ISAH INDIAN JOURNAL OF ARID HORTICULTURE
2019, Vol. 1 (1):26-28

Effect of different rooting media on rooting characters of date palm offshoots cv. KCCL-63

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(Received: 13.03.2019, Accepted: 14.05.2019)

Abstract
Date palm is an important fruit crop of arid and semi-arid regions of India. It is propagated through offshoot and tissue culture. Healthy and uniform offshoots were selected and replicated thrice under factorial concept. IBA treatment (I) (I_1 = 1000 mg l^{-1} IBA; I_2 = without IBA) and types of media (M) (M_1= sandy soil + decomposed FYM; M_2= sandy soil + vermicompost; M_3 = cocopeat; M_4= sandy soil + cocopeat; M_5= sandy soil + sawdust; M_6= sandy soil) were two factors. There were no significant differences with and without application of IBA on number of roots but length of roots have increased on application of IBA. Among the media, cocopeat has shown higher number of roots and root length compared to other medias. Usage of cocopeat along with IBA has shown better results in both root length and number of roots.

Key words: Date palm, Indole-3-butyric acid, offshoots, propagation, rooting media

Introduction
Date palm is one of the most important crops of Kachchh District of Gujarat in India. The region is characterized by low rainfall, high temperature and presence of coastal belt resulting in high salinity in soil and water; high saline tolerance capacity of dates and higher economic return has made it a successful crop of this region (Muralidharan *et al*., 2008). The orchards available in the Kachchh region are of seedling origin, hence exhibit great variability in size, colour, shape, taste and fruits which leads to many issues for marketing and processing of the fruits. Vegetative propagation through offshoots or plantation of tissue culture plants are the only solution to maintain true to type nature. In last two decades the expansion of commercial date plantation has risen significantly and to prepare true to type plants, offshoots are most economical and commonly followed method (Al-Mana *et al*., 1996), although number of offshoots produced per plant, time required for their preparation and success rate are the biggest constraints (Darwesh *et al*., 2013). However, the paucity of tissue cultured plants and its high cost left no other way but to propagate through offshoots. Furthermore, the main concern with offshoots propagation is its low survivability percentage in the field conditions which depend upon so many factors. The survival of offshoot in field is very low. Therefore the present study was conducted involving IBA and rooting medias to improve efficacy and survival percentage.

Offshoots are axillary buds arising alongside of the mother plant. Initially the offshoots are solely dependent on the mother plant and develop only a few roots. When such offshoots are directly transplanted, they show mortality. So, based on this observation, experiment was conducted and offshoots were prepared with different soil mixture to evaluate the best rooting mixture and their influence on vegetative characters. Since, usage of rooting property of auxins is well established (Thiman and Went, 1934), where IBA (Indole-3-butyric acid) is most widely used rooting stimulator (Weisman, *et al.,* 1988), IBA was applied as another factor to understand benefit of auxin treatment on rooting of date palm.

Material and Methods
The experiment was carried out at Date Palm Research Station, S. D. Agricultural University, Mundra-Kachchh, Gujarat, India located at 22°50'22.27" N and 69°43'16.78" E during 2015-16. Temperature ranges from 6° C in December to 45° C in May. Annual average rainfall was 350 mm occurring in July and August. Seven year old mother plants of cultivar KCCL 63 planted at the spacing of 9m x 9m were used. Healthy offshoots of one and a half year age with around same size and weight (approx. 10 kg) were selected for the experiment. The experiment was laid with two factors; first factor (I) is presence of IBA (I_1 = 1000 mg l^{-1} IBA; I_2 = without IBA); second factor(M) different media (M_1= sandy soil + decomposed FYM; M_2= sandy soil + vermicompost; M_3 = cocopeat; M_4= sandy soil + cocopeat; M_5= sandy soil + sawdust; M_6= sandy soil). During preparation of offshoot soil around the offshoot were cleaned, old leaf butts around the offshoot were removed and treated with IBA (as per treatment). Number of leaves were kept as 7 for all the treatments. For preparation of each offshoot, 10-12 kg of media was used.

Each of the treatments was represented by 6 ground offshoots with 3 replications (each replication with two offshoots). Plants were randomly selected having minimum weight of 10 kg among the different mother plants. The bags were tied and filled with different media in the month of October, 2015 and the final observation was taken in the month of September, 2016. The moisture on offshoots were maintained using drip irrigation system and each offshoot received similar amount of water. The experiment was conducted in a randomized block design (RBD) with factorial concept. The results were evaluated as per OPSTAT (Sheoram, *et al.*, 1998). At the time of offshoot removal, they were dugout using a sharp chisel and number of roots, length of the longest roots was recorded. Roots with diameter more than 0.5 cm were counted and recorded.

Result and Discussions

Before planting, observation of root characters was recorded and presented in Table 1. On number of roots, no significant differences were observed between with and without IBA treatment, whereas, length of roots were significantly higher in IBA treated offshoots. However, in context to the earlier experiments by Rizk (2006), Bakr *et al.*, (2010) and Darwesh *et al.* (2013) where higher concentration of IBA treatments have shown better result in root initiation than at lower concentration, which, is showing similarity with our present experiment where lower concentration of IBA (1000 ppm) was used.

Among media, offshoots grown with cocopeat shows maximum number of roots and length of roots. Cocopeat shows better rooting in date palm owing to high water retention capacity and porouness (Hartman *et al.*, 2011; Renuka *et al.*, 2015). The interaction effect of IBA treatment and rooting media on root growth was found significant. Highest rooting was observed in roots with cocopeat as media with IBA application and was found significant with cocopeat as media without IBA application. However, advantage of higher rooting was not observed in survival percentage rejecting our earlier hypothesis. In survival percentage, no role of IBA application was observed. Among the different medias,

Table 1. Effect of different rooting media on plant morphological characters of date palm offshoots

Treatments	Number of roots*	Length of the roots (cm)	Survival Percentage **
I_1 (With 1000 ppm IBA)	7.03(54.44)	27.86	60.24(69.05)
I-$_1$ (Without IBA)	6.49(43.27)	32.27	62.42 (71.77)
SEm ±	0.28	1.03	4.62
C.D. @ 5 %	NS	3.03	NS
M_1= sandy soil + decomposed FYM;	5.89(35.33)	23.42	71.14 (82.66)
M_2= sandy soil + vermicompost ;	6.76(46.41)	29.00	71.14(82.66)
M_3 = cocopeat ;	9.91(101.50)	43.75	38.44 (41.83)
M_4= sandy soil + cocopeat ;	5.56(31.33)	30.25	51.52 (58.16)
M_5= sandy soil + sawdust ;	6.75(46.00)	28.83	64.60 (74.50)
M_6= sandy soil	5.08(32.58)	25.16	71.14 (82.66)
SEm ±	0.48	1.77	8.01
C.D. @ 5 %	1.44	5.24	23.64
I_1M_1	5.51(31.00)	25.50	71.14 (82.66)
$I_1 M_2$	5.59(30.33)	27.16	71.14 (82.66)
$I_1 M_3$	11.89(141.00)	43.83	44.98 (50.00)
$I_1 M_4$	5.65(31.00)	24.16	44.98 (50.00)
$I_1 M_5$	7.23(53.16)	22.83	58.06 (66.33)
$I_1 M_6$	6.29(40.16)	23.66	71.14 (82.66)
$I_2 M_1$	6.27(39.66)	21.33	71.14 (82.66)
$I_2 M_2$	7.94(62.50)	30.83	71.14 (82.66)
$I_2 M_3$	7.91(62.00)	43.66	31.90 (33.66)
$I_2 M_4$	5.48(31.66)	36.33	58.06 (66.33)
$I_2 M_5$	6.28(38.83)	34.83	71.14 (82.66)
$I_2 M_6$	5.08(25.00)	26.66	71.14 (82.66)
SEm ±	0.69	2.51	11.32
C.D. @ 5 %	2.04	7.42	NS

*Data are square root transformed. ** Data are arc sine transformed; Data in parenthesis are original value

although cocopeat shows higher rooting but at field level after one year of transplanting shows lower survival percentage. Highest survival percentage was observed with sandy soil + FYM, Sandy soil + Vermicompost and sandy soil alone. However they were found to be all other treatments except cocopeat.

Although rooting is considered important for successful survival after transplanting but observation in the current experiment rejects this hypothesis. It is also observed that no additional benefit is obtained with application of IBA (1000 ppm) in rooting and survival percentage and thus in future higher concentration needs to be evaluated. For better understanding impact of medias, multiple year trails on multiple varieties needs to be done.

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