

RECURRENT SELECTION FOR INCREASED PEARL MILLET GRAIN YIELD

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ABSTRACT:

Pearl Millet [*Pennisetum glaucum* L.(BR.)] is a model crop as far as improvement through mass selection is concerned, because it encompasses great genetic variation for a wide spectra of traits [Burton and Powell 1968]. Landraces are recognised as valuable genetic resources for various important agronomic traits.

To provide a genetic base for the Namibian Pearl Millet Breeding Programme, a major germplasm collection was carried out during the 1990\91 season.

During the 1991\92 season five accessions were identified for their yield superiority and other agronomic traits as accessions which need only a little improvement.

In pearl millet recurrent selection procedures were found to be effective in improving grain yield and other agronomic traits [Gupta and Andrews 1978]. Recurrent selection system provide an excellent way of utilising germplasm in a breeding programme to further broaden the genetic base. A 10-20% yield increase is achievable.

Using recurrent selection, five test varieties were made during the off-season at both Omahenene Research Station and Mzarabani by diallel fashion. The following varieties were made: SDMV 92034, SDMV 92035, SDMV 92036, SDMV 92037, and SDMV 92038.

During three seasons of testing across several test locals in several yield trials in Namibia these varieties have shown a combined yield superiority of between 2,3% to over 26%.

This article is based on research results the past three seasons.

INTRODUCTION:

Pearl Millet [*Pennisetum glaucum* L.(Br)] is a drought tolerant crop.

Recurrent selection is a model of plant breeding for quantitatively inherited traits by which the frequencies of favourable genes are increased.

Bengt Anderson suggested that recurrent selection applied to new material or to characters not previously selected, usually produces marked changes.

Our landraces are adopted to our growing conditions ,but there is, however, a great need to increase grain yield. Increased pearl millet yields are a necessity to provide more household food self sufficiency and security. Such increases are also attainable through the development of high yielding varieties, tolerant to stresses with earliness.

Grain production can also be maximised by providing the best field conditions and cultural practices.

Panicle weight, tiller numbers, earliness, grain size and grain density were found to constitute important yield components.

If a landrace accession is only lacking in one or two traits, a limited backcross procedure is used in which case only that limiting trait is incorporated using a donor parent.

MATERIALS AND METHODS

Five superior pearl millet accessions of Namibian origin were identified during 1990\91 season for a minor improvement. Five test varieties were made from these accessions during the off-season of 1991\92 at two stations.

These varieties were tested at all our test locations during the last three seasons of 1992\93, 1993\94 and 1994\95.

Data were collected for: time to 50% days to bloom (days); plant height (cm) ; ear-length (cm) ; grain yield in gram per plot . The last variable was converted to tonnes per hectare.

The threshing ratio was calculated as the ratio of grain weight to panicle weight expressed in percentage.

These data were taken from trials conducted on our stations and each season represent a replication.

Using MSTATC package data were subjected to analysis of variance and yield stability analysis.

RESULTS AND DISCUSSIONS

Analysis of variance showed that there is a significant difference between treatments over seasons (reps). Yields have also shown a tendency to maintain a fair stable pattern across season.

SDMV 92034 and SDMV 92035 showed a yield advantage of well over 26 % over Farmers Local control .

SDMV 92038 showed a 15 % but more stable yield advantage over the Farmers Local control. This variety flowers a week earlier and is 25 cm shorter than the Farmers' local control.

SDMV 92034 flowers eight days earlier and is 29 cm shorter than the Farmers' Local control.

SDMV 92035 flowers six days earlier and is 19 cm shorter than the control.

The difference is not that pronounced between the rest of the varieties and the control.

CONCLUSION

In pearl millet, characters such as large grain, long panicles, the ability to produce more tillers, pest and disease tolerance and earliness favour high yields. Recurrent selection is one of the methods that could be employed to achieve this objective.

Improved cultivars apart from high yield potential, adaptation to heat and drought stress must also improve yield stability and be accepted for local consumption.

Farmers should also be brought into the variety identification picture much earlier so that our breeding efforts do not go astray from farmers' perceptions and their feedback must be incorporated in the future research activities.

REFERENCES

ANDERSON, B. Research and Results in Plant Breeding Svalof 1886-1986. Svalof AB 26800 Svalof Sweden.

ANDREWS, D.J. Paula J.Bramel-Cox: Breeding cultivars for sustainable crop production in low input Dryland Agriculture in the Tropics. Crop Science 1 1993.Crop Science Society of America 677 S.Segoe Rd. Madison WI 53711, USA; pp 216-217.

BIDINGER, F.R. Research on small Farmer crops in Northern Namibia:Report to Division of Agricultural Research, MAWRD Namibia. ICRISAT, Patancheru, P.O.Andhra Pradesh, 502 324, India; pp 12-20.

GOMEZ, K.A., GOMEZ, A.A., 1984: Statistical Procedures for Agricultural Research. John Wiley and Sons New York, USA.

ICRISAT Annual Report 1993: ICRISAT, Patancheru, Andhra Pradesh 502 324, India; pp 88-90.

ICRISAT Southern and Eastern Africa Regional Program. Annual Report 1993. ICRISAT, Patancheru, Andhra Pradesh, 502 324, India; pp 28-30.

RACHIE, K., MAJMUDAR, J.V., MILLET, P. The Pennsylvania State Press.University Park and London 1980; pp 116- 120.

RATTUNDE, H.F.W., WITCOMBE, J.R. Recurrent Selection for increased grain yield and Resistance to Downy Mildew in Pearl Millet.Plant Breeding 110; 63-72 1993. Paul Parey Publishers, Berlin and Hamburg. ISSN 0179-9541.

APPENDIX

Mean performance of five improved varieties from the Namibian Pearl Millet Accessions compared against Farmers' Local control under Namibian conditions averaged over three seasons.

No.	Variety Name	Days to 50 % Bloom	Plant height in centimetres	Grain yield in tonnes/hectare
1.	SDMV 92034	58.000	170.250	1.390
2.	SDMV 92035	60.750	180.250	1.395
3.	SDMV 92036	63.000	185.000	1.179
4.	SDMV 92037	61.250	198.000	1.123
5.	SDMV 92038	59.000	174.750	1.225
6.	Farmers' Local	66.250	199.250	1.098
	Mean	61.417	184.583	1.233
	C.V.%	5.11	6.600	9.620
	S.E +-	0.792	4.191	0.05