



Medicinal plants and *Casuarina* based Agroforestry systems to enhance the productivity and to combat the Global Warming

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Abstract

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Medicinal plants based agroforestry systems can play an important role through which we can cultivate tree crops as well as medicinal plants on same piece of land and it's an additional income to farmers. It can also reduce pressure on natural forests. The growth parameters of tree species and medicinal plants were recorded in Cuddalore, Jayangondam, Sendurai and Sivagangai. The medicinal plants of *D. hamiltonii*, *H. indicus*, *G. superba* and *H. indicus* had the suitability under all the three tree species. The trees and medicinal plants species in Agro - ecosystems have more significance owing to various tangible and in tangible benefit. Thus agroforestry is an important tool for balancing biodiversity conservation, enhance the productivity and climate reliance.

1. Introduction

Agroforestry is gaining importance as land use practice in different parts of the country with an emphasis on sustainable agriculture. Different kinds of agroforestry practices have been recognized in India. India is the second largest exporter of medicinal plants after China. However, our share is lesser than one per cent in the \$62 billion market, having greater scope. At present 90-95 % of medicinal plants is being extracted from the natural forest (Ved *et al*, 1998). The continuous and over-exploitation of medicinal plants wealth from forests may diminish the supply of medicinal plants to

industries and in the immediate future it will deplete the genetic stock of these plants (Nandal, 2002). Mixing up tree species and medicinal plants will bring potential use of land as well as help to reduce the pressure on forest. *Casuarina equisetifolia* and *Eucalyptus tereticornis* are important species in industrial sector, which are grown in large area, including farm lands by the farmers (Parthiban and Govinda Rao, 2008). In farm lands, farmers intercrop tree species with many agricultural crops like cotton, soyabeans, maize, ground nut etc. While agroforestry models have been developed for these agricultural crops by many researchers, no adequate research has been done to develop agroforestry

system with medicinal plants. In the context of growing interests among the farmers for cultivating tree species in farm lands, in particular *Casuarinas* and existing potential market for medicinal plants, the present study is proposed to develop suitable agroforestry systems with medicinal plants.

Tree outside forests play a vital role in adding to the existing pool of biological diversity and also the carbon stock. In this regard, the trees in Agro-ecosystems have much more significance owing the various tangible and in tangible benefits as appropriately under should in the

agroforestry systems. Agroforestry has been the traditional practice of several indigenous communities and therefore tremendous socio-economic bearing. Thus agroforestry and farm forestry in the Country can be an important tool for balancing biodiversity conservation with climate reliance (Arunachala and Arunachalam 2010).

2. Methodology

Species selected for the study:

The following tree species and medicinal plants were selected for raising agroforestry trial with the medicinal plants (Table-1).

Table: 1

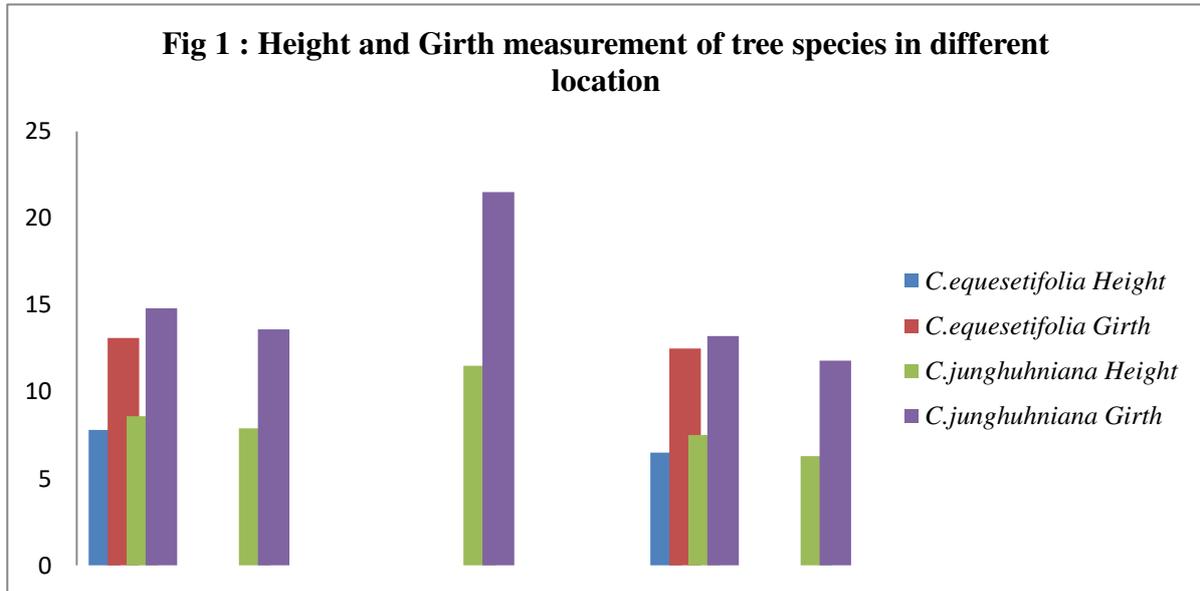
S. No.	Medicinal plants studied		S. No.	Tree species selected	
	Species	Spacing		Species	Spacing
1.	<i>Asparagus racemosus</i>	1m x 1m	1.	<i>Casuarina equisetifolia</i>	1.5 x 1.5m
2.	<i>Cassia senna</i>	30cm x 30cm	2.	<i>Casuarina junghuhniana</i>	1.5x1.5m
3.	<i>Decalepis hamiltonii</i>	60cm x 60cm			
4.	<i>Gloriosa superba</i>	30cm x 30cm			
5.	<i>Hemidesmus indicus</i>	30cm x 30cm			
6.	<i>Plectranthus barbatus</i>	45cm x 45cm			

Experimental design:

Agroforestry model proposed with five tree species and six medicinal plants in four locations were established in a randomized block

design (RBD) in three replications. Two species of *C. equisetifolia* and *C. junghuhniana* were planted in an appropriate spacing along with 6 medicinal plants species in the field.

3. Results & Discussion



C. equisetifolia had highest height and girth value in Cuddalore location when compare to sendurai. The *C. junghuhniana* planted in all four

locations, where the Cuddalore had the highest height and girth value compared to Jayangondam, Sendurai and Sivagangai.

Fig 2. *Gloriosa superba*



a) Under open

C. equisetifolia



b) Under *C. equisetifolia*

***C. junghuhniana*:**



c) Under *C. junghuhniana*

Fig 3. *Hemidesmus indicus* - *C. equisetifolia* and *C. junghuhniana*:



a) Under *C. equisetifolia*



b) Under *C. junghuhniana*



c) *Gloriosa superba* seeds

Fig 4. *Decalepis hamiltonii* - *C. equisetifolia* and *C. junghuhniana*



a) Under open

b) Under *C. equisetifolia*

c) Under *C. junghuhniana*

The significant difference was found among the root length, shoot length and girth of *D. hamiltonii* and *H. indicus* under different agroforestry trial. Maximum root length, shoot

length and girth were recorded at cuddalore under the *C. equisetifolia* followed by *C. junghuhniana* (Table-2).

Table 2. Height and Girth measurement of tree species in different location.

Name of the location	<i>C. equisetifolia</i>		<i>C. junghuhniana</i>	
	Height	Girth	Height	Girth
Cuddalore	7.8m	13.1cm	8.6m	14.8cm
Jayangondam	-	-	7.9m	13.6cm
Sendurai	6.5m	12.5cm	7.5m	13.2cm
Sivagangai	-	-	6.3m	11.8cm

C. equisetifolia had highest height and girth value in Cuddalore location when compare to sendurai. The *C. junghuhniana* planted in all four locations, where the Cuddalore had the highest height and girth value compared to Jayangondam, Sendurai and Sivagangai.

4. Conclusion

Agro forestry systems can play an important role through which we can cultivate tree crops as well as medicinal plants on same piece of land and it's a additional income to farmers. Since, it allows for combined cultivation of trees and medicinal

plants/annuals as well. The highest growth parameters of tree species and medicinal plants recorded at Jayangondam followed by Cuddalor, Sendurai and Sivagangai. The soil fertility was found to be improved under agroforestry plantations condition. Among the three tree species the highest macro and micronutrient was observed in the soil analysis of *Casuarina equisetifolia* plantation followed by *Casuarina junghuhniana*. The *Gloriosa superba* produced maximum seed yield in open field compared to agroforestry system in Jayngondam location. The maximum shoot length and root



length of *Decalepis hamiltonii* were produced from the *Casuarina equisetifolia* plantation compared to *Casuarina junghuhniiana* and open field. The highest shoot length and root length of *Hemidesmus indicus* were produced from the *Casuarina equisetifolia* plantation compared to *Casuarina junghuhniiana*, *Eucalyptus camandulensis* and open field. The medicinal plants of *Decalepis hamiltonii*, *Gloriosa superb*, *Hemidesmus indicus*, had the suitability under all the two tree species. The above mentioned medicinal plants based agroforestry project may help to increase the soil fertility and the perennial medicinal plants may recover from the endangered one, so such a research programme are needed to conserve the valuable medicinal plants. All these medicinal plants had the better suitability under the industrial tree species. The practice of agroforestry will also reduce the pressure on the natural forest ecosystem and help conserve the medicinal plants in the wild and enhance the productivity and mitigate the global warming.

5. References

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