

Assessment of Foliar Application of Nutrient Mixtures for Enhancing Yield and Economic Returns in Groundnut

M. Punithavathi, P. Dominic Manoj, S. Kokila Vani

ICAR-Krishi Vigyan Kendra, Valikadapuram, Perambalur-621115. T.N. India

Email: punithaagronomy@gmail.com

Abstract

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop cultivated extensively under irrigated conditions in Perambalur district of Tamil Nadu. Low productivity is often associated with imbalanced nutrient application and inadequate supplementary foliar nutrition during critical crop growth stages. An on-farm trial (OFT) was conducted during Rabi 2024 in five farmers' fields at Kurur village of Alathur block, Perambalur district, to assess the effect of foliar application of nutrient mixtures on pod yield and economic returns of groundnut. The experiment comprised three treatments: farmer's practice without foliar spray, foliar application of TNAU Groundnut Rich @ 5.0 kg ha⁻¹ at 35 and 45 days after sowing (DAS), and foliar application of NOVEL organic liquid nutrient @ 2 ml L⁻¹ at two crop growth stages. The soil of the experimental fields was red sandy loam with medium available nitrogen (252.6 kg ha⁻¹), low phosphorus (7.7 kg ha⁻¹), and medium potassium (137.8 kg ha⁻¹). Application of TNAU Groundnut Rich resulted in the highest pod yield (23.98 q ha⁻¹), followed by NOVEL organic liquid nutrient (22.75 q ha⁻¹), while the farmer's practice recorded 18.98 q ha⁻¹. TNAU Groundnut Rich also recorded the highest net return (₹81,654 ha⁻¹) and benefit-cost ratio (2.42), compared with ₹53,666 ha⁻¹ and 1.98, respectively, under farmer's practice. The treatment increased pod yield by approximately 26.3% over farmer's practice. The results indicate that foliar application of TNAU Groundnut Rich at critical crop growth stages is an effective nutrient management practice for improving pod development, productivity and profitability of irrigated groundnut.

Keywords: Groundnut, foliar nutrition, TNAU Groundnut Rich, nutrient management, pod yield, net return, benefit-cost ratio

Introduction

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop cultivated extensively in India and contributes significantly to edible oil production, farm income and nutritional security. The productivity of groundnut is influenced by cultivar, soil fertility, moisture availability, climatic conditions and appropriate nutrient management. Balanced and timely application of nutrients is particularly important during the reproductive phase of the crop for improving flowering, pod setting, pod development and final pod yield.

In conventional groundnut production, farmers mainly depend on soil-applied fertilizers, while supplementary foliar nutrition during critical crop growth stages is often neglected. Foliar application provides an efficient approach for supplying nutrients directly through the leaves, particularly when nutrient demand is high or soil nutrient availability is limited. Foliar application of potassium and micronutrients has been reported to improve growth and yield attributes of groundnut (Der et al., 2016). Similarly,

foliar application of water-soluble fertilizers has shown beneficial effects on yield, oil content and economic returns in groundnut (Manasa et al., 2020). Nutrient combinations containing nitrogen, potassium and trace elements can improve crop growth and yield when applied at appropriate stages. S. et al. (2023) reported that basal and foliar application of nitrogen and potassium along with trace elements influenced the productivity of summer groundnut. Foliar application of potassium nitrate and calcium nitrate has also been reported to influence the growth and productivity of groundnut (Sarkar et al., 2000).

Recent studies have further emphasized the importance of foliar micronutrient application for improving groundnut productivity and quality. Dheebakaran et al. (2025) reported the potential of foliar micronutrient mixtures for addressing productivity and quality constraints in groundnut. Shete et al. (2018) also demonstrated the beneficial effect of foliar nutrition on yield and quality of Kharif groundnut. Similarly, Khandagale et al. (2022)

reported improvement in yield-attributing characters of summer groundnut through foliar nutrition.

Despite the potential benefits of foliar nutrient application, adoption of this practice among farmers in the study area remains limited. In Perambalur district, groundnut is an important oilseed crop cultivated under irrigated conditions, particularly during the Kharif and Rabi seasons. In Alathur block, farmers commonly experience low productivity due to imbalanced nutrient application, inadequate supplementary nutrition and limited awareness of foliar nutrient management.

Therefore, an on-farm trial was conducted during Rabi 2024 in farmers' fields of Kurur village, Alathur block, Perambalur district, Tamil Nadu, to assess the effect of foliar application of nutrient mixtures on pod yield, yield attributes and economic returns of irrigated groundnut.

Materials and Methods

Experimental Site

The on-farm trial was conducted during Rabi 2024 in five farmers' fields at Kurur village of Alathur block, Perambalur district, Tamil Nadu. The experimental fields were predominantly red sandy loam soils. The initial soil fertility status indicated medium available nitrogen (252.6 kg ha^{-1}), low available phosphorus (7.7 kg ha^{-1}) and medium available potassium (137.8 kg ha^{-1}).

The average productivity of groundnut in the locality was about 18.5 q ha^{-1} . The major production constraints identified among farmers were imbalanced nutrient application, inadequate supplementary nutrition during critical crop stages and limited awareness regarding foliar nutrient application.

Treatments

Three technology options were evaluated under the OFT:

T₁ – Farmer's practice: No foliar spray.

T₂ – TNAU Groundnut Rich: Foliar application of TNAU Groundnut Rich @ 5.0 kg ha^{-1} , with two sprays at 35 DAS (50% flowering) and 45 DAS (pod development stage).

T₃ – NOVEL organic liquid nutrient: Foliar application of NOVEL organic liquid nutrient @ 2 ml L^{-1} , with two sprays during the crop growth period.

The treatments were evaluated under farmers' field conditions to assess their effect on pod yield, yield attributes and economic returns.

Critical Inputs

The critical inputs supplied for the intervention included TNAU Groundnut Rich and NOVEL organic liquid nutrient. The total expenditure incurred for critical inputs across the five trials was ₹8,777.10.

RESULTS AND DISCUSSION

A. Effect of Foliar Nutrition on Pod Yield

The on-farm trial demonstrated a clear response of groundnut to supplementary foliar nutrition. The highest pod yield of 23.98 q ha^{-1} was recorded with foliar application of TNAU Groundnut Rich @ 5.0 kg ha^{-1} at 35 and 45 DAS, compared with 18.98 q ha^{-1} under farmer's practice without foliar spray. The treatment resulted in a 26.34% increase in pod yield over farmer's practice.

The improvement in pod yield may be attributed to enhanced nutrient availability during flowering and pod development stages, which supported reproductive growth and pod formation. Similar positive responses to foliar nutrient application in groundnut have been reported by Der et al. (2016), who observed improvement in growth and yield attributes through foliar application of potash and micronutrients. Shete et al. (2018) also reported beneficial effects of foliar nutrition on yield and quality of Kharif groundnut.

Dheebakaran et al. (2025) highlighted the importance of foliar micronutrient mixtures in addressing productivity and quality constraints in groundnut. The present findings are also in agreement with Khandagale et al. (2022), who reported improvement in yield-attributing characters of summer groundnut through foliar nutrition.

B. Effect on Number of Pods per Plant

The highest number of pods plant^{-1} (30.6) was recorded with TNAU Groundnut Rich, followed by NOVEL organic liquid nutrient (28.4), whereas farmer's practice recorded 24.2 pods plant^{-1} . The increased number of pods may be associated with improved nutrient availability during flowering and pod-setting stages.

Foliar application of nutrients during critical crop growth stages can improve nutrient utilization and reproductive development. Similar beneficial effects of foliar nutrient application on yield-attributing

characters of groundnut have been reported by Khandagale et al. (2022) and Der et al. (2016).

C. Economic Performance

TNAU Groundnut Rich recorded the highest net return of ₹81,654 ha⁻¹ and B ratio of 2.42, compared with ₹53,666 ha⁻¹ and 1.98, respectively, under farmer’s practice. The higher economic return was mainly associated with increased pod yield obtained through foliar nutrient application. Manasa et al. (2020) reported that application of water-soluble fertilizers improved yield and

economic returns in groundnut. The present findings are therefore consistent with earlier studies demonstrating the economic advantage of supplementary foliar nutrition in groundnut. The findings of Sarkar et al. (2000) regarding foliar application of potassium nitrate and calcium nitrate, and those of S. et al. (2023) concerning basal and foliar application of nitrogen and potassium with trace elements, further support the importance of balanced nutrient supply during critical crop growth stages.

Table 1. Effect of foliar nutrient application on yield and economic returns of groundnut

Treatment	No. of trials	Pod yield (q ha ⁻¹)	Net return (₹ ha ⁻¹)	B ratio	Pods plant ⁻¹
Farmer’s practice – No foliar spray	5	18.98	53,666	1.98	24.2
TNAU Groundnut Rich @ 5.0 kg ha ⁻¹ , two sprays	5	23.98	81,654	2.42	30.6
NOVEL organic liquid nutrient @ 2 ml L ⁻¹ , two sprays	5	22.75	75,605	2.34	28.4

Conclusion

The on-farm trial demonstrated that foliar nutrition can effectively supplement soil-applied nutrients and improve productivity and profitability of irrigated groundnut. Among the treatments evaluated, foliar application of **TNAU Groundnut Rich @ 5.0 kg ha⁻¹ at 35 and 45 DAS** recorded the highest pod yield (23.98 q ha⁻¹), number of pods per plant (30.6), net return (₹81,654 ha⁻¹) and benefit-cost ratio (2.42). Compared with the farmer’s practice, the treatment increased pod yield by approximately **26.3%** and substantially improved economic returns. The technology was well accepted by the participating farmers because of its positive effect on pod setting and pod development. Therefore, foliar application of TNAU Groundnut Rich @ 5.0 kg ha⁻¹ at 35 DAS (50% flowering) and 45 DAS (pod development stage) can be recommended as a supplementary nutrient management practice for improving productivity and profitability of groundnut under irrigated conditions in the study area.

Farmers’ Feedback

Farmers expressed that application of TNAU Groundnut Rich at 35 and 45 DAS improved pod setting and pod development under irrigated

conditions. They also observed higher pod yield compared with the existing practice of not applying foliar nutrients.

Feedback to the Technology Developer

Foliar application of TNAU Groundnut Rich @ 5.0 kg ha⁻¹ at 35 and 45 DAS showed promising results under farmers’ field conditions. The technology improved pod formation, pod yield and economic returns and was positively received by farmers. Further demonstrations may be undertaken in additional locations and seasons to validate its performance under different soil and climatic conditions.

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