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Research Article

Agro-forestry system of Guava +wheat in riverine tract of Uttar Pradesh

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Abstract

The experiment was laid out during two consecutive years of 2005-06 and 2006-07 at Mainpuri district in the catchments area of river *Isan*. The main objective was to findout the suitable variety of wheat for agro-forestry of guava + wheat. The secondary objective was to utilize the space available between two rows of guava. The experimental soil was sandy clay loam, having low fertility status. The four treatment *i.e.*, guava + wheat PbW-343, guava + wheat K-9006, guava + wheat U.P.-2382 and guava + wheat K-9107 were tested under agro-forestry system. Wheat varieties sown at the distance of 25 cm and adjusted 20 rows between two rows of guava cv. L-49, which was already planted by participatory farmers themselves at the distance of 6 x 6 m^2. The different combination of agro-forestry with wheat varieties were not affected to fruits yield of guava, it was recorded 8.30 q/ha to 9.2 q/ha upto 5 to 7 year plantation of guava plants. Variety PbW-343 of wheat gave higher grain yield by 51.30 q/ha, closely followed by wheat cv. U.P. 2382 (51.15 q/ha). Wheat cultivar K-9107 yielded lowest grains by 38.80 q/ha. Likewise, wheat variety K-9006 produced grains by 47.30 q/ha. The guava + wheat cultivar PbW-343 displayed the highest system productivity by 59.80 q/ha, closely followed by guava + wheat cultivar U.P. 2382 (59.45 q/ha). The higher gross return of Rs. 116155.00/ha, net return of Rs. 69155.00/ha and BCR of 1:2.47 were recorded under guava + wheat PbW-343. Guava + wheat U.P. 2382 displayed gross return, net return and BCR by Rs. 115377.50/ha, 68377.50/ha and 2.45, respectively. Therefore, these two cultivars of wheat were found most suitable for agro-forestry system of guava + wheat.

Keywords: *Agro-forestry, catchements area, Guava + Wheat, System productivity, Wheat cvs. PbW-343 and U.P.2382.*

Introduction

Guava is one of the most important fruits and it is considered as apple of poorer. In India its position is fourth after mango, banana and citrus, so far, as area and production of major fruits is considered. Because of the hardy nature of the plant, it has high adaptability to wide range of soil and climatic conditions. Records suggested that it has been in cultivation since early time and gradually become a crop commercial significance. Guava is prolific bearer and highly remunerative even without much care. Although it is successfully grown all over India but U.P. is most important growing tract. The vicinity area of *Gangetic* 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 stress to farmers for parallel cropping. In the context of increasing country demographic cereals and pulses may not be themselves fulfill the food requirement in future. The cereals and pulses in conjunction of fruit, root and tuber crops as secondary staples 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,

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parallel cropping with guva may widely be accepted by resource poor farm families residing in the vicinity of *Gangetic* river and its tributaries. With the main objective to utilize the gapes of two rows of guava with cultivation of wheat for higher productivity of the system. Because no perfect system of package of practices of guava + wheat was not available. The feedback received from the farmers fields of Mainpuri, Etah, Budaun, Hardoi, Farrukhabad, Kannauj, Unnao, Kanupr Nagar, Lucknow, Sitapur and Prayagraj districts etc of guava growing area, there is no suitable system of guava + wheat agro-forestry. Therefore, the flexible plan was prepared and undertaken in Mainpuri district of South-Western-Semi-Arid zone IV of Uttar Pradesh by the scientists of National Agricultural Research Project, Mainpuri. Therefore, the agro-forestry system of guava + wheat is the subject matter of this manuscript.

Materials and Methods:

An experiment was laidout during two consecutive years of 2005-06 and 2006-07 at Mainpuri districts in the catchments area of river *Isan.* The main objective was to findout the suitable variety of wheat for agro-forestry system of guava + wheat in the degraded land area. The secondary objective was to utilize the space available between rows of guava for raising of wheat. The experimental soil was sandy clay loam, having pH 8.1, organic carbon 0.26%, total nitrogen 0.02%, available P_2O_5 8.3 kg/ha and available K_2O 198 kg/ha, therefore, the analyzed data of soil indicated low fertility status of plant nutrients. The pH was determined by electrometric glass electrode method (Piper, 1950), while organic carbon was determined by colorimetric method (Datta, *et al.*, 1962). Total nitrogen was analyzed by Kjeldahl's method as described by Piper (1950). The available phosphorus and potassium were determined by Olsen's method (Olsen, *et al.*, 1954) and Flam photometric method (Singh, 1971), respectively. The farming situation of the experimental area was irrigated. The four treatment *i.e.*, guava + wheat PbW-343, guava + wheat K-9006, guava + wheat U.P.-2382 and guava + wheat K-9107 were tested under agro-forestry system. Wheat varieties sown at the distance of 25 cm and adjusted 20 rows between two rows of guava cv. L-49, which was already planted by participatory farmers themselves at the distance of 6 x 6 m^2. The wheat cultivars sown 25-30 November during two experimental years. The recommended doses of NPK were given to wheat and guava. The irrigations to wheat and guava were given at five times. The wheat varieties were harvested full maturity stage after 120 days of planting. The guava fruits were supposed to be ready for harvesting when a fruits exhibited yellowish colour. Therefore, the ripened fruits of guava were plucked, weighed and obtained the final data of guava yield from participatory farmers.

Agro-forestry system of guava + wheat at 5 years old guava plantation

Agro-forestry system of guava + wheat at 7 years old guava plantation

Results and Discussion:

The pooled results of two years are presented in Table-1 and discussed here under appropriate heads :-

(A) **Fruits yield of guava:** The yield of guava cv. Lucknow-49 was more, grown in U.P. conditions, and it is heavy bearing large sized fruits, crisp pulp, soft and cream-white, acidic – sweet, dwarf, spreading, good fruiting. Good keeping quality. With these qualities it is also known as *Sardar Guava*. Therefore, the fruits yield of guava was taken, when the plantation attended the age between the five to seven year. The different combination systems of agro-forestry with wheat varieties were not influenced to fruits yield of guava, it was recorded between 8.30 q/ha to 9.20 q/ha. The high yielder cultivars of wheat gave lower yield of guava fruits in comparison to lower yielder of wheat varieties. The high yielder wheat varieties uptake the plant nutrients more from soil in comparison to low yielder wheat cultivars. This was the major reason for higher and lower fruits yield of guava. These findings are agreement with those reported by Singh (2007), Singh (2011), Singh, *et al.* (2011), Singh, *et al.,* (2011) and Singh, *et al.,* (2016).

(B) **Grain yield of wheat:** Cultivar PbW-343 of wheat registered higher grain yield by 51.30 q/ha closely followed by wheat U.P. 2382 (51.15 q/ha). Cultivar K-9107 of wheat gave lowest grain yield by 38.80 q/ha. Wheat variety K-9006 produced grain by 47.30 q/ha. The variation in the grain yield of wheat was due to genetic variability. Similar results have also been reported by Singh (2007), Singh (2011), Singh, *et al.* (2011), Singh, *et al.,* (2011) and Singh, *et al.,* (2016).

(C) **System productivity (q/ha):** The guava + wheat cultivar PbW-343 displayed the highest system productivity by 59.80 q/ha. The system productivity of guava + wheat UP-2382 (59.45 q/ha) was at par to the system productivity of guava + wheat PbW-343. Guava + wheat cv. K-9006 and guava + wheat K-9107 displayed the system productivity as 56.30 q/ha and 48.00 q/ha, respectively. The guava + wheat K-9107 agro-forestry system showed lowest system productivity (48.00 q/ha). This was due to yield variabilioity of guava and wheat cultivars. The similar results have also been reported by Singh (2007), Singh (2011), Singh, *et al.,* (2011), Singh, *et al.,* (2011) and Singh, *et al.,* (2016).

(D) **Economic studies:** The data computed on economics have been presented in Table-1. The similar cost of cultivation to Rs. 47000.00/ha was recorded under different treatments. The higher gross return of Rs. 116155.00/ha, net return of Rs. 69155.00 and BCR of 1:2.47 were recorded under guava + wheat PbW-343. The lowest gross return, net return and BCR were computed by Rs. 94780.00/ha, Rs. 47780.00/ha and BCR 1:2.02, respectively, under guava + wheat K-9107 agro-forestry system. The guava fruits production/ha and grain production of wheat/ha were responsible for higher and lower net return and BCR under different agro-forestry system.

Table-1: Yield of guava and wheat cultivars and economic studies under different agro-forestry system. *(Pooled data of two years)*

S. N.	Treatment	Yield (q/ha)		System productivity (q/ha)	Economic study (Rs./ha)			BCR
		Guava	Wheat		Cost of cultivation	Gross return	Net return	
1.	Guava + wheat PbW-343	8.50	51.30	59.80	47000.00	116155.00	69155.00	2.47
2.	Guava + wheat K-9006	9.00	47.30	56.30	47000.00	110005.00	63005.00	2.34
3.	Guava + wheat U.P. 2382	8.30	51.15	59.45	47000.00	115377.50	68377.50	2.45
4.	Guava +wheat K-9107	9.20	30.80	48.00	47000.00	94780.00	47780.00	2.02

Conclusion and Recommendation:

The agro-forestry system of guava + wheat PbW-343 and guava + wheat U.P.-2382 gave highest system productivity and net return to the growers. Therefore, the farm house holds residing in guava growing tract may be suggested for the adoption of these agro-forestry systems and harvest the fruits of newly generated technology.

Note:

1. Guava yield was taken between age of 5 to 7 year at initial fruiting stage.
2. Market rate of guava – Rs. 2500.00 per quintal
3. Market rate of wheat – Rs. 1850.00 per quintal
4. Manuval doses used in guava is included in cost of cultivation with the cost of cultivation of wheat.

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