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Efficacy Evaluation of Bio-stimulant OXYVEG on Growth and Yield of Cotton

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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

OXYVEG efficacy was studied in field condition at Agriculture Research Station, Achalpur, Dist. Amravati under Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2024-25. The topography of the field was fairly plain and leveled. The soil was medium black cotton belonging to Vertisol. The monopodial branches were found to be non-significant among the different treatments. Plant height, number of sympodial branches and per plant yield was found to be significant with respect to the treatments. Highest plant height (108.05 cm), number of sympodial branches (6.70), available N(198.20 kg/ha), P(23.48 kg/ha) and K (460.21 kg/ha) and per plant

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yield (30.17 g) was recorded with treatment T_4: OXYVEG 3 ml / litre of water. The seed cotton yield (1500.76 kg/ha) was significantly higher with treatment T_4: OXYVEG 3 ml / litre of water and it was at par with treatment T_2: OXYVEG 1.5 ml / litre of water (1414.63 kg/ha).

Keywords: Cotton; bio-stimulants; seed cotton yield.

1. INTRODUCTION

"Cotton (*Gossypium hirsutum* L.) is one of the most important fiber and cash crop of India and plays a dominant role in the industrial and agricultural economy of the country. It provides the basic raw material (cotton fibre) to cotton textile industry. Cotton in India provides direct livelihood to 6 million farmers and about 40 -50 million people are employed in cotton trade and its processing. It is grown mainly in tropical and subtropical region of more than 80 countries in the world. It is grown mostly for fibre used in the manufacture of cloths for mankind. Besides fibre, cotton is also valued for its oil (15-20 percent) which is used as vegetable oil and cotton seed cake. Cotton seed cake used as cattle feed and can also be used as manure which contain 6.4, 2.9 and 2.2 percent N, P and K, respectively also it is likely to play a pivotal role in paper, particle board and cardboard industries. Cotton provides livelihood to more than 60 million people in India by way of support in agriculture, processing, and use of cotton in textile. India produced 6,188,000 tons followed by China and USA. India is one of the largest producers of cotton in the world accounting for about 26 percent of the world cotton production. The lint yield kg per hectare which is presently 487 kg ha^{-1} is still lower against the world average yield about 768 kg ha^{-1} which is 36.59 percent higher than India average yield" (Anonymous, 2020). "Maharashtra is the leading state in respect of area (41.84 lakh hectare) under cotton cultivation, which shares 32.28 percent of total cotton growing area of the country (129.60 lakh ha) but second rank in production (86 lakh bales) (which is 17 % of the production) next to Gujarat (90.50 lakh bales) and 9th in productivity 319 kg ha^{-1}" (ICAC, 2021). "The optimum timing of PGRs has proved to be much more difficult to determine. The optimum timing varies with the condition of the crop and desired plant response of the PGR being used. The filling phase of boll development begins during the fourth week after flowering. At this time, fiber elongation ceases and secondary wall formation of the fiber begins. This process is also known as fiber filling, or deposition. The deposition of cellulose into the fiber cell is also sensitive to environmental conditions. Water, temperature and nutrients (especially potassium) are the primary environmental factors that influence this stage of boll development. The filling phase of boll development continues into the sixth week after pollination" (Anonymous, 2007). "Plants and microbes are the sole source of these substances in soil. These substances are not nutrients and promotes/stimulate and control plant growth like embryogenesis and plant ontogeny" (Méndez-Hernández et al., 2019), "regulates organ size and protects against pathogens (Agbodjato et al., 2016), impose stress resistance" (Pereira et al., 2020) and organizes reproductive development (Pierre-Jerome et al., 2018)

"In addition, bio stimulants minimized the need for fertilizers, in small concentrations, these substances are enhancing nutrition uptake, abiotic stress tolerance, crop quality traits, regardless efficient, of its nutrients content" (Du Jardin, 2015). "Bio stimulants offer a potentially novel approach for the regulation and/or modification of physiological processes in plants to stimulate growth, to mitigate stress induced limitations, and to increase yield. Bio stimulants based on humic substances have been studied in terms of stress protection against salinity due to their bio stimulatory activity" (Aydin et al., 2012). "Bio stimulants effects are still not clear. But they can act on plant yield/ hectare as a direct response of plants or soils to the bio stimulant application or an indirect response of the bio stimulant on the soil and plant microbial environment with subsequent effects on plant productivity" (Kumar et al., 1976). Several researches have been developed in order to evaluate the use of bio stimulants in improving plant growth subjected to abiotic stresses.

2. MATERIALS AND METHODS

A field experiment was conducted at Agriculture Research Station, Achalpur, Dist. Amravati under Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the season *kharif* 2024-25. The topography of the field was fairly uniform and levelled. The soil was medium black cotton belonging to order Vertisol. The soil of experimental plot was clayey in texture (Piper, 1966). Soil was slightly alkaline in reaction (pH-7.9). Among nutrient status it ranged medium in organic carbon, low in available nitrogen174.3 kg ha^{-1} (Subbiah and Asija, 1956), very low in available phosphorus 12.21 kg ha^{-1} (Olsen et al., 1954) and very high in available potassium412.74 kg ha^{-1} (Jackson, 1967).

Achalpur is situated in the subtropical region at 21°15'26" North latitude and 77°30'31'' East longitude and at an altitude of 375 m above mean sea level. Total rainfall received at Agriculture Research Station, Achalpur, Dist. Amravati was 845.6 mm rainfall received in 54 rainy days. Monsoon was started during 23rd MW. The treatment includes, T_1: OXYVEG - No spray, T_2: OXYVEG 1.5 ml / litre of water, T_3: OXYVEG 2.5 ml / litre of water, T_4: OXYVEG 3 ml / litre of water and T_5: Relevant University Practice. The spraying was done as per schedule (22/07/24, 06/08/24 and 21/08/24), University practice include 2 % urea spray. In the present investigation, healthy and viable seeds of AKH-09-5 (Suvarna shubhra) variety of 160-170 days duration was used. cotton was sown by hand dibbling at 60 x 30 cm spacing with two seeds $hill^{-1}$ as per treatment. With fertilizer dose 60:30:30 NPK kg ha^{-1}. The statistical design was Randomized Block Design (RBD) with four replications and data was analyzed by "Analysis of Variance" method (Panse and Sukhtame, 1967) and F test of significance was used for testing. Study the effect of organic sources of manures on soil health in organic colour cotton with objectives to study the effect of organic nutrients on yield and quality of colour cotton and soil fertility.

3. RESULTS AND DISCUSSION

The monopodial branches was found to be non-significant among the different treatments. Plant height, number of sympodial branches and per plant yield was found to be significant with respect to the treatments. Highest plant height (108.05 cm), number of sympodial branches (6.70), available NPK and per plant yield (30.17 g) was recorded with treatment T_4: OXYVEG 3 ml / litre of water. The seed cotton yield (1500.76 kg/ha) was significantly higher with treatment T_4: OXYVEG 3 ml / litre of water and it was at par with treatment T_2: OXYVEG 1.5 ml / litre of water (1414.63 kg/ha).

(No severe phytotoxic effect was observed on the growing crop during the investigation and recommended practices adopted for pest control and insect population was maintaining below the economic injury level.)

Table 1. Effect on ancillary observation of cotton after OXYVEG application

Treatments	Plant height (cm)	No. of Mono-podiya	No. of Sym-podiya	Per Plant Seed cotton yield (g)	Seed Cotton Yield(kg/ha)
T_1: OXYVEG - No spray	97.80	1.70	6.05	19.75	1003.99
T_2: OXYVEG 1.5 ml / litre of water	106.10	1.80	6.60	28.19	1414.63
T_3: OXYVEG 2.5 ml / litre of water	107.00	1.85	6.65	28.64	1463.42
T_4: OXYVEG 3 ml / litre of water	108.05	1.90	6.70	30.17	1500.76
T_5: Relevant University Practice	99.80	1.75	6.35	20.16	1037.02
SE m $\pm$	0.81	0.10	0.16	2.83	129.04
CD at 5%	2.51	NS	0.48	8.72	397.64

Table 2. Effect of OXYVEG application to cotton on available N, P and K after harvest (kg/ha)

Treatments	Initial			After harvest		
	Ava. N	Ava. P	Ava. K	Ava. N	Ava. P	Ava. K
T_1: OXYVEG - No spray	163.07	14.11	351.12	125.44	20.83	278.10
T_2: OXYVEG 1.5 ml / litre of water	163.07	14.11	351.12	150.53	21.95	337.12
T_3: OXYVEG 2.5 ml / litre of water	163.07	14.11	351.12	163.07	23.07	406.90
T_4: OXYVEG 3 ml / litre of water	163.07	14.11	351.12	198.20	23.48	460.21
T_5: Relevant University Practice	163.07	14.11	351.12	137.98	21.28	292.77
SE m $\pm$	-	-	-	6.22	1.25	3.57
CD at 5%	-	-	-	19.17	3.85	11.00

This may be the beneficial effect of OXYVEG as a bio-stimulant on physiology activities, growth of cotton which is ultimately reflected into increased seed cotton yield as similar results reported by Patel (1992). Biostimulants have been found to positively affect the flowering and boll formation stages in cotton. The application of biostimulants can improve the plant's hormonal balance, promoting better flowering, fruit set, and boll retention. This leads to a higher number of bolls and, consequently, an increase in cotton yield (Hassan et al., 2015). Effect of Bio stimulant Significantly recorded highest plant height, sympodial branches plant-1 was recorded in treatment T_4: OXYVEG 3 ml / litre of water. Which was at par with the treatment T_3: OXYVEG 2.5 ml / litre of water and T_2: OXYVEG 1.5 ml / litre of water. Plant growth regulators are known to enhance source-sink relationship and stimulate translocation of photo assimilates. Significant increase in the plant height was observed in Gulliver variant (18.7 cm), Anticolorad and Avangard +Gulliver+ Anticolorad variants also have similar indicators (18.8 cm and 18.1 cm). Significant result with respect to biostimulants was noted by (Azizovna and Qakhramonovna, 2024), sympodial branches plant^{-1} was due to spraying of OXYVEG might be because of its involvement in seed germination, seedling establishment, This is in agreement with Patel (1993). However, monopodial branches were found non–significant. This might be attributed to increased plant height, which provides site for more number of nodes and internodes from where sympodial branches emerge similarly increased number of sympodial branches were noticed in cotton by several scientist Pothiraj et al., (1995). The plant growth regulators are known to enhance the crop growth by cell division in meristematic region through cell enlargement and cell division and thereby increase in plant height, number of branches and number of functional leaves might have contributed to more amount of photosynthetates to be assimilated which were further stored in plant body resulted in higher dry matter accumulation plant-1. Similar findings were also reported by Govindan et al., (2000).

The data regarding Available N, P, K. of soil influence due to various treatments of bio stimulant are presented in Table 2. Effect of bio stimulant Soil available nitrogen, phosphorus and potassium after harvest of crop were influenced significantly due to spray of different bio stimulant. Significantly more N (198.20 kg ha^{-1}) P (23.48 kg ha^{-1}) and K (460.21 kg ha^{-1}) remained in soil recorded in T_4: OXYVEG 3 ml / litre of water. However, the lowest available N (125.44 kg ha^{-1}), P (20.83 kg ha^{-1}) and K (278.10 kg ha^{-1}) was recorded in T_1: OXYVEG - No spray (Méndez-Hernández et al., 2019; Dhote et al., 2023).

4. CONCLUSION

Biostimulants can enhance nutrient absorption by improving the plant's root function and increasing nutrient availability in the soil. By stimulating the soil's microbial activity, biostimulants help release nutrients that are otherwise inaccessible to the plant, leading to better growth and significant cotton yields in the treatment T_2: OXYVEG 1.5 ml / litre of water (1414.63 kg/ha). This might be due to the beneficial effect of plant growth regulator spray towards physiological crop growth of plant which ultimately increase nutrient requirement and capacity for uptake of NPK and decrease the left over available NPK in soil.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (Chat GPT, manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Agbodjato, N. A., Adjanohoun, P. A., Agbessi, L., & Baba-Moussa, L. (2016). Synergistic effect of plant growth promoting rhizobacteria and chitosan on *in vitro* seeds germination, greenhouse growth, and nutrient uptake of maize. *Biotechnology Research International*, 2016, 7830182. https://doi.org/10.1155/2016/7830182

Anonymous. (2007). *Cotton growth and development*. University of Georgia, 12.

Anonymous. (c2020). *All India crop situation*. Retrieved from http://www.cotcrop.gov.in/all-india-cropsituation

Aydin, A., Kant, C., & Turan, M. (2012). Humic acid application alleviate salinity stress of bean (*Phaseolus vulgaris* L.) plants membrane leakage. *African Journal of Agricultural Research*, 7, 1073–1086. https://doi.org/10.5897/ajar10.274

Azizovna, K. S., & Qakhramonovna, I. D. (2024). The effect of biostimulants on cotton yield: Research results and applications. *American Journal of Agriculture and Biomedical Engineering*, 6(12), 18–21.

Dhote, S. S., Charjan, Y. D., Kakade, S. U., & Wankhade, R. S. (2023). Effect of biostimulant on growth and yield of Bt cotton hybrid and varieties. *The Pharma Innovation Journal*, 12(6), 4157–4163.

Du Jardin, P. (2015). Plant biostimulants: Definition, concept, main categories and regulation. *Scientia Horticulturae*, 196, 3–14.

Govindan, K., Thirumurugan, V., & Arulchelvan, S. (2000). Response of soyabean to growth regulators. *Research on Crops India*, 1, 323–325.

Hassan, M. U., Zubair, M., & Arshad, M. (2015). Biostimulants and their role in plant growth and stress alleviation. *Plant Growth Regulation*, 76(1), 1–15.

ICAC. (2021). Committee on cotton production and consumption (COCPE) meeting held on 25.01.2021.

Jackson, M. L. (1967). *Soil chemical analysis*. Prentice Hall, Inc., Englewood, USA, 498.

Kumar, B., Gangwar, M. S., & Rathore, V. S. (1976). Effect of dimethyl sulfoxide (DMSO) on zinc availability (L-value), growth and metabolic activities of rice plantings. *Plant and Soil*, 45, 235–246.

Méndez-Hernández, H. A., Ledezma-Rodríguez, M., Avilez-Montalvo, Y., Skeete, A., Avilez-Montalvo, J., De-la-Peña, C., Loyola-Vargas, V., & Víctor, M. (2019). Signaling overview of plant somatic embryogenesis. *Frontiers in Plant Science*, 10, 77. https://doi.org/10.3389/fpls.2019.00077

Olsen, S. R., Cole, C. V., Watanabe, F. S., & Dean, L. A. (1954). Estimation of available phosphorus in soil by extraction with $NaHCO_3$. *USDA Circular 939*, U.S. Washington.

Panse, V. G., & Sukhatme, P. V. (1967). *Statistical methods for agricultural workers*. ICAR, New Delhi.

Patel, J. K. (1992). Effect of triacontanol and naphthalene acetic acid on lint yield, fibre quality, and nitrogen, phosphorus and potash uptake in cotton (*Gossypium* species). *Indian Journal of Agronomy*, 37(2), 332–337.

Patel, J. K. (1993). Response of cotton (*Gossypium hirsutum*) to triacontanol and naphthalene acetic sprays. *Indian Journal of Agronomy*, 38, 97–101.

Pereira, N. C., Galindo, F. S., Gazola, R. P., Dupas, E., Rosa, P. A., Mortinho, E. S., & Filho, M. C. M. T. (2020). Corn yield and phosphorus use efficiency response to phosphorus rates associated with plant growth promoting bacteria. *Frontier in Environmental Science*, 8, 40.

Pierre-Jerome, E., Drapek, C., & Benfey, P. N. (2018). Regulation of division and differentiation of plant stem cells. *Annual Review of Cell and Developmental Biology*, 34, 289–310.

Piper, C. S. (1966). *Soil and plant analysis*. Asia Publishing House, Bombay and New Delhi.

Pothiraj, P., Jaganathan, N. T., Venkitaswamy, R., Premeshekhar, M., & Purushothaman, S. (1995). Effect of growth regulators in cotton. *Madras Agricultural Journal*, 82, 283–284.

Subbiah, B. V., & Asija, C. L. (1956). A rapid procedure for the estimation of available nitrogen in soils. *Current Science*, 25, 259–260.

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