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EFFECT OF VERTICAL TRAILING ON VEGETATIVE, REPRODUCTIVE AND YIELD OF LUFFA AS INTERCROP IN COCONUT FIELD

ABDUL HAMEED SOLANGI[*], JAVEED AKHTAR BALOCH[*] AND M. ZAFAR IQBAL[**]

[*]*Coastal Agricultural Research Station, SARC, PARC, Karachi, Pakistan*
[**]*Department of Botany, University of Karachi, Karachi-75270, Pakistan.*

Abstract

Intercropping trial in coconut (*Cocos nucifera* L), was carried out for generating more income/yield. The experiment was conducted at Coastal Agricultural Research Station (CARS) Farm, PARC, Karachi. The Tori varieties planted ridge gourd (L*uffa acutangul*la Roxb.) and sponge gourd (*Luffa cylindrica* L.) under the trail staked and unstaked Tori were grown satisfactory under coconut plot. The results showed that the staked method compared to unstaked had 30-35% increase in yield and also insect pest protection. The yield data recorded showed that staked gave maximum yield. It was also found that the intercropping did not affect the agronomic trails and yield of the coconut, but increase the yield compared to palms alone.

Introduction

The sponge gourd and ridged gourd belonging to family Cucurbits are common vegetable throughout Pakistan. There is difference in the nutritive value of these two species. This crop is an annual of climbing or trailing habit and grown for its fruit, when tender is considered a good vegetable. The vegetables constitute an important item of human diets, according to a dietician, is 284g per head, i.e. about 20 per cent of the daily requirement of the total food of an adult (ICAR, 2004). The dry, fibrous, inner portion of the mature fruit of luffa is used for bathing, cleaning utensils, making shoe sales, and also as filters in factories (Malik, 1994). According the Pocha & Sons (1952) the fruits when ripened form inside a tough fibrous mass which when the seeds and shell removed are used for bathing and for scouring cooking utensils. The ridge gourd has longitudinal ribs and is light-green in colour. Its seeds are dark black and rough textured. The sponge gourd has a smooth, dark green skin, its seeds are white and black.

Training is an important cultural practice which is done for a lot of horticultural crop. This is particularly critical for a cop that possesses heavy foliage which tends to restrict light penetration to lower leaves and thus lowers also the photosynthetic efficiency of the crop. The dense veining canopy also hampers proper air circulation and enhances high humidity that can promote the occurrence and spread of disease. Luffa requires a lot of space, so plant seeds in hills spaced 6 feet apart or space plants about 3-4 feet apart in a single row. Provide a trellis or plant along a fence. Fruits touching the soil develop decay so mulch will be helpful (James, 2003). Two to three seeds are planted per hill, which are later thinned to one or two plants per hill. If support is provided for climbing, yield is considerably increased (Malik, 1994).

Vertical training or trellising has been reported to improve the yield and quality of Cucumber and to aid in the control of its foliar and fruit diseases (Konsier & Strides, 1973). Improved photosynthetic efficiency has also been cited as one of the possible reasons for the observed increased yield (Hanna. *et al*., 1987). Anjum & Amjad (1999) revealed that plant height, number of leaves per plant, number of pods per plant, pod length and green pod yield were affected significantly by using different fertilizer combination.

Intercropping of coconut is a way of increasing productivity by planting inter-spaces of a coconut farm. Thus using the same land area with no other crop or land area with no other crops or land use displaced usually increases crop production per hectares. Simultaneous growing of several crops in coconut areas offers several advantages over mono-cropping, such as increased utilization , increased productivity per unit area due to yield of intercrops and increased coconut production and over all the farm production (Magat,1990). The manure and fertilizer requirements of ridge and sponge gourd grown in interspaces of coconuts, the highest yield of the crop and the benefit cost ratio was recorded in recommended dose of NPK +50% of FYM. The intercropping also improved the yield of coconut palm from70 to 75 nuts per palm per year (Nair & Nair, 2006). Pepper on *G. sepium* gave almost double the yield (nut/palm/year) compared to pepper trained on to coconut palms. Coconut yields in the trial area was higher than that of the rest of the estate (Anon., 1985). Therefore this study was undertaken to find out the effect of different methods on growth and yield of tori in coconut crop under the agro- climatic condition of Karachi, Pakistan.

Materials and Methods

The study was conducted at the Coastal Agricultural Research Station, Malir, Karachi during the growing season 2006-2007. The experiment was laid out in randomized complete block design (RCBD) using 5 different methods alongwith control treatment.

Two cultural methods were used as staked and unstaked treatments. In the staked treatment, the main stem of the plant was tied with support post (bamboo). Plastic rope was used to connect one support to another for trailing of lateral stems. Spaced the plant 30cm apart. Three rows (each row length of 10m) were assumed as replicates with a 2m distance between rows. All the experiments were designed under coconut crop to observe the effect of intercrop on the coconut yield.

In the unstaked treatment, the plants were allowed to vine on the ground using the same plant spacing. The observation were taken on percentage of germination, number of leaves every week, vine length, leaf width, length (cm) and number of female flowers on the main stem and the lateral stems.

The fruits of the selected 5 were plants regularly harvested to determine the number and fresh weight of fruits harvested per week. Fresh weight of the fruit after the harvest was also determined. Two varieties of Tori (*Luffa acutangull*a) and spong gourd (*Luffa gladrica*) were used for experiment. The experimental treatments were T1=unstaked, T2=staked, T3=Tori on ground (unstaked), T4=Tori and Tori on staked, T5=Tori and T6=Tori on ground (unstaked).

Results and Discussion

Both the varieties (*L. acutangulla* and *L. gladrica*) performed well at soil pH 8.5. The fruit was about 10 to 12cm long when fully grown. It was club shaped and dark green in color. Ghiya Turai was smooth and cylindrical. It was about 12 to 15cm long.

The seeds of two varieties of Tori i.e., smooth and ridge were propagated on staked and unstaked methods. It was observed that the staked method was better than unstaked method with reference to production of fruits. Table 2 showed the vegetative features such as vine length and number of leaves was almost same in staked and unstaked methods. Both the varieties smooth and ridge gave higher yield of fruits on staked method. The fruit width was greater in staked as compared to unstaked. It was also observed that the insect pests attack was less on staked method than unstaked method.

Smooth luffa fruits were shaped like cucumbers but are larger as 1-2 feet in length and 4-5 inches width. The exterior was green, sometimes mottled and smooth with longitudinal lines. Fruit of the angled luffa was characterized by sharp, elevated ridges running the length of the pods. These results are similar to those of James (2003). The expenditure on control measures was less on staked method as compared to unstabled. The studies regarding effect of vertical trailing on vegetative growth and yield of Tori and Ghiya Turai planted on staked and un-staked methods (Tables 1 and 2) showed that the staked method was better as compared to un-staked method. The other vegetative parameters like vine length, number of leaves were same in both methods. As far as attack of insect pest is concerned, plants grown under staked method were found less affected by insect pests. Intercropping of Luffa under coconut plantation indicated that the coconut nut production was more as compared to control (Table 3).

The nut yield data for the year 2006 to 2007 were studied and the nut yield per palm for the different applications is given in Table 3. The data indicated a positive effect on the yield due to the two *Luffa* varieties. Four harvest moving average of the nut yield due to the *Luffa* vegetable was compared with the control according to Sreekala & Jayachandran (2006). It was concluded that vegetables like *Luffa* can be intercropped with coconut as they did not affect the growth of the palm. It was also proved that a profitable venture to augment farmer's income could be achieved by intercropping. It indicated that intercropping did not affect the yield of coconut in those areas where sufficient soil water storage and both crops are not properly managed.

Conclusion

Among the different methods, the staked method proved as the best method due to its production of longest fruit, height, fruit weight, number of fruit per plant and ultimately the highest yield. Results from the intercropping of tori under coconut palm suggest that these crops are particularly important as alternate source of income if replanting is under way. It needs further confirmation of the same investigation as the results of the present study have been based on the single experiment data.

Table 1. Effect of the staked and unstaked methods on the vegetative and yield of Turai (Smooth).

Characters	Staked (Turi) smooth		Unstaked (Turi) smooth	
	Mean	s.e (±)	Mean	s.e (±)
Vine length (cm)	514.6	± 28.02	877	± 15.20
No. of leaves	55.2	± 2.67	53.2	± 1.82
Leaf length (cm)	24.2	± 1.71	20.56	± 0.65
Leaf width (cm)	23.02	± 0.75	16.28	± 1.03
Fruit length (cm)	23.62	± 1.37	15.86	± 1.14
Fruit width (cm)	5.2	± 0.35	4.62	± 0.34
Fruit wt. (g)	163.1	± 21.69	104.98	± 8.88
Fruits/vine (no.)	38.8	± 5.33	55.2	± 3.69

Table 2. Effect of the staked and unstaked methods on the vegetative and yield of Tori (Ridge).

Characters	Staked (Turi) Ridge		Unstaked (Turi) Ridge	
	Mean	s.e (±)	Mean	s.e (±)
Vine length (cm)	528.2	± 21.86	580.2	± 36.98
No. of leaves	70.2	± 3.09	88.4	± 8.47
Leaf length (cm)	31	± 2.34	27.86	± 7.76
Leaf width (cm)	25.06	± 1.69	21	± 0.88
Fruit length (cm)	20.26	± 1.20	12.58	± 1.20
Fruit width (cm)	5.98	± 0.26	4.76	± 0.40
Fruit wt. (g)	109.4	± 8.73	81.56	± 5.48
Fruits/vine (no.)	65.2	± 5.26	53.8	± 2.17

Table 3. Nut yield of coconut as intercropped with luffa.

Treatment	Control	Tori (Smooth)	Tori (Ridge)
1	55	72	75
2	66	78	82
3	45	85	93
4	78	90	88
5	60	84	92
Total	304	409	430
Mean	60.8	81.8	86
SD	12.31	6.94	7.51
± SE	± 5.52	± 3.11	± 3.36

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