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EFFECT OF TREE LEAF MULCH ON GROWTH AND YIELD OF PEARL MILLET (*PENNISETUM GLAUCUM* L.) IN GUAVA (*PSIDIUM GUAJAVA* L.) BASED AGRI-HORTI SYSTEM IN VINDHYAN REGION

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ABSTRACT

The present study to investigate the 'Effect of Tree Leaf Mulch on growth and yield of Pearl Millet (*Pennisetum glaucum* L.) in Guava (*Psidium guajava* L.) based Agri-horti System in rainfed condition of Vindhyan region', was conducted during the kharif season of 2015 at Agricultural Research Farm of Rajiv Gandhi South Campus, Barkachha, Mirzapur, Uttar Pradesh. The field experiment was conducted in 8 year old guava tree plantation with spacing of 7x7 meter. Experiment consisted of total 12 treatment combinations which were replicated three times, factorial randomized block design having four different type of leaf mulching (i.e., *Leucaena leucocephala* (M_1), *Azadirachta indica* (M_2), *Emblica officinalis* (M_3), *Albizia lebbeck* (M_4) and three different levels of doses of leaf mulch (i.e., 0 t/ha (D_0), 2.5 t/ha (D_1) and 5 t/ha (D_2). Result showed that both of type and dose of leaf mulch recorded maximum plant height (181.19 cm), Number of leaves plant^{-1} (16.87), Number of tillers plant^{-1} (0.93), Total dry matter accumulation plant^{-1} (76.05 g) , Panicle length (18.50 cm), Panicle girth (9.58 cm), Number of grains panicle^{-1} (1165.78), grain weight panicle^{-1} (12.82 g), test weight (10.98 g) with *Leucaena leucocephala* at 5 t/ha and minimum with *Albizia lebbeck* at 0 t/ha. Dose of leaf mulch obtained maximum of grain yield (17.13 q/ha), straw yield (51.09 q/ha), Harvest index (24.73 %) at 5 t/ha and minimum at 0 t/ha in Vindhyanregion.

Keywords: Leaf mulch, Pearl millet, Guava, Agri-horti system, Agroforestry.

Introduction

Today the agriculture sector is facing major various challenges such as climate change and irregularity of weather and one such is to feed ever increasing population on sustainable basis (Pretty, 2008). In recent few times, Agroforestry emerged as an alternate and viable option for climate change mitigation and reduce risk of agriculture failure by intercropping of fruit/ timber tree species with crops in farmland (Nair, 2012). Agroforestry is a sustainable land management system that offers numerous benefits for farmers, communities, and the environment, including increased agricultural productivity, improved soil health, enhanced biodiversity, and climate change mitigation. By diversifying agricultural landscapes and integrating trees with traditional crop and livestock systems, agroforestry contributes to sustainable food production, rural livelihoods, and ecosystem resilience (Jose *et al.*, 2008; Jose, 2009). Agroforestry designs such as alley cropping, silvopasture, and forest gardening incorporate horticultural elements to diversify production and increase overall system resilience.

Agri-horticulture system is animportant component of agroforestry. Itis innovative agricultural practice that combines horticultural crops with trees or shrubs, often in a complementary manner, to enhance productivity, biodiversity, and environmental sustainability (Francis *et al*., 2011). Unlike traditional monoculture cropping, agri-horti integrates a diverse range of crops and trees within the same agricultural landscape, fostering mutually beneficial relationships among different components. In agro-horticulture system, trees or shrubs can serves multiple functions, including providing shade, wind protection, and habitat for beneficial organisms, while horticultural crops contribute to diversified income streams and nutritional security. Fruit crops are first preference of farmers under this system on account of short gestation period, regular income, risk cover and aesthetic value. Guava (*Psidium guajava* L.) is popular fruit trees, grown in the tropics and subtropics in all around the world due to its broader adaptability. It is widely available in both rural and urban areas, and it is also known as the 'apple of the tropics'. Its nutritive value is very high; hence it is an ideal fruit for nutritional security (Minz *et al*., 2021). Among the various agriculture crops, Pearl millet (*Pennisetum glaucum* L.) is a resilient and versatile cereal grain that belongs to the Poaceae family (Devendra *et al*., 2002). Widely cultivated in arid and semiarid regions of Africa and Asia, pearl millet is valued for its adaptability to harsh environmental conditions, making it a crucial staple crop for millions of people in regions with limited rainfall and poor soil fertility (Bhattacharjee *et al*., 2002; Bidinger *et al*., 2007). To accomplish sustainable food and wood production while simultaneously safeguarding the environment, tree and crops can be grown together as agroforestry. Therefore, this is necessary to study the growth and yield attributes of pearl millet under guava-based agroforestry system.

The utilization of tree leaf mulch in agri-horticulture systems can have a significant impact on the growth and yield of crops (Akhtar *et al*., 2004). This practice involves covering the soil surface with a layer of material, such as organic matter or synthetic materials, to provide a range of advantages. Mulch acts as a protective barrier, reducing evaporation from the soil surface and thereby conserving moisture (Hatfield *et al*., 2015). Mulching can significantly reduce water loss from the soil and improve water use efficiency in agricultural systems, particularly in regions prone to drought (Saha *et al*., 2018). Mulch acts as an insulating layer, moderating soil temperatures and protecting plant roots from extremes of heat and cold (O'Connell *et al*., 2018). Mulching can significantly reduce soil temperature fluctuations, providing a more stable environment for plant growth (Bhattarai *et al*., 2017). Mulch acts as a physical barrier, suppressing weed growth by blocking sunlight and inhibiting weed seed germination (Mohler *et al*., 2014). Mulching can reduce weed emergence by up to 90%, reducing the need for herbicides and manual weeding (McGrath *et al*., 2019). Mulch plays a critical role in preventing soil erosion by reducing surface runoff and soil loss caused by wind and water, particularly on slopes and in areas prone to heavy rainfall. Mulching helps in stabilizing soil aggregates, reducing erosion rates, and improving soil conservation in agricultural and horticultural systems (Boardman, 2013). Organic mulches gradually decompose, releasing nutrients into the soil and improving its fertility (Lal, 2015). Organic mulches can increase soil organic matter content and enhance nutrient availability, leading to improved plant growth and productivity (Tang *et al*., 2019). Certain types of mulch, such as organic materials with antimicrobial properties, can help suppress soil-borne diseases and pathogens (Strand *et al*., 2016). Mulching helps in reducing disease incidence and severity in agricultural and horticultural crops, thus minimizing crop losses and improving yield stability (Bonanomi *et al*., 2018). In addition to its functional advantages, mulch enhances the aesthetic appeal of agri-horticulture systems by providing a uniform, tidy appearance to garden beds and landscapes. With a variety of mulch materials available, including bark, wood chips, and decorative stones, growers can create visually pleasing environments that enhance the overall attractiveness of their farms and gardens.

It is essential to understand how mulching practices influence soil conditions, crop growth, and resource utilization for optimizing water management and improving pearl millet yield. However, the information about the effects of different mulching practices on Pearl millet is lacking. The present study was therefore taken to investigate the effect of tree leaf mulching on growth and yield performance of pearl millet under guava based agri-horti system of Vindhyan region. Such study will be useful in order to create awareness among the farming community about the use of mulching to get maximum production.

Materials and Methods

Study Area:

The study was carried out during the Kharif (rainy) season in a eight-year-old guava plantationat the agriculture research farm of Rajiv Gandhi south campus, Banaras Hindu University, Barkachha, Mirzapur district (Uttar Pradesh) in Vindhyan region of India. Geographically, the experimental site was located on 25°10' N Latitude 82°37' E Longitudes and at an Altitude of 427 meters above mean sea level. The climate of the study area was characterized as typically semi-arid, eastern plain zone agro-climatic zone IIIA. The average annual rainfall received at the experimental site during the study period was 513.8 mm, out of which 75% was contributed through the southwest monsoon between June to September in 2015.The weekly mean maximum and minimum temperature, during the period of crop growth, ranges from 28.9 ℃ to 33.1 ℃ and 20.4 ℃ to 29.0 ℃, respectively. The maximum temperature 33.1℃ was recorded in the 40th standard week, whereas the minimum temperature 20.4℃ was observed in 41st standard week.

Experimental details

The field experiment was laid out during Kharif(rainy) season of 2015 in 8 year old guava (Lucknow-49) plantation which was planted in2007 with 7×7 m spacing. In the experiment, Pearl Millet variety (ICTP-8203) was seeded as an intercrop under guava plantation with is row to row 40 cm and plant to plant 10 cm spacing with a 5 kg ha^{-1} seed rate. The experiment was conducted in factorial randomized block design having four different levels of leaf mulching. The treatments were randomized as per statistical procedure and experiment consisted of total 12 treatment combinations replicated three times. Four types of mulch were *Leucaena leucocephala* (M_1), *Azadirachta indica* (M_2), *Emblica officinalis* (M_3), and *Albizia lebbeck* (M_4), in three doses of mulch were 0 t/ha (D_0), 2.5 t/ha (D_1), and 5 t/ha (D_2) were applied 10 days after sowing that covered the open soil surface. The treatment combinations used were M_1D_0 (0 t/ha + *Leucaena leucocephala*), M_1D_1 (2.5 t/ha + *Leucaena leucocephala*, M_1D_2(5 t/ha + *Leucaena leucocephala*, M_2D_0 (0 t/ha + *Azadirachta indica*), M_2D_1 (2.5 t/ha+ *Azadirachta indica*), M_2D_2 (5 t/ha + *Azadirachta indica*), M_3D_0 (0 t/ha + *Emblica officinalis*), M_3D_1 (2.5 t/ha + *Emblica officinalis*), M_3D_2 (5 t/ha + *Emblica officinalis*), M_4D_0 (0 t/ha + *Albizia lebbeck*), M_4D_1 (2.5 t/ha+ *Albizia lebbeck*), and M_4D_2 (5 t/ha +*Albizia lebbeck*). The recommended dose of fertilizers 100 kg Nha^{-1}, 40 kg P_2O_5 ha^{-1}and 40 kg K_2O ha^{-1} were applied as in the form of urea, diammonium phosphate and MOP respectively below the seed line at the time of sowing of crop.

Biometric Observation

In each treatment five plants of Pearl Millet were randomly selected for taking growth and yield parameters. Three stages were fixed for data collection as were 25, 50, 75 days after sowing (DAS). The data of plant height (cm), number of leaves per plant, number of tiller per plant, dry matter production of Pearl Millet (g) per plant, as growth parameter, panicle length (cm), girth of panicle (cm), number of grain per panicle, grain weight (g) per panicle, test weight (g), seed yield (Q ha^{-1}), straw yield (Q ha^{-1}), biological yield (Q ha^{-1}), and harvest index (%) as yield parameters were measured.

Statistical analysis of data

The collected data from various characters were subjected to standard statistical method 'analysis of variance'. The significant effect of the treatment effect was tested with the help of 'F' test (variance ratio). The difference of the treatment mean was tested by using critical difference (C.D.) at 5% probability level. When the variance ratio was significant at 5% level, standard error mean (SEm±) was calculated with critical differences for comparison between two means.

Relative Economics

Cost of cultivation, gross and net returns under different treatments were worked out on the basis of prevailing cost of different enterprises. Economics of pearl millet as influenced by type and dose of tree leaf mulch under Guava based agri-horti system was analysed on the basis of gross returns, net returns and B:C (benefit: cost) ratio.

Results and Discussion

Soil characteristics

Initial physio-chemical properties and mechanical composition were analysed. Sand, silt, and clay made up 57.0%, 20.6% and 22.4% of the mechanical composition, respectively. The soil slightly acidic, with a pH of 6.1, electric conductivity of 0.28 dSm^{-1}, organic carbon of 0.28%, medium in N 176.20 kg ha^{-1}, available P 11.15 kg ha^{-1}, and available K of 185.5 kgha^{-1} as per the findings of analysis.

Growth parameters

In the present investigation the critically examined data showed that plant height increased with the progressive development of crop growth stages and reached to its maximum at maturity. Results revealed that growth parameters of pearl millet viz. plant height, number of leaf plant^{-1}, number of tiller plant^{-1} and dry matter accumulationplant^{-1}(Table 1) were observed significant variation due to type and dose of mulch.

Table 1: Growth parameters of pearl millet as influenced by type and dose of tree leaf mulch under guava based agri-horti system.

Treatment	Plant height (cm)			Number of leaves plant^{-1}			Number of Tiller plant^{-1}			Dry matter accumulation plant^{-1} (g)		
Type of Mulch	25 DAS	50 DAS	At harvest	25 DAS	50 DAS	At harvest	25 DAS	50 DAS	At harvest	25 DAS	50 DAS	At harvest
Leucaena leucocephala	80.35	169.84	212.78	12.06	15.99	15.32	1.42	2.37	1.58	10.77	45.06	80.87
Azadirachta indica	78.67	168.02	212.56	10.80	14.88	14.22	1.37	2.32	1.52	9.27	43.61	79.19
Emblica officinalis	76.82	164.29	205.29	9.81	13.68	13.46	1.34	2.29	1.50	8.40	42.00	77.65
Albizia lebbeck	75.06	162.58	204.74	8.41	11.93	11.71	1.31	2.26	1.47	6.98	40.94	74.25
S.Em. ±	1.71	3.81	4.87	0.25	0.31	0.34	0.01	0.01	0.01	0.27	0.86	1.44
CD at 5%	5.01	11.18	14.30	0.73	0.92	1.00	0.03	0.03	0.03	0.78	2.52	4.23
Dose of Mulch (t/ha)												
0	65.64	149.37	186.84	6.66	7.55	7.21	1.22	2.17	1.39	4.82	29.83	67.08
2.5	81.98	171.90	218.67	10.05	16.22	15.72	1.40	2.35	1.56	9.67	47.83	80.93
5	85.55	177.27	221.02	14.10	18.59	18.09	1.46	2.41	1.60	12.08	51.05	85.95
S.Em. ±	1.48	3.30	4.22	0.22	0.27	0.29	0.01	0.01	0.01	0.23	0.74	1.25
CD at 5%	4.34	9.68	12.38	0.63	0.80	0.86	0.02	0.02	0.03	0.67	2.18	3.66

Analysis of data revealed that variations in plant height due to type of leaf mulch were found non-significant at all the crop growth stages, where dose of mulch was found significant at all the crop growth stages. At this stage 5 t ha^{-1} being at par with 2.5 t ha^{-1} recorded significantly higher plant height than 0 t ha^{-1} mulch, which was recorded the lowest plant height. Interaction was found non-significant at the all crop growth stages. The number of leaf plant^{-1} increasing with the advancement of crop growth stages up to 50 DAS after sowing and decreases thereafter. Both Type and dose of mulch were found significant at all the crop growth stages. The interaction between mulch of selected tree species and dose of mulch were found significant at all the crop growth stages. The numbers of tiller plant^{-1} was decreased with the progress of crop growth stages up to maturity. Type and dose of mulch were found significant at all the crop growth stages and interaction was also found significant.

The dry matter accumulation in plant increased with progression up to reproductive phase and reached to its maximum at maturity. Total dry matter accumulation plant^{-1} was significantly affected by type and dose of mulch at all the stages of crop growth, where type of mulch was found significant at the all crop growth. Significant difference observed at 25 DAS in between *Leucaena leucocephala* and *Azadirachta indica*, *Emblica officinalis, Albizia lebbeck* and significant difference among other treatment combinations. At harvest *Leucaena leucocephala* was found significantly higher than *Azadirachta indica, Emblica officinalis, Albizia lebbeck,* while rests of the treatment combinations were foundat par. Lowest dry matter accumulation plant^{-1} found in the *Albizia lebbeck* species.

Due to dose of mulch total dry accumulation plant^{-1} was found significant at all the stages of growth. At 25 DAS after sowing 5 t mulch being not at par with 2.5 t mulch produced significantly higher total dry matter accumulation plant^{-1} than 0 t ha^{-1} while at 50 DAS significant difference was observed between 5 t , 2.5 t and 0 t mulch ha^{-1} and rest of the treatment combination were remained not at par. At harvest all the treatments were significantly different among themselves where 5 t ha^{-1} and 0 t ha^{-1} mulches produced significantly highest and lowest total dry matter accumulation plant^{-1} respectively. Interaction was found significant at 25 days and Interaction was found non-significant at 50 days and at harvest while interaction was found significant at 25 days.

Yield parameters

Panicle length plant^{-1}, Panicle girth plant^{-1}, Grain weight panicle^{-1}, number of grain panicle^{-1} and test weight (g) of pearl millet as influenced by type and dose of tree leaf mulch under guava based agri-horti system, were presented in Table 2.

Table 2: Yield parameters of pearl millet as influenced by type and dose of tree leaf mulch under guava based agri-horti system

Treatment	Panicle length plant^{-1} (cm)			Panicle girth plant^{-1} (cm)			Grain weight panicle^{-1} (g)	Number of grain panicle^{-1}	Test weight (g)
Type of Mulch	**25 DAS**	**50 DAS**	**At harvest**	**25 DAS**	**50 DAS**	**At harvest**	**At harvest**	**At harvest**	**At harvest**
Leucaena leucocephala	--	15.50	18.83	--	10.24	10.79	12.90	1186.89	11.11
Azadirachta indica	--	14.71	17.43	--	9.15	10.03	11.64	1107.78	10.71
Emblica officinalis	--	12.87	16.07	--	8.16	8.94	11.08	1005.78	10.45
Albizia lebbeck	--	11.30	14.89	--	6.89	8.48	10.35	933.44	9.85
S.Em. ±	--	0.25	0.40	--	0.26	0.02	0.21	22.67	0.22
CD at 5%	--	0.72	1.17	--	0.76	0.60	0.63	66.50	0.64
Dose of Mulch (t/ha)									
0	--	8.21	11.49	--	4.74	6.06	8.75	789.92	5.65
2.5	--	14.74	18.10	--	9.62	10.28	12.27	1124.25	11.77
5	--	17.83	20.83	--	11.48	12.34	13.46	1261.25	14.18
S.Em. ±	--	0.21	0.35	--	0.22	0.18	0.18	19.64	0.19
CD at 5%	--	0.63	1.01	--	0.66	0.52	0.54	57.59	0.55

A close examination of data revealed that differences due to type of mulch were found significant. Farther analysis revealed that due to dose of mulch panicle length was found significant at harvest. At this stage 5 t ha^{-1} mulch being not at par with 2.5 t ha^{-1}, 0 t ha^{-1} recorded. Interaction was found significant at 50 DAS the stages of crop growth and Interaction was found non-significant at harvest the stages of crop growth. Panicle girth was found significant due to dose of mulch at 50 DAS and harvest, where significant difference observed between 5 t ha^{-1}and 2.5 t ha^{-1}mulchalthough they were significantly superior over 0 t ha^{-1} mulch but remained not at par with each other. Interaction was found significant at both the stages of crop growth. The grain weight panicle^{-1} was significantly affected due to type of mulch but found significant due to dose of mulch. Significant difference observed between 5 t and 2.5 t ha^{-1} mulch but both of them were found significantly superior than 0 t ha^{-1} but not at par with each other. Lowest grain weight panicle^{-1} was recorded by 0 t ha^{-1}. Interaction for grain weight panicle^{-1} was found significant. The number of grain panicle^{-1} was found significant due to type and dose of mulch both. *Leucaena leucocephala* recorded significantly higher number of grain panicle^{-1} over *Azadirachta indica* and *Emblica officinalis, Albizia lebbeck*. Significant difference observed between all the treatments for number of grain penical^{-1} due to dose of mulch where 5 t and 0 t ha^{-1} recorded significantly highest and lowest number of grain panicle^{-1} respectively. Interaction between type and dose of mulch for number of grain panicle^{-1} was found significant. The test weight as influenced by both type and dose of mulch was found significant. *Leucaena leucocephala* along with *Azadirachta indica* produced significantly highest test weight than *Emblica officinalis, Albizia lebbeck.* Lowest test weight recorded by *Albizia lebbecks*. All the treatments of dose of mulch were found significant where differences among themselves for test weight found in the order of 5 t > 2 .5 t > 0 t ha^{-1}. Interaction was found non-significant.

Data pertaining to Grain yield ha^{-1}, straw yield ha^{-1}, biological yield ha^{-1} and harvest index (%) of pearl millet as influenced by type and dose of tree leaf mulch under guava based agri-horti system, was presented in Table 3.

Table 3: Yields of pearl millet as influenced by type and dose of tree leaf mulch under guava based agri-horti system.

Treatment	Grain yield (Q ha^{-1})	Straw yield (Q ha^{-1})	Biological yield (Q ha^{-1})	Harvest index (%)
Type of Mulch				
Leucaena leucocephala	17.51	52.77	70.28	24.70
Azadirachta indica	15.72	52.64	68.37	23.00
Emblica officinalis	14.97	50.55	65.52	22.84
Albizia lebbeck	12.76	49.14	61.91	20.55
S.Em. ±	0.28	0.91	0.95	0.54
CD at 5%	0.82	2.66	2.79	1.57
Dose of Mulch (t/ha)				
0	11.68	42.13	53.81	21.80
2.5	16.38	55.15	71.53	22.79
5	17.66	56.56	74.21	23.73
S.Em. ±	0.24	0.78	0.82	0.46
CD at 5%	0.71	2.30	2.41	1.36

A critical examination of the data reflected that grain yield was significantly affected by type and dose of mulch both. All the treatments were significantly different due to type and dose of mulch. Highest grain yield (17.51 Q ha^{-1}) was obtained with *Leucaena leucocephala*, however lowest grain yield (12.76 Q ha^{-1}) obtained with the application of *Albizia lebbeck* mulch. All the doses of mulch were found significantly different among themselves and all the type of mulch were found significantly different among themselves. Highest yield (17.66sQ ha^{-1}) was found with the application of 5 t mulch ha^{-1} while lowest (11.68Q ha^{-1}) with the application of 0 t ha^{-1}. Interaction between type and dose of mulch for grain yield was found significant. The differences due to type of mulch were found significant for straw yield ha^{-1}. Due to dose of mulch differences were found significant where 5 t ha^{-1} being notat par with 2.5 t ha^{-1}. Straw yield was maximum at 5 t ha^{-1} and minimum at 0 t ha^{-1}. Interaction was found significant. Data concerned with biological yield ha^{-1}as influenced by type and dose of mulch revealed that differences due to type of mulch was found significant while due to dose of mulch was also found significant where all the treatments were significantly different among themselves and found in the order of 5 t > 2.5 t > 0 t ha^{-1}. Interaction was found significant. Data related with harvest index as affected by type and dose of mulch showed that harvest index was significant due to type and dose of mulch. Interaction was also found non-significant.

Economics

The economics as influenced by type and dose of mulch are the data pertaining presented in Table 4.

Table 4: Economics of pearl millet as influenced by type and dose of tree leaf mulch under Guava based agri-horti system.

Treatment	Cost of cultivation (Rs. ha^{-1})	Gross return (Rs. ha^{-1})	Net return (Rs. ha^{-1})	Benefit: Cost (B:C) Ratio
Type of Mulch				
Leucaena leucocephala	23679	37434	13755	1.57
Azadirachta indica	23679	34770	11091	1.46
Emblica officinalis	23679	33199	9520	1.40
Albizia lebbeck	23679	29636	5957	1.25
S.Em. ±	0.00	460	460	0.02
CD at 5%	0.00	1350	1350	0.06
Dose of Mulch (t/ha)				
0	21579	26499	4920	1.23
2.5	23679	36294	12615	1.53
5	25779	38487	12708	1.49
S.Em. ±	0.00	398	398	0.02
CD at 5%	0.00	1169	1169	0.05

The data indicated that the Crop variety (ICTP-8203) recorded for type of tree leaf mulch, the maximum gross return (37434Rs. ha^{-1}), net return (13755Rs. ha^{-1}), cost of cultivation (23679Rs. ha^{-1}) and B: C ratio (1.57 %) was observed in the treatment of *Leucaena leucocephala* leaf mulch and type of tree leaf mulch, the minimum gross return (29636Rs. ha^{-1}), net return (5957Rs. ha^{-1}), cost of cultivation (23679 Rs. ha^{-1}) and B: C ratio (1.25 %) was observed in the treatment of *Albizia lebbeck* leaf mulch. Dose of tree leaf mulch, the maximum gross return (38487Rs. ha^{-1}), net return (12708Rs. ha^{-1}), cost of cultivation (25779Rs. ha^{-1}) and B: C ratio (1.49 %) was observed at the 5 t ha^{-1} and the minimum gross return (26499Rs. ha^{-1}), net return (4920Rs. ha^{-1}), cost of cultivation (21579Rs. ha^{-1}) and B: C ratio (1.23 %) was observed at 0 t ha^{-1} .

Conclusion

The pearl millet the crop variety (ICTP-8203) effect of tree leaf mulch on pearl millet in guava based basedagri-horti system along with *Leucaena leucocephala* leaf mulch maximum cost of cultivation (23679 Rs. ha^{-1}), gross return (37434 Rs. ha^{-1}), net return (13755 Rs. ha^{-1}), and B: C ratio (1.57 %) obtained with *Leucaena leucocephala* of type of mulch while dose of mulch, maximum cost of cultivation (25779 Rs. ha^{-1}), gross return (38487 Rs. ha^{-1}), net return (12708 Rs. ha^{-1}), and B: C ratio (1.49 %) applied with 5 t ha^{-1} mulch. It can be concluded that mulch application of *Leucaena leucocephala* will be profitable. It will help in conserving soil moisture and hence increases water use efficiency, moderating the temperature, suppressing the weed growth, improving the physical, chemical and biological properties of soil and controls the soil loss through erosion and these advantages, interacting together, enhancing the growth, yield and quality of field and fruit crops.

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