



EFFECT OF DIFFERENT GROWING MEDIAS AND LEVELS IBA ON GROWTH AND DEVELOPMENT OF KHIRNI (*MANILKARA HEXANDRA* ROXB) SEEDLINGS CV. LOCAL

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ABSTRACT

An experiment on effect of different growing medias and levels IBA on growth and development of khirni (*Manilkara hexandra* Roxb) seedlings cv. 'Local' was carried out at Horticultural research farm, Department of Horticulture, B. A. College of Agriculture Anand during the year 2010-11. The experiment was laid out in Completely Randomized Block Design (Factorial) with fifteen treatment combinations and replicated thrice. The treatment comprised of five growing medias (M₁- Soil + Coco peat + Vermicompost (1:1:1), M₂- Soil + Sand + Vermicompost (1:1:1), M₃- Soil + Coco peat + FYM (1:1:1), M₄- Soil + Coco peat + Vermicompost + Sand (1:1:1:1) and M₅- Soil + FYM (1:1)) and three plant growth regulators (P₁- IBA (1000 ppm), P₂- IBA (2000 ppm) and P₃- IBA (0 ppm)). At 90, 135 and 180 DAB, significantly maximum plant height (9.50, 15.56 and 20.55 cm), root length (11.18, 17.33 and 23.37 cm), number of leaves per plant (8.78, 16.33 and 21.33), number of branches per plant (1.56, 2.56 and 4.67), leaf area per plant (16.22, 19.00 and 21.44 cm²), root dry weight (0.38, 0.52 and 0.73 g), stem dry weight (1.66, 2.68 and 4.30 g), total dry weight (2.03, 3.20 and 5.03 g), root/shoot ratio (0.22, 0.19 and 0.17), and minimum mortality (7.33, 12.00 and 21.00 %) were noted with M₃. Soil + Coco peat + FYM (1:1:1). Different growing medias showed non-significant differences with respect to crop growth rate at 135 and 180 DAB. At 90, 135 and 180 DAB, maximum plant height (7.70, 13.00 and 18.00 cm), root length (8.47, 13.93 and 19.97 cm), number of leaves per plant (5.46, 11.27 and 16.13), number of branches per plant (1.20, 1.60 and 3.60), leaf area per plant (11.67, 13.93 and 16.00 cm²), root dry weight (g) (0.20, 0.34 and 0.57 g), stem dry weight (1.67 and 4.30 g), total dry weight (1.87, 2.99 and 4.88 g), root/shoot ratio (0.12, 0.13 and 0.13) and minimum mortality (19.53, 24.53 and 35.33 %) were obtained with P₁ level (IBA 1000 ppm). Various levels of IBA showed non-significant differences with respect to crop growth rate at 135 and 180 DAB. At 180 DAB, maximum plant height (22.33 cm), root length (24.37 cm), number of leaves per plant (23.33), number of branches per plant (5.00), leaf area per plant (23.33 cm²), root dry weight (0.83 g), root/shoot ratio (0.19 g), stem dry weight (4.30 g), total dry weight (5.13 g) and minimum mortality (15.67 %) were noted in treatment combination Soil + Coco peat + FYM (1:1:1) + IBA (1000 ppm) as compared to the rest of the combinations. With respect to crop growth rate, treatment combination M₂P₁ (Soil + Sand + Vermicompost) (1:1:1) + IBA (1000 ppm) showed maximum value i.e. 4.44 % at 180 DAB.

KEY WORDS: Growing medias, plant growth regulators, growth and development of khirni seedlings.

INTRODUCTION

The *Khirmi* (*Rayan*) (*Manilkara hexandra* Roxb.) is native of Central India and the Deccan peninsula. It is cultivated in greater part of India for ornamental and wild sown near villages, common in wastelands and hedges, in plains, gregarious in patches in Saurashtra and also for the sweet edible fruits. *Rayan* is commonly grown in laterite soil. Wastelands can be utilized by growing *rayan*. *Rayan* is mainly propagated by seeds. It is drought hardy and slow growing species. *Rayan* have no improved varieties. However, locally grown trees have variation from plant to plant. Potting media is the important input for containerized seedling production. It is responsible for the healthy and uniform seedling production. Apart from the selection of proper ingredients, it is necessary to maintain the porosity of the potting mixture so that proper development of root takes place (Srivastava *et al.*, 1998). The media should be rich enough to sustain seedling for about a year. A good potting medium is characterized by light weight friability, easy blandability, good water

holding capacity, drainage, porosity, low bulk density, free from fungal spores and insects and low inherent fertility *etc.* In addition, during secondary nursery transplanting often causes root damage, reducing the effective root area which in turn cause water stress (Karmer, 1995), decrease nutrient uptake (Bloom and Sukrapanna, 1990) and make plants more susceptible to diseases. To enhance the root regeneration dipping of the roots in the Indole butyric acid found most effective in seedling survival percentage and initiation of new roots subsequently growth of khirni seedling. In view of this background, the investigation entitled "effect of different growing medias and levels of IBA on growth and development of *Khirmi* seedlings (*Manilkara hexandra* Roxb.) cv. Local"

MATERIALS & METHODS

An experiment on effect of different growing medias and levels IBA on growth and development of khirni (*Manilkara hexandra* Roxb.) seedlings cv. 'Local' was carried out at Horticultural research farm, Department of Horticulture, B. A. College of Agriculture Anand during

the year 2010-11. The experiment was laid out in Completely Randomized Block Design (Factorial) with fifteen treatment combinations and replicated thrice. The treatment comprised of four growing medias (M₁- Soil + Coco peat + Vermicompost (1:1:1), M₂- Soil + Sand + Vermicompost (1:1:1), M₃- Soil + Coco peat + FYM (1:1:1), M₄- Soil + Coco peat + Vermicompost + Sand (1:1:1:1) and M₅- Soil + FYM (1:1)) and three plant growth regulators (P₁- IBA (1000 ppm), P₂- IBA (2000 ppm) and P₃- IBA (0 ppm)). The data on plant height, root length, number of leaves per plant, number of branches per plant, leaf area per plant (cm²), root dry weight, stem dry weight, total dry weight, root: shoot ratio and crop growth rate and mortality percent were recorded and statistically analyzed (Snedecor and Cochran, 1980).

RESULTS & DISCUSSION

Effect of different growing Medias

The data pertaining to plant height at 90, 135 and 180 DAB were significantly influenced with different growing medias. Soil + Coco peat + FYM (1:1:1) significantly recorded the highest plant height *i.e.* 9.50, 15.56 and 20.55 cm as compared to rest of the treatments. This may be due to attributed to general improvement in the physical and chemical properties of the rooting medium. (Deelip *et al.*, 1994). The treatment Soil + Coco peat + FYM (1:1:1) recorded the maximum root length *i.e.* 11.18, 17.33 and 23.27 cm at 90, 135 and 180 days as compared to rest of the treatments respectively. This may be due to attributed to general improvement in the physical and chemical properties of the rooting medium. (Deelip *et al.*, 1994). Soil + Coco peat + FYM (1:1:1) treatment significantly recorded the maximum number of leaves per plant *i.e.* 8.78, 16.33 and 21.33 as compared to rest of the treatments at 90, 135 and 180 DAB. The results are in line with findings of Malewar *et al.* (1998). The treatment Soil + Coco peat + FYM (1:1:1) significantly produce maximum number of branches per plant *i.e.* 1.56, 2.56 and 4.67 at 90, 135 and 180 DAB as compared to rest of the growing medias. Application of plant growth regulators in minute quantities enhanced the biomass production of *Bambusa arundinacea* expressed as number of branches per plant (Vamil *et al.*, 2011). Data pertaining to leaf area per plant (cm²) were influenced with different growing media. Soil + Coco peat + FYM (1:1:1) significantly recorded the maximum leaf area per plant *i.e.* 16.22, 19.00 and 21.44 cm² at 90, 135 and 180 DAB. Similar results were obtained by Mumtaz and Azam (2006) and Salakinkop *et al.* (2010). At 90, 135 and 180 DAB, Soil + Coco peat + FYM (1:1:1) treatment recorded the maximum root dry weight *i.e.* 0.38, 0.52 and 0.73 g as compared to rest of the growing medias. This may be attributed to general improvement in the physical and chemical properties of the rooting medium. (Deelip *et al.*, 1994). Similar findings were reported by Abirami *et al.* (2010).

Soil + Coco peat + FYM (1:1:1) recorded the maximum stem dry weight *i.e.* 1.66 and 4.30 g at 90 and 180 DAB respectively as compared to rest of the growing medias. This may be attributed to general improvement in the physical and chemical properties of the rooting medium. (Deelip *et al.*, 1994). The treatment Soil + Coco peat + FYM (1:1:1) recorded the maximum total dry weight *i.e.*

2.03 and 5.03 g as compared to rest of the growing medias respectively at 90 and 180 DAB. The result corroborate with the findings of Lavania *et al.* (2007). At 90, 135 and 180 DAB, the root/shoot ratio recorded significantly differ by different growing medias. The treatment Soil + Coco peat + FYM (1:1:1) recorded the maximum root/shoot ratio *i.e.* 0.22, 0.19 and 0.17 as compared to rest of the growing medias. The results are in line with the findings of Oddiraju *et al.* (1994) in western black cherry. The treatment Soil + Coco peat + FYM (1:1:1) recorded numerically the maximum crop growth rate *i.e.* 4.07 % at 180 DAB as compared to rest of the growing medias. 135 DAB Soil + Coco peat + Vermicompost produced the minimum crop growth rate *i.e.* 2.51 %. Increasing in crop growth rate may be due to more available moisture and some acids may have helped in better crop growth rate. (Bisla *et al.*, 1984). An appraisal of data pertaining to mortality (%) at 90, 135 and 180 DAB were influenced by different growing medias. The Soil + Coco peat + FYM (1:1:1) significantly recorded the minimum mortality *i.e.* 7.33, 12.00 and 21.00 % at 90, 135 and 180 DAB as compared to rest of the growing medias. These results are in close agreement with Shamet *et al.* (1994).

Effect of different levels of IBA

The maximum plant height *i.e.* 7.70, 13.00 and 18.00 cm recorded significantly influenced with IBA 1000 at 90, 135 and 180 DAB respectively. Application of IBA has been reported to contributing in the increase in the growth of shoot that emerged on Kainth (Sandhu *et al.*, 2011). Significantly the maximum root length *i.e.* 8.47, 13.93 and 19.97 cm obtained with the effect of IBA 1000 ppm. Better plant survival and plant growth may be synchronized due to more number of roots with higher length which have covered more surface area for absorption of minerals. Application of IBA to cuttings of many plant species results in the induction of adventitious roots, in many cases more efficiently than IAA (Ludwig-Muller, 2000). It was observed that significantly, the maximum number of leaves per plant *i.e.* 5.46, 11.27 and 16.13 obtained with IBA 1000 ppm at 90, 135 and 180 DAB. The effect of lower concentration of growth regulators promoted the increase in number of leaves and this beneficial effect was found to be decreased with increasing concentrations. The result was supported by Bora *et al.*, (2006). Significantly, maximum number of branches per plant (1.20, 1.60 and 3.60) was obtained with P₁ level (IBA 1000 ppm) at 90, 135 and 180 DAB. The effect of lower concentration of growth regulators promoted the increase in number of leaves and this beneficial effect was found to be decreased with increasing concentrations. (Chauhan and Reddy, 1972). Significantly, maximum leaf area per plant *i.e.* 11.67, 13.93 and 16.00 cm² was obtained with the treatment IBA 1000 ppm at 90, 135 and 180 DAB. The effect of lower concentration of growth regulators promoted the increase in leaf area per plant and this beneficial effect was found to be decreased with increasing concentrations. (Chauhan and Reddy, 1972).

The maximum root dry weight *i.e.* 0.20, 0.34 and 0.57 g gained by treatment IBA 1000 ppm. This may be due to better mobilization of primary metabolites for better root formation with the help of growth regulators.. Application

of plant growth regulators in minute quantities enhanced the biomass production of *Bambusa arundinacea* expressed as fresh and dry weight. (Vamil *et al.*, 2011). Significantly the maximum stem dry weight i.e. 1.67 and 4.30g obtained with treatment IBA 1000 ppm, respectively at 90 and 180 DAB. This may be due to better mobilization of primary metabolites with the help of growth regulators. Application of plant growth regulators in minute quantities enhanced the biomass production of *Bambusa arundinacea* expressed as fresh and dry weight. (Vamil *et al.*, 2011). The maximum total dry weight i.e. 1.87 and 4.88 g obtained with IBA 1000 ppm treatment at 90 and 180 DAB respectively. Application of plant growth regulators in minute quantities enhanced the biomass production of *Bambusa arundinacea* expressed as fresh and dry weight. (Vamil *et al.*, 2011). Significantly the maximum root/shoot ratio i.e. 0.12, 0.13 and 0.13 were obtained by treatment IBA 1000 at 90, 135 and 180 DAB. Greater root/shoot ratio in IBA treatment may have been due to that increasing in the number of leaves on the shoots resulting in higher accumulation of dry matter contributing in the production of healthier roots and shoot growth (Shukla and Bist, 1994). Numerically the minimum crop growth rate i.e. 2.47 was obtained with IBA 1000 ppm treatment while maximum crop growth rate similar value 2.56 obtained with IBA 2000 ppm treatment and without IBA at 135 DAB. At 180 DAB maximum crop growth rate 4.19 was obtained with IBA 1000 PPM while minimum crop growth rate similar value 4.01 observed with IBA 2000 ppm and Without IBA. It has been observed that application of certain plant growth regulators at lower concentrations enhanced better crop

growth rate. Similar findings were supported by Radhakrishan and Renganayaki, 2008 while working in various crop plants. Significantly the minimum mortality i.e. 19.53, 24.33 and 35.33 % obtained with the treatment IBA 1000 ppm. It has been observed that application of certain plant growth regulators enhanced seedling survival percentage by decreasing mortality percentage. The results corroborate with the findings of Radhakrishan and Renganayaki, 2008 while working in various crop plants.

Interaction effect of different growing medias and IBA levels

The maximum plant height i.e. 22.33 cm was noted in M₃P₁ (Soil + Coco peat + FYM (1:1:1) + IBA (1000 ppm) as compared to the rest of the combinations. This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum plant height in *khirni* seedlings. The maximum root length i.e. 24.37 noted in treatment combination M₃P₁ - Soil + Coco peat + FYM (1:1:1) + IBA 1000 ppm at 180 DAB respectively as compared to the rest of the combinations. This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum root length in *khirni* seedlings. The maximum number of leaves per plant i.e. 23.33 recorded treatment combination M₃P₁ - Soil + Coco peat + FYM (1:1:1) + IBA (1000 ppm) as compared to the rest of the combinations. This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum number of leaves in *khirni* seedlings. Significantly maximum number of branches per plant (5.00) was noted in M₃P₁ (Soil + Coco peat + FYM (1:1:1) + IBA (1000 ppm)) as compared to the rest of the combinations.

TABLE 1: Effect of different growing medias and IBA (Indole butyric acid) on plant height, root length, number of leaves per plant and number of branches per plant at 90, 135 and 180 DAB in *Khirni* (*Manilkara hexandra* Roxb) seedlings cv. 'Local'

Factor	Plant height (cm)			Root length (cm)			Number of leaves per plant			Number of branches per plant		
	90 DAB	135 DAB	180 DAB	90 DAB	135 DAB	180 DAB	90 DAB	135 DAB	180 DAB	90 DAB	135 DAB	180 DAB
Growing Medias												
M ₁	8.22	14.00	19.11	9.33	15.00	21.03	5.78	11.67	16.33	1.00	2.00	3.89
M ₂	5.22	7.33	12.33	4.89	7.67	13.70	3.00	5.33	9.78	1.00	1.00	2.67
M ₃	9.50	15.56	20.55	11.18	17.33	23.37	8.78	16.33	21.33	1.56	2.56	4.67
M ₄	4.00	10.00	15.00	5.56	11.00	17.03	3.67	7.67	12.33	1.00	1.00	3.00
M ₅	7.33	13.33	18.33	7.67	13.33	19.37	4.67	10.33	15.00	1.00	1.00	3.00
S.Em. ±	0.177	0.183	0.202	0.157	0.192	0.135	0.070	0.192	0.179	0.050	0.050	0.099
C.D. at 5 %	0.512	0.527	0.583	0.454	0.556	0.389	0.203	0.556	0.517	0.143	0.143	0.287
CULTIVARS												
P ₁	7.70	13.00	18.00	8.47	13.93	19.97	5.46	11.27	16.13	1.20	1.60	3.60
P ₂	6.56	11.66	16.70	7.93	12.93	18.97	5.40	10.07	14.67	1.13	1.53	3.53
P ₃	6.30	11.46	16.50	7.13	11.73	17.77	4.67	9.47	14.07	1.00	1.40	3.27
S.Em. ±	0.137	0.141	0.156	0.122	0.149	0.104	0.054	0.149	0.139	0.038	0.038	0.086
C.D. at 5 %	0.397	0.408	0.452	0.351	0.430	0.301	0.157	0.430	0.401	0.111	0.111	0.249
C.V. %	7.76	4.55	3.55	6.01	4.49	2.14	4.07	5.62	3.59	13.42	9.86	9.62
Interaction	Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign	Sign

Significantly maximum leaf area per plant (23.33 cm²) noted in treatment combination M₃P₁ - Soil + Coco peat + FYM (1:1:1) + IBA (1000 ppm) as compared to the rest of the combinations. This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum leaf area per plant in *khirni* seedlings. The maximum root dry weight i.e. 0.83 g recorded in M₃P₁ - Soil + Coco peat + FYM (1:1:1) + IBA

(1000 ppm)) as compared to the rest of the combinations. This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum root dry weight in *khirni* seedlings. At 180 DAB maximum stem dry weight (4.30 g) was noted in M₃P₁ (Soil + Coco peat + FYM (1:1:1) + IBA (1000 ppm)) as compared to the rest of the combinations.

TABLE 2: Effect of different growing medias and IBA (Indole butyric acid) on leaf area per plant (cm²), root dry weight, shoot dry weight and total dry weight at 90, 135 and 180 DAB in Khirni (*Manilkara hexandra* Roxb) seedlings cv. 'Local'

Factor	Leaf area per plant (cm ²)			Root dry weight (g)			Stem dry weight (g)			Total dry weight (g)		
	90 DAB	135 DAB	180 DAB	90 DAB	135 DAB	180 DAB	90 DAB	135 DAB	180 DAB	90 DAB	135 DAB	180 DAB
Growing Medias												
M ₁	14.11	16.89	19.00	0.20	0.37	0.60	1.70	2.67	4.30	1.90	3.03	4.90
M ₂	5.00	6.67	8.67	0.10	0.13	0.37	1.43	2.54	4.03	1.53	2.67	4.40
M ₃	16.22	19.00	21.44	0.38	0.52	0.73	1.66	2.68	4.30	2.03	3.20	5.03
M ₄	8.11	10.00	12.00	0.10	0.20	0.43	1.63	2.67	4.30	1.73	2.87	4.73
M ₅	10.11	11.89	14.00	0.13	0.27	0.50	1.67	2.67	4.30	1.80	2.93	4.80
S.Em. ±	0.131	0.186	0.192	0.005	0.007	0.010	0.020	0.022	0.017	0.019	0.021	0.019
C.D. at 5 %	0.380	0.537	0.556	0.014	0.020	0.028	0.059	0.064	0.048	0.056	0.061	0.056
CULTIVARS												
P ₁	11.67	13.93	16.00	0.20	0.34	0.57	1.67	2.65	4.30	1.87	2.99	4.88
P ₂	10.60	12.60	14.80	0.18	0.30	0.53	1.61	2.65	4.22	1.79	2.95	4.75
P ₃	9.87	12.13	14.27	0.16	0.25	0.47	1.57	2.64	4.22	1.73	2.89	4.69
S.Em. ±	0.102	0.144	0.149	0.004	0.005	0.007	0.016	0.017	0.013	0.015	0.016	0.015
C.D. at 5 %	0.294	0.416	0.430	0.011	0.016	0.048	0.046	NS	0.037	0.043	0.047	0.043
C.V. %	3.68	4.33	3.84	8.18	7.08	5.48	3.8	2.52	1.18	3.21	2.15	1.21
Interaction	Sig	Sig	Sig	Sign	Sign	Sign	Sig	NS	Sig	Sign	NS	Sign

TABLE 3: Effect of different growing medias and IBA (Indole butyric acid) on root: shoot ratio, crop growth rate and mortality percent at 90, 135 and 180 DAB in Khirni (*Manilkara hexandra* Roxb) seedlings cv. 'Local'

Factor	Root : shoot ratio			Crop growth rate (%)		Mortality (%)		
	90 DAB	135 DAB	180 DAB	135 DAB	180 DAB	90 DAB	135 DAB	180 DAB
Growing Medias								
M ₁	0.12	0.14	0.14	2.51	4.15	13.78	18.78	30.67
M ₂	0.07	0.05	0.09	2.51	3.85	40.11	45.33	59.00
M ₃	0.22	0.19	0.17	2.59	4.07	7.33	12.00	21.00
M ₄	0.06	0.07	0.10	2.51	4.14	28.33	33.33	45.00
M ₅	0.08	0.10	0.11	2.51	4.14	20.33	25.33	37.89
S.Em. ±	0.004	0.003	0.002	0.051	0.083	0.348	0.430	0.528
C.D. at 5 %	0.013	0.009	0.007	NS	NS	1.004	1.243	1.525
CULTIVARS								
P ₁	0.12	0.13	0.13	2.47	4.19	19.53	24.53	35.33
P ₂	0.11	0.12	0.13	2.56	4.01	21.93	27.00	39.20
P ₃	0.10	0.09	0.11	2.56	4.01	24.47	29.33	41.60
S.Em. ±	0.003	0.003	0.002	0.039	0.065	0.269	0.333	0.409
C.D. at 5 %	0.010	0.007	0.005	NS	NS	0.778	0.963	1.182
C.V. %	11.79	8.67	5.66	5.99	6.14	4.75	4.79	4.09
Interaction	Sign	Sign	Sign	NS	Sig	Sign	Sign	Sign

TABLE 4: Interaction effect of different growing medias and IBA (Indole butyric acid) on plant height, root length, number of leaves, number of branches and leaf area per plant (cm²) at 180 DAB in Khirni (*Manilkara hexandra* Roxb) seedlings cv. 'Local'

PGR- IBA / Medias	Plant height (cm) (180)			Root length (cm) (180 DAB)			Number of leaves per plant (180 DAB)			Number of branches per plant (180 DAB)			Leaf area per plant (cm ²)		
	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃
M ₁	19.66	18.83	18.83	21.37	21.37	20.37	17.33	16.33	15.33	4.00	4.00	3.67	19.67	18.67	18.67
M ₂	13.66	11.66	11.66	16.37	13.37	11.37	10.33	10.00	9.00	2.67	2.67	2.67	9.67	8.67	7.67
M ₃	22.33	19.66	19.66	24.37	23.37	22.37	23.33	20.33	20.33	5.00	5.00	4.00	23.33	21.33	19.67
M ₄	15.66	14.66	14.66	17.37	17.37	16.37	14.33	11.33	11.33	3.00	3.00	3.00	12.67	11.67	11.67
M ₅	18.66	18.66	17.66	20.37	19.37	18.37	15.33	15.33	14.33	3.00	3.00	3.00	14.67	13.67	13.67
S.Em.±	0.350			0.233			0.310			0.192			0.333		
C.D. at 5%	1.010			0.674			0.896			0.552			0.963		
C.V. %	3.55			2.14			3.59			9.62			3.84		

This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum stem dry weight in *khirni* seedlings. The maximum total dry weight i.e. 5.13 g noted in M₃P₁ - Soil + Coco peat + FYM (1:1:1) + IBA (1000 ppm) treatment combination as compared to the rest of the combinations respectively. This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum total dry weight in *khirni* seedlings. The data pertaining to root/shoot ratio were found significant differences at 180 DAB. Significantly the maximum root/shoot ratio i.e. 0.19 g was noted in treatment combination M₃P₁ - Soil + Coco

peat + FYM (1:1:1) + IBA (1000 ppm) as compared to the rest of the combinations. This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum root/shoot ratio in *khirni* seedlings. The maximum crop growth rate (4.44) was recorded which influenced by treatment combination M₂P₁- Soil + Sand + Vermicompost (1:1:1) + IBA (2000 ppm) followed by all the combination except M₂P₂ and M₂P₃. This may be due to favorable growing media along with proper concentration of IBA, which enhances maximum crop growth rate in *khirni* seedlings. Significantly minimum mortality i.e. 15.67 %, respectively

noted in treatment combination Soil + Coco peat + FYM (1:1:1) + IBA (1000 ppm) as compared to the rest of the combinations. This may be due to favorable growing

media along with proper concentration of IBA, which decreases in mortality percentage in *khirni* seedlings.

TABLE 5: Interaction effect of different growing medias and IBA (Indole butyric acid) on root: shoot ratio, crop growth rate and mortality percent at 90, 135 and 180 DAB in *Khirni (Manilkara hexandra Roxb)* seedlings cv. 'Local'

PGR- IBA	Root dry weight (g) (180 DAB)			Stem dry weight (g) (180 DAB)			Total dry weight (g) (180 DAB)			Root : shoot ratio (180 DAB)			Crop growth rate (%) (180 DAB)			Mortality % (180 DAB)		
	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃	P ₁	P ₂	P ₃
Medias																		
M ₁	0.63	0.63	0.53	4.30	4.30	4.30	4.93	4.93	4.83	0.15	0.15	0.12	4.15	4.15	4.15	29.33	29.67	33.00
M ₂	0.43	0.33	0.33	4.30	3.90	3.90	4.73	4.23	4.23	0.10	0.08	0.08	4.44	3.56	3.56	53.00	60.00	64.00
M ₃	0.83	0.73	0.63	4.30	4.30	4.30	5.13	5.03	4.93	0.19	0.17	0.14	4.07	4.07	4.07	15.67	23.67	23.67
M ₄	0.43	0.43	0.43	4.30	4.30	4.30	4.73	4.73	4.73	0.10	0.10	0.10	4.15	4.15	4.15	41.00	45.00	49.00
M ₅	0.53	0.53	0.43	4.30	4.30	4.30	4.83	4.83	4.73	0.12	0.12	0.10	4.15	4.15	4.15	37.67	37.67	38.33
S.Em.±	0.017			0.029			0.033			0.004			0.144			0.915		
C.D. at 5%	0.048			0.083			0.096			0.012			0.417			2.642		
C.V. %	5.48			1.8			1.21			5.66			6.14			4.09		

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