

PERFORMANCE OF SORGHUM VARIETIES IN POTOHAR REGION

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ABSTRACT

Eight sorghum genotypes were evaluated for grain and other associated traits at the National Agricultural Research Center, Islamabad, Pakistan in 2010. The results revealed that sorghum varieties differed significantly for grain yield, stalk yield, plant height, days to 50% flowering and maturity. Among varieties, SPV-462, CSP-15 and Johar produced higher grain yield (4120, 3898 and 3857 kg ha⁻¹) than other genotypes tested. Varieties YSS-9 and SPV-462 produced higher stalk yield of 23820 and 23640 kg ha⁻¹, respectively. Sorghum varieties YSS-9 and CSV-15 took maximum days (75 and 74) to 50% flowering while variety PARC-SS-2 took minimum 63 days to 50% flowering. The varieties PARC-SS-2 and Johar showed earliness as they both took 108 days to mature while YSS-9 was found late maturing variety.

INTRODUCTION

Sorghum (*Sorghum bicolor* L. Moench) is a major kharif cereal crop in arid and semi-arid areas of the world including Pakistan. It is one of the four major food grains of the world. Besides being a major source of staple food for humans, it serves as an important source of feed and fodder for animals. It makes comparatively quick growth and gives not only good yield of grain but also very large quantities of fodder. Sorghum fodder possesses oxalic acid and prussic acid. Its grains contain about 10-12% protein, 03% fat and 70% carbohydrates, therefore, it can replace other grains in the feeding program for dairy cattle and poultry (Ullah *et al.*, 2007). Its grain has high level of iron (>70 ppm) and zinc (>50 ppm), which can reduce micronutrient malnutrition globally.

Sorghum is also a good substrate for ethanol production which can be added to fuel for saving precious foreign exchange (Reddy *et al.*, 2005).

Sorghum is also an important crop in Potohar region, which lies from about 32.5°N to 34.0°N Latitude and from about 72°E to 74°E Longitude. This region holds the major portion of Attock, Jhelum, Rawalpindi and Chakwal with total area of 28488.9 sq Km. The best suited area is mainly located between 33.0°N and 35.0°N latitude where the food crop production is possible under rainfed conditions.

Among various factors responsible for low yield, lack of quality seed of sorghum is of prime importance (Anonymous, 2004). Osmanzai (1994) reported that hybrids performed better or at par with cultivars and produced 36%

more grain yield than cultivars. He further reported no significant difference between hybrids and cultivars for days to bloom, physiological maturity, plant height and seed weight. In another study, Yadav (1994) tested 38 hybrids and 22 millet composites for days to 50% flowering, plant height and grain yield. The results indicated that pearl millet hybrids did not offer sufficient advantage over composite in arid regions. Alagarsamy (1993) evaluated 9 sorghum hybrids and 17 varieties at 47 locations and reported that hybrids as a group had higher yield than varieties. Zahid and Bhatti (1994) also reported that sorghum hybrids, having more number of leaves/plant and higher leaf area, produced maximum green and dry fodder yields.

Keeping this in view, the present study was conducted to evaluate genotypic

potential among different sorghum genotypes for their grain yield and other associated characteristics under agro-climatic condition of Potohar.

MATERIALS AND METHODS

Eight sorghum genotypes were evaluated at the National Agriculture Research Centre, Islamabad, Pakistan in 2010. The trial was laid out in a randomized complete block design with three replications; each consisted of 60 cm apart and 5 meter long four rows. Fertilizers @ 90: 45 NP kg ha⁻¹ was applied as urea and phosphorus. All P and half N was applied at sowing time and remaining N was side dressed with second irrigation. All other agronomic practices were kept uniform for all the treatments. Detail of genotypes is given as under:

| S # | Varieties | Source |
|-----|------------|---|
| 1 | Rari-S-4 | Regional Agricultural Research Institute, Bahawalpur |
| 2 | SPV-462 | International Crops Research Institute for the Semi-Arid Tropics, India |
| 3 | CSV-15 | International Crops Research Institute for the Semi-Arid Tropics, India |
| 4 | RS-29 | National Agricultural Research Centre, Islamabad |
| 5 | PARC-SV-10 | National Agricultural Research Centre, Islamabad |
| 6 | YSS-9 | Maize and Millet Research Institute, Yousaf Wala |
| 7 | PARC-SS-2 | National Agricultural Research Centre, Islamabad |
| 8 | Johar | National Agricultural Research Centre, Islamabad |

Five plants were selected randomly from central 2-rows of each plot for recording data on days to 50% flowering, days to maturity, plant height, stalk and grain yield. Plant height was recorded from surface of soil to tip of head. Fifty percent flowering was recorded when 50% plants completed heading. Grain yield was adjusted to 15% grain moisture using the formula as prescribed by Taran *et al.* (1998). Plant height was measured 3 weeks after flowering from the base (ground) to the point where the flag-leaf blade extends from the stalk as recommended by Abel and Pollak (1991). Grain and stalk yields were recorded and then converted to kg per hectare. The data were analyzed statistically (Steel *et al.*, 1997) and means were compared using least significant difference test through

MSTATC computer software (MSTATC, 1991).

RESULTS AND DISCUSSION

Grain yield (kg ha⁻¹)

The data revealed that sorghum varieties differed significantly for grain yield (Table-1). The highest grain yield was obtained from sorghum variety SPV-462 (4120 kg ha⁻¹), which was statistically at par with CSV-15 (3898 kg ha⁻¹) and Johar (3857 kg ha⁻¹). The lowest grain yield (2858 kg ha⁻¹) was recorded in

variety Rari-S-4. Similar results were reported by Alagrasamy (1993) and Osmanzai (1994).

Stalk yield (kg ha⁻¹)

Varieties also differed significantly in stalk yield (Table-1). The highest stalk yield was obtained from varieties YSS-9 (23820 kg ha⁻¹) and SPV-462 (23446 kg ha⁻¹), followed by Johar (23380 kg ha⁻¹). The lowest stalk yield was recorded in variety Rari-S-4 (19420 kg ha⁻¹). Earlier scientists (Alagrasamy, 1993; Osmanzai, 1994) also reported similar results. The data further showed that YSS-9 proved as dual-purpose variety with reasonable grain and stalk yields.

Plant height at maturity (cm)

A perusal of data (Table-1) indicated that maximum plant height (217cm) was recorded in CSV-15, which was statistically at par with SPV-462 (212cm), YSS-9 (205cm) and RS-29 (202cm). Short statured plants of 157cm were recorded in variety PRC-SS-2. Difference in plant height could be due to variation in genetic make-up or the hormonal balance and cell division rate that result in changes in the plant height of the different varieties (Ullah *et al.*, 2007). Olakajo and Iken (2001) also reported significant variations in plant height among various maize varieties.

Table-1. Grain and stalk yields, plant height, days to 50% flowering and days to maturity as affected by various sorghum varieties and hybrids.

| Varieties | Grain yield (kg ha ⁻¹) | Stalk yield (kg ha ⁻¹) | Plant height (cm) | Days to 50% flowering | Days to maturity |
|---------------------------|------------------------------------|------------------------------------|-------------------|-----------------------|------------------|
| SPV-462 | 4120a | 23640ab | 212a | 70b | 118c |
| CSV-15 | 3898a | 21820c | 217a | 74a | 125b |
| Johar | 3857ab | 23380abc | 185abc | 66c | 108d |
| PARC-SS-2 | 3573bc | 21910bc | 157c | 63d | 108d |
| RS.29 | 3565bc | 23240abc | 202ab | 71b | 129a |
| YSS-9 | 3556c | 23820a | 205ab | 75a | 132a |
| PARC-SV-10 | 3360c | 21640c | 176abc | 71b | 122b |
| Rari-S-4 | 2858d | 19420d | 170bc | 70b | 122b |
| LSD_{0.05} | 293.8 | 1820 | 43.10 | 1.848 | 3.367 |

Means followed by different letter(s) in a column are significant at 5% level of probability.

Days to 50% flowering

Varieties differed significantly in days to 50% flowering (Table-1). Sorghum variety YSS-9 and CSV-15 took maximum days (75 and 74) to 50% flowering than varieties Johar and CSV-15 taking 66 and 63 days to 50% flowering and proved as early maturing. Similar results were reported by Alagarsamy (1993).

Days to maturity

Days to maturity usually follows the flowering pattern. Days to maturity was significantly affected by sorghum varieties (Table-1). Varieties PARC-SS-2 and Johar Showed earliness by taking 108 days to maturity, followed by SPV-462 (118 days). Variety YSS-9 was found late, which matured in 132 days.

CONCLUSION

From the results obtained, it is concluded that sorghum varieties differed in their capability of producing higher stalk and grain yield in Potohar region. Among the

tested genotypes, SPV-462 produced higher grain and stalk yield than all other genotypes.

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