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Agroforestry Sustaining the Paper Industry in District Saharanpur

Isha Katariya[1], Lolita Pradhan[2], Nisha Tripathi[3]

Abstract

Star Paper Mills is one of the largest paper mills in India that produces virgin paper. The mill not only made papers but also promoted agroforestry and the greening of the environment in different districts of western Uttar Pradesh on a large scale as part of its Kisan nurseries development program. In addition, the company has developed infrastructure to develop superior clones of Eucalyptus and Poplar of high yields and their propagation technology on a commercial scale through vegetative means under standardized mist chamber conditions. In Western Uttar Pradesh, clonal plantations yield double the productivity of seedlings within a shorter period. The clonal plantation is like a boon to the farmers. Farmers are giving a very good response to the clonal plantation, On the boundaries of their farmland, they grow mainly Eucalyptus and Poplar. The program of these clonal plants started 20 years and this is going on successfully.

Keywords: *Agroforestry, Kisaan nurseries, clonal plants, Eucalyptus, Poplar, Bamboo.*

Introduction

Agroforestry is a combination of agriculture and forestry(Dwivedi et al., 2020). It involves trees and shrubs along with agricultural crops(Chinnamani, 1993). Programs for watershed development have also included agroforestry interventions(Palsaniya et al., n.d.). There is an age-old tradition of agroforestry in this region, both in the production of crops and livestock. Agroforestry has a strong contribution to the paper industry. Star paper mill Saharanpur plays a vital role in the field of agroforestry. Star paper mill has a long history of more than 70 years (since 1938)(Kumar Sharma et al., 2009). This paper mill is located in the district Saharanpur, Uttar Pradesh. Star paper mill is a private company that is a part of the Duncan Goenka group. They use wood, wood pulp, and waste material to make different kind of papers(Kumar Sharma et al., 2009). It is one of the 15 largest paper mills in India. Star paper mills purchase raw materials from wood traders, contractors, and sometimes directly from the farmers. Star paper mill promotes agroforestry on a large scale in some selected districts of Western Uttar Pradesh. Besides western Uttar Pradesh, they also procured raw materials from some parts of Eastern Uttar Pradesh. Star paper mill is an integrated pulp and paper mill. Papermill operations can make so many benefits to agroforestry, economies, and farmers mainly in rural areas. There are so many districts of Uttar Pradesh connected to the star paper mill like

[1] Amity School of Natural Resources & Sustainable Development, Amity University, Noida, Uttar Pradesh, India, ishakatariya96@gmail.com

[2] Amity School of Natural Resources & Sustainable Development, Amity University, Noida, Uttar Pradesh, India, lpradhan@amity.edu

[3] Sanjeevani foundation for health education and environmental research action (SFHEERA), Delhi, India, nisha.sfheera@gmail.com

Saharanpur, Muzaffarnagar, Bijnor, Meerut, Moradabad, etc. In these selected districts the star paper mill distributes the seeds/seedlings to the farmer to grow trees like shisham (Dalbergia sissoo), poplar (Populus deltoids), Eucalyptus, and Bamboo (Bambusa vulgaris). The beginning of seed distribution was made in 1996-1997. Star paper mill held seminars and gosthis at various places(villages) in districts. The main purpose of these seminars and gosthis is to solve the problems of farmers. After the distribution of seeds, farmers cultivate the trees on their farms and take care of the trees until they are not ready for harvesting. After harvesting farmers sell the trees to the paper mill. The plywood waste material is used in large quantities for making papers. The most used wood in the star paper mill is eucalyptus, and that is 80%. Over 30 lac superior eucalyptus clones have been planted in the farmer's field. Poplar also plays an important role in the paper industry. In the star paper mill, poplar used 10-15%. Star paper mills use poplar trees in wood form for making different kind of papers. Rest 5-10% bamboo tree wood is used in the star paper mill. A clonal development infrastructure has been established at star paper mills limited for producing 30 lac clonal plants per year. Star paper mill has started seed distribution to make a profitable bond between farmers and paper mills. The main commercial crops cultivated by farmers in western Uttar Pradesh on their farmlands are eucalyptus and popular. Both trees are economically important in many wood-based industries like paper mills. In western Uttar Pradesh, many farmers are not aware of the benefits of poplar and eucalyptus. A few years back star paper mill took this important step to create awareness and benefit poor farmers. Although there are so many farmers had not adopted agroforestry yet in district Saharanpur. But most of the farmers in western Uttar Pradesh are interested in adopting agroforestry models which are beneficial to them. Agroforestry has been promoted by star paper mills in Uttar Pradesh under some simple terms and conditions. Suitable species of agriculture crops such as poplar, eucalyptus, and bamboo have been identified so that farmers will get benefit and earn a good return on their crops during the harvest season.

Materials and methods

Study site

Star paper mill is situated in district Saharanpur, Uttar Pradesh. In the district Saharanpur, so many farmers adopted agroforestry in recent years. In agroforestry mostly they grow poplar and eucalyptus along with agricultural crops.

The Star Paper Mill has been in operation since 1938. It is situated in Saharanpur, a city in the northern Indian state of Uttar Pradesh (29058'N 77033'E/29.97,77.55). Star Paper Mills is dedicated to environmental stewardship. Star Paper Mill is working to create a greener environment. In 1995-1996, the Star paper mill distributed approximately 1.0 million seedlings to farmers for planting on their farmland as part of an initiative to protect the environment and ensure the continued supply of raw materials to the industries. In the district of Saharanpur alone, over 85-90, Kisan nurseries have been built, and more than 350 total nurseries operating in nearby districts like Muzaffarnagar, Bijnor, Meerut, JP Nagar, Moradabad, Bulandsher, Ghaziabad, Haridwar, and Dehradun.

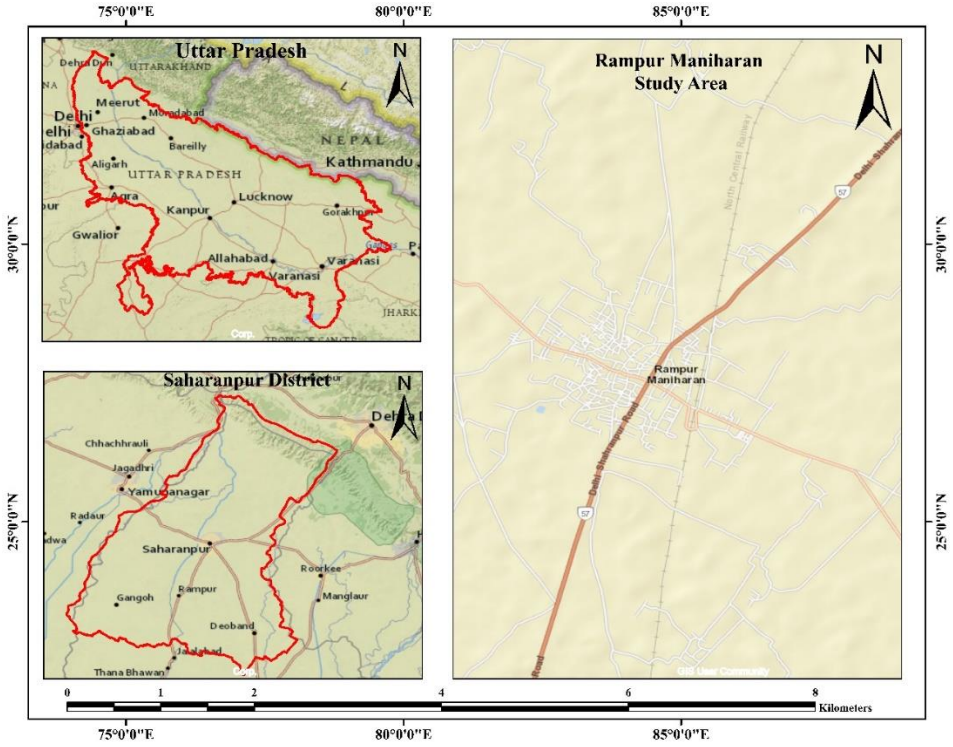

Fig. 1 Map of the study area

Data collection

For data collection, a questionnaire was made for the star paper mill. After that, an interview was conducted with the plantation manager of star paper mill. The questionnaire was based on the requirements of wood in the mill and at what cost they procured the wood and raw material.

Table1 Kisan nurseries and seedlings distribution status in districts of Western Uttar Pradesh (2017-21)

Year	Number of nurseries	Seedlings distributed (In Lacs)
2017	369	485
2018	378	515
2019	386	521
2020	394	526
2021	405	539

Source: primary data collection

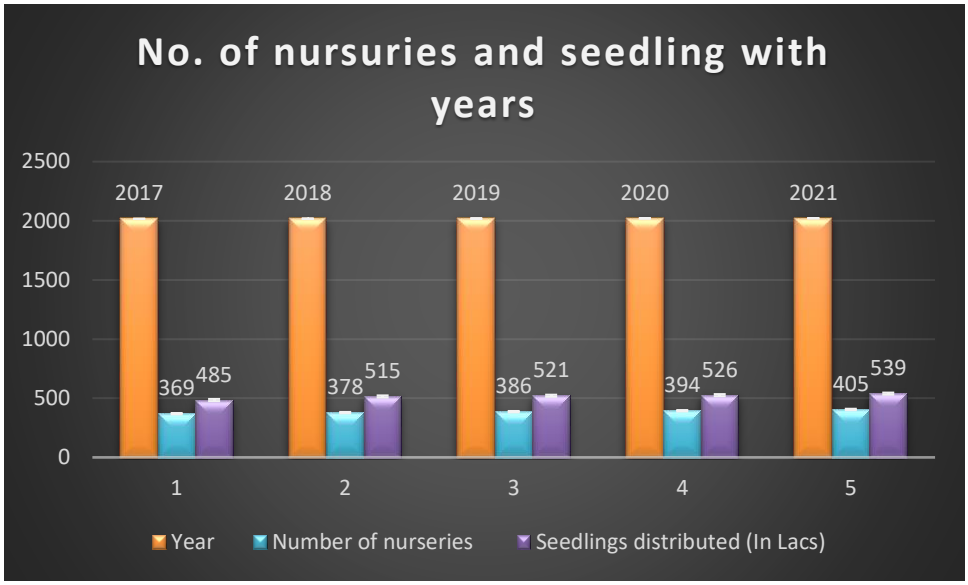

Fig. No. of nurseries and seedlings over the years

Details of raw material

The agroforestry programme of Star Paper Mill focuses on three tree species: Eucalyptus, Poplar, and Bamboo. The quantity of raw materials is used in different quantities, the required quantity depends on the type of paper. The species which are commonly growing in district Saharanpur are

Eucalyptus teriticornis, Populus deltoids, and Bambusa vulgaris. These species are grown on farmlands by farmers in the district Saharanpur.

Table 2 – consumption of raw material per day

Raw material	Ratio of daily consumption	Per day requirement(tons)	Price procured (per ton)	Source
Eucalyptus	80%	520	3858	Farmers or middle man
Poplar (Sokta)	10-15%	97.5	6173	Farmers or middle man
Bamboo	5%	32.5	3307	Farmers of middle man

Source: primary data collection

Star paper mill procured different kinds of raw materials. The two main raw materials are wood and plywood waste. They procured this raw material between the 200-250 km range of district Saharanpur. As per star paper mill they also procured raw materials from different parts of eastern Uttar Pradesh. The raw material is completely tree-based. The cost involved in the transportation of raw materials is between 400-1000/metric tons.

Star paper mills use plywood waste also (300 tons per day), and they procured this plywood waste from plywood industries. The quantity of total wood consumption per day is 600-700 tons per day. The wood is procured from contractors and sometimes directly from the farmers.

Eucalyptus (Eucalyptus globulus)

Star paper mill uses about 80% of eucalyptus wood in papermaking. E.tereticornis called Mysore gum (which is believed to be a hybrid) are the most widespread eucalypts in India. Eucalyptus is a commercial crop in India and farmers cultivate a wide range of eucalyptus on their farms. In some parts of Uttar Pradesh eucalyptus grow along with agricultural crops. Eucalyptus is widely used in different kinds of industries like the plywood industry, pulp industry, fuelwood industry, board industry, etc. in western Uttar Pradesh eucalyptus is one of the most trees among the farmers. According to the star paper mill, eucalyptus is the most beneficial tree species in the papermaking industry. Eucalyptus has an important role in paper-making industries. In common language, eucalyptus is called “safeda”. It has the ability to adapt to a wide range of edaphoclimatic conditions.

Poplar(Populus deltoides)

The cultivation of poplars in Uttar Pradesh since 1950, when the first exotic species were introduced. Industrial products were manufactured using poplar wood as a significant tree resource (RC Dhiman,2022). Plant poplar as either a line planting along bunds or irrigation channels or as a block planting in agricultural fields. The species of poplar which is commonly grown in district Saharanpur is called Populus deltoides. Poplars have very fast growth rates and can be used in a variety of ways(Chauhan et al., n.d.). About 78% of farmers in Saharanpur, which is close to poplar wood markets, practice a bund/boundary system based on poplar trees. In the star paper mill, the total consumption of poplar is 10-15%. In western Uttar Pradesh farmers grow poplar trees along with agricultural crops like wheat and paddy on the boundary of fields(Shukla et al., 2020). Besides of paper industry, poplar is also used in the pulp industry and the fuelwood industry. Star paper mills procured the poplar wood from traders or contractors and sometimes direct from the farmers. In western Uttar Pradesh, the variety of poplar trees which is widely grown on fields is known as G-48. The Star paper mills have taken steps since 2006 to develop superior clones of Poplar, and their ETPs have been planted in farmers' fields under simple conditions with joint venture agreements. Some uses of poplar are:

1. Paper industry
2. Pulp industry
3. Plywood industry
4. Furniture making
5. Fuel industry

Poplars are among the fastest-growing trees in temperate latitudes. Their high productivity is associated with large water requirements. As a result, productivity is closely related to water availability (Ceulemans et al., 1988).

Tree parts	Uses
Bark	Firewood
Stem	Timber, firewood, and pulpwood
Leaves	Fodder and firewood
Branches	Firewood, pulpwood, and timber
Roots	Firewood and timber

Uses of different parts of poplar tree

Both seasonally and periodically, the price of poplar wood can fluctuate significantly between extremes at the upper and lower ends of the price band. Both farmers and industry may be interested in sustaining the culture in this way, but this is not a good sign. Poplar culture is likely to be sustained in the present region based on the synergy between growers and wood-based industries, higher returns to growers, and characterizing the forest to the present land-use system (Dhiman., 2022.).

Bamboo (Bambusa vulgaris)

In addition to being a fast-growing plant, bamboo is also a good source of wood pulp since it has good fiber properties and quality wood pulp. In the star paper mill, the consumption of bamboo is about 5% of the total wood consumption. The state of Uttar Pradesh produces two kinds of bamboo, “laathi baans” and “mota baans”. The three nurseries of bamboo in Uttar Pradesh Mirzapur, Lalitpur, and Pilibhit have been set up. Bamboos are commonly grown near rivers(Sharma et al., 2014). According to some sources, bamboo will now grow in agroforestry. Bamboos are also used in fuelwood and textiles.

Uses of bamboo

Primary use	Value added
Inter-cropping	Timber and craft wood
Riparian vegetation filter	Fiber crop for pulp and paper industry
Constructed wetlands	Livestock
Living screen	Bamboo shoot

In the district, Saharanpur 78% of farmers are practicing agroforestry, while 22% of farmers had not adopted yet.

Table 3. Composition of sample farmers

Farmers’ category	Percentage of farmers	Landholding(average) In acre
Small (1-5 acre)	17(17%)	5.71
Marginal (5-10 acre)	51(51%)	2.53
Large (>10 acres)	32(32%)	23.95
Total	100(100%)	8.04

Source: primary data collection

Cost-benefit analysis

The farmers who are practicing agroforestry are getting more benefits than those farmers who are not practicing agroforestry.

Table 4. Cost-benefit analysis of agroforestry in district Saharanpur

Particulars	Initial cost (in Rs.)	Input cost (in Rs.)/annum	Gross return (in Rs.)
Tree	315	6467	60000
Crop	1000	66780	150000
Total	1315	73247	210000

Source: Primary data collection

Role of agroforestry in the paper industry

Agroforestry has been practiced in India for so many years. After knowing its economical contribution people are more interested in agroforestry. Agroforestry has a big contribution to the wood-based industry. The Indian market is one of the largest producers and consumers of wood and wood products in Asia (Kallappan et. Al., 2021). In the paper industry, agroforestry plays an important role.

The lack of assured buy back and price support is one of the big problems faced by those farmers who are growing trees on their lands. The star paper mill Saharanpur resolved this issue by developing the Kisan nurseries in different districts. Both farmers and industries benefited from this system since they were able to avoid being locked into their wood inventories as well as to avoid the loss of wood due to insect and disease infestations, as well as theft in the field, during transit, and in the log yard. Farmers have been drawn to agroforestry because of its benefits, and wood-based industry participation has increased as a result.

Results and discussion

The result of the study summarized the role of agroforestry in the star paper mill. We discussed, how star paper mill promotes agroforestry among the farmers of district Saharanpur in western Uttar Pradesh. There are two main points of this study

1. Role agroforestry in star paper mill
2. How farmers are getting more benefits by adopting agroforestry

They distribute seed/seedlings to farmers to grow trees on their farmlands and procured wood after harvesting. Star paper mills procured wood from traders also. In star paper mill the tree of eucalyptus plays an important role.

Star paper mill provides seedlings, clonal plants, compost, and other help for growing trees. The farmers of district Saharanpur showing interest in this because they are getting benefits from their crop. Farmers are also adopting different patterns of cropping.

It concluded that the initiatives of the star paper mill to develop Kisan nurseries for papermaking are beneficial for farmers.

Conclusion

Agroforestry is a land-use system that provides a sustainable way for farmers to increase their productivity and profitability. The planting of trees on farmland has not only benefited farmers, but has also created jobs in a variety of sectors, including on-farm (from tree nursery to harvesting), wood-based industries, transportation, trading, and so on, and has made wood products more affordable.

Farmers in the district Saharanpur, Uttar Pradesh, are now adopting the appropriate agroforestry model with the appropriate crop and benefiting greatly. This will not only help and support the wood-based industries in the region but also help in increasing the green forest cover of the region. Various Star Paper Mill initiatives, such as Kisaan nurseries, the distribution of better clones seedlings, and the agreement policy for collaborative production of commercially important crops such as Eucalyptus, Poplar, and Bamboo, significantly aid farmers in achieving higher output and greater benefits. This type of scheme should be implemented by state governments, as well as other public-private organizations involved in research and extension that support farmers in a similar manner.

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