

# Opportunities And Major Constraints In Agroforestry Systems Of Western U.P.: A Vital Role Of Star Paper Mills

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## ABSTRACT

Star Paper Mills is among the 15 largest virgin fiber paper mills in India. It has a good rapport in National and International market and has a long history of more than 70 years (since 1938). The industry is engaged not only in making of different kinds of papers e.g. Virgin fibre paper, cultural papers etc. using wood pulp as raw material from Eucalyptus, Bamboo, Poplar and other fibrous species but also engaged in implementing and promoting agroforestry and social forestry programme on large scale in different districts of Western Uttar Pradesh (India). Star Paper Mills provides good quality seeds of Eucalyptus and Bamboo, pesticides, micronutrients, manual of guidance etc. free of cost to the farmers for developing Kissan nurseries. 270 nurseries have been developed and 48 million seedlings distributed amongst farmers during 2009-2010 in adjoining districts. We have thus contributed to green area around 75000 ha till date. Star has also successfully developed infrastructure to develop superior clones of Eucalyptus and Poplar of high yield and their propagation technology on commercial scale through vegetative means under standardized mist chamber conditions. Around 30 lac clonal plants of Eucalyptus are supplied to the farmers annually.

Clonal plantation which yield double the productivity compared to seedlings in shorter period is proving a boon to the farmers of Western Uttar Pradesh. Programme has been receiving encouraging response from the farmers who mostly raise Eucalyptus and Poplar on the boundaries of their farm land. The programme was initiated 10 years back and operating successfully. As regards marketing, the demand of wood based industries e.g. Paper Mills, Ply wood and Board Industries in particular is increasing rapidly and the production of wood is not able to cop-up with the growing demand of wood, For this, the farmers of Western Uttar Pradesh are consequently benefited from competition among various industries for raw material. Marketing is not a problem for the farmers to sell their crop at the time of harvesting. Farmers are however confronting with many problems like, no system for proper evaluation of their crop and they are completely in the hands of middle man. They are also facing under estimated price of their crop due to different levies laws e.g. Transit fee and Mandi fee. In addition to payment, farmers have to face hardship in obtaining the passes from these departments. Beside this there is invasion of an epidemic called Gall. There is considerable damage in India by this Wasp. We should take remedial and preventive measures. Now the research work is fully focused on to find out certain preventive and remedial measures to over come this problem.

**Keywords:** Agroforestry, Kissan nurseries, Clonal Technology, Eucalyptus clones, Bamboo, Poplar , Vegetative propagation, Raw material,, Marketing and Gall Wasp.

## Introduction

Agroforestry combines agriculture and forestry technologies to create more integrated, diverse, productive, profitable, healthy and sustainable land use system. It is the science of designing and developing integrated, self-sustainable, land management system that involves the introduction and retention of woody components such as trees, shrubs, bamboos, canes and palm along with agricultural crops

including pastures or animals , Agric. Biol. J. N. Am., 2009, 1(3): 343-349 344 simultaneously or sequentially on the same unit of land and time to satisfy the ecological as well as socio-economic needs of people. India has been in the front of agroforestry research ever since organized research in agroforestry started worldwide about 25 years ago. Considering the country's unique land- use, demographic, political and sociocultural characteristics as well as its strong contribution in agricultural and forestry research, India's experience in agroforestry research is important to agroforestry development, especially in

developing nations. On the other hand, the success stories of wasteland reclamation, and poplar-based agroforestry show that the technologies are widely adopted when their scientific principles are understood and socioeconomic benefits are convincing. An examination of the impact of agroforestry technology generation and adoption in different parts of the country highlights the major role of smallholders as agroforestry producers of the future. It is crucial that progressive legal and institutional policies are created to eschew the historical dichotomy between agriculture and forestry and encourage

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integrated land-use systems. Government policies hold the key to agroforestry adoption (Puri and Nair, 2004).

### Current status of research on Agroforestry system in India:

The total geographical area of India is about 328.8 million hectares. Out of which forests occupy 67.4 million hectares. Agroforestry as a land use system is as old as agriculture. In a country like India with varied agro climatic zones, various combinations of trees with arable crops, fruits and animal husbandry exist (Nair and Sreedharan, 1986). Growing field crops like peral millet, legumes and oil seeds in a field predominant by Khejri (*Prosopis cineraria*) and Bordi (*Zizyphus nummularia*) are examples of traditional agroforestry of Rajasthan, Punjab, Haryana and Gujrat states. Growing tree species, such as Eucalyptus spp. *Dalbergia sissoo*, *Azadirachta indica*, *Acacia nilotica*, *Grewia optiva*, *Morus alba* and *Ficus* spp., on the borders of fields to meet local demands for timber, fodder and fuel is a common practice throughout the country (Singh, 1990). India's long tradition of agroforestry has been influenced by numerous religious, social and economic factors. Several indigenous agroforestry system based on people's needs and site specific characteristics have developed over the years. Agroforestry research was initiated in the country about two decades ago; since then, considerable progress has been achieved. The agroforestry practices i.e. growing trees with food crops and grasses, is believed to have been practiced during Vedic era (Ancient period, 1000 BC) the agroforestry as a science is introduced only recently. The systematic research in agroforestry geared up after the establishment of the International Council for Agroforestry (ICRAF) in 1977, which was renamed in 1991 as the International Centre for Research in Agroforestry (Tewari, 1998). Agroforestry has received much attention in India from researchers, policy makers and others for its perceived ability to contribute significantly to economic growth, poverty alleviation and environmental quality, so that today agroforestry is an important part of the evergreen revolution' movement in the country. Twenty-five years of investments in research have clearly demonstrated the potential of agroforestry in many parts of the country, and some practices have

been widely adopted. But the vast potential remains largely underexploited, and many technologies have not been widely adopted. This situation is a result of the interplay of several complex factors. The understanding of the biophysical issues related to productivity, water resources sharing, soil fertility, and plant interactions in mixed communities is incomplete and insufficient, mainly because research has mostly been observational in nature rather than process oriented. Agroforestry research is now conducted under the auspices of the All India Coordinated Agroforestry Research Project of the Indian Council of Agricultural Research at 31 centers distributed over India's tropical and temperate regions. In addition to research, the program includes agroforestry training of farmers, technicians and scientists at 28 centers throughout the country. Expectations from agroforestry are high in India in both rural and urban areas; these expectations include production benefits that are in harmony with the ecology, environment, traditions and heritage of the country (Chinnamani, 1993).

### Materials And Methods

The Star Paper Mills Limited, has a long history since 1938 working under the flagship of Duncan Goenka is situated in Saharanpur, Saharanpur an important city and municipality lies in the state of Uttar Pradesh in Northern India (29°58'N 77°33'E/29.97,77.55). Saharanpur is internationally famous for its wood carving work cottage industry. A variety of other agrobased industrial enterprises such as textile, sugar, paper and cigarette factories are also located in the city. According to Government of India, the district Saharanpur is one of the minority Agr. Biol. J. N. Am., 2009, 1(3): 343-

349 345 concentrated district in India (Planning Commission, 2005). The population of Saharanpur District is 2.9 million which is growing at the rate of 2.59% annually. The Star Paper Mills is among the 15 largest virgin fiber paper mills in India. Area targeted for Agroforestry in Western U.P:

The following type of land can be used for agroforestry development in Western Uttar Pradesh:

1. Cultivated land
2. Field boundaries
3. Along with farm roads and canals/nallahs sides affected by erosion
4. Pockets with in cultivated holding where cultivation is not possible
5. Old fallows
6. Cultivable waste land
7. Other area like community or panchayat land etc.

In which agroforestry can be incorporated. Social and Agroforestry initiatives taken by Star Paper Mills: Greening of environment is the priority of Star Paper Mills. We have taken large scale social and agroforestry programmes in the adjoining districts of the state. A humble beginning was made in 1995-1996 with a distribution of around 1.0 million seedlings amongst the farmers for planting on their farm land with an objective of greening the environment along with ensuring the sustained supply of raw material to the industry. Since, then activities were accelerated and expanded with the encouraging participation and response of farmers. 270 nurseries have been developed and 48.0 million seedlings distributed amongst farmers during 2010- 2011 in adjoining ten districts viz. Saharanpur, Muzaffaranagar, Bijnore Meerut, J.P. Nagar, Moradabad, Bulandsahar, Ghaziabad, Haridwar and Dehradun. (Table-1).

**Table-1: Status of Kisan nurseries and seedlings distributed in districts of Western U.P. (2009-10)**

S. No.	Name of District	No. of Kisan Nurseries	Seedlings distributed (in Lakh)
1	Bijnore	35	82.5
2	Bulandsahar	3	6.5
3	Ghaziabad	16	2.0
4	J. P. Nagar	8	2.5
5	Meerut	16	36.0
6	Moradabad	5	10.5
7	Muzaffaranagar	48	85.0
8	Saharanpur	86	150.0
9	Haridwar	53	105.0
10	Dehradun	5	52.0
	Total	270	480.0

As on date, around 222.81 million plants raised from quality seeds obtained from seed orchards of Forest Research Institute Dehradun (Uttarakhand) and U.P. Forest Department, have been distributed amongst the farmers. We have thus contributed to green an area of around 75000 ha. Now our programme envisages raising of 40 million seedlings every year through Kisan Nurseries.

Agroforestry through Kisan Nurseries and Kisan Ghosties: Star Paper Mills has established various Kisan Nurseries in different districts of Western Uttar Pradesh under its agroforestry development programme (Table-1). Initially 10 Kisan Nurseries were established under this programme. Till date approx 48 million seedlings of Eucalyptus are distributed annually amongst farmers by establishing approx. More than 270 Kisan Nurseries and area coverage under Eucalyptus plantations has reached up to 18000 ha per annum. Till date the company has covered approx 75000 ha area under plantations. Quality seeds, insecticides, fungicides and publicity material are supplied to the farmers free of cost under Kisan Nursery Scheme. Main species promoted by Star under Agro-Forestry Programme are :

Eucalyptus  
Poplar  
Bamboo

### Eucalyptus

Eucalyptus is recognized as a commercial crop in India and widely cultivated on farm lands, waste land by the farmers of Western U.P. on large scale. Eucalyptus is widely used for many purposes by many industries like Pulp industry, Board industry, Fuel wood, Furniture wood. It has become a way to earn the money through its cultivation on farm land. Star Paper Mills Limited, Saharanpur has also adopted vegetative means of propagation of Eucalyptus Species under its tree improvement programme with an objective of productivity improvement of plantations per unit area. As the demand of raw material is drastically increasing day by day so to meet this it is very essential to grow superior clones of Eucalyptus on large scale capable of yielding high percentage of bulk. This method of vegetative propagation offers following advantages:

Conserve the genotype of the donor tree in its propagules.

Increase in genetic gain by selection

and multiplication of both additive and non additive gene effects.

Helps in developing fast growing, disease resistant and uniform plantations.

Helps in productivity and yield enhancements.

Star has developed a good rapport among farming communities through

**Table 2. Use of bamboo in Agroforestry**

Agroforestry function-Primary use	Agroforestry Products-Value added
Inter cropping	Timber and Craft wood
Riparian vegetation filter	Fibre crop for Pulp and Paper Industry
Constructed wetlands	Livestock
Living Screen	Bamboo shoots

selling of their high yielding clones in Western U.P. to increase productivity of raw material since 2002. Farmers are cultivating these clones on their farm land and getting full value of their crop at the time of harvesting. More than 30 lacs of superior clones of Eucalyptus have gone to farmer's field. Many of them have harvested their first crop and gained additional income.

### Poplar

The development of Poplar agroforestry and associated research in India was reviewed earlier by many workers (Newman, 1997). The development of Poplar agroforestry and associated research in India has gained much attention to the Commercial growers Agric. Biol. J. N. Am., 2009, 1(3): 343-349 346 and researchers in India.

The model of agroforestry development involving partnership between, the private sectors and the government is worthy of further investigation for application in other areas of India and to other countries. A number of suggestions are given for further research in the context of optimizing the system for resource poor farmers. These include changes in trees and crop varieties, tree spacing and utilization of small diameter logs, and other poplar product. Star paper mills have taken initiatives in this direction since 2006 to develop superior clones of Poplar and their ETP's were planted in the farmer's field with joint venture through agreement on simple terms and conditions.

### Bamboo

The farmers are keenly interested in this scheme. Bamboo has a variety of applications in many areas. Bamboo is a fast growing plant species and used as a prime source of wood pulp as it has a good fibre properties and quality wood

pulp. Suitability of bamboo species has been evaluated for various grades of pulp and paper and for different pulping process (Guha, 1961; Guha and Pant, 1961; Karnick, 1961). Bamboo as a woody grass plant is uniquely suited to agroforestry. Some of the many uses of bamboo in agroforestry are summarized in the Table-2.

Star Paper Mills Limited has established clonal development infrastructure capable of producing 30 lac clonal plants by establishing 9 nos of Mist Chamber in 3000 sq mt area, four hardening chamber in 2500 sq mt area, one Clonal Mini Garden in 128 sq mt area along with Gene bank in 25 acre land. Clonal technology has been proved a boon for the farming community as it offers almost double the returns in half the rotation period which means 3-4 times yield is obtained in a particular gestation period in case of clonal plantations vis-a-vis seedling plantations. On one side clonal plantations helps to a great extent in economic prosperity of the farming community, it also helps the paper industry by providing competitive advantages by increasing the volume of wood produced per ha or promoting desirable wood characteristics for making pulp such as low bark content and higher pulp recovery. Star Paper Mills under its R&D activities is focusing on development of clones through hybridization which are high yielding and are having higher pulp content.

### Major constraints in Agroforestry systems in Western Uttar Pradesh:

Agroforestry is the science of designing and developing integrated, self sustainable, land management system that involves the introduction and retention of woody components such as trees, shrubs, bamboos, canes and palm along with agricultural crop including pastures or animals, simultaneously or sequentially on the same unit of land and time to satisfy the ecological as well as socio-economic needs of properties. The farmers of western districts of Uttar Pradesh are suffering with low price of their crops since they are completely in the hand of middle



man or contractor. To overcome this Star has taken major step to return back their crop directly on market rates. The farmers of western districts of Uttar Pradesh are confronting with following problems: Agric. Biol. J. N. Am., 2009, 1(3): 343-349 347.

#### **Lack of proper valuation of crop:**

The agro-climatic conditions of western Uttar Pradesh is very suitable to all seasonal crops and for large plantations. Wood is the main raw material and a source for all wood based industries. The absence of proper system they are suffering low price of their crop at the time of harvesting in the lack of proper market. They are completely in the hands of middle man like contractor so that they are not getting the full cost of their crop. The district of Saharanpur is surrounded with industrial area in which there are many industries e.g. Paper Mills, Ply wood, Board Industries etc. Farmers of western U.P. are consequently benefited from competition among various industries for raw material. To overcome price problem Star has taken major step in this direction to purchase their plantation crop directly on market rates at the time of harvesting under buy back policy. The farmers of Western UP completely depend on their crop for earnings. Due to absence of proper system and laws to selling the crops directly on the market price, farmers of Western U.P. are suffering with low cost. Taxation laws are one of them. Price of their crop is considerable under estimated because of many levies like Transit fee at the rate of 38.0 per tone including 2.5% mandi fee. In addition to payment, farmers have to face hardship in procuring the passes from both departments.

#### **Lack of awareness to adopt and cultivation of superior Eucalyptus clones and Poplar Clones of high yield:**

Eucalyptus and Poplar are the major commercial crops which are cultivated by the farmers of Western U.P. on their farm land in a defined pattern. As both the crops are economically very important used in many purpose by many wood based industries e.g. Paper Mills, Ply wood, Board Industries etc. Farmers of Western U.P. are not aware about the suitable species or clones of high yield of both the species. Through Kisan Nurseries and Kisan Ghosties, farmers are keenly interested to grow suitable and high yielded variety of

Eucalyptus and Poplar. This was the major step, taken by Star in few years back to create awareness and for the benefits of poor farmers. Star is producing more than 30 lacs of Clonal plants of Eucalyptus and more than 2-3 lacs of Poplar clones on our production site and selling them on genuine price to farmers with a proper guidance about the cultivation techniques and proper care. Certainly this will improve the status of agroforestry in Western Uttar Pradesh. Invasion of epidemic disease like gall: It is an important constraint. Many of the farmers with no preventive measure against these invasions are losing their crop. Some time they have lost their crop completely. There is an apprehension of invasion of any disease in epidemic form like Gall. There is considerable damage not only in south India but also many parts of the country are suffering from this disease. Scientists and Researchers have gained much attention to overcome this problem. Research work is going on to find out some preventive measure or resistant genes so that they can be incorporated or adopted to remove this situation. The problem of Gall is increasing day by day in many woody species such as Eucalyptus which is an important and vital source for many wood based industries and it has been observed that Gall wasp is very susceptible to many of the Eucalyptus species. Keeping in mind that Eucalyptus occupies 8 million ha in India and spread of gall wasp is of huge economic concern to that country. The young shoots of seedlings and coppice crops form an ideal breeding site for the wasp and heavy infestation can damage an entire plantation. If timely control measures are not taken. Recent reports show that 18 species of Eucalypt has already been found to be susceptible of the gall wasp *Leptocybe invasa* in the nursery and young Eucalyptus plantation in Vietnam (Thu *et al.*, 2009). The causal agent is *Leptocybe invasa*. It is a newly described species which is currently spreading in many countries around Mediterranean Basin and in Africa, causing damage to Eucalyptus young plantation and nurseries. This situation has also been observed in southern parts of India and now drastically moving to other parts of the country. The problem has targeted in many parts of Uttar Pradesh also. It has become a subject of lot of attention for Forest departments, Research Institution and major cultivators of Eucalyptus. It has created a lot of damage of Eucalyptus crop even it has

finished some where whole the Eucalyptus crop. If certain preventive and remedial measures are not taken then the results will be horrible.

#### **Availability of labour:**

Labour is one of the main constraints of agricultural production. It plays an important role in defining the opportunities and constraints of agroforestry. Many of the areas of Western U.P. are suffering from this problem, where there is no labour or the labour cost is very high. Soil fertility and productivity: Many farmers claim, that plantations are often created in fields which have a declining soil-fertility resulting from continuous Agric. Biol. J. N. Am., 2009, 1(3): 343-349 348 cultivation. This allows farmers to secure long-term benefits on degraded land. It is unclear, however, how much tree plantations can replenish soil fertility.

#### **Results And Discussion**

Twenty-five years of investments in research have clearly demonstrated the potential of agroforestry in many parts of the country, and some practices have been widely adopted. But the vast potential remains largely underexploited, and many technologies have not been widely adopted. This situation is a result of the interplay of several complex factors. The understanding of the biophysical issues related to productivity, water resources sharing, soil fertility, and plant interactions in mixed communities is incomplete and insufficient, mainly because research has mostly been observational in nature rather than process oriented. The farmers and land owners in different parts of the country integrate a variety of woody perennials in their crop and livestock production fields depending upon the agro-climates and local needs. Most of these practices are, however very location specific and information on these are mostly anecdotal. Therefore, their benefits have remained vastly under exploited to other potential sites. It has now been well-recognized that agroforestry can address some of the major land-use problems of rain fed and irrigated farming system in India, and that a great deal can be accomplished by improving indigenous systems. With the current interests in agroforestry worldwide, attempts are being made in India to introduce agroforestry techniques using indigenous and exotic multipurpose and nitrogen-fixing woody perennials (Tewari, 1998).

Farmers of the Western U.P. are keenly interested to adopt agroforestry model which are beneficial for them. They are also adopting various pattern of cropping like Intercropping. Star Paper Mills has launched some policy on simple terms and conditions for agriculture crop to promote agroforestry in Western U.P. adopting commercial crops for large plantation by the farmers. For this suitable species with superior variety of agriculture crop like Poplar, Eucalyptus and Bamboo have been identified so that the farmers may be benefited and earn good revenue of their crop at the time of harvesting. As far as disease of gall is concerned, many Research Institutes of great repute and Forest Departments of the States, Government of India have come forward to find out certain preventive measure to overcome this problem. Many scientists are focusing their interest on these aspects which certainly give a better solution to overcome this problem with in the coming days. As far as concern related to certain taxation laws and proper evaluation of crop of the farmers of Western U.P. Government should make easy laws and taxation laws for farmers at the time of harvesting and selling so that farmers of this state can earn exact amount of their crop. For this proper system for evaluation of crop must be implement for poor or uneducated farmers.

### Conclusion

Agroforestry is a collective name for land-use systems and technologies in which woody perennials including

trees, shrubs, bamboos etc. are deliberately combined on the same unit of land management unit with herbaceous crops or animals either in some form of spatial arrangements or temporal sequence. The farmers of Western Uttar Pradesh now adopting suitable agroforestry model with suitable crop on their farm land and are benefited. This will also help to increase the depleting forest cover and also it will help to meet the increasing demand of wood for such industries of Western U.P. which are based on wood. Various programme like Kisan Nurseries, Kisan Ghosties, Agreement policy for joint cultivation of crops such as Eucalyptus, Poplar and Bamboo will be proved a boon to the farmers for their better earnings, livelihood and improve their life standard also. This type of programme should also be launched through State Government so that farmers can take a beneficiary advantage of their crops. This will also enhance the productivity level and increase the forest area.

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