

PERFORMANCES OF TWO AMARANTHS GROWN UNDER AGROFORESTRY SYSTEM

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ABSTRACT

An experiment was carried out at Char Sadipur near Pabna town during August to February, 2015 to evaluate the growing performance of two winter vegetables grown under Telsur (*Hopea odorata*) saplings. The vegetables were stem amaranth (*Amaranthus lividus*) and red amaranth (*Amaranthus gangeticus*). Each vegetable were laid out using the Randomized Complete Block Design (RCBD) with three replications as separate experiment. In each experiment vegetables are grown at different distance from tree base which were treated as different treatment. Performance of winter vegetables in terms of morphological parameters as well as fresh and dry yield was affected significantly by distance from the tree. The result showed that vegetable production was the highest recorded in control treatment which was significantly similar with 2, 3 and 4 feet distance from the tree base and the lowest was observed less than 1 feet distance. Among the different morphological characteristics of winter vegetable, stem girth, fresh weight and dry weight decreased consistently with the decrease of distance from sapling where the best result was obtained under 4 feet distance from Telsur sapling.

Key words: Performance, telsur, vegetables.

Introduction

The actual forest area of Bangladesh is approximately 17.50% (BBS, 2004). But in order to enjoy the benefits of nature, at least 25 percent of our land area must be covered with forest. Again, human nutrition is very essential to develop a nation in every way. Vegetables can play a crucial role in this. In general, vegetables are rich sources of minerals, vitamins and essential amino acids. A few techniques have recently been advocated to overcome the future food challenges and confirming the environmental benefits, Agroforestry in one of them. Agroforestry, the integration of tree and crop or vegetable on the same piece of land, is a promising production system for maximizing yield and maintaining a friendly environment (Nair, 1990). Telsur is a forest plant species from the *Dipterocarpaceae* family. It is found in Bangladesh, Cambodia, India, Laos, Malaysia, Myanmar, Thailand and Vietnam. It is a large tree that grows up to 45 m high and the base of the trunk reaches a diameter of 4.5 m. It grows in forests, preferably near rivers, at altitudes between 0 and 600 m. Valued for its wood, it is an endangered species in its natural habitat (IUCN, 2006). Vegetable cultivation under Telsur provides both the demand for wood and for human food. To increase overall production, the current study was therefore conducted with the aim of evaluating the performance of important vegetables grown under Telsur tree, to identify the appropriate Agroforestry system for maximum land use in Bangladesh.

Materials and Methods

The study was made to evaluate the performance of vegetables in association with sapling of telsur timber species. 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 level. The vegetables were stem amaranth (*Amaranthus lividus*) and red amaranth (*Amaranthus gangeticus*). Randomized Complete Block Design (RCBD) with three replications as separate was

practiced in this experiment. In each experiment vegetables are grown at different distance from tree base which were treated as treatment viz., T₀ = Open field referred to as control, T₁ = 1 feet distance from the tree, T₂ = 2 feet distance from the tree, T₃ = 3 feet distance from the tree T₄ = 4 feet distance from the tree. The seeds were directly sown following broadcasting method in the experimental plot on 20th November 2015. The seeds were sown. After emergence finally all vegetables were thinned out maintaining 10 and 15 cm distance from plant to plant. Plant samples were collected randomly from all the respective plots. Ten plants were selected from each pot for data collection. Data regarding various parameters under study for the experiment were statistically analyzed by the computer using statistical package programme MSTAC-C. Mean comparisons were done by DMRT (Duncan's Multiple Range Test) at 5% level of significance.

Results and Discussion

Morphological characters of red amaranth (*Amaranthus gangeticus*) grown with different spacing in association with telsur (*Hopea odorata*) tree sapling.

Plant height (cm): Due to the effect of seedling ages the plant height of red amaranth (*Amaranthus gangeticus*) was affected significantly (Table 1). The best plant height (17.09 cm) was recorded in without seedling treatment (Table 1). It was noticeable that plant height of red amaranth (*Amaranthus gangeticus*) was significantly increased with the increase of distance of seedling. Similar type results were observed by Dhukia *et al.* (1988).

Stem girth (cm): Stem girth of Red amaranth (*Amaranthus gangeticus*) was also significantly influenced with increasing distance from tree base (Table 1). Like plant height similar tend variation was observed in case of stem girth where the highest stem girth recorded under control condition (2.21 cm) and lowest at 1 feet distance (1.826 cm) from tree base.

No. of leaves plant⁻¹: No. of leaves plant⁻¹ is the most important yield contributing character, which was also significantly influenced by different distance from telsur plant. No. of leaves plant⁻¹ was significantly influenced by different distance orientation from the base (Table 1) significantly. The highest no. of leaves (14.31) was recorded in control and the second two highest no. of leaves plant-1 (14.01 and 12.01) was observed in 4 and 3 feet.

Fresh weight (g plant⁻¹): Fresh weight per plant differed significantly between the treatments (Table 1). The best plant fresh weight (21.01 g) was recorded in without seedling treatment. The lowest plant fresh weight (15.15g) was observed under 1 feet distance from seedling. It was noticeable that plant fresh weight of red amaranth (*Amaranthus gangeticus*) was significantly increased with the increase of distance of seedling. Similar type results were observed by Dhukia *et al.* (1988).

Table 1. Morphological characters of red amaranth (*Amaranthus gangeticus*) grown with different spacing in association with telsur (*Hopea odorata*) tree sapling

Treatment	Plant height(cm)	Stem girth(cm)	No. of leaves of plant	Fresh weight (g plant ⁻¹)
T ₀	17.09a	2.21a	14.31a	21.01a
T ₁	13.02d	1.826c	9.66d	15.15 d
T ₂	13.81c	1.926b	9.91c	16.0c
T ₃	15.44b	2.025a	12.01b	18.21b
T ₄	16.93a	2.10a	14.01a	19.89a
Level of sig.	**	**	**	**
LSD	1.231	0.0911	1.986	0.97

Here, T₀ = Open field referred to as control, T₁ = 1 feet distance from the tree, T₂ = 2 feet distance from the tree, T₃ = 3 feet distance from the tree T₄ = 4 feet distance from the tree

Dry weight (g plant⁻¹): Dry weight of Red amaranth was affected significantly by the distance from tree and root growth. The best plant dry weight (3.49 g) was recorded in without seedling treatment (Fig. 1) and the lowest plant dry weight (2.21g) was observed less than 1 feet distance from seedling. It was noticeable that plant dry weight of Red amaranth was significantly increased with the increase of distance of seedling.

Yield (tha⁻¹): The yield of Red amaranth was affected significantly at 5% level of significance due to light, nutrient and water competition. Red amaranth yield plant⁻¹ was also significantly influenced by growth of root length of different distance levels from tree base (Fig. 1). The highest yield 15.56 tha⁻¹ was recorded in the open field. Significantly the highest yield (15.50 tha⁻¹) was found in 4 feet from tree base which was statistically similar to that of the open field condition. The lowest yield (13.12 tha⁻¹) was recorded in 1 feet distance from tree base.

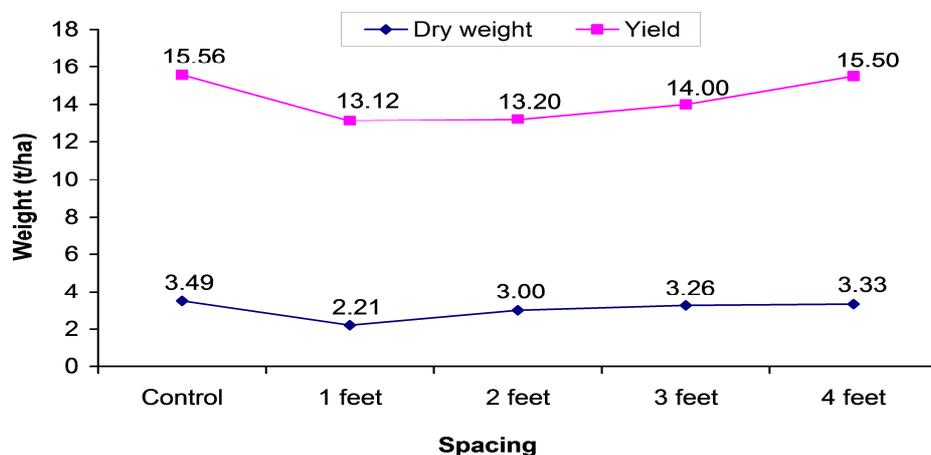


Fig 1: Dry weight and yield of Red amaranth in association with *Hopea odorata*

Morphological characters of stem amaranth (*Amaranthus lividus*) grown with different spacing in association with telsur (*Hopea odorata*) tree sapling.

Plant height (cm): Due to the effect of seedling ages the plant height of stem amaranth (*Amaranthus lividus*) was affected significantly (Table 2). The best plant height (58.80 cm) was recorded in without seedling treatment (Table 2). It was noticeable that plant height of Stem amaranth (*Amaranthus lividus*) was significantly increased with the increase of distance of seedling.

Stem girth (cm): Stem girth of stem amaranth (*Amaranthus lividus*) was also significantly influenced with increasing distance from tree base (Table 2). Like plant height similar tend variation was observed in case of stem girth where highest stem girth recorded under control condition (3.93 cm) and lowest at 1 feet distance (3.25 cm) from tree base.

No. of leaves plant⁻¹: Due to the effect of seedling ages the no. of leaves plant⁻¹ of stem amaranth (*Amaranthus lividus*) was affected significantly (Table 2). The best plant no. of leaves (24.31) was recorded in without seedling treatment (Table 2).

Table 2. Morphological characters of stem amaranth (*Amaranthus lividus*) grown with different spacing in association with telsur (*Hopea odorata*) tree sapling

Treatment	Plant height(cm)	Stem girth(cm)	No. of leaves of plant	Fresh weight (g plant ⁻¹)
T ₀	58.80a	3.93a	24.31a	84.29a
T ₁	52.49d	3.25d	17.24d	80.00d
T ₂	54.80c	3.55c	19.54c	81.614c
T ₃	56.80b	3.77b	22.05b	82.13b
T ₄	58.75a	3.91a	24.25a	83.92a
Level of sig.	**	**	**	**
LSD	1.901	0.123	2.175	1,07

Here, T₀ = Open field referred to as control, T₁ = 1 feet distance from the tree, T₂ = 2 feet distance from the tree, T₃ = 3 feet distance from the tree T₄ = 4 feet distance from the tree

Fresh weight (g plant⁻¹): Fresh weight per plant differed significantly between the treatments (Table 2) Plate1. The best plant fresh weight (84.29 g) was recorded in without seedling treatment (Table 2). The lowest plant fresh weight (80.00 g) was observed under 1 feet distance from seedling. It was noticeable that plant fresh weight of Stem amaranth (*Amaranthus lividus*) was significantly increased with the increase of distance of seedling.

Dry weight (g plant⁻¹): Dry weight per plant differed significantly between the treatments (Fig. 2). The best plant dry weight (8.25 g) was recorded in without seedling treatment. The lowest plant dry weight (7.021 g) was observed under 1 feet distance from seedling.

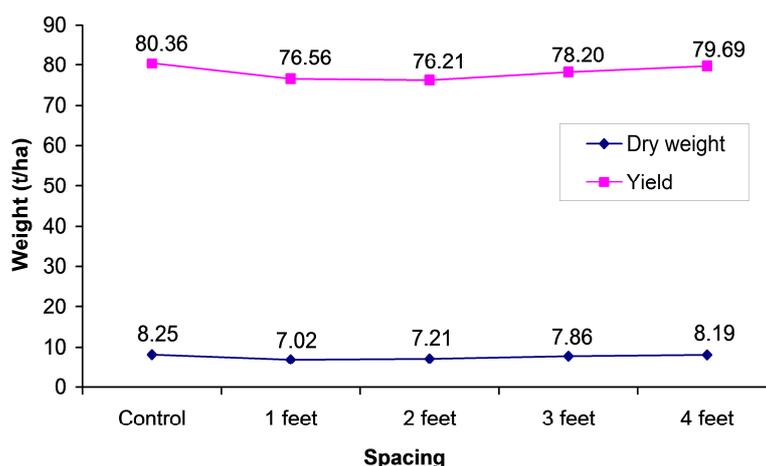


Fig 2: Dry weight and yield of Stem amaranth in association with *Hopea odorata*

Yield (tha⁻¹): The yield of stem amaranth was affected significantly at 5% level of significance due to light, nutrient and water competition. Stem amaranth yield plant⁻¹ was also significantly influenced by growth of root length of different distance levels from tree base (Fig. 2). The height yield (80.36 tha⁻¹) was recorded in the open field. Significantly the highest yield (79.69 tha⁻¹) was found in 4 feet from tree base which was statistically similar to that of the open field and the lowest yield was observed in 1 feet distance from seedling was (76.562 tha⁻¹).

Conclusion

The highest vegetable production was recorded under 4 feet distance from Telsur sapling which was statistically similar with control and the lowest vegetable production was observed under 1 feet distance from Telsur sapling.

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