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## Effect of different grass species on growth parameters of *Terminalia chebula* Retz. tree in sub-tropical region of Jammu

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### Abstract

A field experiment was conducted during the years 2021 to 2023 at the Experimental Farm, Division of Silviculture and Agroforestry, Chatha, SKUAST-Jammu, Jammu and Kashmir. Seven types of grasses namely: *Pennisetum purpureum*, *Bracharia decumbens*, *Setaria anceps* var. PSS-1, *Setaria anceps* var. S-25, *Sorghum bicolor*, *Paspalum notatum* and Natural grass were maintained as intercrop under 11 year old Harad (*Terminalia chebula*) trees. Data was recorded after one year of experiment in 2022 on plant height, diameter at breast height (DBH) and crown width of harad trees. There was no significant effect of grass species on growth parameters of *Terminalia chebula* trees. The height, diameter at breast height (dbh) and crown width of harad trees ranged from 6.30 to 7.81 m, 11.44 to 12.92 cm and 5.19 to 7.58 m respectively. Data on forage yield was also recorded and found that T<sub>3</sub> (Harad + *Setaria anceps* var. PSS-1) recorded highest total fresh yield (75.70 t/ha) as well as total dry yield (16.67 t/ha).

**Keywords:** Forage yield, grass, Jammu, Setaria, sub-tropical

### Introduction

Agroforestry is a farming system, integrating crop and/or livestock with trees and shrubs in order to obtain economic, environmental, ecological, and cultural benefits [1]. Cultivating trees and agricultural crops in intimate combination with one another is an ancient practice that farmers have used throughout the world. The rapid increase in population of human and animals along with their ever-increasing food, fodder and fuel needs exert a great pressure on agro-ecosystems. Among different approaches to counteract this problem, agroforestry or woody perennial based intercropping system has proved itself as a key component of sustainable agriculture. So, agroforestry has become an important land use system not only to meet the food and wood requirement of the people but also to protect the earth from environmental hazards. Livestock production is the backbone of Indian agriculture and is a major source of employment. Around 70 percent of households rely on the livestock and agriculture sector for their livelihood [3]. India supports nearly 20 percent of world livestock and 16.8 percent human population against the geographical area of only 2.3 percent of the world [1]. According to the 20<sup>th</sup> livestock census of 2019, India's total livestock population is 535.82 million, 4.6 percent higher compared to the last livestock census of 2012. India has 57.30 percent of the world's buffalo population and 14.7 percent of the world's cattle population [7]. Even after having a very high population of livestock, the productivity of Indian animals is relatively low. The major reason for low productivity is deficiency of quality feed and fodder which accounts for half of the total losses. Further, their production potential is also neutralized because of constraints related to feeding, breeding and health management [8]. Fodder need of nearly all developing countries now exceeds the sustainable yield of rangelands and other forage resources. Therefore, keeping in view the above mentioned constraints, there is an urgent need to increase the production and at the same time improve the productivity of fodder crops in order to meet the fodder needs in the farming systems.

## Materials and Methods

The site selected for the study was experimental farm of Division of Silviculture and Agroforestry, Sher-e-Kashmir University of Agricultural Sciences and Technology, Chatha, Jammu (Fig. 1). The experimental area falls under sub-tropical zone of Jammu division and is located at an altitude of 325 m

above mean sea level. The climate of the area is characterized by hot-dry summers, hot and humid rainy months and cold winters [5]. The study was carried out during 2021 to 2023 and consisted of harad (*Terminalia chebula*) as tree species maintained at a spacing of 5 m × 4 m (planted in 2011).

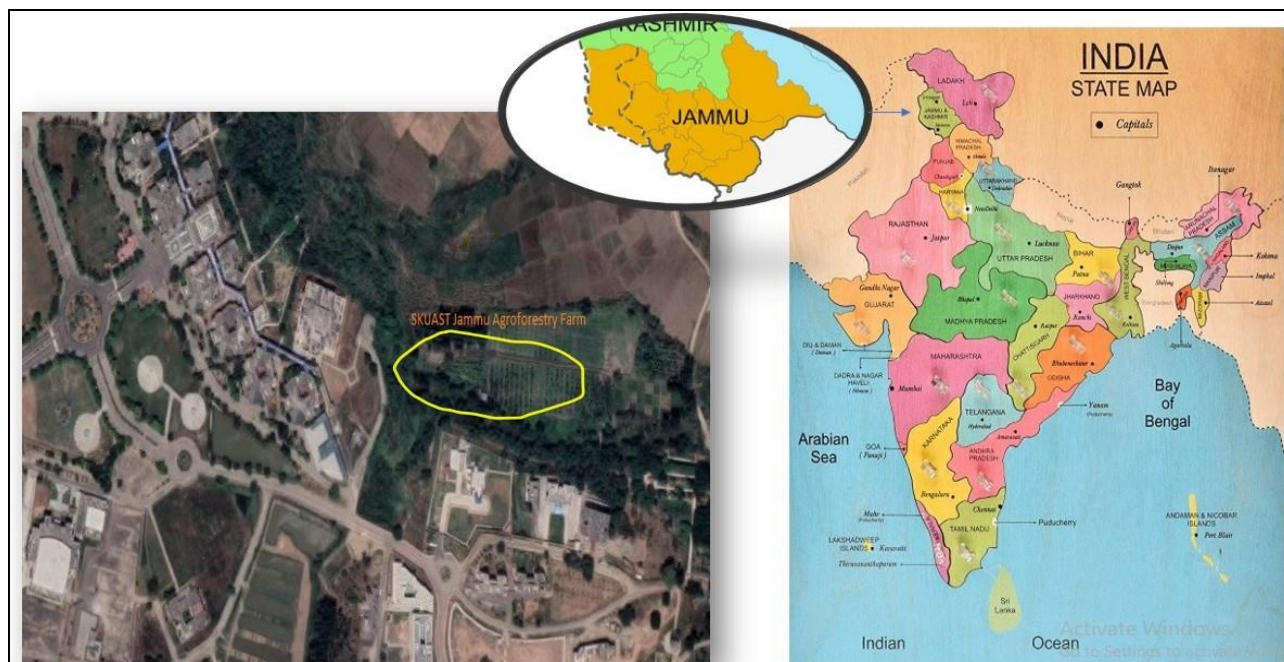


Fig 1: Location map of study area

In addition to one natural grass, a total of 6 grass species namely: *Pennisetum purpureum*, *Bracharia decumbens*, *Setaria anceps* var. PSS-1, *Setaria anceps* var. S-25, *Sorghum bicolor* and *Paspalum notatum* were planted as intercrop in harad plantation in the month of August, 2021 at a uniform spacing of 40 cm × 40 cm. The experiment was laid out in Randomized Block Design (RBD) with three replications and seven treatments. No farm yard manure or fertilizer was used during the course of experiment. In total, three cuttings were taken in a season. The growth parameters viz. plant height, diameter at breast height and crown spread of trees and dry forage biomass of grasses were recorded and analyzed.

## Results and Discussion

The results presented in Table 1 revealed that there was no significant effect of different grass species on plant height, DBH and crown spread of harad trees. The height of harad trees ranged from 6.30 to 7.81 m whereas, DBH and crown width ranged from 11.44 to 12.92 cm and 5.19 to 7.58 m respectively. It may be concluded that the tree species were not influenced by any particular intercropped grasses. Many workers have studied effect of grasses on the growth of trees and found similar results. Dalvi and his co-workers [2] found that different grass species grown under mango plantation had no significant effect over its growth. Likewise, crops grown in Gamhar based agroforestry system had no influence on height of Gamhar trees and were found statistically non-significant [6].

Table 1: Growth performance of *Terminalia chebula* tree and total forage yield of different grass species

Treatments	Harad tree			Total forage yield (t/ha)	
	Plant Height(m)	DBH (cm)	Crown spread (m)	Fresh	Dry
T <sub>1</sub> : (Harad + <i>Setaria anceps</i> var. S-25)	6.62	11.77	5.59	69.00	15.51
T <sub>2</sub> : (Harad + <i>Sorghum bicolor</i> )	7.06	12.28	5.92	35.22	9.33
T <sub>3</sub> : (Harad + <i>Setaria anceps</i> var. PSS-1)	7.10	11.77	5.22	75.70	16.67
T <sub>4</sub> : (Harad + <i>Pennisetum purpureum</i> )	7.81	11.44	7.58	63.61	10.65
T <sub>5</sub> : (Harad + <i>Paspalum notatum</i> )	7.37	12.92	6.57	49.36	11.52
T <sub>6</sub> : (Harad + <i>Bracharia decumbens</i> )	7.22	12.10	5.95	38.77	8.22
T <sub>7</sub> : (Harad + Natural grass)	6.30	12.56	5.19	14.18	6.52
SE (m) ±	0.53	0.38	0.04	1.42	0.42
CD <sub>0.05</sub>	NS	NS	NS	4.43	1.30

Similar study undertaken by Korwar and co-workers [4] also found that castor and green gram grown under agroforestry tree species had no significant influence on the tree species. The result of the present study also revealed that significantly different total forage yield was recorded by different grass

species. Among the different treatment combinations, T<sub>4</sub> i.e. Harad + *Setaria anceps* var. PSS-1 recorded highest total fresh yield of 75.70 t/ha which was statistically different from all other treatments. In terms of total dry yield, T<sub>4</sub> i.e. Harad + *Setaria anceps* var. PSS-1 again recorded highest (16.67 t/ha)

exhibiting statistical parity with T<sub>1</sub> (Harad + *Setaria anceps* var. S-25) (15.51 t/ha).

### Conclusion

The result of the study suggests that *Setaria anceps* var. PSS-1 grown in Harad (*Terminalia chebula*) based agroforestry system gives higher yield over all other grass species under the sub-tropical conditions of Jammu, J&K. Therefore, *Setaria anceps* var. PSS-1 based agroforestry system may be exploited for its higher yield to ensure sustainability and profitability of the farming system.

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