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Mangifera indica Based Hortipasture System With Fodder Grass *Panicum maximum* For Nutritional Security And Economic Stability In Rainfed Area Under Climate Change.

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ABSTRACT

Integration of fruit trees with pasture (grasses and or legumes) is one of the best and economic alternative Hortipastoral system for rainfed area. It supplies the protective food /fruit for human being and fodder for animal and thus helps in bridging the wide gap between the supply and demand of fruit and fodder and secured nutrition and improved livelihood. *Panicum maximum* is the most important pasture grass. Its productivity, compatability with legumes, freedom from pests and diseases, relatively high feeding value are major reasons for its popularity. Guinea grass can be cultivated throughout the state for pasture by cut-and-carry method or by silage and hay. It is a very fast growing and leafy grass, which is palatable to livestock with a good nutritional value. However, it is generally recommended to supplement it with sources of protein in order to meet nutritional requirements or improve animal performance. A trial was conducted with *Panicum maximum* in the agroforestry field as under storey of *Mangifera indica* to study the biomass yield and feeding value. Biomass yield documented revealed 22.39 MT fresh biomass/ha/annum under the influence of shade in the model *vs* 19.10 MT fresh biomass/ha /annum under direct sunlight. The study revealed that *Panicum maximum* can be cultivated in the agroforestry field as under storey of *Mangifera indica* with increased biomass as compared to sole crop.

Keywords: *Panicum maximum*, Agroforestry, *Mangifera indica,* biomass yield

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INTRODUCTION

In India, about 60 % of net sown area is rainfed, contributing 40 % of the total food production; it supports 40% of human and 60% of livestock population. Under such situation, incorporation of fruit trees along with animal husbandry in common farming system is advisable to improve income and nutritional security of the farmers. Horti- pasture system is the most ideal strategy to provide food, nutrition and income security to the people living in rainfed areas. Urbanization reduces the land area for fodder production and also the failure in monsoon urges the farmers to go for fodder production under agroforestry models. Hortipastoral System is ecologically feasible and economically viable (Kumar and Chaubey, 2008)[4]. Hence, growing of *Panicum maximum* as the understorey of fruit trees are studied in this research.

Guinea grass is well suited for cut-and-carry systems and can be used for making silage and hay. Guinea grass can be managed as a long-term pasture grass. As the grass rest-period affects animal performance, a good rest-period is to wait for regrowth (Candido *et al.,* 2005)[3]. Guinea grass is a fast growing, bulky grass that helps prevention of soil erosion since it provides rapid ground cover (Buxton, 2001)[2]. Commonly farmers are feeding guinea grass in the bunds, to assess the biomass yield *Panicum maximum* in the agroforestry field as understorey of *Mangifera indica,* this study was conducted.

MATERIALS AND METHODS

Field experiment was conducted during 2015 at Institute of Animal Nutrition, Kattupakkam as a part of the All India Co-ordinated Research Project on Agroforestry. Hortipasture in degraded wastelands was established with fruit trees coconut, guava and mango at 8 x 8 m, 6 x 6 m and 3 x 3 m spacing, respectively ten years back. In the existing hortipasture, interspaces between *Mangifera indica* in degraded wasteland was used for the study. Land area under *Mangifera indica* was ploughed and the land was prepared for sowing the fodder. After land preparation application of organic manure was done as per the standard package of practices. *Panicum maximum* root slips were taken from the existing plant. *Panicum maximum* root slips were planted with a spacing of 50 X 50 cm in the agroforestry field as understorey of *Mangifera indica* and as a sole crop. Biomass yield was documented in three harvests. The Mean biomass yield (MT/ha) of *Panicum maximum* as sole crop *vs* understorey of *Mangifera indica* was recorded. Samples of *Panicum maximum* were also estimated for their proximate principles as per AOAC (2000) [1].

RESULT AND DISCUSSION

Panicum maximum root slips were planted in the agroforestry field as understorey of *Mangifera indica* and as a sole crop. Biomass yield was documented in three harvests. The biomass yield is presented in table 1. Samples of the grass were also estimated for their proximate principles as per AOAC (2000). The results of which are presented in table 2.

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Table 1: Biomass yield (MT/ha) of *Panicum maximum* as sole crop *vs* understorey of *Mangifera indica*

Harvest	Fresh Biomass yield (MT/ha)		Biomass yield on dry matter basis (kg/ha)	
	Sole crop	Understorey of *Mangifera indica*	Sole crop	Understorey of *Mangifera indica*
I	26.82	27.74	9.38	8.33
II	20.70	24.30	7.45	7.29
III	9.79	15.12	3.53	4.55
Mean	**19.10**	**22.39**	**6.80**	**6.73**

The biomass yield of *Panicum maximum* (on Dry Matter basis) was slightly lower in understorey *Mangifera indica* in all the three harvests (Fig.1). The influence of shade may be attributed to this reduced

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yield. Whether grown as a sole crop or understorey *Mangifera indica* the biomass yield was highest in the first harvest

Table 2: The mean proximate composition (%DMB) of *Panicum maximum*

Harvest	Sole *vs* Shade	Moisture	Crude protein	Ether Extract	Crude fibre	Total ash	Nitrogen free extract
I	Shade	70.05 ± 1.58	9.92 ± 0.63	2.80 ± 0.07	46.81 ± 1.65	12.43 ± 0.15	28.02 ± 1.34
	Sole	67.92 ± 0.41	8.35 ± 0.43	2.81± 0.1	50.48 ± 0.79	10.77 ± 0.31	27.58± 0.84
II	Shade	78.60 ± 1.27	6.67 ± 1.42	2.05± 0.42	45.15 ± 2.13	11.61± 0.15	34.50± 2.01
	Sole	72.89 ± 0.75	7.93 ± 0.27	1.78± 0.16	44.52 ± 1.02	9.55 ±0.41	36.20 ±1.56
III	Shade	65.54 ± 1.67	7.12 ± 0.10	3.40± 0.22	43.36 ± 2.29	11.48 ± 0.07	38.30 ± 1.97
	Sole	63.33 ± 1.84	6.05 ± 0.09	2.10 ± 0.28	44.60 ± 3.69	11.66 ± 0.34	35.57 ± 4.12

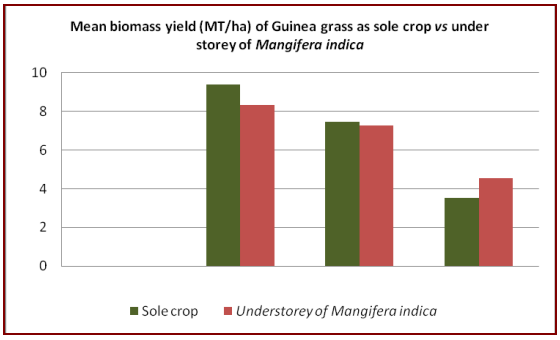

Fig 1: Mean biomass yield (MT/ha) of *Panicum maximum*

There existed no significant variation in proximate composition of *Panicum maximum* whether cultivated as a sole crop or understorey in *Mangifera indica.* This is in accordance with the findings of Candido *et al.,* 2005. Except for moisture, the proximate composition did not vary between harvests. The relatively lower moisture in third harvest could be due to no rainfall during this period.

CONCLUSION

Panicum maximum was used as non leguminous roughage as roughage source. Guinea grass is a shade loving grass. Shade increases the availability of soil nitrogen and this stimulates plant growth. The study revealed that *Panicum maximum* can be cultivated in the agroforestry field as understorey of *Mangifera indica* with increased biomass as compared to sole crop.

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