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Cassia siamea (Lamk) Irwin and Barneby based agri-silvicultural system in eastern Bihar : an economic analysis

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Abstract

Cassia siamea locally known as chakundi is one of the fast growing tropical tree species capable of producing high biomass in a short rotation period. This paper describes the economic model of *Cassia siamea* and assessed monetary return from its agri-silviculture system. It is significant to note that NPV of the model at 12% discount rate is rupees 27,360 only.

Key words : Agri-silviculture, Biomass, Net present value, Tree-crop management

Introduction

Cassia siamea (Chakundi, Iron wood, Vakai, Ponavari, Kassod and Minjri) is an useful multipurpose tree species (MPTS). It is drought resistant and fast growing with desirable stem, crown and branch characteristics for agroforestry. It is good coppicer and is used as intercropping systems, windbreaks and shelterbelts. It produces excellent sturdy poles which are suited for scaffolding and farm construction. Wood is excellent as fuel wood with high calorific value (4500-4600 Kcal/kg). On good sites *Cassia siamea* can grow to a height of 8 m and a root collar diameter of 20 cm in 40 months. Total yield of wood for timber, poles and fuel wood may reach 10-15 m^3/ha/year (Gutteridge, 1997). *Cassia siamea* grows under a wide range of edapho -climatic conditions. Crops such as maize, fodder, sorghum, bajra, ragi, pulses, sesamum, groundnut *etc.* can be cultivated with *Cassia siamea* under rainfed conditions. Under irrigated conditions tomato, lady's finger, brinjal, turmeric and chilli can be planted as intercrops (Jha, 2002). In the present model maize (*Zea mays*) was intercropped with *Cassia siamea* and the economic production was worked out.

Materials and Methods

The experiment was carried out at the Dry Land Research Station, KVK, Munger ($24^0$23'N latitude, $85^0$35'E latitude and about 52 m amsl) under rainfed conditions. Average annual rainfall for the Munger is 1100 mm, falling predominantly (> 80%) during rainy season between July to mid September. The soil of experimental area was sandy loam. The pH and EC of the soil were 7.06 and 0.14 dsm^{-1}, while the organic carbon available P_2O_5 and available, K_2O were 8.2 g kg^{-1}, 6.73 kg ha^{-1} and 153 kg ha^{-1}, respectively. Land was prepared for growing agricultural crops just before the onset of south-west monsoon (May-June). Raising of agricultural crop and planting of *Cassia siamea* seedlings was carried out simultaneously. Parallel watering channels were taken 7 m apart. Four month old potted seedlings of *Cassia siamea* were planted in pits of size 30 cm^3 at 2 m distance between plants in each channel. Thus, the density of *Cassia siamea* remained as 714 trees/ha. A basal dose of 25 gm each of N, P and K fertilizer and 1 kg farm yard manure (FYM) was added in each pit at the time of planting. Biofertilizer like Azotobactor was mixed with the soil in the pits for better establishment. Maize (*Zea mays*) was dibbled at 60 x 25 cm apart as per package of practices in the interspace between *Cassia siamea* rows.

Casualty of seedlings replacement is done within a month. Periodical cultural operations such as weeding, soil working *etc.* were carried out twice a year. Lower lateral branches of the trees upto nearly half the height of canopy were pruned during the second and third year.

Results and Discussion

The seedlings grew very fast and attained an average height of 2.63m in the first year, 5.12 m at two years and 8.22 m at the end of third year. Similarly, the basal girth also increased from 14.2 cm in the first year to 28.4 cm over bark at the end of third year. At this stage the trees were harvested and marketed. *Cassia siamea* does not put forth a deep and exhaustive root system that makes excavation of stumps difficult. By the end of the third year

the tap root grew to a depth of 1.86 m. The longest lateral root extended upto 2.0-2.5 m. However, most of the lateral roots were clustered around the taproot within a radius of 0.6 to 0.85 m.

Table 1 : Economic returns (Rs./ha) from agrisilviculture model (*Cassia siamea* - Maize)

Number of poles	714
Income from poles @Rs.75/pole	53,550
Fuel wood (mg ha^{-1})	3.6
Income from fuel wood @ 800/mg^{-1} (Farm gate price)	2,800
Total income	56,350
Expenditure	14,994
Net income	41,356
Average annual net income (Rs. ha^{-1} $year^{-1}$)	13,785.33
Agricultural Crop-Maize	
Grain yield (mg ha^{-1} $year^{-1}$)	1.1
Stover yield (mg ha^{-1} $year^{-1}$)	4.5
Income from grain @ 10,000 mg^{-1}	11,000
Income from stover @ 1200 mg^{-1}	5,400
Expenditure	6,250
Net income from Maize (Rs. ha^{-1} $year^{-1}$)	10,150
Average annual net income from the model	23,935
NPV of the Model at 12% discount rate	27,360

Tree : *Cassia siamea* (Spacing 7 x 2 m, density 714 trees/ ha, age 3 years)

Cassia siamea trees attained required basal girth and height for harvesting at the end of the third year. Each tree yielded pole of size 3.2 ± 0.31 m length, 28 ± 0.5 cm girth and 14 ± 0.1 cm top girth (over bark). The economic returns from the model is given in Table-1. *Zea mays* was intercropped between the tree rows. No perceptible reduction in maize yield was noticed upto third year. The average grain yield of maize amounted to 1.1 to 1.5 mg ha^{-1} and stover yield 4.5 mg ha^{-1}. The net income from the tree component (poles and fuel wood) amounted to Rs. 41,356 ha^{-1}. This is in addition to the net income from agricultural crop which amounts to Rs. 10,150 ha^{-1}. These results strongly corroborate with the findings of Kareemulla *et al.* (2002) and Rana *et al.* (2000). The average annual net income from the model amounts to Rs. 23,935 ha^{-1} $year^{-1}$ and the NPV works out to Rs. 27,360 at 12% discount rate.

References

Gutteridge, R. C. 1997. *Cassia siamea* (Lamk) Irwin & Barneby. In : *Faridah Hanum, I & van der Maesen, L.J.G. (Editors)* : *Plant resources of South-East Asia* No. 11. Auxiliary Plant. Backhuys Publishers, Leiden, the Netherlands pp. 232-236.

Jha, R. K. 2002. Development of agroforestry model I. *Annual Report* K.V.K., Munger 811201. Bihar pp. 7-14.

Kareemulla, K., P. Rai, G. R. Rao and K. R. Solanki. 2002. Economic analysis of a silvo-pastoral system for degraded lands under rainfed condition. *Indian Forester* 128 : 1346-1350.

Rana, R. K., P. Kaushal and Y. S. Negi. 2000. Benefit : cost analysis of Agroforestry trees on eroded soils – a case study of upper-swan catchments in district Una (H.P.). *Indian Forester* 126 : 1297-1308.