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Effect of nano DAP on growth and economics in chickpea

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ABSTRACT

A field experiment was carried out during *rabi*, 2022–23 on a clay loamy soil at Agricultural College Farm, Bapatla to study the effect of nano DAP on growth and economics of chickpea. The experiment was laid out in Randomised Block design with eleven treatments and three replications. The results of the investigation revealed that the highest plant height at 30, 60 and at harvest was recorded in T_9 (100 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) exhibited a higher plant height which was statiscally comparable with T_{10} (75 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) .Maximum gross returns were registered with T_9 (100 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) which was on parity with T_{10} (75 % P +Seed treatment with Nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) .While significantly lower gross returns was observed in T_1-control in which no fertilizers were applied Among all the treatments,net returns and B:C ratio was the highest in T_9 which was statistically on par with T3.

Key Words: *Chickpea, Growth and Nano DAP*

Chickpea *(Cicer arietinum L.*), being a major rabi pulse crop of India, occupies 35.2 per cent of total area under pulses contributing to about 49.7 per cent of total pulse production in 2021-22. In Andhra Pradesh, it is grown in an area of 4.51 lakh hectares producing of 4.90 lakh tones with a productivity of 1105 kg ha (Agricultural Statistics at a glance-2022). The components of the chickpea crop can be influenced by the natural needs of nitrogen and phosphorus fertilizers, if the soil has a high nitrogen and phosphorus content, there is no need to add nutrients that have reached their optimum level, then only a low dose of N and P fertilizer is required which is equivalent to nitrogen and phosphorus which is transported at the time of harvest, the nutrient source can be either a single fertilizer, compound fertilizer, or a combination of both, particularly for pulse crops. Fertilizer has a significant role in modern agriculture, particularly in the increase of chickpea production by providing single or multiple nutrients. The excessive usage of conventional chemical fertilizers cause accumulation of toxic by- components in soil which results in deterioration of soil ecological environment by heavy metals, nitrate and other harmful components. Nanofertilizers are the most technically advanced way to supply crops with mineral nutrients, compared to chemical fertilizers. Particle size below 100 nm nano-particles can use as fertilizer for efficient nutrient management which are more eco-friendly and reduce environment pollution. fertilizers Nanofertilizers can increase the availability of nutrients in the root zone due to their slow and controlled release of nutrients (De Rose *et al.,* 2010).

MATERIAL AND METHODS

A field experiment was carried out ,2022-23 on a clay loamy soil at the Agricultural College Farm, Bapatla. The weekly mean maximum and minimum temperatures during the crop period ranges from 32.8^0 C to 28.7^0 C and 18.0^0 C to 22.5^0 C , respectively, while the average maximum and minimum temperatures during the crop growth period were 30.4^0 C and 20.1^0 C, respectively. The weekly mean relative humidity ranged between 85.73% to 71.73 % with an average of 78.7%. A total rainfall of 326.6 mm rainfall was received in 5 days during the crop growth period. The soil of the experimental site was classified as clay loam in texture, neutral in reaction,

Table 1. Plant height (cm) at different growth stages of chickpea as influenced by the application of nano DAP

Treatments	30 DAS	60 DAS	At harvest
T_1 : Control	11.38	22.05	25.38
T_2 : 100 % P	20.64	38.6	40.77
T_3: 100% P+ nano-DAP spray @ 2.5 mL^{-1} before flowering	20.17	42.35	45.67
T_4 : 75% P+ nano-DAP spray @ 2.5 mL^{-1} before flowering	18.59	38.5	42.57
T_5 : 50% P+ nano-DAP spray @ 2.5 mL^{-1} before flowering	16.21	32.22	36.33
T_6 : Nano-DAP spray @ 2.5 mL^{-1} before flowering	12.06	26.75	30
T_7 : Seed treatment with nano-DAP @ 5ml per kg seed	13.62	28.39	32.14
T_8 : Seed treatment with nano-DAP @ 5ml per kg seed+ nano-DAP spray @ 2.5mL^{-1} before flowering	12.9	31.01	34.95
T_9 : 100 % P +seed treatment with nano-DAP @ 5ml per kg seed+ nano-DAP spray @ 2.5mL^{-1} before flowering	23.79	47.72	49.97
T_{10} : 75 % P +Seed treatment with nano-DAP @ 5ml per kg seed+ nano-DAP spray @ 2.5mL^{-1} before flowering	22.43	45.71	47.25
T_{11} : 50 % P +seed treatment with nano-DAP @ 5ml per kg seed+ nano-DAP spray @ 2.5mL^{-1} before flowering	16.32	34.13	37.5
SEm ($\pm$)	1.08	1.61	1.59
CD (P=0.05)	3.18	4.74	4.69
CV (%)	11	7.9	7.2

Table 2. Gross return (Rs. ha^{-1}), net return (Rs. ha^{-1}) and B: C ratio of chickpea as influenced by the application of nano DAP

Treatments	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B: C Ratio
T_1 : Control	42088	-1782	-0.23
T_2 : 100 % P	109746	71971	1.91
T_3: 100% P+ nano-DAP spray @ 2.5 mL^{-1} before flowering	124359	83184	2.02
T_4 : 75% P+ nano-DAP spray @ 2.5 mL^{-1} before flowering	122877	82370	2.03
T_5 : 50% P+ nano-DAP spray @ 2.5 mL^{-1} before flowering	89865	50027	1.26
T_6 : Nano-DAP spray @ 2.5 mL^{-1} before flowering	55929	18428	0.49
T_7 : Seed treatment with nano-DAP @ 5ml per kg seed	69547	34846	1.00
T_8 : Seed treatment with nano-DAP @ 5ml per kg seed+ nano-DAP spray @ 2.5mL^{-1} before flowering	85392	47291	1.24
T_9 : 100 % P +seed treatment with nano-DAP @ 5ml per kg seed+ nano-DAP spray @ 2.5mL^{-1} before flowering	145119	103344	2.47
T_{10} : 75 % P +seed treatment with nano-DAP @ 5ml per kg seed+ nano-DAP spray @ 2.5mL^{-1} before flowering	138053	96946	2.36
T_{11} : 50 % P +seed treatment with nano-DAP @ 5ml per kg seed+ nano-DAP spray @ 2.5mL^{-1} before flowering	92664	52226	1.29

E.C. was non-saline in nature and below the critical point, low in organic carbon, low in available nitrogen (190 kg ha^{-1}) and medium in available phosphorus (24.6 kg ha^{-1}) and high in potassium (305 kg ha^{-1}). Standard abutirstred proceduing were followed for akolegering the data to get proper results.

RESULTS AND DISCUSSION

Effect of nano DAP on plant height

The data pertaining to plant height at 30, 60 DAS and at harvest as influenced by different nutrient management practices was presented in Table 4.1.

It is depicted from the data that plant height increased with advancement in the age of the plant and significant differences are hard among different treatments with respect to plant height at all the stages of observations.

At 30 DAS, higher plant height was recorded with treatment T_9 (100 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) and exhibited higher plant height (23.79 cm) which was on par with T_{10} (75 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) (22.43 cm). This was followed by T_2, T_3 and the lowest was recorded under absolute control $T_{1.}$

At 60 DAS, significantly taller plants (47.72 cm) were recorded with the T_9 (100 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering), which was on par with T_{10} (75 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) (45.71 cm) followed by T_3 and T_2.Whereas shorter plants were recorded in Control T_1 (22.05 cm).

At Maturity, T_9 (100 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) exhibited a higher plant height (49.97cm) which was on par with T_{10} (75 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) (22.43 cm) and T_3 (100% P+ nano-DAP spray @ 2.5 mL^{-1} before flowering) whereas the smaller plant height was recorded in T_1 control (25.38 cm) followed by T_6 (Nano-DAP spray @2.5mL^{-1} before flowering).

Plant height in chickpea showd notable increment with higher dose of RDF levels and nano DAP foliar sprays at varying times and concentrations indicating that the crop received an appropriate amount of fertiliser in a balanced proportion that provided the right amount of phosphorus and nitrogen to promote cell division and increasesed synthesis of amino acids ,which helps to grow taller, more robust and healthier chickpea plants. Similar results were reported by Mishra *et al.(* 2020) .

Gross Returns (Rs ha^{-1})

Maximum gross returns were registered with T_9 (100 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) which was on par with $T_{10(}$ 75 % P +Seed treatment with Nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering)(Rs 1,01,082) .While significantly lower gross returns were observed in T_1-control in which no fertilisers were applied which was significantly lower than all the treatments The significant increase in gross returns might be due to higher grain yield and haulm yield in the treatments in which nano DAP performed well . The increase in yield attributes such as number of branches per plant, pods per branch and number of seeds per plant resulted in higher yield inturn increases gross returns. Corresponding results were reported by Prakesh et al.(2023).

Net Returns (Rs ha^{-1})

The net returns of chickpea were significantly influenced by various nutrient management practices. Among the different treatments, higher net returns (59975 Rs ha^{-1}) were obtained with $T_{9\,(}$100 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) which was on par with T_{10} (75 % P +Seed treatment with Nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering)(64471 Rs ha^{-1}). The significant increase in net returns might be due to higher gross returns.

Benefit-cost ratio

Due to the increase in both gross returns and net returns (59975 Rs ha^{-1}) the B:C ratio increase, which was the highest in T_9(100 % P +Seed treatment with nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering) and was on par with T_{10} (75 % P +Seed treatment with Nano-DAP @5ml per kg seed+ Nano-DAP spray @2.5mL^{-1} before flowering). The Higher net returns and B: C was due to higher yield of the crop in that particular treatment. These results are in accordance with the findings of Chavan *et al*.(2023) and Ravishankar *et al*.(2008) .

LITERATURE CITED

Agriculture Statisties at a Glance 2022, Directorate of economics & Statistics, Planning department Government of Andhra Pradesh www.apdes.ap.gov.in.

De Rosa, MC., Monreal, C., Schnitzer, M., Walsh, R. and Sultan, Y 2010. Nanotechnology in fertilizers. *Nature Nanotechnology*, 5(2): 91-99.

Mishra B, Sahu, GS, Mohanty LK, Swain BC, Hati S 2020. Effect of nano fertilizers on growth, yield and economics of tomato variety Arka rakshak. Indian Journal of Pure and Applied Pri Biosciences, 8(6):200-204

Chavan PM, Waghmare YM, Maindale SD and Chaudhari BK. 2023, Studies on effect of foliar application of nano N fertilizer on yield and economics of sorghum (Sorghum bicolor L). *The Pharma Innovation*, 12(3):1498-1500.

Ravishankar N, Raja R, Din M, Elanchezhian R, Swarnam TP and Deshmukh PS, 2008. Influence of varieties and crop establishment methods on production potential, economics and energetic of wet seeded rice (*Oryza sativa* L.) under Island eco-system. *Indian Journal of Agricultural Sciences*, 78(9):807-809.

Prakash, A.N., Siddaram, R. and Bellakki, M.A 2023. Response of nano DAP on growth, yield and economics of Soybean (*Glycine max* L.) *The Pharma Innovation Journal*, 12(12): 1985-1989

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