

# AGROFORESTRY FOR DOUBLING FARMERS' INCOME

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## INTRODUCTION

The agroforestry system is recognised as an important integrated farming practice since time immemorial, to fulfil the domestic need of food, fodder, fuelwood, fibre and timber along with aesthetic and environmental services to the society. However, woody perennials have been reduced gradually due to more demand of foodgrains on limited land resources in entire world in general and India in particular. National Commission on Agriculture 1976 suggested for implementation of social forestry programme, which covered farm forestry, extension forestry, reforestation in degraded forests and recreation forestry. This system was supported by government because of its role in improvement in soil health, nutrient cycling, carbon sequestration and better economic return in comparison to existing cropping systems with less use of natural resources. To promote agroforestry, various specific initiatives such as National Agriculture Policy 2000, Planning Commission Task Force on Greening India 2001, National Bamboo Mission 2002, National Policy for Farmers 2007, Green India Mission 2010 and finally a dedicated National Agroforestry Policy was approved by Government of India in 2014. This policy was recommended for setting up of a Mission or Board to address development of agroforestry sector in an organized manner.

To implement the suggestion, a sub-mission on agroforestry has been initiated under the sustainable agriculture in 2016 by Ministry of Agriculture and Farmers Welfare, Government of India. In common parlance, two factors determine the adoption of agroforestry in any specific region: one is relative profitability with other existing crops and second is the price volatility of wood. Farmers allocate their resources in production of various commodities on the basis of signals they receive from markets. The growing of tree on farms for market seemed to farmers in many regions of India a more profitable option than field crops. However, in spite of relative higher profitability to farmers and several concerted efforts made by government, the adoption of agroforestry has not reached at expected level. Our Prime Minister has set the target of doubling farmers' income by 2022-23 over that in 2015-16. To achieve this goal, it would require significantly faster growth and synergetic interaction among all variables those affect farmers' income. Agroforestry is one of the landuse to fulfill the commitment for Nationally Determined Contributions (NDCs) of our country and reduce emission of Greenhouse Gases (GHGs) by application of carbon, water and land footprints.

## 2. MATERIALS AND METHODS

**Study area** To test the hypotheses, the study was conducted in the Yamuna Nagar district of Haryana, India (Figure 1) which is bounded by the state of Himachal Pradesh in the north and by the state of Uttar Pradesh in the east. Rice-wheat cropping system is prominent and the farmers are also used to grow poplar and eucalyptus trees in the district.

**Data collection** It is assumed that first and second year of tree has very small amount of biomass, hence only three to seven years of data on all parameters of poplar trees were estimated. The field survey was conducted to test H01 in the year of 2016-17. To test the other hypotheses (H02-H05), secondary data were collected from various government publications namely Commission on Agricultural Costs and Prices, Government of India, Department of Economics and Statistical Analysis, Government of Haryana and World Bank and online sources.

## DATA ANALYSIS

Simple tabular analysis was used for presentation of the results. To calculate the time value of money, 12% discount rate was considered. The policy matrix was used for presentation for inter-industry linkages among various sectors related to the agroforestry.

## 3. RESULTS AND DISCUSSION

Relative profitability of poplar based agroforestry system. The comparative economic viability of poplar based agroforestry system with rice-wheat system, prevalent in study area is presented in Table 1. It showed that agroforestry system is able to enhance farmer's income about double in seven years and triple, if farmers get incentive of their carbon sequestered by agroforestry system in comparison to existing rice-wheat cropping system. It is verified that if a farmer growing rice-wheat continuously at his farm for seven years, he could receive net





income of only Rs. 3,27,703/ha, while another adjacent farmer with poplar based agroforestry at his farm (agrisilviculture system with 500 poplar trees, first four years wheat in rabi and fallow in kharif season) could get net income of Rs. 5,94,811. This could be due to the difference in tree density and rotation of trees. Further, the difference in micro edapho-climatic conditions could also play its role. Accounting incentives for sequestered carbon by agroforestry, the farmer may receive a total income of Rs. 8,98,537 in the period of seven years. Considering the time value of money with discount rate of 12%, net income of Rs. 2,27,575, Rs. 2,94,997 and Rs. 4,83,36.

## IMPORT OF WOOD AND WOOD-BASED PRODUCTS AND RATE OF CUSTOM DUTY

Despite of sharpest price crash of woods in India since 2013-14, the quantity of net import of wood and wood-based products are significant. This is an example of policy fatigue towards agroforestry farmers, which discourage farmers for new plantations, resulting creation of gap in demand and supply especially raw materials for wood-based industries in future.

## STATUS OF CENTRAL GOODS AND SERVICES TAX (CGST) ON WOOD BASED PRODUCTS

The recent taxation policy clearly indicates that CGST rates are higher on wood and wood based products in comparison to rice and wheat produced by the farmers in same environment. In fact, in a situation when Government try to diversify agriculture and shift from rice-wheat cropping through various schemes in general and particularly in the state of Punjab, Haryana and western Uttar Pradesh, the taxation policy does not commensurate with other policy for agroforestry development. Moreover, the CGST rates are much higher on wood and wood based products in comparison to gold which is a purely luxurious good. It implies that recent government taxation policy is not encouraging agroforestry.

## INTER-SECTORAL POLICY LINKAGES RELATED TO AGROFORESTRY SECTOR

The inter-linkages of various policies related to agroforestry are presented in Table 4. Various policies influence the development of agroforestry through inter-linkages. Now question arises that, which is the most important policy instrument for policy makers among available options? This solely depends on priority of the government to achieve the most prioritized objective. For example, if objective of the Government of India is the expansion of area under agroforestry to reduce the pressure on forest for fuelwood and timber demand, save money on import of raw material for wood based and paper industries, agriculture diversification through agroforestry in water scarce region, enhance farmers' income and fulfill the commitment under Paris agreement 2015, priority should be given to agroforestry sector. This is imperative because horizontal expansion of area under forest is not feasible. Further, farmers cannot spare private holding for sole plantation of trees on croplands due to compulsion of growing food crops to fill empty belly.

## CONCLUSION

The comparative economic viability of poplar based agroforestry system with continuous rice-wheat crop rotation showed that agroforestry system is able to enhance farmers' income more than double in seven years and triple if farmers get value of their carbon sequestered by agroforestry. It is verified that if a farmer growing rice-wheat continuously at his farm since last seven years, he could receive net income of Rs. 3,27,703/ha, while another farmer with poplar based agroforestry at his farm (agrisilviculture system with 500 poplar trees, first four years wheat in rabi and fallow in kharif season) could get net income of Rs. 5,94,811 and if government provide incentives for the carbon sequestered by agroforestry, he could receive a total income of Rs. 8,98,537 in the period of seven years. Considering the time value of money with discount rate of 12%, net income of Rs. 2,27,575, Rs. 2,94,997 and Rs. 4,83,368 per ha from rice-wheat rotation and poplar based agroforestry without and with reward of carbon sequestration, respectively is estimated.

