

Simarouba (*Simarouba glauca* D.C.) (TBO) Based Silviculture System in Semi Arid Region of Gujarat

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Abstract: A field experiment was conducted to utilize interspaces for grown up seven years old simarouba plantation with five treatment combinations viz. T₁(Simarouba Sole), T₂(Simarouba+fodder pearl millet), T₃(Simarouba+fodder Sorghum), T₄(Fodder pearl millet sole), T₅(Fodder Sorghum sole) in Randomized Block Design with four replications by intercropping Simarouba plantation at 6.0×6.0 m spacing at the Centre for Agroforestry, Forage Crops & Green Belt, S.D. Agricultural University, Sardarkrushinagar (Gujarat) in loamy sand soil during 2014-15. Associated fodder crops did not show any negative impact on height of simarouba plants. However maximum plants height (3.82 m) recorded in Simarouba sole plantation but Collar diameter (11.06 cm) and plant canopy (N-S, 3.76 m and E-W, 3.88 m) was recorded significantly higher in Simarouba sole plantation over intercropped with pearl millet and sorghum crops. Among the fodder crop combinations, Simarouba with pearl millet produced significantly higher stover yield (889 kg ha⁻¹) and gross return (4448 Rs ha⁻¹) over other tree+crop combination. Hence, sowing rainfed fodder pearl millet with 7 years old simarouba plantation proved to be profitable land use system.

Keywords: Agroforestry, Silviculture, Simarouba, Fodder crops

1. INTRODUCTION

Simarouba (*Simarouba glauca* DC) is a medium sized evergreen tree which belongs to family

Simaroubaceae, commonly known as paradise trees or bitter wood. It is an important Tree Borne Oilseed (TBO) with immense importance for oil production like bio-diesel that has tremendous commercial value. It can survive high altitude up to 1000 m above sea level in all type of drained soil (pH 5.5 to 8), having annual rainfall between 250 mm to 2500 mm and in area having high temperature up to 45 °C [2]. Hence the North-Western Gujarat is suitable for Simarouba plantation and can be involved in agroforestry system for maximum utilization of land. Agroforestry is environmentally safe and economically attractive land use option. There are many traditional agroforestry systems in practice in arid region of India [4]. Simarouba is suited to arid and semi arid environment but it has not been a key component of any fodder crop combination so there is need to develop an agroforestry system for providing fodder in low rainfall area of North and North-west part of Gujarat. So we conduct an experiment to check out the suitable fodder

crops combinations with 7 year old plantation of simarouba in North and North-West climatic condition of Gujarat.

2. MATERIALS AND METHODS

The experiment was conducted during Karif 2014-15 at Research farm, Centre For Agroforestry, Forage Crops & Green Belt, S.D. Agriculture University, Sardarkrushinagar Gujarat. This state occupied the most predominant position in arid and semi arid area of India. The north Gujarat region faces frequent drought and scarcity of water. The area received erratic and less precipitation with high evaporation. The average temperature during summer is 45°C while during winter 8°C. The soil was alkaline in reaction, with low organic carbon and available nitrogen and medium in available phosphorus and potassium. The experiment was laid by intercropping 7 year old Simarouba plantation 6×6 m spacing with Kharif fodder crops viz, pearl millet (GHB-558) and Sorghum (Malavan.), in Randomized Block Design with four replications and five treatment combinations viz, T₁(Simarouba Sole), T₂(Simarouba+pearl millet), T₃(Simarouba +Sorghum), T₄(pearl millet sole), T₅(Sorghum sole). The recommended dose of chemical fertilizer in the form of urea and diammonium phosphate was applied to fodder intercrops. Nitrogen was applied in two equal splits, first dose was basal and the remaining at the 30 days after sowing (DAS). The phosphorus was applied as the basal dose to all the experimental fodder crops. The data of the Simarouba tree viz, tree height; Collar Diameter (CD) and plant canopy were recorded at harvest of fodder intercrops. The height of the shoot was recorded from the ground level to the apex of the leading shoot by measuring scale. Collar diameter was measured with help of digital caliper at collar region. All the plants were maintained by using uniform cultural operation during the period of experiment.

3. RESULTS AND DISCUSSIONS.

3.1. Growth parameter of Simarouba

The data on effect of different silviculture system on plant height and Collar Diameter of simarouba tree is presented in

Table-1. These silviculture system did not significantly affect the plant height and Collar Diameter of simarouba tree. However maximum plant height (3.82 m) and Collar Diameter (11.06 cm) were recorded under simarouba tree without fodder crops T₁. While plant canopy (N-S, 3.76 m and E-W, 3.88m) of simarouba tree was significantly higher under simarouba sole. Similar result were obtained under jatropha (*Jatropha curcas*) with field crops and mustard intercropped with simarouba under arid condition [1,4].

Table 1: Growth parameter of Simarouba tree in (November 2014)

Treatment	Tree height (m)	Collar diameter (cm)	Plant canopy	
			N-S(m)	E-W(m)
T1: Simarouba sole	3.82	11.06	3.76	3.88
T2: Simarouba + Fodder Pearl millet	3.45	9.06	2.69	2.67
T3: Simarouba + Fodder Sorghum	3.53	9.58	2.89	2.98
C.D. at 5%	NS	NS	0.7	0.7
C.V.%	16.6	22.3	22.9	22.5

3.2. Dry fodder yield of Intercrops

The data recorded from different silvicultural system for intercrops dry fodder yield is presented in Table-2. It reveals that fodder pearl millet sole (T₄) gave significantly higher dry fodder yield (1186 kg ha⁻¹) and gross return (Rs.5930/- ha⁻¹) over other treatments. Among the intercropped treatments (T₂ and T₃), the combination of simarouba + pearl millet (T₂) recorded significantly higher dry fodder yield (889 kg ha⁻¹) and gross return (Rs.4448/- ha⁻¹) as compared to simarouba + sorghum (T₃). It was investigated that significantly higher Stover yield (6684 kg ha⁻¹) under the treatment of mustard sole was obtained while lower Stover yield (3828.5 kg ha⁻¹) under simarouba + mustard [1]. Hence, sowing rainfed fodder pearl millet with 7 years old simarouba plantation proved to be profitable land use system.

Table 2: Dry fodder yield and Gross return from different fodder crops with and without association of Simarouba tree Kharif - 2014.

Treatments	Dry fodder yield (kg ha ⁻¹)	Gross return (Rs.ha ⁻¹)
T1: Simarouba sole	---	-
T2: Simarouba + Fodder Pearl millet	889	4448
T3: Simarouba + Fodder Sorghum	581	3489
T4: Fodder pearl millet sole	1186	5930
T5: Fodder Sorghum sole	796	4778
C.D. at 5%	149	827
C.V.%	14.00	14.40

4. CONCLUSION

Fodder Pearl millet crop grown as an intercrop with 7 year old simarouba plants produce significantly higher dry fodder yield (889 kg ha⁻¹) and gross return (Rs.4448/- ha⁻¹) as compared to fodder Sorghum crop grown with simarouba without adverse effect on the height of Simarouba plants in rainfed condition of North and North-West Gujarat.

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