

Progress of Pulses Improvement Work in Madra

by

SRI V. SRINIVASAN, B. SC. (Ag.),

and

SRI K. JAYABHIMA RAO, B. SC. (Ag.),

Assistants in Pulses,

Agricultural College and Research Institute, Coimbatore

Introduction: Pulses form a group of food grains which play an important role in the Indian diet, especially in Madras, which is predominantly a rice-consuming State. They form the chief source of protein food to vegetarians and to the poorer classes who cannot afford the higher cost of animal protein. The pulses which are important in the Madras State are redgram, greengram, blackgram, horsegram and Bengalgram. The pulse grain is mostly consumed by human beings, while the by-products such as broken grains, husk, chaff etc., are fed to cattle. Apart from their food value the cultivation of these crops increases the fertility of the soil in which they are grown, as the atmospheric nitrogen is fixed by the bacteria present in their root nodules. In spite of their importance, work on their improvement has not received the attention they deserve. The total area of all the pulses in Madras is about 3 million acres with a production of about 2.9 lakhs tons of grain. The average consumption of pulses in the State is about 5.8 lakhs of tons, which works out at the rate of 1 oz. per day per adult. Dr. Aykroyd has suggested that every adult should consume a minimum of 3 oz. of pulses a day to have a balanced diet. Even for the consumption of 1 oz. per day the production in the State is not sufficient, and as much as 50% of the requirements is met by imports from other States. The following table shows the acreages, production, consumption and deficit under each pulse in the Madras State.

Crop	Normal area sown (Acres)	Normal production (Tons)	Normal consumption (Tons)	Deficit Tons
Redgram	3,52,390	53,010	1,22,500	69,490
Blackgram	3,02,900	34,480	63,100	28,620
Greengram	4,97,810	54,220	60,400	6,180
Bengalgram	85,290	16,240	1,84,000	1,67,760
Horsegram	15,55,850	1,11,580	1,25,000	13,420
Other pulses	2,52,290	22,430	28,450	6,020
Total	30,46,530	2,91,960	5,83,450	2,91,490

From the above table it will be seen that in our State, the deficit is serious in the three major pulses viz., Bengalgram, redgram and blackgram. To make the State self-sufficient with regard to these pulses, without depending upon their imports from other States, it is essential that their production is increased considerably. This can be done both by increasing the area of cultivation and by the evolution of higher yielding strains. Pulses are mostly grown as mixtures with other crops such as paddy, millets and oilseeds, and mainly on drylands in low rainfall areas. Consequently their production is dependent on the vagaries of the monsoons. So, it is suggested that in all newly reclaimed lands pulses should also figure as a major crop. The progress of work in this State on the problem of evolving higher yielding strains is summarised in this paper.

A scheme of work for the improvement of pulses, partly financed by the Indian Council of Agricultural Research, New Delhi, was commenced in 1943. Prior to that, some of the pulses had been studied by the Cotton Specialist and Millet Specialist and cultures isolated by them were transferred to the scheme. Besides these, a large number of samples of different pulses were collected from various parts of the State. The cultivation and study of these seed materials was commenced at Coimbatore, Vizianagaram and Salem. While at Coimbatore all the pulses were under study, only redgram, blackgram, greengram and horsegram were studied at Vizianagaram, and redgram, lablab and horsegram at Salem. The work was confined to the evolution of high yielding strains by pure line selection.

Redgram: (*Cajanus cajan*, Millsp.): In addition to the cultures taken over from the Cotton Specialist, 47 samples from various districts were collected and grown at Coimbatore in 1944-'45, and 140 single plants selected. In the succeeding years all the cultures were tested for yield. None of the cultures was found to yield significantly better than the standard, a selection made from a Coimbatore variety by the Cotton Specialist. Subsequently 760 single plants were selected afresh from the ryots' crops in the Tanjore (Vallam area), Kurnool, Anantapur and Bellary districts and studied for yield in 1949-'50 and 1950-'51. Fifty-two promising cultures from these have been retained for further tests. One of the cultures of the Cotton Specialist, No. 2900, which was reported to yield well in Salem district is under distribution in Salem and Coimbatore districts. Twenty-three samples were collected from Salem and neighbouring districts and grown in 1944-45 at Salem and 120 single plants were selected. From the results of the trials in the subsequent years it was found that culture No. 37 gave a significantly higher yield than the local bulk and its performance was consistent. This culture was also tried in the southern districts of the State under cultivators' conditions and it proved its merit by yielding 12 to 41% extra grain over the local variety. It has

been released for general cultivation in the southern districts. The details of its yield performance are summarised below: One hundred single plants were selected from the district samples collected and grown at Vizianagaram in 1944-'45. From the yield trials in the subsequent years, two cultures, No. 72 (medium duration) and No. 97 (long duration) have been retained for further trials.

Performance of redgram No. 37.

Year	Yield per acre in lb.		Percentage of increase over control	Remarks
	No. 37	Control		
1946-'47	647	487	34.3	At Salem Sub-Station
1947-'48	786	486	61.7	do.
1948-'49	489	397	23.1	At Dharmapuri Sub-Station
1949-'50	661	429	54.1	At Coimbatore Station
1950-'51	810	574	41.1	do.

Results of district trials.

Name of taluk	Percentage of increase over local variety
Nilakottai	12.5
Periakulam	35.5
Thirukoilur	41.6
Gingee	16.7
Cuddalore	33.5

Blackgram: (*Phaseolus mungo*, L.): Out of 49 district samples grown and studied in 1944-'45 at Coimbatore 190 single plants were selected. Based on the results of their yield trials in the succeeding years, two cultures, Nos. 212 and 216, which gave consistently higher yields than the local variety have been selected for further tests. One hundred single plants were selected in 1944-'45, and tested for yield, at Vizianagaram, in the subsequent years. One culture, No. 189, gave consistently higher yield than the local variety and this is under trial in the northern districts. A summary of its performance on the station is furnished below:—

Blackgram No. 189.

Year	Yield per acre in lb.		Percentage of increase over local bulk.
	No. 189	Local bulk	
1948-49	311	248	25.4
1949-50	350	252	38.8
1950-51	324	204	58.8

Greengram : (*Phaseolus aureus*, Roxb): Two hundred and ninety single plants were selected from 36 samples collected and grown at Coimbatore in 1944-45. In succeeding years, they were tested for yield, and one culture, No. 62, proved to be the best by giving significantly higher yield than the local variety, with an average increase of 24.4%. This culture has been issued for trial in the southern districts. Its performance at the station is summarised below :—

Greengram No. 62.

Year	Yield per acre in lb.		Percentage of increase over local bulk.	Remarks.
	No. 189	Local bulk		
1948-49	408	344	18.6	
1949-50	Crop failed
1850-51	406	312	30.1	due to ad- verse season.

Sixty-three samples collected and grown at Vizianagaram in 1944-45 resulted in the selection of 100 single plants. The trials in the subsequent years showed that culture No. 127 was significantly superior to the local variety. This has been issued for trial in the northern districts. Its yield data are summarised below :—

Greengram No. 127.

Year	Yield per acre in lb.		Percentage of increase over local bulk.	Remarks.
	No. 127	Local bulk		
1948-49	363	256	41.8	
1949-50	Crop was
1950-50	468	358	30.7	damaged by cyclone.

Horsegram : (*Dolichos biflorus*, L.): From sixty-two samples collected and grown in 1943-44, 169 single plants were selected. Further trials revealed that none of the cultures out-yielded No. D. B. 7, an earlier release of the Millet Specialist. From further samples collected and studied 56 cultures are under yield tests. From the district samples grown at Salem in 1943-44, 194 single plants were selected. They were tested for yield in subsequent years and based on their performance, three cultures, No. 86, 122 and 153, have been retained for further tests. Out of a total of one hundred single plants selected in 1943-44 and tested for yield in subsequent years, at Vizianagaram, four cultures, which gave consistently higher yields than the local variety were selected for yield

trials. Among them one black-seeded culture No. 93, was found to be significantly better than the local variety and it has been released for trial in the northern districts. Its yield data are summarised below:—

Horsegram No. 93.

Yeald	Yield per acre in lb.		Percentage of increase over local bulk.
	No. 93	Local bulk.	
1947-48	266	166	60.2
1948-49	210	136	54.4
1949-50	202	160	26.2

Bengalgram: (*Cicer arietinum*, L.): Twenty-two samples were collected and grown at Coimbatore in 1943-44, and 120 single plants were selected. Since none of them out-yielded culture No. 482, an earlier selection by the Cotton Specialist, fresh samples were collected and studied in 1945-47. Twentysix promising cultures from these are under trial.

Lablab: (*Dolichos lablab*, L.): One hundred single plants were selected from the district samples collected and grown at Coimbatore in 1944-45. None of them out-yielded culture No. D. L. 231, a selection by the Millet Specialist and fresh samples were collected and grown in 1950-50, and 360 single plants were selected. They were tested in 1950-51, and 120 cultures were retained for further trials. Ninety-eight single plants, selected at Salem in the year 1944-45, underwent yield trials in the subsequent years. Two cultures No. 44 (buff seed) and No. 92 (white seed), gave higher yields than the local variety, and they await multiplication of seed and trial in the districts.

Cowpea: (*Vigna unguiculata*, Walp.): One hundred and forty single plants were selected at Coimbatore in 1944-45, and tested for yield in the subsequent years. None of the cultures out-yielded the control C. 57, a selection by the Millet Specialist. Fresh samples were collected and studied and 200 single plants were selected in 1949-50. They were tested for yield in 1950-51 and 120 cultures have been carried over for further study.

Simultaneously with the trials of the cultures for their production, their quality, particularly with reference to protein content, was also kept in view in recommending promising ones for trial in the districts. Samples of the improved cultures and the local varieties were analysed

by the Government Agricultural Chemist. It will be seen from the results furnished below that the improved cultures were not inferior to the local ones in protein content.

Protein Content.

Crop	Improved strains	Local variety
Redgram	No. 37 21.48%	21.12%
Greengram	No. 62 22.81%	22.63%
Greengram	No. 127 26.00%	25.69%
Blackgram	No. 139 25.56%	24.56%
Horsegram	No. 93 25.13%	24.63%

In addition to the isolation of high yielding strains of local pulses, trials were also conducted to study the possibility of introducing improved varieties from States. Improved other types of redgram, greengram, blackgram and Bengalgram were obtained from North India and tried, but without much success. These types were either too long or too short in duration and low in yield and so were unsuitable for cultivation under the conditions of climate and soil prevailing in Madras.

To sum up, as a result of work on the improvement of pulses in this State, the following high-yielding cultures suitable for general cultivation by ryots have been isolated and are under multiplication and distribution.

Crop	Cultures Suitable for Southern Districts	Cultures Suitable for Northern Districts
Redgram	No. 37	...
Greengram	No. 62	No. 127
Blackgram	No. 212	No. 189
Horsegram	D. B. 7	No. 93
Bengalgram	No. 482	...
Lablab	D. L. 321	...
Cowpea	C. 57 & C. 521	...

Besides the above cultures in field crops, culture No. C. 419 in vegetable cowpea, half-a dozen high-yielding and good quality kitchen garden lablab types and two cluster-bean types have also been isolated, and their seeds are being distributed for general cultivation.

The above cultures are suited only to certain specific localities, and strains for other localities and for cultivation under different conditions, as in wetlands, as an after-crop succeeding paddy, have yet to be isolated. Moreover, varieties vary in their time of sowing and duration according to the rainfall and other conditions which prevail in different parts of the State. Strains suitable to such local conditions are also to be isolated. The work which has been in progress mainly by selecting single plants. It is considered desirable to collect varieties from a wide range, study and select desirable types with a view to cross them and isolate promising types from their hybrid progeny. These aspects are kept in view in the future programme of work on pulses.

Summary: Madras State is deficit in pulses to the extent of 50%. The output has to be increased by bringing in more area under cultivation and by evolution and spread of high-yielding strains. As a result of work done during the past eight years a few high-yielding cultures of different pulses, suitable for general cultivation by ryots, have been isolated. These not only yield more than the local varieties but also possess a higher percentage of protein. The pulses are found to be zonal in their performance and in any programme of improvement this aspect also is to be considered.

Acknowledgements: The results of the work reported in this paper were those obtained in a scheme partly financed by the Indian Council of Agricultural Research, New Delhi, to whom we acknowledge our thanks. Our thanks are also due to Messrs. Samuel Jobitha Raj and T. K. Balaji Rao, Pulses Specialists, now retired, Messrs. B. S. Moorthi and A. K. Nagarathnam, Assistants at the sub-stations, Vizianagaram and Dharmapuri, for the data collected by them at these stations, and to Sri M. A. Sankara Ayyar, Pulses Specialist, for his help and guidance in the preparation of this paper.
