SUMMARY

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The present research work was conducted during the two consecutive seasons of 2007 and 2008 in the Experiment station of floriculture Dept., Faculty of Agric., Benha university. The purpose of this investigation was to study the effect of chemical fertilizer and or bio fertilizer and planting media on growth and chemical composition of *Adiantum cuneatum* plants.

This study included two parts:

1- The first part: dealing with planting media

1-The second part: dealing with mineral nutritionand or bio fertilizer.

The first part: Effect of planting media on growth and chemical composition of *Adiantum cuneatum* plants:

Potted experiments were conducted; each was devoted to evaluate some planting media (for substrate mixtures).

Preparation of the differential substrate mixtures (planting media):

In this regard for planting media representative of some combinations between five substances namely: a - sand , b. clay, c- leaf dust, dust, d- peatmoos and e- vermiculite.

The planting media were as follows:

M_1 = sand; clay : leaf dust 1 :1 :1 .by volum.

M_2 = sand : clay : peat moss 1 : 1 :1 by volum.

M_3 = sand: clay: vermiculit 1 : 1 :1 by volum.

M_4= sand : clay 1: 1 by volum.

Proportion of adding various components per given planting media was estimated on the base of volume.

On the first of January in each experimental season, mature plants of *Adiantum cuneatm*, were divided into several uniform plated in 20 on plastic posts filled with the different planting mixtures. On mid February of each treatment were care fully selected as being healthy and nearly uniform in their growth vigor. Thus, In each of both conducted experiments the complete randomized block design was used for arranging the different treatments. Each treatment was replicated for times, every replicated was replicated by ten plants.

The chemical analysis of the used media:

II- The second part: Effect of chemical and or bio –fertilizers on *Adiantum cuneatum* plants.

The aim of this part was to study the response of *Adiantum cuneatum* plants to different ratios of NPK either alone or in combination with biofertilizer. On the first of January in each experimental season, mature plants of *Adiantum cuneatum* were divided in to several uniform plant les (about cm length with fronds) which were planted in 20 cm plastic posts filled with a mixture of clay+ sand (1 : 1. v/v).

The chemical analysis of the used media are presented in Table (a) .All treatments of NPK and bio for fertilizer were applied as a soil drench. All treatments of chemical fertilizer

were Applied three times at one month in travels , whereas bio fertilizer were applied at once the first applying was begun at first April.

The experiment included the following treatments F1= control "without chemical and bio. fertilizers). $F_{2=}$ 100%chemical fertilizer (NPK) (recommended dose

F3= 75% chemical fertilizer (NPK)

F4= 75% chemical Fertilizer+ 25% bio- fertilizer

F5= 50% chemical fertilizer +50 % bio fertilizer

F6= 25 % chemical fertilizer + 75% bio- fertilizer

F7 = 100% bio - fertilizer .

Bio-fertilizer treatments:

Adiantum plants were inoculated with a mixture of nitrobein + phosphorien contained efficient strains of nitrogen fixing bacteria namely, Azotobacter chroococcum + phosphate dissolving bacteria (Bacillus megaterium var phosphaticum) which supplied by the Department of Microbiology, Agric.Res.Center, Giza was used in this study as biological activators. The strains were characterized by a good ability to infect its specific host plant and by its high efficiency in N-fixation and phosphate solublizing.

Bio-fertilizer treatments were applied by drench method as follow:

The plants received the suspension of bio-fertilizer one time after 45 days from traveling as a soil drench at the rate of 1cm per pot **(Gomaa and Youssef (2009).**

Chemical fertilizer treatments.

The plants were fertilized with full chemical fertilizer as a recommended dose; nitrogen fertilizer ($NH_4 NO_3$) was added at the rate of 2 g N/pot., calcium superphosphate (15.5 % P_2O_5) was added at the rate of 1 g/pot P_2O_5 and potassium sulphate (48% K_2O) at the rate of 1g/pot K_2O **El-Deeb (1999)**. As it added in three equal doses at 45, 60 and 75 days after sowing **(El-Khyat and Zaghloul, 1999).**

The most important results can be summarized as follows:

The first part : planting media:

1- It was found that the tallest adiantum cuneatum plants was recorded by using M_2 "clay: peat moss: sand" (1:1:1) followed by using M_1 "clay: leaf dust: sand" (1:1:1) as on average, of both seasons.

2- The greatest number of fronds/plants was gained by using M_1 followed by M_2, whereas the lowest number of this parameter was obtained by using M_4 in both seasons.

3- Using M_2 and M_1 showed to be the most effective planting media for producing the highest number of leaves/frond in both seasons, while the lowest number of leaves/ frond was recorded by using M_4 in both seasons.

4- The heaviest fresh and dry weights of fronds/ plant were registered by using M_1 followed by M_2 as an average of both seasons, whereas the lowest values of fresh and dry weights of fronds/plant were obtained by using M_4 in both seasons.

Root growth measurements:

It was found that the heaviest fresh and dry weights of roots/plant were recorded by using M_1 followed by M_2, whereas the lowest values of these parameters were registered by using of M_4 in both seasons of this study.

Chemical growth measurements:

1- Planting adiantum cuneatum plants in M_1 and M_2 as a planting media produced the greatest leaf nitrogen content in both seasons, whereas the lowest leaf nitrogen content was recorded by using M_4 in both seasons.

2- The highest value of leaf phosphorus content was recorded by using M_1 followed by M_2 in both seasons, while the lowest values of this parameter was gained by using M_4 in both seasons.

3- Using M_1 showed to be the most pronouncing planting media for inducing the highest leaf potassium content, followed by using M_2 in both seasons, on contrary the lowest values of this parameter was obtained by using M_4 in both seasons of this work..

4- The heaviest fresh and dry weights of fronds/ plant were registered by using M_1 followed by M_2 as an average of

both seasons, whereas the lowest values of fresh and dry weights of fronds/ plant were obtained by using M_4 in both seasons.

Root growth measurements:

It was found that the heaviest fresh and dry weights of roots/plant were recorded by using M_1 followed by M_2, whereas the lowest values of these parameters were registered by using M_4 in both seasons of this study.

Chemical growth measurements :

1- Planting Adiantum cuneatun. Plants in M_1 and M_2 as a planting media produced the greatest leaf nitrogen content in both seasons, whereas the lowest leaf nitrogen content was recorded by using M_4 in both seasons.

2- The highest values of phosphorus content was recorded by using M_1 followed by M_2 in both seasons, while the lowest values of this parameter was gained by using M_4 in both seasons.

3- Using M_1 showed to be the most pronouncing planting media for inducing the highest leaf potassium content, followed by using M_2 in both seasons , on contrary the lowest values of this parameter was obtained by using M_4 in both seasons of this work..

4- It was found that the richest leaf total carbohydrates content was registered by using M_1 followed by using M_2, while the lowest leaf total carbohydrates content was gained by using M_4 in both seasons.

5- The highest values of leaf total chlorophylls content was obtained by using M_1 followed by M_2 as an average of both seasons. On the reverse the lowest values of this parameter was recorded by using M_4 in both seasons.

6- Leaf total indols content of Adiantum plants as greatly increased by using M_2 followed by using M_1, whereas the lowest records of this parameter was gained by using M_4 in both seasons. On contrary, the lowest leaf total phenols content was registered by using M_2 and M_1 in both seasons, while the highest values of this parameter was recorded by using M_4 in both seasons of this study.

The second part: fertilizer experiment

A- vegetative growth measurements:

1- It was observed that all tested fertilizer treatments significantly increased the plant height of Adiantum plants, with superior for using the treatment of F_2"100% chemical fertilizer" as compared with control in both seasons.

2- Number of fronds/plants was greatly increased by using all studied fertilizer treatments when compared with control in both seasons. However, the greatest number of fronds/plant was gained by using the treatment of F_4 "75 %"chemical fertilizer +25%bio fertilizer followed using the treatment of F2.

3- 3-Using the treatment of F4 showed to be the most effective treatment for inducing the highest number of

leaves/frond followed by using the treatment of F2 as compared with control and other treatments in both seasons.

4- Fresh and dry weights of fronds/plant were greatly increased by using all application of fertilizer in both seasons and the superiority was for the treatment of F4 followed by F2.

B- Root growth measurements:

It was found that all tested fertilizer treatments succeeded in increasing fresh and dry weights of root /plant when the compared with control in both seasons. In general, the heaviest fresh and dry weights of roots/plant were obtained by using the treatment of F_4 followed by using the treatment of F_2 in both seasons.

C. Chemical composition determinations:

1-It was realized that all studied fertilizer treatments resulted in an increments in leaf nitrogen, phosphorus and potassium contents in both seasons as compared with control. Generally, the richest leaf N,Pand K contents were obtained by using the treatment of F_2 followed by using the treatment of F_4 in both seasons.

2-Leaf total carbohydrates was greatly increased by all fertilizer applications when compared with control in both seasons. In general, the highest values of leaf total carbohydrates content was obtained by using the

treatment of F_4 followed by using the treatment of F_2 as an average of both seasons of this work.

3-The highest values of leaf total chlorophylls content were recorded by using the treatment of F_2 followed by using the treatment of F_4 as an average of both seasons of this study.

4- All tested fertilizer applications succeeded in increasing leaf total indols content in both seasons, on contrary all studied fertilizer treatments decreased leaf total phenols content as compared with control in both seasons. In general, the highest leaf total indols content was gained by using the treatment of F_2 followed by using the treatment of F_4, whereas the lowest values of leaf total phenols content was obtained by using the treatment of F_2 followed by using the treatment of F_4 as an average of both seasons of this work.

Conclusively it was found that the best growth of Adiantum cuneatum plants was recorded by using M_1 (clay: sand: peatmoss).

Additionally, using the treatment of F_4(75% chemical+ 25% biofertilizer) was found to be the most effective treatments for producing the best growth.