

PERFORMANCE OF KANGKONG AND SWEET GOURD IN ASSOCIATION WITH FOUR YEARS OLD LOHAKAT TREE (*Xylia dolabriformis*)

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ABSTRACT

A field experiment was conducted at the Banglabazar field area near Pabna town during the period from 05 February 2016 to 25 May 2016 to observe the performance (growth and yield) of kangkong and sweet gourd grown at different distances from the lohakat tree (*Xylia sp.*). Different treatments of the experiment were T₁ (3 feet distance from tree), T₂ (6 feet distance from tree) and T₃ (9 feet distance from tree) T₄ (open field referred as control). The experiment was laid out in RCBD for all six crops with 3 replications. In case of sweet gourd, it was found that open field produced highest yields (40.30 t ha⁻¹) which were statistically similar to treatment T₃. In case of kangkong, it was also found that treatment T₃ (9 feet distance from tree) produced highest yields (39.20 t ha⁻¹) which were statistically similar to treatment T₄ (open field referred as control). In case of sweet gourd and kangkong, the lowest yield was found in T₁(3 feet distance from the tree). The growth characters of lohakat tree (*Xylia dolabriformis*) tree are not satisfactory in association with kangkong and sweet gourd at 9 feet distance from lohakat tree (*Xylia dolabriformis*) tree.

Key words: Performance, kangkong, vegetables, agroforestry.

Introduction

In Bangladesh, a large number of vegetable are grown throughout the year including summer season. About 30 per cent of vegetable are produced in summer and rainy seasons. The average consumption of vegetable in Bangladesh is only 70 g per head per day including potato and sweet potato. To supply the minimum daily requirement of 200g vegetable head day⁻¹, national production of vegetable should be over 10 million ton in addition. The effective area of forest in Bangladesh is neither in a position to fulfill the requirements of the people's fuel and timber nor to stabilize the climatic condition. So, conflict for land use between agriculture and forestry are prevalent in Bangladesh. Under these circumstances it is necessary to find out a suitable alternative to overcome this situation. Recently, some techniques have already been advocated to overcome future food challenges, vegetable agroforestry is one of them. The integration of tree and crop or vegetable on the same area of land is a promising production system for maximizing yield and maintaining friendly environment (Nair, 1990). In Bangladesh; different crops are cultivated in summer season. Among the different summer vegetables okra and bottle gourd are the important summer vegetables in Bangladesh. These are well known and very popular vegetables grown successfully during summer season in Bangladesh. For identifying the compatible tree-crop combination, particularly under storey species i.e. different crops should be screened out in terms of their adaptability and yield in association with the early stage of tree. Therefore, it would be wise to conduct experiments under different tree crop or vegetable combination at different spacing for screening of different crops in terms of their growth and yield performance. The specific objectives of the study were to observe the performance of kangkong and sweet gourd in association with lohakat tree tree and to observe their interaction.

Materials and Methods

The study was made to evaluate the performance of vegetables in association with four years old lohakat tree. The soil of the experimental area was a medium high land. The texture of the soil was silty loam having pH 6.7 (Amir and Bhuiya, 1994). The topography of the field was medium high land above flood.

Tree and plant materials: In this study the four years old previously established lohakat tree (*Xylia dolabriformis*) tree were used as tree components. The seeds of kangkong variety BARI Gimakalmi were also collected from International Seed Fair in Bangladesh Agricultural University campus, Mymensingh. The seeds of sweet gourd variety BARI Misti Kumra-1 were collected from International Seed Fair in Bangladesh Agricultural University campus, Mymensingh.

Experimental design and treatment combination: The study for okra and bottle gourd was laid out following the Randomized Complete Block Design with single factorial arrangement and three replications. Individual plot size was 9 ft x 2 ft. Four treatments were used in this study which is as follows: T₁= 3 feet distance from the tree base, T₂=6 feet distance from the tree base, T₃=9 feet distance from the tree base and T₄=Open field referred to as control

Land preparation: The experimental land was first opened on 05 February 2016 and the operation was done by spade. Then the land was fallow for few days. All crop residues and weeds were removed from the field and finally the land was properly leveled.

Crop establishment and management: Seeds of kangkong and sweet gourd were directly sown in the experimental plot on 15 February 2016. Seeds of Seeds of kangkong were sown following the line sowing method and the spacing was 10 cm x 20 cm. Seeds of sweet gourd were sown following the spacing 40 cm x 45 cm. Only recommended dose of well decomposed cowdung were applied for the all crop species. No chemical fertilizer was applied considering the suitable fertility status of the soil. Full amount of well decomposed cowdung was incorporated during the final land preparation. The plots were irrigated seven times by using water cane to supply sufficient soil moisture for the vegetable. Finally, okra was harvested in several pickings; first harvesting was done 70 days after the seed sowing. Bottle gourd was harvested by cutting the twigs as vegetables as they were not grown for fruit cultivation.

The data were collected from the experiment at different stages of various growths and then analyzed statistically by using PC- MASTAT software package to find out the statistical significance of the experimental results. The means for all the treatments and analysis of variance of yields of the summer vegetables were calculated by Duncan's Multiple Range Test (DMRT).

Results and Discussion

Performance of kangkong in association with lohakat tree (Xylia dolabriformis)

Kangkong was cultivated under different distance from the tree. It grew more vigorously in the open field than those grew close distance to the tree. The first harvesting was done at 55 days after seed sowing by cutting the main branch and the number of branch was increased later. Branching and growth were more vigorous in the open field than those grew close distance to the tree. The highest average number of branching was 19, found in T₄ (Open field referred as control) and lowest average number of branching was 05, found in T₁ (3 feet distance from the tree). Other than the T₄ (Open field referred as control) highest average number of branching was 15, found in T₃ (9 feet distance from the tree) showing no statistical difference to T₂. The highest average length of branch was 27 cm, found in T₄ (Open field referred as control) and lowest average length of branch was 64 cm, found in T₁ (3 feet distance from the tree).

Good foliage indicates higher growth, development and productivity of plant. The result of the experiment showed that the number of leaves per plant gradually increased with time being highest at 65 DAS (Plate 1). The highest number of leaves plant⁻¹ was 121 when plants were grown under treatment T₄ (Open field referred as control). The lowest number of leaves plant⁻¹ (90) was found under treatment T₁ (3 feet distance from the tree), (Table 1). Number of leaves per plant showed significant variation due to different distance of kangkong plant from the tree.

The stem weight plant⁻¹, leaf weight plant⁻¹ and total weight plant⁻¹ showed significant variation due to different distance of kangkong plant from the tree. The highest stem weight plant⁻¹, leaf weight plant⁻¹ and total weight plant⁻¹ were 206 g, 95 g and 301 g respectively, found in T₄ (Open field referred as control).

The lowest stem weight plant⁻¹, leaf weight plant⁻¹ and total weight plant⁻¹ were 55 g, 25 g and 80 g respectively, found in T₁ (3 feet distance from the tree).

Table 1. Morphological characteristics of kangkong in association with lohakat tree

Treatments	No of branch plant ⁻¹	Average length of branch (cm)	No. of leaves plant ⁻¹	Stem weight plant ⁻¹ (g)	Leaf weight plant ⁻¹ (g)	Total weight plant ⁻¹ (g)
T ₁	5c	19b	20d	55c	25b	80c
T ₂	14b	21b	60c	163b	89a	252b
T ₃	15b	25a	90b	195a	90a	285a
T ₄	19a	27a	121a	206a	95a	301a
CV	0.23	0.43	1.11	1.87	0.87	2.12
Level of significance	**	**	**	**	**	**

**= Significant at 1% level of probability

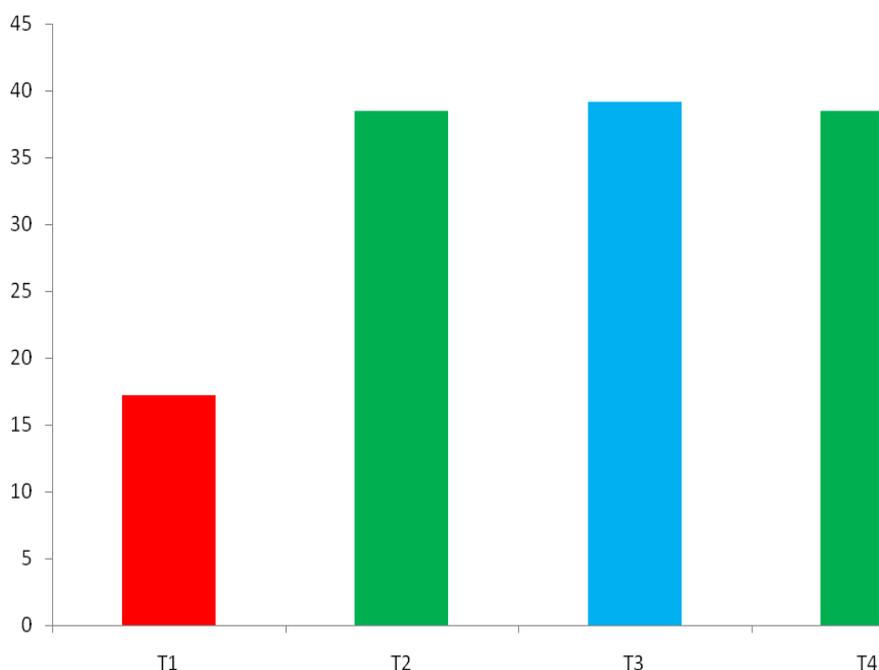


Fig.1. Yield of kangkong in association with lohakat tree (*Xylia dolabriformis*)

The variation in yield of Kangkong ton per hectare due to different treatments was found significant. As evident from results, the highest yield of Kangkong (39.20 t ha⁻¹) was obtained from treatment T₃ (9 feet distance from the tree) T₄ (Fig.1). On the other hand, the lowest yield of Okra (17.20 t ha⁻¹) was found from treatment T₁ (3 feet distance from the tree). The second highest yield of Kangkong (38.50 t ha⁻¹) was obtained from (Open field referred as control).

Performance of sweet gourd in association with lohakat tree (*Xylia dolabriformis*)

Sweet gourd was cultivated under different distance from the tree. It grew more vigorously in the open field than those grew close distance to the tree. The first harvesting was done at 65 days after seed sowing by cutting the main branch and the number of branch was increased later. Branching and growth were more

vigorous in the open field than those grew close distance to the tree. The highest average number of branching was 06, found in T₄ (Open field referred as control) and lowest average number of branching was 02, found in T₁ (3 feet distance from the tree). The highest average length of branch was 124 cm, found in T₄ (Open field referred as control) and lowest average length of branch was 64 cm, found in T₁ (3 feet distance from the tree). Other than the T₄ (Open field referred as control) highest average length of branch was 115 cm, found in T₃ (9 feet distance from the tree).

Table 2. Morphological characteristics of sweet gourd in association with lohakat tree

Treatments	No. of branches plant ⁻¹	No. of Leaves plant ⁻¹	Average length of the branch (cm)	Stem weight of branches plant ⁻¹ (g)	Leaf weight of branches plant ⁻¹ (g)	Total weight of branches plant ⁻¹ (g)
T ₁	2c	10c	64c	36c	74c	110c
T ₂	4b	20b	109b	96b	192b	288b
T ₃	5a	25a	115b	99b	204a	303a
T ₄	6a	30a	124a	107a	213a	320a
CV	0.11	0.56	1.22	1.01	1.89	2.12
Level of significance	**	**	**	**	**	**

**= Significant at 1% level of probability

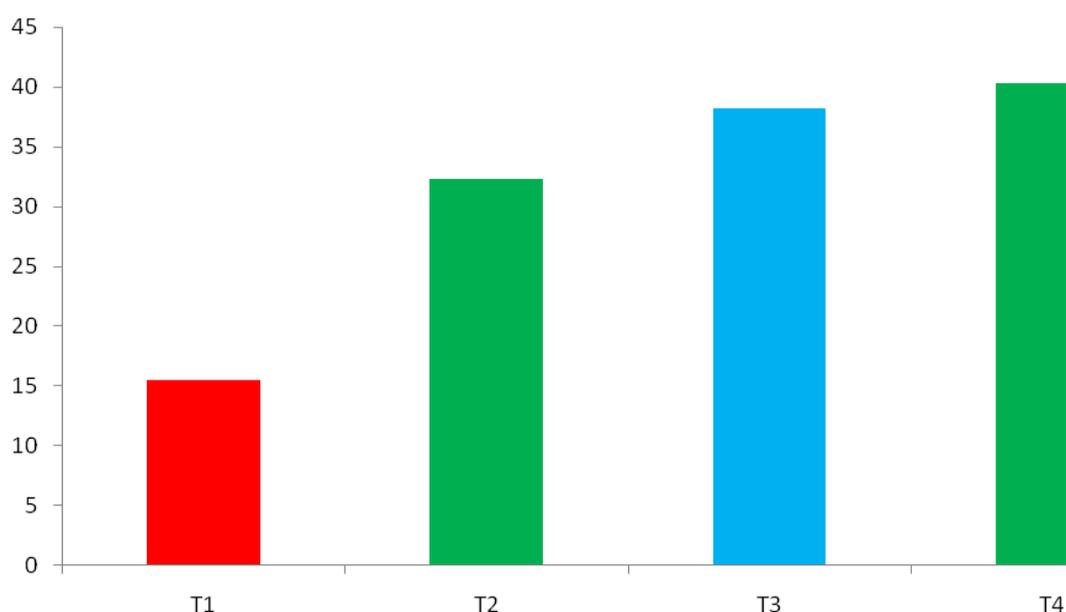


Fig. 2. Yield of sweet gourd in association of lohakat tree (*Xylia dolabriformis*)

The result of the experiment showed that the number of leaves per plant gradually increased with time being highest at 65 DAS. The highest number of leaves plant⁻¹ was 30 when plants were grown under treatment T₄ (Open field referred as control).The lowest number of leaves plant⁻¹ (10) was found under treatment T₁ (3 feet distance from the tree), (Table 2). Number of leaves per plant showed significant variation due to different distance of Sweet gourd plant from the tree.

The highest stem weight plant⁻¹, leaf weight plant⁻¹ and total weight plant⁻¹ were 107 g, 213 g and 320 g respectively, found in T₄ (Open field referred as control).The lowest stem weight plant⁻¹, leaf weight plant⁻¹ and total weight plant⁻¹ were 36 g, 74 g and 110 g respectively, found in T₁ (3 feet distance from the

tree). The stem weight plant⁻¹, leaf weight plant⁻¹ and total weight plant⁻¹ showed significant variation due to different distance of Sweet gourd plant from the tree.

The variation in yield of Sweet gourd ton per hectare due to different treatments was found significant. As evident from results (Fig. 2), the highest yield of Sweet gourd (40.30 t ha⁻¹) was obtained from treatment T₄. On the other hand, the lowest yield of Sweet gourd (15.0 tha⁻¹) was found from treatment T₁ (3 feet distance from the tree). Sayed *et al.* (2009) showed that highest production of vegetables was recorded in control condition (without tree) which was significantly similar with 3 and 4 feet distance from the tree base and the lowest was observed under one feet distance which was almost similar with 2 feet distance.

Conclusion

The result revealed that among the tree-crop interaction, tree- kangkong and tree-sweet gourd gives highest value of yield and other morphological characters in T₃(9 feet distance from tree) which is statistically similar to T₄ (open field referred as control).

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