SUMMARY & RECOMMENDATION

The present investigation was carried out during the two successive 1996/1997 and 1997/1998 on *Yucca filamentosa* plants in the Experimental Farm belonging to Faculty of Agriculture at Moshtohor, Zagazig University, Benha Branch. Whereas, the main purpose aimed to throw some light on some factors affecting growth of 3 months and one year old plants through studying the ability to grow under different types of media, nutrition and irrigation through studying the response of both vegetative and chemical composition of plants. In addition, studying the possibility of producing plants of three species of *Yucca elephentipes*, *Y. filamentosa* and *Y. filamentosa var. variegata* through enhancing rooting ability of their cuttings by applying some growth regulators before inserted them in sand as a rooting medium.

Part I :

Experiment I : Growth and chemical composition as affected by growing media :

A simple experiment in complete randomized block design, each treatment replicated four times, two plants in each replicate.

The investigated media consist of the following mixtures :

M1- sand + clay + peat 1 : 1 : 1

M2- sand + clay + leaves dust 3 : 1 : 1

M3- sand + clay + dry chips of *Eichhornia speciosa* compost 3 : 1 : 1

M4- sand + clay + foam 3 : 1 : 1

M5- sand + peat + leaves dust 3 : 1 : 1

M6- sand + peat + dry chips of *Eichhornia speciosa* compost 3 : 1 : 1

M7- sand + peat + foam 3 : 1 : 1

Data obtained could be summarized as follows :

I. 1. Vegetative growth measurements :

1) This study displayed that planting 3 months old seedlings in M1, M5 and M7 produced the highest values of plant height, number of leaves, leaf area, fresh and dry weights of leaves.

2) Data revealed that growing one year old plants in M1 induced the best results in their effect on plant height. Whereas, M5 was the most favourable medium for increasing number of leaves but leaf area and leaves fresh and dry weights increased when their plants grown in M2.

I. 2. Root growth measurements :

1) Data obtained declared that both of M4 and M1 were the most effective media in increasing number of roots developed on 3 months old seedlings. On the contrary, planting seedlings in each of M5, M6 and M7 increased significantly length, fresh and dry weights of roots.

2) From the obtained data on one year old plants, we mentioned obviously that M4 was the most effective in increasing number of developed roots whereas, M1 stimulated the peneration of root system to reach the maximum length. On the other hand, M2, M5 and M7 media increased the fresh 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 and M6 produced the highest N %. Whereas, seedlings grown in M1 and M2 had the highest percentage of P, K and total carbohydrate.

2) Data obtained declared generally that M1 induced one year old seedlings with the highest content of nitrogen and total carbohydrate % whereas,

grown seedlings in M2 and M5 gave the highest P% and also M2 gave the highest 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 the mean of two seasons was taken into consideration.

2) It is quite clear from obtained data that one year old seedlings grown in M1, M4 and M6, their roots contained the maximum % of N and total carbohydrate. Whereas, M2 was the favourable in producing plants with roots contained the highest P and K %.

Experiment II : Growth and chemical composition as affected by nutrition treatments :

A factorial experiment in complete randomized block design was carried out included studying the effect of 13 treatments representative the different combinations between two forms of fertilizers i.e. Stimufol (F1) and Prepared fertilizer (F2), two methods of application i.e. spray (S) and drench (D) and three concentrations of fertilizers i.e. 0.5, 1.0 and 1.5 gm/L / pot No.25, in addition 0.0 gm/L "tap water as control".

The investigated treatments were as follows :

1) Control (tap water)
2) F_1 x S at 0.5 gm/L
3) F_1 x S at 1.0 gm/L
4) F_1 x S at 1.5 gm/L
5) F_1 x D at 0.5 gm/L
6) F_1 x D at 1.0 gm/L
7) F_1 x D at 1.5 gm/L
8) F_2 x S at 0.5 gm/L
9) F_2 x S at 1.0 gm/L

10) F_2 x S at 1.5 gm/L

11) F_2 x D at 0.5 gm/L

12) F_2 x D at 1.0 gm/L

13) F_2 x D at 1.5 gm/L

Data obtained could be summarized as follows :

II. 1. Vegetative growth measurements :

1) Data obtained revealed that all vegetative measurements of 3 months old seedlings responded to drenching F_1 or F_2 at the low and medium rates.

2) Obtained data displayed that one year old plants did not follow a firmer trend in their effect on the vegetative measurements which showed that drenching F_1 or F_2 at all applied rates increased significantly all characters compared to other treatments.

II. 2. Root growth measurements :

1) Conclusively, the largest number of roots was always in closed relationship with fertilization 3 months old seedlings with F_1 x D at 0.5 gm/L. Whereas, the longest roots developed on seedlings supplied with F_2 x D at 0.5 gm/L. Meanwhile, both of F_1 and F_2 added as drench at 0.5 gm/L gave the heaviest fresh and dry weights.

2) This study displayed that one year old plants fertilized with F_1 x D at 0.5 and 1.0 gm/L increased both number and length of roots, while fresh and dry weights of roots responded obviously to spraying F_1 at 1.0 gm/L.

II. 3. Chemical composition :

II. 3. A. Leaves content :

1) It observed on 3 months old seedlings that F_2 x D at 1.5 gm/L increased each of N, Mg, total carbohydrate and Fe content in leaves, whereas F_1 x S

at 1.0 gm/L, F_1 x D at 1.5 gm/L and F_2 x S at 0.5 gm/L were the superior treatments in increasing P, K and Ca %, respectively. Meanwhile, spraying plants with F_2 at 1.5 gm/L increased Zn and Mn content in leaves.

2) Drenching F_2 at 1.5 and 1.0 gm/L to one year old seedlings increased (N & total carbohydrate) and (P & Zn) content in leaves. While, F_2 x S at 1.5 gm/L gave the highest content of Fe and Mn in leaves. F_1 x D at 1.5 gm/L, F_2 x S at 1.0 gm/L and F_2 x D at 0.5 gm/L raised K, Ca and Mg % in leaves, respectively.

II, 3. B. Roots content :

1) It was clear that 3 months old plants responded to F_2 x D at 1.5 gm/L treatment which gave the highest content of N, Mg, total carbohydrate, Fe and Zn content while, drenching seedlings with 1.0 and 0.5 gm/L of F_2 Ca and Mn content in roots respectively, but the highest % of K was a result of fertilized seedlings with F_2 x S at 1.5 gm/L.

2) As for one year old, spraying F_1 at 1.5 gm/L increased N and K % whereas, spraying F_2 at 0.5 gm/L increased total carbohydrate%. While, F_2 x D at 1.5 and 1.0 gm/L gave the highest content of P, Ca, Mg and Fe. Meanwhile, both Zn and Mn content responded to drench F_2 at 0.5 and 1.0 gm/L, respectively.

Experiment III : Growth and chemical composition as influenced by irrigation treatments :

This study aimed to know water requirements of 3 months and one year old Yucca plants through irrigation by different water regimes on basis of field capacity (F.C.). The complete randomized block design with four replicates each replicate included two plants was used :

The investigated treatments were as follows :

1) Irrigation by 25 % of F.C. Level (A)

and (C) levels increased. total carbohydrate % in the first and second seasons, respectively.

2) Referring to one year old plants, it is quite clear that irrigation by (A) and (C) levels increased N% whereas irrigation by (D) level raised P and K% 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% of F.C., their roots contained the highest N and total carbohydrate %. Whereas, irrigation by 25 and 75% of F.C. increased P and K% in roots, respectively.

2) It is obvious that one year old seedlings irrigated by 100% of F.C. raised N, K and total carbohydrate % in roots whereas, P content increased as a result of irrigation by (D) and (C) levels in the first and second seasons, respectively.

Part II :

Experiment IV : Effect of growth regulators on rooting of Yucca cuttings :

Knowing the effect of some growth regulators on rooting of 3 *Yucca sp.* (*elephentipes*, *filamentosa*, *filamentosa var. variegata*) and reflected it on the success of rooting, vegetative and root measurements of developed offsets, as well as the chemical composition of both leaves and roots were the main purpose of this study.

In addition, the chemical content of phenols and indoles in three portions of cuttings (Apical, Middle and Basal) were determined and hormonal content (GA_3, IAA and ABA) were also determined to find out

the relationship between their levels as affected by the effect of cutting portion from one hand and possibility or difficulty to root from the other.

Three *Yucca sp.* plants were chosen and divided into cuttings dipped for 3 hours pre culture in the following solutions :

A- *Yucca elephentipes* cuttings :

1) Control (distilled water)
2) Dipping in IBA 2000 ppm
3) Dipping in IBA 4000 ppm
4) Dipping in PP_{333} 5 ppm
5) Dipping in PP_{333} 25 ppm
6) Dipping in IBA 20 ppm + PP_{333} 5 ppm
7) Dipping in IBA 100 ppm + PP_{333} 25 ppm
8) Dipping in NAA 20 ppm + PP_{333} 5 ppm
9) Dipping in NAA 100 ppm + PP_{333} 25 ppm

B- *Yucca filamentosa* and *Yucca filamentosa var. variegata* cuttings :

1) Control (distilled water)
2) Dipping in IBA 20 ppm + PP_{333} 5 ppm
3) Dipping in IBA 100 ppm + PP_{333} 25 ppm
4) Dipping in NAA 20 ppm + PP_{333} 5 ppm
5) Dipping in NAA 100 ppm + PP_{333}25 ppm

The different treatments were arranged in a randomized complete block design as each treatment was replicated three times, 4 cuttings in every 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 PP_{333} 5 ppm and IBA 20 ppm + PP_{333} 5 ppm increased percentage of succeeded cuttings.

IV. 1. B. Vegetative growth measurements :

In general, it is quite clear that dipping cuttings in IBA 20 ppm + PP_{333} 5 ppm, dipping in PP_{333} 5 ppm in the first season only and NAA 20 ppm + PP_{333} 5 ppm in the second season only increased number and length of offsets, in addition number, fresh and dry weights of leaves.

IV. 1. C. Root growth measurements :

When cuttings dipped in PP_{333} 5 ppm and NAA 20 ppm + PP_{333} 5 ppm, the number of developed roots were increased during the first and second seasons, respectively. While, IBA 20 ppm + PP_{333} 5 ppm treatment increased significantly length of roots, but fresh and dry weights of roots increased as a result of IBA 100 ppm + PP_{333} 25 ppm treatment.

IV. 1. D. Chemical composition :

IV. 1. D. 1. Leaves content :

Using PP_{333} 5 ppm to cuttings increased N% in leaves. Meanwhile, treating cuttings with IBA 20 ppm + PP_{333} 5 ppm treatment was the effective one in increasing total carbohydrate % and C/N ratio in leaves.

IV. 1. D. 2. Roots content :

Treating cuttings cane with PP_{333} 25 ppm and 5 ppm increased roots content of nitrogen and total carbohydrate respectively, while IBA 20 ppm + PP_{333} 5 ppm increased C/N ratio in roots.

IV. 2. *Yucca filamentosa* cuttings :

IV. 2. A. Percentage of succeeded cuttings :

Data obtained revealed generally that IBA 20 ppm + PP_{333} 5 ppm and IBA 100 ppm + PP_{333} 25 ppm were the superior treatments in increasing % of succeeded cuttings. Whereas, NAA 20 ppm + PP_{333} 5 ppm treatment did not record any percentage of success.

IV. 2. B. Vegetative and root growth measurements :

IBA 100 ppm + PP_{333} 25 ppm was the most effective treatment in increasing the aforesaid vegetative and root growth measurements to cuttings cane.

IV. 2. C. Chemical composition :

IV. 2. C. 1. Leaves content :

Data obtained showed that if mean of two seasons was taken in consideration, IBA 20 ppm + PP_{333} 5 ppm treatment increased N and total carbohydrate %, but control treatment increased C/N ratio.

IV. 1. 2. B. Roots content :

Treating cuttings with NAA 100 ppm + PP_{333} 25 ppm and IBA 100 ppm + PP_{333} 25 ppm increased nitrogen and total carbohydrate %. While, IBA 20 ppm + PP_{333} 5 ppm treatment was the most suitable in increasing C/N ratio .

IV. 3. *Yucca filamentosa var. variegata* cuttings :

Generally, we could mentioned that treated cuttings cane with IBA 100 ppm + PP_{333} 25 ppm was the most effective treatment in this respect. On the contrary, NAA 20 ppm + PP_{333} 5 ppm and NAA 100 ppm + PP_{333} 25 ppm failed completely to produce any value for this character.

From the different results of two investigated seasons as for the effect of cuttings rooting which may due to different cutting portion from one season to other which reflected on the success of rooting. Thus, some chemical constituents of cuttings as related to its portions (Apical, Middle and Basal) were determined to reach the most suitable portion for 3 investigated *Yucca sp.* :

Hormanal content of cuttings :

1-*Yucca elephentipes* cuttings :

cuttings collected from Apical portion gave the highest GA_3, IAA and total indoles content so, it was the most favourable one as compared to the others.

2-*Yucca filamentosa* cuttings :

It was obvious that cuttings taken from Basal portion was the superior one which it contained the highest content of GA_3 (mg/100 gm dry weight) in addition, the lowest values of ABA, free and total phenols.

3-*Yucca filamentosa var. variegata* cuttings :

It was favourable to take cuttings of *Yucca filamentosa var. variegata* from Apical position which gave the highest level of GA_3 and no ABA content in addition, lowest value of free phenols compared to other cuttings portions.

Recommendation :

The first experiment :

No obvious response could be concluded due to growing *Yucca filamentosa* 3 months old and one year old seedlings on different growing media concerning the most of vegetative and root measurements and chemical content, although M1 (sand : clay : peat moss) and M5 (sand : peat moss : leaves dust) showed its superiority in most cases for 3 months seedlings and both of M1 (sand : clay : peat moss) and M2 (sand : clay : leaves dust) which considered available media for growing one year old seedlings.

The second experiment :

This investigation aimed to study the response of 3 months and one year old to the effect of two forms of fertilizers and two methods and three rates of application. The obtained results can be summarized as follows :

1) As for 3 months old, it could concluded that plants responded obviously to drenching with F_1 (Stimufol) and F_2 (prepared fertilizer) at 0.5 gm/L at fortnight intervals.
2) In view of our results, it might be recommended to fedded one year old plants at fortnight intervals using F_1 and F_2 at 1.0 and 1.5 gm/L as soil drench.

Generally, from our results it might be recommended to use F_2 (prepared fertilizer) which we could prepared easily and gave best results if it compared to F_1 (Stimufol) which costs about 27 LE / Kg whereas, F_2 costs about 2-3 LE / Kg and their constituents available locally in addition, foliar application treatment (spray) did not have any effect on most of the investigated growth measurements as a result of the presence of waxy layer on leaves surface.

The third experiment :

It could be recommended by irrigation 3 months old plants with 50 % of F.C. and watered one year old plants with 50 and 75 % of F.C. which reflected on producing plants with fovourable appearance.

The fourth experiment :

It might be recommended to propagate *Yucca sp.* from cane stem cuttings which are cut into sections, waxed on the distal (top); basal ends Apical portion of cuttings are treated for 3 hours with IBA 20 ppm + PP_{333} 5 ppm for *Yucca elephentipes* and IBA 100 ppm + PP_{333} 25 ppm for *Yucca filamentosa* Basal portion cuttings and *Yucca filamentosa var. variegata* Apical portion cuttings and placed in sand in a worm greenhouse under shade.