Plan. Every union has to "function as a planning authority for the area and annually frame an agricultural production programme with specific targets and take all steps within its power to ensure that the targets are attained". Additional facilities by way of staff and increased payment to village offices acerying out their duties have been provided which should go a long way in encouraging these field workers for efficient work and obtaining substantial results.

The prime importance in agriculture is to bring the village agriculturist in close contact with the state department. His needs have to be met with in the proper time for ensuring increase in agricultural production. With the self determination and self help by way of local administration imposed upon the villages by the panchayat acts and the link provided with higher administrative set up through the Panchayat Unions, who could voice the necessities of the villages, it is to be hoped that opportunity will be availed of by our villagers for increasing agricultural production and bringing in prosperity to the villages.

An Announcement

At the General Body meeting of the Madras Agricultural Students' Union held on 21—8—1960, it was decided unanimously that the rates of subscription of the members be enhanced as given below with effect from 1—7—1960.

Gazetted officers and other subscribers	Rs. 8.00 per annum
Upper subordinates of the Madras Agricultural Department	Rs. 6.00 "
Student members	Rs. 4.00 "

Studies in Cereals-Structure in Relation to Drought Resistance *

by

M. CHARLESS RATNASWAMI, B. Sc. (Ag.),
Agricultural Research Institute, Coimbatore.

Introduction : The principal rainfed cereals of South India are the Millets which during their growth pass through frequent failure of rainfall. During droughty seasons they are found to withstand drought in varying degrees. It is obvious that these cultivated species have developed variations in adaptations which appear to have survival value in coping with a varying water supply. The earlier workers probing into the cause of drought resistance studied the structure of the leaves alone instead of considering the other component parts of the plant. In this work on the rainfed cereals, detailed studies on the structure of the whole plant have been made and presented.

Previous work : Under conditions of poor soil moisture and high atmospheric temperature the plants are subjected to a complexity of reactions both from within the plant body and outside. Maximov (1925) believed that the ability of the plant to resist drought is due to a multiplicity of morphological and physiological characteristics. It was generally assumed as expressed by Maximov (1929) that the drought resistant plants must have developed structural adaptations to enable them to transpire very slowly. As such, importance was laid on the study of the leaves mainly and to some extent on the stem, the organs concerned with transpiration and water loss. Krishnaswamy *et al* (1942) in their study on the anatomical features of the leaves of the millets, have concluded that the leaf anatomy did not give any clue to identify drought resistant varieties. While the study of the leaf may be expected to show certain characteristics, it, being the component part of the organism, cannot explain the behaviour of the whole body. Viewed from this angle, the present approach has been made in trying to find out the relation of the structure of the various parts of the plant to drought resistance. Daniel Sundararaj (1950) has studied the structure of five grasses and has shown definite correlations of structural adaptations in respect of root, stem and leaf to drought resistance.

* Prize winning article for Ramasastrulu Munagala Prize awarded during 43rd College Day and Conference 1960.

Materials and Methods: The strains studied in each of the millets are presented in Table I. *Zea mays* was also examined so as to get a comparative knowledge of the structural pattern of *Sorghum durra* as related to the former so far as drought resistance is concerned.

TABLE I.
Details of Strains Studied.

S. No.	Species	Strain No.
A. Millets:		
1.	<i>Sorghum durra</i> . Stapf. var. Coimbatoreum Snow	Co. 1
2.	<i>Pennisetum typhoides</i> . Stapf. and Hubbard	Co. 4
3.	<i>Setaria italica</i> Beauv.	Co. 3
4.	<i>Panicum miliaceum</i> L.	Co. 1
5.	<i>Paspalum scrobiculatum</i> Linn.	Co. 1
6.	<i>Eleusine coracana</i> Gaertn.	Co. 7
7.	<i>Echinochloa frumentacea</i> Link.	Co. 1
8.	<i>Panicum miliare</i> Lam.	Co. 1
B. Corn:		
	<i>Zea Mays</i> Linn.	Local strain

The plants were grown in a field of red loamy soil under replicated conditions during the main and summer seasons of 1959. The details of the plant part studied in relation to drought resistance are presented below:—

Structure of the Plant parts studied	Nature of experimentation made at flowering stage.
Root —	(a) Morphology of the roots. (b) Transverse section of the nature root.
Stem —	(a) Transverse section of the 4th internode from the top, taken at the middle of the internode.
Leaf —	(a) Transverse section at the middle of the 4th leaf sheath and (b) blade. (c) Lower epidermal peel of the 4th leaf at the middle.

The camera lucida drawing of the root was made on a graph sheet and the area of the stele was calculated as a percentage of the total cross-sectional area of the root. The transverse sections

were taken by hand sectioning and were stained with Safrannin 1% aqueous solution. Camera lucida drawings of the sections were made at 45 degrees at table level. Microphotographs were taken with a Zeiss microscope.

Pot Culture Experiments: A pot culture experiment with nine species of cereals replicated four times was conducted under uniform conditions of soil and water. The size of the pot was 48 cms. in diameter and 65 cms. in depth. Two plants were grown in each pot. After 35 days, the watering was stopped and the observations on temporary and permanent wilting were recorded. The wilting experiment was initially laid out in the field with four replications. A regular grade in the degree of resistance to drought was observed, the maximum in *S. Durra* and the minimum in *P. miliare* with the rest intermediate in the order of *Z. mays*, *P. typhoides*, *S. italica*, *P. miliaceum*, *P. scrobiculatum*, *E. coracana* and *E. frumentacea* the least but better than *P. miliare*. With these indications observed, pot culture studies were made subsequently to confirm them.

Microscopic measurements were made with the micrometer scale and the rest with the centimeter scale and slide clipers wherever necessary. All the measurements and counts presented in each table are mean of readings recorded for ten plants in each species.

Experimental Observation:

1. **Wilting experiment:** The data recorded on the nature of wilting under pot-culture experiment is presented in table II.

TABLE II.
Particulars of wilting noted in Pot Culture Studies.

Species	Date of showing	Date on which watering was stopped	No. of days after which temporary wilting commenced	Day on which permanent wilting was noted
<i>S. durra</i>	15—12—59	20—1—60	12	16th day
<i>Zea mays</i>	do.	do.	11	15 do.
<i>P. typhoides</i>	do.	do.	9	12 do.
<i>S. italica</i>	do.	do.	8	11 do.
<i>P. miliaceum</i>	do.	do.	8	11 do.
<i>P. scrobiculatum</i>	do.	do.	6	8 do.
<i>E. coracana</i>	do.	do.	5	7 do.
<i>E. frumentacea</i>	do.	do.	4	6 do.
<i>P. miliare</i>	do.	do.	3	5 do.

A perusal of the data presented shows that the water absorbed by the plant has been sufficient for or in excess of the loss by transpiration up-to three and twelve days in the case of *P. miliare* and *S. durra* respectively. In *S. durra* there is more efficiency in controlling the water loss for four days. These observations on wilting confirmed the field studies of drought resistance tried under natural conditions.

2. *Root studies*: (a) *Root morphology*: Table III presents the morphological characters of the roots studied and the number of roots produced per plant and per tiller.

TABLE III.
Morphology of the roots.

Species	No. of roots per plant		No. of roots		Average length of long roots in cms.	Stiff portion in the thick roots from the base in cms.	Branching habit
	Thick over 1 mm. in diameter	Thin less than 1 mm. in diameter	Total per plant	Average per tiller			
<i>S. durra</i>	36	21	57	57	43.0	10.1	Thick roots unbranched
<i>Zea mays</i>	21	19	40	40	36.6	6.5	"
<i>P. typhoides</i>	25	11	36	36	34.2	8.1	unbranched
<i>S. italica</i>	20	55	75	10.0	28.0	6.0	Thin roots with few branches
<i>P. miliaceum</i>	15	8	23	11.5	29.0	8.1	Profusely branched thin roots
<i>P. scrobiculatum</i>	...	34	34	11.5	28.3	...	"
<i>E. coracana</i>	53	49	102	14.6	30.5	1.0	Profusely branched thick roots
<i>E. frumentacea</i>	68	30	98	24.5	26.6	3.5	unbranched
<i>P. miliare</i>	6	13	19	9.5	27.1	0.9	"

S. durra which is the most drought resistant of the nine species, has more number of roots per tiller, more stiffness in the roots, and more number of thick roots. Further its roots are also longer compared to the rest. *E. frumentacea*, although has more number of roots per tiller, is soft without any stiffness and without any branches. Similarly *E. coracana* has the poorest stiffness in roots. In the case of *P. scrobiculatum*, although it is devoid of thick

roots, all the thin roots unlike in the rest of the species, were found to be stiff to a length of 12.4 cms. The most susceptible *P. miliare* has few roots per tiller with poor stiffness.

(b) *Structure of the root*: A consolidated picture of the important anatomical features studied in the root is presented in table IV.

TABLE IV.
Comparative Anatomical Features of the root.

Species	Piliferous layer	Exodermal layer	Cortical cells	(*) Area of stele	Endodermis	No. of Xylem vessels
<i>S. durra</i>	lignified epidermis	4-5 celled very thick	Uncollapsed	40.6%	Well developed	Big-26 Small-3
<i>Z. mays</i>	thin walled	2-4 celled	do.	37.8%	do.	Big-22 Small-4
<i>P. typhoides</i>	do.	3-4 celled	do.	19.1%	do.	Big-13 Small-2
<i>S. italica</i>	do.	4-5 celled very thick	do.	25.9%	do.	Big-10 Small-1
<i>P. miliaceum</i>	do.	2-3 celled thick	do.	26.6%	do.	Big-8
<i>P. scrobiculatum</i>	do.	1-2 celled	Collapsed	19.7%	Very well lignified	Big-13
<i>E. coracana</i>	do.	do.	do.	21.2%	Well developed	Big-10
<i>E. frumentacea</i>	do.	do.	do.	12.8%	do.	Big-8
<i>P. miliare</i>	do.	2-3 celled	do.	11.7%	do.	Big-8

(*) Area of stele as a percentage of the total cross-sectional area of root.

The stele is the biggest in *S. durra* and the smallest in *P. miliare*. The non-collapsability of the cortical cells with age in *S. durra*, *Z. mays*, *P. typhoides*, *S. italica* and *P. miliaceum* is a protective feature over the stelar region. Although the stele volume is less in *P. typhoides* compared to *P. miliaceum*, *S. italica*, *P. scrobiculatum* and *E. coracana*, the well-developed exodermis in the cortical region and well lignified sclerenchymatous cells encircling the vascular tissues inside the stele favour better resistance to drought in respect of *P. typhoides*. In *P. scrobiculatum* the endodermis and the sclerenchymatous cells enclosing the vascular tissues are better lignified.

3. *Structure of the stem*: A comparative picture of the important features studied in the stem structure in relation to drought resistance is presented in Table V.

TABLE V.

Comparative anatomical features of the stem.

Species	Vascular bundles along with peripheral hypo-dermal band		Vascular bundles in ground tissue	Total No. of Vascular bundles	Thick-ness of hypo-dermal band	Pith
	Small	Big				
<i>S. durra</i>	156	40	481	677	...	No distinct pith
<i>Zea mays</i>	52	68	492	612	...	do.
<i>P. typhoides</i>	64	72	120	256	...	do.
<i>S. italica</i>	29	14	41	84	0.1 mm	Small pith
<i>P. miliaceum</i>	16	12	25	53	0.08 "	hollow pith
<i>P. scrobiculatum</i>	29	30	27	86	0.05 "	do.
<i>E. coracana</i>	18	20	76	114	0.12 "	Small pith
<i>E. frumentacea</i>	29	26	47	102	0.06 "	hollow pith
<i>P. miliare</i>	40	15	25	80	0.05 "	do.

The most drought resistant *S. durra* and *Z. mays* have a large number of vascular bundles, the number becoming less in the less drought resistant species. In *S. durra* and *Z. mays* the whole ground tissue is scattered with vascular bundles without a distinct pith region. In *S. durra*, towards the periphery, the cells are very small in size and the vascular bundles of the smaller size cluster together forming a protective layer to the tissues inside. Studying from the periphery, the hypodermal thickening is very prominent in the case of *S. italica* and *P. miliaceum* with highly lignified cell walls. But in *E. coracana* though the width of the hypodermal band is more, the lignification of the individual cell walls are too poor to offer a better protection compared to *S. italica* and *P. miliaceum*.

4. *Structure of the leaf sheath*: A comparative picture of the important features studied in the structure of the leaf sheath is presented in Table VI.

TABLE VI.

Comparative anatomical features of the leaf sheath.

Species	No. of vascular bundles in the leaf sheath				Patches of sclerenchyma	Whether the leaf sheath grips the culm
	Big	Medium	Small	Total		
<i>S. durra</i>	28	22	52	102	Prominent	Very tightly gripped
<i>Z. mays</i>	26	16	46	88	do.	do.
<i>P. typhoides</i>	24	16	28	68	not prominent	do.
<i>S. italica</i>	...	26	34	60	small patches	do.
<i>P. miliaceum</i>	...	20	22	42	do.	do.
<i>P. scrobiculatum</i>	...	13	10	23	Very poor	Loosely held
<i>E. coracana</i>	...	15	23	38	do.	do.
<i>E. frumentacea</i>	...	14	18	32	do.	do.
<i>P. miliare</i>	...	7	27	34	Very very poor	do.

The outer surfaces of the leaf sheaths in *S. durra* and *Z. mays* have conspicuous patches of sclerenchyma which give protection to the vascular bundles, thus reducing the adverse effect of heat on the sheath as well as the enclosed stem. As in the case of the stem, the number of the vascular bundles are maximum in *S. durra* and *Z. mays* and minimum in *P. miliare* and *E. frumentacea*.

5. (a) *Structure of the leaf*: A consolidated picture of the anatomical features studied in the leaf is presented in Table VII.

TABLE VII.

Comparative anatomical features of the leaf.

Species	No. of vascular bundles			Presence of sclerenchyma	Presence of motor cells	Motor cell in μ length/width	Protective tissues in the midrib
	Big	Small	Total				
<i>S. durra</i>	56	268	324	Plenty	Upper-surface	54/54	Well developed
<i>Z. mays</i>	49	284	333	do.	do.	78/48	do.
<i>P. typhoides</i>	28	106	134	few	both surfaces	62/62	developed
<i>S. italica</i>	14	72	86	Plenty	do.	44/40	Well developed
<i>P. miliaceum</i>	6	20	26	do.	do.	76/80	do.
<i>P. scrobiculatum</i>	8	21	29	Poor	Upper surface	80/56	Very poor
<i>E. coracana</i>	11	14	25	do.	do.	92/82	Poor
<i>E. frumentacea</i>	22	69	91	do.	do.	104/80	Very poor
<i>P. miliare</i>	11	17	28	do.	do.	60/52	do.

S. durra, *Z. mays*, *S. italica* and *P. miliare* have prominent patches of sclerenchyma protecting the vascular bundles both in the leaf blade and in the midrib. Further, the central portion of the midrib in *P. scrobiculatum*, *E. coracana*, *E. frumentacea* and *P. miliare* are occupied by big cells of thin walled parenchyma and in the case of *P. scrobiculatum* the cells get torn off easily and a big vacuole is formed.

(b) *Structure of the lower epidermis of the leaf*: The important features studied in the lower epidermis of the leaf are presented in Table VIII.

TABLE VIII.

Comparative structure of the lower epidermis.

Species	Thickness of broad-layer of silicated long cells in mms.	Stomata No. per unit area	Epi-dermal long cells length/width in μ	Epi-dermal short cells length/width in μ	Unicellular hairs in a microscopie field	Spines cent or rounded modifications on the epidermis
<i>S. durra</i>	0.17	17	106/26	84/30	6	11
<i>Z. mays</i>	0.13	14	134/32	50/44	1	4
<i>P. typhoides</i>	0.10	12	174/40	134/44	2	2
<i>S. italica</i>	0.07	18	160/16	64/18	12	23
<i>P. miliaceum</i>	0.10	12	200/18	100/26	6	15
<i>P. scrobiculatum</i>	0.08	9	154/26	92/20	2	4
<i>E. coracana</i>	0.10	10	100/22	84/20	...	2
<i>E. frumentacea</i>	0.07	9	100/22	72/30	5	2
<i>P. miliare</i>	0.03	10	174/24	74/32	6	...

S. dura has the thickest layer of silicated long cells while *P. miliare* has the thinnest with the other species intermediate in thickness. More number of stomates are found in the drought resistant species. The tendency of the epidermal cells becoming smaller in size towards the more drought resistant species is noted. The walls of the epidermal cells are more wrinkled due to cutinization and greater number of hairs, spinescent and other rounded modifications are noted in the drought resistant cereals.

Discussion : The indications from the wilting experiment on the degree of resistance to drought have been confirmed by the structural adaptations noted in both underground and aerial parts of the plants.

Root studies and drought resistance : Studies on the morphology of the roots show that the cereals having more number of thick roots with stiffness to a greater length, resist drought to a longer period. Further long roots in the drought resistant species show deeper penetration in the soil. These observations are in conformity with those of Weaver and Clements (1938) who have recorded better developed, longer and thick roots in the drought resistant grasses.

As for the structure of the roots, the volume of the stele is one of the major factors determining the resistance to drought. The non-collapsability of the cortical cells noted in *S. durra* and *Z. mays* is a distinct protective feature to the root against the

adverse soil moisture and temperature. The well packed cortical cells with the exodermal layer form an efficient covering over the stele keeping it free from dessication. These observations are in conformity with those of Daniel Sundararaj (1950) who has recorded better drought resistance in the grass *P. antidotale* as due to more volume of stele with un-collapsed cortical cells in the root.

Aerial vegetative parts and drought resistance : In the case of the stem structure more number of vascular bundles with well developed tissue systems favour better drought resistance. Next in importance are the well developed hypodermal layer and the compactness of the parenchymatous cells in between the epidermis and the hypodermal layer. It is possible that the larger number of vascular bundles have a large amount of water in their protected vessels and this keeps the tissues of both stem and leaf from wilting for a long period. As in the case of the stem, the vascular bundles in the leaf sheath are also more in the more drought resistant species. The water loss from the exposed surface of the leaf sheath by transpiration is probably reduced by the sclerenchymatous patches seen in the outer surfaces in *S. durra* and *Z. mays* and to some extent in *S. italica* and *P. miliaceum*. As stated by Eames and MacDaniels (1947) the sclerenchyma may also act as a partial screen against intense light, besides preventing water loss and aiding in the support of the plant tissues in the drought resistant species. The presence of an extra covering in the form of leaf sheath gripping the stem adds protection against excessing atmospheric temperature. The anatomical characteristics of the leaves do not give definite relationship to drought resistance. The structural adaptations noted in the aerial vegetative parts of the plant in these cereals are also in line with those of the drought resistant grasses recorded by Daniel Sundararaj (1950). The findings on the lower epidermal structure of the cells are in agreement with the views recorded by Walter (quoted by Parker—1956). The drought resistant *S. durra* has the thickest layer of silicated long cells below the vein on the lower surface of the leaf, more number of stomates per unit area and better cutinization of the cell walls.

Summary : The structural characteristics of the roots, stem and leaf of the eight millets i. e., *S. durra*, *P. typhoides*, *S. italica*, *P. miliaceum*, *P. scrobiculatum*, *E. coracana*, *E. frumentacea*, *P. miliare* and corn i. e., *Zea mays* have been studied in relation to drought resistance.

S. durra is more efficient in resisting the drought and controlling the water loss while *P. miliare* is the least efficient out of the rest. Adaptations in the structure of the roots, stem and leaf and in the morphological characteristics of the roots, noted in varying degrees in the above species are discussed. *S. durra* has long and thick roots with stiffness to a greater length. The roots have more volume of stele protected by a well developed exodermis and uncollapsed cortical cells. The stem is provided with more number of vascular bundles and well-developed tissue systems. The leaf sheath also has more number of vascular bundles protected by sclerenchymatous patches on the outer surface. In the leaf blade the lower epidermis is well-cutinized. So far as structure is concerned these are the indications of the basic causes of drought resistance in *S. durra*. It is confirmed, therefore, that the structure in every part of the plant contributes either to the over-all or to the vital drought resistance in these cereals.

Acknowledgment: The author is greatly indebted to Dr. B.W.X. Ponniah, Associate Dean and Professor of Plant Breeding and Botany and Sri S. G. Aiyadurai, Millets and Pulses Specialist without whose guidance and help these studies would not have been conducted. The critical remarks passed by Dr. D. Daniel Sundararaj, Associate Professor of Botany was very useful in the presentation of the findings.

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Early maturing cultures of Ragi, the Finger Millet

by

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Introduction: *Ragi* (*Eleusine coracana*. Gaertn) unlike the other millets is mainly cultivated in gardenlands in the Madras State. It occupies an area of 10 lakhs of acres distributed over almost all the districts in the State. The crop is first sown in the nursery and later on (20 to 25 days after sowing) transplanted in the main field. Ragi responds well to manuring and a successful crop of Ragi can be grown provided adequate manuring and facilities for irrigation are available. Ragi matures in about 100 to 140 days and records as much grain yield as the other grain crops of the same duration. It withstands alkalinity to a certain extent. Due to failure of monsoon rains and inadequate facilities for irrigation, there is a persistent demand for early maturing or short duration strains. Early maturing crops can be easily rotated with the other major gardenland crops of the tract. In Chingleput and South Arcot Districts, Ragi is grown under irrigated conditions in a large area in two distinct seasons, viz., December to March and May to September. The variety grown in December season is shorter in duration and is popularly known as 'Kulla' Ragi. In the May — September a long duration crop 'Perum' Ragi is raised. In the short duration crop, groundnut is usually inter sown about a month before the harvest of Ragi. Groundnut continues to remain in the field till August while Ragi is harvested. Among the selections and strains, two improved strains AKP. 1. and AKP. 2. evolved at the Agricultural Research Station, Anakapalle proved suitable and they are under spread in the tract. Though popular for their earliness, the yields of both these strains however were not as high as those of the other improved strains of the Madras State. With a view to evolve an early maturing strain of Ragi, yielding higher than the strain AKP. 2., selection work was undertaken at the Millet Breeding Station, Coimbatore in the year 1954.

Materials and methods: The existing economic improved strains of Ragi have a duration of more than 100 days. With the object of evolving an economic Ragi strain which matures in about 85 to 90 days, a large number of representative short duration selections were collected and studied. Two of them viz., E. C. 4713 and E. C. 4728 obtained from Tellichery (Kerala State) and Nellore (Andhra State) respectively recorded high yield coupled with a short duration.

E. C. 4713 is a nonpigmented pure line selection with fisty type of earheads. E. C. 4728 is a selection from a natural cross. It is a pigmented type, (purple pigmentation due the presence of anthocyanin pigments in the plant body) with incurved earheads. These two selections were tested in comparative yield trials against AKP. 2. as the standard, for three successive seasons viz., 1957, 1958, and 1959. Details regarding average plant height, number of tillers, nodes, leaves, length of the fourth leaf and the number of fingers are given in Table No. I.

TABLE I.
Plant Measurements.

Particulars	YEARS								
	1957			1958			1959		
	E. C. 4713	E. C. 4728	AKP. 2 (Standard)	E. C. 4713	E. C. 4728	AKP. 2 (Standard)	E. C. 4713	E. C. 4728	AKP. 2 (Standard)
Plant height in cms.	82.6	69.2	55.7	72.1	69.9	54.5	50.0	45.2	42.5
No. of Tillers.	3	3	5	2.8	3	3.1	2.5	3.5	2.2
No. of Nodes.	5	4	4	5.3	4.8	3.9	4.0	3.5	3.2
No. of leaves.	11	9.6	9	11.8	11.5	9	8.1	7.4	6.7
4th leaf length in cms.	30.9	27.4	24.5	40.7	35.9	31.9	24.9	22.7	25.2
Panicle in length cms.	5.2	5.3	4.9	5.7	5.2	5.2	4.6	4.5	4.9
No. of fingers.	6	5	5	7.9	6.1	6.3	4.8	4.5	4.6

The summary of the trials is presented in Table No. II.

TABLE II.
Performance of short duration selections of Ragi.

Particulars	Year of trial	Selections		
		AKP. 2 (Standard)	E. C. 4713	E. C. 4728
Grain yield per acre in lb.	1957	896	1876	1771
Grain yield expressed as a % of standard	"	100	208	198
Straw yield per acre in lb.	"	2778	6583	3367
Straw yield expressed as a % of standard	"	100	237	121
Duration in days	"	93	95	87

TABLE II. (Contd.)

Particulars	Year of trial	Selections		
		AKP. 2 (Standard)	E. C. 4713	E. C. 4728
Grain yield per acre in lb.	1958	701	1116	1430
Grain yield expressed as a % of standard	"	100	160	203
Straw yield per acre in lb.	"	1535	4050	2644
Straw yield expressed as a % of standard	"	100	264	172
Duration in days	"	95	89	90
Grain yield per acre in lb.	1959	1556	1333	2139
Grain yield expressed as a % of standard	"	100	85	137
Straw yield per acre in lb.	"	2194	4156	2573
Straw yield expressed as a % of standard	"	100	190	114
Duration in days	"	101	96	92

Discussions of results: The results reveal that in all the three years of trial, the two early maturing selections viz., E. C. 4713 and E. C. 4728 were superior to the standard AKP. 2. in grain yield, the average increase being 51 per cent and 79 per cent respectively. E. C. 4713 recorded 1116 to 1876 pounds per acre, while E. C. 4728 gave 1430 to 2139 pounds per acre. Further, both the selections are shorter in duration than AKP. 2. the standard by nearly a week. These two selections viz., E. C. 4713 and E. C. 4728 which have combined in them the two desirable economic attributes of high yield and short duration will find favour in the districts of South Arcot Chingleput where there has existed a long-felt need for a high yielding and short duration variety to replace AKP. 2. which does not fare well in this tract. The selections await confirmatory trials in the districts.

Summary: For the evolution of a short duration and high yielding strain in Ragi, for Chingleput and South Arcot districts, trials were conducted with the short duration and promising selections against AKP. 2. as the standard. Two economic and short duration selections (viz., E. C. 4713 and E. C. 4728) coupled with high yield have been evolved and await confirmatory trials in the districts.

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Research Notes

An Epiphytotic of Pigeon Pea Sterility Mosaic at Coimbatore

A virus disease of redgram (*Cajanus cajan* (Linn.) Millsp.) was noticed in the field plots of the Millets Breeding Station, Agricultural College and Research Institute, Coimbatore during the month of October 1959. The affected plants were characterised by pale green foliage with faint mosaic mottling. The most striking symptom of the disease however, was a reduction in the size of the leaflets and their crowding at the ends of branches (plate I). These reduced leaflets showed the mosaic mottling of pale green and dark green areas. The plants were largely sterile, flowering being largely suppressed. Even when flowers were produced pod set was poor. For this reason collection of pods had to be entirely abandoned being uneconomical.

The disease could not be transmitted to healthy redgram plants by inoculation with sap from infected plants. Fifteen plants that were sap inoculated failed to show symptoms even after 90 days. Transmission by other methods like grafting is being attempted. A search for the insect vector if any is also being made. Seeds from diseased plants gave healthy seedlings.

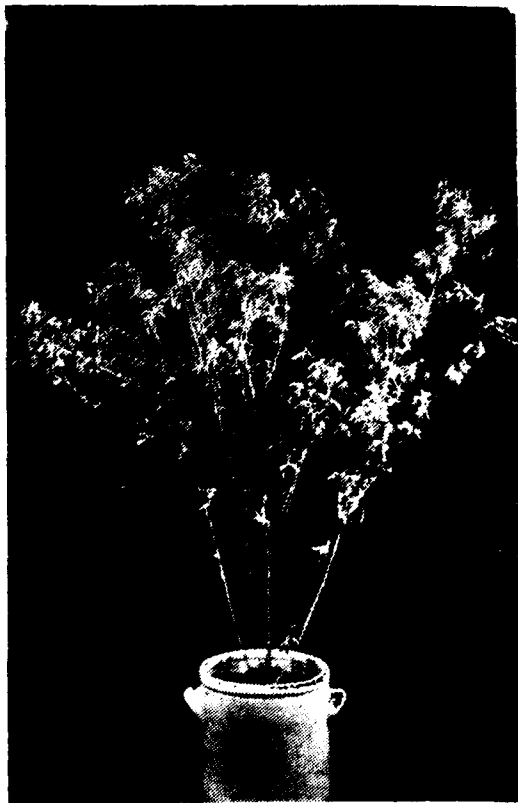


PLATE I.
Pigeon pea plant infected by sterility mosaic showing reduction in the size of leaflets and their crowding at the ends of branches.

The following varieties of redgram grown at the Millets Breeding Station during the 1959-1960 season showed a high level of infection. Not a single variety among these showed resistance or even tolerance.

Rahar C. 15, C. 18, N. P. 8, 41, 51, Etaworhch. Auriay arhar, Bharthua, local arhar, Sobour late, Safdarganj, C. C. 26 (M), Jaipur T 2, Tur E. B. 3, 31, 148, Arhar 3, 7, 10, 132, P. J. 2, Hyderabad, obcordifolia, Arhar Ujjaini 7, Keymor 1 (pl.), 2 (Br.).

3 (Wh.), Hawaii (pl.), Hawaii (Br.) and 39 (Wh.), New era (Wh.) and (T. Br.), Arbhavi Tur, Niphad T. 84, Anand No. 1, 4 A, 4 B, TPT. 206, Rasipuram, Bhuvanagiri, Maruthuvakudi, Ramapuram, Bangare, Mangalore, Udigir, Warangal, Chodavaram, Gunapur, Vidivada (Br.), Chicacole, (Wh. & Br.). Adoni Hosket, Gambia, VZM. 72, 97, 448, 449/1 & 2, 450, 451, 456-469, 471, 474, 476, 478, 484-484, 486, 488, 500-504, 509/1 & 2, 511, 518/2, 519, 520 573, Wilt 18, 32, 40, 41, 66-68, 78, 88, 127, 129, 135, 141, 150, 173, 80, 202, 206, 214, 216, 231, 242, 267, 287, & 312, 1134/1-1, 1134/1, 2, 1134/2, 1134/3, 1140/1 & 2, 1141, 1723, 2900 and 3085/1, M. S. 8903-8944, 9311, 9016, 9033 and S. A. I.

Capoor (1952) has described a sterility disease of pigeon pea from the Bombay state. The affected plants were palish green in colour and were characterised by upright and profuse vegetative growth. The plants were mostly sterile. Leaves of diseased plants were generally reduced in size, pale green in colour and displayed distinct mosaic patterns when young. There was no deformation of the leaves. The disease was easily graft transmissible and sap transmissible to a very small extent. The disease was not seed transmissible. The virus was considered new and named 'Pigeon pea sterility mosaic virus'.

A similar disease has earlier been reported from Coimbatore (Anon, 1938), and Bihar (Mitra, 1931, Alam, 1931 and McRae, 1932).

The present disease agree in all essential respects with the 'Pigeon pea sterility mosaic'. Further studies on the properties of the virus and its transmissibility by insect vectors are in progress.

We are thankful to the Millets and Pulses Specialist, Coimbatore for facilities for making observation at his station.

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Note on Unlocking of the Adaptive Complex in a few Cotton Cultures from Surat under Periakulam Conditions

The performance of the Surat Cultures S. B. 91 E of parentage 134 Co. 2 X Meade - was studied under unirrigated conditions during winter season at Periakulam from 1950—'51. The studies revealed that the parent cultures were lacking in adaptability showing variation in habit, and bud and boll shedding. The Surat Back-Crosses are generally late, resistant to jassid and drought, more hairy, bolls spherical of small to medium size, either bushy or erect in habit and intense in squaring.

Here the annual rainfall ranges between 30 to 35 inches having the peak precipitation in North East Monsoon period i. e., September to November which coincides with the growing phase of the crop. The weather during October to December will be chill, dewy and cloudy with low temperature. High winds prevail in January-February. Environmental conditions at Periakulam played an important role in the above crosses studied for their morphological and economical characters which showed marked variation. The three cultures, two viz - P. K. 961 and P. K. 1609 isolated from S. B. 91 E-3/1-2 and one P. K. 688 from S. B. 91 E-1/5-4 differed from one another in habit, morphological and economical characters eventhough they are of the same parentage i. e., reselections from S. B. 91 E and no difference in them recorded at early stages of trial at this Centre. After rigorous selection under Progeny Row Trials the material was carried over to Family Block where their character is fixed (also purity for morphological and economical) and this character is retained at later stages of breeding. In this way re-selection within the parent germ plasm of S. B. 91 E helps in a reshuffling of the genes so as to present a different fact of the adaptation complex ensured to Periakulam condition. It is probably this moulding of the original polygene of S. B. 91 E that has resulted in new expression like P. K. 688, P. K. 1609 and P. K. 961.

Some of the distinguishing morphological characters like leaf colour, hairiness, boll shape & size, jassid grade and susceptibility to blackarm are given in Table I along with that for M. C. U. 1.

In habit P. K. 688 and P. K. 1609 are bushy while P. K. 961 is erect and tall with sympodial branches shorter than the other two. P. K. 961 is very late (Node No. 6) while the rest are a little earlier than P. K. 961 but all the three are a little late when compared to M. C. U. 1. Culture P. K. 961 has small, flat and hairy leaf and light green in color. The leaf of P. K. 688 is dark in color and has longer leaf and lobe length and lobe width is broader and has longer petiole. The leaf of P. K. 1609 is almost flat, light green in color with light

pink shade, has leaf size larger than P. K. 961, leaf length is longer with shallow cut lobe width less and resembles that of 920 strain in shape (Table I).

Culture PK 961 has larger boll than PK. 688 and PK. 1609 but poor in retention of floral forms. The boll size of PK. 1609 is small (Table I).

Cultures PK. 961 and PK. 1609 have good jassid resistance since these possess long hairs on mid rib and lamina while PK. 688 has dense short hairs which confers resistance to jassid to a certain extent. The hairiness grade as per Hutchinson & Ramiah is given in Table I. All the three cultures record Grade I of jassid resistance (I. C. C. C.).

In blackarm PK. 1609 has more of laminal infection while PK. 688 and PK. 961 show higher susceptibility.

The economic characters of the three cultures are given under Table II along with that for M. C. U. 1 and parent S. B. 91E — Culture PK. 961 possesses fine lint, higher lint index and fibre maturity. Fibre strength and ginning percent are also good. Culture PK. 688 is highly productive and requires further improvement in lint quality. Culture PK. 1609 is having higher lint index, fibre length and ginning percent. It could be seen that the three cultures have improvement for ginning & fibre quality over their parent type M. C. U. 1.

Some of the H. B. and I. S. C. types when raised here in 1955—'56 showed variation for leaf lobing, size and pigmentation (e. g., H. B. 35, H. B. 21, I. S. C. 82, I. S. C. 76, I. S. C. 68, I. S. C. 34, I. S. C. 80 etc.).

Generally the materials received from Surat show resistance to jassid and are productive and adaptable, though a bit late under Periakulam conditions but require improvement in lint quality. The material shows variability which gives room for the desirability of change of breeding material by changing the place and thereby creating more chances for reselection from such material. In short a strain found adaptable at one place when shifted to another zone of different climatic conditions may respond to selection due to the unlocking of the adaptive complex under changed environment.

TABLE I
Morphological Character.

CHARACTER	PK. 688	PK. 961	PK. 1609	MCU. 1
1. HABIT	Bushy	Erect & tall	Bushy	Bushy
2. NODE NUMBER	4	6	5	5
3. LEAF	dark green	light green	light green	green
Color			into pink shade	
Length mm.	108	88	105	106
Lobe length mm.	97	76	84	92
Lobe width mm.	54	44	49	55
Sinus length mm.	56	49	60	53

TABLE I. (Contd.)

CHARACTER	PK. 688	PK. 961	PK. 1609	MCU. 1
4. HAIRINESS				
Stem tip	long dense G1	long dense uneven G1	Short dense G1 with long hair sparse	dense G1
Leaf midrib	short sparse	long dense uneven	long sparse uneven	sparse short
„ lamina	short dense	long sparse	long sparse	„
5. BOLL				
Colour	dark green	light green	green	green
Length mm.	41	45	39	44
Breadth mm.	31	30	27	32
Shape	...	spherical with small tip	...	...
6. Petiole length mm.	113	73	104	100
7. Blackarm Resistance	G6	G6	G5	G5
8. Jassid Resistance	G1	G1	G1	G2

N. B :— Jamid and Blackarm Resistance grades recommended by ICCC.

TABLE II
Mean Economic Character.

S. No.	Culture No.	Yield in lb. per acre		Ginning %	M. H. L. M. M.	Fibre length inch.	Max. fibre weight Millionth oz.	Maturing %	Pressley's strength index lb./mg.	100 Seed d. gm.	
		Kapas	Lint							L.W.	S.W.
1.	PK. 688	618	217	35	24	0.95	0.132	76	7.36	50	94
2.	PK. 861	544	200	37	27	0.90	0.126	78	7.99	55	98
3.	PK. 1609	527	194	37	25	0.98	0.132	71	6.62	54	83
4.	M.C.U - 1	547	124	34	24	0.91	0.136	74	7.28	53	100
5.	SB91E	786	269	34	25	0.93	0.133	75	7.38	50	92

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Preliminary Note on the Economic Importance of Potato Bolters

Introduction : Bolters occur in several commercial varieties of potato in India. They are common in varieties like Uptodate, King Edward and Great Scot. Several characters both morphological and physiological distinguish them from normal plants. Morphologically bolters are taller with longer internodes and lighter pigmentation, and they flower profusely. Physiologically they are later in duration, more resistant to diseases and yield a heavier crop.

The occurrence of bolters is still not properly understood. Thomas (1945) suggests that bolters may be due to the presence of a chromosome fragment found by him at meiosis. Hawkes (1947) is of the opinion that plants adapted to short day conditions, when grown under long day show similarity with bolters, and this condition of bolting is attributed by him to the mutation of one or more genes controlling the photo periodic response.

Materials and Methods : Bolter plants were marked out in a bulk crop of Great Scot in the winter crop season 1957 at the Agricultural Research Station, Nanjanad. These plants were harvested separately and the tubers were sown in the varietal collection plots in the three seasons, i. e., Autumn 1957, Summer 1958 and Winter, 1959. The yields of these bolter plants compared to normal plants for the three seasons mentioned above are presented in the table below :—

TABLE I
(Yield Data)

Particulars	Autum crop 1957		Summer crop 1958		Winter crop 1959	
	Normal	Bolter	Normal	Bolter	Normal	Bolter
Acre yield in lb.	8,373	9,584	9,575	16,960	9,808	19,744
Percentage over (Normal)	100.00	114.40	100.00	177.10	100.00	201.70

The yield data indicate that bolters are capable of yielding more than the normal plants. The bolters were found to be more vigorous and produce more tillers per tuber than the normal.

In regard to resistance to virus diseases, the bolter plants were found to be highly resistant compared to normal plants.

TABLE II
(Data on virus incidence)

	Great Scot	
	Normal %	Bolter %
Autumn crop 1957	1.60	Nil.
Summer crop 1958	0.31	Nil.

Discussion and Conclusion: Opinions are varied in regard to the occurrence of bolters. It is possible that these bolters in Great-Scot are long day mutants of this variety, which when isolated and sown may prove to be a high yielding strain of this variety due to the long day conditions existing here and its inherent character of performing well under such conditions. Economically the high yield and resistance to diseases are desirable characters. But production of coarse tubers and longer duration are traits which are not desirable under conditions on the Nilgiris.

By proper selection from the bolters it is possible to evolve a high yielding strain of Great Scot acceptable to the potato growers.

Acknowledgements: The authors are thankful to the numerous research workers of this station who were responsible for the isolation and maintenance of these plants, and particularly to Sri M. D. Azariah, B. Sc., (Ag.), former Superintendent, Agricultural Research Station, Nanjanad for his guidance and help in this work.

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A note on the effect of dowpon on the rhizomiferous bulbs of *Cyperus rotundus* L.

Dowpon (2,2—dichloropropionic acid) is one of the latest successful herbicides recommended for the control and eradication of grassy weeds. Many preliminary and detailed investigations have been done with dowpon on noxious weeds such as Johnson grass (*Sorghum halepense* Pers.) hariyali (*Cynodon dactylon* Pers.) and nutgrass (*Cyperus rotundus* L.), resulting in complete control. Search (1951), Watson (1955—1956), Stamper (1957) and many others have reported detailed investigations on the control of annual and perennial grasses by using dalapon (now dowpon). Hauser and Thompson (1956) reported that *Cyperus rotundus* L. was more responsive to dowpon and 2,4-D than *C. esculentus* L. Stamper and Melville (1956) working with nutgrass have reported the effect of different herbicides and combinations. Hauser *et al* (1955) studied the effect of dowpon on Johnson grass and nutgrass with and without disking. Their observations were that dowpon at 10 pounds per acre in one application gave 80% and 78% reduction in stand, with and without disking.



Figure showing the effect of dowpon at 0(c), 10(1), 50(2), 100(3) and 220 ppm. (4) on nutgrass rhizomes. Photograph taken eight weeks after application of dowpon.

In the present investigation the effect of different strengths of dowpon on the underground rhizomes of nutgrass was studied. These rhizomes were treated for 12 hours with dowpon of 10, 50, 100 and 200 ppm. strengths. After the above treatments they were planted in uniform pots and observed for a period of 10 weeks. Both untreated (control) and rhizomes treated with 10 and 50 ppm. started germinating after three days. The rhizomes which received 50 ppm. showed maximum vegetative growth, suggesting that this concentration would have induced the vigour. There was no germination of rhizomes in respect of 200 ppm. treatment and it was negligible in the case of

100 ppm. strength. The germination percentage in each treatment is presented below and the growth in each case after a period of eight weeks is presented in the plate.

Treatment with dowspon (ppm.)	Germination %
0 (control)	... 100
10	... 100
50	... 100
100	... 10
200	... 0

Subsequent watering was done and till the end of 10 weeks there was no change in the above data. These preliminary observations indicated that dowspon at a concentration of about 200 ppm. caused a complete kill of the underground parts of nutgrass.

Botany Department,
Agricultural College, Coimbatore-3.
24-7-1960.

J. SAKHARAM RAO.

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- Watson, A. T. 1955 Controlling established Johnson grass in cotton by spot treatment with dalapon (now dowspon). Down to Earth. 11: 2-3.
- 1956 Use of dalapon (now dowspon) for spot treating established Johnson grass in cotton. Down to Earth 12: 4.

Gleanings.

Weeding with fire in the Soviet Union: The Saratov Research Institute is experimenting with liquid gas "Giprioniigas". This gas is now being applied for weeding. A somewhat unusual type of cultivator has been constructed. On top it carries a cylinder of liquid gas; the scuffle knives and teeth have been substituted by ordinary gas burners.

In the field the tongues of the blue flame that come out of the burners as the cultivator is moving burn down the weeds and pests between the rows. The burners are fitted with special safety guards that protect the crop proper from the fire.

The new cultivator is soon to be tested in the fields.

Luminescence test for ripeness of grains: Soviet physicists have designed a pocket luminescope which is quite simple and convenient for making luminescent analyses in field conditions. It consists of a black ebonite tube, 2 cm. in diameter and 3 cm. long. The top part of the tube houses the main cone, while the lower part contains a cylindrical, two-centimetre thick filter made of special (violet) glass. Within the ebonite tube there is a glass lens that magnifies the image of the material under examination which is lit by ultra-violet rays supplied by ordinary sun light.

The luminescope may be employed for the qualitative analysis of grains - barley, wheat, maize, peas, and other crops. The grain is put on the palm of the hand and tightly closed with lower end of the luminescope where the violet filter is located. The instrument is held so as to have the sun's rays pass through the filter and fall upon the grain.

The nature of the grain's luminescence shows the degree of its ripeness. Thus, the appearance of a violet tint in the luminescence of wheat and barley endosperms is due to the yellowing of their flower scales and the beginning of endosperm hardening. Till this period sets in, the luminesces will have a grayish tint. Wheats of all varieties in the milky stage have a light blue luminescence of their outer bran coats.

Luminescence analysis also helps to determine the germinating power of seeds, the quality of feeds, vegetables and oils.

College and Estate News

The College hockey and cricket teams visited Madurai during October for playing friendly matches against local teams.

Out of the two hockey matches played there, our team won the match against the Madurai Medical College by 3 goals to nil while they gamely conceded the other by 0-1 to the American College.

In Cricket, Madurai Medical College was prevailed over by a 9 wicket victory. Against the Madurai College, our team scored 202 for 6 wickets but the match was abandoned due to heavy showers. A sparkling feature of the match was a brilliant century by Paul Devakumar.

Award of Research degree: Sri V. S. Narasimhan, Assistant Lecturer in Agricultural Economics was awarded the M. Litt. Degree by the Madras University, the thesis of his research being Agricultural Labour in the Southern Taluks of Coimbatore District.

Weather Review — for September, 1960.

RAINFALL DATA (IN INCHES)

Region	Station	Total rainfall for the month	Departure from normal	Total since 1st January
North	Madras (Meenambakkam) ...	10.5	+ 5.8	21.0
	Tirurkuppam* ...	8.2	+ 3.6	17.7
	Vellore ...	8.2	+ 1.3	29.0
	Gudiyatham* ...	11.4	+ 7.2	22.5
East Coast	Palur* ...	6.4	+ 2.7	15.6
	Tindivanam* ...	5.9	+ 2.4	15.8
	Cuddalore ...	6.0	+ 0.8	18.8
	Nagapattinam ...	4.2	+ 0.9	21.7
	Aduthurai* ...	2.5	— 2.2	13.5
Central	Pattukkottai* ...	3.2	— 2.1	20.1
	Salem ...	5.5	— 0.6	25.2
	Coimbatore (A. M. O.)* ...	0.6	— 0.5	4.8
	Coimbatore ...	0.6	— 1.0	8.9
South	Tiruchirapalli ...	3.4	— 0.6	16.5
	Madurai ...	5.8	+ 1.1	20.0
	Pamban ...	...	— 1.1	10.5
	Koilpatti* ...	0.3	— 1.7	16.7
	Palayamcottai ...	0.4	— 0.8	16.4
	Ambasamudram* ...	1.3	+ 0.3	21.1
	Nagercoil* ...	2.9	+ 0.5	34.6
	Capecomorin* ...	...	...	...
Hills	Kodaikanal ...	3.6	— 3.7	44.6
	Coonoor* ...	4.7	+ 1.1	47.7
	Ootacamund* ...	5.4	+ 1.3	30.2
	Nanjanad* ...	5.5	— 0.1	38.3

1. * Meteorological Stations of the Madras Agricultural Department.

In the first two days of the month under report scattered or localised showers were received in Madras State. On 3—9—1960 the weather remained dry throughout the State. From 4—9—1960 to 9—9—1960 scattered showers were received in Madras State. The weather again became dry on 10—9—1960 and continued to be so on the next day as well. During the period 12—9—1960 to 26—9—1960 either scattered or localised heavy showers were received in Madras State. The weather became dry once again on 27—9—1960. Thereafter for two days scattered rains were received. On 30—9—1960 the State had localised showers.

2. In regard to fluctuations in day temperatures there was no large change. In fact, the day temperature was practically steady throughout the State.

3. The noteworthy rainfalls and zonal rainfalls for the month of September, 1960 are furnished hereunder :—

Noteworthy rainfalls.

S. No.	Date	Name of Place	Rainfall in inches
1.	13—9—1960	Madurai	3.9"
2.	"	Salem	3.5"
3.	"	Tiruchirapalli	2.7"
4.	14—9—1960	Tiruppatur	2.7"
5.	17—9—1960	Madras (Nungambakkam)	2.7"
6.	"	Tindivanam	2.5"
7.	30—9—1960	Gudiyatham	3.3"

Zonal rainfall (in inches)

Name of the Zone	Rainfall for Sept. 1960	Departure from normal	Remarks
North	9.6"	+ 4.5	Above normal
East Coast	4.7"	+ 0.4	Just above normal
Central	2.5"	— 0.7	Below normal
South Hills	4.8"	+ 0.4	Above normal

Agricultural Meteorology Section,
Lawley Road Post, Coimbatore-3.
10th October, 1960.

C. B. M. & L. P. N.

Departmental Notifications

Gazetted Officers—Madras Agricultural Department
Postings and Transfers during the Month of October, 1960

Name and Designation	Posted or Transferred to
Sri V. Ramalingam, Journal Assistant, Office of the Director of Agriculture.	Agricultural Information Officer, Madras.
Srimathi Lily Dhanaraj, Assistant, in Paddy.	Superintendent, Agricultural Research Station, Bhavanisagar.
Sri S. Lakshmanan, Assistant Lecturer in Agriculture.	Additional Lecturer in Agriculture Coimbatore.
" S. Muthusami, Assistant Extension Specialist.	District Agricultural Officer, Erode.
" T. Arunachalam, District Agricultural Officer, Erode.	Assistant Extension Specialist, Coimbatore.
" Leo Swamikan, Assistant Agricultural Engineer (Soil Conservation Scheme)	Assistant Agricultural Engineer, Soil conservation Sub-Assistants training Centre, Coimbatore.
" Thiruvengkatasami, Assistant Agricultural Engineer (Soil Conservation Sub-Assistant Training Centre.)	Agricultural Engineer Soil Conservation Scheme Coimbatore.

Upper Subordinates—Agricultural Department
Postings and Transfers during the month of October, 1960

Name and Designation	Posted or Transferred to
Sri K. M. Kakkan, Agricultural Demonstrator, Thiruvannamalai.	Marketing Assistant, Vellore.
„ R. Govinda Rao, Agricultural Demonstrator, Sithalai.	Marketing Assistant, Chingleput.
„ R. Kandaswami, Coconut Nursery Assistant, Sholavaram.	Assistant in Oilseeds, Bhavanisagar.
„ G. Varadharajan, Assistant in Entomology	Assistant in Entomology, Paddy stem borer Scheme, Aduthurai.
Sri M. Muniswamy, Extension Officer, Polur.	Extension Officer, Chingleput.
„ N. Sankararaman, Extension Officer, Chingleput.	Extension Officer, Polur.
„ G. Marudhachalam, Farm Manager, Central Farm.	Earned leave for 120 days from 10-8-'60 to 7-12-'60.
„ V. G. Palaniandi, Paddy Assistant	Paddy Assistant, Rice Research Station, Tirur.
„ J. Ganapathi	Coconut Nursery Assistant, Uchipuli.
Kumari V. A. Shakunthala	Assistant in Oilseeds, Tindivanam.
Sri S. Veeraragavan	Analytical Assistant Soil Testing Laboratory, Aduthurai.
„ P. Thyagarajan	Chemistry Assistant, Coimbatore.
„ S. Ramamurthi	Soil Survey Assistant (Amaravathi Project) Coimbatore.
„ N. Muralidaran	Chemistry Assistant (Gur) Cuddalore.
„ K. N. Chandrasekaran	Soil Survey Assistant, Coimbatore.
„ J. Joseph Christie	Chemistry Assistant, Coimbatore.
„ Devendran	Analytical Assistant, Coimbatore.
„ R. Janarthanan	Assistant in Entomology, Coimbatore.
„ P. K. Monikantan	Alloted to Dy. Director of Madurai.
„ P. K. Ramesh, Plant Protection Assistant.	Resigned.
„ Mani Varghese, Plant Protection Assistant.	Resigned.
„ M. S. Venugopal, Extension Officer	Resigned.

ERRATA

September 1960, page 404—College and Estate News.

For	Read
Third Annual Conference	Delete "Third"
Sri Subbanna Gounder, M. L. A.	Sri K. M. Kandasamy Gounder, President, District Congress Committee

DISTRICTS

SOUTH ARCOT, NORTH ARCOT
 COIMBATORE
 AMANATHAPURAM
 RUNELVELI

CROPS
 GROUNDNUT, GINGELLY,
 COTTON
 &
 TOBACCO



Review of market conditions of commercial crops in the notified areas of Madras State for the month of September, 1960.

Cotton: (In this section Cotton Kapas in pothi of 280 lbs. or 127.006 K. G. Cotton lint in Candy of 784 lbs. or 355.616 K. G.)

COIMBATORE DISTRICT: Season: The rainfall received during the month under report was 1. cm. Sowings of Cotton have been done in places where irrigation facilities are available and in places where there are enough rains. In other areas the growers are awaiting rains for sowing of cotton.

Arrivals and Transactions: Lint: On 27-8-1960 there was a stock of 12308 candies of cambodia and 30 candies of Karunganni lint in Tiruppur Market area. The total arrivals into Tiruppur during the month of September, 1960 were 4968 candies of cambodia and 190 candies of Karunganni which included 760 candies of cambodia and 97 candies of Karunganni lint locally ginned. Despatches from Tiruppur were 4914 candies of cambodia and 191 candies of Karunganni lint.

Kapas: On 27-8-1960 there was a stock of 6592 pothis of cambodia and 4042 pothis of Karunganni Kapas in Tiruppur Market area. The total arrivals during the month were 10783 pothis of cambodia and 119 pothis of Karunganni Kapas. The disposals during the month were 12661 pothis of cambodia and 984 pothis of Karunganni kapas. On 24-9-1960 there was a stock of 4714 pothis of cambodia and 3177 pothis of Karunganni kapas.

Prices: The cotton market was steady with prices of 9030 Kapas ranging upto Rs. 163/- per pothi of 280 lbs. The prices of lint were for the most part near the ceiling rates.

Lint: The price ranges of cotton lint and kapas during the month as compared to that of previous month were as hereunder.

Prices in Rs./nP.

	September, 1960	August, 1960
Cambodia Superior quality	Rs. 900—1040	931—980
Cambodia Average quality	„ 830— 900	830—890

Kapas:

Cambodia Superior quality	„ 150— 163	147.50—164.00
Cambodia Average quality	„ 115— 145	100—135
Karunganni Superior quality	„ 115— 120	100—138
Karunganni Average quality	„ N. A.	102

RAMANATHAPURAM: *Season:* Only scattered rainfall was received and it was quite inadequate. The standing crops Redgram, Groundnut etc., were adversely affected. Paddy transplantation has been postponed in some area. In short the weather prevailed was not conducive for crop growth.

Arrivals and Transactions: As the season was over long back receipts were mainly from stocks. Merchants were permitted to sell cotton to mills according to their wish subject to survey before acceptance by mills. Hence prices of lint were not attractive. However seed prices which ruled high during the month caused for a firm trend in kapas market. The Uganda cotton season is nearing completion. Hence arrivals declined gradually during the month. In Pollachi groundnut market keen competition existed throughout the month from among millers of the South and North. Due to keen purchase by North Indian firms there is a spurt in the prices of kernels, oils etc.

Kapas:

Name of Market	Opening Stock	Receipts	Disposals	Closing Stock
1. Virudhunagar	1,750	15,050	15,800	1,000
2. Sattur	...	15,500	15,500	...
3. Rajapalayam	6,000	42,000	45,000	3,000
Total	7,750	72,550	76,300	4,000

Lint:

Name of Market	Opening Stock	Receipts	Disposals	Closing Stock
1. Virudhunagar	200	1,550	1,600	150
2. Sattur	200	1,500	1,500	200
3. Rajapalayam	1,600	2,900	2,700	1,800
Total	2,000	5,950	5,800	2,150

Prices:

<i>Lint:</i>	September, 1960	August, 1960
Karunganni lint	... Rs. 900 to 930	Rs. 981 to 993
Karunganni	... „ ...	„ ...
Tinny Karunganni	... „ ...	„ ...
Karunganni II crop	... „ 900 to 930	„ 900 to 946
Tinny	... „ 840 to 910	„ 860 to 935
Uganda certified	... „ 1100 to 1125	„ 1100 to 1125
Uganda uncertified	... „ 1080 to 1100	„ 1080 to 1106

Kapas:

Karunganni	... „ N. A.	„ 122 to 125
Tinny Karunganni Mix.	... „ N. A.	„ 83 to 125
Karunganni II crop	... „ 92 to 119	„ 90 to 121
Tinny	... „ 80 to 120	„ 75 to 115
Inferior quality	... „ ...	„ ...
Uganda I quality	... „ 125 to 150	„ 133 to 155
Uganda II quality	... „ 92 to 137	„ 100 to 133

Cotton Seeds. (Prices in Rs./nP. per standard maund)

Karunganni	... Rs. 14.85 to 16.97
Tinny	... „ 16.35 to 17.62
Uganda	... „ 11.90 to 13.38

TIRUNELVELI DISTRICT: *Season:* The month was dry except for a slight drizzle of about 25 cents. Ryots are expecting a good rainfall for the commencement of cultivation of cotton and other crops.

The season for Karunganni cotton was coming to a close and so arrivals of that crop to the local market was very limited. Arrivals decreased at the end of the period due to the introduction of the survey system.

SOUTH ARCOT: *Season:* Fairly widespread and good showers were received during the month. The condition of standing winter groundnut were crop which had been affected in some areas by drought and insect pests improved after the receipt of rains.

Arrivals and Transactions: Despatches of groundnut kernels to other districts amounted to 2683 tons and other states 196 tons. Despatches of gingelly to other districts came to 908 bags. Despatches of cotton kapas to other districts totalled 480 pothis.

Prices: As the harvest of summer groundnut was concluding the arrivals of this crop were on the decrease. Arrivals of gingelly and cotton were on the increase. Prices of all the three crops ruled high and were on upward trend.

II. Groundnut:

SOUTH ARCOT MARKET: Arrivals of summer crop were on the decline as the harvest of the crop was concluding. Arrivals totalled 6787 tons comprising 6412 tons from the district produce and 375 tons from other districts. Despatches to other districts amounted to 3825 tons while exports to other states of Pondy and Andhra came to 310 tons. Consumption by mills and chekkus was respectively 2778 and 488 tons. Wastages were calculated at 396 tons. The stock with the trade at the end of the month stood at 2287 tons. Prices ranged from Rs. 192.50 to 223.60 per candy of 531 lbs.

RAMANATHAPURAM DISTRICT: During the month the arrivals, sales and stock of pods kernels in the district were as follows:

Name of Market	Opening Stock	Arrivals	Disposals	Closing Stock
Groundnut pods				
Virudhunagar	100	...	100	...
Groundnut kernels				
Virudhunagar	1300	4000	4000	1300

Prices: The following were the prices that prevailed for groundnut pods, kernels, oils and cake in the district during the month as compared to previous month.

Prices in Rs./nP.		
	September, 1960	August, 1960
Groundnut pods (Per Md. of 82.2/7 lbs.)	N. A.	24.00 to 25.00
Groundnut kernels (candy of 531 lbs.)	210.00 to 225.00	210.00 to 230.00
Groundnut oil (candy of 35 lbs.)	27.75 to 29.25	28.50 to 28.75
Groundnut oil cake (maund of 82.2/7 lbs.)	13.04 to 15.05	13.71 to 15.38

TIRUCHIRAPALLI DISTRICT: *Season:* Light to moderate showers were widespread in the district during the period under report and helped the standing winter groundnut crop wherever it occurred. Fairly large areas of winter groundnut were, however found to be withering for want of timely rains. Pest attack was also reported in some places. The canal irrigated groundnut crop of Karur will be harvested early next month and its produce likely to move into the market towards the end of next month. This crop was reported to be good. Transplanting of tobacco will take place next month.

Arrivals and Transactions: This being the last month for the disposals of groundnuts from the previous year's crop, arrivals were only in small quantities. Only local country chekkus owners and oil producers, societies operated in the markets while the large scale crushers diverted their activities to Pollachi Market.

Prices: The prices of kernels ranged between Rs. 181.90 to 253.90 per candy of 531 lbs. The average price stood at Rs. 228.77 per candy.

NORTH ARCOT DISTRICT: *Season:* Widespread, scattered and fairly heavy rains were received almost throughout the district during the month, which has benefited the standing crop of winter groundnut largely and as a result of, the crop is expected to yield 75% of normal, and thus the production is placed at about 65,000 tons this year. The crop is also expected to be taken up for harvest by about the middle of October, a few days before Deepavali festival and is likely to be in full swing during November and December.

Arrivals and Transactions: The arrivals, disposals, stocks etc., in this district during the month were as follows:

Quantity in tons				
	Opening Stock	Arrivals	Disposal	Closing Stock
Groundnut pods in metric tons.	284	94	161	217
Groundnut kernels in metric tons.	201	231	314	119

Prices:

Prices in Rs./nP.			
	September, 1960	August, 1960	
Groundnut pods in metric tons.	23.00 to 26.00	23.50 to 26.00	
Kernels candy in metric tons.	201 to 232	198 to 231.50	
Oil candy of 226 K. G.	400 to 437	...	

Gingelly:

SOUTH ARCOT DISTRICT: Arrivals were mainly to Vridhachalam Market and arrivals to other markets were negligible. Total arrivals came to 1687 bags from the district produce besides 372 bags from neighbouring districts. Despatches were amounted to 908 bags. The trade had a stock of 781 bags at the close of the month.

Prices: Prices of Gingelly improved and the average prices ranged from Rs. 84.60 to Rs. 93 per bag of 168 lbs. according to quality.

Tobacco :

COIMBATORE DISTRICT: At the end of the month under report there was a stock of 18680 candies of chewing and 940 candies of cheroot tobacco. About 5130 candies of chewing and 65 candies of cheroot tobacco were exported to places in Kerala, and Andhra States., Ramnad and Kanyakumari districts in the Madras State.

Prices of tobacco were steadily with limited demand from traders. In the case of pit-cured tobacco at Palladam, prices recorded an increase of Rs. 45/- per candy from Rs. 330/- due to good demand from traders of North Arcot, Madras and Andhra.

Prices: The prices prevailed during the month are given hereunder :

Per candy of 500 lbs. or 226.80 kilo-grams			
Variety	I Grade	II Grade	III Grade
A. Chewing Tobacco			
(Sun cured):			
1. Meenampalayam	450 — 550	360 — 440	250 — 350
2. Other varieties	450 — 500	300 — 400	250 — 300
B. Cheroot Varieties			
(Sun cured):			
(Grown in Erode and Bhavani taluks)	400 — 450	300 — 375	150 — 200
C. Chewing Tobacco			
(Pit cured):			
(Grown in Palladam and Sulur areas)	300 — 375	225 — 290	95 — 150

Cardamom :

MADURAI DISTRICT: *Season:* During the month of September, 1960 there was good rainfall in the cardamom plantation areas in Madurai District as well as in Kerala hills. Stand of the crop was good. Agricultural operations like weeding, spraying, picking and curing of the fruits were in progress.

Arrivals and Transactions: The following were the opening stock, arrivals and despatches of cardamom during the month :

Name of Markets	Opening Stock	Arrivals	Sales	Closing Stock
Quantity in lbs.				
1. Bodinaickanoor	1,000	157,000	156,500	1,500
2. Thevaram	...	15,000	15,000	...
3. Pannaipuram	...	...	...	...

Name of Markets	Opening Stock	Arrivals	Sales	Closing Stock
4. Kombai	...	3,000	3,000	...
5. Uthamapalayam	...	7,500	7,500	...
6. Cumbum	11,000	2,000	5,000	8,000
7. Gudalur	...	2,500	2,500	...
8. Pattiveerampatti	...	50,000	50,000	...
9. Virudhunagar	4,000	59,000	46,000	17,000

*Prices :*1. *Bodinaickanoor :*

Name of quality.	Price in Rs./n.P. per lb.
(1) Extra Green	...
(2) Green	...
(3) Medium	9.13 to 9.34
(4) Inferior	9.00 to 9.45
(5) Seeds	12.00 to 12.48

2. *Pattiveerampatti :*

(a) Sundried :	
Superior and bold	9.10 to 10.18
Medium and bulk	9.16 to 9.86
Inferior and small	8.31 to 9.48
(b) Store Green :	
Superior and bold	9.92 to 10.93
Medium and bulk	9.31 to 9.90
Inferior and small	8.50 to 9.52
(c) Splits	8.85 to 9.32
(d) Lights	7.39 to 8.46
(e) Seeds : I	11.80 to 12.88
II	8.37

3. *Virudhunagar :*

(1) Bold quality	10.37 to 10.50
(2) Smalls	9.00 to 9.12
(3) Seeds	12.75 to 13.00

Review of administrative activities of Market Committees during September, 1960

The Market Committees of South Arcot, North Arcot, Coimbatore, Ramanathapuram, Tiruchirapalli and Tirunelveli continued to function during the month under report.

Enforcement: The progress of enforcement during the month were as detailed below :

Name of Committee	Section 5 (1)		Section 5 (3)		Weighment	
	A	B	A	B	A	B
South Arcot Market Committee	202	1699	137	1198	132	1196
North Arcot Market Committee	154	1748	150	1647	30	693
Coimbatore Market Committee	174	2484	99	1603	30	740
Ramanathapuram Market Committee	29	333	26	287	22	239
Tirunelveli Market Committee	21	91	15	82	18	77
Tiruchirapalli Market Committee	151	1594	132	1296	118	1163

A = Licences issued during September, 1960.

B = „ „ upto the end of this month.

Meetings: No meetings were held in any of the market committees during the month under report.

Regulated Markets: Being the slack season, arrivals in all the markets were generally poor.

Quality Analysis: Nil.

Quality Competition: Nil.



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during September, 1960**

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Jm 21, 1960
N 60-47-10