

PRODUCTIVITY OF ARABLE CROPS AND PASTURE GRASSES IN ASSOCIATION OF MULTI-PURPOSE TREE SPECIES IN HOT ARID REGION OF RAJASTHAN

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SUMMARY

The field experiment was conducted during 2008 to 2010 at Bikaner to find out an efficient agri-silviculture or silvi-pastoral model for cultivable wastelands of arid tropics of India. Three multi-purpose tree species viz., *khejri* (*Prosopis cineraria*), *ardu* (*Ailanthus excelsa*) and *rohida* (*Tecomella undulata*) suitable for arid tropics were planted in July 2008 and annual grain legumes viz., clusterbean (*Cyamopsis tetragonoloba*), and mothbean (*Vigna aconitifolia*) in **kharif** 2009 and 2010, while pasture grasses viz., *sewan* (*Lasiurus indicus*) and *anjan* (*Cenchrus ciliaris*) grasses once in July 2009. Results indicated that tree species had no adverse effect on growth and grain/fodder yields of crops and grasses in both the years. Similarly, annual crops/grasses did not exert any significant effect on the growth attributes of any tree species. Among grain crops and grasses, clusterbean recorded higher grain (0.82 and 0.91 t/ha) and straw (1.97 and 2.47 t/ha) yields over mothbean. Whereas *sewan* grass outyielded *anjan* grass with green fodder yield of 12.1 and 16.7 t/ha, and dry matter yield of 4.68 and 6.02 t/ha during 2009 and 2010, respectively. Computation of clusterbean equivalent yields (CEY) showed that CEY recorded with clusterbean (1.31 t/ha) and mothbean (1.28 q/ha) were statistically at par but significantly higher over both the grass species. Slight higher values of net returns and B : C ratio were observed with *khejri* plantation (Rs. 11,697 and 1.78) compared to other tree species, while among crops clusterbean gave maximum values of net returns Rs. 16,837 and B : C ratio 2.05. Organic carbon (%) and available N, P and K contents of soil substantially improved under all treatments in comparison to initial soil fertility status. Thus, study suggests that growing of clusterbean or mothbean with any multi-purpose tree species viz., *khejri*, *ardu* and *rohida* plantation holds promise to provide higher and economical grain productivity with improved fertility status of soil under agri-silviculture system in arid tropics of Rajasthan.

Key words : Arable crops, pasture grasses, multi-purpose tree species, agri-silvi-pastoral system

The Indian arid zone extends in an area of 31.7 million hectares and the major area (about 60%) of total arid zone lies in the western part of Rajasthan covering 12 districts of the state. Moreover, almost 40 per cent land of the region is under cultivable wastelands or degraded pastures. Due to poor and erratic rainfall pattern and low fertility of soils, agri-silvi-pastoral system is the vital life support system of rural folk of this region. Although, traditional agroforestry system with *Prosopis cineraria* exists in arid tropics (Gupta, 1994), but for improvement in productivity of the system to meet increasing demand of food, fodder and fuel, new alternatives of land use system are to be explored on the basis of rainfall pattern and edaphic conditions. There

are number of multipurpose tree species viz., *Prosopis cineraria*, *Ailanthus excelsa*, *Hardwickia binata*, *Colophospermum mopane*, *Tecomella undulata*, *Azadirachta indica*, etc. suitable for the region and may provide fodder, fuel, timber or other edible and commercial products to mitigate the effect of frequent occurrence of droughts and fulfil the need of rural population. Clusterbean (*Cyamopsis tetragonoloba*) and mothbean (*Vigna aconitifolia*) are two most important legumes generally grown during **kharif** season under rainfed conditions and have capacity to bear harsh climatic situations, while *sewan* (*Lasiurus indicus*) and *anjan* (*Cenchrus ciliaris*) are the most suitable perennial pasture grass species because of their high yielding, better

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