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Research Article

The Role of AIA for Inducing Regeneration Embryogenesis that Palm

Horticulture

Keywords: Germination, AIA, Washingonia filifera, Chamareops humilis and Phoenix daxtylifera.

Edlira Kukali		**Agricultural University of Tirana Faculty of Agricultural & Environment. Department of Horticulture.**
Irida Isufaj		**General Directorate of ALUIZNI Tirana, Albania.**
Ana Mane		**Agricultural University of Tirana. Faculty of Economy.**
Julian Fejzaj		**University of Tirana. Faculty of Nature of Science.**

Abstract

In a period of 3 years in the AUT, it is experimenting embryogenesis process of three palms: Washingonia Filifera, Phoenix Humilis and Chamareops Daxtylifera through the treatment with the solution of 50 ppm concentrations AIA, 200 ppm, 500 ppm sol hydro alcoholic and Control (water only). The seeds were immersed in the solutions for 24 hours and then are stored at the substrate of sand and peat (1: 1). During embryogenesis, temperature regimes: 18-200 C, and optimal humidity of the substrate. After germination, the main examinations were (i) the awakening and opening of the embryo, and the number of embryos / no (ii) the number and length of radicle. Data are analyzed in JMP software for variance (alpha = 0:05). Genotypes Ch. Humilis, Ph. Daxtylifera and W Filifera treated with AIA 200 ppm have germination 94%, 93% and 97% while control; 46%, 44% and 51%. Influence of AIA was simultaneous germination ability and radicle number compared with control. Number of radicles for three genotypes of palm was, respectively: Ch Humilis (9.6-1.9), Ph Daxtylifera (4.4-4.1) and W Filifera (2.5-1.6). Impact of AIA It has been indirect on length of radicle and plant performance. In this case embryogenesis expressed a cell potential found only in the zygote and instigated by hormone. Dimensions of radicle were not interdependent of their number. As a conclusion embryogenesis induced by Auxin in any of its concentration it has given a good effect in awakening and regeneration of embryos.

Introduction

Washingonia filifera, Chamareops humilis , Phoenix dactylifera L., is considered one of the main trees in tropical and subtropical areas. Their delicious fruits constitute important component in the daily diet and are considered the main factor in some countries export. Data for palm trees are closely related to the Egyptian landscape, like trees that grow everywhere (Morini, SG. Et al 2003). Adding commercially carried palm branches, which are produced in a limited number for a certain period in the life of a new palm. Sprig low number usually subject failure after it separated from the mother tree weak root system forms (Cline, M.G., 2000).

Palma is a decorative species such as easy, and equally difficult for seed germination and their preparation soon. Research on the palm multiplication method in vitro and some regulators use indigenization promoter are subject to experiments aimed at standardization of technology (Hartmann, H.T et al 1990).

Anatomical features and eager for the anchoring of the species, is an important element which affects the rapid and low cost favors. Process embryogenesis first peak It has purpose natural ability recognition of germination than seeds but ways which increase the ability by induction of phyto regulations or hormonal acids which it is an attempt of many current researchers on the other hand are important origin and seeds, stages of development and liaison with the morphology and biology processes of arousal and germination process. (RIBEIRO, L. M.;et al 2011)

In these circumstances, through this experiment was analyzed the impact that provide some concentrations auxins in inducing and regeneration of meristems and the discovery of priorities its application. (CHIN, H. F et al 1988)

Material and Method

Herbal material: There consisted, First in November-December extracting the seeds from the parent plants. Seeds of three genotypes of Palms they have been retrieved in full ripening, considering the end of November. The seeds are cleaned by covers and are washed with water several times; they are dried and stored prior to treatment. (Thomas S.G., Rieu I. and Steber C.M 2005)

Drying and manipulation in the laboratory for about 20 days, packaging and storage in paper packets until the time of planting. Prepares the seeds started in early January, initially stimulation with 4-5 grade temperature for 36 hours over 10 days before planting. Soon afterwards stimulation for 24 hours with hormonal acid solution AIA in the shape wash, in concentrations 50, 200 and 500 ppm.

Indole acetic acid or hetero auxin it is chemical solution ($C_{10}H_9NO_2$). Chemical solution It is prepared by ethanol + AIA, then by using 0.5 cc mother solution, ethanol, cc 2; 70 ^{O} and 97.5 distilled H_20. It is applied for stimulation of seeds in the laboratory, ambience temperature 18-20^{0}C.

Treatment scheme has been applied:

Chamareops. Humilis 200 ppm
Ch. Humilis 50 ppm
Ch. Humilis 500 ppm
Ch. Humilis Control
Phoenix. Daxtylifera 200 ppm
Ph. Daxtylifera 50 ppm
Ph. Daxtylifera 500 ppm
Ph. Daxtylifera Control
Washingonia Filifera 200 ppm
W Filifera 50 ppm
W Filifera 500 ppm
W Filifera Control

Indicators Search:

(i) Quality of the embryos to 100 seeds / variant for opening.
(ii) Numbers of stem and buds radicle 30 Shoot / Treatment.
(iii) Dimensions of the roots before we mm, metering out of 30 Shoot / variant.
(iv) Phenological stages; time of planting, time of germination, exit leaves first.
Statistical Analysis; Descriptive analysis consisted for, variance by standard deviation squared, Tukey test a level of Significant ($p < 0.05$) for the variance between the variants, etc.

Result and Discussion

Analysis variance: In table 1, AIA at all concentrations 50, 200, 500 ppm it has stimulated different state after lethargic embryos but with the favorable compared to control...

Embryos of three genotypes of palms have expressed heterogeneous value for germination in correlation with auxins treatments and control. The results have been different and within the variables of each genotype, between treatments and genotypes reference research indicators. Tukey-Cramer, p = 0:05. Indol acetic acid, concentration of 200 ppm and 500 ppm gave close results and in general had not changes validated.

Treatments	**Mean/St Dev Sprout (%)**	**Mean/St Dev Length of root (mm)**	**Mean and St Dev No of root**
Ch. Humilis 200 ppm	94.0±3.00 a	151.0±4.00 b	9.2±0.30 a
Ch. Humilis 50 ppm	81.3±2.51 b	127.3±3.78 de	6.3±0.45 b
Ch. Humilis 500 ppm	90.0±2.00 a	152.6±3.05 b	8.5±0.25 a
Ch. Humilis Control	46.0±3.00 c	125.6±6.65 de	3.0±0.25 gh
Ph. Daxtylifera 200 ppm	93.0±2.00 a	130.3±3.51 d	5.0±0.10 cde
Ph. Daxtylifera 50 ppm	79.0±4.00 a	114.3±2.51 f	3.4±0.60 gh
Ph. Daxtylifera 500 ppm	94.0±1.00 a	119.0±1.00 ef	4.6±0.32 def
Ph. Daxtylifera Contol	44.0±3.00 c	123.3±1.52 def	5.3±0.40 bcd
W Filifera 200 ppm	97.0±1.00 a	165.0±2.00 a	4.0±0.20 efg
W Filifera 50 ppm	77.0±3.00 b	144.3±4.04 bc	3.6±0.49 fgh
W Filifera 500 ppm	90.0±3.00 a	149.3±2.51 bc	5.9±0.30 bc
W Filifera Control	51.0±2.00 c	140.6±3.05 c	2.6±0.40 h
Mean	78.02	136.91	5.13
Min	44.03	114.31	2.61
Max	97.00	165.03	9.23
Std Dev	19.33	15.57	2.04
Std Err	3.22	2.59	0.34
CV	24.4	11.1	38.7
Prob > F	0.0111*	0.0170*	0.0369*

Table 1. Data analysis variance for Means and Std Dev for germination%, radicle length (mm) and the number of roots for three Palm genotypes in correlation with the concentrations 50, 200 and 500 ppm of indole acid

Two above treatments had higher results relative with AIA 50 ppm and Control, but superiority in three palm trees and all treatments were found in the treatment with AIA 200 ppm. In this way, it is clear from the data in Table-1 average, the AIA in treatments has significantly increased the percentage of rooting, number of roots, buds and roots length (mm) compared with the control in three genotypes of palms.

Mechanisms of embryonic induction: normal embryos Seeds derived from a zygote characterized by their morphology in three cases. Because (a) differentiate primarily a polar axis that ends with a root meristem and its section immediately arises a vegetative meristem (bud) which constitutes the next plant. In this case cotyledons serve as spare organs up to this time. (b) in the case of control treatment, we identified the phenomenon of pseudo embryos which comprises greater percentage (per treatment) abnormal embryos they have degenerated (c) have been observed in general that somatic embryos have bipolar structure which differentiate once first a root meristem whose body emitted a stem meristem.

Besides the above-mentioned phenomena, they are observed in the treatment 200 and 500 ppm germination of some embryos of zygotes that seed cells. In this case the embryo geneses expressed a cell potential it is found only in the zygote and instigated by hormone. For palm zygote presents three distinct features: (i) formed of for a cell fertilization ♀ and a cell ♂ with (n chromosomes), (ii) constitutes an independent development of various other tissues, (iii) embryos arising from zygote consisting of albumen which regenerates growth regulator for further stages of vegetative development.

AIA in the dosage 200 ppm and 500, average repeated without changes validated to three genotypes to speed the opening of the genotypes embryos. But three concentrations of AIA have stimulated different results to promote physiological or embryogenesis process. Referring cumulative total variance in Table 1, (level = 0.001*), Data of AIA in the concentration 200 ppm are superior, not withstanding less then concentration of 500 ppm, little to control.

In this way physiological awakening the embryos to three genotypes in correlation with concentrations of AIA receive respective ranking by performance, (AIA200> AIA500> AIA50> Control (% germination). Consequently, the level of correlation AIA PPM – awakening physiological % was r 2 = 0,922, which means that the results of the awakening of embryos or on embryogenesis AIA has 92.2 % role.

Referencing Table 1 and Dendron grams 1, three palms *Ch. Humilis*, *Ph. Daxtylifera* and *W Filifera* when they were treated with auxin in different concentrations have been respectively, different germination percentage and the same concentration it has certified variance between genotypes. While in the concentration AIA 200 ppm percentage embryonic germination was higher respectively in three genotypes 94, 93 and 97 percent when version control mutually The washing with water has been opening germ; 46, 44 and 51 percent. Apparently the effect of hormone induction is 48, 49 and 46% higher respectively for the three genotypes of palms. (Graphic 2) (CARPENTER, W. J.; OSTMARK, E. R.; CORNELL, J. A.1993)

Germination of embryos is also genetic influence, namely individual ability for reaction to embryonic wakening in the same conditions of treatment with auxin express germination value for *W Filifera* Palm (97%) and the correlations between the three palms and treatments of experimented have greater variation cv = 24.4% and Prob> F = 0.0111*. In the correlations with Control variation it is much greater. Variance of embryogenesis correlations between the three genotypes and auxin treatment express high correlation coefficient r^2 = 0.922 figure 2.[2]

Inductive for embryogenesis ability: washing environment of embryos with different doses AIA, 50, 200 and 500 ppm to promote awakening and germination, development of vegetative organs provoked different results. For 200 to 500 ppm concentration were more efficient 50 ppm dose for embryogenesis process.

This happened for best effects of correlation that their cells expressed in the first phase, perhaps their totipotency. But the quality of induction is not observed in all embryos. Reduced concentration of auxins or lack thereof have avoided pace of the process. It seems no matter the same species, tissues of seed do not have the same ability to regenerate embryonic process. (BASKIN, C. C.; BASKIN, J. M 1998).The ability to regenerate a new individual is the ability of vegetative cells and zygote. While the further stages of the development of the root meristems and bran vegetation have expressed the same physiognomy regardless of treatment. (Cline, M.G., 2000)

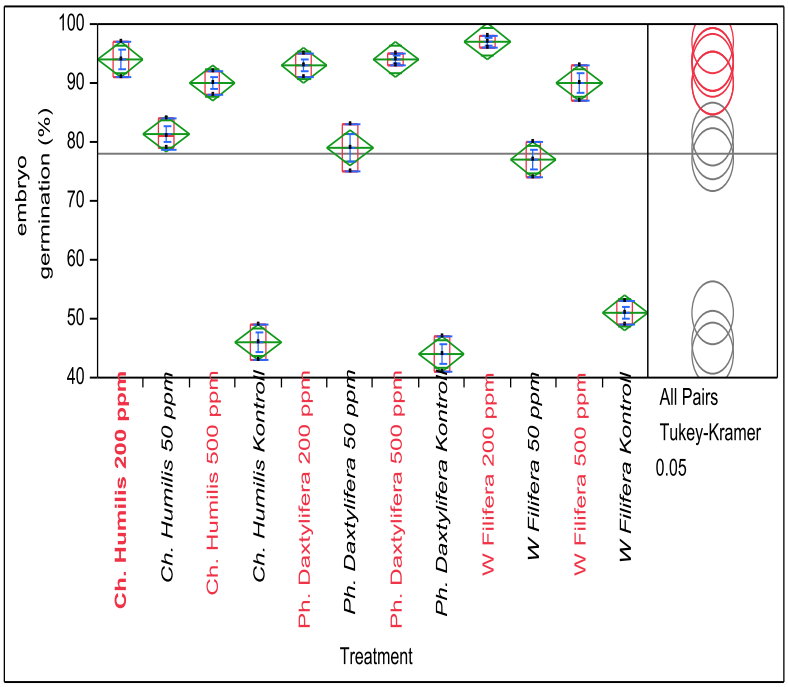

Figure 1. Dendron grams per Oneway Analysis of Embryo of sprouted (%) By Treatment for analysis of variance, and Std Dev Means for germination%, and the test of authenticity Tukey-Cramer p = 0:05. for three genotypes of Palm in correlation with the concentrations 50, 200 and 500 ppm of indole acetic acid.

Similar observations with those the percentage of indigenization received also as regards number of roots and linear growth in mm (table 1, graph 2 and 3).

Number of new roots formed, in correlation with vegetative buds and their sizes they have increased significantly in response the hormonal activators.

Awakening of the embryo, proliferation, and emitted radicle as physiological process, expressed variance correlative validated changes.

Numbers of radicles for germ and length of radicle were two biometric indicators which resulted different. Treatment with auxins has recovered large variance as to germination of embryos (24.4) in order with stressing for number the radicle emitted for each seed or embryo. cv = 38.7% analyzed and verified for Prob> F, 0.0369 *.

Tests conducted in 16 plants of each version, confirmed that AIA stimulated appearance a greater number of primary roots from meristematic nucleus tissue that seed.

Stimulants in various concentrations it has penetrated the embryo and tissue nucleus, it has prompted parencimatic cell multiplication and differentiation of a greater number of radicle compared with control. Each genotype palm differentiates different number but large roots when compared with control stimulated, with AIA. In table 1 & Dendrongram-2, note that *ch. Humilis*, palm trees, under inducing of hetero auxins had the greatest number of roots than the other two. Three genotypes through treatment with AIA have been 9.6, 4.4 and 2.5 roots for every sprouted seed.

These results have been significant changes between each other, LSD, 2.91 and alpha 00:05. The biggest changes are when each treatment under the AIA stimulation is compared with its control means of each palm: *Ch Humilis* 9.6 to 1.9; *Ph Daxtylifera* 4.4 to 4.1 and 2.5 to 1.6 *W Filifera*, radicles. Variability within the replays of each variant is not certified while stressing variance was between averages of options.

Coefficient of variation in each repeat it was 1.7, 2.01 and 2.9 % when between variants it has resulted cv = 38.7%. Great variability between treatments has come of effect that gives hormone in correlation with the concentrations. Figure -2 & table 1.

By Dendron grams it appears in each case that hormonal effect positions so dominant variables that stream so respective the number of roots of each palm.

According 5.13 cumulative average variables is the average number of roots of all treatments but larger amplitude the maximum average 23.9 roots to *Ch. Humilis* 200 ppm and the minimum average *W Filifera* control, CV = 038.7%, Prob> F 0.0369 *

The number of roots is important and without discussion attributed to induction of AIA in meristems cell as a physiological process to regenerate or differentiate more root having function to absorb water and minerals and feed the vegetative organs.

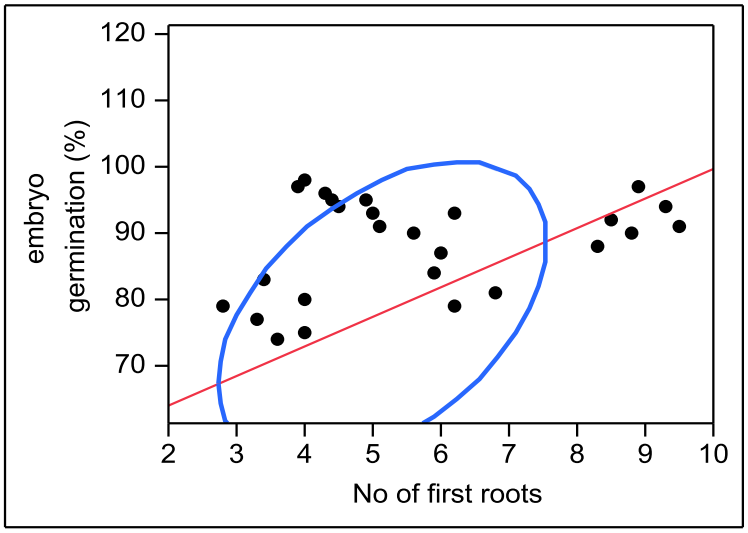

Figure 2. Correlation; number of roots & embryo germination.

Biometr meristems of root. Surveys have expressed root system with different size and proven p = 0:05. The variation within each genotype was in correlation with four experimental treatments. Dimensions of radicle were visible statistical changes and corresponded a variation coefficient CV = 11.1%.

Size greater radicles had *W. Filifera* with 165.03 mm with AIA dose 200 ppm. Minimum size have coincided to palm *Ph. Daxtylifera* in the concentration of AIA 50 ppm with
114.31 mm, average.

General Average Verified resulted 136.91mm Prob> F, 0.0170 *. Averages, with use of IAA 200 ppm, influences in creation such changes, that positioned results in dominance, making economic and profitable application of the hormone.

In graphic 4, given the importance that the number roots have, in correlation with the average length of three palm trees and apparently, as the packet number of primary roots so long is the average root length.

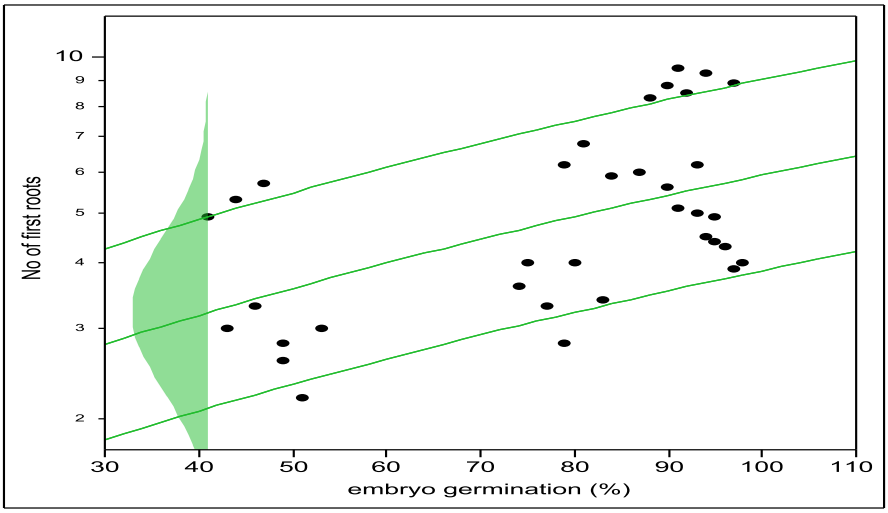

Figure 3. Fit Life by X - No of first roots BY Arrhenius Celsius (embryo germination (%)) Scatterplot

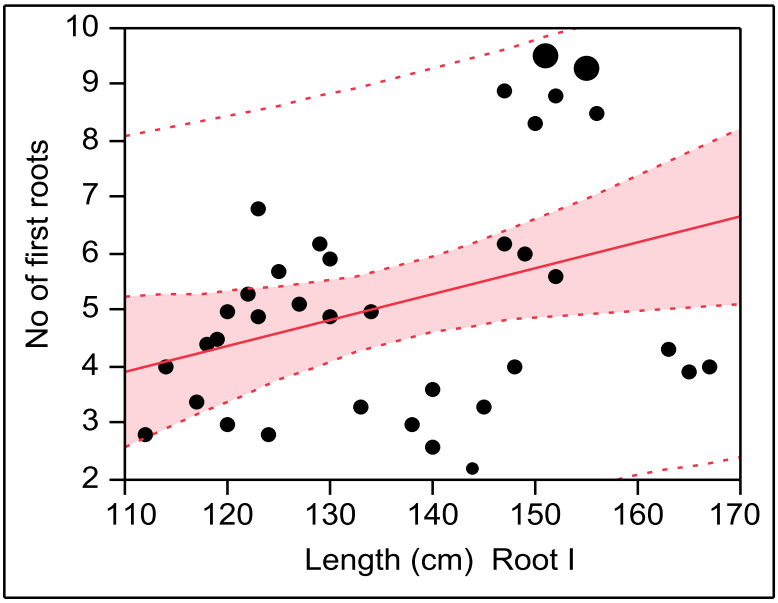

Figure 4. Dendron grams for Oneway Analysis of the length of the root mm by embryo blown in% for the three genotypes of Palm in correlation with the concentrations 50, 200 and 500 ppm of indole acetic acid.

In graphic 4, on analysis orthogonal of regression of changes of connected between the root length and average number of embryonic roots there is resulting representative curve has a positive sense. Namely that, as many average root the greater is the linear length (overall of roots).This means how much more root the greater is the

total root length. This phenomenon shows the importance of a powerful root system that makes the plant premises for greater vegetative growth. It seems for every 4.1 root on average there was a linear length 10.9 cm with a 3.5 and 6.9 standard deviations and a coefficient correlation r = 0:23.

Conclusions

- Embryogenesis induced by hetero eventually resulted auxins best way from Control, because it has encouraged the formation of radicle and buds simultaneously and a higher percentage
- While it has been able to acquired somatic embryos as a method to achieve macro propagation of plantlet at any time necessary for use
- Enriched environments with hormonal stimulant are quite suitable for embryonic awakening, embryogenesis and vegetative development of the embryos of seeds
- Embryogenesis induced through Auxin, every its concentration t has given a good effect in awakening and regeneration of embryos, radicle and vegetative buds for every seed and germ, and when these substances are absent embryogenesis process has poor performance.
- Phyto regulators auxin type, have contributed favorable for activating cell, simultaneous regeneration of meristems root, above its axis differentiated vegetative meristems, similar phenomena of three genotypes of palms.
- The reaction of genotypes was specific, because in this case have influence genetics specific features.

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