



## **Agro-Forestry of Guava (*Psidium guajava*) and Berseem (*Trifolium alexandrinum*) for Good Palatable Green Fodder to Milch Buffalo**

**R.A. Singh, P.V. Singh, I.P. Singh, S.P. Singh and Dharmendra Yadav**

*C.S. Azad University of Agriculture and Technology, Kanpur (U.P.), India*

### **Abstract**

An experiment was laid out during two consecutive years of 2002-03 and 2003-04 at village *Rajpura* of Mainpuri districts in the catchments area of river *Isan* under “National Agricultural Technology Project” for making the model to KVKs. The main objective was to increase the milk productivity of graded buffaloes and utilize the spaces of two rows of guava with raising of berseem as filler crop. The experimental soil was sandy clay loam, having low plant nutrients status. Four treatment *i.e.*, guava + berseem – sowing with untreated seed, guava + berseem – sowing with natural treated seed, guava + berseem – sowing with artificial treated seed and alone guava fruits yield collected from the adjoining area of experimental site with survey. Berseem cv. Diploid sown by broadcasting in the end of September after termination of rain. The berseem was fertilized with 15 kg N+60 kg P<sub>2</sub>O<sub>5</sub>/ha. The first berseem fodder cutting was done after 60 days of planting and second cutting was followed after 35 days of first cutting. Further cuttings were made at the interval of 35 days. Green fodder of berseem was obtained upto six cuttings. Guava + berseem sowing with natural treated seed and guava + berseem – sowing with artificial treated seed gave guava fruits by 11.30 q/ha and 11.38 q/ha, respectively, which was at par. Guava + berseem – sowing with untreated seed gave lowest fruits yield by 9.75 q/ha. The guava fruits yield collected from survey produced highest fruits yield by 15.25 q/ha. The guava + berseem sowing with natural treated seed and guava + berseem with artificial treated seed yielded 1138.40 q/ha and 1140.00 q/ha, respectively, green fodder yield of berseem in six cuttings. Guava + berseem- sowing with untreated seed gave green fodder by 915.00 q/ha. The graded buffaloes gave milk production by 15.15 lit/day/buffalo, 15.40 lit/day/buffalo and 15.50 lit/day/buffalo from the tested treatment of guava + berseem – sowing with untreated seed, guava + berseem-sowing with natural treated seed and guava + berseem sowing with artificial treated seed, respectively.

**Keywords:** *Artificial treated seed, Filler cropping, Graded buffaloes, Milk productivity, Natural treated seed.*

### **Introduction**

Guava fruit is one of the most important 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.

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 is an old practice but the size of holding sank due to increased human demography. Therefore, companion cropping with guava may widely be accepted by resource poor farm families

residing in the vicinity of *Gangetic* river. With the main objective to utilize the gaps between rows with cultivation of fodder crop of berseem to increase the milk productivity from graded buffalos and improve the economic condition of farm families.

Berseem is main green fodder crop of winter season of Uttar Pradesh as well as north India under irrigated situation. It is low shrubby crop with 50 to 75 cm height. The main succulent stem gives of branches terminating in two or three leaves. These stem become fibrous after the flowering stage. Leaves are small oblong and round at the end bright green and slightly hairy specially on up surface. It is more succulent and palatable than the other fodder crops. It contains higher protein, calcium, phosphorus and mineral matters. The green fodder of berseem is heavy yielder and has quite appreciable digestibility. The value of berseem silage or hay is excellent than other fodders crops and this silage utilize into fodder scarcity period from December to March. Mostly green fodder of berseem is more important in increasing the milk productivity. The milker utilize its green fodder for rearing of milch buffaloes during their milking period. Mostly green fodder of berseem is beneficial in increasing the milk productivity. The milkier utilize its green fodder for rearing of milch graded buffaloes during their milking period. In operational area of project good guava orchards are available but spaces between rows left vacant by farm families. Therefore, the flexible plan for agro-forestry system and increasing the milk productivity was made and undertaken, is the subject matter of this manuscript.

### Materials and Methods

The experiment was laidout during two consecutive years of 2002-03 and 2003-04 at village *Rajpura* of Mainpuri districts in the catchments area of river *Isan* under "National Agricultural Technology Project" for making the model to KVKs. The main objective was to increase the milk productivity of graded

buffaloes and utilize the spaces of two rows of guava with raising of berseem as companion crop. The experimental soil was sandy clay loam, having pH 8.0, organic carbon 0.2%, total nitrogen 0.03%, available  $P_2O_5$  8.7 kg/ha and available  $K_2O$  201 kg/ha, therefore, the analysed data of soil displayed 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 discribed 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 + berseem - sowing with untreated seed, guave + berseem - sowing with natural treated seed, guava + berseem - sowing with artificial treated seed and alone guava fruits yield, collected from the adjoining fields of experimental vicinity with survey were tested under agro-forestry system. Berseem variety *Diploid* sown by broadcasting. The seed of the berseem crop was small, hence, a fine seed bed prepared. The vacant spaces of guava ploughed 5 to 6 times for fine tilth the vacant spaces of rows made well leveled and smaller size beds were formed for easy irrigation. The crop was sown in the end of September after termination of rain. The small seed of berseem was mixed with equal quantity of fine soil. Uniform sowing was done in beds in standing water. The berseem was fertilized with 15 kg N + 50 kg  $P_2O_5$ /ha. Irrigation were given as and when required. The first cutting was done after 60 days of planting at the height of 30 cm. The second cutting was done after 35 days of first cutting. Further cuttings were made at the interval of 35 days. With this system of cuttings, six cuttings of berseem were done. The yield data of all six cuttings were sum up.



View of guava+berseem-sowing with natural treated seed



View of guava+berseem-sowing with artificial treated seed

## Results and Discussion

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

**Fruits yield of guava:** The yield of guava cv. L-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. Therefore, guava + berseem - sowing with natural treated seed and guava + berseem - sowing with artificial treated seed gave guava fruits by 11.30 q/ha and 11.38 q/ha, respectively which was at par. Guava + berseem - sowing with untreated seed gave lowest fruits yield by 9.75 q/ha. The sowing of treated seed with natural method and artificial method fixed the nitrogen from environment, which utilized by guava and bore good number of fruits, resulted in, it maximized the fruits yield in comparison to untreated sowing of seed. The guava fruits yield collected from survey gave highest fruits yield by 15.25 q/ha. This was due to repeated cultural operation in pure orchards of guava as informed by participated farm families. Similar results have also been reported by Singh (2007), Singh (2011) and Singh, *et al.*, (2016).

**Green fodder yield of berseem:** The guava + berseem sowing with natural treated seed (mixing of soil collected from berseem cultivated field) and guava + berseem - sowing with artificial treated seed (seed treatment with *Rhizobium* culture) yielded green fodder of berseem by 1138.40 q/ha

and 1140.00 q/ha, respectively, which was higher in comparison to guava + berseem - sowing with untreated seed (915.00 q/ha). Therefore, application of *rhizobium* as seed treatment with *rhizobium* rich soil or *rhizobium* culture increased the green fodder yield by 24.42% and 24.59%, respectively, in comparison to untreated seed sowing treatment. These findings are in agreements with those reported by Singh (2007), Singh (2011) and Singh, *et al.*, (2016).

**System productivity:** The highest system productivity by 1151.38 q/ha was recorded under guava + berseem - sowing with artificial treated seed, closely followed by 1149.70 q/ha under guava + berseem - sowing with natural treated seed, which were higher in comparison to guava + berseem - sowing with untreated seed (924.75 q/ha). The least system productivity was noted under the treatment of Guava fruits yield collected from survey method (15.25 q/ha). Similar results have also been reported by Singh (2007), Singh (2011) and Singh, *et al.*, (2016).

**Milk productivity:** Since, this system was developed for milk producers. The milk productivity was recorded from morning and evening time. The milk productivity increased with the feeding of green fodder of berseem, provided to the graded buffalo under all the treatments in comparison to non feeding of berseem green fodder. Guava + berseem - sowing with natural treated seed (15.40 lit. milk/day) and guava + berseem - sowing with artificial treated seed (15.50 lit.

milk/day) gave higher milk productivity in comparison to guava + berseem – sowing with untreated seed (15.15 lit. milk/day) and

without feeding of berseem green fodder (12.85 lit milk/day).

**Table-1:** Fruits yield of guava and green fodder yield of berseem under agro-forestry system of guava + berseem and milk yield of graded buffalo/day. (Pooled data of two years)

S. N.	Treatment	Yield (q/ha)		System productivity (q/ha)	Milk productivity/day of graded buffaloes (Lit/day)		
		Fruit yield of guava	Green fodder yield of berseem		Morning	Evening	total
1.	Guava + berseem – sowing with untreated seed	9.75	915.00	924.75	8.00	7.15	15.15
2.	Guava + berseem – sowing with natural treated seed	11.30	1138.40	1149.70	8.10	7.30	15.40
3.	Guava + berseem – sowing with artificial treated seed	1138	1140.00	1151.38	8.20	7.30	15.50
4.	Guava fruits yield-yield collected with survey	15.25	-	15.25	6.75	6.10	12.85

**Note:** Fruits yield of guava was taken between age of 5 to 7 year at initial fruiting stage.

### Conclusion and recommendation

In agro-forestry system of guava + berseem-sowing with natural treated seed and guava + berseem – sowing with artificial treated seed (use of *rhizobium* culture) increased the system productivity and milk productivity, therefore, the rural farm house hold which adopt the crop cultivation and rearing of graded buffaloes for milk may be advocated for adoption of aforementioned agro-forestry systems and harvest the fruits of newly generated technology.

### References

- Datta, N.P., Khera, M.S. and Saini, T.R. "A rapid colorimetric procedure for the determination of organic carbon in soils." *Journal of the Indian Society of Soil Science* 10.1 (1962): 67-74..
- Olsen, S.R., Cole, C.V., Watanable, F.S. and Dean, L.A. "Estimation of available phosphorus in soil by extraction with sodium bicarbonate." *U.S.D.A. Circ* 939 (Washington) (1954): 19.
- Piper, C.S. "Soil and Plant Analysis." *Univ. Adelaida Aust* (1950).
- Singh, R.A. "Productivity and employment generation through guava base agro-forestry system in gangetic area of U.P." *Range Management and Agro-forestry*, 28.2 (2007): 348-349.
- Singh, R.A. "Guava + summer groundnut – A New Vista of Agro-Forestry for Semi-Arid-Tropics of Uttar Pradesh." *NSAESLS and Climate Resilient Agriculture: Challenges and Opportunities*, organized by NRCAF, Jhansi on 3-5 Dec (2011): 19-20.
- Singh, T.A., Chandra, S., Singh, A. and Pal, S.B. "Agro-forestry system of guava and potato –A- Conducive for climate resilient agriculture." *Paper presented in 4<sup>th</sup> UPASCSGTASA, organized by CSAUAT, Kanpur on 24 March* (2016): 195.
- Singh, T.A. "A laboratory manual for soil fertility and fertilizer." *U.P. Agril. Univ. Pantnagar, (Nainital)* (1971): 71-74.

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