

Studies on silvi-pasture systems for intensive fodder production**R.Susheela^{1*}, R.V.T. Balazzii Naaiik¹, M. Shanti¹, T. Shashikala¹, M. Anuradha¹, V. Chandrika²**^{1*}AICRP on Forage Crops and Utilization, PJTSAU, Hyderabad, India²S.V.Agricultural College, Tirupati, ANGRAU, ANGRAU, Andhra Pradesh, India

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Keywords: Bajra napier hybrid, *Desmanthes*, *Stylosanthes*, Silvipasture systems, Subabul**Introduction**

Silvi-pastoral system with suitable species of trees and grasses help in increasing the land productivity and also maintain environmental potentialities. Moreover, deep root system of trees bind the soil, reduces erosion and extracts moisture from deeper strata of the soil. The effects of tree species on associated crops in agro forestry system are not consistent. The association of cereal and legume forages not only maintains similar level of herbage yield but also nearly doubles the crude protein production. Study of the right combination of tree species and associated crop in agro forestry for this region is the need of the hour. However, meager information is available on silvi pastoral systems with different grass legume components, hence present investigation was undertaken.

Materials and Methods

A field experiment was conducted in sandy loam soils at AICRP on Forage Crops, ARI, Rajendranagar, Hyderabad for four years *i.e* during 2010-11 to 2013-2014 to explore the fodder potential of various crops and their influence on soil fertility and intercrops under subabul based silvipastoral system under protective irrigation *i.e*, one or two irrigations during month of May. Subabul was the main crop and a combination of crops including annuals, perennials, cereals and legumes were studied to aim at highest green fodder production in whole year through resource conservation. Crops *viz.*, sorghum, bajra along with intercrop of horse gram in 3:1 ratio, while perennial crops *viz.*, BN hybrid, *Stylo* and *Desmanthes* were grown in solo as well as intercropped with either of the perennial crops. Subabul was grown with a spacing of 3x2 m. Treatments were T₁- Subabool + Bajra Napier hybrid, T₂- Subabool + *Stylosanthes*, T₃- Subabool + *Desmenthus virgatus*, T₄- Subabool + Bajra Napier hybrid + *Stylosanthes* (3:1), T₅- Subabool + Bajra Napier hybrid + *Desmenthus* (3:1), T₆- Subabool + Sorghum + Horse gram (2:1), T₇- Subabool + Pearl millet + Horsegram (2:1), T₈ – Subabool sole.

Results and Discussion

By the end of the fourth year of study highest green fodder yield of 508.93 q ha⁻¹ was harvested from Subabul+ Bajra Napier hybrid + *Desmanthes* (3:1) followed by that of Subabul+ Bajra Napier hybrid + *Stylo* (501.90 q ha⁻¹ and Subabul+ Bajra Napier hybrid (450.23 q ha⁻¹) The crude protein yield was also highest in Subabul - Bajra Napier hybrid + *Desmanthes* (15.23 q ha⁻¹). The gross returns and net returns followed the trend that was reflected in GFY. The benefit : cost ratio of 4.14 was observed with the best system Subabul+Bajra Napier hybrid + *Desmanthes* (3:1) (Table.1). In agroforestry, the potentially higher productivity could be due to the capture of more growth resources *e. g.* light or water or due to improved soil fertility. Several studies in different parts of the country suggested that agroforestry is more profitable to farmers than agriculture or forestry for a particular area of land (Tokey, 1997 Samra *et al.*, 1999).

The intensive silvipasture system also caused remarkable changes in soil fertility after fourth year of cropping cycle. The growing of subabul + BN hybrid + *Desmanthus virgatus*, silvipasture system resulted in higher available N (260.7 kg N/ha), and K (586.8 kg K/ha) over rest of the treatments while organic carbon (0.32%) was highest in Subabul +Bajra napier hybrid + *Stylosanthes* system. The higher level of available N and P in soil was recorded over its initial level under all the intensive forage production systems. Newaj *et al.*(2008) observed that in agri- silviculture growing of *Albizia procera* with different pruning regimes, the organic carbon of the soil increased by 13-16 % from their initial values under different pruning regimes which was 5 to 6 times higher than growing of either sole tree or sole crop.

Table.1. Fodder yield, quality and economics as influenced by different silvipasture systems

Treatment	Green fodder yield	Dry matter yield	Crude protein yield	Gross monetary return	Net monetary return	Benefit cost ratio

	(q/ha)	(q/ha)	(q/ha)	(Rs.)	(Rs.)	
T ₁ = Subabul + B N hybrid	450.23	94.75	6.90	82346	62346	3.77
T ₂ = Subabul + <i>Stylosanthes</i>	280.52	60.92	7.36	47818	28568	2.38
T ₃ = Subabul + <i>Desmenthus virgatus</i>	272.70	60.95	8.70	48235	27235	2.15
T ₄ = Subabul +B N hybrid+ <i>Stylosanthes</i> (3:1)	501.90	107.29	10.02	92766	71016	4.00
T ₅ = Subabul + B N hybrid+ <i>Desmenthus</i> (3:1)	508.93	107.82	15.23	96976	75226	4.14
T ₆ = Subabul + Sorghum + Horsegram (3:1)	258.90	58.81	10.58	39990	21240	2.07
T ₇ = Subabul + Pearl millet+ Horsegram (3:1)	282.11	65.74	12.28	43742	24992	2.25
T ₈ = Subabul (Sole)	75.17	18.35	4.95	8863	-1137	1.07

Conclusion

Silvi-pasture systems Bajra Napier hybrid and *Desmanthes /stylosanthes* in a ratio of 3:1 under Subabul is most promising with appreciable green fodder and crude protein yields besides being improving soil fertility.

References

- Newaj, Ram, S. A. Dar and R. Bhadur 2008. Carbon sequestration in agri silviculture as affected by canopy pruning of *Albizia procera* under irrigated ecosystem. In: Abstracts, *National Symposium on Agroforestry Knowledge for Sustainability, Climate Moderation and Challenges Ahead*, 15-17 Dec.,2008, NRCAF, Jhansi, India, pp 182.
- Samra J. S., B. L. Dhyani and A. R. Sharma 1999. Problem and prospects of natural resource management in Indian Himalayas- A base paper. Hill and mountain Agro-ecosystem Directorate, NATP, CSWCRTI, Dehradun, 146p.
- Toky, O. P. 1997. Poplar an economy booster and eco-friendly agroforestry tree. *Agroforestry News letter*, NRC for Agroforestry **9**: 2-3.