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Congenial companion cropping system of summer pulses with guava on riverine soil of U.P.

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Abstract : The adaptive trial was carried out for two consecutive years during 2004-05 and 2005-06 in the area jurisdiction of Zonal Agricultural Research Station, Mainpuri. The site is located in the catchments area of river Kali at right bank, having riverine soils. The three and four years well thrived newly orchards of guava were selected for congenial cropping system of agro-forestry. Three varieties of black gram *i.e.*, Narendra, Urd-1, Azad Urd-1 and Shekhar-2 and three cultivar of green gram *i.e.*, Narendra Moong-1, Samrat and Malviya Jagrati (HUM-2) were grown in the interspaces of cultivar Allahabad Safeda of guava. Cultivars Narendra Moong-1 and Malviya Jagrati gave almost equal yield by 10.50 q/h and 10.70 q/ha, respectively, from the interspaces of guava. The order of varieties performance was Malviya Jagrati (10.70 q/ha) > Narendra Moong-1 (10.55 q/ha) and Samrat (9.10 q/ha) in agro-forestry system of guava + green gram. Cultivar Shekhar-2 of blank gram gave highest grain yield of 9.85 q/ha closely followed by Narendra Urd-1 (9.50 q/ha) from the interspaces of guava. Azad Urd-1 yielded grain by 8.95 q/ha from the interspaces of guava. At initial stage, the average yield of guava fruits was recorded by 78.00 q/ha in companion cropping systems, which was higher over the sole cropping of guava (70.00 q/ha) under riverine eco-system.

Key words : Congenial cropping system, Generic variability, Shadiness environment, Umbriferous environment, Thermal heat

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Guava is one of the most important fruit and it is considered as apple of resource poor farm families because its orchards survive well on the denuded riverine soil of U.P. In India its position is forth after mango, banana and citrus, so far as area and production of major fruits are considered. Because of the hardy nature of the 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 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 stressed to farmers for parallel cropping.

In younger garden of guava, the field crops can be economically harvested up to 5-6 years and some time 8-9 yeras. The younger guava plants have almost nil adverse effect on growth and yield of field crops. 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. The parallel cropping in guava may widely be adopted by resource poor farm families, residing in the vicinity of gangetic river and its tributaries. Therefore, in younger orchards of guava agri-horti system with summer pulses under two tier system has been planned and executed on farmers fields in catchments area of river Kali at right bank in Bhogaon, Mainpuri (U.P.), is the subject matter of this paper.

RESEARCH METHODS

The adaptive trial was laid out for two consecutive years during 2004-05 and 2005-06 in the area jurisdiction of Zonal Agricultural Research Station, Mainpuri. The operational area is located in the catchments area of river Kali at right bank. The soil of experimental site was sandy loam having pH 8.5, organic carbon 0.30 per cent, available phosphorus 10.0 kg/ha and available potash 278.0 kg/ha, therefore, the fertility status of the operational area was low. The twenty years mean annual rainfall of pilot area is 800 mm. The length of growing period of representative area varies between 120-150 days. The three to four years well developed younger orchards of guava were selected for companion cropping, which were in flowering and fruiting stage. The guava trees in orchards were planted in rows at the distance 7 meter. The distance between tree to tree in rows was also maintained 7 meter. The distance between guava and black gram and green gram rows was also maintained 50 cm from both sides guava rows for easy inter-cultural operations. The black gram and green gram were sown in second fortnight of February at row spacing of 25 cm during both years. The 24 rows of black gram and green gram were sown between two years of guava. The distance between rows of both the pulse crops was reduced for adjusting 100 per cent plant stand. Three varieties of black gram *i.e.*, Narendra Urd-1, Azad Urd-1 and Shekhar-2 and three varieties of green gram *i.e.*, Narendra Moong-1, Samrat and Malviya Jagrati (HUM-2) were tasted as filler crop with guava on five farmer's fields. Cultivar Allahabad Safeda of guava was already planted in the orchards of the farmers. The recommended dose of 20 kg N + 40 kg P₂O₅ +20 kg S/ha was given to black gram and green gram. N.P.K. @150, 90, 150 gms per tree in third year and 200, 120, 200 gms per tree in

fourth year plantation of guava trees in conjunction with 15 kg well rotten FYM was given to each plant. The other recommended package of practices were followed in guava fruit trees and companion summer pulse crops. The matured pods of both the summer pulses were hand picked when they attained the black colour. After picking of pods of black gram and green gram during the months of May to June, the soil of orchards was ploughed and harrowed and mixed the haulms of pulses followed by addition of cow-dung manure @ 15 kg/three years old fruit tree. After mixing of manure, the irrigations were given at an interval of five days in the beginning and later, after every 15 days till the on set of rains. The fruit tree put up blossoms in June-July and fruits grown to full size and given luscious and attractive guavas during the period of November-January. The dry temperature at the time of flowering was proved advantageous, though high temperature caused fruit drop. The rainy season fruiting was avoided because winter season crop fetches better price in comparison to the rainy season crop. The guava fruit was picked when showed light yellowish colour on the outer skin during month of November to January in both experimental years.

RESEARCH FINDINGS AND DISCUSSION

The results obtained from the adaptive trial of congenial cropping system are discussed below :

Grain yield of summer green gram :

Cultivars Narendra Moong-1 and Malviya Jagrati grown in the interspaces of guava gave almost equal grain yield by 10.55 q/ha and 10.70 q/ha, respectively, during summer season. The cultivar Samrat yielded lowest grains by 9.10 q/ha in filler cropping system of green gram and guava. Thus, the order of varieties performance was

Table 1: Yield of guava fruits and grain of summer pulses under congenial companion cropping system of agro-forestry (Pooled data of two years)

Companion cropping system	Grain yield of pulses (q/ha)	Fruits yield of guava (q/ha)	% increased over alone guava
(i) Guava alone	-	70.00	-
(ii) Guava + green gram			
Guava + cv Malviya Jagrati	10.70	79.50	13.57
Guava + cv Narendra Moong	10.65	78.50	12.14
Guava + cv Samrat	9.10	76.50	9.28
Mean	10.11	78.16	11.65
(iii) Guava + black gram			
Guava + cv Shehar-2	9.85	79.22	13.17
Guava + cv Narendra Urd-1	9.50	77.30	10.42
Guava + cv Azad Urd-1	8.95	77.00	10.00
Mean	9.43	77.84	11.20
Overall mean	-	78.00	11.42

Malviya Jagrati (10.70 q/ha) > Narendra Moong-1 (10.55 q/ha) and Samrat (9.10 q/ha) in companion cropping of guava + green gram. The variation among the cultivars of green gram was due to genetic variability of genotypes (Table 1).

Singh (2006) has also reported that green gram in association of guava gave better grain yield because the shadiness environment created by guava protected to green gram from higher thermal heat during summer season.

Grain yield of summer black gram:

Perusal of results make it clear that cultivar Shekhar-2 gave highest grain yield of 9.85 q/ha closely followed by Narendra Urd-1 (9.50 q/ha). Cultivar Azad Urd-1 yielded grain by 8.95 q/ha from the interspaces of guava. Therefore, the order of varieties performance was Skhekhar-2 (9.85 q/ha) > Narendra Urd-1 (9.50 q/ha) and Azad Urd-1 (8.95 q/ha) in filler cropping of guava + black gram. The genetic variability of genotypes affected the grain yield of black gram.

Singh (2007) has also obtained the better yield of inter grown black gram in agro-forestry system of guava + black gram due to umbriferous environmental effect of guava tree on black gram, which protected the black gram from extreme heat of sunlight during summer season.

Fruit yield of guava:

The fruits yield of guava was found higher under congenial cropping system of guava + summer pulses over the alone cropping of guava. At initial stage, the average yield of guava fruits was recorded by 78.00 q/ha in companion cropping systems, which was higher by a

margin of 8.00 q/ha or 11.42 per cent over sole cropping of guava. This was due to the repeated intercultural operations in pulses and its congenial effect on guava (Table 1). The pulses cultivation in the interspaces of guava strengthened to soil health through nitrogen fixation as well as green manuring from its haulms, turned into guava orchards after pods picking were also responsible for higher fruits yield of guava.

The studies carried out by Singh (2006) and Singh (2007) on riverine soils of U.P. are also display the positive effect of inter grown pulses on fruits yield of guava.

Conclusion:

Under congenial companion cropping system of agro-forestry cv Malviya Jagrati of green gram gave higher grain yield of 10.70 q/ha. Similarly, cv. SHEKHAR-2 of black gram gave highest grain yield of 9.85 q/ha. The fruits yield of guava reaped almost equal under both the agro-forestry systems *i.e.*, > 79.00 q/ha.

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