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## Optimization of dosage of bio-growth hormone on growth of sorghum: *Sorghum bicolor* (K12)

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### Abstract

Field experiment was conducted at Pushkaram college of Agriculture Sciences, at Veppangudi village, Thiruvarankulam block, Pudukkottai district to study the effect of bio-growth hormone on growth of sorghum, during *Kharif* season (April–July) 2022. The experiment was laid out in randomized block designs (RBD) and replicated thrice. The treatments comprised of different concentration of bio-growth hormone viz., T<sub>1</sub>-0.5% bio growth hormone, T<sub>2</sub>-1% bio growth hormone, T<sub>3</sub>-1.5% bio growth hormone, T<sub>4</sub>-2% bio growth hormone, T<sub>5</sub>-2.5% bio growth hormone, T<sub>6</sub>- 3% bio growth hormone, T<sub>7</sub>- 3.5% bio growth hormone, T<sub>8</sub>- control. Among the treatments, T<sub>5</sub> (2.5%) significantly influenced the growth components (plant height, root and shoot length, leaf area index) followed by T<sub>7</sub> (3.5% bio growth hormone). The least values for all the growth parameters were recorded with T<sub>8</sub> (control).

**Keywords:** Sorghum, bio-growth hormone, fish amino acid, plant height, root length, shoot length, leaf area index.

### Introduction

Sorghum (*Sorghum bicolor*) popularly called as “Jowar”, and “king of millets” belongs to the family Poaceae. India is the second largest producer of sorghum in the World. The average production of sorghum is 1435 kg per hectare. Sorghum is grown as a major crop in Maharashtra, Telangana and part of central India. It is used as a fodder as well as food for human consumption and important raw material for Starch industry. The plant likely originated in Africa. India contributes about 16% of the world’s sorghum production.

Sorghum, the second largest grain crop in India till the Green revolution, presently occupies third place among food grains in terms of acreage and production. Sorghum is called as ‘The Camel of Cereals’ because of its ability to withstand drought. In India, it produces about 4.4 million tons annually from about 4.27 million hectares of area with an average productivity of 1235 kg per hectare in 2020-21 (USDA). In Tamil Nadu, it covers an area of about 4.01 lakh hectare with production of 4.6 lakh tons and productivity is 612 kg per hectare. Maharashtra has the highest area and production of 2.17 m ha and 1.81 mt respectively, while Andhra Pradesh has the highest productivity of about 2150kg/ha.

The Fish Amino Acid is a liquid made from fish and jaggery, it will increase the soil fertility and enrich soil nutrients. It makes the soil very loose, maintains the biomass of microorganisms and earthworms and guarantees a healthy soil environment. It promotes the growth of crop roots and leaves and enhance photosynthesis, especially for seedlings. It increases crop yield by 10-40%. It Improves the crop quality, extend the harvest period and be more conducive to long term storage and improve crop resistance ability. With this above idea, the experiment was carried out to study the effect of bio growth hormone (FAA) on growth character of sorghum

### Material and Methods

The experiment was conducted at Pushkaram College of Agriculture Sciences during April to July 2022 at Thiruvarankulam block, Pudukkottai district. The field is situated at 10.3607° N latitude, 78.8858° E longitude and at an altitude of 93 meters above Mean Sea level (MSL). The weather of Thiruvarankulam block is moderately warm with hot summer months. The maximum temperature is 36°C and the minimum temperature is 23°C. The mean relative humidity is 80%. The soil of the experimental field was sandy loam soil with pH of 7.1 and EC of 0.02 d Sm<sup>-1</sup>. Regarding fertility status of the soil, it is classified as medium in available nitrogen (357 kg ha<sup>-1</sup>), high in available phosphorous (52.65 kg ha<sup>-1</sup>) and high in available potassium content (324.8 kg ha<sup>-1</sup>). The sorghum variety K 12 was grown as test crop during

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## Results and Discussion

### Effect of bio-growth hormone on growth parameters of sorghum

Plant height, root length, shoot length and leaf area index were recorded. All the parameters were higher in T<sub>5</sub> (2.5%) it significantly influenced the growth components followed by T<sub>7</sub> (3.5% bio growth hormone). The least values for all the growth parameters were recorded under T<sub>8</sub> (control).

T<sub>5</sub> (2.5%) recorded highest root length (15 cm) and shoot length (98.4 cm) this is in accordance with the findings of Johari, *et al.*, (2020) [3] that the 5 ml concentration of fish amino acid application showed the highest root length. Similarly, foliar spray of fish amino acid along with recommended dose of fertilizers recorded higher LAI, soluble protein and grain yield and straw yield of rice.

Among all the treatments highest plant height of 103.6 cm was recorded in T<sub>5</sub> these results are in accordance with the findings of Ramesh (2020). He found that foliar application of fish amino acid 1.0% recorded significantly higher plant height (34.8 cm) than DAP 2% spray. Abbasi *et al.*, (2003) [1] found that foliar spray of fish amino acid at 15 DAS, 30 DAS and 45 DAS would have improved the higher plant height, a greater number of leaves, more chlorophyll content which increased photosynthetic activities which in turn higher growth and yield attributes and higher grain yield of green gram. Sanjuthi *et al.*, (2008) [9] reported that Foliar application of FAA 1% increased the plant height, number of leaves per plant and chlorophyll content to the tune of 16.5, 12.6 and 8.1% respectively over control. This might be due to that quick absorption and assimilation of macro and micro nutrients present in the FAA, improved the metabolic activity and cell division resulted in higher plant height, number of leaves and chlorophyll content.

The leaf area index was higher in the plots sprayed with the concentration of 2.5% bio growth hormone 6.48. Because of

higher leaf area index of the sorghum the photosynthetic movement will be higher which may comes about increment with the yield of sorghum.

Foliar application or a soil drenching of fish amino acid could maximize uptake and minimize runoff or leaching, providing just enough N to the plant for the production of chlorophyll to maintain plant health. Foliar application of fish emulsions promoted seedlings growth of tomato (Murray *et al.*, 2004) [6] and increased the microbial action in the soil (El-Tarabily *et al.*, 2003) [2]. For leafy vegetables, spray weekly to improve yields, fragrance and taste. Use of foliar formulations is gaining importance in crop production owing to its quick response in plant growth (Linda, S. 2007). Foliar feeding has proved to be the fastest way of curing nutrient deficiencies and boosting plant performances at specific physiological stages. Besides inorganic nutrients, organic liquid manures contain several beneficial microbes which help to increase yield, impart resistance to diseases and insect pests, improve drought tolerance and enhance crop quality (Lalitha *et al.*, 2000) [4].

T<sub>5</sub> (2.5% bio growth hormone) has recorded the highest growth component it might be due to the synthesis of various enzymes in plants, which enhance the ability of plant anabolic metabolism, accelerate the production and development of plants, and make plants to have a higher yield and early maturity. Whereas T<sub>8</sub> has recorded the lowest yield and growth component, we applied only water (control) so the nutrient intake is poor when compared to other bio growth hormone concentrations. Application of water alone resulted in poor intake of nutrients in plants that resulted in decreased yield. By using optimum dosage of bio-growth hormone it will promote early rooting and prevent diseases in the seedling stage. It enhances the photosynthetic activities of the crop which resulted in increased yield.

Table 1: Effect of bio-growth hormone on growth parameters of sorghum

Treatments	Plant height (cm)	Root length (cm)	Shoot length (cm)	Leaf area index
T <sub>1</sub> - 0.5% bio growth hormone	82.2	9.8	81.4	4.50
T <sub>2</sub> - 1% bio growth hormone	95.1	11.8	85.6	4.40
T <sub>3</sub> - 1.5% bio growth hormone	84.4	12.5	91.2	4.78
T <sub>4</sub> - 2% bio growth hormone	89.8	9.0	87.1	4.56
T <sub>5</sub> - 2.5% bio growth hormone	103.6	15.0	98.4	6.48
T <sub>6</sub> - 3% bio growth hormone	93.5	10.3	84.4	4.44
T <sub>7</sub> - 3.5% bio growth hormone	100.7	13.6	95.2	5.06
T <sub>8</sub> -control	70.2	7.2	60.5	3.57
S.Em	1.854	0.183	0.964	0.054
CD (P=0.05)	5.679	0.560	2.952	0.164

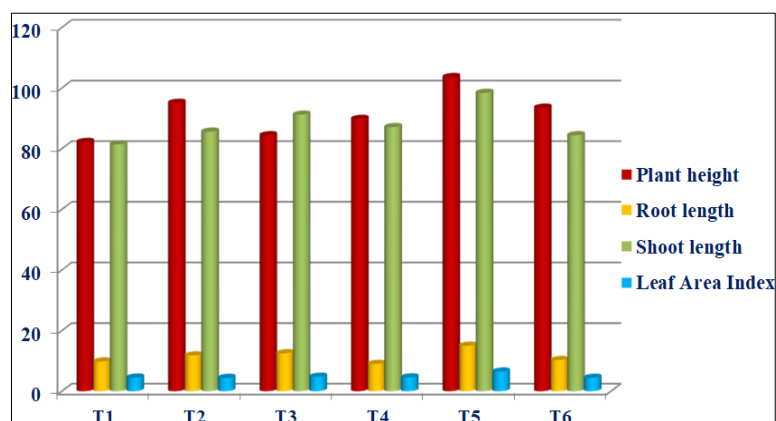


Fig 1: Effect of bio-growth hormone on growth parameters of sorghum

## Conclusion

By using optimum dosage of bio-growth hormone, growth parameters were increased. T<sub>3</sub> has recorded the highest growth component when compared to other treatments, it might be due to the synthesis of various enzymes in plants, which enhances the ability of plant anabolic metabolism activities, accelerate the production of plants and make plants to have a higher yield.

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