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Research Article

Beneficial Agro-Forestry System of Guava (*Psidium guajava*) and Brinjal (*Solanum melongena* L.) for Farm Families of Uttar Pradesh

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Abstract

The field study was undertaken during two consecutive years of 2009-10 and 2010-11 in Kannauj distract of Uttar Pradesh under **"Farmers participatory Action Research Project on Water/Water Harvesting Scheme"**. The main objective was to increase the fruits productivities of brinjal and guava through agro-forestry system under five year's old plantation of guava orchard. The analyzed soil sample showed low status of plant nutrients. The selected guava was already planted by farmers themselves at spacing of 6 m x 6 m. The four treatments i.e., hybrid brinjal alone planted at spacing of 90 x 60 cm, guava + hybrid brinjal – brinjal planted at spacing of 80 x 60 cm – 6 rows, guava + hybrid brinjal – brinjal planted at spacing of 70 x 60 cm – 7 rows and guava + hybrid brinjal – brinjal planted at spacing of 60 x 60 cm – 8 rows were tested. The hybrid brinjal planted at spacing of 90 x 60 cm registered higher fruits yield by 619.00 q/ha. Among the agro-forestry system guava + hybrid brinjal - brinjal planted at the spacing of 80 x 60 cm – 6 rows between two rows of guava (6 m x 6 m) was yielded 613.00 q/ha fruits of brinjal. The system productivity in term of total productivity of hybrid brinjal fruits (613.00 q/ha) and guava fruits (173.00 q/ha) was found 786.00 q/ha, which was highest in comparison to other two treatments of agro-forestry. The order of reduction in the fruits yield of brinjal under agro-forestry was found guava + hybrid brinjal – brinjal planted at spacing of 80 x 60 cm – 6 rows (6.00 q/ha) <guava + hybrid brinjal – brinjal planted at spacing of 70 x 60 cm – 7 rows (22.00 q/ha) <guava + hyrid brinjal – brinjal at spacing of 60 x 60 cm – 8 rows (41.00 q/ha) in comparison to alone cropping of hybrid brinjal. Similarly, plantation of 6,7, 8 rows of hybrid brinjal between two rows of guava was reduced the fruit yield of guava by a margin of 23.00 q/ha, 31.00 q/ha and 35.00 q/ha, respectively.

Keywords: *Agro-forestry, Filler cropping, Guava, Hybrid brinjal, System, Productivity.*

Introduction

Brinjal is a summer season loving crop and is very susceptible to frost. Late round varieties are more tolerant of frost than the early long varieties. Cool night and short summer are unfavorable to its satisfactory yields. It requires a long growing season with the high average day and night temperature. It is a strong garden herb, grown for its large fruits. It is an annual crop largely grown in almost all parts of India as one of the principal vegetables. The fruits of brinjal has high in nutritive value and can well be compared with that of other vegetable crops. The time of seed sowing in nursery and transplanting in fields are determined by temperature, rainfall and availability of irrigation facilities. In riverine tract of Uttar Pradesh, sowing of seed in nursery is done in the second fortnight of June and transplants them after a month. Four leaved seedlings, 20 to 25 days old and about 15 cms height are good for transplanting in riverine soils of Uttar Pradesh.

Guava is one of the most important fruits and it is considered as apple of poorer. In India its

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position is fourth after mango, banana and citrus, so for as area and production of major fruits is considered. Because of the hardy nature of plant, it has high adaptability to wide range of soil and climatic conditions. Records suggest that it has been in cultivation since early time and gradually become a crop of commercial significance. Guava is prolific bearer and highly remunerative even without much care. Although it is successfully grown all over India but Uttar Pradesh is most important growing tract. The vicinity area of Ganga River and its tributaries has reputation of growing of the best guava. Previously the cultivation of guava confined as pure orchard but the sank size of holding stressed to farmers for agro-forestry as a vegi-horti etc. systems. In the context of increasing country demographic cereals and pulses may not be themselves fulfill the food requirement in future. The agro-forestry can meet the shortages of food. The pure cultivation of guava in orchards is an old practice but the size of holding sank due to increased human demography. Therefore, agro-forestry with guava may widely be accepted by resource poor farm families residing with vicinity of Gangetic River and its tributaries. With the objective guava base agro-forestry system with brinjal and their yields level of both the enterprises, the flexible plan was made and carriedout in the catchments area between river Kali and Ganga at Kannauj district under "Farmers Participatory Action Research Project on Water/Water Harvesting Scheme" funded by Central Water Commission, New Delhi.

Materials and Methods

The field study was undertaken during two consecutive years in rainy season of 2009-10 and 2010-11 in district Kannauj of Uttar Pradesh under "Farmers Participatory Action Research Project on Water/Water Harvesting Scheme" funded by Central Water Commission, New Delhi. The main objective was to increase the fruits productivities of brinjal and guava through agro-forestry system under five years old plantation of guava garden. The experimental soil was sandy loam having pH 7.3, organic carbon 0.29%, total nitrogen 0.03%, available phosphorus 8.9 kg/ha and available potash 197 kg/ha. The status of plant nutrients was low. The pH was determined by Electrometric glass electrode method (Piper, 1950), while organic carbon was determined by Calorimetric method (Datta, *et al.,* 1962). Total nitrogen was analyzed by Kjeldahl's method as discussed by Olsen's method (Olsen, *et al*., 1954) and Flame photometric method (Singh, 1971), respectively. The selected guava orchard was already planted by farmers themselves at spacing of 6 m x 6 m. The selected guava orchard was not much developed. Four treatments i.e, hybrid brinjal alone planted at spacing of 90 x 60 cm, guava + hybrid brinjal – brinjal planted at spacing of 80 x 60 cm – 6 rows, guava + hybrid brinjal – brinjal planted at spacing of 70 x 60 cm – 7 rows and guava + hybrid brinjal – brinjal planted at spacing of 60 x 60 cm – 8 rows were tested. The hybrid brinjal crop was fertilized with 200 kg N + 150 kg P_2O_5 + 100 kg K_2O/ha. The Azad hybrid cultivar of brinjal was used for this experiment, which was transplanted in pure and agro-forestry system with guava cv. L-49. The recommended package of practices were followed for raising of both enterprises. The irrigations were given to brinjal as and when required after termination of monsoon.

Results and Discussion

The pooled data of two years on filler crop of hybrid brinjal and plantation enterprise of guava under different aspect are available in Table-1 and discussed here under appropriate heads.

Table 1: Yield of hybrid brinjal and guava under different treatments
(*Pooled data of two years*)

Sl. No.	Treatment	Yield (q/ha)		System productivity (q/ha)	Reduction in yield of filler brinjal (q/ha)	Increase/ decrease in system productivity (q/ha)
		Hybrid brinjal	Guava			
1.	Hybrid brinjal alone planted 90 x 60 cm spacing	619.00	-	619.00	-	(-)167.00
2.	Guava+hybrid brinjal-brinjal planted at spacing of 80x60 cm – 6 rows	613.00	173.00	786.00	6.00	-
3.	Guava+hybrid brinjal-brinjal planted at spacing of 70x60 cm – 7 rows	597.00	165.00	762.00	22.00	(-)24.00
4.	Guava+hybrid brinjal-brinjal planted at spacing of 60x60 cm – 8 rows	578.00	161.00	739.00	41.00	(-)47.00
5.	Guava alone-data collected from farmers field by survey.	-	196.00	196.00	-	(-)590.00

Yield of Hybrid Brinjal under Different Systems (q/ha)

The hybrid brinjal alone planted at spacing of 90 x 60 cm registered higher yield by 619.00 q/ha, closely followed by agro-forestry system of guava + hybrid brinjal by 613.00 q/ha, where brinjal planted at the spacing of 80 x 60 cm and adjusted six rows between two rows of guava. The guava + hybrid brinjal planted at spacing of 70 x 60 cm and adjusted seven rows between two row of guava yielded fruits by 597.00 q/ha. The lowest yield of hybrid brinjal was found under guava + hybrid brinjal (60 x 60 cm) by 578.00 q/ha, where eight rows of hybrid brinjal was adjusted between two rows of guava. The adjustment of high plant density and competition in uptake of nutrients among the plant were responsible for the reduction of fruits yield of brinjal. These results are in agreement with those reported by Singh (2011), Singh, *et al.,* (2016), Singh, *et al.,* (2011) and Singh, *et al.,* (2011).

Yield of Guava Obtained under Different Systems

The guava planted with hybrid brinjal under treatment of guava + hybrid brinjal – brinjal planted at spacing of 80 x 60 cm – 6 rows between two rows of guava gave fruits yield of guava by 173.00 g/ha at initial stage, followed by guava + hybrid brinjal – brinjal planted at spacing of 70 x 60 cm – 7 rows between two rows of guava by 165.00 q/ha. The guava + hybrid brinjal – brinjal planted at spacing of 60 x 60 cm – 8 rows between two rows of guava produced lowest fruits yield of guava by 161.00 q/ha. The pure guava yield noted from the survey from adjoing experimental area was recorded to 196.00 q/ha, which was highest over the yield of guava fruits of agro-forestry systems. The lower yield of guava under agro-forestry systems was due to smoothening effect of hybrid brinjal on guava. These results confirm the findings of Singh, (2011), Singh, *et al.,*

(2016), Singh, *et al.*, (2011) and Singh, *et al.*, (2011) reported under agro-forestry system of guava base.

System Productivity (q/ha)

The system productivity computed in term of total productivity of fruits yield of hybrid brinjal and guava under agro-forestry and alone cropping of both the enterprises. The highest system productivity by 786.00 q/ha was recorded in agro-forestry system of guava + hybrid brinjal – brinjal planted at spacing of 80 x 60 cm – 6 rows between two rows of guava, followed by guava + hybrid brinjal – brinjal planted at spacing of 70 x 60 cm – 7 rows between two rows of guava as 762.00 q/ha. The guava + hybrid brinjal – brinjal planted at spacing of 60 x 60 cm – 8 rows between two rows of guava displayed the system productivity by 739.00 q/ha. Alone cropping of hybrid brinjal showed productivity by 619.00 q/ha and survey yield of pure guava fruits collected by 196.00 q/ha, which were noted lowest in comparison to system productivity of agro – forestry. These findings are commensurable to finding of Singh (2011), Singh, *et al.*, (2016), Singh, *et al.*, (2011) and Singh, *et al.*, (2011).

Reduction in the Yield of Filler Hybrid Brinjal

The order of reduction in the fruits yield of hybrid brinjal under agro-forestry was found guava + hybrid brinjal – brnjal planted at spacing of 80 x 60 cm – 6 rows (6.00 q/ha) <guava + hybrid brinjal – brinjal planted at spacing of 70 x 60 cm (22.00 q/ha) and < guava + hybrid brinjal – brinjal planted at spacing of 60 x 60 cm – 8 rows (41.00 q/ha) in comparison to pure productivity of hybrid brinjal. This may be due to dense demography adjustment of hybrid brinjal in rows spaces of guava.

Increase/Decrease in System Productivity

The system productivity was compared to the highest yield of 786.00 q/ha obtained from the treatment of guava + hybrid brinjal – brinjal planted at the spacing of 80 x 60 cm – 6 rows between two rows of guava. Alone cropping of hybrid brinjal and guava displayed the reduction by 167.00 q/ha and 590.00 q/ha, respectively. The guava + hybrid brinjal – brinjal planted at spacing of 70 x 60 cm – 7 rows between two rows of guava and guava + hybrid brinjal planted at spacing of 60 x 60 cm – 8 rows between two rows of guava were reduced system productivity by 24.00 q/ha and 47.00 q/ha, respectively. These findings support to results of Singh, (2011), Singh, *et al.*, (2016), Singh, *et al.*, (2011) and Singh, *et al.*, (2011).

Alone Hybrid

Intercropping of guava+hybrid brinjal

Conclusion and Recommendation

The agro-forestry system of guava + hybrid brinjal proved beneficial to the growers of guava. Therefore, the brinjal may be raised in the interspaces of guava and suggest to other growers to adoption of this technology in riverine tract for fetching more income from this technology and harvest the fruits of newly generated cropping system.

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