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

भाकृअनुप
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ICAR Research Complex for Eastern Region
ICAR Parisar, P.O. Bihar Veterinary College
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Towards Viksit Bharat@2047: Technological Innovations and Policy Options for Eastern Region

Editors: Abhay Kumar, Anup Das, PC Chandran, SS Mali, DK Singh, P Bhavana, Kumari Shubha, Arti kumari and Sarfaraj Ahmad

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Ph: +91-0612-2223962, FAX: +91-0612-2223956
E-mail: director.icar-rcer@icar.gov.in
Website: www.icarrcer.icar.gov.in

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Multitier Cropping System for Rainfed Uplands of Eastern India

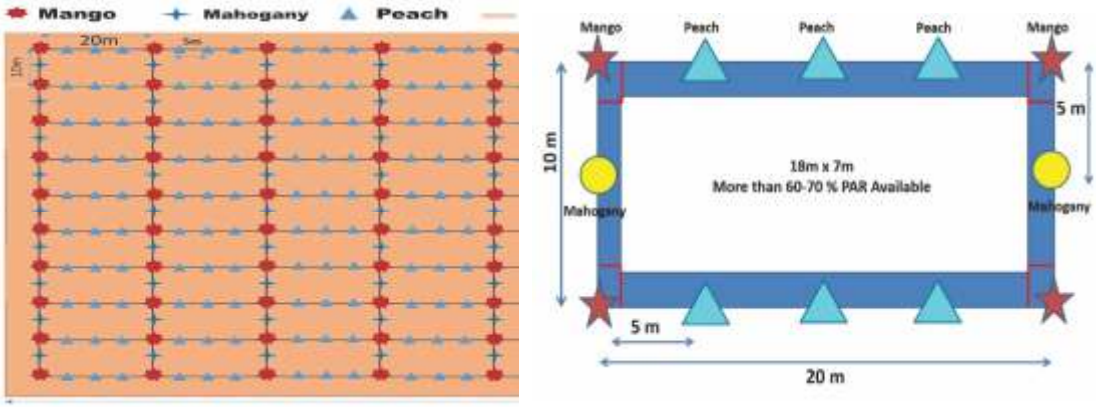
Period of development: 2014 - 2022

Developers:

MK Dhakar, Bikash Das, Reshma Shinde

Background:

In the previously developed multitier models, initially light demanding intercrops are planted but later due to shading effect of perennials, shade tolerant intercrops are recommended. So, it is currently unclear how to achieve optimal yields for light demanding intercrops in these systems on a continuous basis. Cereals-Fruit-Timber-tree based multitier system can produce benefits to farmers by using resources that would not be exploited in monoculture systems and will provide an excellent case study for the potential of cereals-fruit-timber-tree based systems to address the needs of resource limited farmers in marginal upland areas. The current model which integrated fruit and timber tree with rice and finger millet is giving relative income advantages over the monoculture alternatives.



Layout of 1ha plot (Total number of plants in 1 ha= 215 nos.)

Description of the technology :

The developed technology includes Mahogany as top story component, Mango (var. Amrapali) as middle story component, sub tropical peach as filler crops (or region specific) and light demanding intercrops (region specific) (Figure 1). More than 60% area is receiving sufficient light for growing cereals such as finger millet and rice under Mango + Mahogany + Peach system. The filler crop peach attended its maximum canopy after 4 years and producing 45-50kg fruits per plant. The middle story crop (mango) gave fruit yield of 30-35kg/plant under the system. Based on the economics, multitier cropping system Mango + Mahogany + Peach + Rice and Mango + Mahogany + Peach + Finger millet system gave net income of Rs. 120000/- and 150000 respectively from one-hectare area under rainfed condition.

Commercial potential:

Based on the economics, multitier cropping system Mango + Mahogany + Peach + Rice and Mango + Mahogany + Peach + Finger millet system gave net income of Rs. 120000/- and 150000 respectively from one-hectare area under rainfed condition. Model I and II having soil organic carbon stock of 55-60 Mg ha^{-1} which is only 45 Mg ha^{-1} in case of mono-cropping of paddy. The multitier cropping system is demonstrated to more than 1000 farmers. The multitier system in upland is adopted by 50 farmers in Jharkhand.

Impact:

This technology is proposed to include under Birsa Harit Gram Yojna of Department of Rural Development, Government of Jharkhand.

MoUs with different NGOs for scaling-up of the multitier model.

S.N.	NGO/Institutions	State
1.	PRADAN - Professional Assistance for Development Action	Jharkhand
2.	TRI: Transform Rural India	Jharkhand
3.	Bhartiya Lok Kalyan Sansthan	Jharkhand
4.	Maharashtra Prabodhan Seva Mandal (MPSM)	Maharashtra

Field view of horti based multi-tier model

Agro-ecoregions suitability:

Rainfed Uplands of Eastern India

Reference:

Beauty, K, Dhakar, M.K, Das, B, Naik, SK, Oraon, BC, Shinde R and Bhatt BP. 2024. Effects of Different Fruit-based Multitier Systems on Soil Chemical Properties and Leaf Nutrient Acquisition Under Rainfed Plateau Conditions. *Applied Fruit Science*, *66*(5): 2053-2060.