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A STUDY OF AGROFORESTRY SYSTEMS IN MADHYA PRADESH, INDIA

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Abstract

Farmers in India have practised agroforestry in many forms for years, but the various systems have not been scientifically documented. The study in villages around Bhopal region of Madhya Pradesh, has revealed that farmers are developing many innovative systems.

Introduction

As is well known, agroforestry is a generic term and the various forms, which it can take, can be classified into various groups based on the way trees are planted and the products that are harvested.

The study has revealed that agroforestry in this region is still in its infancy. A farmer knows how to plant a tree but fails to identify the right mix of crops and trees. Awareness about management options too is less. This hasn't deterred innovative farmers but it has led to the wide spread acceptance of a small number of tree species which have a proven successful track record.

The agroforestry systems in the study area can be classified as *Agrisilvicultural*, and all the agroforestry in the region is limited to this system. This was found to be the only type of practice currently in existence. Further grouping of the systems with respect to time led to the conclusion that all of the systems were of 'Simultaneous' types. Again in simultaneous systems, practices can be organized according to whether they are mixed or zonal. Largely, spatially zoned practices are being followed in this area with very few examples of spatially mixed practices. If classified on a socio-economic basis, the practices are of subsistence, intermediate as well as commercial type of practices.

THE SYSTEMS

As mentioned above, trees with crops or Agrisilviculture were found to be far more popular with the farmers than any other practice. An account of the various tree-crop combinations found in the study area has been provided here.

Eucalyptus + Wheat + Soyabean

One of the most popular and common tree-crop combinations is Eucalyptus and wheat. Eucalyptus trees have been found in the form of boundary plantations and are mainly planted for commercial purposes.

Mango + Wheat + Soyabean

Mango, being an evergreen, perennial tree, is preferred a lot. Mango trees are found in either separate patches on croplands or in the form of rows between crop areas. Wheat and soyabean are cultivated in different seasons annually while fruiting in mango trees starts around the fifth year.

Gram + Wheat + Orange + Mango

Horticultural trees too are gaining popularity among farmers as fruiting starts early and returns are good. They are grown generally with wheat and gram.

Wheat + Khejari

Khejri, a small to medium sized thorny tree, is grown with wheat. Farmers are fully convinced that this tree species improves fertility beneath its canopy and has no competition with arable crop for soil moisture and nutrients.

Soyabean + Jamun + Aonla + Neem

Although this combination was not a popular one, it was found to be existing in a small area.

Eucalyptus + Wheat + Teak

This combination was found at some places and was one of the few successful ones.

Many more tree species like *Gmelina*, Shisham, Babul, Mahua, Arjun and Tamarind were seen with crops.

Major function of the woody component is for demarcation of boundaries and commercial wood production. Agri-horti-silviculture is more popular with farmhouse owners. *Citrus* sp and *Mangifera indica* are most commonly planted woody components.. More technical interventions and inputs are provided during the plantation of woody component and less or no intensive care are taken after it is established. No silvicultural operations as thinning, pruning are carried out although they plant timber species like Eucalypts and Teak. Whenever, they prepare fields for the seasonal cultivation, management of woody components are also given due care.

The farmers cultivate wheat and soyabean along with woody component. The farmers are cultivating these crops on the basis of their traditional knowledge and skills. No improved varieties of wheat or soyabean are cultivated. Farmers use only bio-fertilizers and very few are applying the chemical fertilizers. Application of fertilizers and irrigation is almost nil for both of crops. Weeding is generally done for soyabean only. No intensive care is given for both the crops as they are planted.

The agroforestry is the traditional practice over India. Farmers are not calculating financial return from it. Whenever they were asked information related to cost and benefits, common answer to these questions are:

"No sir, actually I'm just not able to recollect the exact amounts on a yearly basis, but yes, I can certainly tell you what I had to shell out at the time of planting these trees."

"Sir, things are not so easy as you might think. Remembering how much fuelwood, fruits or fodder these 100 trees produce and that too for the past 8 years is not an easy job. I'm sorry"

"What economics! I'm just bothered about my costs. Hardly do I recognize any major financial gains of planting these trees"

However, attempt has been made to calculate benefit cost ratio (BCR) based on farmers' recall methods on the yield over last five years by different crops and woody component. BCR of different agro forestry model is summarized in table 1 below. The BCR was highest in agri-horticulture system (fruit trees with soyabean) followed by agri-horti-silviculture system (mixture of trees, fruit tree and soyabean). The return from agri-silviculture model was low because farmers are not getting benefits from tree economically though it might have contributed ecologically by preventing erosion or increasing the productivity of soil.

Table 1 - Cost and Benefits of different agroforestry models after five years of plantation per acre

In Rs

SNo	Models	Cost	Benefit	BCR
1	Trees with cereal crops	1720	3140	1.8
2	Trees with cash crops	2150	3800	1.8
3	Fruit trees with cereal crops	1950	5200	2.7
4	Fruit trees with cash crops	2180	6425	2.9

Source: Field Survey

SOME PRACTICAL OBSERVATIONS

A farmer who plants trees or other woody perennial plants instead of seasonal crops has a different set of commitments. Trees, however, are not a panacea for all ills. To achieve the full potential, a farmer must be able to carry out all those operations that control how an agroforestry system functions in a timely and skillful way. But in the study area it was found that farmers aren't really aware of any new technological or management systems. This can be one of the reasons why agroforestry is still struggling.

There are other reasons too. Poor land productivity, water shortage and lack of technological know how have been found to be the main reasons which prevent farmers from replacing the traditional ways of growing crops with agroforestry. In other words, richer is the environment, greater will be the choice of land use practices that can successfully be undertaken.

Farmers associate risk with agroforestry and try to avoid the consequences of making a wrong decision. Farm size is an important issue here because farmers with access to only small areas of land protect their families' subsistence needs first and plant food and other preferred crops. Thus agroforestry options have been found to be more readily acceptable as the farm size increases.

Agroforestry, a means of minimizing risk, is actually associated with a lot of risks. Then at the same time, agroforestry is not covered by the extension services, and is never considered as a potential intervention. Moreover farmers are more interested in the tangible economic benefits from agroforestry and care little for the long term ecological benefits derived from incorporating trees on farmlands. Younger farmers are more inclined to plant crops, while tree planting is favoured by the older generation.

CONCLUSION

There is clearly much more to agroforestry than simply mixing a few trees and crops together and hoping for the best. Different tree-crop and their interaction with crops have to be understood, and this hasn't received any research in the area. There is a critical need to allocate scarce resources in the right way.

Exchange of information and ideas between all the groups involved is essential. We can see that agroforestry is really not a new discovery at all, even for scientists. Much of what we need to know in order to supply a scientific basis for advice on how to practise agroforestry successfully has already been studied to a degree in many other disciplines. Certainly, existing knowledge needs extending and elaborating, but, hopefully, progress can rapidly be achieved.

At the same time, we must temper enthusiasm about what agroforestry might achieve with a considered view of its limitations derived from a sound knowledge of how agroforestry

systems function and what may constrain farmers who want to use it. The farmer is always the final arbiter.