

Performance of some medicinal plants grown under multilayered Agroforestry system

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Abstract: Three experiments were carried out in the field of the Germplasm Centre (GPC), Fruit Tree Improvement Programme (FTIP) and in the laboratory of (FTIP) Horticulture, Bangladesh Agricultural University, Mymensingh during February 2004 to November 2004. Each experiment consisted of three levels of treatments viz. in Expt 1. T₁= Sissoo + Guava + *Aloe Vera*, T₂=Sissoo + Lemon + *Aloe Vera* and T₃=Open condition, in Expt 2. T₁= Sissoo + Guava + Asparagus, T₂= Sissoo + Lemon + Asparagus and T₃=Open condition, Expt.3.T₁= Sissoo + Guava + Misridana, T₂= Sissoo + Lemon + Misridana and T₃=Open condition and was conducted in Randomized Complete Block Design with three replications. The results of the study revealed that, medicinal plants like, *Aloe vera*, and Misridana had the highest plant height and length of leaves in Guava and Sissoo based Agroforestry system but Asparagus had the highest plant height and length of leaves in Lemon and Sissoo based Agroforestry system. *Aloe Vera* produced the highest dry matter in open condition but Misridana and asparagus produced the highest dry matter in Guava and Sissoo based Agroforestry system. Yield contributing characters of medicinal plants was found best in Guava and Sissoo based Agroforestry system.

Introduction

Agroforestry is the integration of the tree, crop and vegetable on the same area of land is a promising production system for maximizing yield (Nair, 1990) and maintaining friendly environment. Moreover, this system is one kind of insurance of the farmers against the risks of total crop failure in case of mono cropping system. Shade tolerant vegetable and spices plants grown well as under storied crop in Agroforestry system. *Aloe vera* Linn, Asparagus (*Asparagus recemosus*) and Misridana (*Scorpio Dulcis*) are three important medicinal plants of our country. The leaves of *Aloe vera* are alterative, stomachic, aphrodisiac, cathartic, emmenagogic, astringent, antidotal, anthelmintic, and hepatic stimulant. Homestead Agroforestry is a potential system because of its diversified role in household economy. There are about 27.24 million households (BBS, 2006) in our country which comprises about 0.3 million hectare of lands. So, if we practice multistoried like Agroforestry system in our homestead with medicinal plants,

vegetables, fruit, fuel and timber yielding plants. It will contribute a part of our household needs. The present study was therefore, undertaken to know the performance of medicinal plants grown under multilayer Agroforestry system and to maintain bio-diversity and to utilize natural resources properly.

Materials and Methods

The experiment was conducted at the Germplasm Centre (GPC) Fruit Tree Improvement Programme, Department of Horticulture, Bangladesh Agricultural University, Mymensingh during the period from February 2004 to November 2004. The each experiment consisted of three levels of treatments viz. Expt 1. T₁= Sissoo + Guava + *Aloe Vera*, T₂=Sissoo + Lemon + *Aloe Vera* and T₃=Open condition, Expt 2. T₁= Sissoo + Guava + Asparagus, T₂= Sissoo + Lemon + Asparagus and T₃=Open condition, Expt.3.T₁= Sissoo + Guava + Misridana, T₂= Sissoo + Lemon + Misridana and T₃=Open condition and was

conducted in Randomized Complete Block Design with three replications. Treatments T₁ and T₂ were three-layered garden, Sissoo at the top layer, Guava and Lemon at the middle layer; and the medicinal plants at the ground layer and treatment T₃ was in open condition. Spacing between guava and / or lemon, and between rows was 6m × 8m and the spacing between Sissoo and between rows was same as 6m × 8m. The plants guava and lemon were 5 years old and Sissoo plants were 8 years old. The plot size for each treatment was 40m × 1.5m. Adjacent plots and neighboring blocks separated by 0.5m and 2.0m, respectively. Seedlings of *Aloe Vera*, mother rhizome of Misridana and tuberous roots of Asparagus were planted in the experimental plots on 15th February 2004. The spacing of the planting was maintained by 60 cm × 40cm for all the plants. Fertilizer application and Intercultural operations were done as and when necessary. Data were collected on various parameters as shown in tables and graphs. The analysis of variance for each of the studied character was done F test and data were analyzed statistically following ANOVA technique and means were adjusted by DMRT test at 1% and 5% level of significance.

Results and Discussion

Aloe vera: From the result it was evident that the performance of *Aloe vera* in term of growth and yield contributing characters were significantly influenced by the different multilayered Agroforestry system. The maximum Plant height (34.50 cm), number of leaves/plant (9.98), leaf length (24.50 cm), canopy volume (11726.77 cm³), leaf width (2.49 cm), fresh weight of leaves/plant (345.69 g), root length/plant (9.44 cm), root weight/plant (31.25 g) and yield (13.82 t/ha) were maximum in Guava and Sissoo based

Agroforestry system while minimum were observed in the parameters in open condition (Table 1). These results are in agreement with Wang and Zhang (1998). Solanki (1998), who reported that the highest yield of Cabbage under 30-47% shaded condition was found by the different multilayered Agroforestry system. But the maximum amount of dry matter of leaves (6.21 g) was found in open condition and the minimum amount of dry matter (5.78 g) was found in Guava and Sissoo based Agroforestry system (Table 1).

Misridana: The growth and yield contributing characters of Misridana were significantly influenced by the different multilayered Agroforestry system. The maximum plant height (57.08 cm), number of leaves/plant (17.04), canopy volume (58230.14 cm³), weight of mother rhizome (49.43 g), number of primary fingers (40.97) weight of primary fingers (146.47g) number of secondary fingers (12.54), weight of secondary fingers (14.56 g), total fresh weight of corm/plant (210.46 g), dry weight of corm/plant (19.07 g), and yield (8.42 t/ha) were found under treatment in Guava and Sissoo based Agroforestry system and the growth and yield contributing above the mentioned parameters of misridana plant were found lowest in open field condition (Table 2). Significantly, the tallest plant height under heavy shade in okra was reported by Ali (1999).

Asparagus: The growth and yield contributing characters of Asparagus were significantly influenced by the different multilayered Agroforestry system. The maximum plant height

Table 1. Growth and yield contributing characters of *Aloe Vera* plant grown under different Agroforestry systems

Treatment	Plant height (cm)	Leaves per plant (no.)	Leaf length (cm)	Canopy volume (cm ³)	Leaf width (cm)	Leaf fresh wt./plant (g)	Leaf dry matter/ plant (g)	Root length/plant (cm)	Root wt./plant (g)	Yield (t/ha)
With guava and sissoo	34.50	9.98	24.50	11726.77	2.49	345.69	5.78	9.44	31.25	13.82
With lemon and Sissoo	31.50	9.45	21.35	8931.50	2.01	241.00	6.00	8.10	24.35	9.95
Open condition	22.91	8.95	17.22	2431.43	1.91	120.45	6.21	5.20	14.90	5.71
LSD _{0.05}	7.519	1.967	5.16	2094.00	0.2585	79.19	1.439	0.5219	2.267	1.543
Coefficient of variation (%)	11.20	9.17	1083	12.00	5.40	14.82	10.59	3.05	4.26	6.93

(111.60 cm) number of tuberous root/plant (86.31) length of tuberous root (20.55 cm), fresh weight of tuberous root (290.00 g) weight of dry matte of tuberous root (28.00 g) and yield (12.35 t/ha) were found in Lemon and Sissoo based Agroforestry system and the minimum were found above the mentioned parameters in open condition (Table3). Similarly higher plant height under reduced light levels was observed in carrot (Michon *et. al.*, 2000). The maximum number of leaves/plant (448.59) and canopy volume (92658.95 cm³) were found in Guava and Sissoo based Agroforestry system and the lowest canopy volume (26392.50 cm³) was found in open condition (Table 3).

References

Ali, M.A. 1999. Performance of Red amaranth and lady's finger growth at different orientation and distances under Guava

and Drumstick trees. MS. Thesis. BSMRAU, Gazipur. Bangladesh. p. 140.

BBS. 2001. Statistical Year Book of Bangladesh Bureau of Statistics. Ministry of Planning, Government of the people of Bangladesh, Dhaka, Bangladesh.142p.

Michon, G.; F. Mary and J. M. Bompard, 1986. Multistoried Agroforestry garden systems in west Sumatra, Indonesia. *Agroforestry Systems*, 4(4): 315-338.

Nair, P. K. R. 1990. An Introduction to Agroforestry. Kluwer Academic Publishers. ICRAF.52p.

Solanki, K. R. 1998. Agorforestry Research in India. *Indian. J. Agril. Sci.* 68(8): 559-566.

Wang, S, H. and Zhang, Z. X. 1998. Effect of shade on growth and yield of ginger. *China Vegetables*. 5: 5-8

Table 2. Growth and yield contributing characters of Misridana plant grown under different Agroforestry systems

Treatment	Plant height (cm)	No. of leaves per plant	Canopy volume (cm ³)	Wt. of mother rhizome (g)	No. of primary fingers	Wt. of primary fingers (g)	No. of secondary fingers	Wt. of secondary fingers (g)	Total fresh wt. of corm per plant (g)	Wt. of dry matter of the corms (g)	Yield (t/ha)
With guava and sissoo	57.08	17.04	58230.14	49.43	40.97	146.47	12.54	14.56	210.46	19.07	8.42
With lemon and Sissoo	53.90	16.00	52325.50	45.50	34.417	137.50	11.90	12.00	189.50	17.95	7.73
Open condition	34.50	14.00	12445.00	44.90	26.250	91.50	5.85	3.90	93.50	17.00	3.10
LSD _{0.05}	10.98	1.18	13760.00	12.30	7.948	34.63	4.13	5.998	32.69	2.069	1.818
Coefficient of variation (%)	9.99	4.32	14.81	11.64	10.35	12.20	13.08	13.06	8.84	5.07	12.50

Table 3. Growth and yield contributing characters of Asparagus plant grown under different Agroforestry systems

Treatment	Plant height (cm)	Leaves per plant (no.)	Tuberous root/plant (no.)	Tuberous root length (cm)	Fresh wt. of Tuberous root (g)	Dry matter wt. of Tuberous root (g)	Canopy volume (cm ³)	Yield (t/ha)
With guava and sissoo	111.60	448.59	77.33	14.81b	225.0	24.00	92658.95	6.23
With lemon and Sissoo	126.50	379.40	86.31	20.55	290.00	28.00	80539.79	12.35
Open condition	68.75	199.25	32.50	13.92	95.00	20.00	26392.50	4.10
LSD _{0.05}	22.67	82.78	4.139	1.487	11.33	3.802		1.474
Coefficient of variation (%)	9.78	10.66	4.79	4.99	4.46	6.90	5.30	8.61

