

**PHYSIOLOGICAL GROWTH PARAMETERS OF SORGHUM AS INFLUENCED WITH FERTILITY, FYM AND BIOINOCULANTS**

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In India, sorghum is popularly grown as the main source of food and fodder by poor people and forms an important component of dry land agriculture. Sorghum is very exhaustive crop and requires high quantities of nutrients, particularly nitrogen. Therefore, for sustainable production of sorghum judicious use of fertilizers is extremely important (Ram and Singh 2003, Singh and Surmeriya, 2012). Therefore, the present investigation was conducted to find out the effectiveness of organic manure and bioinoculants *i.e.* Phosphate –solubilizing bacteria (PSB), *Azospirillum* in combination with chemical fertilizers on growth parameters, on sorghum prevailing agro climate condition of Madhya Pradesh.

A field experiment was conducted during the rainy season of 2008 and 2009 at College of Agriculture Indore, Madhya Pradesh The soil of the experimental plot was clay in texture having fairly

high moisture retention capacity, organic carbon (4.5 g kg<sup>-1</sup>) available nitrogen (200 kg ha<sup>-1</sup>), phosphorus (9.6 kg ha<sup>-1</sup>) and potassium (497 kg ha<sup>-1</sup>) with pH 7.9. The treatment consisted of 3 levels of fertility (100% RDF as 80kg N + 40kg P<sub>2</sub>O<sub>5</sub> +40 kg k<sub>2</sub>O ha<sup>-1</sup>, 75% RDF and 50% RDF), 2 levels of farmyard manure (0 and 10 t ha<sup>-1</sup>) and bioinoculants (control, phosphate, solubilizing bacteria (PSB), *Azospirillum* and PSB + *Azospirillum* coinoculation. The fertilizer sources of NPK were urea, single superphosphate and muriate of potash. These treatments were evaluated in split plot design (3 levels of fertility + 2 levels of farmyard manure in the main plot and bioinoculants in the sub plot) with three replications. Sorghum hybrid, CSH 16 was sown on 26 June, 2008 and 20 June, 2009 in furrows at 45 cm. row spacing using a seed rate of 10 kg ha<sup>-1</sup>. The crop was harvested on 23 October, 2008 and 20 October, 2009.

Table 1: Physiological growth parameters of sorghum as influenced by fertility levels, FYM levels and bioinoculants

Treatment	Leaf Area Index at 75 DAS	No of leaves / plant	CGR (g/ plant/ day) 75-90DAS	RGR (g/day/10 <sup>-3</sup> ) 75-90 DAS	NAR (g/day/dm <sup>2</sup> /10 <sup>-4</sup> ) 75-90 DAS
<b>Fertility level</b>					
100% RDF	7.24	10.07	1.558	12.003	2.553
75% RDF	6.51	9.66	1.461	11.574	2.400
50% RDF	5.74	8.99	1.374	10.860	2.312
CD (P=0.05)	0.184	0.241	0.074	0.679	0.144
<b>FYM (t ha<sup>-1</sup>)</b>					
0	6.34	9.39	1.438	11.414	2.410
10	6.63	9.75	1.482	11.638	2.446
CD (P=0.05)	0.150	0.196	NS	NS	NS
<b>Bioinoculants</b>					
Control	6.33	9.41	1.453	11.375	2.343
PSB	6.51	9.56	1.457	11.530	2.415
<i>Azospirillum</i>	6.36	9.50	1.461	11.474	2.426
PSB+ <i>Azospirillum</i>	6.76	9.81	1.470	11.537	2.497
CD (P=0.05)	0.117	0.216	NS	N.S.	NS

Application of higher fertility levels recorded significantly higher leaf area index, number of leaves, crop growth rate (CGR), relative growth rate (RGR) and net assimilation rate (NAR) compared to 75% and 50% RDF. The number of leaves per plant was

significantly higher in term of percentage as compared to 75% RDF and 50% RDF by 4.2 and 12.0% at 75 DAS. This was owing to more number of leaves and their better growth resulted higher CGR, RGR and NAR as compared to 75% RDF and 50%

RDF (Table1). This might be due to rapid cell division and cell elongation which have increased the dry matter per unit time with increasing levels of fertility. These results are in line with those of Gawal and Pawar, (2006). Application of 10t FYM ha<sup>-1</sup> gave 4.6% higher number of leaves than no FYM. FYM levels had non-significant influence on CGR, RGR and NAR of sorghum. Application of FYM gave significantly higher leaf area index as compared to no

FYM. Similar finding was reported Guatam *et.al* (2001). Inoculation of *PSB+Azospirillum* was significantly superior to no bioinoculants as well as separate application of *PSB* and *Azospirillum* (Table1). Inoculation of *PSB+Azospirillum* gave maximum leaf area index of 6.76 and this was significantly superior over control. Bioinoculants had non-significant influence on CGR, RGR and NAR of sorghum (Parasuraman *et al.* 2000).

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