Effect of growth regulators,nutrition and ,media on growth and propagation of some yucca Sp

Sahar Samir Abd El Hamed Abd El-Hafez

SUMMARY & RECOMMENDATIONThe present investigation was carried out during the two successive1996/1997 and 1997/1998 on Yuccafilamentosa plants in the ExperimentalFarm belonging to Faculty of Agriculture at Moshtohor, ZagazigUniversity, Benha Branch. whereas, the main purpose aimed to throwsome light on some factors affecting growth of 3 months and one year oldplants through studying the ability to grow under different types of media,nutrition and irrigation through studying the response of both vegetativeand chemical composition of plants. In addition, studying the possibility ofproducing plants of three species of Yucca elephentipes, Y.filamentosa andY. filamentosa var. variegata through enhancing rooting ability of theircuttings by applying some growth regulators before inserted them in sandas a rooting medium.Part I :Experiment I : Growth and chemical composition as affectedby growing media:A simple experiment in complete randomized block design, eachtreatment replicated four times, two plants in each replicate.The investigated media consist of the following mixtures :Ml- sand + clay + peatM2- sand + clay + leaves dustM3- sand + clay + dry chips of Eichhomia speciosa compostM4- sand + clay + foamM5- sand + peat + leaves dustM6- sand + peat + dry chips of Etchhomta spectosa compostM7- sand + peat + foamData obtained could be summarized as follows:I. 1. Vegetative growth lDeaSIlftDleDts :1:01:01 AM3:01:01 AM3:01:01 AM3:01:01 AM3:01:01 AM3:01:01 AM3:01:01 AM1) This study displayed tha.t planting 3 months old seedlings in Ml, M5 andM7 produced the highest values of plant height, number of leaves, leafarea, fresh and dry weights of leaves.2) Data revealed that growing one year old plants in Ml induced the bestresults in their effect on plant height. whereas, M5 was the mostfavourable medium for increasing number of leaves but leaf area and leavesfresh and dry weights increased when their plants grown in M2.I. 2. Root growth measurements :1) Data obtained declared that both ofM4 and Ml were the most effectivemedia in increasing number of roots developed on 3 months old seedlings.On the contrary, planting seedlings in each ofM5, M6 and M7 increasedsignificantly length, fresh and dry weights of roots.2) from the obtained data on one year old plants, we mentioned obviouslythat ;M4 was the most effective in increasing number of developed rootswhereas, Ml stimulated the peneration of root system to reach themaximum length. On the other hand, M2, M5 and M7 media increased thefresh and dry weights of roots.I. 3. Chemical composition :I. 3. A. Leaves content:1) The study displayed that growing 3 months old plants in both M2 andM6 produced the highest N %. whereas, seedlings grown in Ml and M2had the highest percentage ofP, K and total carbohydrate.2) Data obtained declared generally that Ml induced one year old seedlingswith the highest content of nitrogen and total carbohydrate % whereas,grown seedlings in M2 and M5 gave the highest P% and also M2 gave thehighest value of K%.I. 3. B. Root content:1) When planting 3 months old seedlings in M2, N and K% increased.While, culture in M4 and M7 increased P and total carbohydrate % if themean of two seasons was taken into consideration.2) It is quite clear from obtained data that one year old seedlings grown inMI, M4 and M6, their roots contained the maximum % ofN and totalcarbohydrate. whereas, M2 was the favourable in producing plants withroots contained the highest P and K %.Experiment II: Growth and chemical composition as affectedby nutrition treatments :A factorial experiment in complete randomized block design wascarried out included studying the effect of 13 treatments representative thedifferent combinations between two forms of fertilizers i.e. Stimufol (PI)and Prepared fertilizer

(F2), two methods of application i.e. spray (S) anddrench (D) and three concentrations of fertilizers i.e. 0.5, 1.0 and 1.5 gmIL/ pot No.25, in addition 0.0 gmJL ”tap water as control”.The investigated treatments were as follows :1) Control (tap water)2) Fl x S at 0.5 gmIL3) F1 X S at 1.0 gmIL4) Fl X Sat 1.5 gmIL5) F1 X D at 0.5 gmIL6) F1 X D at 1.0 gmIL7) F1 X D at 1.5 gmIL8) F2 X S at 0.5 gmIL9) F2 x S at 1.0 gmIL10) F2 X S at 1.S gmIL11) F2X D at 0.5 gmJL12) F2 x D at 1.0 gm/L13) F2 xD at 1.5 gmILData obtained could be summarized as follows :II. 1. Vegetative growth measurements :1) Data obtained revealed that all vegetative measurements of 3 months oldseedlings responded to drenching F} or F2 at the low and medium rates.2) Obtained data displayed that one year old plants did not follow a firmertrend in their effect on the vegetative measurements which showed thatdrenching F1 or F2 at all applied rates increased significantly all characterscompared to other treatments.II. 2. Root growth measurements :1) Conclusively, the largest number of roots was always in closedrelationship with fertilization 3 months old seedlings with Fl x D at 0.5gmIL. whereas, the longest roots developed on seedlings supplied with F2x D at 0.5 gmIL. Meanwhile, both of F, and F2 added as drench at 0.5gmIL gave the heaviest fresh and dry weights.2) This study displayed that one year old plants fertilized with F1 x D at 0.5and 1.0 gmIL increased both number and length of roots, while fresh anddry weights of roots responded obviously to spraying Flat 1.0 gm/L.ll. ~3.Cbemical composition :II. 3. A. Leaves content:1) It observed on 3 months old seedlings that F2 x D at 1.5 gm/L increasedeach of N, Mg, total carbohydrate and Fe content in leaves, whereas F. x Sat 1.0 gm/L, F] x 0 at 1.5 gm!L and F2 x S at 0.5 gm!L were the superiortreatments in increasing P, K and Ca %, respectively. Meanwhile, sprayingplants with F2 at 1.5 gmIL increased Zn and Mn content in leaves.2) Drenching F2 at 1.5 and 1.0 gmIL to one year old seedlings increased (N& total carbohydrate) and (P & Zn) content in leaves. While, F2 x S at 1.5gmJL gave the highest content of Fe and Mn in leaves. F1 x D at 1.5 gm/L,F2x S at 1.0 gmJL and F2 x D at 0.5 gmIL raised K, Ca and Mg % inleaves, respectively.n, 3. B. Roots content:1) It was clear that 3 months old plants responded to F2 x D at 1.5 gm!Ltreatment which gave the highest content of N, Mg, total carbohydrate, Feand Zn content while, drenching seedlings with 1.0 and 0.5 gmIL ofF2 Caand Mn content in roots respectively, but the highest % of K was a result offertilized seedlings with F2, x S at 1.5 gmJL.2) As for one year old, spraying F] at 1.5 gmIL increased Nand K %whereas, spraying F2 at 0.5 gmIL increased total carbohydrate%. While, F2x D at 1.5 and 1.0 gmJL gave the highest content of’P, Ca, Mg and Fe.Meanwhile, both Zn and Mn content responded to drench F2 at 0.5 and 1.0gm!L, respectively.Experiment III: Growth and chemical composition as influenced byirrigation treatments :This study aimed to know water requirements of 3 months and ODeyear old Yucca plants through irrigation by different water regimes on basisof field capacity (F.C.). The complete randomized block design with fourreplicates each replicate included two plants was used: ,The investigated treatments were as follows :I) Inigation by 25 % ofF.C. Level (A)and (C) levels increased. total carbohydrate % in the first and secondseasons, respectively.2) Referring to one year old plants, it is quite clear that irrigation by (A)and (C) levels increased N%whereas irrigation by (0) level raised PandK% in leaves and watering by (A) level gave the highest total carbohydrate% if the mean of two seasons was taken into consideration.III. 3. B. Roots content:1) It was easy to observe that 3 months old seedlings irrigated by 75% ofF.C., their roots contained the highest N and total carbohydrate %.whereas, irrigation by 25 and 75% ofF.C. increased P and K% in roots,respectively.2) It is obvious that one year old seedlings irrigated by 100% ofF.C. raisedN, K and total carbohydrate % in roots whereas, P content increased as aresult of irrigation by (0) and (C) levels in the first and second seasons,respectively.Part II :Experiment IV : Effect of growth regulators on rooting ofYucca cuttings:Knowing the effect of some growth regulators on rooting of 3 Yuccasp. Ielephenttpes, jilamentosa, jilamentosa var. vaTiegata) and reflected iton the success of rooting, vegetative and root measurements of developed: offsets, as well as the chemical composition of both leaves and roots werethe main purpose of this study.In addition, the chemical content of phenols and indoles in threeportions of cuttings (Apical, Middle and Basal) were determined andhormonal content (GA3• IAA and ABA) were also determined to find outthe relationship between their levels as affected by the effect of cuttingportion from one hand and possibility or difficulty to root from the other.Three Yucca sp. plants were chosen and divided into cuttings dippedfor 3 hours pre culture in the following

solutions :A- Yucca elephentipes cuttings :1) Control (distilled water)2) Dipping in IBA 2000 ppm3)Dipping in rnA 4000 ppm4) Dipping in PP333 5 ppm5) Dipping in PP333 25 ppm6) Dipping in rnA 20 ppm + PP333 5 ppm7) Dipping in rnA 100 ppm + PP333 25 ppm8) Dipping in NAA 20 ppm + PP333 5 ppm9) Dipping in NAA 100 ppm + PP333 25 ppmB- Yucca filamentosa and Yuccajilamentosa var. variegata cuttings :1) Control (distilled water)2) Dipping in rnA 20 ppm + PP333 5 ppm3) Dipping in rnA 100 ppm + PP333 25 ppm~) Dipping in NAA 20 ppm + PP333 5 ppm5) Dipping in NAA 100 ppm + PP33325 ppmThe different treatments were arranged in a randomized completeblock design as each treatment was replicated three times, 4 cuttings inevery replicate.The obtained results could be summarized as follows :IV. 1. Yucca elephentipes cuttings:IV. 1. A. Percentage of succeeded cuttings :Dipping cuttings cane in PP333 5 ppm and rnA 20 ppm + PP333 5 ppmincreased percentage of succeeded cuttings.IV. 1. B. Vegetative growth meuurements :In general, it is quite clear that dipping cuttings in rnA 20 ppm + PP3335 ppm, dipping in PP3335 ppm in the first season only and NAA 20 ppm +PP333 5 ppm in the second season only increased number and length ofoffsets, in addition number, fresh and dry weights of leaves.IV. 1. C. Root growth measurements :When cuttings dipped in PP333 5 ppm and NAA 20 ppm +PP333 5ppm, the number of developed roots were increased during the first andsecond seasons, respectively. While, rnA 20 ppm + PP333 5 ppm treatmentincreased significantly length of roots, but fresh and dry weights of rootsincreased as a result of rnA 100ppm + PP33325 ppm treatment.IV. 1. D. Chemical composition:”IV. 1. D. 1. Leaves content:Using PP333 5 ppm to cuttings increased N% in leaves. Meanwhile~treating cuttings with rnA 20 ppm + PP333 5 ppm treatment was theeffective one in increasing total carbohydrate %and CIN ratio in leaves.IV. 1. D. 2. Roots content:Treating cuttings cane with PP333 25 ppm and 5 ppm increased rootscontent of nitrogen and total carbohydrate respectively~while IBA 20 ppm+ PP333 5 ppm increased CIN ratio in roots.IV. 2. Yucca jUamentosa cuttings:IV. 2. A. Percentage of succeeded cuttings:Data obtained revealed generally that IBA 20 ppm + PP333 5 ppm andIBA 100 ppm +PP333 25 ppm were the superior treatments in increasing %of succeeded cuttings. whereas, NAA 20 ppm + PP333 5 ppm treatment didnot record any percentage of success.IV. 2. B. Vegetative and root growth measurements :rnA 100 ppm + PP333 25 ppm was the most effective treatment inincreasing the aforesaid vegetative and root growth measurements tocuttings cane.IV. 2. C. Chemical composition :IV. 2. C. 1. Leaves content:Data obtained showed that if mean of two seasons was taken inconsideration, IBA 20 ppm + PP333 5 ppm treatment increased N and totalcarbohydrate %, but control treatment increased CIN ratio.IV. 1. 2. B. Roots content:Treating cuttings with NAA 100 ppm + PP333 25 ppm and rnA 100ppm + PP333 25 ppm increased nitrogen and total carbohydrate %. While,rnA 20 ppm + PP333 5 ppm treatment was the most suitable in increasinge/N ratio.IV. 3. Yucca filamentosa var. variegata cuttings :.Generally, we could mentioned that treated cuttings cane with rnA 100ppm + PP333 25 ppm was the most effective treatment in this respect. Onthe contrary, NAA 20 ppm + PP333 5 ppm and NAA 100 ppm + PP333 25ppm failed completely to produce any value for this character. .from the different results of two investigated seasons as for the effectof cuttings rooting which may due to different cutting portion from oneseason to other which reflected on the success of rooting. Thus, somechemical constituents of cuttings as related to its portions (Apical, Middleand Basal) were determined to reach the most suitable portion for 3investigated Yucca sp. :Hormanal content of cuttings :1- Yucca elephentipes cuttings :cuttings collected from Apical portion gave the highest GAl, lAA andtotal indoles content so, it was the most fuvourable one as compared to theothers.2- Yucca frlamentosa cuttings:It was obvious that cuttings taken from Basal portion was the superiorone which it contained the highest content of GA3 (mgtlOO gm dry weight)in addition, the lowest values of ABA, free and total phenols.3- Yucca jilamentosa var: variegata cuttings:It was favourable to take cuttings of Yucca filamentosa var. variegatafrom Apical position which gave the highest level of GA3 and no ABAcontent in addition, lowest value of free phenols compared to other cuttingsportions.Recommendation:The first experiment:No obvious response could be concluded due to growing Yuccaftlamentosa 3 months old and one year old seedlings on different growingmedia concerning the most of vegetative and root measurements andchemical content, although Ml (sand: clay: peat moss) and M5 (sand:peat moss: leaves dust) showed its superiority in most cases for 3 monthsseedlings and both of Ml (sand: clay: peat moss)

and M2 (sand: clay:leaves dust) which considered available media for growing one year oldseedlings.The second experiment:This investigation aimed to study the response of 3 months and oneyear old to the effect of two forms offerti)izers and two methods and threerates of application. The obtained results can be summarized as follows :1) As for 3 months old, it could concluded that plants responded obviouslyto drenching with F 1 (Stimufol) and F2 (prepared fertilizer) ”at0.5 gm/Lat fortnight intervals.2) In view of our results, it might be recommended to fedded one year oldplants at fortnight intervals using F1 and F, at 1.0 and 1.5 gmIL as soildrench.Generally, from our results it might be recommended to use F2(prepared fertilizer) which we could prepared easily and gave bestresults if it compared to F1 (Stimufol) which costs about 27 LE / Kgwhereas, F2costs about 2-3 LE / Kg and their constituents availablelocally in addition, foliar application treatment (spray) did not have anyeffect on most of the investigated growth measurements as a result ofthe presence of waxy layer on leaves surface.The third experiment: . .It could be recommended by irrigation 3 months old plants with 50 %of F.e. and watered one year old plants with 50 and 75 % ofF.C. whichreflected on producing plants with fovowable appearance.The fourth experiment:It might be recommended to propagate Yucca sp. from cane stemcuttings which are cut into sections, waxed on the distal (top); basal endsApical portion of cuttings are treated for 3 hours with IBA 20 ppm +PP3335 ppm for Yucca elephentipes and rnA 100 ppm +PP333 25 ppm for Yuccafilamentosa Basal portion cuttings and Yuccafilamentosa var. variegataApical portion cuttings and placed in sand in a worm greenhouse undershade.