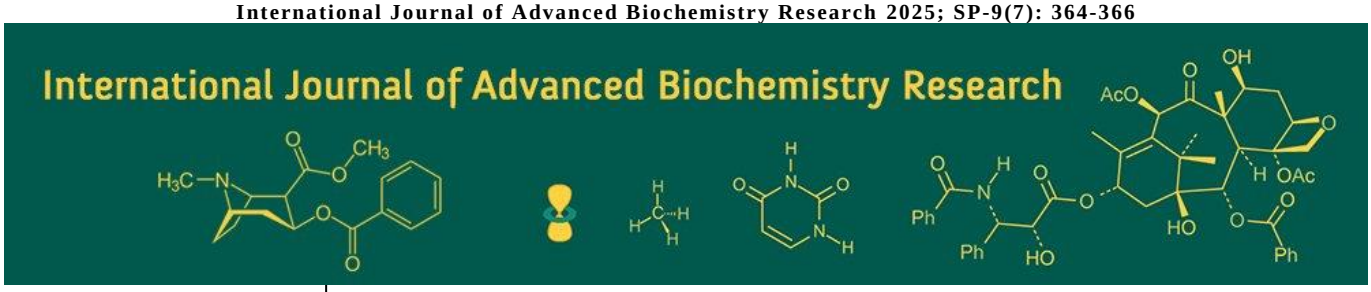

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2025; SP-9(7): 364-366
www.biochemjournal.com
Received: 02-05-2025
Accepted: 06-06-2025

Sabarish M
Department of Sericulture, Government of Tamil Nadu, India

Kalpana R
Department of Sericulture, Forest College and Research Institute, Mettupalayam, Tamil Nadu, India

Brindha Bharathi
Department of Sericulture, Forest College and Research Institute, Mettupalayam, Tamil Nadu, India

Nandha Kumar R
Department of Sericulture, Forest College and Research Institute, Mettupalayam, Tamil Nadu, India

Moulidharshan R
Department of Sericulture, Forest College and Research Institute, Mettupalayam, Tamil Nadu, India

Corresponding Author:
Sabarish M
Department of Sericulture, Government of Tamil Nadu, India

Standardizing nutritional requirement for mulberry mini clonal hedge garden (*Morus sinensis*)

Sabarish M, Kalpana R, Brindha Bharathi, Nandha Kumar R, Moulidharshan R

DOI: https://www.doi.org/10.33545/26174693.2025.v9.i7Se.4864

Abstract
Studies were carried out to standardize optimum nutrient requirement for mulberry (*M. Sinensis*) mini clonal hedge garden. Mother plants were treated with different quantities of NPK *viz*., (2 g, 4 g, 6 g, 8 g and 10 g/plant). Morphometric traits *viz*., shoot length, number of shoots per plant and number of healthy leaves produced per plant were recorded for three different growth periods *viz*., 7DAA, 14DAA and 21DAA and the result revealed that two treatments of NPK *viz*., (6 g/plant) reported superiority in all growth parameters evaluated. In other hand, over dosage of NPK treatments (10 g/plant) leads death of mother plant.

Keywords: NPK, growth, *Morus sinensis*, DAA

Introduction
Mulberry (*Morus sp*., Moraceae) is a fast growing, deciduous woody perennial tree with a deep rooting system with its leaves being simple, alternate, stipulate, petiolate, entire or lobed, lobes may vary from 1-5. Inflorescence is catkin type with a pendent or drooping peduncle bearing unisexual flowers. There are about 68 species of the genus *Morus* present in the world in which majority of these species occur in Asia, especially in China (24 species) and Japan (19). The continental America is also rich in its *Morus* species, whereas it is poorly represented in Africa and Europe. In India many species of *Morus are* present of which, *M. alba, M. indica*.
M. serrata and *M. laevigata* grow wild in the Himalayas. Several varieties belonging to *M. multicaulis*, *M. nigra*, *M. sinensis* and M. *philippinensis* have been introduced. Most of the Indian varieties of mulberry belong to *M. indica* (Sanjappa, 1989) [1]. Out of 68 known mulberry species, only 16 perform well in terms of leaf, fruit and timber production.
Mulberry is amenable for sexual and asexual modes of reproduction. Owing to heterozygosity of parents, propagation through seeds is not commercially viable as seed grown plants show high degree of variability and poor survival percentage 20-30 percent (Vijayan, 1997) [4]. Therefore, propagation of mulberry for large scale production is done using stem cuttings by planting the cutting directly in the field or raising saplings in nursery and then transplanting to main field. The advantage of propagating through stem cuttings is the ability of perpetuating the good characteristics of mother plant without any alteration and adapts to various agro-climatic conditions. Likewise, triploid varieties could only be propagated vegetatively due to its sterile nature (Narayan *et al*., 1989) [1].
Mulberry leaf is the sole Source of food for silkworm (*Bombyx mori* L.) providing more than 70 percent of the material to biosynthesize silk proteins, sericin and fibroin. However, the highly intensive mulberry cropping system results in depletion of nutrients in soil. So it is essential to recharge the soil with adequate quantity of nutrient to support the growth of mulberry. This study was carried out to standardize optimum nutrient requirement for mini clonal hedge garden.

Materials and Methods
This experiment was carried out at Forest College and Research Institute, Tamil Nadu Agricultural University, Mettupalayam (11º19'N, 76º56'E, 300 meters MSL, 800 mm, pH 7.1. The propagules required for standardizing cutting size for mini clonal propagation were

collected from mini clonal hedge garden of MR2.

The study was undertaken to standardize the quantity of fertilizer required to augment the maximum growth and number of shoots from the seedlings. After each harvest mother bed was enriched with NPK of different quantities *viz*, (2 g, 4 g, 6 g, 8 g, 10 g/plant). Source of NPK was from Urea, Single super phosphate and Muriate of potash. Three fertilizers were mixed in equal proportion and weighed accordingly to the treatments applied to each plant and irrigated immediately after application of fertilizer. Observations on growth attributes viz., Shoot length, number of shoots per plant and number of leaves per shoots were taken at three different intervals *viz*., 7 DAA, 14 DAA and 21 DAA.

Shoot length

The shoot length was measured from the point of shoot initiation to tip of the shoot and expressed in cm.

Number of shoots per plant

Number of shoots per plant was counted and their average values were tabulated

Number of leaves per shoot

Number of leaves per shoot was counted and their average values were tabulated

Fig 1: Application of NPK of different quantities *viz*, (2 g, 4 g, 6 g, 8 g, 10 g/plant)

Result and Discussion

In the present study on standardizing optimum nutrient requirement the mini clonal hedge was enriched with NPK of different quantities *viz*, (2 g, 4 g, 6 g, 8 g and 10 g/plant). Growth parameters *viz*., Shoot length, number of shoots per plant and number of leaves per shoots were taken at three different intervals *viz*., 7DAA, 14DAA and 21DAA

Shoot length (cm)

The highly significant differences in shoot length among the treatments were observed in three growth stages. At 7 DAA, the shoot length ranged from 9.18 cm (T_4) to 2.45 cm (T_5). Three treatments *viz*., T_4 (9.18 cm), T_3 (8.18 cm) and T_2 (6.85 cm) recorded significantly higher shoot length. At 14 DAA, shoot length ranged from 22.85 cm (T_4) to 1.00 cm (T_5). Two treatments *viz*., T_3 (22.40 cm) and T_2 (21.28 cm) exhibited higher shoot length

At 21 DAA, the shoot length varied from 39.30 cm (T_4) to 1.00 cm (T_5). The average soot length recorded was 26.92 cm. Two treatments *viz*., T_3 (38.58 cm) and T_2 (36.58 cm) expressed significantly higher shoot length among the treatments investigated (Table 1).

Number of shoots

At 7 DAA, number of shoot ranged from 1.00 (T_5) to 3.50 (T_3). The average number of shoot recorded was 2.38. Except T_5, all other treatments registered significantly higher number of shoot than control. At 14 DAA, number of shoot varied between 5.50 (T_3) and 1.00 (T_5). The average number of shoot recorded was 3.08.

At 21 DAA, the number of shoots varied from 1.00 (T_5) to 8.50 (T_3). The average number of shoot recorded was 5.38. Only one treatment T_2 (4 g/plant) recorded significantly higher number of shoots (Table 1).

Healthy leaves

Number of healthy leaves increased with the increase in the number of days of observation. At 7 DAA and it has varied from 1.00 to 4.00. The average number of leaves recorded was 2.25. Three treatments *viz*., T_3 (4.00), T_2 (3.00) and T_1 (2.50) recorded significantly higher number of healthy leaves compared to control (2.00).

Number of healthy leaves produced at 14 DAA ranged between 7.15 and 1.00. Two treatments *viz*., T_3 (7.15), and T_2 (5.88) recorded significantly higher number of healthy leaves compared to control (3.70).

At 21 DAA, number of healthy leaves varied between 9.05 and 1.00. Two treatments T_3 (9.05) and T_2 (8.00) recorded supremacy for this parameter (Table 1).

Unhealthy leaves

Among the treatments, maximum number of unhealthy leaves were recorded by T_4 (5.15) at 21 DAA, followed by T_5 (10 g/plant). Three treatments *viz*., T_1, T_2 and T_3 recorded least value for unhealthy leaves 1.00 (Table 1).

Fig 2: Shoot growth of mulberry mini clonal hedge treated with NPK @ 6 g/plant

Fig 3: Scorching of mulberry leaves when plants treated with treated with NPK @ 10 g/plant

It was found that mulberry mini clonal hedge treated with NPK at 6 g/plant show better in all growth parameters *viz*., Shoot length, number of shoots per plant and number of leaves per shoots. Overdosage of mini clonal hedge NPK at 10 g/plant leads to scorching of leaves followed by death of plant. The dose of NPK is an important factor in shoot growth.

The similar findings were found in *Lycopersion esculantus* where in 50% hike in nitrogen over recommended dose of fertilizer *viz*., 120:80:75 kg/ha NPK significantly increased plant height and number of branches per plant. (Manoj Kumar *et al*., 2013) [5], in finger millet (Patil *et al*., 2015) [6] and in *Raphinus sativus* (Parwaiz Ahmed Baloch *et al*., 2014) [7].

In holistic perspective the current study recommends that supply of mulberry mini clonal hedge with NPK at 6 g/plant show better shoot growth.

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