International Archive of Applied Sciences and Technology
Int. Arch. App. Sci. Technol; Vol 10 [3] September 2019 : 40-43
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www.soeagra.com/iaast.html

IAAST
ONLINE ISSN 2277- 1565
PRINT ISSN 0976 - 4828

CODEN: IAASCA **ORIGINAL ARTICLE**

DOI: .10.15515/iaast.0976-4828.10.3.4043

Study on Pre-sowing Treatments of Custard Apple (*Annona squamosa*L.) Root Growth

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ABSTRACT
Aexperiment was conducted during the 2015-2016 at research farm, College of Agriculture, Badnapur, DistJalna. (Maharashtra) to "Study on Pre-sowing Treatments of Custard Apple (Annona squamosaL.) Root Growth"was carried in Randomized Block Design with eight treatments replicated thrice, comprising eight treatments of KNO_3 (0.1%), urea (0.1%), hot water, cold water, thiourea (1%), cow urine (10%), cow dung slurry (10%), GA_3 400 ppm for 24 hrs.Amongst the different treatments, the results showed that seeds treated with gibberellic acid (GA3) achieved maximum germination and seedling root growth of custard apple. The seed soaked in GA_3 400 ppm solution for 24 hours prior to sowing resulted in maximum germination percentage, however, maximum length of root (19.83 cm), maximum primary roots (48.47), maximum secondary roots (49.60), fresh weight of root (0.37 g) and dry weight of root (0.16 g) was obsereved under treatment T_8i.e GA_3 400 ppm for 24 hrs. The present investigation concluded that the better root growth of custard apple seedling was observed in treatment T_8 i.e GA_3 400 ppm.

Keywords: *Seed, Custard apple, Annona squamosa,pre-sowing treatments, seed germination, growth.*

Received 22.03.2019 Revised 12.04.2019 Accepted 11.05.2019

CITATION OF THIS ARTICLE
S. B. Mane, M. O.Jugnake, R. N. Parse and U. M. Naglot. Study on Pre-sowing Treatments of Custard Apple (*Annona squamosa*L.) Root Growth. Int. Arch. App. Sci. Technol; Vol 10 [3] September 2019 : 40-43

INTRODUCTION

Custard apple (*Annona squamosa*L.) is a delicious and important fruit crop which is cultivated in tropical and subtropical climate. It comes under family Annonaceae and four of the five species covered in this monograph originated in South or Meso-America and one seems to have originated in eastern Africa. The first group includes *Annona cherimola*Mill, cherimoya, *A. muricata*L., soursop, *A. reticulata*L., custard apple, and *A. squamosa*L., sugar apple. The African species is *A. senegalensis*Pers., wild soursop. Cherimoya is the only species adapted to subtropical or tropical highland conditions; the others are mostly adapted to the tropical lowlands but can be grown in the subtropical. Custard apple is an important dry land fruit of India. The advantages of these crops over those that currently dominate world agriculture, the nutritional and health qualities, medicinal potential, tolerance to drought and other climate extremes and non reliance on fertilizer and other input will have more significance as climate change, population growth and urbanization shape tomorrow's world. There is tremendous scope for increasing the area and production

of these crops. These are tolerant to drought, salinity and alkalinity and nutritionally they are comparable with major crops and are sources for many processing units.
Custard apple growing regions in India include Assam, Bihar, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, and Uttar Pradesh, Andhra Pradesh, Telangana and Tamil Nadu. Approximately 55,000 hectares are dedicated to custard apple cultivation. Along with Maharashtra, Gujarat is another large custard apple growing state. The fruit tolerates a variety of conditions, from saline soils to droughts. In fact, farmers usually cultivate the fruits on hills in barren lands. Erratic rains will, however, impede fruit quality. Annona fruits grow well throughout the plains of India at elevations not exceeding 4,000 ft. It prefers a tropical climate, but with cool winters. The fruit tolerates a variety of conditions, from saline soils to droughts. Farmers usually cultivate the fruits on hills in barren lands. Erratic rains will, however, impede fruit quality. The tree displays yellow trumpet shaped flowers that emit a pleasant sweet smell, with only a small number of flowers setting fruit. (Department of Agriculture and cooperation ministry of Agriculture Government of India, 2014).The pre-sowing treatments improve the germination and growth of seedling. The custard apple seed dormancy remove by using of different soking treatment of KNO_3, Urea, Hot water treatment, Cold water treatment, Thiourea, Cow urine, Cow dung slurry and GA_3 are to improve germination and root.

MATERIAL AND METHODS

The experiment entitle, "Study on Pre-sowing Treatments of Custard Apple (*Annona squamosa*L.) Root Growth" was carried out at Instructional-cum Research Farm, Department of Horticulture, College of Agriculture, Badnapur, DistJalna. Vasantarao Naik Marathwada Krishi Vidyapeeth Parbhani, during the year 2015-2016. Geographically Badnapur is situated in sub tropical region between 19^0 52' 00'' North latitude and 75^0 44' 00'' East longitudes. The altitude of the place is 75.733 and at 498 m above mean sea level. The average annual precipitation is 722 mm. The climate of Badanapur is semi arid and characterized by three distinct season viz., hot and dry summer from March to May, warm humid and rainy season from June to October 21.4^{0}C and mild cold winter from November to February. The month of July, August, and september were humid and moisture index was positive, winter was cool with moisture index oscillating to deficit side and rest of the period was dry.
The sowing seeds in (15 x 20 cm) size polythene bags. The polythene bags were punctured with 4 holes to improve the drainage and filled with a mixture of 3:1 part of well fertile soil and well decomposed FYM.The seeds were soaked in different concentrations of GA_3 (400 ppm), KNO_3 (1%), cow dung slurry 10%, cow urine 10%, Urea (0.1%), Thourea (1%), cold water and Hot Water for 24 hours in beaker.

RESULTS

The results obtained during this work the maximum primary roots per plant was recorded in T_{15} (48.47) i.e. 400 ppm GA_3 for 24 hr and it was significantly different over other treatments. While, the minimum primary roots per plant were recorded in treatment T_{16} (27.53) i.e. control.
The data on this Table indicated that the maximum secondary roots per plant (49.60) recorded under treatment T_{15} i.e. 400 ppm GA_3 for 24 hr which was significantly higher than the rest of treatments. While, the minimum secondary roots per plant were recorded under treatment T_{16} (20.27) i.e. control.
Effect of seed treatment on root length of seedlingshown that the highest root length of seedling (19.83 cm) was recorded in treatment T_{15} i.e. 400 ppm GA_3 for 24 hr and it was statistically at par with the treatment T_{10} (19.63 cm), T_9 (19.34), T_2 (18.18), T_1 (17.51), T_{14} (16.05), T_{13} (15.66) and significantly superior over rest of treatments. While, the minimum root length of seedling was recorded in the treatment T_{16} (13.53 cm) i.e. control.
The significantly maximum fresh weight of root (0.37 g) recorded under treatment T_{15} i.e. 400 ppm GA_3 for 24 hr which was statistically at par with treatment T_{10} (0.37 g) i.eThiourea (1%) for 24 hr and T_9 (0.34 g) i.eThiourea (1%) for 12 hrand significantly higher than the rest of treatments. While, the minimum fresh weight of root was recorded in treatment T_{16} (0.17 g) i.e. control at 90 days after sowing and presented in Table.

The significantly maximum dry weight of root (0.16 g) was recorded in the treatment T_{15} i.e. 400 ppm GA_3 for 24 hr and which was significantly higher than the over rest of other treatments. While, the minimum dry weight of root recorded under treatment control T_{16} (0.03 g) presented in Table.

Table 3. Effect of pre-sowing treatments on root growth parameters at 90 DAS.

Tr. no.	Treatments	Primary roots per plant 90 DAS	Secondary roots per plant 90 DAS	Length of root (cm) 90 DAS	Fresh weight of root (g) 90 DAS	Dry weight of root (g) 90 DAS
T_1	KNO_3 (0.1%)	32.60	25.67	18.18	0.24	0.07
T_2	Urea (0.1%)	28.80	21.27	14.23	0.17	0.04
T_3	Hot Water	32.20	24.93	14.89	0.19	0.06
T_4	Cold Water	29.53	23.67	14.75	0.18	0.05
T_5	Thiourea (1%)	39.00	34.00	19.63	0.37	0.14
T_6	Cow urine (10%)	33.20	30.80	15.40	0.29	0.08
T_7	Cow dung slurry (10%)	34.80	33.20	16.05	0.32	0.10
T_8	GA_3 400 ppm	48.47	49.60	19.83	0.37	0.16
S.Em.±		2.83	3.01	1.20	0.02	0.01
C.D. at 5 %		8.59	9.13	3.65	0.06	0.02

DISCUSSION

The effect of GA3 and stratification on root parameters followed the same trend of its effect on shoots. The promotion effect of GA3 and stratification on root parameters might be explained through the role of GA3 and stratification in enhancing gibberellins synthesis which also leads to increase the growth and root branching and also It was found that GA increases the growth potential of embryo and promotes germination and is necessary to overcome the mechanical restraint conferred by the seed covering layers by weakening of the tissues surrounding the radical. These results are obtained in accordance with the results of earlier worker Anjanwe*et al.* (2013) in papaya fruit crop.

The higher root length due to GA_3 treatment to seeds may be due to cell multiplication and elongation in the meristematic region of the roots. Results are obtained in accordance with the results of earlier worker Pampanna and Sulikeri (2001) in Sapota and Parvin*et al.* (2015) in black walnut seeds.

The data regarding maximum fresh weight associated when the seeds was soaked in GA_3 400 ppm for 24 hr prior to sowing which might be due to fact that, gibberellic acid seed treatment can be attributed to maximum fresh weight of root. This might be due to, as fresh weight increases, it simultaneously increases the dry weight. Similar results have been reported by Anjanwe*et al.* (2013) in papaya, Gurung*et al.* (2014) in passion fruit.

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