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Survey of Existing Agroforestry Systems and Identify Different Fruit/ Forest Crops Grown Under Agroforestry in Selected Villages of Baldirai Block in Sultanpur District

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ABSTRACT

Agroforestry is not a new practice. It is an age old practice of growing woody plants with agricultural crops and/or livestock on the same unit of land. The total geographical area of Sultanpur district is 4,436 km^2 and area under forestry cover 175 km^2 is 3.94 % of total geographical area. The present investigation was carried out at five villages of Baldirai Block viz. Hahyapur, Dobhiyara. Saray Baghha, Meghmau and Dih of district Sultanpur to investigate the "Present status of Agroforestry practices in certain villages of Baldirai Block in Sultanpur district". The farmers (marginal, small, medium and large) in the villages have devoted approximately 28-74 % area of the total land for various agroforestry systems. The bund and block planting was observed most prominent agroforestry practice in all the five villages. The maximum area under agroforestry in large farmers (62-74 per cent) followed by medium farmers (51-56 %), small farmers (30-48 %) and minimum in marginal farmers (28-44 %) in all five villages Agri-silvi system dominant in ail selected villages. Eucalyptus, Tectona grandis, Dalbergia sisso and Azadirachta indica, common forest tree and Mangifera indica, Psidium guajava and Embilica officinalis are the fruit plants, species planted under different agroforestry system in the villages.

Key words: *Agroforestry, Agricultural crops, Livestock, Sultanpur, and Fruit plants.*

INTRODUCTION

Agroforestry is the new name for an ancient land use practice. The concept of agroforestry implies the integration of farming with forestry practices on the farm to increase output. Traditional agroforestry system combining trees, shrubs with crops and livestock production have sustained farmers for generations. In recent decades, drought and famines have underlined the need for such sustainable land use system. Agroforestry solutions are often location specific in their relevance, performance and farmer acceptability[7]. Agroforestry has the potential to significantly improve the live hoods, economic viability, and agricultural production of small farmers in traditionally marginalized areas.

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In addition, agroforestry can be used as a tool for changing attitudes towards natural resource management[2]. Agroforestry offers a potential solution to the problem of declining rural agricultural production in the tropics[3]. This study will be carried out by analysing the current agroforestry practices in Baldirai Block in district Sultanpur (U.P.) with respect to system classification of agroforestry system. Suitable fruit/forest crop grown under agroforestry systems.

MATERIAL AND METHODS

The present investigation was carried out at five villages of Baldirai Block *viz.* Hahyapur, Dobhiyara. Saray Baghha, Meghmau and Dih of district Sultanpur to investigate the "Present status of Agroforestry practices in certain villages of Baldirai Block in Sultanpur district".

The methodology followed in present studies is:

1. Survey of Existing Agroforestry Systems in Certain Villages of the Baldirai Block in Sultanpur

1.1 Geographical Status of Sultanpur District

The Sultanpur district is situated in north eastern parts of Uttar Pradesh at 26.15^o N latitude and 82.05^o E longitude with an altitude of 102 meters from mean sea level and comes under semi-arid climate with hot summer and cold winters. The temperature varies from 2°C - 43°C with average annual rainfall of 1,005 mm. and soil is mainly Usar and Sandy loam. The total geographical area of district is 4436 km^2.

1.2 Selection of the Block

Out of 23 Blocks in Sultanpur district, the Baldirai block was selected purposively for the study near beside the NDUA&T Kumarganj.

Baldirai block was established on 1958. This block is located in North-West corner part of the Sultanpur district, the block headquarter is situated at the distance of 45 km away from Sultanpur city. The block has a Nyay Panchayats, 56 village Panchayat and 99 villages, which cover a total geographical area of 30438 hectares. The total population of the block according to 2011 census, was 158938 (80410 males 78528 females), among them 25872 males and 8926 females were literate.

1.3 Selection of Villages

Five villages of Baldirai Block of Sultanpur district, namely Haliyapur, Dobhiyara, Saray Baggha, Meghmau and Dih were selected for survey of existing agroforestry systems. While selecting the villages, easy assessment and villages having similar agro climatic conditions were the two criteria for its selection.

1.4 Selection of farmers

The twenty farmers from each village were selected for this study Apenix-2. Thus to analyze the existing agroforestry systems in the villages, a total of hundred farmers were selected. The farmers were categorized in four section 10 marginal farmers (<1 ha.), 5 small farmers (1-2 ha.), 3 medium farmers (2-4 ha) and 2 large farmers (>4 ha.) on the basis of land holding size.

1.5 Survey of different systems

On the basis of questionnaire put to the farmers as well as field observations. Following information were collected.

1.5.1 Crops growing in association with perennial woody plants

Firstly, a list of perennial woody plants and crops planted in particular system was prepared. On the basis of components, the systems were classified as Silvi-Horti (Forest trees+Fruits trees), Agri-Horti (Agronomical crops + Fruit plants), Agri-Silvi-Horti (Agronomical crops + Forest trees + Fruit crops) and Silvi-Pastoral (Forest trees+ Grasses) systems.

1.5.2 Area under agroforestry systems

The percent area put under a particular system was calculated on the basis of total area owned by a particular farmer to the area under agroforestry system**.** Per cent adoption of various systems were pooled, village wise and system wise.

RESULT AND DISCUSSION

The present investigation pertaining to "Present status of Agroforestry practices in certain villages of Baldirai Block in Sultanpur district" was conducted in two parts. First part

of investigation includes the survey of existing agroforestry system in selected villages, second part analyses the tree growth of agroforestry systems at farmers field in selected villages.

Survey of Existing Agroforestry Systems in Different Villages

The present study indicated that area under agroforestry systems was maximum in Dobhiyara village followed by Haliyapur, Saray Baghha, Dih and Meghmau. It has been observed that farmers are practicing agroforestry in 28-74 per cent area of their total lands. Farther, the area under agroforestry systems was maximum in large farmers and minimum in marginal farmers than other small and medium farmers in different villages. However, marginal farmers have low land holding size and economically poor as compared to large and other farmers. An exploratory survey was conducted by Pant *et al*.[6] surveyed the status and patterns of agroforestry practices in the Tarai region of Kumaun, Uttar Pradesh (India). The study was undertaken in 3 villages (Narayanpur, Ganeshpur and Gangapur) in the new district of Udham Singh Nagar. Among the trees planted poplar [*Populus species*] is most preferred species. Study of agroforestry patterns showed that bund planting was predominant, followed by wayside and field plantations. In these villages all the farmers have adopted agroforestry practices, thereby reducing pressure on the surrounding natural forests.

Survey of five villages of Baldirai block, Sultanpur district revealed that Agri-silvi system was dominant in all selected villages (Haliyapur, Dobhiyara, Saray Baghha, Dih and Meghmau). In all the selected villages, generally boundary and block plantations were adopted by the farmers. The observations showed that silvicultural and horticultural components was generally common in most of the agroforestry systems, which may be due to the fact that the budded/grafted fruit plants yield fruit at an early stage. Yield of these plants can be a good source of income to the farmers at very early stage. The same is not possible with any forest species. A study was conducted by Ahmed *et al*.[1] in Sitakunda, Chittagong, Bangladesh to determine the views of farmers on the effect of *Eucalyptus* hybrid plantation in an agroforestry system. A total of 30 respondents were selected in the study area from different categories of farmers who practice agroforestry in agricultural lands; farmers having monoculture plantation of *Eucalyptus* hybrid species in homestead fallow land; and farmers having homestead mixed plantations with *Eucalyptus* hybrid species in homestead fallow land. The parameters studied include family size, occupation and mean annual income of the respondents, frequency distribution of landholdings based on the categories; sources of planting material. Local people are also interested to plant it to meet their immediate demand within a short period. During the survey, some farmers were found enthusiastic to raise monoculture plantation of *Eucalyptus* hybrid even in their agricultural lands. If they get a good return, then it may be expected that many other farmers will also take this as an initiative of *Eucalyptus* hybrid plantation in the area.

Different Agronomical and Fodder Crops Grown In Association with Perennial Woody Plants

It is apparent from the present study that *Eucalyptus* hybrid, *Tectona grandis*, *Dalbergia sisso* and *Azadirachta indica* were the major forest species planted by the farmers. However, *Eucalyptus* hybrid gaining importance over *Tectona grandis* because of the fast net return from *Eucalyptus* hybrid. Madiwalar *et al.*[4] surveyed three northern districts *viz.* Bidar, Gulbarga and Raichur, to find out prominent agroforestry practices. In Bidar district, bund planting, boundary planting, scattered planting and block plantations were prominent. In Gulbarga and Raichur districts, bund planting and scattered planting were predominant under rainfed agro ecosystem. Neem, *Acacia nilotica* and *Eucalyptus* hybrid are frequently planted species in all the 3 districts under both agro ecosystems.

Dalbergia sisso was seen under various agroforestry systems in the present villages due to the high quality wood which fetches good price in the market. Among the fruit plants *Mangifera indica, Embilica officinalis, Psidium guajava* and *Artocarpus heterophyllus* were predominant in the villages, due to nearby NDUA&T Campus which has produced good and popular fruit varieties. Initially, annual crop can be grown successfully with silvicultural and horticultural trees or plants and on later farmers get income from the orchard and forest trees. Among the agronomical crops, wheat, paddy, mustard, maize, potato, arhar, moong, urd, lentil, gram, piper mint berseem and bajra were grown in association with perennial woody plants under different agroforestry systems. Nikiema[5] reported that agroforestry parkland in semi-arid West Africa is a rural land use system which allows farmers to grow annual crops in combination with useful trees. In addition to cereals, tree products such as vegetables, fruits, vegetable oil, firewood, fodder and medicines are obtained from the parklands. Common dominant species recorded in the parklands are *Vitellaria paradoxa, Balanites aegyptiaca, Sclerocarya birrea, Bombax costatum, Lannea microcarpa, Stercularia setigera* and *Parkia biglobosa*. The investigation on livestock parkland interaction showed that some species are preferred for fodder for cows and/or sheep and goats.

Table-1: Area under agroforestry systems in different villages (Average across farmers).

S. no.	Farmer Size	Average total area (ha)	Average area under Agroforestry (ha)	per cent area under A/F system	Agroforestry systems Practiced
1.	**Haliyapur**				
	Marginal farmers	0.51	0.15	28.51	Agri-silvi, Silvi-pastoral,
	Small farmers	1.66	0.50	34.56	Agri-silvi, Silvi-pastoral, Agri-horti,
	Medium farmers	3.17	1.73	54.60	Agri-silvi,
	Large farmers	6.50	4.70	72.31	Agri-silvi, Silvi-pastoral, Agri-horti, silvi-horti
2.	**Dobhiyara**				
	Marginal farmers	0.46	0.14	28.33	Agri-silvi, Agri-silvi-horti
	Small farmers	1.62	0.66	45.50	Agri-silvi, Agri-silvi-horti
	Medium farmers	3.57	1.93	53.72	Agri-silvi, Agri-horti
	Large farmers	7.50	5.50	73.33	Agri-silvi, Agri-horti, Silvi-pastoral,
3.	**Saray Baghha**				
	Marginal farmers	0.52	0.16	28.75	Agri-horti, Agri-silvi, Silvi-pastoral, Agri-silvi-horti
	Small farmers	1.58	0.44	30.26	Agri-horti, Agri-silvi, Silvi-pastoral
	Medium farmers	2.93	1.57	53.17	Agri-silvi-horti, Agri-silvi
	Large farmers	7.00	5.00	71.43	Agri-horti, Agri-silvi
4.	**Meghmau**				
	Marginal farmers	0.46	0.18	43.06	Agri-silvi, Agri-horti, Silvi-pastoral
	Small farmers	1.72	0.74	41.78	Agri-silvi-horti, Agri-silvi, Silvi-pastoral
	Medium farmers	2.27	1.27	55.79	Silvi-horti, Agri-horti, Agri-silvi, Silvi-pastoral
	Large farmers	5.00	3.25	65.00	Agri-silvi-horti, Agri--horti
5.	**Dih**				
	Marginal farmers	0.64	0.31	43.26	Agri-silvi, Silvi-pastoral
	Small farmers	1.64	0.82	47.96	silvi-horti, Agri-silvi, Silvi-pastoral
	Medium farmers	3.00	1.50	51.75	silvi-horti, Agri-silvi
	Large farmers	4.25	2.65	62.35	Agri-silvi-horti, Agri-silvi

Table-2: Crops and perennial woody plants grown by the farmers in different villages

S. No.	Villages	Forest trees	Fruits plants	Agronomical crops	Fodder crops
1.	**Haliyapur**	*Eucalyptus* *Tectona grandis* *Dalbergia sisso,* *Madhuca latifolia, Azadirachta indica*	*Mangifera indica, Embilica officinalis, Psidium guajava*	Wheat, Paddy Mustard, Arhar, Maize, Sugarcane, Moong, pepper mint	Barseem Oat Jwar
2.	**Dobhiyara**	*Eucalyptus, Tectona grandis, casuarinas equisetifolia* *Dalbergia sisso, Madhuca latifolia*	*Mangifera indica, Embilica officinalis* *Psidium guajava, Artocarpus heterophyllus*	Wheat, Paddy, Mustard, Bajra, Sugarcane, Urd, pepper mint, vegetables	Barseem Jwar
3.	**Saray baghha**	*Eucalyptus* *Populus deltoides* *Tectona grandis*	*Mangifera indica, Psidium guajava* *Embilica officinalis*, Lemon	Wheat, Paddy Mustard, Gram, Lentil, Arhar,	Barseem, Jwar, M.P. Chari
4.	**Meghmau**	*Eucalyptus,* *Tectona grandis, Dalbergia sisso, Azadirachta indica*	*Mangifera indica, Psidium guajava, Citrus* spp., *Artocarpus heterophyllus*	Wheat, Paddy, Mustard, Gram, Pea, Urd Arhar, Maize, vegetables	Barseem, Jwar
5.	**Dih**	*Eucalyptus, Tectona grandis, Dalbergia sisso, Madhuca latifolia, Holoptelea integrifolia*	*Mangifera indica, Embilica officinalis, Psidium guajava*	Wheat, Paddy, Mustard, Moong, Arhar, Pipermint	Barseem,

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