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Effect of Supporters on Yield and Quality of Black Pepper in Hilly Region

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Abstract

An investigation was carried out from July, 2022 to march, 2023 in existing black pepper orchard at Hill Tract Agricultural Research Station to find out suitable support for yield and quality black pepper production in hilly region. There were three support tree were used as treatment viz.. T_1=Jackfruit (*Artocarpus heterophyllus*), T_2= Mango (*Mangifera indica*) and T_3= Chapalish (*Artocarpus chama*). There were no significant differences among treatments under the parameters studied. The highest (1514) and the lowest (1142) spikes/plant was obtained from mango and jackfruit supporters, respectively. In case of fruit wight/spike, black peeper vines supported by jackfruit tree gave the highest (5.67 gm) fruit weight followed by chapalish (4.63 gm), respectively. Fresh fruit yield/support tree was varied from 6.89 kg to 6.47 kg, respectively. The highest fresh fruit yield (6.89 kg) was recorded from black peeper vines supported by mango tree followed by jackfruit tree (6.53 kg) and the lowest yield (6.47 kg) obtained from chapalish tree. The highest (1.91 kg) dry fruit yield/support tree was obtained from black peeper vines grown on jackfruit, followed by mango tree (1.58 kg) and the lowest (1.57 kg) dry fruit yield was recorded from chapalish tree.

Keywords: Supporter, yield, hill, jackfruit

Introduction

Black pepper (*Piper nigrum*), the 'King' of spices under the family 'piperaceae' an Indian-originated perennial vine, is one of the world's most important and widely used spices. Black pepper is native to south Asia (website review). In Bangladesh, small-scale cultivation of black pepper was initiated in the decade of sixty but it is not commercially success yet (AIS, 2018) [1]. In 2020, Vietnam was the world's largest producer and exporter of black pepper corns, producing 270,192 metric tonnes or 36% of the world total. Other major producers are Brazil, Indonesia, India, Sri Lanka, china and Malaysia (website review). Bangladesh Agricultural Research Institute (BARI) had released a black pepper variety as BARI Golmorich-1 in 1992. This variety was released through selection from different germplasm of Malaysia and Sri Lanka (Azad *et al.,* 2020) [2]. Black pepper vine can be grown up to 10 m height on supporting trees, poles, or trellises (Sasikumar *et al.,* 2008) [7]. Traditionally in the Indian subcontinent, different multipurpose tree species such as coconut, erythrina (Mandar), drumstick, Jackfruit, etc. are widely used as support for black pepper cultivation. Interaction between the host tree and climbing plants were studied in case of many plants. In panama, some woody vine seedlings performed better in terms of stem growth when they were given support than non-supported condition (Putz, 1984) [4]. Support availabilities were proved to be critical for the growth and establishment of a Japanese woody vine viz. *Wisteria floribunda* DC (Sakai and Suzukiu, 1999) [5]. The functional role of those support trees has little been studied in case of black pepper. So the question is "are support plants able to provide yield or growth advantage of black pepper?" Keeping this view in mind, the present investigation was carried out with a view to assessing the impacts of support plants on black pepper production, yield and quality.

Materials and Method Materials

BARI Golmorich-1 were used as variety.

Method

The investigation was carried out from July, 2022 to march, 2023 in existing black pepper orchard at Hill Tract Agricultural Research Station, Ramgarh, Khagrachari hill district to find out suitable support for yield and quality black pepper production in hilly region. Black pepper vines were planted three years ago on the top of hills. There were three support tree were used as treatment viz. T_1=Jackfruit (*Artocarpus heterophyllus*), T_2= Mango (*Mangifera indica*) and T_3= Chapalish (*Artocarpus chama*). The experiment set

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under a randomized completely block design (RCBD) and replicated three times. Each treatment consists of one support plant under one replication. Weeding, irrigation, pesticide spraying, mulching and other cultural practices were done as and when necessary. After harvest, the fresh fruits (berries) were separated from spike and then all fruits were rinsed with tap water for five minutes, in order to remove all dust and debris. Then washed berries were boiled in hot water (70-80°C approx.) for fifteen minutes. Immediate after boiled, fruits were sun dried on clean paved floor for five days until the skin around the seeds become shrink and darken. Data on length of the spike (cm), total no. spike per plant, total berry/spike, berry weight/spike (gm), yield/plant (kg), thousand fresh fruit weight(g) and thousand dry fruit weight (g) were recorded. The data were analyzed using statistix10 statistical software. Differences among the means were compared following Least Significance Difference Test (LSD) at 5% level of significance.

Results and Discussion

Data on different yield and yield contributing parameters has given in table 1. From this table it was revealed that none of the treatments showed significant differences among the parameters studied. The highest spike length (12.63 cm) was observed in black peeper vine supported by jackfruit tree followed by mango tree (12.36 cm) and the lowest spike length was recorded from chapalish tree (11.32 cm). In an investigation of black pepper Kunhamu *et al.* (2012) [3] reported the highest (6.66 m) vine length from *Casuarina equisetifolia* and the lowest (6.30 m) vine length from *Grevillea robusta*. Although in this investigation we did not measure vine length, the reports of Kunhamu *et al.* (2012) [3] suggested that jackfruit was a suitable supporter for black pepper production. Figure 1 showed vegetative stage of black pepper vines on different support trees. They also obtained 11.00 m height and 19.87 cm radial growth from jackfruit trees, which supports the findings of present investigation. Kunhamu *et al.* (2012) [3] mentioned that the better growth performance of support trees like *Acacia auriculiformis* and *A. heterophyllus* indicate strong functionalities between pepper yield and support tree growth. In an investigation, Sakai and Suzuki (1999) [5] reported that the existence of support strongly affected stem height growth and dry matter production of *W. floribunda* seedlings. They also mentioned that length of support positively affected stem height growth. The highest (1514) and the lowest (1142) spikes/plant was obtained from mango and jackfruit supporters, respectively. In present study the highest no of (61.67) berries/spike were recorded from black peeper vine supported by jackfruit tree followed by mango tree (54.33), but the lowest (54.67) no of berries obtained from vines supported by chapalish tree. Kunhamu *et al.* (2012) [3] also obtained the highest (31) no. of berries/spikes from vines supported by jackfruit (*Artocarpus heterophyllus*) which was similar to present investigation. In case of fruit wight/spike, black peeper vines supported by jackfruit tree gave the highest (5.67 gm) fruit weight followed by chapalish (4.63 gm), respectively.

Fresh fruit yield/support tree was varied from 6.89 kg to 6.47 kg, respectively (Table1). The highest fresh fruit yield (6.89 kg) was recorded from black peeper vines supported by mango tree followed by jackfruit tree (6.53 kg) and the lowest yield (6.47 kg) obtained from chapalish tree. Kunhamu *et al.* (2012) [3] mentioned that in the year 2000, they obtained the highest yield (3.89 Mg/ha) from *Acacia auriculiformis*. In the same year they reported the second highest yield (2.77 Mg/ha) from black peeper vines supported by *Artocarpus Heterophyllus.* The present investigation agreed with the findings of Kunhamu *et al*. (2012) [3]. The highest (1.91 kg) dry fruit yield/support tree was obtained from black peeper vines grown on jackfruit, followed by mango tree (1.58 kg) and the lowest (1.57 kg) dry fruit yield was recorded from chapalish tree. Many reports suggest the suitability of conventionally employed support trees *like Erythina indica, E. lithosperma Garuga pinnata* as effective pepper supports (Salam *et al*. 1991). Our observation suggests suitability of fast growing tree species like jackfruit, mango and chapalish. Those trees have other economic values i.e. fruits and timber other than the use as a support trees. The pepper variety (BARI golmorich-1) used in this study should be compared with other available cultivars in order to get precise results.

Table 1: Yield and yield contributing character of black pepper influenced by different supporter tree

Treatment	Spike Length (cm)	No. of Spike/plant	No. of Fruits/Spike	Fruit Weight/Spike (gm)	Fresh fruit Yield/Plant (kg)	Yield of Dry Fruit/Plant (kg)
T_1	12.63a	1142a	61.67a	5.67a	6.53a	1.91a
T_2	12.36a	1514a	54.33a	4.50a	6.89a	1.58a
T_3	11.32a	1445a	54.67a	4.63a	6.47a	1.57a
Lsd (.05)	3.10	787.95	19.45	3.16	5.63	1.45
CV (%)	11.32	25.42	15.08	28.20	37.51	37.92

T_1=Jackfruit (*Artocarpus heterophyllus*)

T_2= Mango (*Mangifera indica*)

T_3= Chapalish (*Artocarpus chama*)

Fig 1: Black pepper vines on three support trees, e.g. jackfruit, mango and chapalish

Thousand fresh fruits weight as well as dry fruit weight were also recorded and shown in figure 2. Both the thousand fresh fruit weight and dry fruit weight were the highest (91.33g and 25.38g, respectively) when vines were grown on Jackfruit tree. Thousand fresh fruit weight and dry fruit weight were the lowest in mango (81.77g) and chapalish (24.71g), respectively. Kunhamu *et al.,* 2012 [3] reported that black pepper yield was the second highest when jackfruit tree was used as support whereas the highest was recorded from *Acacia auriculiformis.* Our study also supports that findings, since *Acacia auriculiformis* was not available in these region. Dry black pepper seeds obtained from different treatments under different replication were shown in figure 3. Production cost of black pepper in different supporters is almost same. So, black peeper cultivation can be recommended on jackfruit tree as it gave the highest yield.

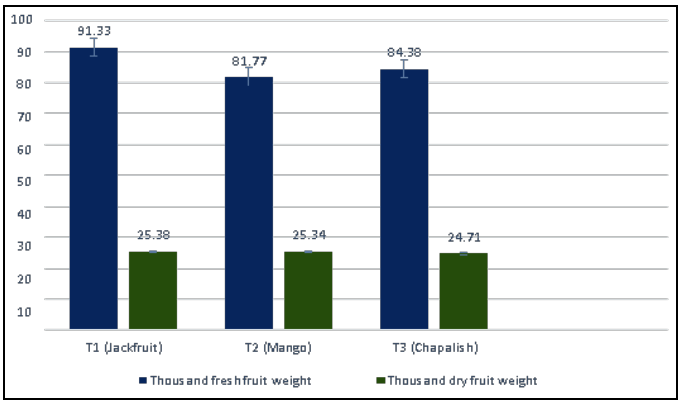

Fig 2: Comparison of thousand fresh and dry fruit weight.

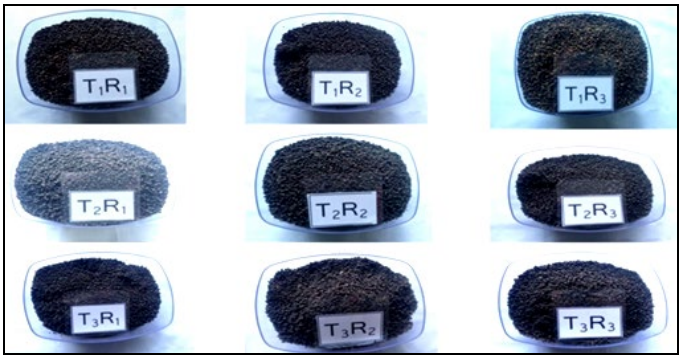

Fig 3: Dry fruits obtained from different treatment

Conclusion

From this investigation it was concluded that black pepper can be cultivated on different tree supports in hilly area of Bangladesh. Among the supporters jackfruit tree recommended as the best support for higher yield and quality production in climate change situation. In order to get precise results, this study should be continued for next consecutive years with more treatments under different locations.

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References

1. AIS (Agricultural Information Service). (2018). Black pepper: Bangladesh Perspective. Retrieved from: http://www.ais.gov.bd/site/view/krishi_kotha. Access date: 1st May 2023
2. Azad *et al*. Edited: KRISHI PROJUKTI HATBOI (Handbook on Agro-Technology), 9th edition, Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh, 2020.
3. Kunhamu Tk, Kumar BM, Valasseri VJ. Utility of multipurpose trees as black pepper (Piper nigrum L.) standards in the humid tropics of Kerala. Indian J. Agroforestry. 2012; 14(1):17-22. https://epubs.icar.org.in/index.php/IJA/article/view/103714
4. Putz FE. The natural history of lianas on Barro Colorado Island, Panama. Ecology, 1984; 65:1713-1724. DOI: 10.2307/1937767
5. Sakai A, Suzuki W. Effect of support on the growth of a woody vine, *Wisteria floribunda* DC. (Leguminosae). J. for. Res. 1999; 4:183-186. DOI: 10.1007/BF02762245
6. Salam AM, Mohanakumaran N, Jayachandran BK, Mamman BK, Sl'eekumar D, Satheesh Babu K. Thirty-one tree species support black pepper vines.; Agroforestry Today. 1999; 3(4):16.
7. Sasikumar B, Thankamani CK, Srinivasan V, Devashayam S, Santhosh JE, Suseela Bhai R, John Zacharaiah T. (2008). Black pepper (Extension pamphlet). Indian Institute of spices Research.
8. Website https://en.m.wikipedia.org > wiki