E-ISSN: 2618-0618
P-ISSN: 2618-060X

NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(12): 608-610
Received: 12-09-2025
Accepted: 18-10-2025

Harsha KN
Scientist-C & Scientist-in-charge, Indian Cardamom Research Institute, Spices Board, Sakleshpur, Hassan, Karnataka, India

Manoj Ommen
Scientist-C, Division of Agronomy, Indian Cardamom Research Institute, Spices Board, Myladumpara, Idukki, Kerala, India

Saju KA
Scientist-C, Division of Plant Pathology, Indian Cardamom Research Institute, Spices Board, Myladumpara, Idukki, Kerala, India

Veeresh N
Senior Microbiologist, Division of Plant Pathology, Indian Cardamom Research Institute, Spices Board, Sakleshpur, Hassan, Karnataka, India

Karuppa Samy K
Research Associate, Division of Crop Botany, Indian Cardamom Research Institute, Spices Board, Sakleshpur, Hassan, Karnataka, India

Manuval Joseph
Senior Agriculture Demonstrator, Indian Cardamom Research Institute, Spices Board, Sakleshpur, Hassan, Karnataka, India

Siddarth NS
Senior Research Fellow, Division of Crop Botany, Indian Cardamom Research Institute, Spices Board, Sakleshpur, Hassan, Karnataka, India

Corresponding Author:
Harsha KN
Scientist-C & Scientist-in-charge, Indian Cardamom Research Institute, Spices Board, Sakleshpur, Hassan, Karnataka, India

Influence of base mulch substrate on growth attributes of vanilla (*Vanilla planifolia*)

Harsha KN, Manoj Ommen, Saju KA, Veeresh N, Karuppa Samy K, Manuval Joseph and Siddarth NS

DOI: https://www.doi.org/10.33545/2618060X.2025.v8.i12i.4433

Abstract
Vanilla (*Vanilla planifolia*) popularly referred as princess of spices belongs to the family Orchidaceae. Vanilla is a rich source of flavor as natural vanillin is the most preferred flavoring component among the global confectionaries industry and widely used as a flavoring agent in cakes, sweets, chocolates, ice creams, beverages and condiments as well as in the cosmetics and perfumery industries. Information on plant base or rhizosphere management through base mulching and type of mulch substrate is lacking currently. Hence an observational study was taken up at Indian Cardamom Research Institute, Regional Research Station, Spices Board, Sakleshpur during 2017-2020. Two to three node cuttings of Vanilla plants were planted using *glyricidia* as standard tree in June, 2018. Experiment consisting 5 treatments with four replications was laid out in Randomized Block Design. Higher length of vines was observed in the treatments where plants base was mulched with charcoal during both the observation schedules (509.6 & 624.3 cm). Increased vine length and number of leaves per vine has positive influence for leaf area. Hence treatments receiving plant base mulch with Charcoal (640.22 & 802.12 cm^2) tree log chips (5285.36 & 724.36 cm^2) and coconut husk (608.16 & 612.14 cm^2) recorded significantly higher leaf area as compared to vanilla plants without base mulching. Among the treatments plant base mulching with charcoal, tree log chips and coconut husk recorded significantly longer internodal length. Supplementing various organic substrates as mulch material like charcoal, coconut husk and tree log chips ensures to facilitate better drainage, aeration and perfect encourage for the root mass of vanilla plant. Vanilla being a *sciophytic epiphyte* needs favourable rhizosphere especially during *monsoon* period. Rhizosphere modification influences on per cent disease incidence also. Relatively lowest incidence of block rot disease and stem rot disease was observed in treatment receiving charcoal as vanilla plant base mulch. Hence, it can be concluded from the results of the current study that, appropriate modification in the rhizosphere for vanilla crop using locally available slow degrading organic substrates like charcoal, coconut husk and tree log chips supports growth of vanilla vine and also minimizes incidence of important disease also.

Keywords: *Vanilla planifolia*, base mulching, mulch substrates, rhizosphere management

Introduction
Vanilla (*Vanilla planifolia*) popularly referred as princess of spices is botanically an orchid which is sceiophyte, epiphyte and aerophyte with CAM physiology belongs to the family Orchidaceae. Vanilla is native to southeastern Mexico (Purseglove *et al*., 1981) [4]. The leading producers of vanilla is Madagascar, Indonesia, Mexico, Tahiti and India. Vanilla is a rich source of flavor as natural vanillin is the most preferred flavoring component among the global confectionaries industry (Bory *et al*., 2008) [1]. Vanillin or vanilla essence is extracted after curing of beans and widely used as a flavoring agent in cakes, sweets, chocolates, ice creams, beverages and condiments as well as in the cosmetics and perfumery industries (Giridhar *et al*. 2001) [2]. It is the only orchid genus that makes its position into commercial trade as world's most expensive spice after saffron (Verma *et al*. 2009) [8]. The beans contain on an average 2 to 3% vanillin which is the world's most expensive spice after saffron (*Crocus sativus* L.) (Verma *et al*., 2009) [8].
Vanilla flourishes well and is more productive under tropical climates with well distributed rainfall and the Western Ghats of South India is' suitable for its cultivation. Conventionally vanilla is propagated through cuttings. However, the plant base or rhizosphere management

largely influences the growth and yield of vanilla. Moreover, there is no scientific study to delineate the importance of base mulching and which mulch substrate is ideal for cultivation of vanilla. Hence an observational study was taken up to study the effect of planting vanilla epiphytically using different mulch substrates in the plant base and its influence on growth and disease incidence.

Materials and Methods

An experiment was conducted at Indian Cardamom Research Institute, Regional Research Station, Spices Board, Sakleshpur during 2017-2020. Two to three node cuttings of Vanilla plants were planted using *glyricidia* as standard tree in June, 2018. Experiment consisted of 5 treatments and experiment was laid out in Randomized Block Design and replicated 4 times. Treatment details are furnished below.

Treatment Details

T_1: Base mulching with tree logs chips
T_2: Base mulching with Coconut husks
T_3: Direct planting in soil without basal cleaning
T_4: Direct planting in soil with basal cleaning
T_5: Base mulching with Charcoal

For each treatment 12 established vanilla plants were considered. For managing irrigation micro sprinklers were installed and irrigation was provided daily for a duration of one hour. Nutrient management was managed through foliar feeding of water soluble 19-19-19 grade NPK fertilizer @ 5g/lit once in a month and prophylactic plant protection measures were ensured as per the requirement. Treatments were imposed from post monsoon of 2017 and observations on growth attributes were recorded during April and October months of 2018 and 2019. Observations on growth and disease incidence were recorded periodically. Since materials used as mulch substrate was having high C:N ratio, degradation status was measured based on scale of material degradation *viz*., A- No sign of degradation, B- 25% of material degraded, C-50% of material degraded and D- 100% of material degraded. Percent Incidence of Disease for black rot (*Phytophthora*) Stem rot (*Fusarium batatatis*) was recorded and expressed in percentage. Observations on disease incidence were recorded when disease incidence was less than 5%. The Polled analysis of data (2018 & 2019) was done using OPSTAT software developed by Chaudhary Charan Singh (CCS) Haryana Agriculture University, Hisar, India.

Results and Discussion

Pooled analysis data of the current study are presented in Table 1. Observations were recorded at two different intervals in a year (pre & post monsoon) mainly to document the dynamics of crop growth due to variations in weather elements across season. Influences of weather attributes during rainy season found to have positive influence on quick and luxurious growth of vanilla vines. This variation was observed across all the treatments during the month of October. This betterment in growth can be attributed to influence of weather elements mainly higher atmospheric humidity and low dynamics of atmospheric temperature prevailed during monsoon period (Sri Suryanti *et al*., 2024) [6]. Higher length of vines was observed in the treatments where plants base was mulched with charcoal during both the observation schedules (509.6 & 624.3 cm). Similar trend of observations was documented in the treatments where plant base was mulched with coconut husk and tree log chips (Table.1). Whereas, poor vine length was observed in treatments where no mulching material was provided to plant base (T_3 and T_4). It is very well established and proved fact that, the number of leaves has direct association or proportional for length of vines. This association was again found to be correct in the current study also. Increased vine length and number of leaves per vine has positive influence for leaf area (Table no. 1). Hence treatments receiving plant base mulch with Charcoal (640.22 & 802.12 cm^2) tree log chips (5285.36 & 724.36 cm^2) and coconut husk (608.16 & 612.14 cm^2) recorded significantly higher leaf area as compared to vanilla plants without base mulching. Higher leaf area per meter length of vine was observed to be better during the post monsoon season (October) as compared to pre monsoon (April). This progress is mainly due to the accumulation of higher vegetative dry matter coupled with favorable weather attributes prevailed during the *monsoon* period. Observation on internodal length of vanilla vine divulges that, wherever vanilla plant base is mulched relatively longer internodal length was observed in comparison to plant base without mulching. Among the treatments plant base mulching with charcoal, tree log chips and coconut husk recorded significantly longer internodal length. Supplementing various organic substrates as mulch material like charcoal, coconut husk and tree log chips ensures to facilitate better drainage, aeration and perfect encourage for the root mass of vanilla plant. Vanilla being a *sciophytic epiphyte* needs favourable rhizosphere especially during *monsoon* period. Mulching of plant base with organic substrates helps in reducing the damage caused by rain water splashes at the plant base and modified rhizosphere supports for easy drainage of excess moisture and ensures required aeration in plant base (Siddagangaiah *et al* 1996) [5]. This specific rhizosphere modification is wholly absent in T_3 and T_4. Hence, positive influence of rhizosphere modification through organic mulch substrates ensures better growth attributes in vanilla. This modification influences on per cent disease incidence too (Sudharshan *et al* 2003) [7].

Table 1: Growth attributes of vanilla plants as influenced by different base mulch substrate (pooled data of two years)

Treatments	Length of vine (cm)		Number of leaves /vines		Leaf area/m length of vine (cm^2)		Internodal length (cm)	
	April	October	April	October	April	October	April	October
T_1: Base mulching with tree logs chips	489.8	612.4	94.6	132.5	528.36	724.36	9.4	9.6
T_2: Base mulching with Coconut Husks	492.4	602.8	102.4	121.8	608.16	612.14	9.8	10.2
T_3: Direct planting in soil without basal cleaning	267.3	342.5	77.6	90.4	484.24	564.28	7.6	8.4
T_4: Direct planting in soil with basal cleaning	372.3	477.2	87.0	108.6	502.80	598.44	8.6	8.8
T_5: Base mulching with Charcoal	509.6	624.3	128.2	164.0	640.22	808.12	10.2	10.8
S.Em±	51.6	36.2	4.8	6.2	12.6	27.3	0.52	0.66
C.D @ 5%	154.8	108.6	14.4	18.6	37.8	81.9	1.56	1.98

Relatively lowest incidence of block rot disease caused by *Phytophthora* sps. and stem rot disease caused by *Fusarium* sps. was observed in treatment receiving charcoal as vanilla plant base mulch. Moreover, when charcoal was used as plant base mulch, lower mortality rate of vanilla plants was observed (Table 2). Since, the material used for the plant base mulching has varying texture and C: N ratio, degradation rate of these mulch materials also varies. As a part of documentation extent of mulch material degradation was also documented in scale of four levels. It was observed that, wooden log chips and charcoal had degraded to only 25% extent in a year, whereas coconut husk was 100% degraded in one year.

Table 2: Disease incidence (%), mortality (%) and mulch degradation as influenced by different base mulch substrate (pooled data of two years)

Treatments	Disease incidence (%)		Mortality (%)	Degradation
	Black rot	Stem rot		
T_1: Base mulching with tree logs chips	10.75	5.26	4.30	B
T_2: Base mulching with Coconut Husks	13.25	5.98	5.48	D
T_3: Direct planting in soil without basal cleaning	17.50	6.2	5.25	-
T_4: Direct planting in soil with basal cleaning	15.25	7.8	7.00	-
T_5: Base mulching with Charcoal	8.10	4.3	2.70	B
SEm±	1.58	1.12	0.94	-
C.D @ 5%	4.94	3.36	NS	-

Degradation assessment scale: A- No sign of degradation
B- 25% of material degraded
C-50% of material degraded
D- 100% of material degraded

Conclusion

Hence, it can be concluded from the results of the current study that, appropriate modification in the rhizosphere for vanilla crop using locally available slow degrading organic substrates like charcoal, coconut husk and tree log chips supports growth of vanilla vine and also minimizes incidence of important disease also.

References

1. Bory S, Grisoni M, Duval MF, Besse P. Biodiversity and preservation of vanilla: Present state of knowledge. Genet Resour Crop Evol. 2008;55:551-571.
2. Giridhar P, Reddy BO, Ravishankar GA. Silver nitrate influences *in vitro* shoot multiplication and root formation in *Vanilla planifolia* Andr. Curr Sci. 2001;81:1166-1170.
3. Potty SN, Thomas J, Rao YS, editors. Introduction. In: *Vanilla* - The prince of spices. Cochin (India): Spices Board; 2003. p. 1-4.
4. Purseglove JW, Brown EG, Green CL, Robbins SRJ. *Spices*. Vol. 2. Tropical agricultural series. London: Longman Inc.; 1981. p. 644-735.
5. Siddagangaiah BA, Vadiraj M, Sudharshan MR, Krishnakumar V. Standardisation of rooting media for propagation of vanilla (*Vanilla planifolia* Andr.). J Spices Aromat Crops. 1996;5(2):131-133.
6. Sri Suryanti, Mawandha HG, Oktavianty H. Physiological traits of vanilla plant (*Vanilla planifolia* Andrews) under various types of shade trees. Planta Tropika. 2024;12(2):159-169.
7. Sudharshan MR, Koshy J, editors. *Vanilla status paper*. 2nd ed. Cochin (India): Spices Board; 2003. p. 34.
8. Verma CP, Chakrabarty D, Jena SN, Mishra DK, Singh PK, Sawant SV, Tuli R. Extent of genetic diversity among *Vanilla* species: Comparative results for RAPD and ISSR. Ind Crops Prod. 2009;29:581-589.