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Early maturing cultures of Ragi, the Finger Millet

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Introduction : *Ragi (Eleusine coracana.* Gaertn*)* unlike the other millets is mainly culivated 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	3583	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 trail, 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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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 1). 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 atttempted. A search for the insect vector if any is also being made. Seeds from diseased plants gave healthy seedlings.

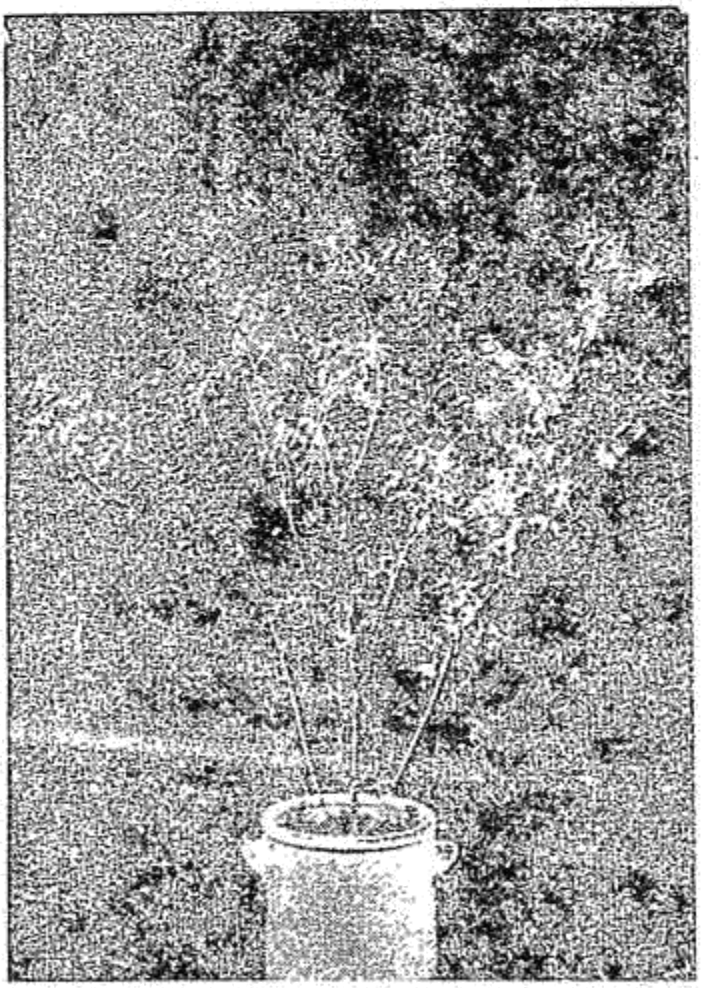

PLATE I.
Pigeon pea plant infected by sterility moisure showing reduction in the size of leaflets and their crowding at the ends of branches.

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, S, 41, 51, Etaworheh. 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 transimissibilty by insect vectors are in progress.

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