# THE EFFECTS OF DATES OF PLANTING ON YIELD AND YIELD COMPONENTS OF PEARL MILLET

## S A IPINGE

Ministry of Agriculture, Water and Rural Development, Private Bag 13184, Windhoek, Namibia

## ABSTRACT

In order to test pearl millet varieties for suitability and adaptability, more than one date of planting is required to reach an average and reliable interpretation of the varieties' performances. Several planting dates at one or different sites can also speed obtaining valuable data on the varieties' average responses to the environmental interactions. Two sets of the Namibian Pearl Millet Advanced National Trial were planted at Omahenene Research Station and Okashana Research and Training Center during the 1997/98 cropping season. Only eight of the twenty-five varieties planted (SDMV 95032, SDMV 95030, SDMV 95042, SDMV 95045, SDMV 95022, SDMV 92038, OKASHANA 1 and OKASHANA 2) appeared consistently among the top ten in both plantings, however, they varied regarding their rankings. This study reveals that the rank order of the yield of varieties is altered even at the same location.

## INTRODUCTION

Florell (1929) implied that more than a single date of seeding is required for a researcher to reliably interpret the performance of varieties. Harrington and Horner (1935) obtained conclusive evidence that a variety-date interaction for sowing existed in trials conducted by them. They also concluded that the two dates gave useful data on the adaptation of varieties; they emphasized the values of good strains while revealing the weakness of others. Planting on two dates at one or several locations reduces the cost of a second test, because each planting date represents a different environment. In areas like Namibia, stable yields are the key to sustainable food supplies. In plant breeding, plant breeders aim at developing varieties that are stable across a range of environments. The term stability refers to the behavior of a variety in varying environments. Maximum stability occurs if the difference between a variety s yield and the mean of all tested varieties is constant across environments.

## MATERIALS AND METHODS

Twenty five (25) varieties of pearl millet were tested in the Namibian Pearl Millet Advanced National Trial, in a five x five lattice design, with replications at Omahenene Research Station (Omahenene) and Okashana Research and Training Center (Okashana). The intervals between the first and second planting dates were one month. All trials were planted mechanically on ridges of four rows, four meters long and with an initial spacing of 0.75m x 0.20m. When the crop reached 15cm in height, plants were thinned to give a final spacing of 0.75m x 0.40m. This spacing allowed crops to fully express themselves under the prevailing conditions. Observations and data were collected during the crop growth and at harvest for statistical analysis on the two center rows on the following:

- Days to 50% flowering,
- Plant stand after thinning,
- Panicle length in centimeters,
- Agronomic desirability on a scale of 1-5,
- Lodging score on a scale of 1-5,
- Number of panicles per plot,
- Weight of panicles per plot in kilograms,
- Weight of grains per plot in kilograms, and
- Threshing percentage as a ratio of grain weight over panicle weight multiplied by 100.

The weight of grains per plot was converted to grain yield in tons per hectare. The analysis of variance components were based on ANOVALAT. The analysis was conducted by using MSTATC statistical package, Release 2.11. This article is restricted to only two yield components, namely days to 50% flowering and grain yield.

## RESULTS AND DISCUSSION

In the first planting Kangara was the highest yielding entry at Omahenene and was third at Okashana to yield 1.75 and 1.54 tons per hectare respectively, and the highest overall yielding entry at 1.65 tons per hectare. SDMV 95032 and Okashana 1 took the second and third place in overall performance, both at 1.58 tons per hectare.

In the second planting SDMV 95042 had the highest overall mean yield of 1.56 tons per hectare. Okashana 2 and Okashana 1 performed very well to occupy the second and third overall place respectively.

Kangara and Okashana 1 were earliest to flower, while SDMV 93033 and Farmers' Local flowered the latest in the first planting. For most varieties, flowering was later in the second than in the first planting.

Table 1. Performance data of the Namibian Pearl Millet Advanced National Trial across the two test sites in Namibia during the 1997/98 cropping season (yield in tons per hectare), 1st planting

| Variety Name | Days to 50% Flowering | Omahenene (Yield (t/ha) | Okashana yield (t/ha) | Mean yield (t/ha) |
|---|---|---|---|---|
| KANGARA | 43.560 | 1.750 | 1.540 | 1.650 |
| SDMV 95032 | 48.440 | 1.140 | 2.020 | 1.580 |
| OKASHANA 1 | 43.670 | 1.670 | 1.480 | 1.580 |
| SDMV 95030 | 44.890 | 1.370 | 1.580 | 1.480 |
| SDMV 95042 | 48.890 | 1.060 | 1.680 | 1.370 |
| Okashana 2 | 48.440 | 1.120 | 1.520 | 1.320 |
| SDMV 95045 | 49.220 | 1.240 | 1.360 | 1.300 |
| SDMV 94001 | 50.110 | 0.990 | 1.450 | 1.220 |
| SDMV 92038 | 59.670 | 0.780 | 1.350 | 1.070 |
| SDMV 95022 | 48.780 | 0.820 | 1.290 | 1.060 |
| SDMV 92037 | 51.110 | 0.840 | 1.250 | 1.050 |
| SDMV 95046 | 46.890 | 0.750 | 1.240 | 0.990 |
| SDMV 95016 | 49.890 | 0.790 | 0.940 | 0.870 |
| SDMV 95027 | 51.560 | 0.850 | 0.870 | 0.860 |
| SDMV 94018 | 51.220 | 0.700 | 1.020 | 0.860 |
| SDMV 95038 | 50.110 | 0.810 | 0.890 | 0.850 |
| SDMV 93014 | 56.060 | 0.400 | 1.300 | 0.850 |
| SDMV 94014 | 52.110 | 0.700 | 0.920 | 0.810 |
| SDMV 95036 | 48.110 | 0.650 | 0.920 | 0.790 |
| SDMV 95037 | 50.110 | 0.840 | 0.740 | 0.790 |
| SDMV 95025 | 48.890 | 0.630 | 0.790 | 0.710 |
| SDMV 92035 | 55.330 | 0.710 | 0.700 | 0.710 |
| Farmers' Local | 70.440 | 0.570 | 0.622 | 0.600 |
| SDMV 92038 | 57.330 | 0.340 | 0.720 | 0.530 |
| SDMV 93033 | 70.110 | 0.200 | 0.370 | 0.290 |
| Mean | 51.800 | 0.870 | 1.410 | 1.010 |
| S.E.-+ | 0.540 | 0.050 | 0.060 | - |
| C.V. | 3.670 | 38.460 | 36.200 | - |

Table 2. Performance data of the Namibian Pearl Millet Advanced National Trial across two locations in Namibia during the 1997/98 cropping season (yield in tons per hectare), 2nd planting

| Variety Name | Days to 50% Flowering | Omahenene yield (t/h) | Okashana yield (t/ha) | Mean yield (t/ha) |
|---|---|---|---|---|
| SDMV 95042 | 58.000 | 1.830 | 1.270 | 1.560 |
| OKASHANA 2 | 56.500 | 1.890 | 1.200 | 1.540 |
| OKASHANA 1 | 53.830 | 2.130 | 0.670 | 1.400 |
| SDMV 92038 | 64.000 | 1.560 | 1.220 | 1.390 |
| SDMV 95022 | 54.670 | 1.700 | 1.080 | 1.390 |
| SDMV 95045 | 58.000 | 2.020 | 0.710 | 1.370 |
| SDMV 95046 | 57.830 | 2.030 | 0.680 | 1.350 |
| SDMV 95036 | 54.830 | 1.960 | 0.720 | 1.340 |
| SDMV 95030 | 52.830 | 1.800 | 0.670 | 1.240 |
| SDMV 95032 | 54.670 | 1.750 | 0.740 | 1.240 |
| SDMV 94001 | 57.500 | 1.480 | 0.940 | 1.210 |
| SDMV 95038 | 58.330 | 1.540 | 0.860 | 1.200 |
| KANGARA | 52.670 | 1.810 | 0.490 | 1.150 |
| SDMV 92037 | 55.170 | 1.400 | 0.810 | 1.110 |
| SDMV 95037 | 58.330 | 1.650 | 0.560 | 1.110 |
| SDMV 95025 | 57.000 | 1.280 | 0.880 | 1.080 |
| SDMV 95016 | 54.500 | 1.370 | 0.750 | 1.060 |
| SDMV 92035 | 60.000 | 1.080 | 0.950 | 1.010 |
| SDMV 94018 | 58.500 | 1.270 | 0.570 | 0.920 |
| Farmers' Local | 63.670 | 1.190 | 0.630 | 0.910 |
| SDMV 92036 | 62.500 | 0.860 | 0.820 | 0.840 |
| SDMV 94014 | 57.500 | 0.920 | 0.730 | 0.830 |
| SDMV 93033 | 68.670 | 0.720 | 0.930 | 0.820 |
| SDMV 93014 | 60.000 | 0.680 | 0.850 | 0.770 |
| SDMV 95027 | 58.500 | 1.120 | 0.320 | 0.720 |
| MEAN | 57.920 | 1.480 | 0.800 | 1.140 |
| S.E-+ | 3.530 | 26.330 | 38.260 | - |
| C.V.% | 0.830 | 0.060 | 0.040 | - |

## CONCLUSIONS AND RECOMMENDATIONS

Only eight varieties appeared consistently among the top ten in both plantings, although with some changes in their rank order. SDMV 95042, Okashana 2 and Okashana 1 appeared to be very stable in their performances. SDMV 95042 needs to be closely looked at for future recommendations as it is very promising, however, there is a need for it to undergo on-farm verification under the farmers' own management practices.

## ACKNOWLEDGEMENT

## REFERENCES

IPINGE, S.A. 1998. The Sorghum and Pearl Millet Improvement Program. 1997/98 Annual Progress Report. Ministry of Agriculture, Water and Rural Development, Windhoek, Namibia.

MANJIT S. KANG & HUGH G. GAUCH Jr. (Editors). 1996. Genotypes by Environment Interaction. CRC Press Incorporated. 2000 Corporate Blv, N.W., Bock Raton, Florida, 33431.

STEEL, R.G.D., J.H.TORRIE & D.A. DICKEY.1997. Principles and Procedures of Statistics: A Biometrician Approach, 3rd Edition. The McGraw Hill Companies Inc. 1221 Avenue of the Americas, New York, NY, 10020.