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# Assessment of Yield Attributes, Yield, Nutrient Uptake and Economics of Yellow Pericarp Sorghum (*Sorghum bicolor* (L.) Moench) Genotypes as Influenced by Land Configurations and Vegetative Mulch under Rainfed Condition of Southern Telangana Zone, India

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

A field experiment was carried out at College of Agriculture, Rajendranagar, Hyderabad to study the influence of land configurations and vegetative mulch on the yield, yield attributes, nutrient uptake and economics of yellow sorghum genotypes during *kharif* 2018-19. The experiment was laid out in strip plot design with six (6) land configurations as main plots *viz.,* Flat bed, Ridge and furrow, Broad bed and furrow, Flat bed + Mulch (FB + M), Ridge and Furrow + Mulch (RF + M), Broad bed and furrow + Mulch (BBF + M) and four (4) yellow pericarp sorghum genotypes as sub plots *viz.,* PYPS (Palem yellow pericarp sorghum) 101,102, 103 and 104. Results obtained from the study showed that broad bed and furrows along with mulch (BBF+ M) reported higher yield attributes *viz.,* effective ear heads per $m^2$ (11.91), grains per ear head (741), grain weight per ear head (21.93 g) and higher nutrient uptake (246 N, 43.0 P and 78.7 K kg $ha^{-1}$). While, PYPS 102 genotype registered higher effective ear heads per $m^2$ (11.90), grains per ear head (702), grain weight per ear head (19.49 g) and higher total nutrient uptake (246 N, 43.0 P and 78.7 K kg $ha^{-1}$). In terms of economics, higher gross returns (Rs. 95747 $ha^{-1}$), net returns (Rs. 62101 $ha^{-1}$). and BC ratio (2.84) were recorded under broad bed and furrows with mulch, owing to higher grain and stover yield (1700 and 1585 kg $ha^{-1}$, respectively). BBF + M recorded an increase of 37, 35 and 57 per cent in grain yield, gross returns and net returns, respectively over flatbed with no mulch. Correspondingly, higher grain yields of PYPS 102 (1586 kg $ha^{-1}$) had reflected in monetary terms, as both the gross returns (PYPS 102 – Rs. 89774 $ha^{-1}$), net returns (PYPS 102 – Rs. 57028 $ha^{-1}$) and benefit cost ratio (PYPS 102 – 2.74). Thus, the above treatments were found to be the best options for cultivation of yellow sorghum considering their higher yield, yield attributes, nutrient uptake and economics under rainfed condition in South Telangana agro-climatic zone.

*Keywords: Genotypes; land configurations; vegetative mulch; yellow pericarp sorghum.*

## 1. INTRODUCTION

Sorghum is a staple food for the world's poorest people living in the semi-arid tropics. is one among the top five cereals grown in India and accounts for roughly 16% of the world's sorghum production. With an output of 4.41 million tonnes and a productivity of 780 kg ha-1, the crop is grown on an area of 5.65 million hectares in India [1]. In Telangana, it is cultivated in 80,000 ha with a production of 70,000 tonnes and productivity of 1051 kg $ha^{-1}$. Out of the total cultivated area under sorghum in Telangana, 60 % of the area accounting for 48,000 ha is under rainfed cultivation. However, the area under sorghum is declining every year (from 18 million ha in 1960 to 5.65 million ha in 2015-16) in all parts of India due to expanded area of the other competing crops - rice, wheat, maize, cotton, sugarcane, chilli, soybean, and groundnut. Hence, alternate use of sorghum is the need of the hour to ensure the food security of the socially underprivileged people.

Sorghum has a variety of grain colours, which is one of its distinctive characteristics. The grain might be red, lemon-yellow, white, or black in colour. In tribal parts of Telangana, the yellow pericarp sorghums are typically grown in patches for sustenance during the kharif season with little management techniques, which results in low yields and vulnerability to pests and diseases. However, yellow sorghum has generated a need for an increase in its area and production with better cultures because of its excellent nutritional, good roti making, and keeping capabilities. The yellow sorghums are prone to lodging when grown under better management procedures during *rabi* and summer because they are normally taller than the white sorghums. Hence, they are invariably cultivated during *kharif* season in Telangana. In this situation, adopting appropriate land management practices that can conserve moisture during *kharif* may help in achieving a higher yield attributes, yield of yellow sorghum, subsequently resulting in higher profitability [2-4].

The configuration of the land contributes to greater water usage efficiency by increasing rainfall infiltration, reducing erosion, total runoff, and facilitating drainage. Reduced soil-related issues and improved crop growth and yield would result from land modification using broad bed and furrow and ridges and furrows. The role of improved genotypes in increasing crop productivity is well established. Many studies pronounced that choosing the genotype to site-specific conditions *viz.,* climate, soil productivity, availability of water resources, biotic and other abiotic factors is a must. Presently, the genotypes with higher productivity have been identified in yellow pericarp sorghum at Regional Agricultural Research Station, Palem, Telangana. Evaluation of these genotypes at different locations is necessary to know their sustainability. With this overview, the present field study was carried out to investigate the effect of different land configurations on the yield attributes, yield, nutrient uptake and economics of yellow pericarp sorghum genotypes under rainfed condition of Southern Telangana agro-climatic zone.

## 2. MATERIALS AND METHODS

The field experiment was carried out at College of Agriculture, PJTSAU, Rajendranagar, Hyderabad during *kharif* of 2018. The farm was geographically situated at an altitude of 542.6 m above mean sea level on $17^0$ 18' 16.4'' North latitude and $78^0$ 40' 39.7" East longitude and categorized under the Southern Telangana Agro-Climatic Zone. The perusal of the data revealed that the soil was sandy clay loam in texture, neutral in reaction (6.83), low (0.46 %) in organic carbon, low (224 kg $ha^{-1}$) in available nitrogen, medium (37.2 kg $ha^{-1}$) in available phosphorus and high (467.6 kg $ha^{-1}$) in available potassium. The bulk density of 0-15 cm and 15-30 cm was 1.48 g $c.c^{-1}$ and 1.58 g $c.c^{-1}$, respectively. The soil moisture content in 0-15 and 15-30 cm depth at field capacity was 19.2 and 17.8 percent, respectively and at the permanent wilting point was 8.7 and 7.5 percent, respectively. The total rainfall received during the growth period was 333.8 mm with a total of 21 rainy days.

The experiment was laid out in strip plot design with six (6) land configurations in vertical plots and four (4) yellow pericarp sorghum genotypes in horizontal plots. The vertical plot treatments included were $M_1$- Flat bed, $M_2$ – Ridge and furrow, $M_3$ – Broad bed and furrow, $M_4$ – Flat bed + Mulch, $M_5$ – Ridge and Furrow + Mulch, and $M_6$ – Broad bed and furrow + Mulch. Mulch applied was pongamia leaf @ 6 t $ha^{-1}$. The horizontal plot treatments were PYPS 101, PYPS 102, PYPS 103, and PYPS 104. The net plot area was 4.05 m x 4.20 m. The spacing adopted for sowing was 45 cm × 15 cm. The mulch (Pongamia leaves) was evenly spread between the crop rows in uniform thickness at 20 DAS. The crop was sown on 5.07.2018 and harvested on 22.10.2018.

The broad beds and furrows were laid with a bed width of 135 cm and a furrow depth of 15 cm. Similarly, for ridges and furrows, a depth of 15 cm was maintained. Proper care was taken to maintain optimum plant population in each configuration. Urea, Diammonium phosphate, and muriate of potash were used as sources of fertilizers at recommended doses of 60:40:30 kg $N:P_2O_5:K_2O$ $ha^{-1}$. The recommended dose of nitrogen @ 60 kg $ha^{-1}$ was applied as a uniform dose in two splits, one as basal and the other at 30 DAS. The entire recommended phosphorus (40 kg $ha^{-1}$) and potash (30 kg $ha^{-1}$) were applied as basal at the time of sowing uniformly to all the plots. Soil moisture was estimated from two soil depths *viz.,* 0-15 and 15-30 cm by gravimetric method at weekly intervals. The biometric observations for growth analysis were recorded at monthly intervals and the yield attributes were accounted for at harvest to estimate the yield of yellow sorghum genotypes under different land configurations during *kharif*. Plant samples from all the treatments were collected, processed and analyzed for total N, P and K contents and N, P and K uptake was computed. Gross returns and net returns were calculated using the price of the produce and cost of cultivation.

## 3. RESULTS AND DISCUSSION

### 3.1 Yield Attributes

The data revealed that yield attributes differed significantly due to land configurations and genotypes. Whereas, the interaction effect was found to be non-significant. Among the land configurations, the number of effective ear heads per $m^2$ (12.0), the number of grains per ear head (741) and the grain weight per ear head (21.9) was significantly higher in the crop raised on broad beds and furrows with mulch (BBF + M). However, the number of grains per ear head was on par with Ridges and furrows with mulch (RF + M). Higher yield attributes in BBF + M might be attributed to superior plant height and dry matter production leading to better translocation of photosynthates from source to sink. Further, the availability of more moisture in BBF + M might had contributed to assuring reproduction of the crop in terms of grains per ear head. These results are in line with those obtained by Hanamat and Angadi [5] and Srivatsava and Jangawad [6].

With regard to genotypes, PYPS 102 registered significantly higher number of effective ear heads per $m^2$ (11.90), number of grains per ear head

(702) and grain weight per ear head (19.49 g) over other genotypes. Whereas, PYPS 101 recorded lower yield attributes *viz.,* number of effective ear heads per $m^2$ (10.44), number of grains per ear head (588) and grain weight per ear head (16.71 g) among all the genotypes. The higher yield attributes in PYPS 102 genotype was attenuated in response to higher growth parameters. Higher yield attributing parameters under broad beds and furrows and with improved genotypes was also reported by Patil and Ramesha [7] and Sodavidya et al. [8].

### 3.2 Yield

Broad beds and furrows with mulch (BBF + M), recorded significantly higher grain yield (1700 kg $ha^{-1}$) and stover yield ($M_6$, 12403 kg $ha^{-1}$) as compared to other treatments owing to higher growth parameters and yield attributes. However, the stover yield in BBF +M was comparable to RF + M ($M_5$, 11965 kg $ha^{-1}$). Srivatsava and Jangawad [6] reported greater yields in broad bed and furrow method of planting in soybean, which might have contributed to *in-situ* moisture conservation, improved root development, and improved nutrient delivery to the crop, boosting yield attributes and yield. Additionally, the leaf mulch has enhanced the rate of infiltration, increased the availability of fertilizer, and consequently raised crop output [9]. Grain yields were significantly lower in flat beds ($M_1$) and ridges and furrows ($M_2$) without mulch (1239 and 1312 kg $ha^{-1}$, respectively). PYPS 102 performed very well among the genotypes to recording higher grain yield (1585 kg $ha^{-1}$) and stover yield (12085 kg $ha^{-1}$). However, the grain yield of PYPS 102 was on par with and PYPS 103 (1508 kg $ha^{-1}$). While PYPS 101 recorded the lowest grain yield (1320 kg $ha^{-1}$) and stover yield (10151 kg $ha^{-1}$).

### 3.3 Nutrient Uptake

Nutrient uptake by stover (192, 35.5, 69.2 kg NPK $ha^{-1}$), grain (50.6, 7.5, 11.5 kg NPK $ha^{-1}$) and total (246, 43.0, 78.7 kg NPK $ha^{-1}$) in terms of N, P and K was maximum when the crop was raised on broad beds and furrows with mulch (BBF + M). Moisture availability through maximum conservation in BBF + M might have favoured translocation of photosynthates from source to sink (Table 3). However, the stover uptake of NPK under BBF + M was on par with RF + M. The results closely resembled with those of Binod Kumar and Singh [10] in frenchbean and Jat et al. [11] in greengram with higher N, P and K uptakes under raised bed method of sowing. Whereas, the crop raised on flatbed without mulch registered least N, P and K uptakes. Better performance of PYPS 102 was projected by higher stover (185, 31.0, 60.3 kg NPK ha $^{-1}$), grain (47.8, 6.52,10.46 kg NPK $ha^{-1}$) and total (233, 37.5, 70.7 kg NPK $ha^{-1}$) uptake values at harvest. Vigorous growth and higher dry matter production of this genotype compared to the other varieties (PYPS 101, PYPS 103 and PYPS 104) placed it in best position with regards to stover, grain and total uptakes. On the other side, PYPS 101 was found inferior with lowest stover (N - 138, P - 23.3, K - 47.9 kg $ha^{-1}$), grain (N - 37.9, P - 4.77, K - 8.49 kg $ha^{-1}$) and total (N-178, P-28.1, K-56.4 kg $ha^{-1}$) uptakes. However, it was found comparable with PYPS 104 related to stover N uptake (149 kg $ha^{-1}$) and grain N (41.0 kg $ha^{-1}$) and P (5.06 kg $ha^{-1}$) uptakes.

### 3.4 Economics

Raising of the crop on broad beds and furrows with mulch fetched higher gross (Rs. 95747 $ha^{-1}$) and net returns (Rs. 62101 $ha^{-1}$). Inspite of higher cost of cultivation (Rs. 35647 $ha^{-1}$), maximum grain and stover yields in BBF + M resulted in higher returns and hence profit as indicated by the BC ratio (2.84). However, comparable net returns (Rs. 56682 $ha^{-1}$) and BC ratio (2.71) was noticed in Ridges and furrows with mulch. Higher net returns and BC ratio under raised method was also confirmed by Joshi et al. [12], Pramanik et al. [13] and Jat et al. [11]. Comparably lower yields as indicated in Table 4 in flat bed without mulch ($M_1$) had fetched lower gross (Rs. 70872 $ha^{-1}$) and net returns (Rs. 39476 $ha^{-1}$) with BC ratio of 2.26 despite of lower cost of cultivation (Rs. 31396 $ha^{-1}$). Higher grain yields of PYPS 102 had reflected in monetary terms, as both the gross (PYPS 102 – Rs. 89774 $ha^{-1}$) and net returns (PYPS 102 – Rs. 57028 $ha^{-1}$) were higher under BBF + M leading to greater benefit over the cost (PYPS 102 – 2.74). However, PYPS 103 genotype registered comparable gross returns (Rs. 85447 $ha^{-1}$), net returns (Rs. 52701 $ha^{-1}$) and BC ratio (2.61).

**Table 1. Yield attributes of yellow sorghum as influenced by land configuration, mulching and genotypes**

| Treatments | Effective ear heads $m^{-2}$ | Grains per ear head | Test weight (g) | Grain weight per ear head (g) |
|---|---|---|---|---|
| **Main plots** | | | | |
| $M_1$ -Flatbed (FB) | $10.75^{b}$ | $552^{d}$ | 24.12 | $14.31^{e}$ |
| $M_2$ -Ridge and furrow (RF) | $10.83^{b}$ | $582^{cd}$ | 24.15 | $16.07^{d}$ |
| $M_3$ -Broad Bed and Furrow (BBF) | $11.00^{b}$ | $616^{c}$ | 24.16 | $17.38^{cd}$ |
| $M_4$ -FB + M | $11.10^{b}$ | $668^{b}$ | 24.18 | $18.66^{c}$ |
| $M_5$ -RF + M | $11.10^{b}$ | $707^{a}$ | 24.19 | $20.11^{b}$ |
| $M_6$ -BBF + M | $11.91^{a}$ | $741^{a}$ | 24.19 | $21.93^{a}$ |
| SEm (±) | 0.16 | 25 | 0.02 | 0.62 |
| CD (P = 0.05) | 0.36 | 56 | NS | 1.38 |
| **Sub plots** | | | | |
| $S_1$ – PYPS 101 | $10.44^{c}$ | $588^{c}$ | 24.13 | $16.71^{c}$ |
| $S_2$ – PYPS 102 | $11.90^{a}$ | $702^{a}$ | 24.19 | $19.49^{a}$ |
| $S_3$ – PYPS 103 | $11.16^{b}$ | $669^{ab}$ | 24.18 | $18.68^{ab}$ |
| $S_4$ – PYPS 104 | $10.94^{b}$ | $618^{b}$ | 24.16 | $17.43^{bc}$ |
| SEm (±) | 0.19 | 21 | 0.008 | 0.51 |
| CD (P = 0.05) | 0.46 | 52 | NS | 1.26 |
| **Interaction (Main x Sub)** | | | | |
| SEm (±) | 0.22 | 28 | 0.02 | 0.67 |
| CD (P = 0.05) | NS | NS | NS | NS |
| **Interaction (Main x Sub)** | | | | |
| SEm (±) | 0.30 | 32 | 0.04 | 0.59 |
| CD (P = 0.05) | NS | NS | NS | NS |

*PYPS – Palem yellow pericarp sorghum, M – Pongamia mulch @ 6 t $ha^{-1}$*

**Table 2. Grain yield (kg ha$^{-1}$) and stover yield (kg ha$^{-1}$) of yellow sorghum as influenced by land configuration, mulching and genotypes**

| Treatments | Grain yield (kg ha$^{-1}$) | Stover yield (kg ha$^{-1}$) |
|---|---|---|
| **Main plots** | | |
| $M_1$ -Flatbed (FB) | $1239^{e}$ | $10178^{c}$ |
| $M_2$ -Ridge and furrow (RF) | $1312^{de}$ | $10319^{c}$ |
| $M_3$ -Broad Bed and Furrow (BBF) | $1406^{cd}$ | $10583^{c}$ |
| $M_4$ -FB + M | $1491^{bc}$ | $11576^{b}$ |
| $M_5$ -RF + M | $1590^{b}$ | $11965^{ab}$ |
| $M_6$ -BBF + M | $1701^{a}$ | $12403^{a}$ |
| SEm (±) | 47 | 219 |
| CD (P = 0.05) | 105 | 487 |
| **Sub plots** | | |
| $S_1$ – PYPS 101 | $1320^{c}$ | $10151^{d}$ |
| $S_2$ – PYPS 102 | $1585^{a}$ | $12085^{a}$ |
| $S_3$ – PYPS 103 | $1507^{ab}$ | $11579^{b}$ |
| $S_4$ – PYPS 104 | $1413^{bc}$ | $10869^{c}$ |
| SEm (±) | 45 | 144 |
| CD (P = 0.05) | 109 | 487 |
| **Interaction (Main x Sub)** | | |
| SEm (±) | 47 | 348 |
| CD (P = 0.05) | NS | NS |
| **Interaction (Main x Sub)** | | |
| SEm (±) | 63 | 373 |
| CD (P = 0.05) | NS | NS |

*PYPS – Palem yellow pericarp sorghum, M – Pongamia mulch @ 6 t ha$^{-1}$*

**Table 3. N, P and K uptakes (kg ha$^{-1}$) of yellow sorghum as influenced by land configuration, mulching and genotypes**

| Treatments | N uptake (kg ha$^{-1}$) | | | P uptake (kg ha$^{-1}$) | | | K uptake (kg ha$^{-1}$) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Stover | Grain | Total | Stover | Grain | Total | Stover | Grain | Total |
| **Main plots** | | | | | | | | | |
| $M_1$ -Flatbed (FB) | 130$^{e}$ | 36.7$^{c}$ | 168$^{e}$ | 20.8$^{e}$ | 3.95$^{e}$ | 24.8$^{e}$ | 43.6$^{e}$ | 7.62$^{e}$ | 51.2$^{e}$ |
| $M_2$ -Ridge and furrow (RF) | 138$^{de}$ | 38.6$^{c}$ | 180$^{de}$ | 22.6$^{de}$ | 4.20$^{e}$ | 26.8$^{de}$ | 46.3$^{de}$ | 8.17$^{e}$ | 55.0$^{e}$ |
| $M_3$ -Broad Bed and Furrow (BBF) | 152$^{cd}$ | 42.4$^{b}$ | 197$^{cd}$ | 23.9$^{d}$ | 5.13$^{d}$ | 29.0$^{d}$ | 49.8$^{d}$ | 9.05$^{d}$ | 58.9$^{d}$ |
| $M_4$ -FB + M | 166$^{bc}$ | 42.4$^{b}$ | 209$^{bc}$ | 27.5$^{c}$ | 5.82$^{c}$ | 33.3$^{c}$ | 56.9$^{c}$ | 9.83$^{c}$ | 66.8$^{c}$ |
| $M_5$ -RF + M | 178$^{ab}$ | 46.1$^{b}$ | 224$^{b}$ | 32.9$^{b}$ | 6.88$^{b}$ | 39.8$^{b}$ | 62.2$^{b}$ | 10.69$^{b}$ | 72.9$^{b}$ |
| $M_6$ -BBF + M | 192$^{a}$ | 50.6$^{a}$ | 246$^{a}$ | 35.5$^{a}$ | 7.50$^{a}$ | 43.0$^{a}$ | 69.2$^{a}$ | 11.53$^{a}$ | 78.7$^{a}$ |
| SEm (±) | 9 | 1.7 | 8 | 1.1 | 0.21 | 1.1 | 1.8 | 0.25 | 1.9 |
| CD (P = 0.05) | 21 | 3.8 | 19 | 2.5 | 0.47 | 2.5 | 4.0 | 0.56 | 4.1 |
| **Sub plots** | | | | | | | | | |
| $S_1$ – PYPS 101 | 138$^{c}$ | 37.9$^{c}$ | 178$^{d}$ | 23.3$^{d}$ | 4.77$^{c}$ | 28.1$^{d}$ | 47.9$^{d}$ | 8.49$^{d}$ | 56.4$^{d}$ |
| $S_2$ – PYPS 102 | 185$^{a}$ | 47.8$^{a}$ | 233$^{a}$ | 31.0$^{a}$ | 6.52$^{a}$ | 37.5$^{a}$ | 60.3$^{a}$ | 10.46$^{a}$ | 70.7$^{a}$ |
| $S_3$ – PYPS 103 | 165$^{b}$ | 44.5$^{ab}$ | 212$^{b}$ | 28.7$^{b}$ | 5.97$^{b}$ | 34.7$^{b}$ | 56.9$^{b}$ | 9.82$^{b}$ | 66.8$^{b}$ |
| $S_4$ – PYPS 104 | 149$^{c}$ | 41.0$^{bc}$ | 193$^{c}$ | 25.9$^{c}$ | 5.06$^{c}$ | 30.9$^{c}$ | 52.6$^{c}$ | 9.15$^{c}$ | 61.7$^{c}$ |
| SEm (±) | 4 | 1.7 | 2 | 0.4 | 0.18 | 0.4 | 0.9 | 0.23 | 1.0 |
| CD (P = 0.05) | 11 | 4.1 | 5 | 1.0 | 0.44 | 0.9 | 2.1 | 0.57 | 2.3 |
| **Interaction (Main x Sub)** | | | | | | | | | |
| SEm (±) | 6 | 1.38 | 4 | 0.90 | 0.26 | 0.92 | 1.8 | 0.30 | 1.69 |
| CD (P = 0.05) | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Interaction (Main x Sub)** | | | | | | | | | |
| SEm (±) | 10 | 2.06 | 10 | 1.36 | 0.31 | 1.36 | 2.4 | 0.36 | 2.35 |
| CD (P = 0.05) | NS | NS | NS | NS | NS | NS | NS | NS | NS |

*PYPS – Palem yellow pericarp sorghum, M – Pongamia mulch @ 6 t ha$^{-1}$*

**Table 4. Economic evaluation of yellow sorghum as influenced by land configuration, mulching and genotypes**

| Treatments | Cost of cultivation (Rs. ha$^{-1}$) | Gross returns (Rs. ha$^{-1}$) | Net returns (Rs. ha$^{-1}$) | B-C ratio |
|---|---|---|---|---|
| **Main plots** | | | | |
| $M_1$ -Flatbed (FB) | 31396 | 70872$^{e}$ | 39476$^{d}$ | 2.26$^{b}$ |
| $M_2$ -Ridge and Furrow (RF) | 33196 | 74622$^{de}$ | 41426$^{cd}$ | 2.25$^{b}$ |
| $M_3$ -Broad Bed and Furrow (BBF) | 33646 | 79466$^{cd}$ | 45820$^{c}$ | 2.36$^{b}$ |
| $M_4$ -FB + M | 33396 | 84628$^{bc}$ | 53232$^{b}$ | 2.70$^{a}$ |
| $M_5$ -RF + M | 35196 | 89878$^{b}$ | 56682$^{ab}$ | 2 |
| $M_6$ -BBF + M | 35646 | 95747$^{a}$ | 62101$^{a}$ | 2.84$^{a}$ |
| SEm (±) | - | 2456 | 2456 | 0.07 |
| CD (P = 0.05) | - | 5469 | 5469 | 0.16 |
| **Sub plots** | | | | |
| $S_1$ – PYPS 101 | 33746 | 74833$^{c}$ | 42087$^{c}$ | 2.28$^{c}$ |
| $S_2$ – PYPS 102 | 33746 | 89774$^{a}$ | 57028$^{a}$ | 2.74$^{a}$ |
| $S_3$ – PYPS 103 | 33746 | 85447$^{ab}$ | 52701$^{ab}$ | 2.61$^{ab}$ |
| $S_4$ – PYPS 104 | 33746 | 80088$^{bc}$ | 47342$^{bc}$ | 2.44$^{bc}$ |
| SEm (±) | - | 2225 | 2225 | 0.07 |
| CD (P = 0.05) | - | 5446 | 5446 | 0.17 |
| **Interaction (Main x Sub)** | | | | |
| SEm (±) | - | 2230 | 2230 | 0.07 |
| CD (P = 0.05) | - | NS | NS | NS |
| **Interaction (Main x Sub)** | | | | |
| SEm (±) | - | 3124 | 3124 | 0.93 |
| CD (P = 0.05) | - | NS | NS | NS |

## 4. CONCLUSION

From this study, it can be concluded that employing location-specific genotype and good land management techniques will increase the yield of yellow sorghum grown under rainfed circumstances. Land configuration into broad bed and furrows or ridges and furrows along with the application of locally available vegetative mulch may increase the yield and yield attributes of yellow sorghum under rainfed conditions through improved growth due to moisture conservation. Economically, raising yellow pericarp sorghum on broad beds and furrows with mulch and ridges and furrows with mulch sounded more profitable as observed from the higher gross returns, net returns and BC ratio.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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