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Comparative effect of different foliar nutrient formulations on growth rate of mung bean (*Vigna radiata* L.)

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ABSTRACT

The present investigation entitled “Comparative Effect of Different Foliar Nutrient Formulations on Growth rate of Mung Bean (*Vigna radiata* L.)” was conducted during 2025 at the PG Experimental Farm, Department of Agronomy, Vasantao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani, to evaluate the effect of different foliar nutrient formulations on the growth of mung bean (*Vigna radiata* L.). The experiment was laid out in a Randomized Block Design (RBD) with eight treatments. The treatments comprised T1 – absolute control; T2 – RDF + urea @ 2% at flowering stage; T3 – RDF + DAP @ 2% at flowering stage; T4 – RDF + KNO₃ @ 2% at flowering stage; T5 – RDF + 19:19:19 @ 2% at flowering stage; T6 – RDF + 0:52:34 @ 2% at flowering stage; T7 – RDF + 12:61:0 @ 2% at flowering stage; and T8 – RDF + Grade II @ 0.2% at flowering stage. During the course of the experiment, growth parameters, namely Absolute Growth Rate (AGR) and Relative Growth Rate (RGR), were recorded at different stages of crop growth. The results revealed that the application of RDF + 19:19:19 @ 2% at the flowering stage (T5) recorded higher Absolute Growth Rate (AGR) for plant height and dry matter accumulation at the different stages of crop growth. Similarly, the treatment T5 – RDF + 19:19:19 @ 2% at the flowering stage recorded higher Relative Growth Rate (RGR) for dry matter accumulation across the different stages of crop growth.

Keywords: Mung bean, Foliar fertilizer, Absolute Growth Rate, Relative Growth Rate

Introduction

Pulses, commonly referred to as food legumes, rank second to cereals in terms of their production and consumption in India. The World Health Organization (WHO) has suggested a daily per capita pulse consumption of approximately 80 g, whereas the Indian Council of Medical Research (ICMR) recommends a minimum intake of 47 g per day. India is the world's leading producer and consumer of pulses, contributing nearly 32 per cent of the global pulse-growing area and about 25 per cent of total production. Among the important pulse crops, mung bean (*Vigna radiata* L.) contains approximately 25 per cent protein, which is nearly two-thirds of the protein content of soybean, twice that of wheat and three times that of rice. Moreover, mung bean protein is relatively rich in lysine, an essential amino acid that is present in limited quantities in cereal grains (Amutha *et al.*, 2012) [1].

India is also one of the major mung bean-producing countries in Asia, with an area of about 8.7 million hectares, production of 8.83 million tonnes and an average productivity of 1014 kg ha⁻¹ (Nair *et al.*, 2022) [2]. However, the productivity of mung bean remains relatively low, particularly because it is frequently cultivated on marginal and sub-marginal soils with poor fertility and inadequate fertilizer application. Although summer green gram has considerable yield potential, its productivity at the farmers' level is often below the achievable level. In particular, insufficient fertilizer use has been associated with substantial reductions in summer green gram yield.

Foliar nutrition is widely recognized as an effective and economical approach for correcting nutrient deficiencies in crops (Dixit *et al.*, 2007) [3]. Additional nutrient supplementation through foliar application can play an important role in improving seed yield in pulse crops (Chandrasekhar *et al.*, 2003) [4]. Applying nutrients directly to the foliage provides an efficient means of meeting the crop's nutritional requirements and can subsequently improve yield. Compared with soil application, foliar fertilization may offer advantages by minimizing nutrient losses caused by leaching and fixation. It can also promote photosynthetic activity and facilitate the movement of nutrients from leaves to developing seeds (Manonmani *et al.*, 2009) [5].

Foliar spraying provides a rapid means of supplying nutrients to growing plants. This approach can be particularly useful under rainfed conditions, where limited soil moisture may restrict nutrient uptake through the root system. Although foliar feeding cannot completely replace soil fertilization, it can serve as an effective supplementary practice. Appropriate foliar nutrition may improve fertilizer-use efficiency, reduce unnecessary fertilizer losses and lower the overall cost of cultivation, thereby contributing to more economical crop production (Amutha *et al.*, 2012) [1].

Materials and Methods

“Comparative effect of different foliar nutrient formulation on growth rate of mung bean (*Vigna radiata* L.)” was conducted during *kharif* 2025 at PG Experimental farm, Department of Agronomy, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani in Marathwada region of Maharashtra state. The experimental site is geographically situated at an altitude of 409 m Above Mean Sea Level (AMSL) between 19°16' North latitude, 76°47' East longitude in Marathwada region of Maharashtra state, encompassed by 17°35' to 24°40' North latitude and 74°49' to 78°15' East longitude geographical boundaries. The site of the experimentation comes under assured rain fall zone out of nine agro-climatic zones of Maharashtra.

The experiment was laid out in a Randomized Block Design (RBD) comprising eight treatments.. The treatments are T₁- absolute control T₂- RDF + Urea @ 2% at flowering stage T₃- RDF + DAP @ 2% at flowering stage T₄- RDF + KNO₃ @ 2% at flowering stage T₅- RDF + 19:19:19 @ 2% at flowering stage T₆- RDF + 0:52:34 @ 2% at flowering stage T₇- RDF + 12:61:0 @ 2% at flowering stage and T₈- RDF + Grade II @ 0.2% at flowering stage.

Absolute growth rate for plant height (cm day⁻¹ plant⁻¹)

The Absolute Growth Rate (AGR) is the total gain in plant height by the plant within the specific time interval. Absolute growth rate for plant height is expressed as cm day⁻¹ plant⁻¹ and is calculated by the formula given by Richards (1969) as follows.

$$AGR = \frac{H_2 - H_1}{t_2 - t_1} \times 100$$

Where,

H₂ and H₁ are plant height (cm) at time t₂ and t₁, respectively.

Absolute growth rate for dry matter (g day⁻¹ plant⁻¹)

The Absolute Growth Rate (AGR) is the total gain in dry matter by the plant within the specific time interval and expressed as g day⁻¹ plant⁻¹ for dry matter accumulation plant⁻¹ and is calculated by the formula given by Radford (1967) as follows.

$$AGR = \frac{W_2 - W_1}{t_2 - t_1} \times 100$$

Where,

W₂ and W₁ are the dry weight (g) plant at time t₂ and t₁, respectively.

Relative growth rate (RGR)

Increase in dry matter of plant is a process of continuous compound interest wherein the increment in any interval adds to the ‘capital’ for subsequent growth. This rate of increment is called as Relative Growth Rate (RGR), which was worked out as per formula given by Fisher (1921) and expressed in g g⁻¹ day⁻¹ plant⁻¹.

$$RGR (g g^{-1} day^{-1}) = \frac{\log_e W_2 - \log_e W_1}{t_2 - t_1}$$

Where,

W₁ and W₂ are the weights of dry matter in g per plant at times t₁ and t₂, respectively and t₂ - t₁ is the time interval in days.

Log_e = natural logarithm to the base ‘e’ = 2.3026.

Results and Discussion

Growth analysis

Growth functions are the measures of growth rates in different growth parameters of plant.

Absolute growth rate (AGR) of height (cm day⁻¹)

Mean values of AGR for plant height recorded at various growth stages in presented in Table :1 showed that AGR based on plant height was increased up to 30-45 days after planting thereafter starts declines were observed. Maximum values were recorded between 30 DAS to 45 days after sowing which was 1.16 cm day⁻¹ plant⁻¹ respectively.

Effect of treatment

It is clear from the Table:1 that AGR values based on plant height increased rapidly and reached to the maximum value of 1.16 between 30-45 DAS and thereafter it decreased rapidly up to at harvest. The application of RDF + 19:19:19 @ 2% at flowering stage (T₅) recorded higher values of AGR for plant height than other foliar nutrient spray. The lowest values of AGR for plant height was recorded Absolute control (T₁). it was also found that green turf growth parameters and water conservation were significantly affected by the application of 2% NPK (19:19:19) spray at flower initiation and pod initiation. However, the lowest parameter was observed in T₁ (control). Harendra Singh *et al.* (2023) [6]

Table 1. Mean Absolute Growth Rate (AGR) of height (cm day⁻¹ plant⁻¹) as influenced by different treatments during 2024-25.

Treatments	0-15 DAS	15-30 DAS	30-45 DAS	45 DAS- At harvest
T ₁ : Absolute control	0.5367	0.8167	0.9533	0.2267
T ₂ : RDF + Urea @ 2% at flowering stage	0.7426	0.8580	1.0720	0.1613
T ₃ : RDF +DAP @ 2% at flowering stage	0.8000	0.9300	1.0713	0.4587
T ₄ : RDF +KNO ₃ @ 2% at flowering stage	0.7500	0.9567	1.0947	0.2366
T ₅ : RDF +19:19:19@ 2% at flowering stage	0.8667	0.8700	1.1633	0.4333
T ₆ : RDF + 0:52:34 @ 2% at flowering stage	0.6600	0.9393	0.9840	0.1700
T ₇ : RDF + 12:61:0 @ 2% at flowering stage	0.6000	0.9633	0.9400	0.2300
T ₈ : RDF + Grade II @ 0.2% at flowering stage	0.5913	0.7753	1.0867	0.2067
G.M.	0.69	0.888	1.04	1.06

Absolute growth rate (AGR) of dry matter (g day⁻¹ plant⁻¹)

Data on absolute growth rate for dry matter plant⁻¹ as influenced by different foliar application of nutrient at different growth stages during *kharif* seasons of 2025 presented in Table 2 respectively. Maximum absolute growth rate of dry matter was observed between 30-45 days after planting during experimentation. The increasing rate of AGR for dry matter during 30-45 days after planting might be due

to canopy development leading to increased interception of light and photosynthetic activity.

Effect of treatment

The highest absolute growth rate for dry matter was observed in treatment RDF + 19:19:19 @ 2% at flowering stage (T₅) followed by RDF +DAP @ 2% at flowering stage (T₃). The lowest values were observed in Absolute control (T₁). It was also found The treatment in

volving foliar spray of NPK (18:18:18) @2% + 0.5% ZnSO₄ during these stages exhibited superior performance in terms of growth parameters compared to the control. Mehriya *et al.* (2024) [7]

Table 2. Mean Absolute Growth Rate (AGR) of dry matter (gm day⁻¹ plant⁻¹) as influenced by different treatments during 2024-25.

Treatments	0-15 DAS	15-30 DAS	30-45 DAS	45 DAS- At harvest
T ₁ : Absolute control	0.077	0.124	1.069	0.535
T ₂ : RDF + Urea @ 2% at flowering stage	0.1053	0.2047	1.2567	0.4800
T ₃ : RDF +DAP @ 2% at flowering stage	0.1067	0.2067	1.2833	0.6440
T ₄ : RDF +KNO ₃ @ 2% at flowering stage	0.1060	0.2060	1.2487	0.5393
T ₅ : RDF +19:19:19@ 2% at flowering stage	0.1200	0.2367	1.2960	0.7300
T ₆ : RDF + 0:52:34 @ 2% at flowering stage	0.0933	0.1640	1.0887	0.7073
T ₇ : RDF + 12:61:0 @ 2% at flowering stage	0.0880	0.1300	1.0720	0.5433
T ₈ : RDF + Grade II @ 0.2% at flowering stage	0.0800	0.1267	1.0733	0.5333
G.M.	0.20	0.14	1.30	0.50

Relative growth rate (RGR) of dry matter

Data computed on mean RGR at various growth stages of crop in presented in Table 3. As RGR is growth rate of new biomass relative to existing biomass, mean relative growth rate (RGR) was found to be reduced with increase in duration of the crop as compared with earlier growth stage. The highest mean RGR was during 30-45 days after planting. Lowest values of RGR were calculated during 45 DAS - at harvest because of maturity.

Effect of treatment

The higher RGR values were recorded by treatment RDF + 19:19:19 @ 2% at flowering stage (T₅) which is followed by treatment RDF +DAP @ 2% at flowering stage (T₃). Whereas lowest RGR values were recorded by Absolute control (T₁). The similar result found by Harendra Singh *et al.* (2023) [6]

Table 3. Mean Relative Growth Rate (RGR) of dry matter (g g⁻¹ day⁻¹) as influenced by different treatments during 2024-25.

Treatments	0-15 DAS	15-30 DAS	30-45 DAS	45 DAS- At harvest
T ₁ : Absolute control	0.0093	0.064	0.100	0.011
T ₂ : RDF + Urea @ 2% at flowering stage	0.0305	0.072	0.109	0.008
T ₃ : RDF +DAP @ 2% at flowering stage	0.0313	0.071	0.109	0.011
T ₄ : RDF +KNO ₃ @ 2% at flowering stage	0.0309	0.072	0.107	0.009
T ₅ : RDF +19:19:19@ 2% at flowering stage	0.0392	0.072	0.123	0.012
T ₆ : RDF + 0:52:34 @ 2% at flowering stage	0.0224	0.067	0.110	0.028
T ₇ : RDF + 12:61:0 @ 2% at flowering stage	0.0186	0.060	0.118	0.023
T ₈ : RDF + Grade II @ 0.2% at flowering stage	0.0122	0.063	0.121	0.023
G.M.	0.0243	0.067	0.112	0.015

Conclusion

The foliar application of nutrients at flowering stage significantly influenced the growth and yield attributes of green gram. Among the treatments, application of RDF + 19:19:19 @ 2% at flowering stage recorded significantly higher plant height, number of functional leaves, number of branches, leaf area, dry matter accumulation, and growth indices like AGR, RGR, and LAI at early stages.

References

1. Amutha R, Nithila S, Shiva Kumar. Management of source limitation by foliar spray of nutrients and growth regulators in black gram. *International Journal of Plant Science*. 2012;7(1):65-68.
2. Nair RM, Alam AM, Douglas C, Gowda A, Pratap A, Win MM, Schafleitner R. Establishing the international mungbean improvement network (Final Report No. 2601). 2022.
3. Dixit M, Pradeep, Elamathi S. Effect of foliar application of DAP, micronutrients and NAA on growth and yield of green gram. *Journal of Legume Research*. 2007;30(4):305-307.
4. Chandrasekhar CN, Bangarusamy U. Maximizing the yield of mung bean by foliar application of growth regulating chemicals and nutrients. *Madras Agricultural Journal*. 2003;90(1-3):142-144.
5. Manonmani V, Srimathi P. Influence of mother crop nutrition on seed and quality of black gram. *Madras Agricultural Journal*. 2009;96(16):125-128.
6. Harendra Singh, Ramakant Lodhi, DK Dwivedi, Vikram Bharati, Amrendra Kumar, Sunil Kumar, Ankit Singh. *The Pharma Innovation Journal*. 2023;12(8):2200-2202.
7. Mehriya ML, Bheru Lal Kumhar, Singh D, Kumar S, Verma AK, Sarita. Effect of foliar nutrition on productivity and profitability of mungbean (*Vigna radiata*) in western Rajasthan. *The Indian Journal of Agricultural Sciences*. 2024;94(12):13171321.

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