# INFLUENCE OF FERTILIZER LEVELS ON YIELD ATTRIBUTES, YIELD AND ECONOMICS OF RABI SORGHUM GENOTYPES UNDER RAINFED CONDITIONS

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**Abstract:** A field experiment was conducted at Agricultural Research Station, Tandur, Vikarabad (Dist.), Telangana state during the winter season for the year 2014-15. The trial was laid out in randomised block design with three replications comprised of three fertilizer levels 50% RDF (30 kg N + 15 kg $P_2O_5$), 75% RDF (45 kg N + 22.5 kg $P_2O_5$) and 100 % RDF (60kg N + 30 kg $P_2O_5$) with seven genotypes SPH 1741, SPH 1746, SPV 222, CSH-15R, CSV-22R, M 35-1 and CSV 29R. Results indicated that there was a linear improvement in all the growth and yield parameters due to each incremental application of N and P from 50 to 100% RDF. Superior grain and stover yields (2841 kg/ha and 6465 q/ha, respectively) were recorded under 100% RDF application. The gross monetary returns and net returns were significantly highest (Rs. 82622 and 66396, respectively) at 100% RDF. B:C ratio also followed the similar trend. Among the varieties SPH 1742 recorded significantly higher grain yield (2709 kg/ha.) and was statistically on par with M 35-1 and 2528 kg/ha. SPH-1746, CSH 15 R, M 35-1 and CSV 29R recorded highest and on par fodder yields (6263, 6444, 6489, and 6391 kg/ha., respectively).

**Keywords:** Fertilizer Levels, Sorghum Genotypes and Economics

**Introduction:** Sorghum is the most important crop of the semi-arid tropics in India and constitutes the staple food for a large proportion of the population. Sorghum plant is nutritious fodder for dairy animals which is used as both green and dry fodder. Grains are also used in production of alcoholic beverages and bio diesel. The area under rabi sorghum is concentrated in the states of Maharashtra, Karnataka, Telangana and Andhra Pradesh. High-yielding cultivars have shown greater responses than local cultivars and invariably, both N and P have shown additive effect (Tandon and Kanwar 1984). To attain the maximum yield, fertilizer application with appropriate doses suitable to the crop and its genotype in a particular ecosystem is one of the most important considerations. Every tonne of grain 61 kg of NPK is removed from the soil. Thus there is no way of increasing yields without the application of fertilizers. Under the present situation newly released genotypes coupled with fertilizer doses increases the productivity with suitable management practices. Hence the present investigation was carried out to assess the performance of rabi sorghum genotypes under graded levels of fertilizers.

**Materials and methods :** The field experiment was conducted at Agricultural Research Station, Tandur, Vikarabad (Dist.), Telangana state during the winter season for the years 2014-15. The trial was laid out in randomised block design with three replications comprised of three fertilizer levels 50% RDF (30 kg N + 15 kg $P_2O_5$), 75% RDF (45 kg N + 22.5 kg $P_2O_5$) and 100 % RDF (60kg N + 30 kg $P_2O_5$) and seven genotypes SPH 1741, SPH 1746, SPV 222, CSH-15R, CSV-22R, M 35-1 and CSV 29R . The gross plot size was 4.5 x 5 $m^2$ and net plot size 3.6 x 4.6 $m^2$. The sowing of seed was done by dibbling the seed at a spacing of 45 x 20 cm. Recommended crop management practices like thinning, weeding, and plant protection were uniformly followed for the experiment. Observations were recorded on five plants randomly selected per treatment.

**Results and Discussion:** Results indicated that grain and fodder yields of Rabi sorghum significantly influenced due to graded levels of fertilizers and different genotypes. Among the fertility levels, (Table 1.) 100 % of recommended dose of fertilizer (60kg N + 30 kg $P_2O_5$) resulted in significantly taller plants (204 cm), highest number of grains per panicle (503) and 100 seed weight (3.96 g). Number of days taken for 50% flowering and physiological maturity were also sig. highest (73 and 111, respectively under 100% RDF application. while the test genotypes, SPH 1742 and SPH 1746 registered significantly taller plants (202 and 208 cm). SPH 1742 and CSH 15R resulted in maximum number of grains per panicle (477 and 466). There was a linear improvement in all the growth and yield parameters due to each incremental application of N and P from 50 to 100% RDF. Similar findings were reported by Alemayehu et al 2016, and Progress report (IIMR 2016).

100% RDF application (Table 2) recorded the superior grain and stover yields (2841 kg/ha and 6465 q/ha, respectively). Schlegel and Bond (2016) also reported the increased grain and fodder yields with increase in nitrogen and phosphorus dose. The same NP levels registered the highest HI values (30.1) compared to that of 50% and 75% RDF. The gross monetary returns and net returns were significantly highest (Rs. 82622 and 66396, respectively) with 100% RDF. B:C ratio also followed the similar trend. While among the varieties SPH 1742 recorded significantly higher grain yield (2709 kg/ha.) and was statistically on par with M 35-1 and 2528 kg/ha. SPH-1746, CSH 15 R, M 35-1 and CSV 29R recorded highest and on par fodder

yields (6263, 6444, 6489, and 6391 kg/ha., respectively). SPH 1742 recorded significantly higher Gross returns and BC ratio (Rs. 76541/ha. and 3.73) followed by M 35-1 (Rs 76180 per ha and 3.60 respectively). Agronomy Report, (IIMR 2015) also corroborated similar findings. This may be due to the fact that the performance of the variety or hybrid varies from place to place, variety to variety and from season to season.

**Table 1: Growth and yield attributes of Rabi sorghum as influenced by fertility levels and genotypes**

| Treatment<br>A) Factor 1 – 3 Fertility Levels | Plant height at harvest (cm) | Days to 50 % flowering | Days to physiological Maturity | No. of Grains per panicle | 100 seed weight |
|---|---|---|---|---|---|
| $F_1$- 50% RDF (30 kg N + 15 kg $P_2O_5$) | 183 | 69 | 109 | 401 | 3.92 |
| $F_2$- 75% RDF (45 kg N + 22.5 kg $P_2O_5$) | 189 | 71 | 110 | 433 | 3.88 |
| $F_3$- 100% RDF (60 kg N + 30 kg $P_2O_5$) | 204 | 73 | 111 | 503 | 3.96 |
| SEm + | 2 | 0.1 | 0.1 | 8.4 | 0.2 |
| C.D. (p=0.05) | 4 | 1 | 1 | 19 | 0.7 |
| **B) Factor 2 – 7 Genotypes** | | | | | |
| $G_1$- SPH-1742 | 202 | 69 | 111 | 421 | 4.19 |
| $G_2$- SPH-1746 | 208 | 72 | 113 | 477 | 4.06 |
| $G_3$- SPV-2221 | 170 | 69 | 107 | 378 | 4.09 |
| G4- CSH 15R (C) | 189 | 70 | 108 | 466 | 3.78 |
| $G_5$- CSV 22R (C) | 181 | 71 | 109 | 410 | 3.86 |
| $G_6$- M 35-1 (C) | 199 | 73 | 111 | 487 | 3.80 |
| $G_7$- CSV 29R (C) | 195 | 72 | 111 | 482 | 3.64 |
| SEm + | 3.3 | 0.6 | 0.7 | 12.8 | 0.6 |
| C.D (p=0.05) | 6 | 1 | 1 | 28 | 1.1 |
| C. V (%) | 3.4 | 1.6 | 1.1 | 6.7 | 2.9 |
| **Interaction (A X B)** | | | | | |
| SEm + | 4.2 | 0.8 | 0.8 | 16.2 | 0.8 |
| C.D (p=0.05) | NS | NS | NS | NS | NS |

**Table 2: Yield and Economics of Rabi sorghum as influenced by Fertility levels and Genotypes**

| Treatments<br>A) Factor 1 – 3 Fertility Levels | Grain Yield (kg/ha) | Fodder Yield (kg/ha) | Harvest Index (%) | Gross returns (Rs/ha) | Net returns (Rs/ha) | B:C Ratio |
|---|---|---|---|---|---|---|
| $F_1$- 50% RDF (30 kg N + 15 kg $P_2O_5$) | 1783 | 5293 | 25.3 | 55153 | 39153 | 2.45 |
| $F_2$- 75% RDF (45 kg N + 22.5 kg $P_2O_5$) | 2299 | 6059 | 27.4 | 69582 | 53082 | 3.22 |
| $F_3$- 100% RDF (60 kg N + 30 kg $P_2O_5$) | 2841 | 6465 | 30.3 | 82622 | 66396 | 3.91 |
| SEm + | 46.4 | 88.1 | 0.81 | | | |
| C.D. (p=0.05) | 139 | 252 | 1.44 | | | |
| **B) Factor 2 –7 Genotypes** | | | | | | |
| $G_1$- SPH-1742 | 2709 | 5311 | 33.4 | 76541 | 61847 | 3.73 |
| $G_2$- SPH-1746 | 2465 | 6283 | 27.8 | 73979 | 57479 | 3.47 |
| $G_3$- SPV-2221 | 1949 | 4859 | 28.6 | 58434 | 41934 | 2.53 |
| G4- CSH 15R (C) | 2334 | 6444 | 26.3 | 71232 | 54732 | 3.30 |
| $G_5$- CSV 22R (C) | 1799 | 5794 | 23.1 | 55464 | 38964 | 2.35 |
| $G_6$- M 35-1 (C) | 2528 | 6489 | 27.8 | 76180 | 59680 | 3.60 |
| $G_7$- CSV 29R (C) | 2369 | 6391 | 26.9 | 72003 | 55503 | 3.35 |
| SEm + | 70.9 | 135 | 1.4 | | | |
| C.D (p=0.05) | 212 | 385 | 2.2 | | | |
| C. V (%) | 9.6 | 6.8 | 8.3 | | | |
| **Interaction (A X B)** | | | | | | |
| SEm + | 122.8 | 233.1 | 6.4 | | | |
| C.D (p=0.05) | NS | NS | NS | | | |

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