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SHORTCOMMUNICATION

OptimizationofIBAdoseforrootinginfig(*Ficuscarica*L.)cuttings

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ABSTRACT

Present investigation was carried out to optimize the dose of rooting hormone, Indole-3-butyric acid (IBA) for rootingoffigcv.BrownTurkeycuttingsunderaridirrigatedzoneofPunjab.Thehardwoodcuttingswerecollected during January and treated with different concentrations of IBA (0, 100 ppm, 1000 ppm, 2000 ppm, 3000 ppm). The results of investigation indicated that the treatment of IBA @ 1000 ppm induced maximum cutting success (68.6%),numberofbudssproutedpercutting(2.4),numberofleaves(11.3),shootlength(37cm),freshweightof shoots(36g)anddryweightofshoots(11.7g).Also,themaximumnumberofrootspercutting(69.5),freshweight ofroots(4.9g)anddryweightofroots(2.4g)wasrecordedunderthesametreatmentafter180daysofplanting. It is concluded that treatment of cuttings with IBA @ 1000 ppm for five minutes was helpful in rapid vegetative propagation of fig crop in the arid part of the Punjab state.

***Keywords*:**Cuttingsuccess,fig,IBA,propagation,rooting

INTRODUCTION

Fig(*Ficuscarica*L.)isanimportantfruitcrop ofMoraceaefamily.Figcropismainlycultivated in Maharashtra, Karnataka, Andhra Pradesh, Gujarat,UttarPradeshandTamilnadu.Nowaday, the demand of this crop is increasing due to its nutritionalvalueandhardynatureofplant(Nandi *etal.*,2018).Thefigsareconsumedasfresh,dried, preserved, candied, canned and also used for jam making (Caetano *et al.*, 2017). Though, the crop possesses huge market potential, still area under itscultivationislimited.Itseconomicpotentialof cultivationhasnotbeencompletelyrealizedandis consideredasanunderutilizedfruitcropinPunjab. Duetolatearrivalofmonsoonrainsinthispart,it isalsoapotentialareaforfigcultivation.Themain reason for low area under this potential fruit crop seems to be the unavailability of elite planting materialofsuperiorgenotypes.Inrecent,thePunjab Agricultural University has recommended the cultivation of a promising fig variety ‘Brown Turkey’for cultivationin Punjabstate (Anonymous, 2021). Fig is generally propagated through hardwood cuttings collected during dormant period (December-January). There are variousfactorswhichdeterminethesuccessof rooting in fig (Boliani *et al.*, 2019).Among these thelocalenvironmentanduseofgrowthregulators (auxins) exert profound influence in rooting of differentcrops(Kumar*etal.*,2015).Theoptimum doseforrootinductionmayalsovaryaccordingto crop and cultivar (Ludwig-Muller, 2000). The presentstudywasplannedtooptimizethedoseof indole-3-butyric acid (IBA) for treating the hardwood cuttingsto produce rooted plantsin fig cv.BrownTurkeyunderSouth-Westernregionof Punjab.

The experiment was performed at the fruit nursery,RegionalResearchStation,Abohar,Punjab Agricultural University, Punjab. The experiment was carried out during January-July, 2022. The cuttingsof20cmlengthand2.5cmdiameter,were preparedfromlastseasongrowthof7yearsoldfig plants var. ‘Brown Turkey’ during 1st week of January.Theexperimentwaslaidoutincompletely randomizeddesign(CRD)withfivetreatmentsand fourreplications.Fifteenhardwoodcuttingswere usedperreplication.Cuttingsweretreatedwithfour different concentrations of indole-3- butyric acid (IBA)*i.e.*,100ppm,1000ppm,2000ppmand3000 ppm and water (control)for a period of 5 minutes.The treated cuttings were planted into plasticbagsfilledwithapottingmixtureofsoil,

Table1:EffectofIBAconcentrationsoncuttingsuccessandleaf,shootandrootparametersinfig cv. Brown Turkey

Treatmentdetails	Days taken for sprouting	Cutting success (%)	Numberof buds sprouted/ cutting	Number ofleaves	Shoot length (cm)	Numberof roots/ cutting	Root length (cm)
T_1(IBA@100 ppm)	29.7[c]	45.2[d]	2.3	8.5[b]	25.0[c]	44.5[c]	34.9[ab]
T_2(IBA@1000 ppm)	26.7[d]	68.6[a]	2.4	11.3[a]	37.0[a]	69.5[a]	42.1[a]
T_3(IBA@2000 ppm)	30.3[bc]	60.2[b]	2.1	9.0[b]	32.9[ab]	56.0[b]	37.8[ab]
T_4(IBA@3000 ppm)	32.8[ab]	55.1[c]	1.9	8.8[b]	29.8[b]	52.0[b]	32.5[b]
T_5(control)	34.0[a]	26.4[e]	2.1	8.3[b]	21.4[c]	33.5[d]	24.3[c]
C.D.(*P*=0.05)	**2.9**	**1.5**	**-**	**1.7**	**4.3**	**6.9**	**7.7**
C.V.	**6.2**	**1.9**	**16.1**	**12.3**	**9.7**	**7.2**	**12.4**
ANOVA	**s**	**s**	**ns**	**s**	**s**	**s**	**s**

*s:Significant;ns:Non-significant

sand and FYM (1:1:1 v/v proportion) by keeping at least three buds outside above the potting mixture. The cuttings were watered at alternate days.Weedingwasdoneasandwhenrequired.The data was taken on days to bud sprout initiation in different treatments, percent cutting success and average of buds sprouted/cuttings was recorded after60daysoftreatment.Further,percutting,the data on shoot and root growth parameters including total number of leaves, shoot length, number of roots,rootlength,freshweightofroot,freshweight of shoot, dry weight of shoot and dry weight of rootwererecordedafter180daysoftreatment.For shootandrootlength,thedatawastakenonlongest shoot or root per cutting. During the experiment, averagetemperatureandrelativehumiditywerein range 10.1-28.5°C and 47.1-70.5%, respectively. AllthedatawereanalysedusingOPSTAT(Sheoran *et al.*, 1998)and discussedat P <0.05for significance of difference between their mean values.

The results showed that IBA had significant effect on days to sprout initiation and cutting success(P<0.05).Among,thedifferenttreatments, earliest sprouting (26.7 days) was recorded in cuttings treated with IBA @ 1000 ppm (T_2) as shown in Table 1. Sprout initiation was not advancedwithanyfurtherincreaseinconcentration of IBA. There was a significant increase in the percentageofrootedcuttingswiththeuseofIBA over control (Table 1). The maximum cutting success(68.6%)wasrecordedwithIBA@1000 ppm followedby IBA @ 2000ppm (T_3), respectively.Thedataalsoshowedthatanincrease inIBAconcentrationover1000ppmprogressively decreased the cutting success. This might be due tothesensitivityofcuttingstohigherconcentrations of auxin. These results are in accordance with Ghosh *et al*. (2017) who reported more mortality andlesssurvivalpercentageofphalsacuttingswith use of higher concentrations of auxin. No significant effect of IBA was seen on number of budssproutedpercuttingbutsignificanteffectwas recorded for number of leaves/ cutting (P<0.05). Comparatively,highernumberofleaves(11.3)was recorded in T_2(IBA@ 1000 ppm) over the other treatments. Similarly, maximum shoot length (37 cm,32.9cm)wasrecordedforcuttingstreatedwith IBA @1000 ppm (T_2) followed by IBA @ 2000 ppm(T_3),respectively,whichwerestatisticallyon par. More number of leaves in these cuttings possibly reflectstheir comparativelybetter photosynthesis that resulted in better growth of shoots. Further increase in IBA concentration did notinfluencetheshootlength(P<0.05)(Table1). Significantly higher number of roots per cutting (69.5) was also observed in cuttings treated with IBA@1000ppm(T_2).TheeffectofIBAtreatments alsoreflectedclearlyonrootlengthofthecuttings. The IBA treated cuttings had significantly lengthier rootscomparedto untreated control.The significantlylongerroots(42.1cm,37.8cm)were recordedincuttingstreatedwithIBA@1000ppm (T_2)followedbyIBA@2000ppm(T_3),

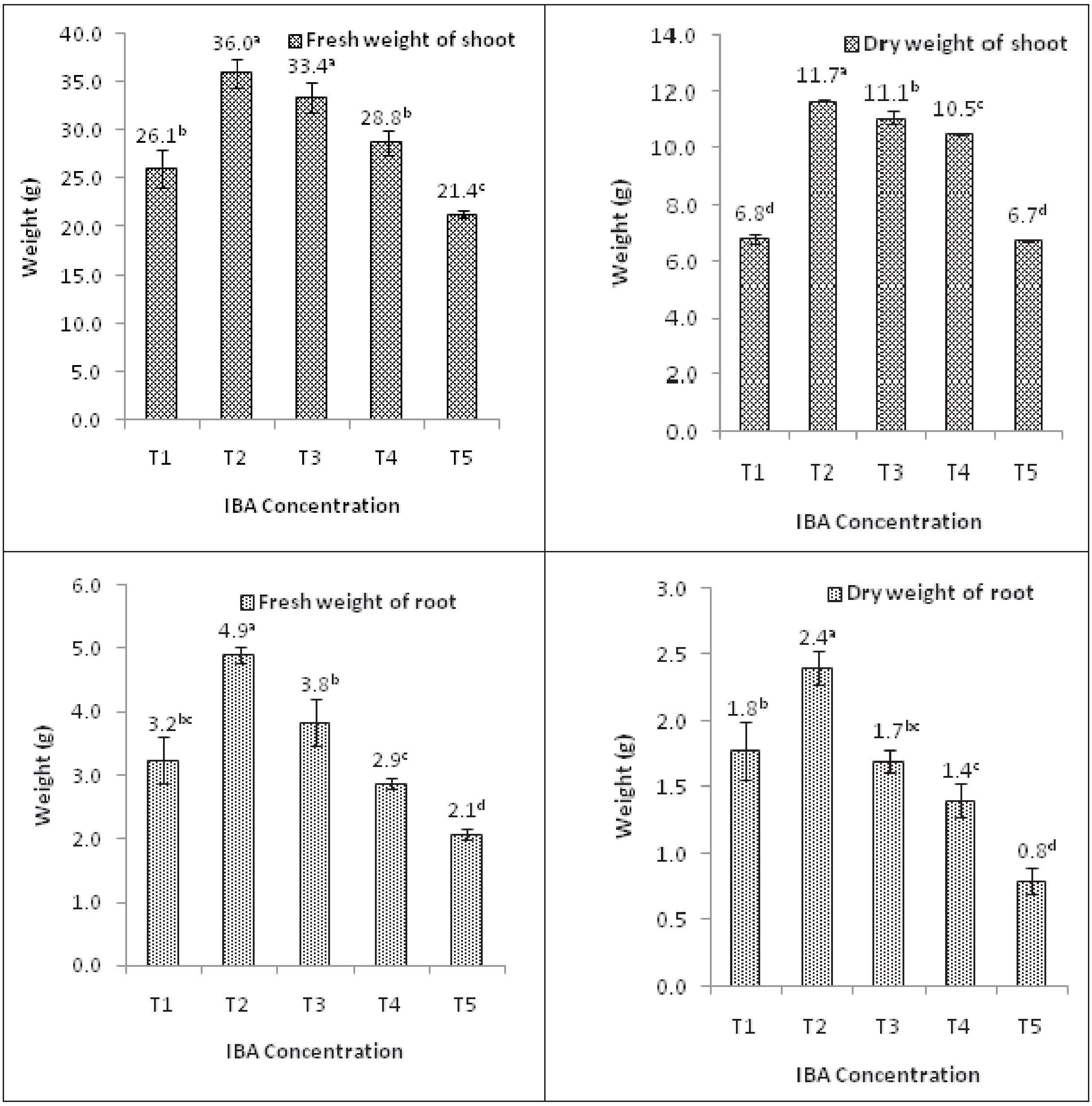

Fig.1:EffectofIBAconcentrationsonfreshanddryweightofshootandrootinfigcv.BrownTurkey (Verticalbarsindicate±SE mean)

respectively (Table 1), which were statistically at par.The results are in conformity with Kumari *et al.*(2020)whosuggestedthatnumberofrootsper cuttingis intensifiedby auxinthrough polysaccharides hydrolysis which provides energy forrootformation.Higherconcentrationsofauxin can cause damage to the cuttings base. Optimum concentration of auxin varies with crop and cultivarsandpossessesaninhibitoryeffectathigher concentrations (Cervenyand Gibson,2005). Significantdifferencesamongtreatmentswere observedforfreshanddryweightofshootsaswell roots($P<0.05$) (Figure1). The optimum concentration of auxin also helps in translocation ofcarbohydratesandnitrogenoussubstancestothe base of cuttings, that promotes accelerated cell divisionandcellelongation(Singh*etal.*,2015).The maximummeanfreshweight(36.0g,33.4g)and dry weight (11.7 g, 11.1 g) of shoots was found with IBA @ 1000 ppm followed by IBA @ 2000 ppm,respectively.Similarly,higherfreshanddry weightofrootswasrecordedincuttingstreated withIBA@1000ppm(Figure1).Theincreasein shoot and root biomass with use of auxins is consistentwiththeearlierfindingsofThota*et al*. (2012), Kaur and Kaur (2017) and Kumari *et al.* (2020) in fig crop.

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