



## **Perceived Profitability of Agroforestry in Rural Multan of Pakistan**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/APRJ/2021/v8i430182

#### Editor(s):

(1) Shri Kant Tripathi, Mizoram University, India,

#### Reviewers:

(1) M. Nuri ÖNER, Çankırı karatekin university, Turkey,

(2) Wubalem Gobie, Debre Markos University, Ethiopia.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/76069>

**Original Research Article**

**Received 30 August 2021**

**Accepted 10 November 2021**

**Published 13 November 2021**

### **ABSTRACT**

Agroforestry remained a profitable venture across the globe if managed well spatially and temporarily. Farmlands are viable option to practice agroforestry in Pakistan for sustaining farmers' livelihoods as well as to provide products and services for ever increasing population. This study focusses on how agroforestry is being perceived as profitable enterprise by the farmers in Multan, Punjab Pakistan. Rural areas of Multan were selected for this study and 200 farmers were selected randomly from 10 villages across 02 union councils using multi-stage sampling procedure. The results revealed that agroforestry remained the prime land use system as reported by the farmers (99%) belonging to agropastoral and agroforestry practice. Moreover, agroforestry perceived as high-income system providing variety of product (increased crop and fodder production, variety of products and income) and services (Carbon sequestration, climate amelioration, soil conservation). The study concluded the need for public-private partnership for the promotion of agroforestry in the region.

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*Keywords: Agroforestry; rural livelihood; income; agroforestry profitability.*

## 1. INTRODUCTION

Pakistan is predominantly an agrarian society having 63% of people are residing in rural areas and are directly or indirectly engaged with agriculture enterprise [1]. Besides, dependence on grains, it is also paramount to meet population need for wood-based products and services. Nevertheless, the country is severely facing problems of low fuel, fiber, and fodder resources [2,3]. Since state land is unable to cope and pace with increasing demand and environmental problems, farmlands remained a feasible solution to grow trees [4,5]. Agroforestry is, therefore, viable alternative to sustain and conserve biodiversity, avert land degradation, provide range of products and services for livelihoods, and mitigate environment in providing distinctive openings for growing biodiversity, averting land degradation, and improving poverty, particularly in developing countries [6,7, 8,9,10].

Agroforestry systems practiced across the world have sound diversification capability to accrue socio-economic along with adaptability and mitigation of environmental challenges. These benefits are spread across all nations and communities [11]. This can be stemmed from the concept of agroforestry entails growing trees along with agricultural crops and or animals on the same piece of land in temporal and spatial combinations [12]. Thus, not only the trees and crops that yield numerous benefits of wood and wood-based product and grains, fiber and cash crops but also sustain livestock components in a coordinated environment, thus additional benefits of dairy products remained helpful in preventing malnutrition and ensuring food security [13]. This diversified system has protection if one system is poorly performed and support each other in terms of increased soil productivity, product diversification, environmental remediation, and few economic losses [14,15]. These systems at most time rewards farmer with increased profits and optimize the production of land [16]. Nevertheless, the occupation of soil for varied benefits also prevents erosion and crop losses and thereby improves water yield by preventing sedimentation into terrestrial habitats [17].

In developing countries due to fragmented and small land holdings, premiums from agricultural production is low, there is ample opportunities to incorporate agroforestry practices on the same piece of land to become bigger producer of the

future. This, however, it needs the popularity and legal framework to avoid historical differences between the two land uses i.e., agriculture and forestry to allow plausible land use practices [18]. Along with the economic aspect of agroforestry it provides interesting contribution for solving food crisis and energy crisis.

Around the world, agroforestry is regarded as significant enterprise in inducing profitability. [19] reported that in Ethiopia, agroforestry is a diversified source of oncome and accrue better economic returns than food crop production [19]. investigated agroforestry as better suited for environmental rehabilitation and ensures sustainability of agricultural development [20]. advocated that agroforestry is the land use supplying diversified products and services. Besides sustainability of food and fiber production, agroforestry has the potential to safeguard environmental problems of agriculture [21]. Therefore, perception of profitability is a prime objective of opting for agroforestry [22].

Thus, agroforestry is a profitable venture and has wider potential of adoptability, however, uptake of agroforestry invitation is low amid numerous responsible factors [23]. The physical features of land, the intention to grow profitable crops, uncertainty of market [14,24] and choice of species and attitudes and perceptions of the farmers remained prime impediments in the adoption of agroforestry practices. Nonetheless, the profitability aspect of the technology is attractive and even compel farmers to go for integrated- tree crop land use system. Thus, perception of profitability across different land use systems and ecosystems would make this resource more popular if supported by the socio-economic and technological innovations [2]. In view of the above, Present study aims to determine the perception among various land holders regarding the Agroforestry profitability.

## 2. MATERIALS AND METHODS

### 2.1 Study Site

Multan is an important and biggest city of Southern Punjab situated on the bank of river Chenab. It is also called as city of Saints. The temperature is very harsh in the summer and severe cold in winter. In terms of population, Multan is the 6<sup>th</sup> largest city in Pakistan. The main crop are cotton, sugarcane and wheat,

while native trees are *Vescheianilotoca*, *Salvador oloides*, *Tamarixaphylla*, *Prosopis cineraria*, *Capparisaphylla* etc.

## 2.2 Research Strategy and Sampling

The study unfolds important information about perceived profitability of agroforestry using survey methodology. Mixed approach using both qualitative and quantitative information was employed using a well-structured questionnaire administered on randomly selected population. Based on time, cost and accessibility, Multistage sampling procedure has been adopted. In the 1<sup>st</sup> stage out of all UCs, 02 UCs (Union Councils) were randomly selected in rural areas of Multan. In the 2<sup>nd</sup> stage villages (10) has been selected from 02 UCs. In the 3<sup>rd</sup> and final stage of sampling, 10 farmers per village were randomly chosen to make a random sample of 200 respondents.

## 2.3 Instrument and Analysis

The major instrument that was used for conducting this study was a mixed questionnaire having wealth of information pertaining to closed and open-ended questions. The respondents were approached at their convenience and face to face interviews were held. Questionnaire was pre-tested to check the order of questions, difficulty level and rephrase the language errors. The respondents involved in pre-testing were not made part of final sampled population. The collected data was analyzed using IBM SPSS 21 for descriptive statistics.

# 3. RESULTS AND DISCUSSION

## 3.1 Land Use Pattern

Regarding land holding 60% of the sampled population is holding less than 20 acres of land whilst remaining 40% are having more than 40 acres of land. The low land holdings made farmers intention to go for cash crops especially cotton and sugarcane. It is in line with a study that showed that in these regions most of the households have family lands, that are then divided equally among the family members thus people receiving little pieces of lands [9,25]. The study also revealed that major land use (51%) remained Agropastoral wherein agricultural crop residues have been used as fodder to raise animals, however, agroforestry has been practiced by a major chunk of sampled population (49%). This finding corroborates

evidence from a study that observed that people in Pakistan are now showing signs of accepting agroforestry as better extension programs and awareness programs regarding its market and benefits are being rigorously conducted [26] (Table 1).

## 3.2 Agroforestry Status

The people using agroforestry were then asked about the system of agroforestry that they were practicing. And the maximum respondents answered that they were using boundary plantation system (80%) in which trees were grown on the margins of the crop land. This is in line with a study in a Pakistan which concluded that most people were practicing the same method [27,28]. There were also only 10% of the respondents having mixed trees and crops on their farms (Table 2). It was observed that majority of respondent shaving more than 200 trees belonging to various species on their farm whilst 45% of the respondents were having less than 50 trees showing promising future of agroforestry wherein farmers are willing to grow and retain trees shows a strong affection and acceptance towards agroforestry [29].

## 3.3 Perceived Profitability of Agroforestry

When farmers were asked to report what benefits they achieve while growing trees on their farms, responses are depicted in Fig. 1. Most of the respondents (30%) rated attainment of variety of products from growing trees is the biggest perceived advantage followed by increase share of income (28%). Obviously, products obtained from trees after being held for domestic consumption could easily be sold in markets for premiums. About 20% people reported that after adopting agroforestry practices they have seen an increased crop production in their farmlands. This may be due to planting leguminous trees around their crops. About 18% of the interviewed population responded that by planting trees increased their fodder production thus utilizing them would entail better livestock rearing and ultimately attainment of products and income from livestock. The returns from agroforestry are well reported to support this study findings [30,31].

## 3.4 Perceived Services from Agroforestry

When respondents were asked about the services that receive from agroforestry, majority

of respondents (40%) followed by 24% reported better environment because of growing trees. Respondents also weight climate mitigation facility by the trees as reported by 20% of the sampled population while 16% farmers reported benefit of trees reflected from increasing soil fertility (Fig2). Similar findings were reported by [32] that these are pivotal in sequestering carbon, rehabilitating land, and generating income thus giving better lifestyle to their families [32].

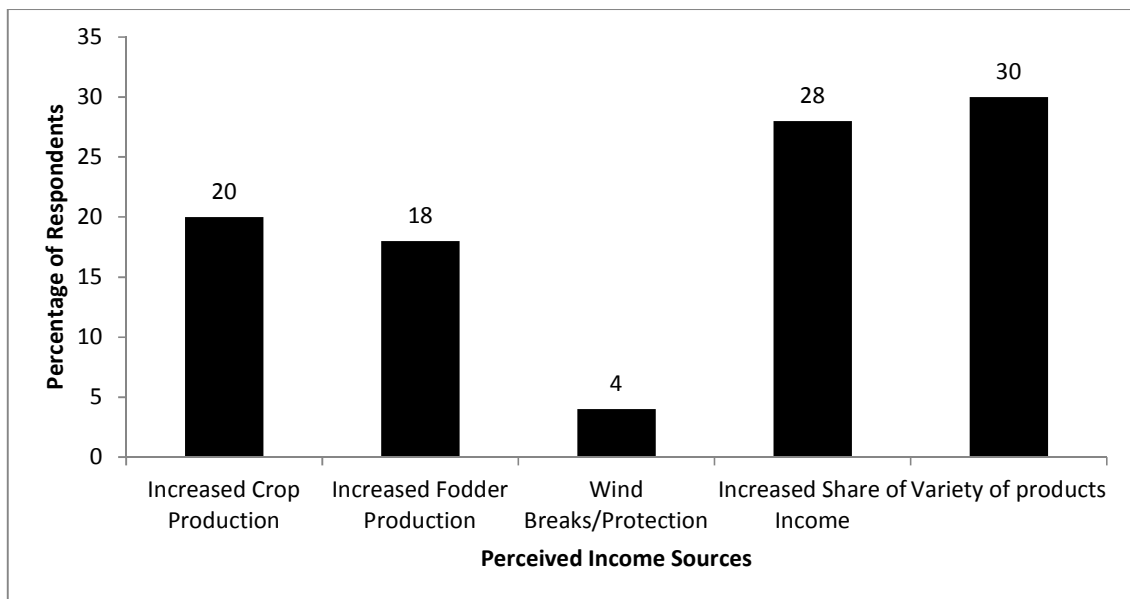
Present study measured how agroforestry perceived as profitable venture in that it provides variety of products and services and increase farmer premium by diversification. Similar findings are in support of this research, for instance, [33,34] evidenced that agroforestry is profitable in terms of increasing agricultural production as well as environmental amelioration. Besides attainment of food and fiber, agroforestry remained instrumental in providing ecosystem services, nutrient recycling, and carbon sequestration [35,36].

**Table 1. Land use pattern of the respondents**

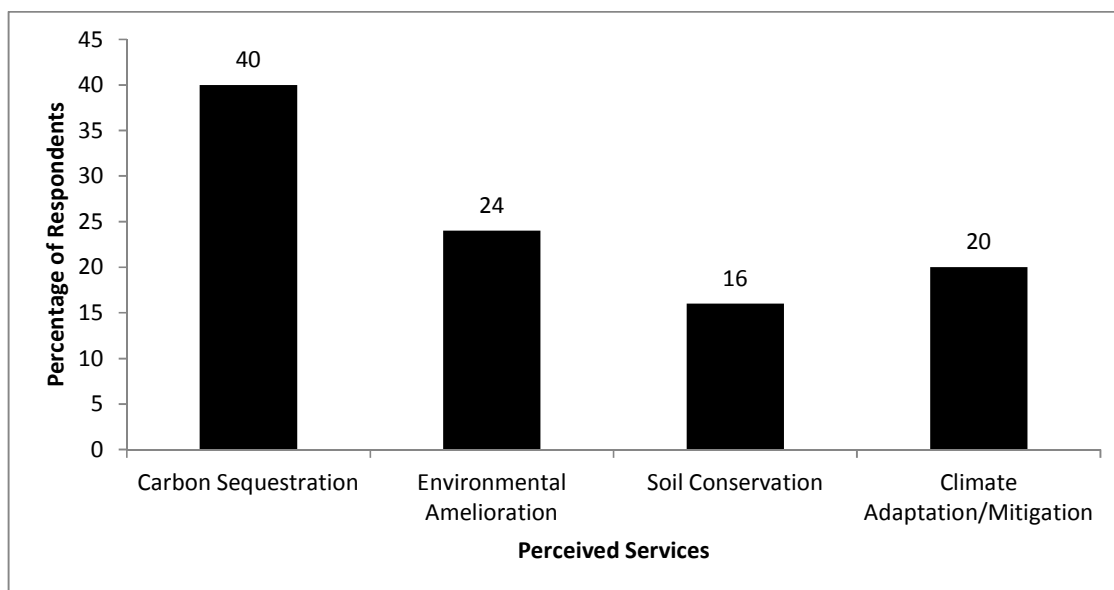
Variable	Categories	Percentage of Respondents
Land Holding Size	<20 acre	60
	> 40 Acre	40
Land usage	Agropastoral	51
	Agroforestry	49
Tenancy Status	Tenancy	25
	Owner cum Tenant	65

**Table 2. Agroforestry Status of the region**

Variable	Categories	Percentage of respondents
Agroforestry System Practiced	Boundary plantation	80
	Alley plantation	2
	Mixed plantation	12
Avg num of trees in the farmlands	<50	45
	>200	65



**Fig. 1. Perceived income from agroforestry**



**Fig. 2. Perceived Services from Agroforestry**

#### 4. CONCLUSION

The study concludes that agroforestry is a viable alternative to increase income and sustain livelihoods of farming community in rural Multan. The production of cash crops recommended in the area by motivating farmers with selected native species by growing trees on the land that would promote the crop yields as an additional handsome benefit to the farmers. Nonetheless, there is need to increase this treasurer through well-coordinated public- private sector campaigns.

#### CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

#### ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
<https://www.sdiarticle4.com/review-history/76069>