

Towards Viksit Bharat@2047 Technological Innovations and Policy Options for Eastern Region



ICAR Research Complex for Eastern Region

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Towards Viksit Bharat@2047: Technological Innovations and Policy Options for Eastern Region

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Tephrosia Biomass Mulching Technology for Improving Soil Health and Productivity of Fruit Orchard

Period of development: 2014 - 2023

Developers:

Bikash Das, MK Dhakar, SK Naik, PK Sarkar, S Maurya, BP Bhatt

Background:

Increasing demand for organic produce as well as increasing cost of manure and fertilizers warrant alternative cheaper options on sustainable nutrient management. Growing of biomass yielding plants and recycling of harvested biomass in the plant basin of fruit trees have been found to improve soil fertility and plant growth of number of fruit trees. In the light of this, an attempt was made to test the effectiveness of different biomass yielding plants in fruit orchards. Enriching the plant basins with leafy biomass can effectively improve soil organic matter and nutrient content. Facing difficulties in eradication of and high seed dispersal of Subabul plants, there was a need for identification of an equally effective substitute biomass yielding plant.

Description of the technology:

The developed technology includes improvement in soil fertility of fruit orchards through biomass mulching of *Tephrosia candida* in the basin of fruit trees viz. Mango, Guava and Bael growing under rainfed conditions of EPHR. Experiment I evaluated four biomass-yielding crops (Tephrosia, Leucaena, rice bean, and vegetable soybean) for their impact on soil and bael health by applying their biomass in plant basins. Experiment II standardized Tephrosia mulching doses (1–3 kg dry biomass/m²) in mango, guava, and bael orchards under rainfed conditions. Both studies assessed soil properties, nutrient recycling, and fruit yield. *Tephrosia candida* is a leguminous perennial shrub with high biomass producing capacity (4.0-5.0 kg dry biomass/m²) with a lifespan of five to six years under regular lopping conditions. The Tephrosia plants can be grown either in the alley area in young orchards and as a hedge in the orchard border and the harvested biomass which can be used in basin enrichment.

Application of Tephrosia biomass @ 3.0 kg dry wt/m² have resulted in improvement in soil properties viz. total soil organic carbon (18.43-21.32%), available nitrogen (13.68-23.02%), available phosphorus (73.18-96.76%), exchangeable potassium (41.60-47.47%), leading to increase in content of leaf nitrogen (35.59-39.06%), phosphorus (27.58-35.01%), potassium (103.3-111.11%) and fruit yield (mango-25.03%, guava-42.25% and bael-100.0%).

Commercial potential:

Under rainfed conditions of eastern plateau and hill region, the productivity of different fruits with biomass mulching of Tephrosia was as follows

Sl. No.	Fruit crop	Variety	Age (years)	Spacing (m)	Yield potential (t/ha)
1.	Bael	Pant Aparna	6	2.5m x 5.0m	3.36
2.	Mango,	Amrapali	18	2.5m x 2.5m	40.43
3.	Guava	Allahabad Safeda	15	1.0m x 2.0m	20.20

The technology can be offered through consultancy services or outsourced to the State Agricultural Department, Development agencies like National Horticultural Mission (NHM), RKVY, NGOs, and farmers' groups.



Tephrosia plant



Tephrosia mulching in mango



Tephrosia mul

Impact:

This technology is recommended for the OFT by ATARI Patna for Bihar and Jharkhand KVKs. This technology is being popularized by State Agricultural Management and Extension Training Institute (SAMETI), Govt. of Jharkhand. This is also included under Birsa Munda Aam Bagwani Yojna of Department of Rural Development, Government of Jharkhand.

Agro-ecoregions suitability:

Rainfed conditions of eastern plateau and hill region

Reference (Publication etc.)

Das B, Sarkar PK, Dhakar MK, Naik SK, Maurya S, Singh AK, Kumar S, Bhatt BP. 2021. Basin enrichment of bael plants (*Aegle marmelos* Correa) through alley cropping of biomass producing plants: Effects on plant growth and soil properties. *Fruits*, 76(2): 61-71.