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Survivability of black pepper (*Piper nigrum* L.) cuttings from different portions of vine and growing media

A. B. Sharangi, R. KUMAR AND P. K. SAHU[1]

Department of Spices and Plantation Crops, Faculty of Horticulture,
[1]Department of Agricultural Statistics, Faculty Agriculture,
Bidhan Chandra Krishi Viswavidyalqya, Mohanpur-741252, Nadia, West Bengal

Black pepper (*Piper nigrum*), of the family Piperaceae, is a perennial export oriented cash crop of India. It is also known as "King of Spices" and "Gold of Spices". Today it commands the leading position among the spices in world trade and is finding its way into the dietary habits of millions around the globe. Pepper use ranges from a simple dietary constituent to that of immense pharmacological benefit. The crop has great economic importance in some other countries *viz.*, Thailand, Indonesia, Malaysia and Brazil. Now-a-days, pre-rooted cuttings from runner shoots are used in commercial level. When hanging shoots are used as planting materials, they take a longer time to establish due to lack of roots at the nodes (Singh and Singh, 1996). It may also be due to the variation of growing media and cutting from different vines. Production of pre-rooted cutting in light polyethylene bags is the surest way of producing quality planting material throughout India. Application of growth regulators such as, IBA by dipping the cuttings in the solution has been found to enhance root proliferation (Pillai *et al.*, 1982, Suparman and Zaubin, 1988). The two node cuttings of runner shoots proved better for black pepper multiplication with the treatment of IBA (1000 ppm) under Andaman conditions (Sridhar and Singh, 1990). Keeping this in view the present investigation was carried out to standardize the portion of vine and the growing media for producing black pepper seedlings under West Bengal situation.

The present experiment was conducted at Nadia KVK Farm, Gayeshpur, Bidhan Chandra Krishi Viswavidyalaya,West Bengal situated at 22.58^{0}N latitude, 80^0 E longitudes and an altitude of 9.75 MSL, during 2007 and 2008. The experiment broadely included three categories of treatments *i.e.* portion of cutting (upper/middle/lower), number of nodes (one/two/thre) and hormonal treatments (IBA100ppm or water). Altogether 18 treatments were replicated trice, having 21 number of cuttings in each. The cuttings were taken from the respective portions of the vine with one node two nodes and three nodes in each from the upper, lower and middle portion of the vine. The cuttings were either quick-dipped in 100 ppm IBA were planted in polythene packets (both sides open) filled with growing media. Polythene packets were kept in partial shade and irrigated frequently for proper rooting and growth. Other management practices were done regularly following the recommendations of Singh and Singh (1996). Survivability percentage of cutting (judged by discarding the rotten/dried/dead ones) was recorded at 15, 30, 45, and 60 days after cutting (DAC), Inorder to standardize the ideal rooting media, sand, soil, FYM and coconut husks were used in different combinations. There were altogether 12 treatments with respect to rooting media.

From table 2, it is evident that portion of vine cuttings has significant influence on survivavility of vine cuttings of black pepper. The initial observation taken on 15 days after cutting, showed the maximum

Table 1a: Treatment combinations for standardization of portion of vine

Treatments	*Portion of vine*	*Number of nodes*	*IBA*
T_1	Upper $^1/_3{}^{rd}$	1	
T_2		1	
T_3		2	
T_4		2	
T_5		3	
T_6		3	
T_7	Middle $^1/_3{}^{rd}$	1	
T_8		1	
T_9		2	
T_{10}		2	
T_{11}		3	
T_{12}		3	
T_{13}	Lower $^1/_3{}^{rd}$	1	
T_{14}		1	
T_{15}		2	
T_{16}		2	
T_{17}		3	
T_{18}		3	

Short communication

E-mail: dr_absharangi@yahoo.co.in

Table 1b: Treatment combinations for standardization of growing media

Treatments	*Mixture of growing media*	*Ratio*
T_1	Sand	-
T_2	Soil	-
T_3	Sand +Soil	1:1
T_4	Sand +Soil	1:2
T_5	Sand +FYM	1:1
T_6	Sand +Coconut Husk	1:1
T_7	Sand +Soil+Coconut Husk	1:1:1
T_8	Sand +Soil+Coconut Husk	1:2:1
T_9	Sand +Soil+FYM	1:1:1
T_{10}	Sand +Soil+FYM	1:2:1
T_{11}	Sand +Soil+FYM + CH	1:1:1:1
T_{12}	Sand +Soil+FYM + CH	1:1:2:1

FYM – Farm yard manure, CH-Cocnut husk

survivavility compared to the subsequent observations taken on 30, 45 and 60 days after cuttings, respectively. The treatment T_9 (Middle1/3 two node with IBA) and T_{11} (Middle1/3 three node with IBA) were found to record the highest survivability (80.00 and 66.67 %, respectively) even at 60 DAC. Thereafter, a reduction in percentage of survivability was marked with time. The treatment T_9 was found to produce the maximum success in terms of survival, consistently upto 60 days after cutting. The poor performance of the upper and lower portion of the vine might be due to the juvenility and the over maturity of the tissues for rooting initiation. Whereas the middle portion was found to be optimum in maturity and best for providing conditions for rooting as well as survivality in the long run.

It is evident from table 3, that similar to the portion of vines, the growing media had also significant influence on the survivavility of vine cuttings of black pepper. Though the preliminary observation on survivality after 15 days of cutting showed higher values, the same reduced with time and the lowest values were observed at 60 DAC irrespective of growing media. However, the treatments T_{12} (90.00, 71.67, 61.67 and 63.67) and T_{11} (90.00, 76.67, 65.00 and 65.00) at 15-, 30-, 45- and 60-DAC, respectively were found to produce the maximum survived seedlings. The superiority of this type of growing medium may be attributed to a balanced mixture of sand, soil alongwith optimum organic amendments necessary for rooting initiation and the survival of the saplings for a considerable period of time. Excepting coconut husk in the growing medium, a similar encouraging result was also found by Satapathy *et al* (2006) with soil: sand: FYM at 1:1:1 ratio.

The study indicated that the middle1/3rd portion of vine with at least two nodes quick-dipped at IBA 100 ppm and a growing media consisting of sand:soil:FYM:coconut husk at 1:1:1:1 are the best so far as the survivability of black pepper cutting is concerned particularly at the new alluvial zone of West Bengal.

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Table 2: Influence of type of cutting, number of nodes and IBA on survival percentage of black pepper cutting

Treatment	Survival percentage			
	15DAC	30DAC	45DAC	60DAC
T_1	61.67(51.81)	30.00(32.76)	18.33(23.99)	11.67(16.45)
T_2	63.33(53.36)	48.33(44.18)	30.00(32.90)	18.33(25.00)
T_3	65.00(54.04)	48.33(43.95)	35.00(35.96)	23.33(28.78)
T_4	75.00(61.26)	50.00(45.00)	20.00(26.26)	15.00(22.60)
T_5	66.67(54.78)	58.33(49.83)	36.67(37.26)	16.67(24.06)
T_6	40.00(39.12)	35.00(36.13)	23.33(28.86)	18.33(25.19)
T_7	66.67(54.83)	46.67(43.05)	35.00(35.98)	20.00(26.45)
T_8	70.00(58.35)	41.67(40.11)	28.33(32.09)	20.00(26.57)
T_9	98.33(85.69)	90.00(71.57)	85.00(67.40)	80.00(63.55)
T_{10}	76.67(61.46)	50.00(45.00)	35.00(36.24)	26.67(31.00)
T_{11}	93.33(75.24)	88.33(70.69)	78.33(62.48)	66.67(55.00)
T_{12}	70.00(57.00)	46.67(42.98)	31.67(33.55)	28.33(31.76)
T_{13}	83.33(65.95)	68.33(56.33)	41.67(40.00)	31.67(34.02)
T_{14}	95.00(79.55)	83.33(70.78)	61.67(51.84)	40.00(39.12)
T_{15}	86.67(72.79)	66.67(55.19)	60.00(51.02)	50.00(45.00)
T_{16}	95.00(77.08)	73.33(58.93)	63.33(52.80)	45.00(42.12)
T_{17}	58.33(50.00)	56.67(49.04)	43.33(41.07)	25.00(29.93)
T_{18}	68.33(56.74)	50.00(45.06)	30.00(33.16)	15.00(18.86)
SEm(±)	**5.069**	**4.825**	**4.148**	**4.390**
LSD(0.05)	**14.581**	**13.880**	**11.931**	**12.628**

Values in the parentheses indicate the angular transformed values; DAC – Days after cutting.

Table 3: Percentage of black pepper plants survived as influenced by different growing media

Treatment	Survival percentage			
	15 DAC	30 DAC	45 DAC	60 DAC
T_1	85.00(68.48)	70.00(57.0)	58.33(49.83)	51.67(45.99)
T_2	66.67(54.83)	51.67(45.97)	41.67(40.17)	23.33(28.86)
T3	66.67(54.83)	56.67(48.87)	45.00(42.12)	26.67(30.95)
T_4	75.00(60.07)	61.67(51.78)	51.67(45.96)	43.33(41.16)
T_5	80.00(64.75)	66.67(54.99)	51.67(45.99)	41.67(40.10)
T_6	83.33(66.26)	70.00(56.96)	55.00(47.88)	50.00(45.00)
T_7	83.33(66.64)	66.67(54.78)	56.67(48.84)	48.33(44.04)
T_8	71.67(57.86)	61.67(51.78)	50.00(45.00)	41.67(40.20)
T_9	81.67(65.96)	71.67(57.98)	56.67(48.85)	38.33(38.10)
T_{10}	75.00(60.47)	55.00(47.91)	43.33(41.12)	40.00(39.21)
T_{11}	90.00(71.57)	76.67(61.33)	65.00(53.85)	65.00(53.76)
T12	90.00(71.95)	71.67(57.91)	61.67(51.78)	66.67(54.83)
SEm (±)	**3.8879**	**2.8937**	**2.5478**	**2.6339**
LSD (0.05)	**11.4035**	**8.4876**	**7.4729**	**7.7253**

Values in the parenthesis indicate the angular transformed values ; DAC – Days after cutting