RESULTS AND DISCUSSION

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The obtained results could be discussed under the following heading :

1. Effect of different media on the vegetative growth of *Aralia longifolium L.*

1.1. Plant height :

Data shown in Table (1) and Figure (1) indicate that medium (4) is consisted of - Sand : Clay : Foam - 3:1:1 by volume respectively, gave the tallest plants as it reached 57.9 cm. in length. Moreover, the plant height was 52.9 cm. in case of medium (2) consisted of - Sand : Clay : Leaf mould - 3:1:1 by volume, respectively.

The statistical analysis show significant difference between the plant heights of the two above treatments 4 > 2 > 5 > 1 > 3.

It is worthy to mention that medium (2) gave significantly taller plants than those grown in medium (1) consisted of - Sand : Clay : Peatmoss - 1:1:1 by volume medium (3) - Sand : Peatmoss : leafmould - 3:1:1 medium (5) - Sand : Clay : Peanut shell - 3:1:1 since the average plant height reached 43.4, 41.7, 49.8 cms respectively. Also medium (5) gave significantly taller plants than those of medoim (1) and medium (3) 2>1>3>5.

Table (1) **Effect of Media on vegetative growth of *Aralia longifolium* L.**

First Season 1990/1991

Treatments	Plant Height (cm)	Number of Leaves (per plant)	Leaf area in (mm^2)	Fresh weight (gms)	Dry weight (gms)
Medium (1)	43.3	45.6	1300	68.4	12.9
Medium (2)	52.9	53.5	1580	75.7	14.5
Medium (3)	41.7	49.4	1250	67.3	12.8
Medium (4)	57.9	42.7	1740	77.2	14.7
Medium (5)	49.8	49.7	1500	70.8	13.8
L.S.D. 5%	3.4	1.2	81.2	0.7	0.7
L.S.D. 1%	5.0	1.7	118.1	1.0	0.9

Figure (1): First Season

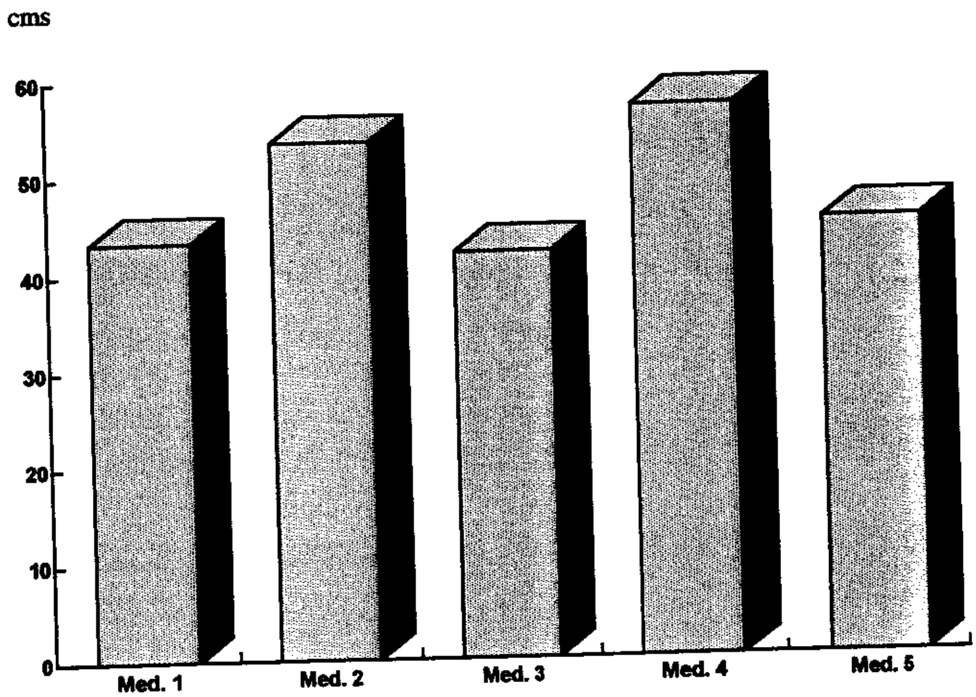
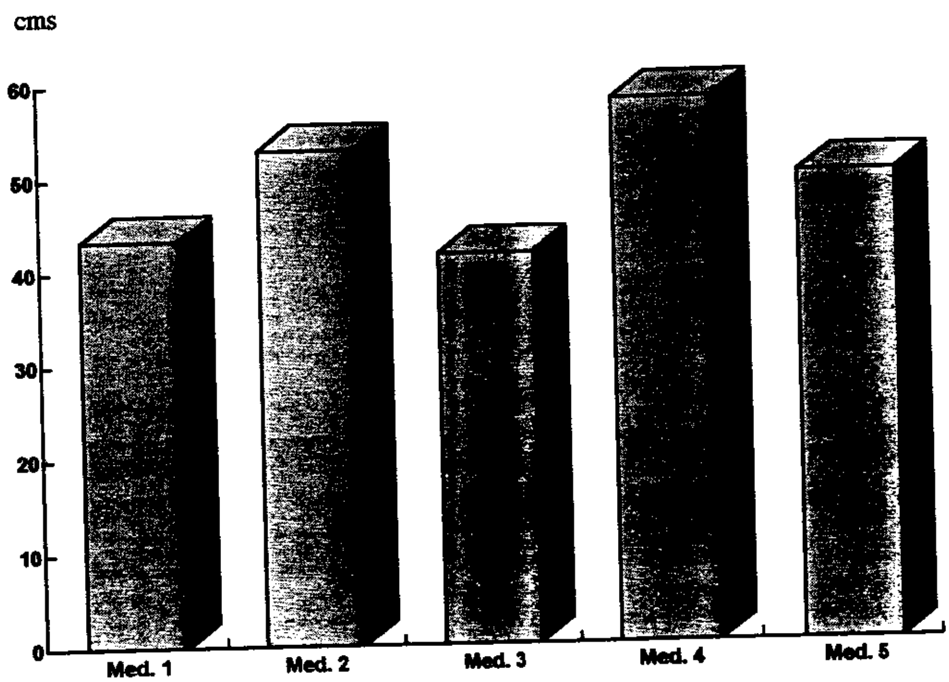


Figure (2): Second Season



Effect of media on plant height of *Aralia longifolium* L.

Moreover, insignificant differences between the plant heights resulting in treatment (1) and treatment (3), the plant height reached 43.4, 41.7 cms. respectively.

Data of the second season (1991/1992) presented in Table (2) and Figure (2) indicate that medium (4) was the best treatment and gave similar trend of results as those of season one (1990/1991), since, the tallest plant height as compared to any other treatment was produced from M (4). The statistical analysis of the obtained data showed significant differences in this respect. The plant height in case of treatment (4) exceeded the height of other plants resulting from the other media.

There were significant differences among medium (4) and medium (1) , M (3) and M (5) at 0.01 level. For instance, the plant height reached 43.3 , 42.0 and 44.8 cms for medium (1) , (3) and (5) respectively. There was insignificant difference between the height of plant of medium (4) as 56.8 cms and the height of plant of medium (2) as 53.5 cms.

Moreover, the plant height in case of medium (5) as 44.8 cm was significantly less than of that grown in medium (2) at the 0.01 level of significance .

The statistical analysis showed insignificant differences among the plant heights of the medium (5) which consisted of - Sand : Clay :

Table (2) **Effect of the Media on vegetative growth of *Aralia longifolium* L.**

Second Season 1991/1992

Treatments	**Plant Height (cm)**	**Number of Leaves (per plant)**	**Leaf area in (mm^2)**	**Fresh weight (gms)**	**Dry weight (gms)**
Medium (1)	43.3	44.3	1300	68.5	12.9
Medium (2)	53.5	50.6	1600	76.3	14.5
Medium (3)	42.0	46.7	1260	68.0	12.4
Medium (4)	56.8	41.2	1700	77.7	14.8
Medium (5)	44.8	47.6	1350	70.3	13.4
L.S.D. 5%	4.4	1.7	118.4	0.7	0.6
L.S.D. 1%	6.4	2.9	172.3	1.1	0.9

Peanut shell - 3:1:1 by volume respectively, medium (1) - Sand : Clay : Peatmoss - 1:1:1 by volume respectively and medium (3) - Sand : Peatmoss : Leaf mould - 3:1:1 by volume, respectively. For instance, the plant height reached 44.8, 43.3 and 42.0 cms for medium (5), (1) control and medium (3) respectively.

The variation in plant heights resulting in the different media could be attributed mainly to the existence of organic matter having different C:N ratios, as shown in Table (3).

Table (3) : Analysis of the different media.

Analysis	Peatmoss	Leaf mould (*Ficus elastica*)	Peanut shell
Organic matter %	98.1246	84.2001	94.1344
Organic carbon %	56.9135	48.8375	54.5992
Total nitrogen %	1.2338	1.0027	0.8588
C/N ratio	1 : 46.1	1 : 49.7	1 : 63.6

However, the level of aeration in the different media exerted its effect on the plant growth. Moreover, the clay content of the studied media played an important role in furnishing suitable conditions plant growth.

It is evident that plant growth in media (1), (2), (3) and (5) containing organic materials such as peatmoss, leafmould and peanut shells were shorter in their height compared with the plants grown in medium (4) which was free decomposable . Using organic matter of a wide C:N ratio as shown in Table (3) and resulted in decreased plant height. The decomposition of such materials exerts a bad effect on plant growth as stated by ***Foth and Turk (1972),*** who pointed out that materials with ratios are relatively rich in nitrogen, while those with higher or wider ratios are relatively low in nitrogen. Organic residues with ratio, less than 15 to 20, usually have enough nitrogen to satisfy the requirements of the decomposing microflora.

The nitrogen content of sawdust and straw is so that when they are incorporated shortly before planting a crop, nitrogen must be supplied from some other sources to meet the nitrogen requirements of the decomposing microflor, otherwise competition for nitrogen between the crop and microflora may occur.

Tall plants existed in case of the medium (4) which consisted of - Sand : Clay : Foam - 3:1:1 by volume, respectively. The use of foam in this medium resulted in better aeration which increased oxygen needed for roots to induce more absorption of minerals from the soil. Because the soil is porous, gases can diffuse freely through the mass of minute fissures, and thus oxygen efficiently enters the soil.

Poorly aerated soil have low oxygen and high carbon dioxide content, whereas, the high carbon dioxide levels have a toxic effect on roots. Good drainage in medium is important because excess moisture in poorly drained medium reduces oxygen levels. Aeration also increase the population of micro-organisms of enormous proportions without which plant growth in the medium would be impossible. These points had their influence on the plant growth presented as plant height. This was very clear with medium (4).

These results agree with those of ***Bergman (1920),*** on *Impatiens spp.Plargonium spp and Caleus spp* who found that these plants were in good vegetative condition and grew normally when these pots of plants were aerated. ***Hunter and Rich (1925),*** found that the rate of transpiration and the intensity of respiratory activity of *Impatiens balsamina* shoots increased by aeration of the soil about the root system. ***Bouygues (1928),*** on *Salix purpurea* noted that the roots stopped development after a short time when grown in an aqueous solution from which the air was excluded by an oily covering, but whenever the plants were removed to a solution in contact with air, the growth of roots was resumed. ***Dean (1933),*** on *Hibiscus spp* , *Acorus spp.*, *Sagittaria spp.*, and ***Typha spp.*** reported that in aerated cultures the roots ramified throughout the entire soil. ***Qadri (1957),*** on *Eucalyptus brockwayi*, *E. microthica* and *E. redunca* Varelata mentioned that the best mixture was silt, sand and dry leaves showed the fastest growth. ***Omran (1968)***, on *Cupressus sempervirens*, *Casuarina equisetifolia*, *Eucalyptus rostrata* and *Schinus terebinthefolius* indicated that stem height were the best on clay, sandy clay loam, and sandy loam soils. ***Moomen (1971),*** on 11 Eucal*yptus spp.*

found that the clay and loam soils gave the best results. Similar results were obtained by ***Shehata (1972) and Bahaa (1979)*** on some timber trees, they mentioned that seedlings grown on clay soil had higher average height than those grown on sandy soil.

On the other hand, ***Shafiq et al. (1979)*** on *Eucalyptus camaldulensis* and *Pinus brutea* and *Casuarina equisetifolia* found that a mixture of alluvial sand soil + heaviely clay + Farm yard manure gave the best growth of *E. camaldulensis*. While ***Conover and Poole (1974b, 1977, 1979a)*** on *Aglaonema commulatum, Aphelandra squarrosa, Dieffenbachia maculata, Philodendron scandens* and *Nephrolepis exaltata*.

Poole and Conover (1979), on *Aglaonema commulatum, Schefflera actinophylla* and *Calathia makoyana* they mentioned that the light mixture media without clay as peat : pine bark : perlite gave the best results for growth. ***Ben-gaacov (1984),*** on *Codiueum variegatum* Pictum cv. Aucubifolium recommended the use of that using a Hydrosoil (ureafoam) amendment as a media to grow plants. ***Abdullah and Ramazan (1987),*** on *Cupressus sempervirens* var. Horizontalis concluded that mixture of sandy, alluvial soil with clay soil in the ratio 1:3 or 3:1 giving the best results. While, ***Nabih and El-Khateeb (1991)*** on *Philodendron erubescens* cv. " Emerald Queen " they found that clay soil increased the plant height.

1.2. Number of leaves :

Data of the first season (1990/1991) as shown in Table (1) and Figure (3) show that the leaf number of plant grown in medium (2) which consisted of - Sand : Clay : Leaf mould - 3:1:1 by volume, respectively reached 53.5. This value was significantly more than any number of leaves from the plants of M (1), M (2), M (3) and M (5).

The following treatment which gave high number as 49.7 of leaves per/plant was medium (5) consisted of - Sand : Clay : Shell peanut - 3:1:1 by volume, respectively. The difference between number of leaves/plant from the two treatments - medium (2) and medium (5) was significant at 0.01 level, (Table 1).

Moreover, the next treatment which gave high number as 49.4 was treatment (3) consisted of - Sand : Peatmoss : Leaf mould - 3:1:1 by volume, respectively. The difference between the effect of two treatments M (5) and M (3) on the number of leaves/plant was insignificant.

M (1) gave 45.6 leaves per plant which was over that of medium (4) where , the plant carried 42.7 leaves / plant. The difference between the two treatments above M (1) , M (4) was significant at 0.01 level. It is worthy to mention that the leaf number in case of medium (4) consisted of - Sand : Clay ; Foam - 3:1:1 by

Figure (3): First year
Number of leaves/plant

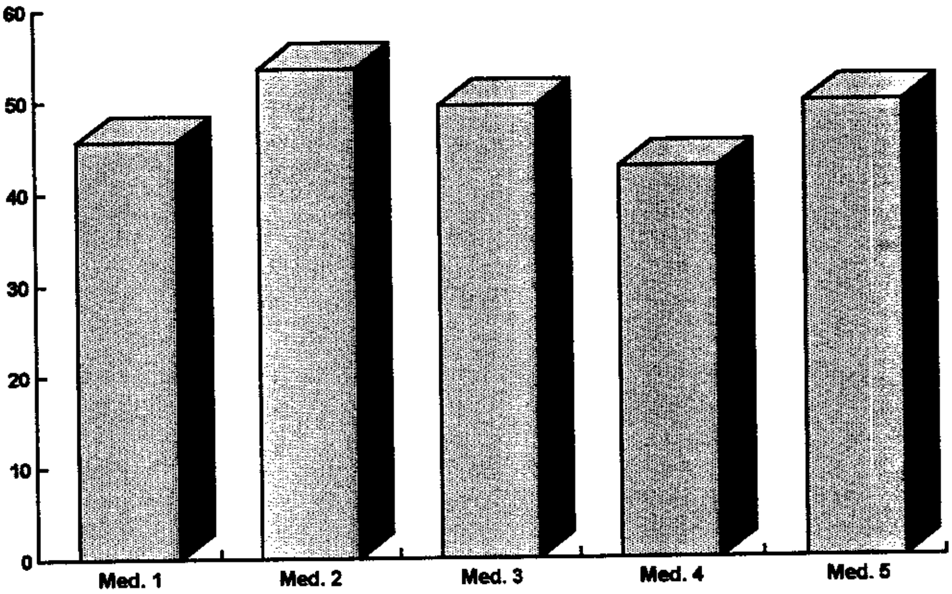
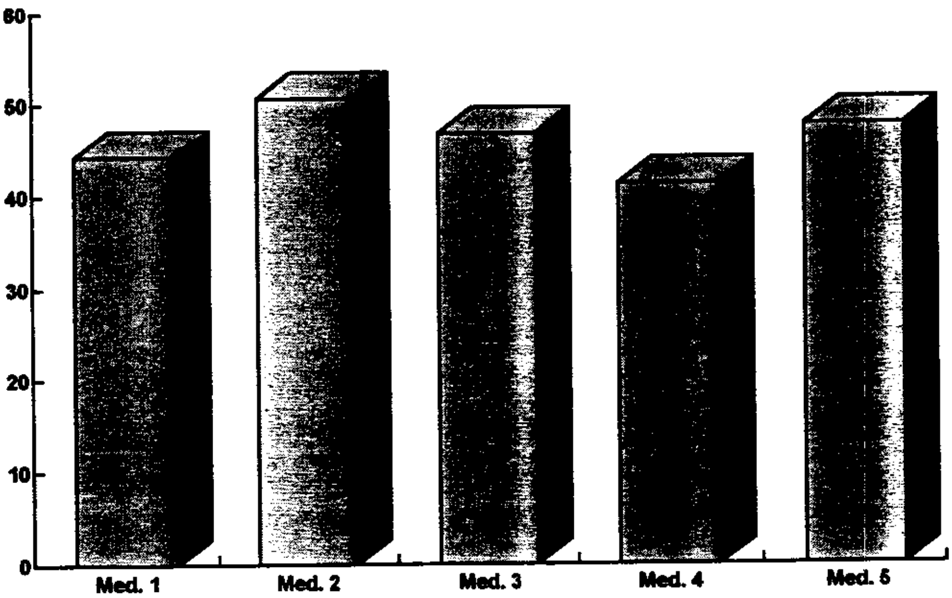


Figure (4): Second year
Number of leaves/plant



Effect of media on number of leaves per plant of *Aralia longifolium* L.

volume, respectively as 42.7 was significantly less than that resulting from any other treatments at 0.01 level of significance.

Data of the second season (1991/1992) presented in Table (2) and Figure (4) indicate the similar trend of results as those of the 1st season. The best highest value of leaf number as compared to any other treatments as (50.6 leaves per plant). was produced from treatment (2). There was significant difference at 0.05 level between the number of leaves /plant from medium (2) and medium (1) as 50.6 and 44.3 respectively.

Whereas, the leaf number of the plants grown in medium (4) as 41.2 leaves per plant was significantly lower at 0.01 level as compared to M (2).

The statistical analysis of the obtained data showed insignificant differences among medium (2) and medium (3) and (5). For instance the leaf number reached 50.6, 46.7 and 47.6 leaves per plant respectively. Also, there were insignificant differences among media 5, 1, 3, the leaf number reached 47.6, 44.3 and 46.7 leaves per plant respectively. While the variation was significant at 0.05 level between medium (5) and medium (4) as 47.6 and 41.2 leaves per plant respectively.

Moreover, the leaf number in case of medium (4) consisted of - Sand : Clay : Foam - 3:1:1 by volume , respectively ,41.2 leaves per plant was the lowest value compared to any other treatment.

The variation in leaf number in plants grown in different media could be attributed to the differences in water conservation in the media.

The plants grown in treatment (2) containing the leaf mould as organic matter source, had high water retention capacity which helped in fulfilling the plant water requirement and avoided leaf shedding as shown in Table (4). On the other hand, the medium (4) which is completely decomposable free in conjunction with its high porosity and aeration, resulted in less water retention capacity which was reflected on more leaf shedding, although this medium (4) gave the tallest plant.

Many investigators found that the different media had its effects on the soil water regime. ***De Boodt (1970),*** classified the soil conditionrs according to their effects on soil moisture properties; soil cation exchange capacity to : (a) products making the soil hydrophilic;

Table (4) **The physical properties of different media .**

Treatment	**Bulk Density g/cm^3**	**Real Density g/cm^3**	**Porosity %**	**Field Capacity**	**Wilting point**	**Available water**
Control (M_1)	1.4	2.4	40.2	12.3	3.1	9.2
(M_2)	0.9	1.6	54.7	14.2	3.4	10.8
(M_3)	1.2	2.4	48.2	15.6	3.9	11.7
(M_4)	1.1	2.0	58.6	11.4	2.1	9.3
(M_5)	1.3	2.5	47.0	11.3	2.0	9.3

(b) products making the soil hydrophobic. ***Allison (1973),*** stated that increasing of organic matter markedly increased the available water in light textured soils. Also, ***Gupta et al. (1977)*** showed that when the organic matter content of sandy soils was increased, the retained water was increased. They reported that this increase may be due to the absorbed water by the organic matter itself. ***Im (1979),*** stated that the available moisture capacity in coarse textured soils usually increase with organic matter addition. Whereas ***Sadek (1984)***, found that the application of hydrophobic conditioners reduced the field capacity in sandy soil, while hydrophilic conditioners increased the available water of treated soils. Moreover, ***Jules (1986)*** mentioned that one of the most essential contributions of organic matter to soil is that it increases water-holding capacity. Organic matter acts like a sponge. It can absorb large amount of water relative to its weight. Because it is porous, it also permits the infiltration of water. Organic matter may remain large quantities of nutrients and thus prevent their loss from the soil by leaching.

The obtained results agree with those of ***El-Afaghani (1981),*** on *Eucalyptus camaldulensis* seedlings who recomended a mixture of 75% sand + 25% peatmoss in addition to the N.P.K fertilizer for increasing the number of leaves. Whereas, ***Mansour (1985)***,on *Aspidestra lurida* reported that the great number of leaves was obtained from mixture of sand + peatmoss. Moreover, ***Nabih and El-Khateeb (1991)*** on *Philodendron erubescens* cv. "Emerald Queen " found that peatmoss alone or its combinations with sand or clay showed a great effect on number of leaves.

1.3. Leaf area in mm^2 :

According to ***Bidwell (1979)*** leaves start as dom-shaped or bumplike primordia on the apical meristem and grow initially in a nearly clylindrical form. After a short time lateral meristems develop that grow sideways, giving the leaf its flattened form. The lateral meristems grow more or less rapidly at different positions along the leaf margin, thus giving the characteristic shape to leaves. The rapidily of growth might relate to nutriation because growth is often greatest opposite the end of major veins. Alternatively, growth factors could be rapidity translocated by the veins, and act most strongly at their ends to stimulate growth primordia formed on a large or more nature meristem will themselves be larger, will have a more rapid initial development, and will respond or their genetic information differently than will those formed earliar or on a smaller or less mature meristem.

Data of the first season (1990/1991) as shown in Table (1) and Figure (5) indicate that the leaf area of plant growth *Aralia longifolium* in medium (4) - Sand : Clay : Foam - 3:1:1 by volume, respectively, produced the largest leaf area (1740 mm^2) as compared with leaf area of any other treatment. The statistical analysis of the obtained data showed high significant differences among medium (4), of 1740 mm^2

Figure (5): First year

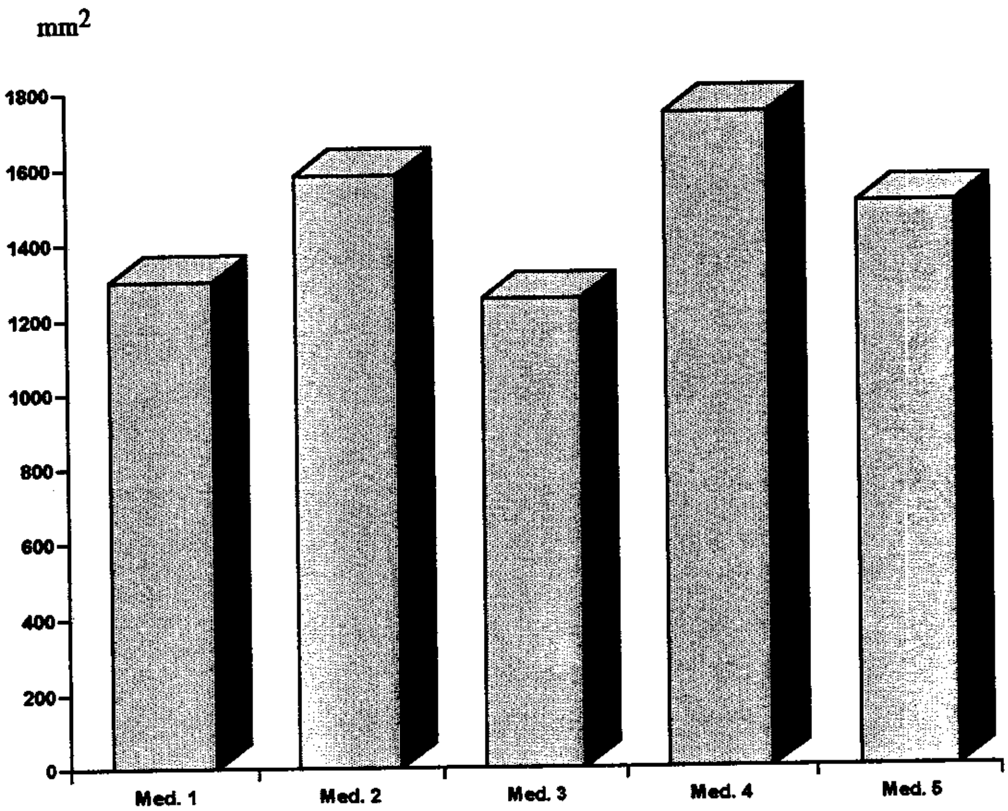
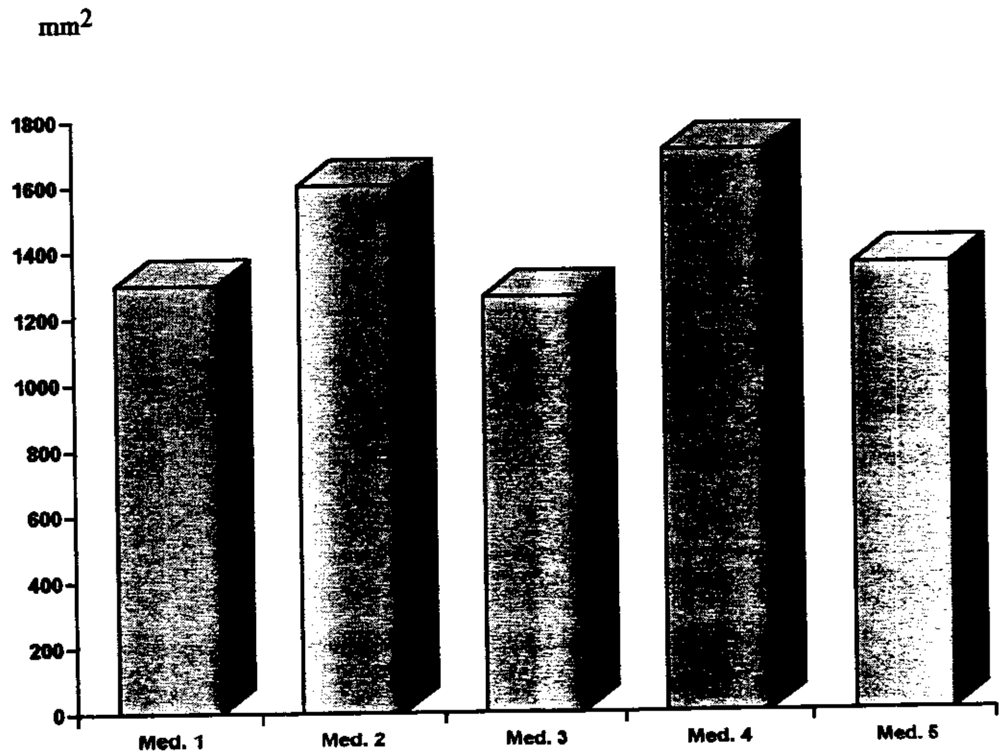


Figure (6): Second year



Effect of media on leaf area of *Aralia longifolium* L.

and media 1, 2, 3 and 5 where the leaf area reached 1300, 1580, 1250 and 1500 mm^2 respectively.

Also highly significant differences among medium (2) and media (1), (3) at 0.01 level occured , but no significant differences were observed between the medium (2) and medium (5) in respect of the leaf area.

There was insignificant difference between medium (1) - Sand : Clay : Peatmoss - 1:1:1 and medium (3) - Sand : peatmoss : leaf mould - 3:1:1 , where the leaf area reached 1300, 1250 mm^2 respictively.

Data shown in Table (1) indicate that medium (3) produced the smallest leaf area (1250 mm^2) as compared with leaf area of any other treatment.

Data in table (2) and Figure (6) of the next season (1991/1992) showed that medium (4) was the best treatment and gave similar trend of results as in season one (1990/1991), since, the large leaf area as compared to any other treatment was produced from treatment (4).

There were significant differences at 0.01 level of significance among the leaf area of plants grown in medium (4) of 1700 mm^2 and media 1, 3, 5, showing 1300, 1260, 1350 mm^2, respectively, . but, no significant differences were observed between medium (4) and medium (2) of 1600 mm^2.

There were high significant differences among leaf area of medium (2) as 1600 mm^2 and media 1, 3, 5 the leaf area reached 1300, 1260, 1350 mm^2, respectively. The data were showed insignificant differences among leaf area of media 1, 3, 5 .

Data shown that medium (3) produced the smallest leaf area (1260 mm^2) as compared with leaf area of any other treatment.

The variation in leaf area might be due to the differences of the media constituents. This could be explained by the differences in organic matter content of the different media as shown in Table (3). The highest percentage of organic matter was in medium (3) - Sand : Peatmoss : Leaf mould - 3:1:1 by volume, respectively. The organic matter content of this medium was 1:47.9. This reflected badly on the growth of those plants. Whereas medium (4) which contained the least organic matter (contamenated in loam).

The decomposition of such materials exerts a bad effect on plant growth as stated by ***Foth and Turk (1972).*** Aeration also increases the population of microorganisms of enormous proportions without which plant growth in the medium would be impossible ***Janick (1986).*** Moreover, the clay content of the studied media played an important role in furnishing suitable conditions for plant growth.

These results agree with those obtained by ***Omran (1968),*** on *Cupressus sempervirens* , *Casuarina equistifolia* , *Eucalyptus rostrata* and *Schinus terebinthefolius* found that the photosynethic area of all species were the best on clay soil. ***Bahaa (1979)***, on some timber trees mentioned that seedlings grown on clay soil had high average leaf area than those grown on calcareous soil and sandy soil. ***Tesi and Tosi (1985)***, on *Chamaedoria elegans* they found that a ratio of brown peat to expanded clay of 1:1 or 1:2 gave the best results in terms of plant size and quality. ***Nabih and El-Khateeb (1991),*** on *Philodendron erubescens cv.* " Emerald Queen " found that peatmoss alone or its combinations with sand or clay showed a great effect on leaf size.

1.4. Vegetative fresh weight of the plant (*Aralia longifolium* L.) :

Data of the first season (1990/1991) shown in Table (1) and Figure (7) indicate that medium (4) gave the heaviest vegetative fresh weight as 77.2 gms per plant after one year growth as compared to any other treatment. It was significantly at 0.01 level more than that resulting in any other treatment . For instance, the vegetative fresh weight reached 68.4, 75.7, 67.3, 70.8 gms per plant in case of media 1, 2, 3, 5 respectively, where all had significantly lower weights as compared to medium (4).

Figure (7): First season

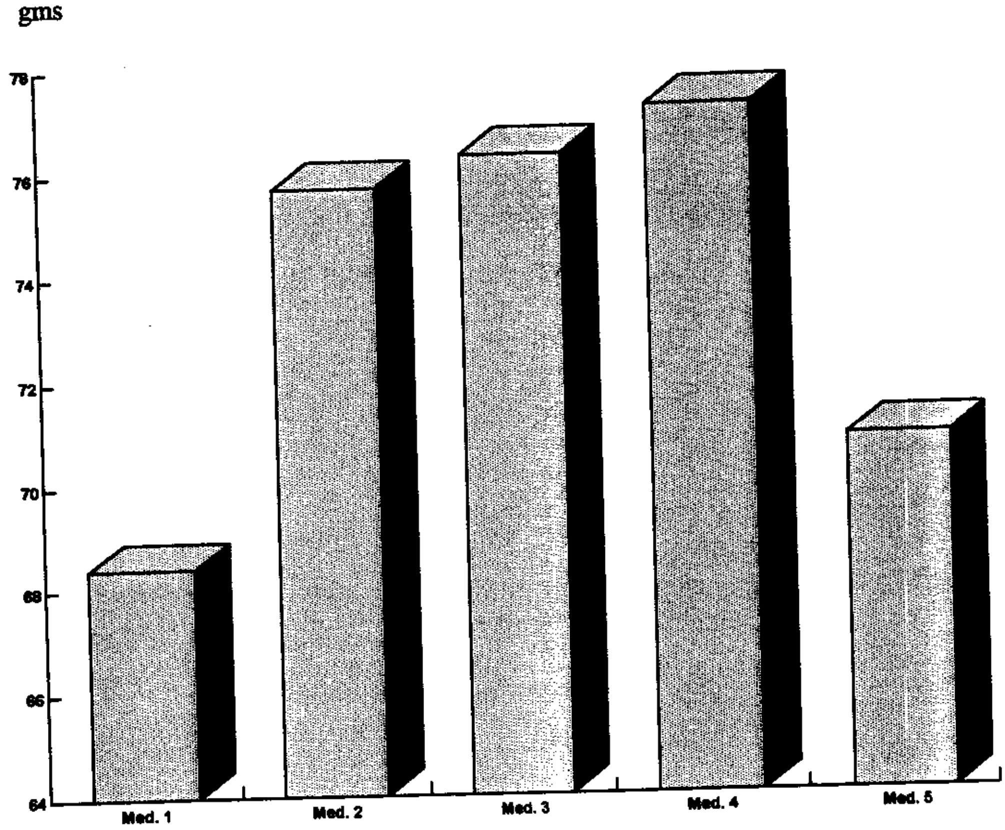
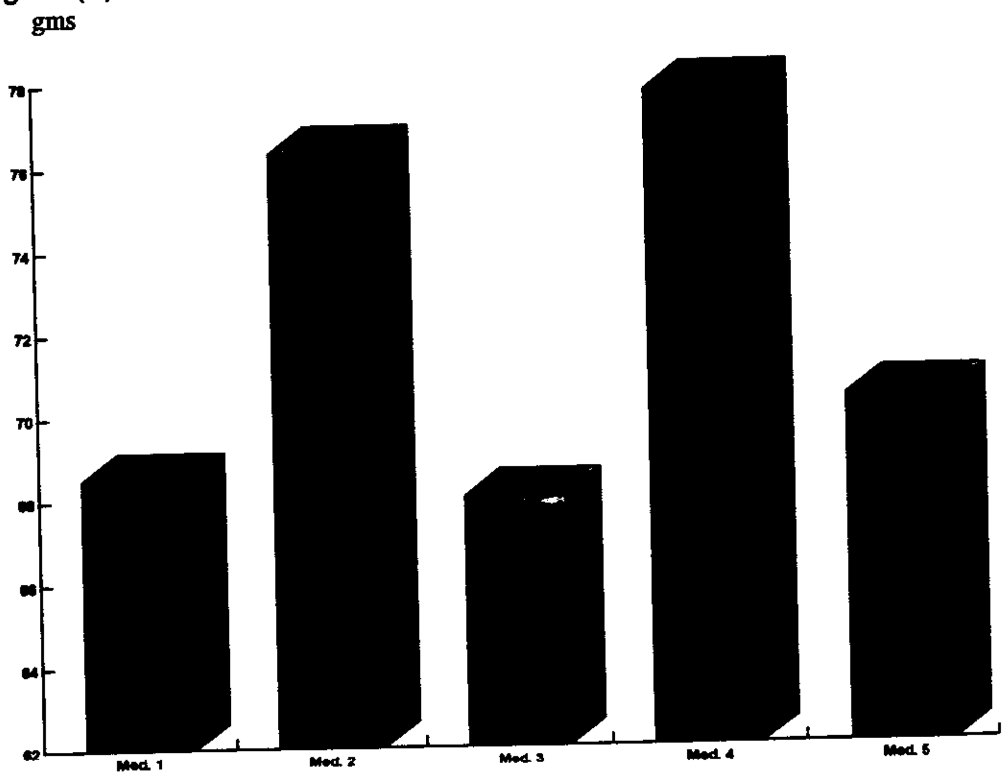


Figure (8): Second season



Effect of media on vegetative fresh weight of *Aralia longifolium* L.

The statistical analysis show significant differences between the vegetative fresh weight of medium (2) - Sand : Clay : Leaf mould - 3:1:1 respectively and media 1,3, 5 at 0.01 level, of significance.

It is worthy to mention that medium (5) - Sand : Clay : Shell peanut - 3 : 1 : 1 by volume, respectively gave significantly higher fresh weight plants (70.8 gms per plant) than plants grown in medium (1) control and medium (3) which gave vegetative fresh weight of 68.4 and 67.3 gms per plant, respectively.

Also, medium (1) - Sand : Peatmoss : Clay - 1:1:1 by volume, respectively gave heavier vegetative fresh weight than that of medium (3).

Whereas, medium (3) - Sand : Peatmoss : Leaf mould - 3:1:1 by volume, respectively gave 67.3 gms per plant which was significantly less than any other treatment.

Data of the second season (1991/1992) presented in Table (2) and Figure (8), indicate that medium (4) was the best treatment and gave similar trend of results as those of (1990/1991) season one. Since, the heaviest vegetative fresh weight/plant as compared to any other treatments was produced from treatment (4).

There were significant differences among the fresh weight/plant of medium (4) as 77.7 gms/plant and media 1, 2, 3, 5 at 0.01 level. For instance, the vegetative fresh weight reached 68.5, 76.3, 68.0, 70.3 gms/plant for media 1, 2, 3 and 5 respectively.

Also, medium (2) 76.3 gms/plant was significantly increased at 0.01 level than those of media 1, 3, 5, in the vegetative fresh weight which reached 68.5, 68.0 and 70.3 gms/ plant, respectively.

Moreover, medium (5) gave higher vegetative fresh weight than those of medium (1) and medium (3). There were significant differences among medium (5) medium (1) and medium (3) at 0.01 level of significance. No significant difference was observed between the medium (1) and medium (3) in respect of the vegetative fresh weight. The variation in vegetative fresh weight for plants resulting from the different media could be attributed mainly to the providing of the factors influencing the growth. Increasing the plant weight can be related to the available moisture, aeration and nutrients supply. When the component of the medium differs, the medium which contains high raw organic matter has bad effect on the growth even when the previous factors are available. The decomposition of such materials exerts a bad effect on plant growth as stated by ***Taha et al., (1969)***, who found that the rate of decomposion of added plant materials depend upon their chemical composition and their C/N ratios. The wider this ratio the longer is the period required to decompose. Similar results were reported by ***Foth and Turk (1972).***

Omran (1968) on *Cupressus sempervirens*, *Casuarina equisetifolius*, *Eucalyptus rostrata* and *Schinus terebinthefolius* noticed that the stem height, the dry weight and the photosynthetic area of all species were the best with the clay soil.

It could be noticed that when foam was added in the mixture medium (4), foam played a great role in increasing aeration in medium (4) as noticed in Table (4).

Aeration in the soil will increases oxygen needed for roots to absorp more nutrients from the soil. It also increases a most remarkable population of micro-organisms of enormous proportions without which plant growth in the medium would be impossible.

The obtained data indicate that medium (4) gave the greatest leaf area, which concerns with photosynthesis. The newly expanding leaf generally shows maximum photosynthetic activity as the leaf expands is not simply a consequence of increased chlorophyll content because assimilation number also increases; instead, changes in CO_2 compensation point plus alterations in internal anatomy and diffusive resistance seem related to the enhanced CO_2 uptake.

These results agree with those of ***El-Tantawy (1981)***, on *Casuarina equisetifolia* and *Cupressus sempervirens* who reported that the clay soil gave the best growth. Since, it increased fresh weight of seedlings. ***Hornis et al., (1983)*** on *Codiaeum variegatum* and *Dieffenbachia amoena* mentioned that clay soil improved the vegetative growth and increased the dry weight of plants.

1.5. Dry weight of vegetative growth :

The data in Table (1) and Figure (9) show the results of the dry weight of the plant in the season (1990/1991). It could be noticed that the treatment which increased the vegetative fresh weight was the same which increased the dry weight. Medium (4) gave the heaviest dry weight of vegetative growth (14.7 gms per plant), it is worthy to mention that medium (4) gave significantly higher dry weights than those of media 1, 3 and 5 where the dry weight of vegetative growth reached 12.9, 12.8 and 13.8 gms, respectively.

The statistical analysis show insignificant difference between the dry weight of the vegetative growth of the plant grown in medium (4) (14.7 gms) and that in medium (2) (14.5 gms). Whereas, the medium (2) gave high significant difference in the dry weight than those of treatment 1, 3, 5 which reached 12.9, 12.8, 13.8 gms per plant, respectively. Also, medium (5) gave 13.8 gms/plant, which was significantly higher in the dry weight of vegetative growth than those of medium (1) and medium (3).

Whereas the statistical analysis showed insignificant difference between the dry weight of vegetative growth of the plant grown in medium (1) and medium (3).The obtained data indicate that medium (3) gave the lowest value of dry weight of vegetative growth/plant.

Figure (9): First year

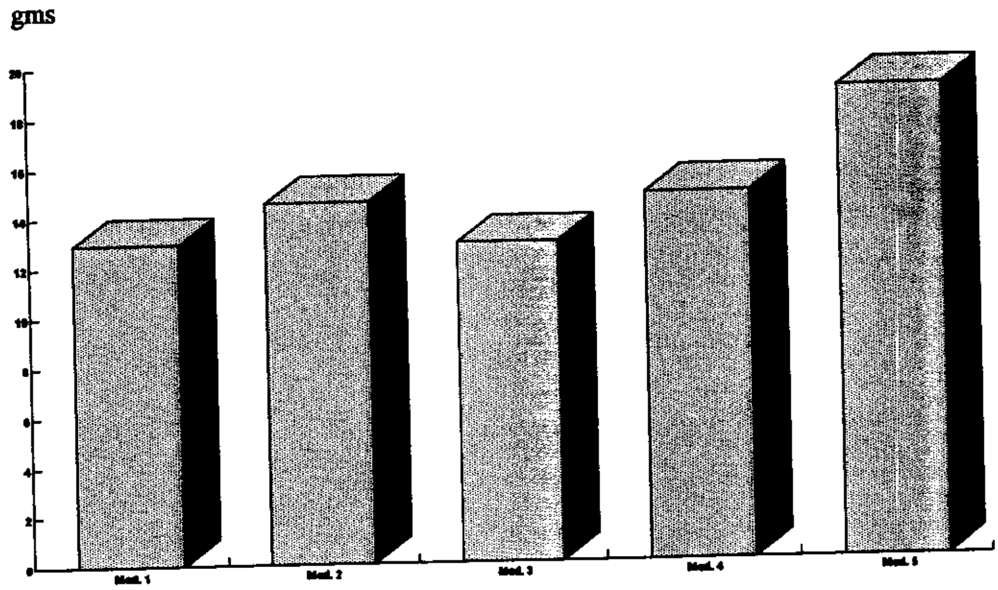
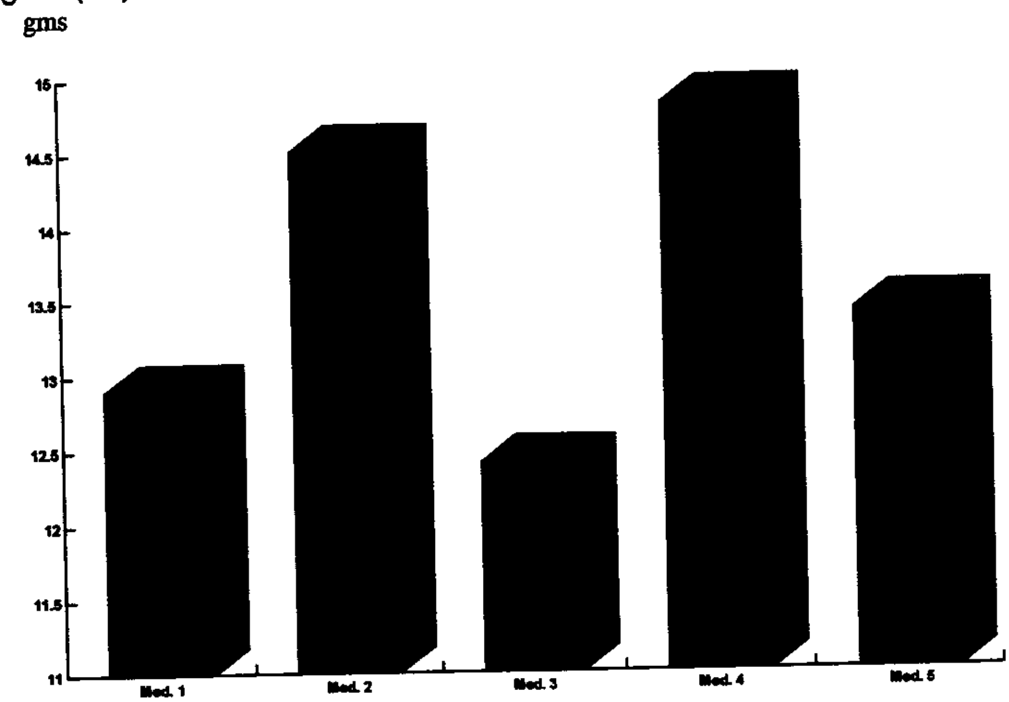


Figure (10): Second year



Effect of media on vegetative dry weight of *Aralia longifolium* L.

Data in table (2) and Figure (10) of the next season (1991/1992) showed that medium (4) was the best treatment and gave similar trend of results as in season one (1990/1991), since, the heaviest dry weight of vegetative growth as compared to any other treatments was produced from treatment (4) (14.8 gms/plant). For instance, the dry weight of vegetative growth reached 12.9, 14.5, 12.4, 13.4 gms., for media 1, 2, 3 and 5, respectively.

The next heavier dry weight was from the plants of treatment (2) as 14.5 gms., the value was significantly higher than those of media 1, 3, 5 at 0.01 level.

Also, the differences among the dry weight/plant from medium (5) and from media 1, 3 were significant at 0.01 level.

Moreover, the statistical analysis showed significant difference between the dry weight of plant vegetative growth in the medium (1) and medium (3) at 0.01 level of significance. It's worthy to mention that medium (3) gave the significantly lowest dry weight of vegetative growth than any other treatment.

The variation in dry weights of vegetative growth might be due to the differences of the media constituents.

The plants of medium (4) which had the heaviest fresh weight and the tallest plants were the same which gave heaviest dry weight of vegetative growth. The cause may be due to the media constituents which contained the least organic matter (contamenated in loam).

It is evident that plant growth in media 1, 2, 3 and 5 having organic materials such as peatmoss, leaf mold, peanut shells were lighter in their dry weight of vegetative growth as compared to the plant grown in medium (4) which contained the least organic matter. Using organic matter in the media reflected on a wide C:N ratio as shown in Table (3) and resulted in decreasing the plant dry weight. The decomposition of such materials exerts a bad effect on plant growth as stated by ***Taha et al., (1969)*** stated that the rate of decomposition of added plant materials depend upon their chemical composition and their C/N ratios. The wider this ratio the longer is the period required to decompose the organic matter. Also, ***Foth and Turk (1972)*** they cleared that the wider ratios are relatively lower in nitrogen content. Organic residues with a ratio, less than 15 to 20, usually have enough nitrogen to satisfy the requirements of the decomposition, there will likely be nitrogen in excess of that needed by the microflora which may be volatilized as amonia. When these materials are incorporation shortly before planting a crop, competation for nitrogen between the crop and microflora may occur.

The heavy dry weight of vegetative growth existed in case of the medium (4) - Sand : Clay : Foam - 3:1:1 by volume, respectively showed that the use of foam in this medium resulted in better aeration which increased oxygen needed for roots to induce more absorption of nutrients from the soil. Poorly aerated soils have low oxygen and high carbon dioxide content, whereas the high carbon dioxide levels have a toxic effect on roots. Aeration also, increases the population of micro-organisms of enormous proportions without which plant growth in the medium would be impossible. Light soil helped root to grow well resulting in the increase of the vegetative growth as there was a balance between the top and root. Moreover, the clay content of the studied media played an important role in furnishing suitable conditions for plant growth.

These results agree with those of ***Omran (1968),*** on *Cupressus sempervirens*, *Cusuarina equestifolia*, *Eucalyptus rostrata* and *Shinus terebinthefolius* whonoticed that the dry weight was the best on clay soil. The similar results were obtained by ***El-Tantawy (1981)*** on *Casuarina equestifolia* and *Cupressus sempervirens.*

Also ***Hornis et al., (1983)*** on Codiaeum varigatum *and* Dieffenbachia amoena found that the clay soil increased dry weight.

On the other hand, ***Mansour (1985)***, on *Aspidistra lurida* mentioned that the clay soil had the lowest values of dry weight.

Moreover, ***Mohamed (1991)*** on Aspar*agus sprengeri* reported that the clay soil increased the dry weight.

Nabih and El-Khateeb (1991) on *Philodendron erubescens cv.* "Emerald Queen" found that peatmoss alone or it's combinations with sand or clay showed a great effect on dry weight.

2. Chemical Analysis :

2.1. Content of NPK nutrients in the different media before and after planting :

The data in Table (5) show the differences in the NPK among the media before and after experiments.

The nitrogen % in all media depleted except with medium 5 which increased despite the decrease of growth under this medium.

The increase in N content at the end of the experiment was probably due to composting of shell-peanut at the late stages.

As for the other media, the bulk of uptake is noticed with M4 which reflected as the best growth of the plants grown in this medium.

As the available phosphorus content in the media varied, it could be noticed that there was enough P in medium (4). The resulted increase in P. in medium (5) might be due to the late bio reaction and decomposting the shell peanut.

No variation did happen in the K content. This is probably due to the enough supply of nutrients through out experiments.

Table (5) **The Effect of media on the soil analysis for N,P and K before and after planting of *Aralia Longifolium* L.**

Treatments	Soil Analysis					
	Before Planting			After Planting		
	N %	P ppm	K ppm	N %	P ppm	K ppm
(M_1)	3.08	7.50	300.0	2.60	2.40	280
(M_2)	1.40	4.01	280	1.60	1.20	265
(M_3)	1.40	2.66	265	1.80	1.15	240
(M_4)	2.66	4.25	260	1.66	5.30	250
(M_5)	1.82	4.25	220	1.50	4.50	220

Table (5a) The Effect of media on the soil analysis for N,P and K before and after planting of *Cupressus sempervirens L.*

Treatments	Soil Analysis					
	Before Planting			After Planting		
	N %	P ppm	K ppm	N %	P ppm	K ppm
(M_1)	3.08	7.50	300.0	2.66	2.50	270
(M_2)	1.40	4.01	280	1.68	1.25	260
(M_3)	1.40	2.66	260	1.82	1.20	240
(M_4)	2.66	4.25	260	1.54	7.43	250
(M_5)	1.82	4.25	220	3.36	6.25	220

Occordingly, it could be conluded that the preparation of a media is mainly important for the growth of plants. If the constituents differed in their effect on the availability of major elements absorped by plants, the most promising effect was for the NPK uptake. This was realized with medium (4) , since it gave the best growth. Medium (4) could be recomended for growing the seedlings of trees.

2.2. Effect of media on the NPK contents in the leaves of *Aralia longifolium L. 1990/1991:*

2.2.1. The effects on nitrogen, phosphorus and potassium contents in mg/gram dry weight

Data in Table (6) show that the nitrogen content increased in the leaves of the plants grown in media M1 (Sand : Clay : Peatmoss 1:1:1 by volume), M4 (Sand : Clay : Foam 3:1:1 by volume respectively) and M5 (Sand : Clay : Shell peanut 3:1:1 by volume respectively), as compared with M2 which consisted of (Sand : Clay : Leaf mould 3:1:1 by volume respectively) and M3 (Sand : Clay : peatmoss 3:1:1 by volume respectively). The increases were highly significant when the contents of the leaves of plants grown in M1 and M4 were compared with those of M2.

Medium (3) gave significant increases in the N content of leaves as compared with M2 and M5. It seemed that M4 was the best treatment which furnished enough availability of nitrogen uptake.

Table (6) The effect of media on the chemical constituents in the leaves of *Aralia Longifolium* L.

Treatments	1990 / 1991					1991 / 1992				
	N mg/g	P mg/g	K mg/g	Total carb. mg/g	Total Phen. ppm	N mg/g	P mg/g	K mg/g	Total carb. mg/g	Total Phen. ppm
M (1)	4.11	0.47	1.88	17.2	132	3.67	0.53	1.92	16.5	126
M (2)	2.69	0.63	1.42	16.5	139	2.60	0.47	1.73	16.9	130
M (3)	2.54	0.55	1.31	16.2	128	2.78	0.49	1.65	15.7	165
M (4)	4.82	0.58	1.39	18.5	125	3.12	0.53	1.83	18.5	114
M (5)	3.11	0.43	1.26	14.3	129	2.39	0.41	1.64	16.2	134
L.S.D. 5%	0.63	0.16	0.13	1.10	N.S.	0.43	0.08	0.12	0.6	11.2
L.S.D. 1%	1.02	0.24	0.23	1.98	N.S.	0.98	0.18	0.39	1.2	16.7

Observing, the values of phosphorus content in the leaves of the plants grown in the different media, M2 realized significant increase at 0.05 level as compared with M1 and M5. However, no differences were noticed among the results of M1, M3, M4 and M5.

Although, phosphorus is very an essential element which impart the different physiological reaction in the metabolism, yet it seemed that the different media had limited effects on its uptake.

As for potassium content the data in the same Table (6) indicate that the plants of M2, M3 and M4 nearly did not differ in their K content. No statistical differences were reached in this concern.

The highest content of K was reached with M1 which was significantly higher than K content in the leaves of any other treatment under investigation. The least value of K content was from the plants of M5 and was significantly lower than the plants from other treatments except M3.

Generally, the media differed in their effect on the availability of major elements absorbed by plants, the most promising effect was for the nitrogen uptake with medium (4) and with potassium uptake with medium (1) . It is worthy to mention that medium (4) was the best one which gave the best growth of plant. This was for sure related with the better capacity of the media to supply the plant with the needed elements.

2.2.2. The effect of media on the total carbohydrate in the leaves as mg/gm dry weight (1990/1991).

As shown in the Table (6) of 1990/1991, the highest content in total carbohydrates was found in the leaves of *Aralia longifolium* L. grown in M (4) (Sand : Clay : Foam 3:1:1 by volume, respectively). The value 18.5 mg/gm obtained with M (4) significantly exceeded these estimated from the plants grown in the other media. The least content of carbohydrate as 14.3 mg/gm dry weight of leaves was found with the plants of M5 which gave a value (14.3) significantly lower than the 16.5, 16.2 mg/gm dry weights of the plants from media M2 and M3 respectively.

The difference was at 0.01 level when compared with medium (1) which gave total carbohydrate of 17.2 mg/gm dry weight.

The data showed the best influence of medium (4) for increasing the total carbohydrate content in the leaves. This indicated that the proper constituents of the medium flourished the best growth as revealed in the vegetative growth data.

In this connection, many invistigators as ***Scheck (1953) and El-Khateeb and Salem (1988)***, on *Thuja orientalis* found that the total soluble sugar were generally encreased with increasing N level. Showed that the proper constituents of media reflect on the plant growth and its total carbohydrate content.

2.2.3. The effect of media on the phenols content in the leaves *of Aralila longifolium* L. of (1990/1991) ;

Data in Table (6) indicate that the different media did not influence the phenols content in the leaves of *Aralia longifolium* L. The values flactuated between 129 ppm and 139 ppm for the different media under investigation. The differences in this respect were insignificant.

In conclusion, the high rate of phenols were obtained with plants that had the minimum rates of growth. This may indicate that whenever the plant growth was shocked under any state, phenols pathway took place.

2.3. The effect of media on the chemical constituents in the leaves of *Aralia longifolium* L. of (1991/1992) :

2.3.1. The effects on nitrogen, phosphorus and potassium contents in dry weight.

Data in Table (6) show that the highest nitrogen content ioccured in leaves of plants grown in media (1) as 3.67 mg/gm dry weight was the best treatment which was significant increase in N content of leaves as compared to any other treatment.

The nitrogen content as mg/gm dry weight in leaves of the plants grown in M4 was significantly at 0.05 level more than that in plants of M2 and M5, which gave 2.60 and 2.39 mg/gm dry weight.

No significant difference was observed between N content of the plant grown in M4 and that from M3.

It seemed that M1 and M4 were the most effective treatments which furnished enough availability of nitrogen uptake.

Observing, the values of phosphorus content in the leaves of the plants grown in the different media, M1 and M4 gave the highest content of P. However, no significant were noticed among the results of M1, M2, M3 and M4 . The least value of P content was observed in plants of M5 and was significantly lower than those in plants from media 1, 3 and 4.

Although, phosphorus is very important element which impart the different physiological reaction in the metabolism, yet it seemed that the different media had limited effects on P uptake.

As for potassium content the data in the same Table (6) indicate that the plants of M2, M3 and M5 nearly did not differ in the K content, as no statistical differences were reached in this concern.

The highest content of K was reached with M1 which was significant more than the content in the leaves of any other treatment under investigation. The least value of K content was from the plants of M5.

Generally, the media differed in their effect on the availability of major elements absorbed by plants, the most promising effect was for the nitrogen uptake with media (1) and (4) and with phosphorus and potassium uptake. It is worthy to mention that medium (4) was the best one which gave the best growth of plant. This was sure related with the better capacity of the media to supply the plant with the needed elements.

2.3.2. The effect of media on the total carbohydrate content in the leaves dry weight :

As shown in the Table (6) of 1991/1992 the highest content of total carbohydrates 18.5 mg/gm was found in the leaves of *Aralia longifolium* L. grown in M4. These value significantly exceeded the values estimated from the plants grown in the other media. The least content of carbohydrates as 15.7 mg/gm dry weight of leaves was found with the plants of M3 which gave 15.7 mg/gm compared to 18.5 mg/gm for M4. This value 15.7 was also significantly lower than 16.5 and 16.9 mg/gm dry weights of the plants from media 1 and 2 respectively.

The difference was significant at 0.01 level when compared with medium (2) which gave a value of total carbohydrate content of 16.9 mg/gm dry weight.

The data showed the best influence of medium (4) for increasing the total carbohydrate content in the leaves. This indicate that the proper constituents of the medium flourished the best growth as revealed in the vegetative growth data.

In this connection, many investigators as ***Nabih and Salem (1991)*** on *Brassia actinophylla* reported that a medium of sand + peatmoss was the most effective in increasing the soluble sugars in the foliage showed that the proper constituents of media reflect on the plant growth and its total carbohydrate content.

2.3.3. The effect of media on the phenols content in the leaves of *Aralia longifolium* L. of (1991/1992) :

Data in Table (6) indicate that the highest content in phenols was found in the leaves of *Aralia longifolium* grown in medium (3). The value of 165 ppm significantly exceeded these estimated in the plants grown on the other media. The least content of phenols (114 ppm/g) in dry weitght of leaves was found with the plants of M (4) which gave 114 ppm compared to 165 ppm for medium (3).

No significant differences among the phenol content of plants grown in media 1,2 and 5, for instance the phenol content reached 126, 130 and 134 ppm respectively.

In conclusion, the high rate of phenols were obtained with the plants had the minimum rates of growth. This case indicated that whenever the plant growth was shocked under any status, phenols pathways took place.

3. Effect of the different media on the vegetative growth of *Cupressus sempervirens L.*

3.1. Plant height :

Concerning the effect of different media on the plant height of *Cupressus sempervirens L.*, the data in Table (7) and Figure (11) and photo (1) indicate that medium (4) gave the tallest plants which reached 28.4 cm. after one year of growth.

There were significant differences at 0.01 level among the plant height from medium (4), 28.4 cms and those from media 1, 2, 3 and 5. which reached 20.8, 21.7, 21.8 and 22.3 cms. respectively.

The next treatment which gave taller plants (22.3 cms) was medium (5), which did not significantly differed from the plants heights grown on M (1), M (2), M (3), and M (5)..

Data of the second season (1991/1992) presented in Table (8) and Figure (12) reveal that medium (4) was the best treatment and gave similar trend of results as those of 1st season (1990/1991), since, it gave the tallest plant as compared to any other treatment .

The statistical analysis of the obtained data showed significant differences in this respect. The plant height in case of treatment (4), 25.5 cms exceeded the height of other plants resulting from the other media.

Table (7) **Effect of the media on vegetative growth of** ***Cupressus sempervirens L.*** First Season 1990/1991

Treatments	**Plant Height** (cm)	**Shoot Number** (per plant)	**Vegetative fresh weight** (gms)	**Dry weight** (gms)
Medium (1)	20.8	33.5	24.0	8.7
Medium (2)	21.7	42.0	30.0	10.9
Medium (3)	21.8	41.1	29.5	10.6
Medium (4)	28.4	49.8	35.5	12.8
Medium (5)	22.3	33.0	23.6	8.5
L.S.D. at 5%	2.4	6.1	1.3	0.7
L.S.D. at 1%	3.4	8.9	2.0	1.0

Figure (11) : First year

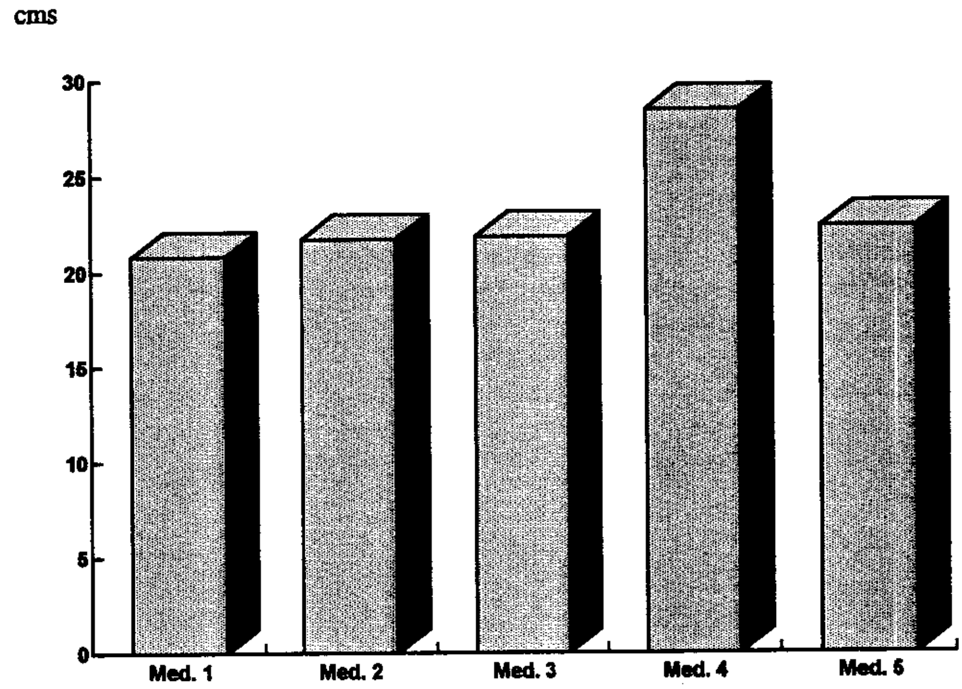
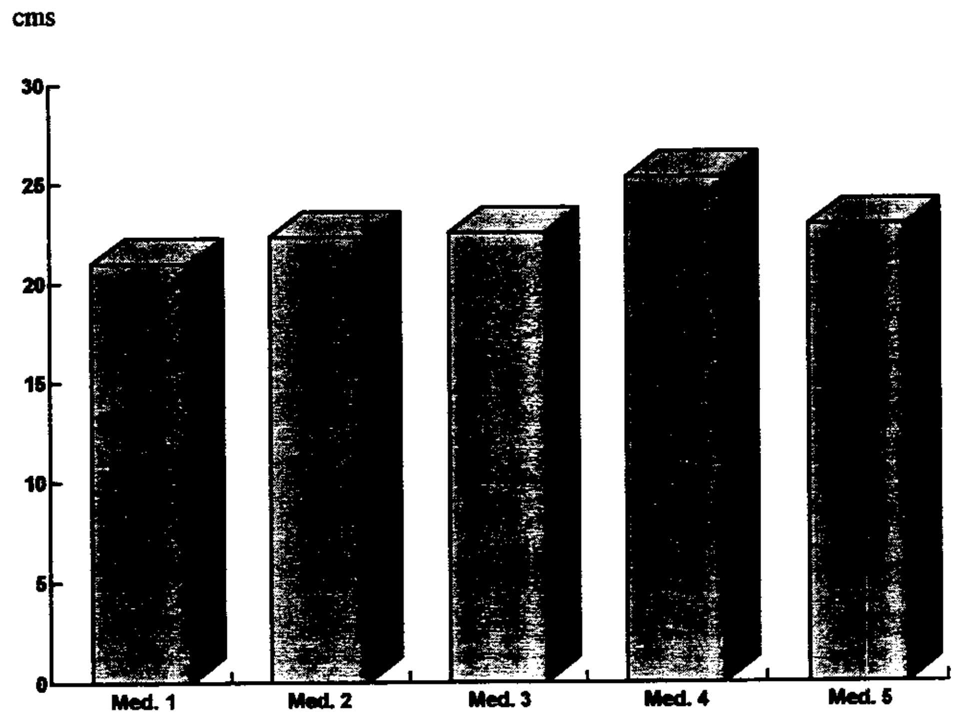


Figure (12) : Second year



The effect of media on plant height of *Cupressus sempervirens* L.

Table (8) **Effect of the media on vegetative growth of *Cupressus sempervirens* L.** Second Season 1991/1992

Treatments	**Plant Height (cm)**	**Shoot Number (per plant)**	**Vegetative fresh weight (gms)**	**Dry weight (gms)**
Medium (1) control	21.0	33.7	24.0	8.7
Medium (2)	22.3	43.5	31.0	11.0
Medium (3)	22.5	38.7	27.5	10.0
Medium (4)	25.3	49.4	35.3	12.8
Medium (5)	22.9	33.3	23.8	8.6
L.S.D. at 5%	1.5	4.2	1.0	0.3
L.S.D. at 1%	2.2	6.1	1.5	0.4

Photo (1): Effect of the different media on the plant height of *Cupressus sempervirens* L.

There were significant differences at 0.01 level among the height of plants from medium (4) (25.3 cms) and those from media 1, 2, 3 and 5 which reached 21.0, 22.3, 22.5 and 22.9 cms , respectively.

The next treatment which gave tall plants (22.9 cms) was medium (5). The difference between medium (5) and plants from medium (1) was significant at 0.05 level as shown in table (8). In spite of the difference in plant height of plants grown in medium (5) and media 2, 3 , no significant difference existed among these three treatments. However, the plant height in case of medium (1) was the shortest ; it reached 21.0 cms. No significant differences among media 1, 2, 3 were found.

The variation in plant height resulting in the different media could be attributed mainly to the existence of organic matter having different C : N ratios, as shown in Table (3). However, the level of aeration in the different media exerted also its effect on the plant growth.

Moreover, the clay content of the studied media played an important role in furnishing suitable conditions for plant growth.

It is evident that plant growth in media (1), (2), (3) and (5) having organic materials such as peatmoss, leaf mold and peanut shells, were shorter in their height compared with the plant grown in medium (4) which contained the least decomposable organic matter (contamenated in loam). This statment was similar to that observed with the effects of media when *Aralia longifolium* L.was concerned.

The use of foam in this medium (4) resulted in better aeration which increased the rate of oxygen diffusion needed for roots to induce more absorption of nutrients from the soil. Because the soil is porous, gases can diffuse freely through the mass of minute fissures, and the oxygen entering the soil. Poorly aerated soil have low oxygen and high carbon dioxide content; the high carbon dioxide levels have a toxic effect on roots. Also, Good drainage in medium is important because excess moisture in poorly drained medium reduces oxygen levels. Aeratioon also increases the population of micro-organisms in enormous proportions without which plant growth in the medium would be impossible. These factors had their influence on the plant growth presented as plant height. This was very clear with medium (4) which was very suitable for growth.

These results agree with those of ***Bergman (1920)***, on *Impatient spp.* , *Pelargonium spp. and Coleus spp,* he found that the plant was in good vegetative condition and grew normally when those pots of plants were aerated. ***Hunter and Rich (1925)***, on *Impatients balsamina* found that the rate of transpiration and the intensity of respiratory activity of the shoot were increased by the aeration of the soil about the root system.

Similar results which proved that the good aeration of the soil is very important were reported by ***Bouygues (1928),*** on *Salix purpurea, and* ***Dean (1933)***, on *Hibiscus spp., Acorus spp.* , *Sagittaria spp.* and *Typha spp.*

3.2. Number of shoots per plant :

Data in the first season (1990/1991) as shown in Table (7) and Figure (13) show that the shoot number of the plant grown in medium (4) - reached 49.8 shoots per plant. This was significant at 0.05 level more than any number of shoots from treatments 1, 2, 3 and 5 which gave 33.5, 42.0, 41.1 and 33.0 shoots/plant, respectively.

The following treatment which gave high average number of shoots as 42.0 was medium (2). It gave significant increase at 0.05 level over medium (1) and medium (5) , but the increase was insignificant as compared with medium (3). However medium (3) gave significant increase over medium (1) and medium (5). No significant difference between medium (1) and medium (5) was noted; the number of shoots reached 33.5 and 33.0 per plant for medium 1, 5 respectively. It is worthy to mention that medium (5) consisted of - Sand : Clay : Peanut shell - 3:1:1, by volume, respectively gave the lowest value of shoot number as compared to any other treatment.

Data of the second season (1991/1992) presented in Table (8) and Figure (14) indicate that medium (4) was the best treatment ; it gave similar results as those of season one (1990/1991). The number of shoots per plant in case of medium (4) exceeded the shoot number of other

Figure (13): First year
Number of shoots/plant

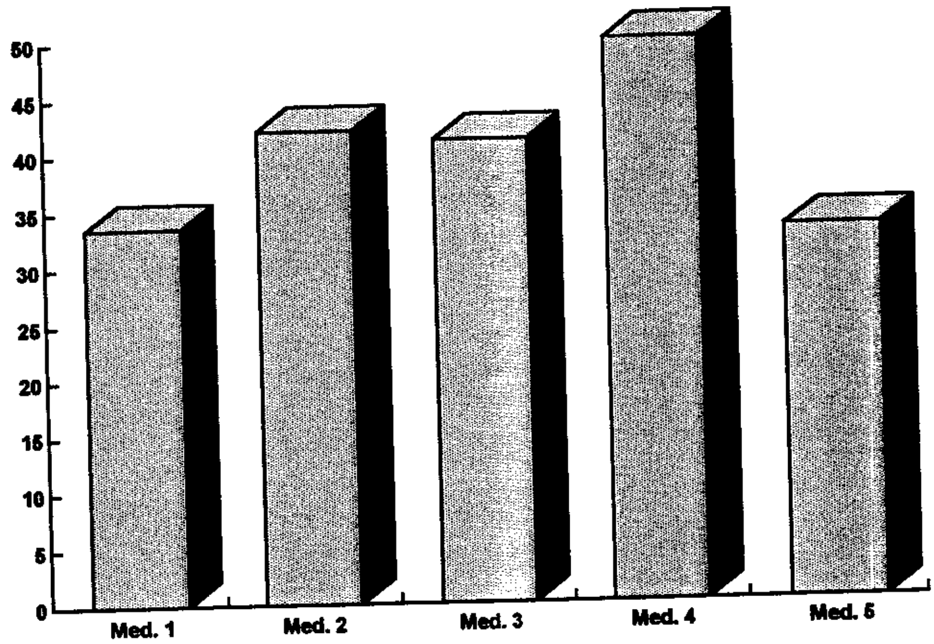
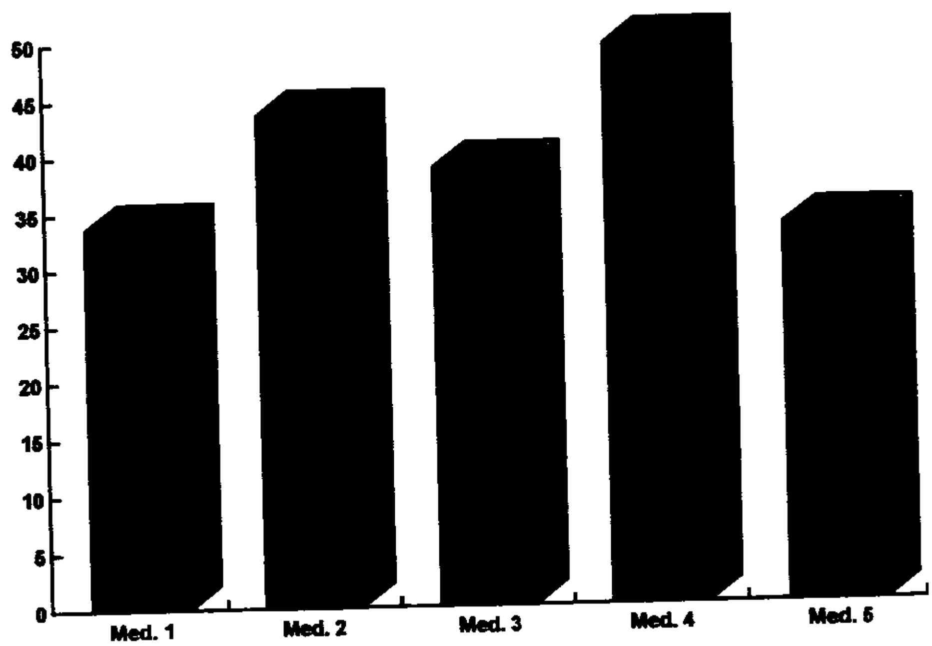


Figure (14): Second year
Number of shoots/plant



Effect of media on shoot number of *Cupressus sempervirens* L.

plants grown in the other media. There was significant difference at level 0.05 between medium (4) producing 49.4 shoots/plant and media (1), (2), (3), and (5) which gave 33.7, 43.5, 38.7 and 33.3 shoots/plant, respectively.

The statistical different media where the valuest shoots number/plant averaged of the obtained data showed significant differences among medium (2) - Sand : Clay : leaf mould - 3:1:1 by volume, respectively as 43.5 shoots per plant and media (1) (3) and (5) 33.7, 38.7, 33.3 shoots plant for media 1, 2 , 3 and 5, respectively. The variation was significant at 0.05 level. Moreover, the shoots number in case of medium (3) - Sand : Peatmoss : Leaf mould - 3:1:1 by volume, respectively as 38.7 shoots per plant was significantly more than the number attained from medium (1) and medium (5). No significant difference was noticed in the number of shoots.plant when the plants of medium (5) was compared with control (M_1). The shoot number in case of medium (5) as 33.3 shoots/plant was the lowest value.

The variation in shoot number in plants grown in different media could be attributed mainly to the providing of the factors influencing the growth. Increasing the number of shoots can be related to available moisture, aeration and nutrients availability in the growth medium.

When the component of the medium differs, the medium contains which decomposed organic matter had a bad effect on the growth even when previous factors are available.

Allison and Klein (1962), mentioned that nitrogen is needed for microbial growth in the some way as crops need it for their growth. ***Taha et al., (1969)***, stated that the decomposition of such materials exerts a bad effect on plant growth.

Moreover, ***Foth and Turk (1972)***, cleared that using organic matter in the media reflected on a wide C/N ratio as shown in Table (3), and resulted in decreasing the shoot number. Moreover, the clay content of the studied media played an important role in furnishing suitable conditions for plant growth. This result confirmed the finding of ***Mohamed (1991)*** on *Chlorophytum comosum and Asparagus sprengeri* who reported that clay soil increased the plant height, fresh and dry weight of plant.

It could be noticed that when foam was added in the mixture medium (4), foam played a great role in increasing aeration as noticed in Table (4). Aeration in the soil will increase oxygen needed for roots to act more absorption of nutrients from the soil. It also increases remarkable population of micro-organisms in enormous proportions without which plant growth in the medium would be possible.

These results agree with those of ***El-Tantawy (1981)*** on *Casuarina equistifolia and Cupressus sempervirens* who reported that the clay soil gave the best growth. ***Hornis et al., (1983)*** on *Codiaeum variegatum and Dieffenbachia amoena* mentioned that clay soil improved the vegetative growth.

Moreover, ***Tesi and Tosi (1985)*** on *Chamaedorea elegans* in pots, they found that ratio of brown peat to expanded clay of 1:1 or 1:2 gave the best results in terms of plant size and quality. ***Poole and Conover (1986)*** on *Aphelandra squarrosa* cv. Dania, *Schefflera actinophylla, Calathea makoyana and Pepromia obtusifolia* found that Metro Mix 200 (sphagnum peatmoss, vermiculite, perlite and sand) was the best mix for *Aphelandra squarrosa* cv. Dania, *Schefflera actinophylla* grew well in all media, but a 3:1 mix of peat : sand (by volume) was the best for *Calathea makoyana*. Schefflera and *Pepromia obtusifolia* grew best in Metro Mix 200. Increases in Metro Mix again improved Schefflera, but reduced growth of Pepromia.

3.3. Vegetative fresh weight :

Data in the first season (1990/1991) shown in Table (7) and Figure (15) indicate that medium (4) - Sand : Clay : Foam - 3:1:1 by volume, respectively gave the heaviest vegetative fresh weight 35.5 gms. per plant as compared to any other treatment. It was significantly more than that of plant fresh weight resulting from any other treatment. The significance was at 0.01 level. For instance, the vegetative fresh weight reached 24.0, 30.0, 29.5, and 23.6 gms/ plant in case of media 1, 2, 3 and 5 respectively.

The statistical analysis show significant differences at 0.01 level, among the vegetative fresh weight of plants from medium (2) and the

Figure (15): First year

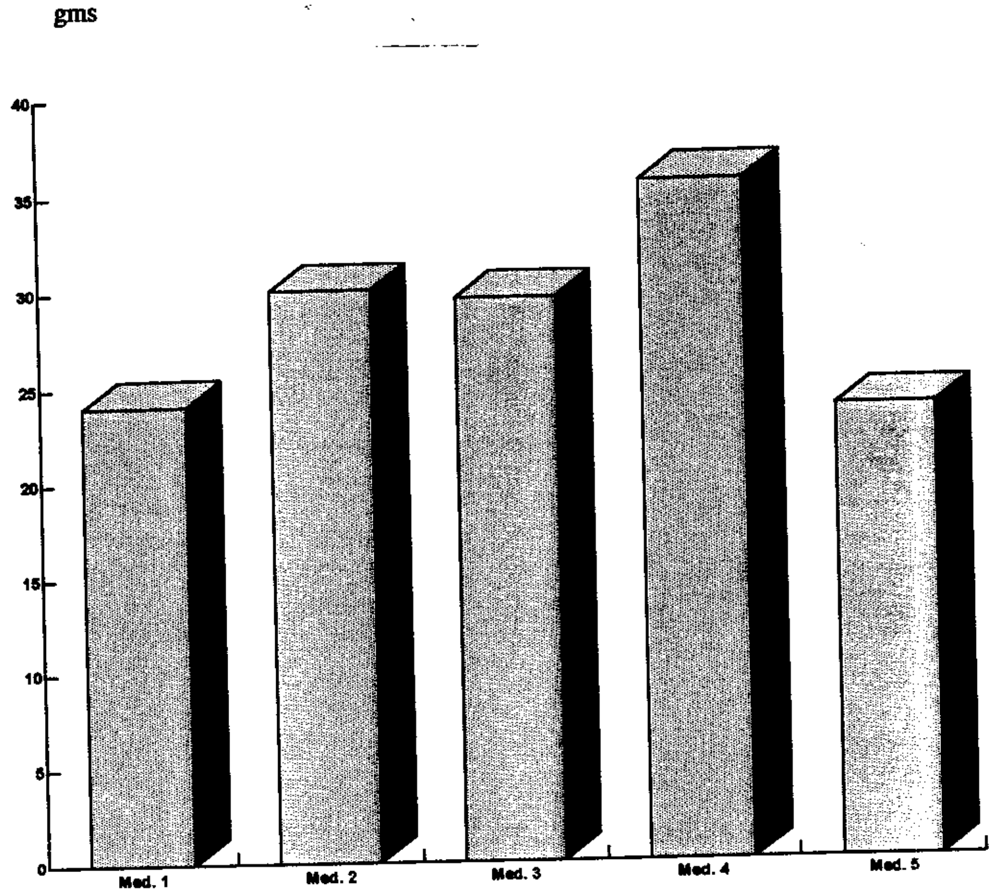
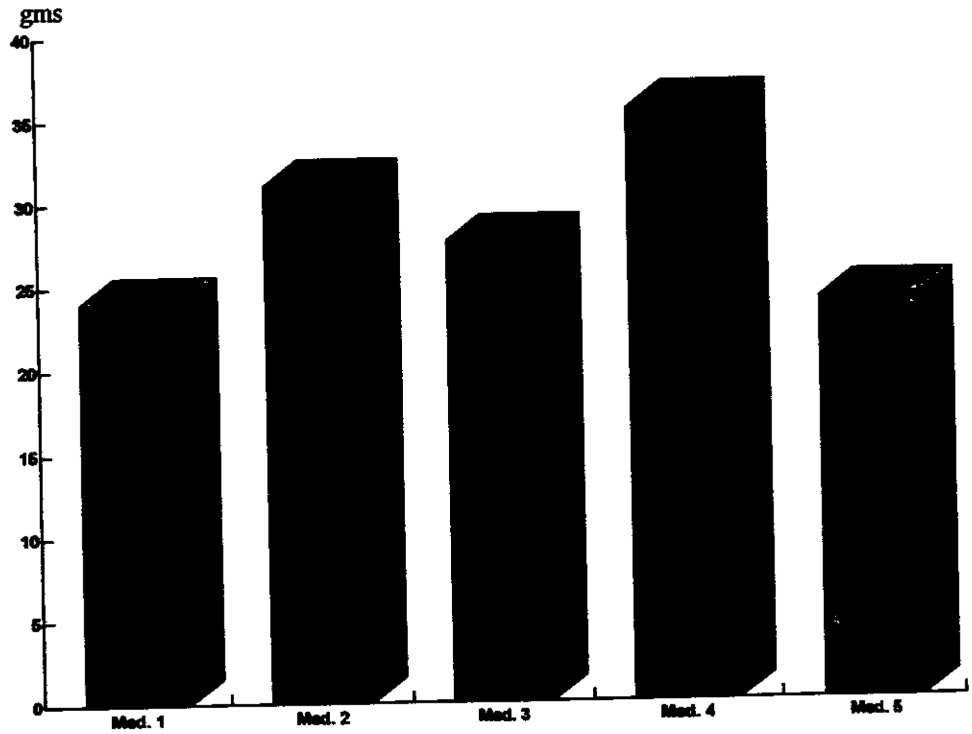


Figure (16): Second year



The effect of media on vegetative fresh weight of *Cupressus sempervirens* plants from media (1) , (5), in the meantime insignificant difference was noticed between the fresh weight of plants of medium (2) and medium (3).

It is worthy to mention that medium (3) - Sand : Peatmoss : Leaf mould - 3:1:1 by volume respectively - gave 29.5 gms fresh weight of plant which was significantly more than that resulting from (M1) and medium (5). The two later treatments gave 24.0 and 23.6 gms of fresh weight/plant, respectively. Medium (5) gave the lowest value as 23.6 gms fresh weight/plant.

Data of the second season (1991/1992) are presented in Table (8) and Figure (16) and indicate that medium (4) was also the best treatment that gave similar trend of results as those of season one (1990/1991).

The heaviest vegetative fresh weight of plant as compared to any other treatment was produced from treatment (4).

The statistical analysis of the obtained data showed significant differences in this respect. the vegetative fresh weight in case of treatment (4) 35.3 gms/plant high significantly exceeded the weight of any other plant resulting from the other media.

There were significant differences at 0.01 level among the fresh weight of the plant from medium (4) (35.3 gms) as compared to any plant from media (1), (2), (3) and (5). For instance, the vegetative fresh weight reached 24.0, 31.0, 27.5 and 23.8 gms/plant for media 1, 2, 3 and 5 respectively.

The fresh weight of the plant grown in M2 was significantly (at 0.01 level), more than the plants from M1 M3 and M5. The later treatments gave 24.0, 27.5 and 23.8 gms/plant, respectively.

Also medium (3) gave higher vegetative fresh weight/ plant than those of (M1) and medium (5). The differences were significant in this concern at the level 0.01.

No significant difference was observed between the fresh weight of the plant grown in medium (5) and that from medium (1) control. The lowest value of vegetative fresh weight/ plant as compared to any other treatments was produced from treatment (5).

The variation in vegetative fresh weight of the plants growing in the different media could be attributed mainly to the providing of the factors influencing the growth. Increasing the plant weight is mainly due to the more storage of the photosynthetic metaboliets. Aeration of the soil affects influence on the number and activity of soil micro-organisms and hence the level of nutrients availability.

The soil conditioner are not fertilizers as such, but materials influencing plant growth indirectly through improving soil properties ***Hedrick and Mowry (1952)***. ***De Boodt (1970)*** classified the soil conditioners according to their effects on soil moisture properties; structure stability and soil cation exchange capacity. In fact, plant growth reflects any changes in soil properties. Many investigators noticed that soil conditioning modifies the soil water regime. In this respect ***Allison (1973)*** , stated that increasing of organic matter markedly increased the available water in light textured soil while slightly increases occurred in heavy textured soils. Moreover, ***Im (1979)***, stated that the available moisture capacity in coarse textured soil usually increase with organic matter addition, whereas in fine textured soils, this increase relates to the texture more than to organic matter. And ***Sadek (1984)***, found that the application of hydrophobic conditioners reduced the field capacity in sandy soil, while the hydrophilic conditioners increased the available water of treated soils.

It could be noticed that in mixture medium (4) which gave the best mixture, foam played a great role in increasing aeration influencing plant growth. The constituents of medium have a kind of balance which leads either to induce micro organisms activity in the soil or, to furnish adequate nutrition to the plant growth in the medium. Moreover, the clay content of the studied media played an important role in furnishing suitable conditions for plant growth. ***Omran (1968)***, on *Cupressus sempervirens,* Casuarina *equisetifolia, Eucalyptus rostrata and Schinus terebinthefolius* noticed that the stem height, the dry weight and the photosynthetic area of all species were the best with the clay soil.

These results agree with those of ***El-Tantawy (1981)***, on *Casuarina equisetifolia and Cupressus sempervirens* who reported that the clay soil gave the best growth, since it increased fresh weight of seedlings. ***Hornis et al., (1983)***, on *Codiaeum variegatum and Dieffenbachia amonea* mentioned that clay soil improved the vegetative growth. On the other hand, ***Mansour (1985)***, on *Aspidestra lurida* reported that the plant grown in clay medium had the lowest values of fresh weight, but the heaviest weights of leaves were obtained from a mixture of sand + peatmoss.

3.4. Dry weight of vegetative growth :

The data in Table (7) and Figure (17) show the results of the dry weight of vegetative growth in the first season (1990/1991).

It could be noticed that the treatments which increased the vegetative fresh weight were the same which increased the dry weights. Medium (4) gave the heaviest dry weight of vegetative growth as 12.8 gms/plant as compared to the media 1, 2, 3 and 5, which reached 8.7 , 10.9, 10.6 and 8.5 gms per plant respectively. The difference in this respect was highly significant.

The next treatment which gave heavier dry weight as 10.9 gms/plant was medium (2). This was significantly higher than those of control (M1), and medium (5). The statistical significance was at 0.01 level. The statistical analysis showed insignificant difference between the

Figure (17): First year

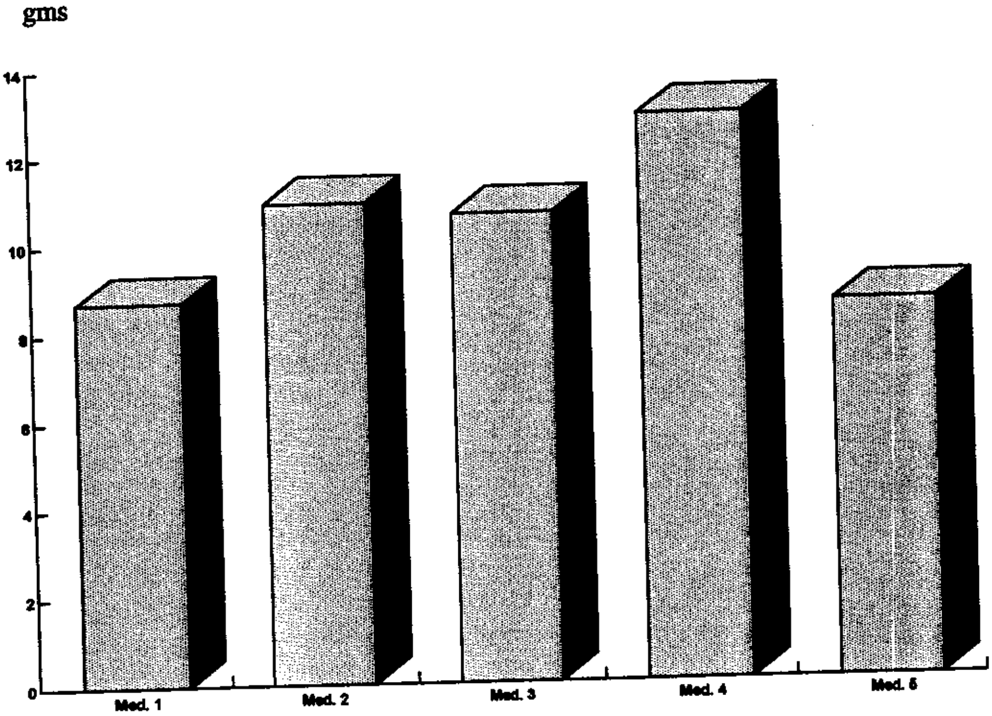
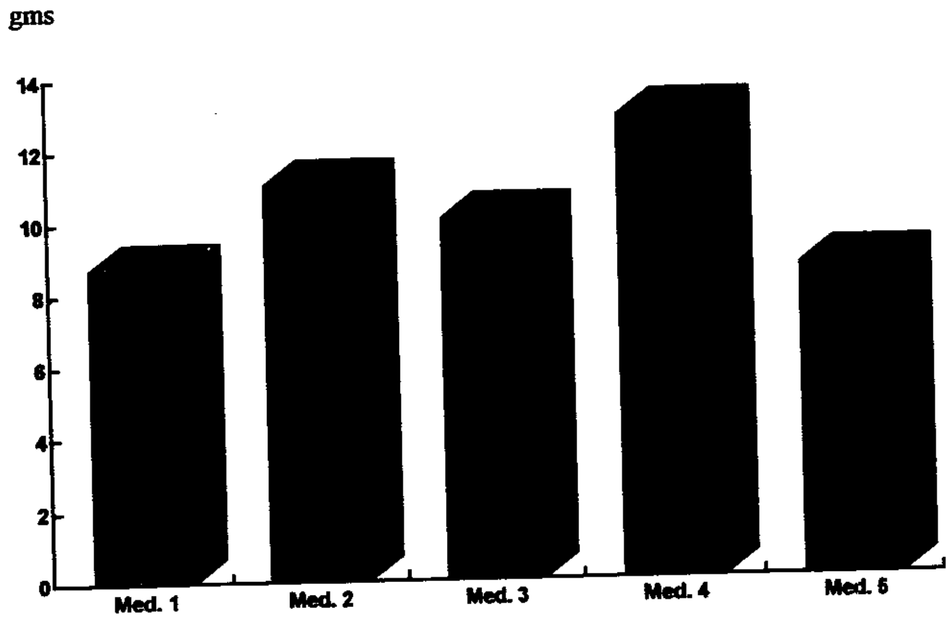


Figure (18): Second year



Effect of media on vegetative dry weight of *Cupressus sempervirens* L.

dry weight of vegetative growth of the plant from medium (2) (10.9 gms/plant and that of medium (3) as 10.6 gms/plant.

Also, no significant difference was noticed between the dry weight of the plant from medium (5) as (8.5 gms)/plant and that from control (M1) which gave 8.7 gms/plant.

Data in Table (8) and Figure (18) of the next season (1991/1992) showed that medium (4) was the best treatmentment and gave similar trend of results as in season one (1990/1991). The heaviest dry weight of vegetative growth plant, as compared to any other treatments, was produced from the treatment (4) as 12.8 gms/plant. The dry weight of vegetative growth reached 8.7, 11.0, 10.0 and 8.6 gms/plant for media 1, 2, 3 and 5 respectively. The statistical analysis showed highly significant differences at 0.01 level in the dry weight of the plants from media 1, 3, and 5 . No significant difference was reached between the dry weight of the plant from medium (4) and medium (2).

Medium (2) gave significant increase at 0.01 level in the plant dry weight when compared with those produced from media (1), (3) and (5).

Moreover, the statistical analysis showed highly signeficant difference among the dry weight of vegetative growth the plant grown in medium (3) as 10.0 gms/plant when compared with 8.1 gm for control M1 and with the 8.6 gms dry weight/plant of the medium (5). No significant difference between medium (5) and control (M1) did happen.

The plants of medium (4) which had the heaviest fresh weight and the tallest plants were the same which gave the heaviest dry weight of vegetative growth. This indicate the better growth of plant in this medium (4), which reached a balance in its materials. The balance of the materials consisting the medium was able to provide the plant with the essential macro - and micro elements required for growth. Besides, it gave the roots proper condition of aeration and adequate soil moisture. Clay holding capacity is greater than the other materials used in the media investigated.

In this connection some investigators as ***Harms (1973)***, on *Nyses aouatica* found that plants grew better in silty clay loam soil than in sandy loam. ***Lasmarias et al., (1975)***, on *Vitex parviflora* seedlings found that seedlings grew better in sand-humus mixture. ***Dimitrovsky (1976)***, on *Acer pseudoplatanus* seedlings noticed that the lamellar clay was most effective than compact clay.

4. Effect of media on the contents in the branches of *Cupressus sempervirens L.* of (1990/1991):

4.1.The effects on nitrogen, phosphorus and potassium contents in dry weight.

Data in Table (9) show that the nitrogen content was increased in the branches of the plants grown in medium (4) which gave highly significant increases in the N content of leaves as compared with any other treatment.

The increase was significant at 0.05 level when the contents of the branches of plants grown in M (3) were compared with those of M2 and M5.

No significant differences was observed among N contents of the plants grown in media 1, 2 and 5 . It seemed that medium (4) was the best treatment which furnished enough availability of nitrogen uptake.

Observing, the values of phosphorus content in the branches of the plants grown in the different media, M4 gave the highest content of P, 0.83 mg/gm dry weight which was highly significant more than that in the branches of any other treatment under investigation.

Medium (3) gave the least value of P content as 0.48 mg/gm dry weight, it was significantly at 0.01 level less than any other treatment.

Table (9) The effect of media on the chemical constituents in the branches of *Cupressus sempervirens*

Treatments	1990 / 1991					1991 / 1992				
	N mg/g	P mg/g	K mg/g	Total carb. mg/g	Total Phen. ppm	N mg/g	P mg/g	K mg/g	Total carb. mg/g	Total Phen. ppm
M (1) control	3.08	0.57	2.94	20.2	113	2.09	0.58	2.81	20.1	120
M (2)	2.96	0.59	2.68	20.0	116	2.33	0.54	2.63	19.3	122
M (3)	3.28	0.48	2.25	19.3	118	3.06	0.41	2.53	18.5	131
M (4)	4.18	0.83	3.21	21.6	118	3.68	0.59	2.21	22.1	125
M (5)	3.02	0.63	2.53	20.5	112	2.81	0.63	2.69	19.4	123
L.S.D. 5%	0.26	0.06	0.36	N.S.	N.S.	0.31	0.04	0.31	1.1	N.S.
L.S.D. 1%	0.73	0.09	0.58	N.S.	N.S.	0.78	0.09	0.62	2.6	N.S.

Medium (5) gave significant increases in the P content of branches as compared with M1. Although, phosphorus is very important element which impart the different physiological reaction in the metabolism, yet it seemed that the different media had limited effects on its uptake.

As for potassium the data in the same Table (9) indicate that the plants of M (1) and M (4) nearly did not differ in K content. No statistical difference was reached in this concern.

The highest content of K was reached with M (4) which was highly significant more than the content in the branches of plants grown in media (2), (3) and (5). The least value of K content was from the plants of medium (3) and was significantly lower than the plants from other treatments except medium (5).

Generally, the media differed in their effect on the availability of major elements absorbed by plants, the most promising effect was for the nitrogen contents with medium (4) and with potassium contents with medium (1). It is worthy to mention that medium (4) was the best one which gave the best growth of plant. This was for sure related with a better capacity of the media to supply the plant with the needed elements.

4.2. The effect of media on the total carbohydrate content in the branches dry weight :

As shown in the Table (9) of 1990/1991, the highest content in total carbohydrates was found in the branches of *Cupressus sempervirens* L. grown in medium (4).

The different media did not influence the total carbohydrates content in the branchs of *Cupressus sempervirens* L. The value ranged between 21.6 and 19.3 mg/gm dry weight for the different media under investigation. The differences in this respect were insignificant.

The data showed the best influence of medium (4) for increasing the total carbohydrate content in the branches of *Cupressus sempervirens L.* This indicated that the proper constituents of the medium led to superior growth.

In this connection, many investegators as ***El-Khateeb (1983)***, on *Eucalyptus integrifolia*, **Mansour** ***(1985)*** on *Chamaedorea spp.*, showed that the proper constituents of media reflect on the plant growth and it's total carbohydrate content.

4.3. The effect of media on the phenols content in the branches *sempervirens* L. :

Data in Table (9) indicate that the different media did not ifluence the phenols content in the branchs of *Cupressus sempervirns.* The values flatuated between 112 ppm and 128 ppm for the different media under investigation. The differences in this respect were insignificant.

In conclusion, the high rate of phenols were observed with the plants that had the minimum rates of growth. This may indicated that the media can change and can influence the pathway of some internal compounds in the plant through their effect on supplying the plant by the needed elements.

4.4. The effect of media on the chemical constituents in the branches of *Cupressus sempervirens* L. of (1991/1992) :

4.4.1. The effect on nitrogen, phosphorus and potassium contents in mg/g dry weight :

Data in Table (9) show that the nitrogen content increased in the branches of the plants grown in medium (4). It was the best treatment that gave 3.68 mg/g of N compared to the minimum value as 2.09 mg/g for M (1). The increases were highly significant at 0.01 level as compared with any other treatment except medium (3). The N content of the plant their early stages of growth. The medium that had proper constituents in a proper ratio was very effective in this concern. The better establishment of the plants of M (4) was due to the proper ratio of constituents.

4.4.2. The effect of media on the total carbohydrate in the branches dry weight :

As shown in Table (9) of 1991/1992 , the highest content in total carbohydrate was found the branches of *Cupressus sempervirens* L. grown in medium (4) . The value 22.1 mg/gm dry weight significantly exceeded the values estimated from the plants grown in the other media. The least content of total carbohydrates 18.5 mg/gm dry weight of branches was found with plants of medium (3) which gave 18.5 mg/gm dry weight compared to 22.1 mg/gm dry weight for medium (4).

The data showed the best influence of medium (4) for increasing the total carbohydrates content in the branches. This indicated that the proper constituents of the medium flourished the best growth as revealed in the vegetative growth data. The increase in the carbohydrate content is a good remark for the healthy growth.

In this connection, many invistigators as ***Nabih and El-Khateeb (1991)*** on *Philodendron erubescens* found that the highest values of total sugars were obtained by using clay : peat (1:1) and sand showed that the proper constituents of media reflect on the plant growth and it's total carbohydrates content.

4.4.3. The effect of media on the phenols content in the branches :

Data in Table (9) indicate that the highest content in phenols was found in the branchs of *Cupressus sempervirens* L. grown in medium (3). The least content of phenols as 120 ppm dry weight of branchs was found with the plants of medium (1) compared to 131 ppm for medium (3).

No significant differences among the phenols content of plants grown in the different media.

In conclusion, the high rate of phenols were observed with the plants that had the minimum rates of growth. This case indicated that when ever the plant growth ws shocked under any status, phenols pathways took place.

5. Effect of light intensity on the vegetative growth of *Aralia longifolium L.* :

5. 1. Effect of light intensity on the vegetative growth of *Aralia longifolium L.* in the 1st season:

5.1.1. The effect of light intensity on the plant height of *Aralia longifolium L.*

Data of the first season (1990/1991) as shown in Table (10) and Figure (19) show that the plant height of *Aralia longifolium* grown in (25% full sunlight under lathhouse conditions) gave the tallest plants since it reached 43.4 cms after six months from distributions compared to 39.3 and 32.6 (50% and 100% full sunlight respectively). The statistical analysis showed significant differences at 0.01 level in this respect when compared with the height of plants grown under full sunlight. No significant difference occurred between the height of plants grown under lath-house and those under the network.

It is worthy to mention that the 50% full sunlight treatment where the plants attained 39.3 cms in length showed significant differences as compared to the plants grown under full sunlight which reached 32.6 cms length.

Data in Table (11) and Figure (20) of 1991/1992 indicate that the 25% full sunlight treatment was the best treatment which gave the tallest plants as compared to the two other treatments. Under this condition the

Table (10) **Effect of light intensity on vegetative growth of *Aralia longifolium* L.** First Season 1990/1991

Treatments	Plant Height (cm)	Number of Leaves (per plant)	Leaf area in (mm^2)	Vegetative fresh weight (gms)	Dry weight (gms)
100% Full sunlight	32.6	26.9	860	26.7	6.7
50% full sunlight	39.3	34.2	1250	41.4	9.0
25% full sunlight	43.4	45.5	1300	68.4	12.9
L.S.D. at 5%	3.9	3.2	44.4	1.3	0.8
L.S.D. at 1%	6.1	5.2	73.5	2.4	1.3

Figure (19): First year

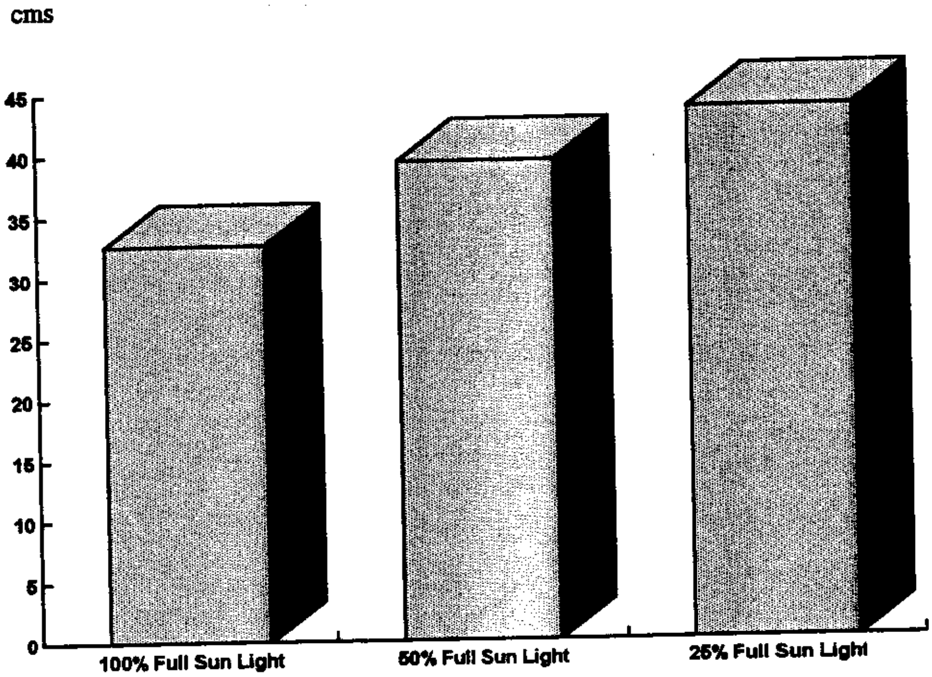
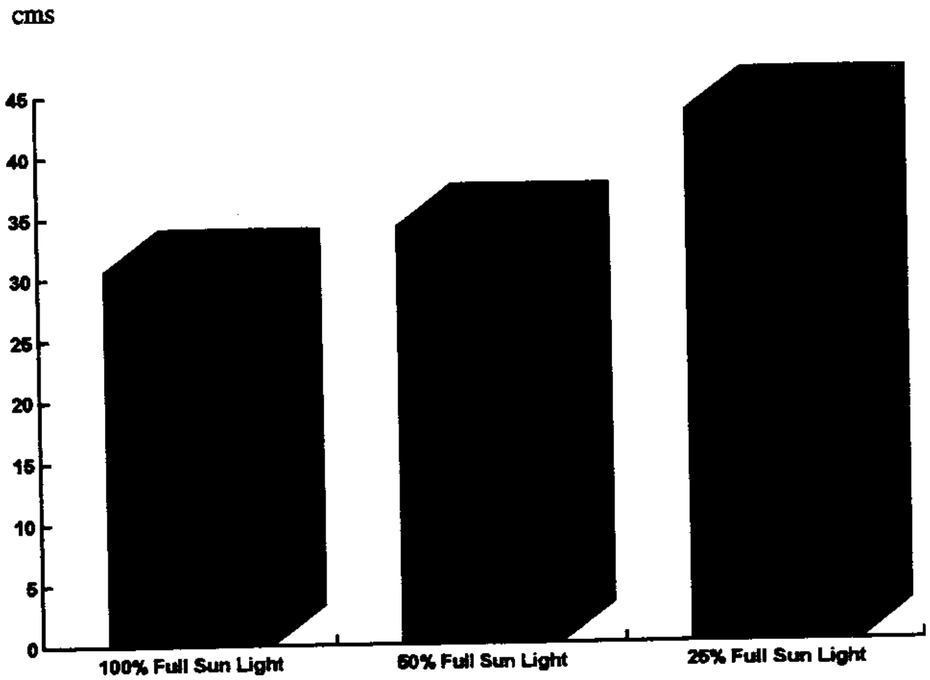


Figure (20): Second year



Effect of light intensity on plant height of *Aralia longifolium* L.

Table (11) **Effect of light intensity on vegetative growth of *Aralia longifolium* L.** Second Season 1991/1992

Treatments	Plant Height (cm)	Number of Leaves (per plant)	Leaf area in (mm^2)	Vegetative fresh weight (gms)	Dry weight (gms)
100% Full sunlight	30.6	24.1	810	25.0	6.3
50% full sunlight	34.1	34.1	1070	35.8	7.9
25% full sunlight	43.3	44.3	1300	68.4	12.9
L.S.D. 5%	3.2	2.3	41.3	2.2	0.7
L.S.D. 1%	5.2	4.4	65.7	4.6	1.1

Aralia longifolum L. plants reached 43.3 cms compared to plants grown under 50% and 100% full sunlight. The statistical analysis of the obtained data showed significant differences in this respect. The plants grown under (25% full sunlight) attained 43.3 cms length and those grown under full sunlight gave 30.6 cms plant length.

Whereas, no significant difference was observed between the plant height of plants grown under (25% full sunlight) and those grown under network 50% full sunlight which reached 34.1 cms plant height. Moreover, no significant difference was realized for the plants grown under 50% full sunlight when compared to those grown under full sunlight. The plants grown under 50% full sunlight were taller by 26% over those grown under full sunlight.

The obtained data showed that the high light (full sunlight) gave the shortest plants. It means that the full sunlight had retarding effect on the growth of tree seedlings. The variation in plant heights resulting from the different treatments could be attributed mainly to different of light intensities which caused different in photosynthesis rates. In this conection ***Hesketh (1963),*** mentioned that the photosynthesis may be inhibited in the high light intensity. This inhibition may happen by stomatal closure, accelerated respiration, or photooxidation of the photosynthetic apparatus. The high light intensity increases transpiration and may result in turgor less and, subsequently, in stomatal closure. High light intensities warm the leaves and may increase respiration, and if the warming becomes too great, the temperature rise may be sufficient to cause thermal inactivation of enzymes.

Many other investigators gave similar conclusions among those ***Shafiq et al., (1974, 1978)*** on *Pinus brutia, Cupressus sempervirens, Casuarina equisetifolia and Thuja orientalis* found that *Pinus brutia and Cupressus sempervirens* , plant height were greatest at 25% light, *Thuja orientalis*, plant height was greatest at 50% light, but, *Casuarina equisetifolia* plant height was unafected by shading.

Braswell et al. (1982), on *Brassaia actinophylla* noticed that plants were larger and of better quality when produced under greenhouse light levels of 828 or 414 Em^{-2} S^{-1} while *Schefflera arboricola* plants were better when produced under the 276 ME m^{-2} S^{-1}.

Jeong et al., (1983), on *Trachelospermum asiaticum* var. intermedium and *Hedra rhombea* found that the stem elongation was promoted as light intensity decreased. ***Rao & Singh (1989)*** , on *Quercus leucotrichophora, Q. floribunda, Aesculus indica, Acer oblongum, Pyrus pashia, Cupressus torulosa, Eucalyptus globulus, Eucalyptus hybrid, Pinus roxburghii and Olea glandulifera*, mentioned that species of all categories attained greater height per unit stem dry weight under deep shade (18% sunlight) than in unshaded conditions (100% sunlight).

5.1.2. Effect of light intensity on the number of leaves of *Aralia longifolium L.* :

Data of the first season (1990/1991) as shown in Table (11) and Figure (21) show that the leaf number of plant grown under 25% full sunlight lath-house conditions reached 45.5 leaves/plant, is number of leaves was significantly more than the number of leves from the treatments 50% full sunlight or the full sunlight one.

The following treatment which gave high number of leaves/plant as 34.2 was the 50% full sunlight for the plants grown under network. The difference between the two treatments - 25% full sunlight and 50% full sulight - was significant at 0.01 level, Table (11). The increase in the number of leaves/plant for the first treatment was 33% over that of the second one. The leaf number/plant as 26.9 in the case of full sunlight treatment was significantly lower as compared to the other treatments. The level of significance in this concern was at 0.01.

Data of second season presented in Table (11) and Figure (22) indicate similar trend of results as those of the first season.

The highest value of leaf number as compared to any other treatments was recorded for the plants grown under 25% full sunlight in the lathhouse. The number of the leaves reached 44.3 leaves per plant. There was significant difference between the leaf number of the 25% full sunlight as compared to the plants grown under 50% full sunlight under

Figure (21): First year
Leaf number/plant

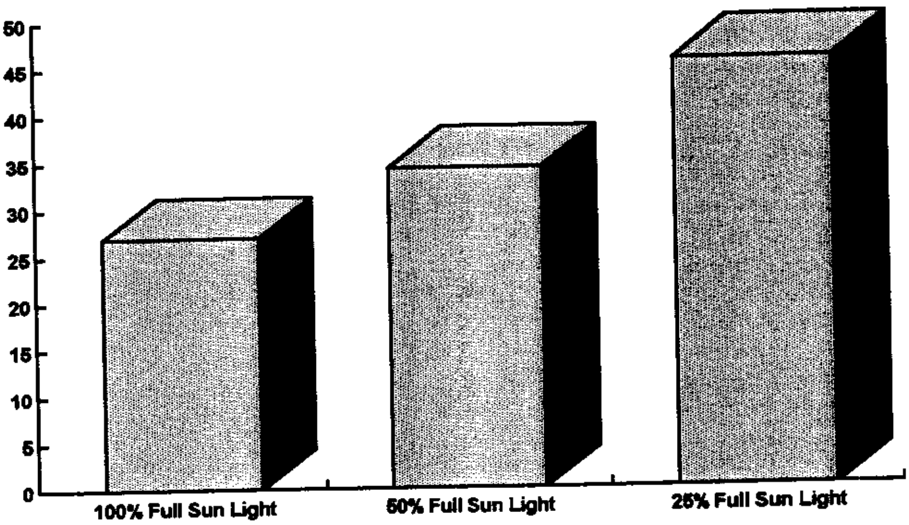
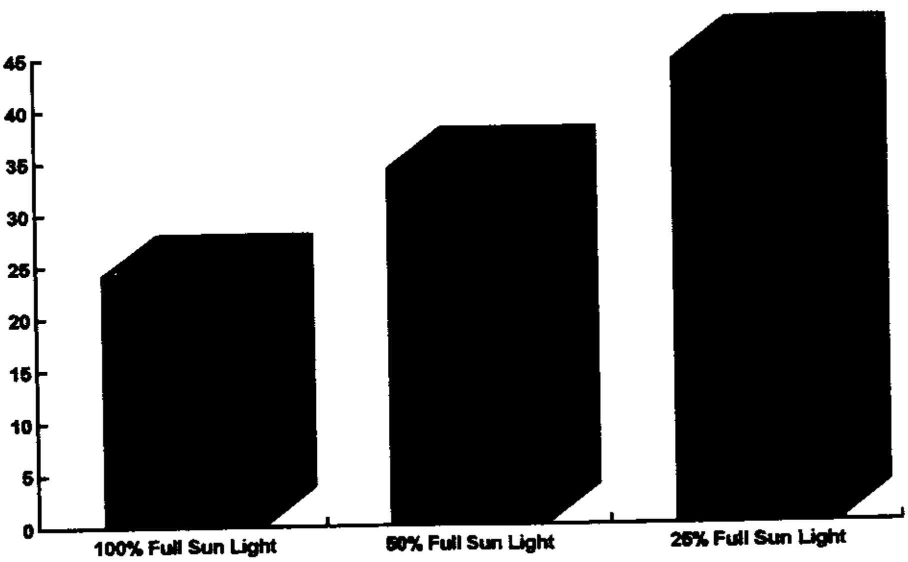


Figure (22): Second year
Leaf number/plant



Effect of light intensity on leaf number per plant of *Aralia Longifolium* L.

the sheets of network which gave 34.1 leaves /plant. The level of significance in this respect was 0.01. However, the plants grown under treatment 50% full sunlight produced 34.1 leaves/plant which was significantly more than the leaf number of the plant grown under full sunlight as 24.1. leaves/plant. The difference in this connection was statistically significant at 0.01 level.

The variation in leaf number resulting under the different light intensities treatments could be attributed to the direct or indirect effect of light intensity on the physiological reaction of light. In this respect ***Joiner and Editor (1981)*** recorded that the amount of light loving plants receive within a broad range determines amounts of carbohydrates synthesized and resaltant growth and quality potential. The photosynthetic rate can be reduced when excessive light energy is received by plants because of limited CO_2 or photooxidation. Under conditions of excessive light and high temperature, photooxidation or sun scald of foliage results from a reversal of the photosynthetic process in that oxygen is absorbed and cells are consumed. Also, ***Halfacre and Barden(1979)***, mentioned that rates of photosynthesis increase with increasing irradiation levels until light saturation is reached. Above this irradiation, there is little or no response to increasing light. There is a direct relationship between the level of irradiation under which a leaf has developed and is light-response curve.

These results agree with those of ***Conover and Poole (1975)*** on *Dracaena marginata who* reported that the plants produced under 40 or 80% shade were better quality plants and showed less leaf drop under interior conditions of 150 ft-c (1.6 klux) than plants produced under full sun. Also, ***Conover and Poole (1976)***, on *Ficus benjamina* found that height, grade and foliage color improved with increasing amounts of shade during production and shaded plants maintained higher quality later than full sun grown ones. According to ***Conover and Poole (1977)***, on Areca Palm indicated that heigher quality Areca Palms were produced under 40% shade than in full sunlight.

However, ***Hung and Lo-Cho (1979)***, on Red cypress *(Chamaecyparis formosensis)* mentioned that the condition of the saplings also became poorer with decreasing light intensity, especially under 30% light where growth was markedly less than at higher light intensities. It is recommended that once seedlings have become established, poor quality broadleaves must be girdled immediatly to let in the sunlight.

Joiner, et al., (1980), on *Ficus benjamina* reported that full sun plants appeared stunted and had fewer leaves compared to shade grown plants were taller and more densely foliated.

5.1.3. Effect of light intensity on leaf area in mm^2 of *Aralia longifolium* L. :

Data of the first season (1990/1991) as shown in Table (10) and Figure (23) indicate that leaf area of *Aralia longifolium* . grown under 25% full sunlight under the lathhouse conditions produced the largest leaf area as 1300 mm^2 as compared to the leaf area of the other treatments.There

Figure (23): First year

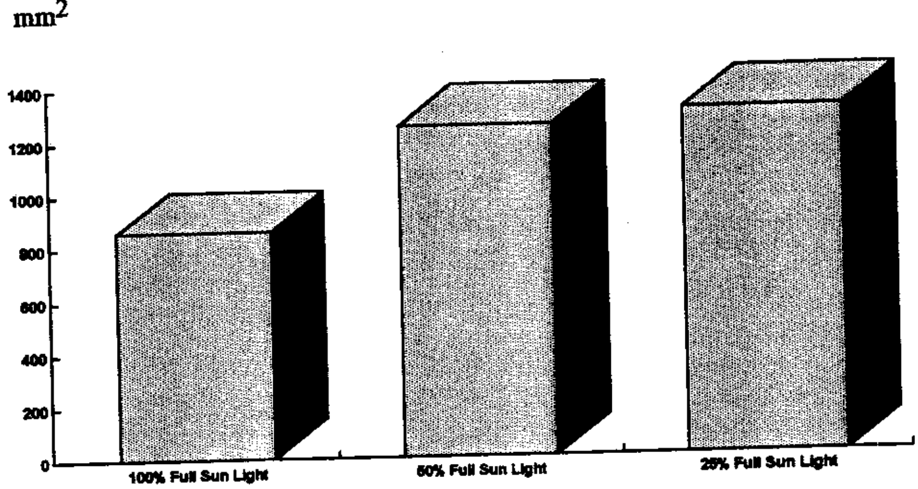
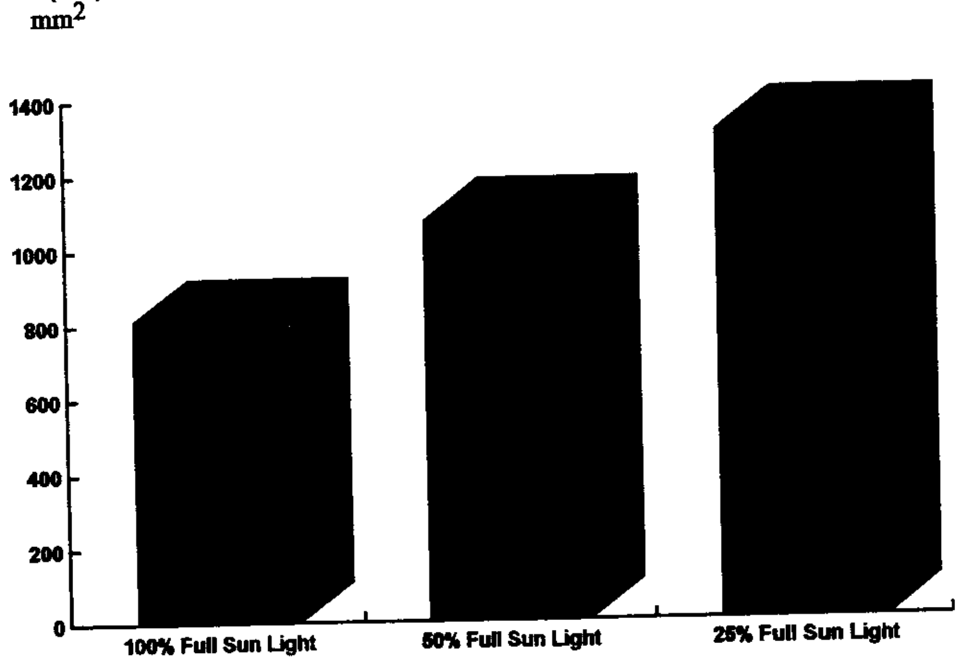


Figure (24): Second year



Effect of light intensity on leaf area of *Aralia Longifolium* L.

were significant differences among the leaf area of the plants grown under 25% full sunlight as 1300 mm^2 and under 50% full sunlight which gave 1250 mm^2 leaf area and that under full sunlight as giving 860 mm^2 leaf area. The differences in this concern were statistically significant at 0.01 level. The smallest leaf area was obtained from the plants grown under the full sunlight showing the bad effect of the light intensity on the leaf area, especially in the early stages of growth.

Data of season (1991/1992) in Table (11) and Figure (24) show that the 25% full sunlight treatment was the best one which gave the largest leaf area of Aralia longifolium L. as 1300 mm^2 compared to 1070 and 810 for the 50% full light intensity and full sunlight, respectively.

There were highly significant differences among the leaf areas when Aralia plants were subjected to light intensity as 25% of full sunlight as compared to the other treatments, the increases were significant at 0.01 level.

Also, the data in Table (10) show highly significant difference between the leaf area of the plants grown under 50% full sunlight and those of the plants grown under full sunlight. This was true at 0.01 level of significance. The smallest leaf area of *Aralia longifolium* L. as 810 mm^2 was obtained from the plants grown under full sunlight treatment.

The variation of the leaf area of *Aralia longifolia* L. plants grown under different light intensities might be due to that rate of photosynthesis increase with increasing irradiation levels until light saturation is reached. Above this irradiation, there is little or no response to increasing light ***(Gordon and John, 1979).*** Also ***Carpenter and Nautiyal (1969)***, declared that the growth of foliage plants under specific light intensities is an important aspect of production. ***Conover and Poole (1974a)***, on *Philodendron scandens* noticed that the plants produces larger leaves and greater stem caliper under 40 percent shade. Also, ***they added in (1975)***, that plants with lance-shaped leaves, such as *Dracaena marginata*, produced longer and narrower leaves under high shade than under low shade levels. They declared that the growth of pot plants, including plant size and shape, is as fast and sometimes faster under proper light intensties than higher or lower levels. ***Conover et al., (1975)***, noted that "shade-grown leaves absorb more of the incoming light energy, (than sun-grown leaves) which allows them to photosynthesize more efficiently under low light conditions.

Moreover, ***Joiner et al., (1980)***, on *Ficus benjamena* L. mentioned that the leaves produced in full sun were lighter green and thicker than those produced in the shade and folded upward to about half closed. Shade leaves were dark green, thin and flattened. These characteristics were reflected in the growth index which was 20% higher in shade plants than in sun plants. ***Senanayake and Kirthisinghe (1983)***, on *Piper nigrum* L. recorded that the cuttings under 50% shade produced largest leaf area. The next best treatment was 35% shade.

Son and Yeam (1988), on *Ceropegia woodii, Begonia semperflorens (B. cuculata), Fittonia verschaffeltii* var Argyroneuram, *Pilea cadierei, Saintpaulia inantha and Pepromia obtusifolia* found that light intensity of (6700 to 10000 lux) produced the maximum average leaf area /plant, light intensities of (340 to 900 lux) produced the smallest leaf area of Cepopegia and Fittonia, light (15000 lux) produced plants compact palisade cells containing extera chloroplasts.

Also, ***Vidal et al., (1990)***, on *Fatsia japonica* found that the leaf area per plants was remarkedly lower in plants grown at low photosynthetic photon flux densities of 50 μ mol m^{-2} S^{-1} Leaf thickness in plants grown at high photosynthetic photon flux densities of 300 μ mol m^{-2} S^{-1}. was 13% higher than in plants grown at low photosynthetic photon flux densities.

5.1.4. Effect of light intensity on vegetative fresh weight of *Aralia longifolium* L. :

Data of the first season (1990/1991) shown in Table (10) and Figure (25) indicate that the plants grown under the 25% full sunlight in the lathhouse produced the heaviest vegetative fresh weight 68.4 gms./plant. This value was highly significant more than plants of other

Figure (25): First year

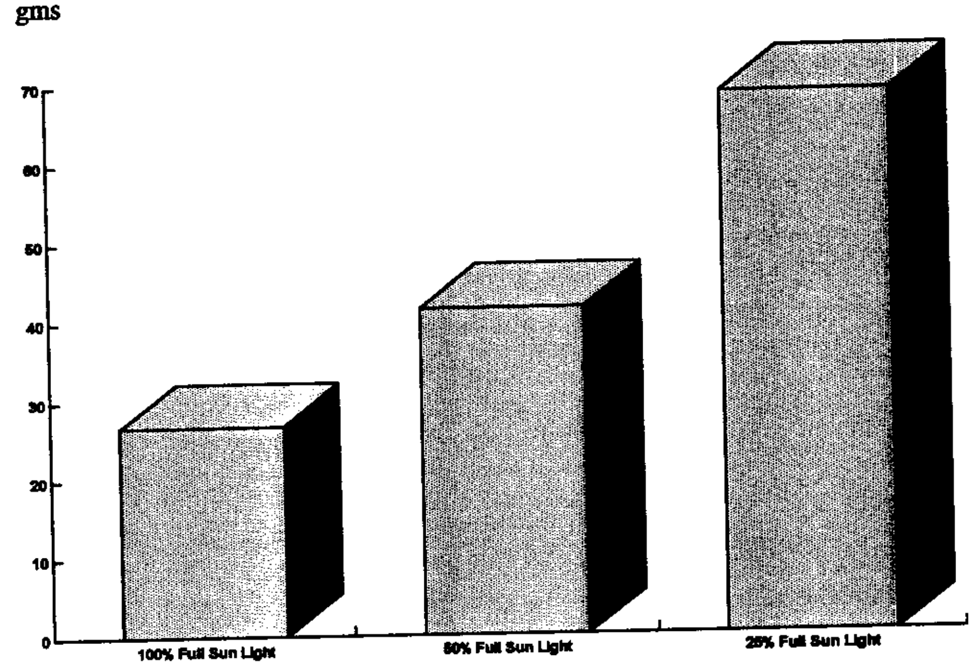
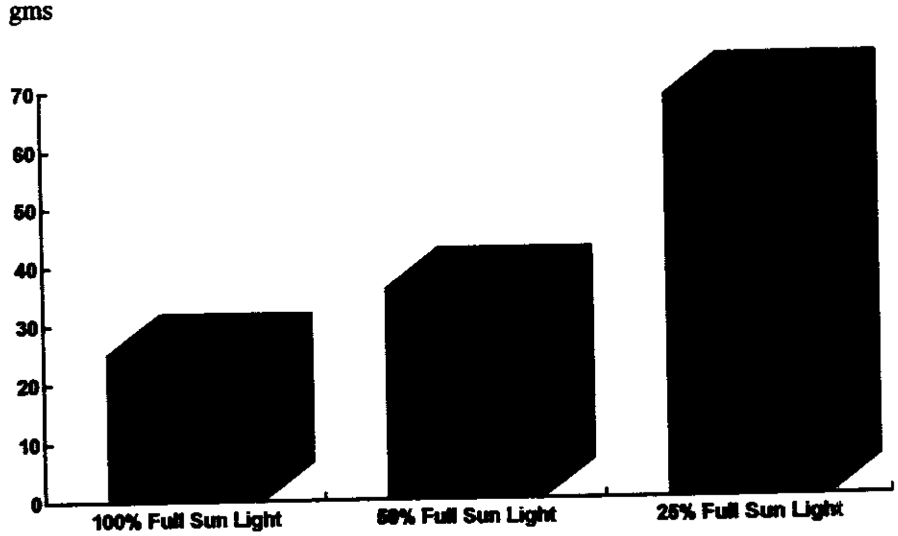


Figure (26): Second year



Effect of light intensity on vegetative fresh weight of *Aralia longifolium* L.

treatments. For instance, the vegetative fresh weight was 41.4 and 26.7 gms./plant for the plants grown under 50% full sunlight and full sunlight.

Also, the statistical analysis showed significant difference between the vegetative fresh weight of plants grown under 50% at light intensities of full sunlight which gave 41.4 gms. /plant and those grown under full sunlight which produced 26.7 gms./plant. The difference in this respect was highly significant .

Generally, the plants grown under full sunlight conditions gave the least weight of vegetative growth.

Data of the second season (1991/1992) presented in Table (11) and Figure (26) incdicate that treatment 25% full sunlight was the best treatment which gave the heaviest fresh weight of plants, 68.4 gms. These results were simillar to those of season (1990/1991).

There were significant differences among the vegetative fresh weight of the plants grown under 25% full sunlight 68.4 gms. /plant and those growth under 50% full sunlight which gave 35.8 gms./plant or under full sunlight 25.0 gms./plant. The differences in this concern were statistically significant at 0.01 level.

This variation could be attributed mainly to different photosynthesis rates under the above llight intensities. ***Hesketh (1963)***, reported that the photosynthesis may be the inhibeted in the high light intensity. The inhibition may be the result of stomatal closure, accelerated respiration, or photooxidation of the photosynthetic apparatus. This strong light increases transpiration and may result in turgor loss and, subsequently, in stomatal closure, High light intensities warm the leaves and may increase respiration, and if the warming becomes too great, the temperature rise may be sufficient to cause thermal inactivation of enzymes. Moreover, ***Conover et al., (1975)***, noted that shade-grown leaves absorb more of the incoming light energy, (than sun-grown leaves) which allows them to photosynthesize more efficiently under low light conditions.

These results agree with those of ***Conover and Poole (1974)***, on *Philodendron scandens* noticed that the plants produces larger leaves and greater stem caliper under 40 percent shade. ***Shafiq, et al., (1974, 1978)***, on *Pinus brutia, Cupressus sempervirens, Thuja oriantalis and Casuarina equisetifolia* found that the growth increased with shading the best all-round response being at 25% day light for Pinus and Cupressus and 50% for Thuja but Casuarina plant weight was greatest at 100% light.

Moreover, ***Conover and Poole (1980)***, on *Pittosporum tobira and P. tobira* cv. Varigata mentioned that the total yield of cut foliage over the period was greatest when plants were grown under 47% shade. Also, ***Joiner et al., (1980)***, on *Ficus benjamina* decleared that top weights were higher in shade plants than sun plants. ***Horn and Huber (1983)***, on *Aglaonema spp., Cissus spp., Schefflera spp., and Ficus spp.*, reported response to light intensity increases from 300 to 3000 lux but in Cissus growth was maximal at 2000 lux.

5.1.5. Effect of light intensity on the dry weight of *Aralia longifolium* L. :

Data of the first season (1990/1991) as shown in Table (10) and Figure (27) show that the dry weight of *Aralia longifolium* L. grown in 25% full sunlight under lathhouse conditions gave the heaviest vegetative dry weight since it reached 12.9 gms./plant. This value was highly significant at 0.01 level more than those under the other treatments. For instance, the vegetative dry weight was 9.0 and 6.7 gms./plant for the plants grown under 50% full sun light and 100% full sunlight respectively. Also, the statistical analysis showed significant difference between the vegetative dry weight of plants grown under 50% at light intensities of full sunlight which gave 9.0 gms. /plant and those grown under full sunlight which produced 6.7 gms./plant. The difference in this respect was highly significant at .

Generally, the plants grown under full sunlight conditions gave the least weight of vegetative dry weight.

5.2. Effect of light intensity on the vegetative growth of *Aralia longifolium L.* in the second season :

5.2.1. The effect of light intensity on the plant height of *Aralia longifolium* L.

Data of the second season 1991/1992 in Table (11) and Figure (28) indicate that treatment 25% full sunlight was the best treatment which gave the heaviest dry weight of *Aralia longifolium* as in season one

Figure (27): First year

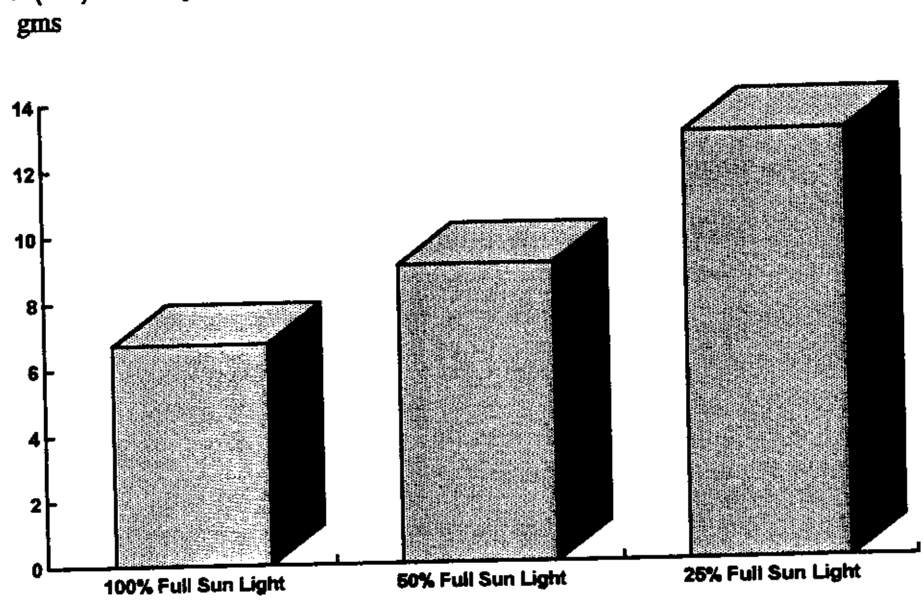
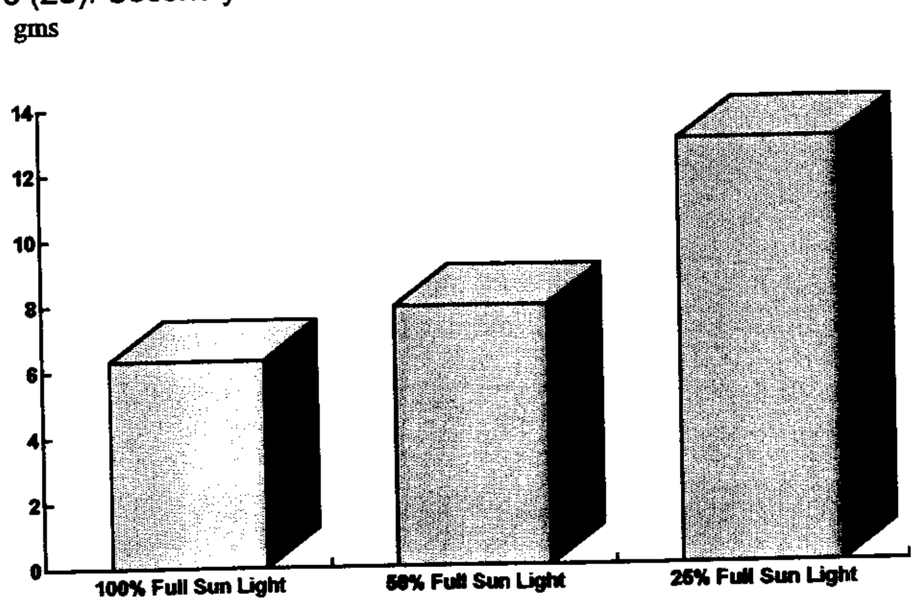


Figure (28): Second year



Effect of light intensity on vegetative dry weight of *Aralia longifolium* L.

(1990/1991). The statistical analysis of the obtained data showed significant difference at 0.01 level, among the vegetative dry weight of the plants grown under 25% full sunlight which attained 12.9 gm./plant and the plants grown under 50% and full sunlight which gave 7.9 and 6.3 gms/plant ,respectively.

The plants under the sunlight treatment gave the least value in dry weight of vegetative growth .

The variation in dry weight of vegetative growth might be due to the differences of light intensities conditions. The plants of 25% full sunlight which were the heaviest in fresh weight and the tallest were the same which gave the heaviest dry weight of vegetative growth.

Conover et al., (1975), noted that leaves of "shade-grown plant absorb more of the incoming light energy, (than sun-grown) which allows them to photosynthesize more efficiently under low light conditions ".

Rao and Singh (1989), on *Quercus leucotrichophora, Q. floribunda, Aesculus indica, Acer oblongum, Pyrus pashia, Cupressus torulosa, Eucalyptus globulus, E. hybrid, Pinus roxburghii and Olea glandulifera* found that the species of all categories attained greader height per unit stem dry weight under deep shade (18% sunlight) than in unshaded conditions (100% sunlight).

6. Effect of light intensities in (the open location) on the chemical constituents of *Aralia longifolium* L. :

6.1. Effect of light intensities in (the open location) on the chemical constituents of *Aralia longifolium* L. in the 1st season (1990/1991):

6.1.1. The effect on nitrogen, phosphorus potassium carbohydrate and phenols contents in dry weight in the leaves :

Data in Table (12) show that the nitrogen content as mg/g dry weight in the leaves increased in plants grown under 25% full sunlight. The increase was highly significant when the contents of the leaves of plants grown in 25% full sunlight is compared with other treatments.

No significant difference was observed between nitrogen contents in leaves of the plants grown in 50% full sunlight and that from full sunlight.

As for phosphorus, the data in the same Table (12) reveal tha the contents of phosphorus in the leaves of plants grown under light intensity as 25% full sunlight, 50% full sunlight and full sunlight did not differ. The mean of P content ranged between 0.46 - 0.49 mg/g dry weight of leaves. It seemed that the light did not influence the P content.

Observing, the values of potassium content in the leaves of plants grown under different light intensities, data in Table (12) showed that the

Table (12) **The effect of light intensities in (the open) on the chemical constituents of *Aralia longifolium* L.**

Treatments	1990 / 1991					1992 / 1993				
	N mg/g	P mg/g	K mg/g	Total carb. mg/g	Total Phen. ppm	N mg/g	P mg/g	K mg/g	Total carb. mg/g	Total Phen. ppm
25% full sunlight	3.92	0.43	1.91	16.4	126	3.12	0.46	1.94	16.6	128
50% full sunlight	2.94	0.53	1.36	17.3	128	3.69	0.49	2.11	17.9	130
Full sunlight	2.91	0.51	1.45	16.9	137	3.25	0.49	1.83	16.4	133
L.S.D. 5%	0.4	N.S.	0.06	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
L.S.D. 1%	0.9	N.S.	0.15	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.

plants grown under 25% full sunlight conditions gave the highest value of K content, it reached 1.94 mg/gm dry weight. The difference in this respect was highly significant. The next treatment which gave higher value K content in mg/gram dry weight in leaves as 1.45 mg/gm was full sunlight. It was significantly higher than those of 50% full sunlight this , statistically significant at 0.05 level.

As for total carbohydrate content data in Table (12) show that the total carbohydrate content as mg/gm dry weight in the leaves of *Aralia longifolium* L. ranged between 17.3 - 16.4 for the light intensities of 50% full sunlight and 25% under full sunlight. No significant difference was reached among these above treatments. However, the increases in this concern could be ignored statistically.

As for phenols data in Table (12) show a little insignificant increase in phenoles leaves content in the leaves of *Aralia longifolium* L. when the plants were subjected to the full sunlight.

6.2. The effect of light intensities in (the open location) on chemical constituents of *Aralia longifolium* L. (1991/1992) :

6.2.1. The effect on nitrogen , phosphorus, potassium, total carbohydrate and phenols contents in dry weight in the leaves. in the leaves, as ppm :

Data in Table (12) show that the nitrogen content as mg/gm dry weight in the leaves of *Aralia longifolium* L. ranged between 3.12 - 3.69 for the light intensities as 25% full sunlight and 50% full sunlight.

No significant difference was reached among these above treatments.

Generally, the light intensities in the (open locations under investigtion) were relatively enough to furnish adequate nitrogen absorption.

As for phosphorus, the data in the same Table (12) reveal that the contents of phosphorus in the leaves of plants grown under different light intensities 0.46, 0.49 mg/g did not differ. The mean ranged between 0.46 - 0.49 mg/gm dry weight of leaves. It seemed that the light did not influence the P content. The trend was as that of the nitrogen,.

Potassium content in the leaves of plants grown under 25% full sunlightm, 50% full sunlight and full sunlight did not greatly differ. The highest value of K content was recorded with the plants grown under 50% full sunlight which gave 2.11 mg/gm dry weight of leaves. The value was above the 1.94 mg/g recorded for the plants grown under 50% full sunglight, 1.83 mg/g noted for the full sunlight. However, this increase was insignificant . Shading did not affect the potassium absorption.

In this connection some investigators as ***Weeks et al (1952), Joiner et al., (1980) and Johnson et al. (1982),*** on *Ficus benjamina L.* noticed that N level slightly affected compensation point and K level had no effect.

As for carbohydrate content, data in Table (12) indicate that total carbohydrate content of *Aralia longifolium L.* ranged between 17.9 - 16.4 for the light intensities of 25% full sunlight, 50% full sunlight and full sunlight.

No significant difference was reached among these above treatments. However, the increases in this concern could be ignored.

The phenols data in Table (12) indicate little increase in their content in the leaves of *Aralia longifolium L.* when the plants were subjected to the full sunlight. Such increase was insignificant.

Generally the light intensities in the (open location) under investigation did not influnce in the contents N, P, K, total carbohydrates and phenols. That means that the three light intensities investigated were did not significantly affect the leaves content of N, P, K, carbohydrate or phenols.

treatment which gave the tallest plants as compared to the two other

Table (13) **Effect of light intensity on vegetative growth on *Cupressus sempervirens* L.** First Season 1990/1991

Treatments	**Plant Height (cm)**	**Number of branches (per plant)**	**Vegetative fresh weight (gms)**	**Dry weight (gms)**
100% Full sunlight	18.3	25.3	15.5	6.0
50% full sunlight	22.7	34.3	22.7	7.9
25% full sunlight	25.3	38.3	28.5	8.8
L.S.D. 5%	2.3	1.1	0.6	0.2
L.S.D. 1%	3.8	1.9	1.1	0.4

Figure (29): First year

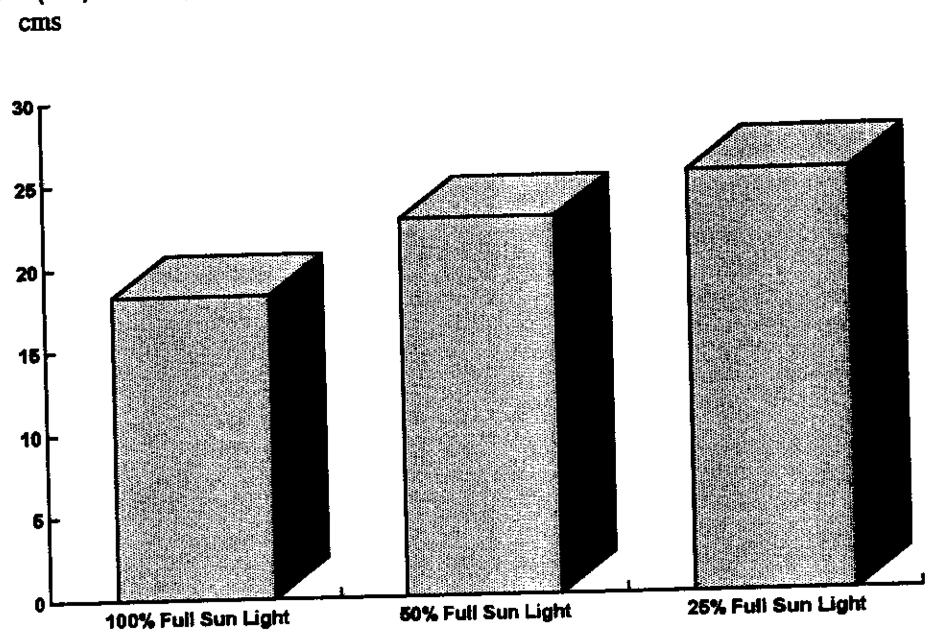
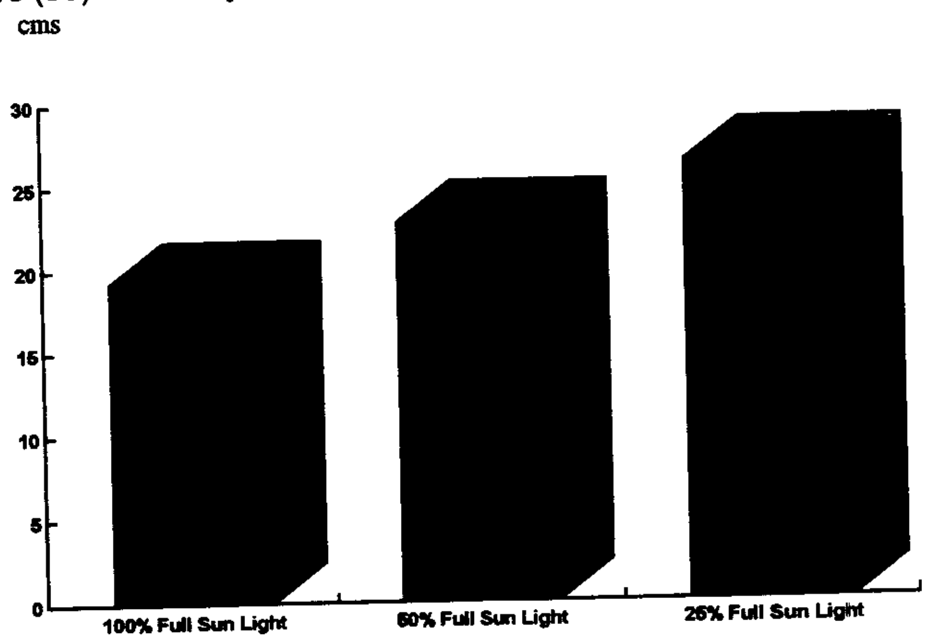


Figure (30): Second year



Effect of light intensity on the plant height of *Cupressus sempervirens* L.

Table (14) **Effect of light intensity on vegetative growth on *Cupressus sempervirens* L.** Second Season 1991/1992

Treatments	Plant Height (cm)	Number of branches (per plant)	Vegetative fresh weight (gms)	Dry weight (gms)
100% Full sunlight	19.2	27.2	17.2	6.3
50% full sunlight	22.7	37.7	23.2	7.9
25% full sunlight	26.2	42.3	30.1	9.0
L.S.D. 5%	1.4	2.9	0.7	0.3
L.S.D. 1%	3.2	4.8	1.1	0.6

showed significant differences in this respect. The variation in plant heights resulting from the different treatments could be attributed mainly to different of light intensities which caused different rates of photosynthesis. ***Conover et al., (1975)***, noted that leavs of "shade - grown plants absorb more of the incoming light energy, (than sun-grown leaves) which allows them to photosytnthesize more efficiently under low light conditions ". ***Davlin and Barker (1977)***, declared that the relationship between light intensity and rate of photosynthesis follows a logarithmic curve. Moreover, ***Joiner et al., (1980),*** on *Ficus benjamina* mentioned that the best acclimatized plants having the lowest compensation point were those grown under 47% shade. Also, ***Joiner and Editor (1981)***, noticed that the photosynthetic rate can be reduced when excessive light energy is received by plants because of limited CO_2 or photooxidation. Under conditions of excessive light and high temperature, photooxidation or sun scald of foliage results from a reversal of the photosynthetic process in that oxygen is absorbed and cells are consumed. ***Jules (1986)***, mentioned that the photosynthetic rate is proportional to the intensity of light up to about 13 klux, or 240 μmol S^{-1} m^{-2}. Because of shading effects, however, a maximum amount of light intensity is required to provide all plant's leaves with optimum quantities of energy. The rate of photosynthesis is sharply curtailed during low light intensity.

Many other investigators gave similar conclusions among those ***El-Agamawy (1981)***,on *Melissa officinalis* found that the low light intensity (4000 ft/c) increased plant height. ***Armitage (1990),*** *reported that* *providing shade is an effective means of reducing irradiance, but low irradians has also been shown to increase internode elongation.* **Ruiz-Sifre (1990)**, on *Aglaonema commutatum* claimed that the shoot height increased as the shade level decreased. ***Andrson et al., (1991)***, on *Rhododendron x* " Pink Ruffles " found that the plant growth index decreased with increasing light level. Plants grown in the 100% sun regime were chlorotic and dwarfed.

On the other hand, ***Brand (1992)***, on *Kalmia latifolia noticed that the plants grown under 60% shade plant height was reduced slightly. Using moderate levels of shade over container-grown* Kalmia spp., could allow growers to produce greener, more marketable plants without sacrificing plant growth.

7.2. Effect of light intensity on the number of branches of *Cupressus sempervirens L.* :

Data of the first seson (1990/1991) in Table (13) and Figure (31) show that the number of branches of plants grown under 25% full sunlight lathhouse conditions reached 38.3 branches/plant. This number of branches was significantly more than the number of branches from the treatments 50% full sunlight or the full sunlight one.

The following treatment which gave high number of branches/plant as 34.3 was the 50% full sunlight for the plants grown under network. The difference between the two treatments, 25% and 50% full sunlight, was

Figure (31): First year
Branch number/plant

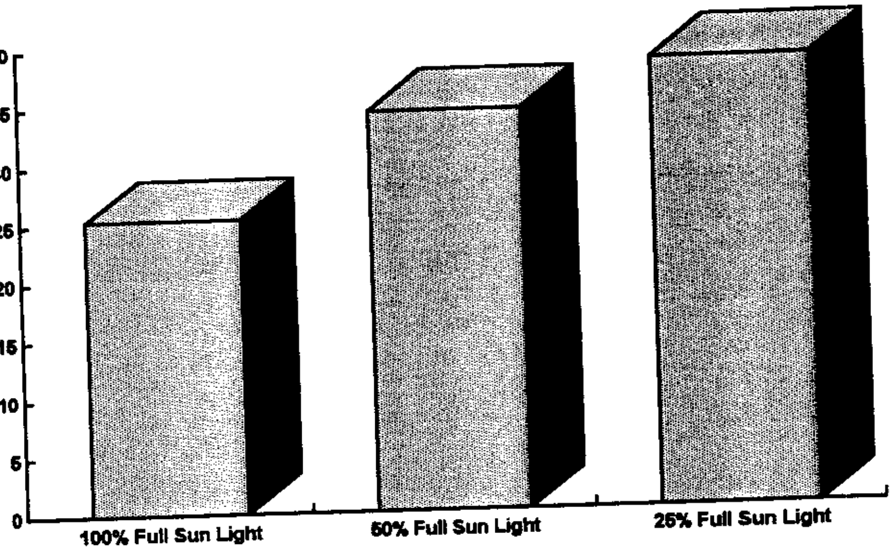
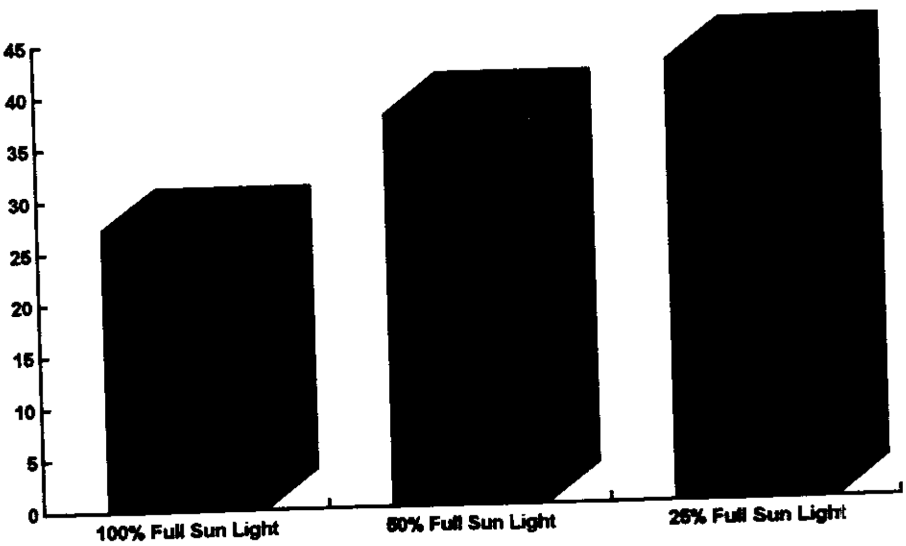


Figure (32): Second year
Branch number/plant



Effect of light intensity on the branch number of *Cupressus sempervirens* significant at 0.01 level, Table (13). The increase in the number of branches/plant for the first treatment was 12% over that of the second one.

It is worthy to mention that the branch number/plant as 25.3 in the case of full sunlight treatment was significantly the least number as compared to the other treatments. The level of significance in this concern was at 0.01.

Data presented in Table (14) and Figure (32) in the second season (1991/1992) indicate results of similar trend as those of the first season (1990/1991). The highest value of branch number as compared to any other treatment was recorded for the plants grown under 25% full sunlight in the lathhouse. The number of the branches reached 42.3 branchs/plant. There was significant difference at 0.01 level between the branch number of the plants grown under 25% full sunlight under lathhouse conditions 42.3 branch/plant number of branches of plant grown under 50% full sunlight as 37.7 branch/plant.

However, the plants grown under the treatment 50% full sunlight produced 37.7 branch/plant which was significantly, at 0.01 level, more than the branch number of the plant grown under full sunlight (27.2 branch/plant).

The variation in branch number resulting under the different light intensities treatments could be attributed to the direct or indirect effect of light intensity on the physiological reactions of light.

Ha;farce and Barden (1979), mentioned that rate of photosynthesis increase with increasing irradiation levels until light saturation is reached. Above this irradiation, there is little or no response to increasing light.

These results agree with those of ***Conover and Poole (1977)***, on Areca Palm indicated that higher quality of Areca palms were produced under 40% shade than in full sunlight. ***Joiner, et al., (1980),*** on *Ficus benjamina* reported that full sun plants appeared stunted and had fewer leaves compared to shade grown plants which were taller and more densely foliated.

In this connection,***Critchley (1981)***, mentioned that the poor performance of some shade-adapted or shade-obligate plant species to high levels of irradiance may be related to the extent of photoinhibition and chlorophyll destruction. **Bunce (1983)**, reported that leaves with the highest photosynthetic potential often developed in enviroments below light saturation. ***Ruiz-Sifre (1990)***, on *Aglaonema commutatum* cultivars Silver Queen and Maria found that the heighest number of offsets was produced by both cultivars at 63% shade, with Silver Queen producing more offsets than Maria. While, ***Trinidad et al., (1992)***, on *Chamaedorea elegans* noticed that the light compensation point **(LCP)** was significantly reduced by decreasing light intensity and increasing fertilizer rates. Leaf and root fresh and dry weights increased with irradiance while shoots were not affected. Chlorophyll a levels were higher in plants grown under the lowest light intensity.

7.3. Effect of light intensity on vegetative plant fresh weight of *Cupressus sempervirens* L.

Data of the first season (1990/1991) shown in Table (13) and Figure (33) indicate that the plants grown under the 25% full sunlight in the lathhouse produced heaviest vegetative fresh weight, 28.5 gms./plant. This value was highly significant at 0.01 level when compared to the other treatments which produced 22.7 gms and 15.5 gms/plant for the plants grown under 50% full sunlight and full sunlight respectively. Also, the statistical analysis showed significant difference between the weights of the two later treatments.

Generally, the plants grown under full sunlight conditions gave the least weight of vegetative growth.

Data of the second season (1991/1992) presented in Table (14) and Figure (34) indicate that the treatment of 25% full sunlight was the best one which gave the heaviest plants, 30.1 gms/plant. These results were simillar to those of the first season (1990/1991).

There were significant differences among the vegetative fresh weight of the plants grown under 25% full sunglight, 30.1 gms./plant and those either under 50% full sunlight which gave 23.2 gms./plant or under

Figure (33): First year

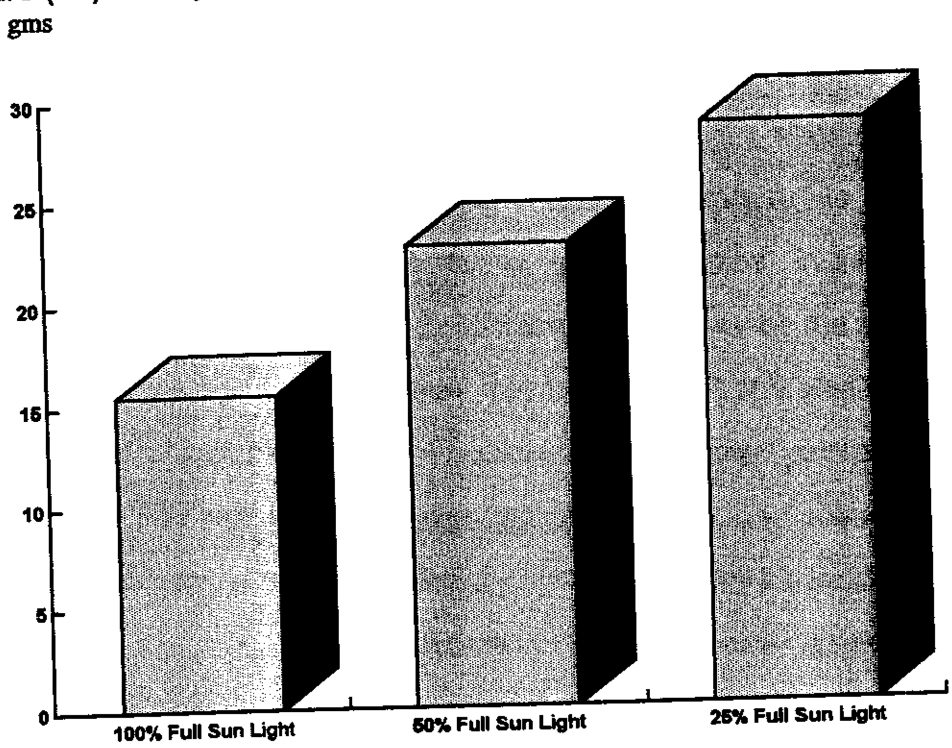
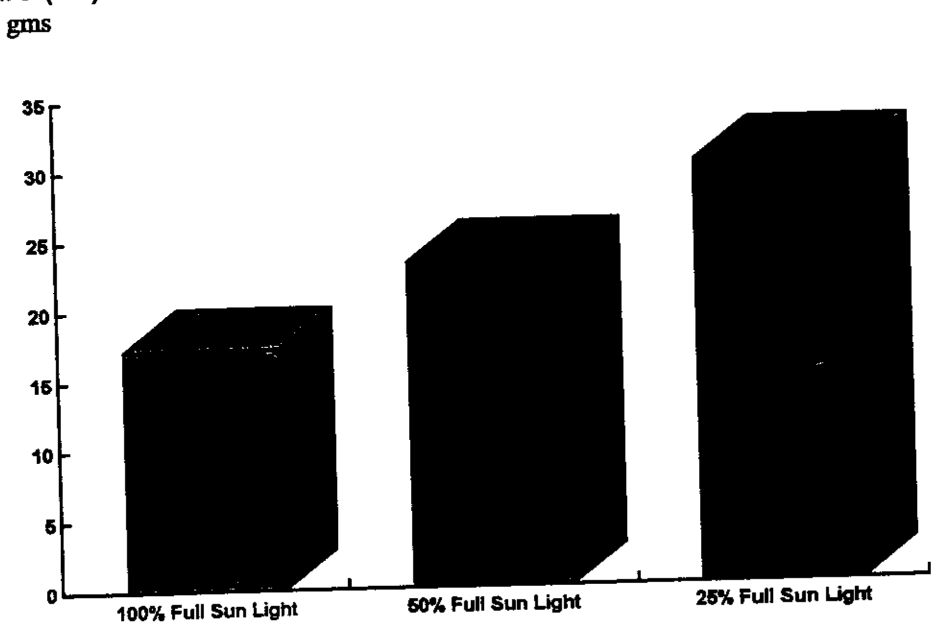


Figure (34): Second year



Effect of light intensity on vegetative fresh weight of *Cupressus sempervirens*

7.4. Effect of light intensity on the vegetative dry weight of *Cupressus sempervirens* L.

Data of the first season (1990/1991) as shown in Table (13) and Figure (35) show that the dry weight of *Cupressus sempervirens L.* grown in 25% full sunlight under lathhouse conditions gave the heaviest vegetative dry weight since it reached 8.8 gms./plant. This value was significant highly when compared to the other treatments.

For instance, the vegetative dry weight was 7.9 gms and 6.0 gms./plant for the plants grown under 50% full sunlight and 100% full sunlight respectively. Also, the statistical analysis showed significant difference between the vegetative dry weight of plants grown under 50% of full sunlight which gave 7.9 gms./plant and that grown under full sunlight which produced 6.0 gms/plant. The difference in this respect was highly significant .

Generally, the plants grown under full sunlight conditions gave the least weight of vegetative dry weight.

Data in table (14) and Figure (36) indicate that the treatment of 25% full sunlight was the best treatment which gave the heaviest dry weight of *Cupressus sempervirens L.* as in season (1990/1991).

Figure (35): First year

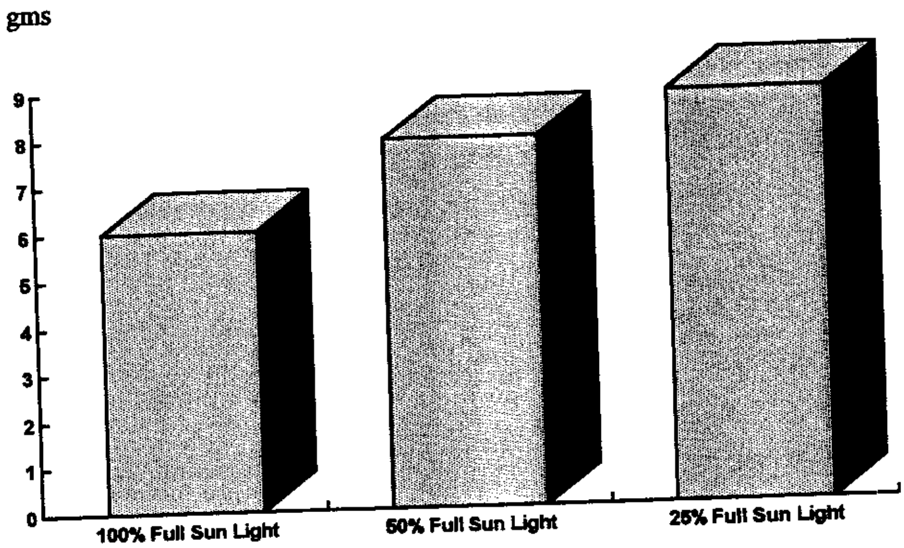
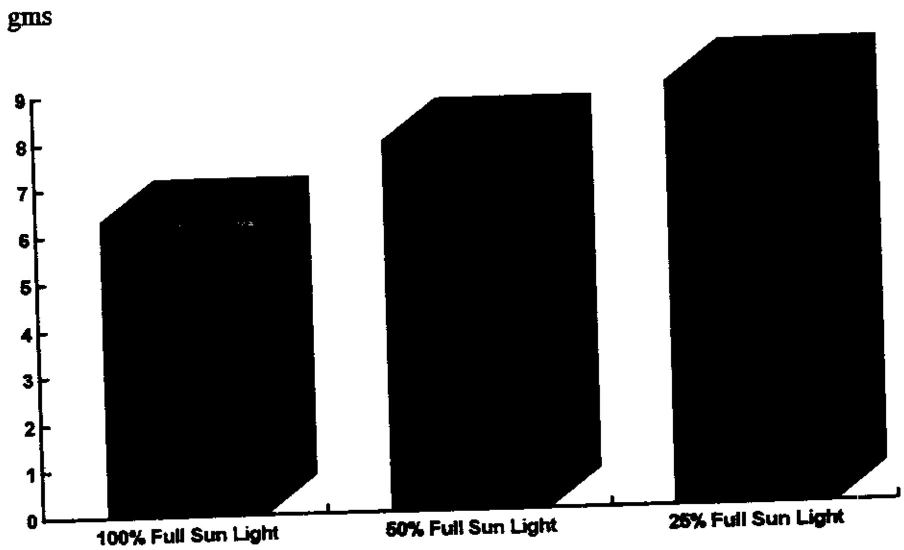


Figure (36): Second year



Effect of light intensity on vegetative dry weight of *Cupressus sempervirens* L.

The statistical analysis of the obtained data showed significant difference at 0.01 level, among the vegetative dry weight of the plants grown under 25% full sunlight which attained 9.0 gms./plant and the plants grown under 50% and full sunlight which gave 7.9 gms. and 6.3 gms./plant respectively.

The variation in dry weight of vegetative growth was due to the differences of light intensities which influenced the the photosynthetic metabolisms. The plants under 25% full sunlight which had the heaviest fresh weight and the tallest plants length were the same which gave the heaviest dry weight of vegetative growth. It is evident that plant growth under full sunlight gave the least dry weights of vegetative growth if compared with any other treatment. This was true in the juvenile stage. This could be explained by this findings of **Conover et al.** (1975) who noted that leaves of Shade grown plants absorb more of the incoming light energy, (than sun-grown plants) which allows them to photosynthesize more efficiently under low light conditions . Also, ***Conover and Poole (1975, 1976, 1977 and 1980)***, on *Dracaena marginata, Ficus benjamena , Areca Palms and Pittosporum tobira and P. tobira cv.* Varigata found that *Dracaena marginata* produced under 80% shade better quality plants, *Ficus benjamina* improved with increasing amounts of shade during production mentioned higher quality later than full sun grown ones. Similary, higher quality areca palms were produced under 40% shade than in full sun, *Pittosporum tobira and P. tobira cv.* Varigata found that total yield of cut foliage over the period was greatest when plants were grown under 47% shade. ***Anderson et al. (1991),*** on

Rhododendron x "Pink Ruffles " mentioned that the plant growth index decreased with increasing light level. Leaf, stem, and root dry weights; total leaf number and dry weight; total and individual leaf area; dry weight per leaf; and leaf chlorophyll concentration were reduced under 100% sun light . Plants grown in 100% sun regime were chlorotic whereas dwarfed, and plants in 29% sun were not sufficiently compact.

It seemed that the light intensities did not influence the P content.

Observing, potassium content in the branches of plants grown under different light intensities did not greatly differ. The highest value of K content was recorded with the plants grown under 25% full sunlight which gave 2.93 mg/g dry weight in branches. The value was 2.86 mg/g for the plants grown under 50% full sunlight, and 2.74 mg/g dry weight in branches noted for the full sun-light. However, the increase was insignificant. Shading did not significantly affect the potassium absorption.

In this connection some investigators as ***Rodriguez et al. (1973)*** on *Dracaena sanderiana* reported that different shade levels had a little effect on the nutrient contents of leaves. Shade intensity increased K especially in the young leaves.

As for carbohydrate content data in Table (15) showed insignificant differences among the different locations of sunlight. Data indicate that the total carbohydrate content as mg/g dry weight in the branches of *Cupressus sempervirens* L. ranged between 19.2 - 21.9 for the light intensities of 25%, 50% and 100% full sunlight. However, the increases in this concern could be ignored.

The phenols, data in Table (15) indicate little increase in their content in the branches of *Cupressus sempervirens* L. when the plants were grown in full sunlight. It's worthy to mention that full sunlight gave significant difference at 0.05 level in the phenols content, in the branches of *Cupressus sempervirens* L. when compared with those produced from 25% and 50% full sunlight.

Generally, the effect of light intensities on NPK total carbohydrate and phenols could be ignored, indicating that the levels of light intensities investigated had little effect in this concern

8.2. Effect of light intensities in (the open) on the chemical constituents of *Cupressus sempervirens* (1991/1992).

8.2.1. The effect on nitrogen, phosphorus, potassium, total carbohydrates and phenols contents dry weight in the branches

Data in Table (15) show that the N content ranged between 2.21 - 2.74 for the light intensites investigated. No significant difference was observed among these treatments.

Generally, the light intensities (in the open locations under investigation) were relatively enough to furnish adequate nitrogen content of of minimum value with full sunlight..

As for phosphorus, the data in the same Table (15) reveal that the contents of phosphorus in the branches of *Cupressus sempervirens* L. plants grown under light intensities of 25% , 50% and full sunlight did not differ. The mean ranged between 0.43 - 0.53 mg/g dry weight of branches. It seemed that the light did not influence the P content. The trend was like that of nitrogen, although the minimum content occurred in the branches of plants grown under full sunlight conditions.

Potassium content in the branches of plants grown under 25% , 50% and full sunlight showed significant differences among the different locations. The statistical analysis showed highly significant differences at 0.01 level in the P content in the branches of *Cupressus sempervirens L.* among the different locations. For instance the P content reached 2.95, 2.83 and 2.16 mg/g dry weight of branchs in case of treatments 50% full sunlight, 25% full sunlight and full sunlight, respectively. 50% shading increasedthe potassium content .

In this connection some investegators as ***Mansour (1985)*** on *Chamaedoria elegans* mentioned that, plants grown in lathhouse had the highest contents of potassium. The plants grown in the plastic house gave the highest contents of nitrogen and phosphorus.

As for total carbohydrate content data in Table (15) showed that treatment of 25% full sunlight gave the significantly least value, than other two treatments. The significance occurred at 0.01 level.

Its worthy to mention that the treatment of 50% full sunlight gave the highest value (19.8 mg/g) dry weight of branches, which was significantly more than that resulted from treatment full sunlight at 0.05 level.

The data in Table (15) indicate some significant increases in phenols content in the branchs of *Cupressus sempervirens* L. when the plants were subjected to full sunlight. The plants under full sunlight gave the highest value phenol content , 154 ppm as compared to any other treatment. It was significantly more than that resulting in any other treatment. The significance was at 0.05 level.

No significant difference between phenol content of 25% full sunlight and 50% full sunlight could be detected..

Generally, the light intensities in the (open location) under investigation did not influence in the NP contents, but the treatment 50% gave the highest value of NPK and carbohydrates and the full sunlight gave the highest value of phenols, which was coincided with growth retardation.

In this connection some investigators as ***Rodriguez et al. (1973)*** on *Dracaena sanderiana,* reported that different shade levels had a little effect on the nutrient contents of leaves. Shade intensity increased K especially in the young leaves. ***Milks et al., (1979),*** on *Ficus benjamina* exposed plants to three levels of shade during six months indoor holding period. They concluded that, increasing shade decreased carbohydrate levels in the leaves. ***Mansour (1985)*** on *Chamaedoria elegans* mentioned that, plants grown in the lathhouse gave the highest contents of soluble sugars and potassium.

9. Effect of light intensities and plant nutrition status on *Cupressus sempervirens L.*

9.1. Plant height :

As shown in Table (16) the application of nutration or addition fertilization increased the plant height. The increases were only significant when the doses of foliar nutrition and addition dosage increased. The significance was at 0.01 level. Kristalon 2 or Foliar 2 gave significantly higher plants. Also, all other combinations gave the same trend. The least height of plants was yielded with control plants, which received niether foliar nutrition nor of Kristalon dressing..

On the other side, the light intensity seemed to have more promising effect on the height of plants were; light intensity from 1250 lux gave the best value , 121.6 cm. This value was significantly at 0.01 level more than that reached by the high light intensity 8500 lux under 0.0 nutrition, 101.9 cm.

Also for the interaction of N x L (nutrients x Light) the most promising effect which gave significantly the heighest *Cupressus semprvirens* L. plants, was the 1250 lux x Kristalon 2 + F_1. The value was 130.6 cm compared to the shortest plant as 85.3 cm under control when the light intensity was 8500 lux, under 0.0 nutration.

Table (16) : The effect of light intensities and plant nutrition on the plant height of *Cupressus Sempervirens* L. (1991)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	85.3	93.5	102.2	112.6	98.4
K_1 : 1 gm/pot	91.4	95.2	105.3	114.1	101.5
F_1 : 3 gm/Liter	96.2	97.2	107.4	113.6	103.6
K_2 : 1.5 gm/pot	97.2	101.2	110.3	120.1	107.2
F_2 : 5 gm/Liter	98.3	106.2	112.8	122.5	109.9
$K_1 + F_1$	102.3	110.3	116.9	126.3	114.0
$K_L + F_2$	116.2	118.9	119.8	128.4	120.9
$K_2 + F_1$	113.3	121.5	126.3	130.6	123.0
$K_2 + F_2$	116.5	120.1	122.1	126.2	121.2
Mean	101.9	107.1	113.7	121.6	111.2

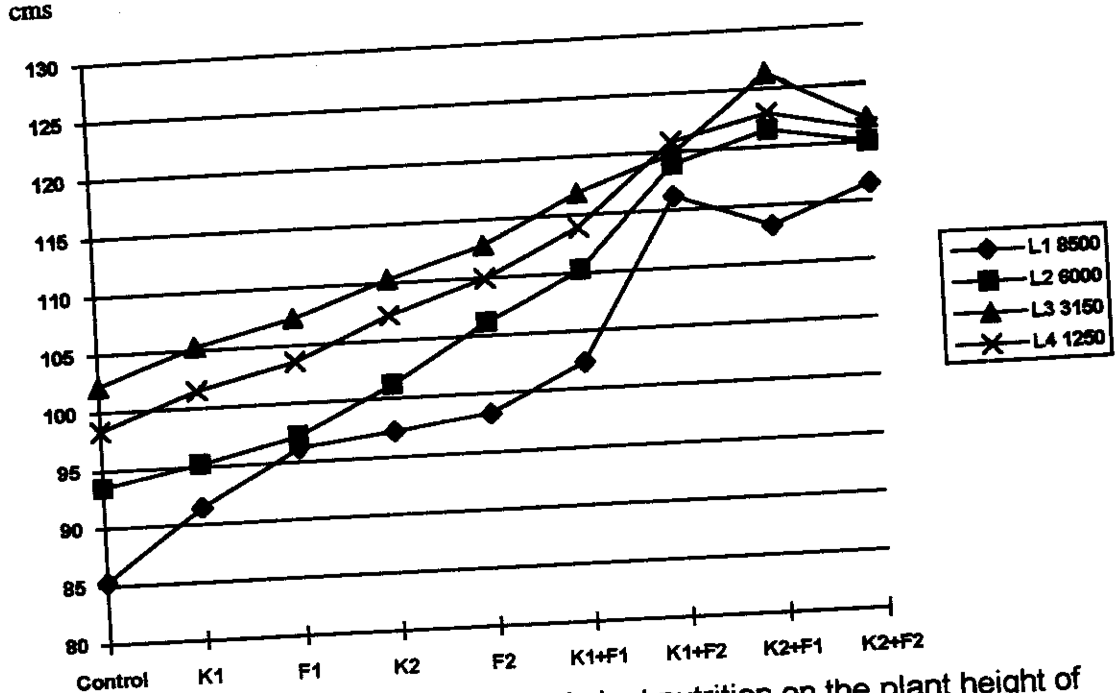
+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = 3.6
1% = 5.9

(Light) L.S.D. 5% = 5.4
1% = 8.6

N × L L.S.D. 5% = 7.9
1% = 11.4

Figure (37)



The effect of light intensities and plant nutrition on the plant height of *Cupressus Sempervirens* L. 1991.

It means that the plants under high light intensity may suffer in their growth due to the inhibiting of photosynthesis rates. If such plants are supplied with nutrients the growth will be improved.

Many investigations came to similar conclusion as ***Conover et al., (1975)*** , , ***Joiner et al., (1980)***, , **and** ***Armitage et al., (1990),*** who found that the low light intensty increased the , internode elongation which reflected on the plant height..

Second Season :

Concerning the plant height data of the second season in Table (17) results show similar trend of for the light intensity as the first season (1991). However, for fertilization were the increases were significant whenever the fertilizers were applied either as foliar application or as soil dressing or when both were combined except in Kristalon 1 alone. Comparing the effects of light intenssities on the plant height the least value was found in the plants grown under the highest light intensity as 8500 lux. This treatment gave the lowest value , 101.9 cms of plant height compared to 107.5, 113.6 and 119.0 cms for 6000, 3150 and 1250 lux respectively. The increases were significant at 0.01 level. For interaction influences, the treatments of Krist 2 + F_1 x 1250 lux gave the tallest plants , 127.4 cm . The value 127.4 cm was significantly more than the plants at maximum or minimum light intensities.

Table (17) The effect of light intensities and plant nutrition on the plant height of *Cupressus sempervirens* L. (1992)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	87.4	92.7	106.3	113.1	99.9
K_1 : 1 gm/pot	90.5	93.7	106.8	110.9	100.5
F_1 : 3 gm/Liter	97.4	99.6	108.3	115.1	105.1
K_2 : 1.5 gm/pot	98.2	105.3	114.1	119.6	109.3
F_2 : 5 gm/Liter	99.8	107.6	113.6	121.4	110.6
$K_1 + F_1$	101.4	108.5	113.6	120.5	111.0
$K_L + F_2$	113.3	116.8	115.4	120.8	116.6
$K_2 + F_1$	114.5	123.1	123.6	127.4	122.2
$K_2 + F_2$	113.6	119.8	120.5	122.6	119.1
Mean	101.8	107.5	113.6	119.0	110.5

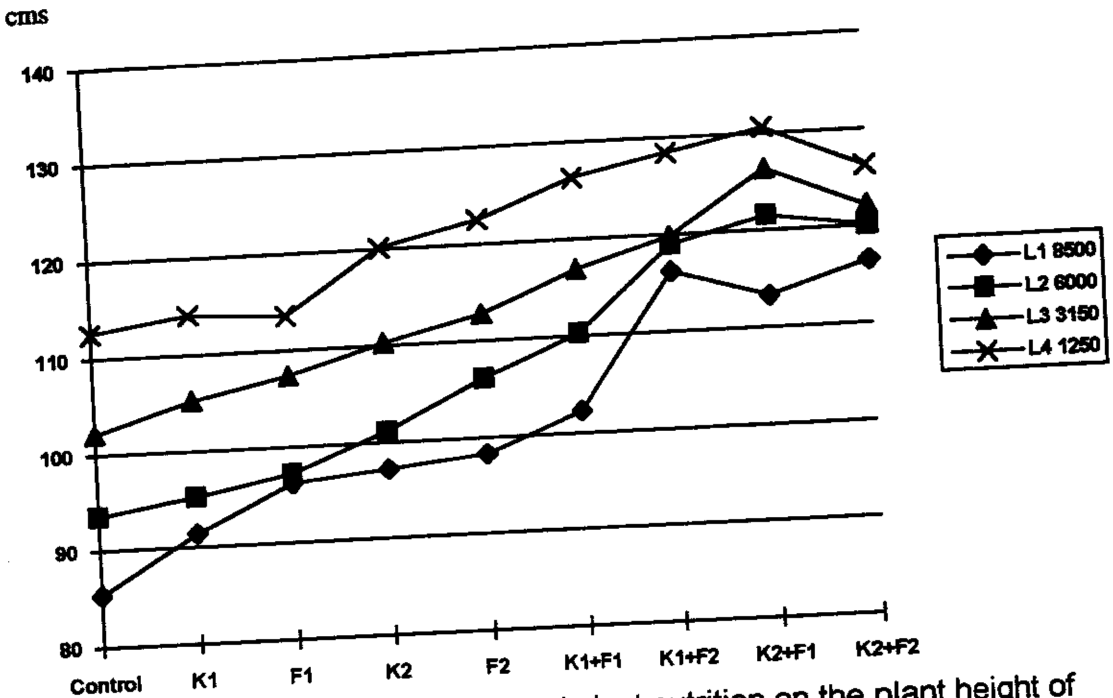
+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = 4.1
1% = 7.2

(Light) L.S.D. 5% = 4.6
1% = 7.8

N × L L.S.D. 5% = 7.9
1% = 11.8

Figure (38)



The effect of light intensities and plant nutrition on the plant height of *Cupressus Sempervirens* L. 1992

Moreover, nutrition had positive effects when interacted with the low light instensity especially when foliar nutrition was combined with Kristtalon. In all these cases significant increases at 0.01 level, were reached.

This indicates that the nutrition combined with low light intensities is very important to improve the plant height which reflect on better growth.

These results agree with those reported by ***Conover and Poole (1974a, 1980), Shafiq et al., (1974), Ingram and , Chase and Poole (1987), Verkade et al. (1987) and Foong and Yang (1988),*** who found that both light intensity and nutrition had positive effects on growth.

9.2. Branch number :

Data in first season (1991) as shown in Table (18) indicate that the foliar fertilization or soil addition fertilizers increased the branch number of *Cupressus sempervirens* L. plants. The increases were only significant with the high doses of foliar nutrition or soil applications. The significance was at 0.05 level. Kristalon 2 or Foliar 2 which gave significantly more branch number, also, all other combinations gave the same trend. The least branch number was occurred with control plants.

Table (18) The effect of light intensities and plant nutrition on the branch number of *Cupressus sempervirens* L. (1991)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	44.3	42.6	48.3	49.2	46.1
K_1 : 1 gm/pot	46.3	47.8	49.8	51.3	48.8
F_1 : 3 gm/Liter	50.8	52.1	53.5	56.1	53.1
K_2 : 1.5 gm/pot	51.6	54.3	55.1	56.8	54.5
F_2 : 5 gm/Liter	52.4	55.6	57.8	56.9	55.7
$K_1 + F_1$	55.6	57.3	61.4	56.2	59.9
$K_L + F_2$	59.4	62.1	66.5	67.8	64.0
$K_2 + F_1$	60.4	65.2	66.2	67.7	64.9
$K_2 + F_2$	61.8	65.5	67.4	62.8	64.4
Mean	53.6	55.8	58.4	59.3	56.8

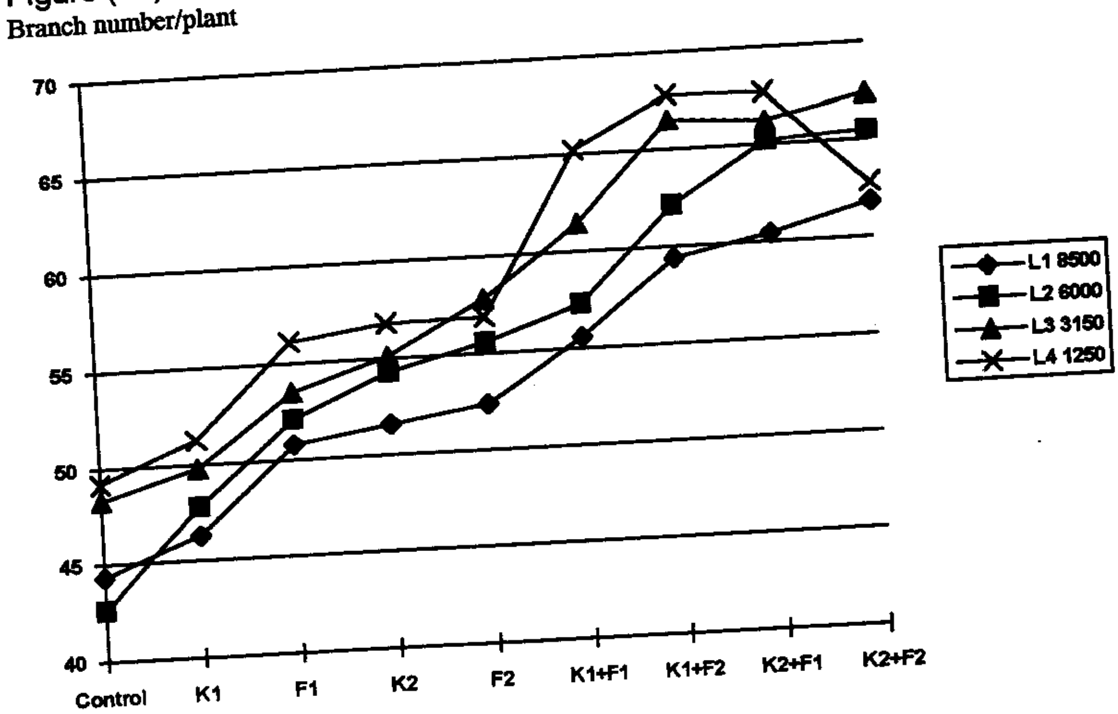
+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = 3.9
1% = 7.3

(Light) L.S.D. 5% = 2.8
1% = 4.1

N × L L.S.D. 5% = 7.1
1% = 12.8

Figure (39)



The Effect of light intensities and plant nutrition on the branch number of cupress semervirens L. (1991)

On the other side, the light intensity seemed to have more inducing effect on branch number , light intensity from 1250 lux and 3150 lux gave nearly similar branch number as 59.31 and 58.44 respectively. These values were significantly at 0.01 level more than that reached by the highest light intensity (8500 lux) , 53.62 branchs/plant.

Also, for the interaction of N x L the most inducing effect which gave significantly higher branch number of *Cupressus sempervirens L.* plants, was the 1250 lux x Kristalon 2 + F_1 . The value was 64.88 branch /plant compared to the lowest branch number/plant, 44.3 branch was observed with control treatment when the light intensity was 8500 lux.

This means that the plants under high light intensity may suffer in their growth due to inhibition of photosynthesis rates.

The data are in agreement with those obtained by ***Conover and Poole (1974a)*** , ***Ranwell et al., (1974) Niklova and Zafirova (1980), Omran et al. (1980), Foong and Yang (1988) and Rao and Sing (1989)***, who found that both light intensity and nutrition are important for improving growth.

Second season (1992) :

Data of the second season in Table (19) show a trend of light intensity results almost similar to , the first season (1991).

The data showed promising effects due to nutrition applications either as foliar or soil dressings especially with the higher rates. The branch number increased significantly when the rate of nutrition increased. The best treatment was K2 + F1

Comparing the effects of light intesities on the branch number/plant, the least one (55.3 branch/plant) was found in the plants grown under the high light intensity , 8500 lux, compared to 56.0, 58.1 and 58.1 for 6000, 3150 and 1250 lux, respectively. However, these increases differences were insignificant . As for interaction, the K2 + F2 x 3150 lux was the best treatment which surpased the other values. This was in most cases, significant as compared to the low doses of nutrition under the different light intensities Table (19).

Moreover, nutrition had positive effects when interacted with the low light intensity especially when foliar nutrition was combined with Kristtalon. The increases in this concern were very promising. In all these cases significant increases at 0.05 level were reached.

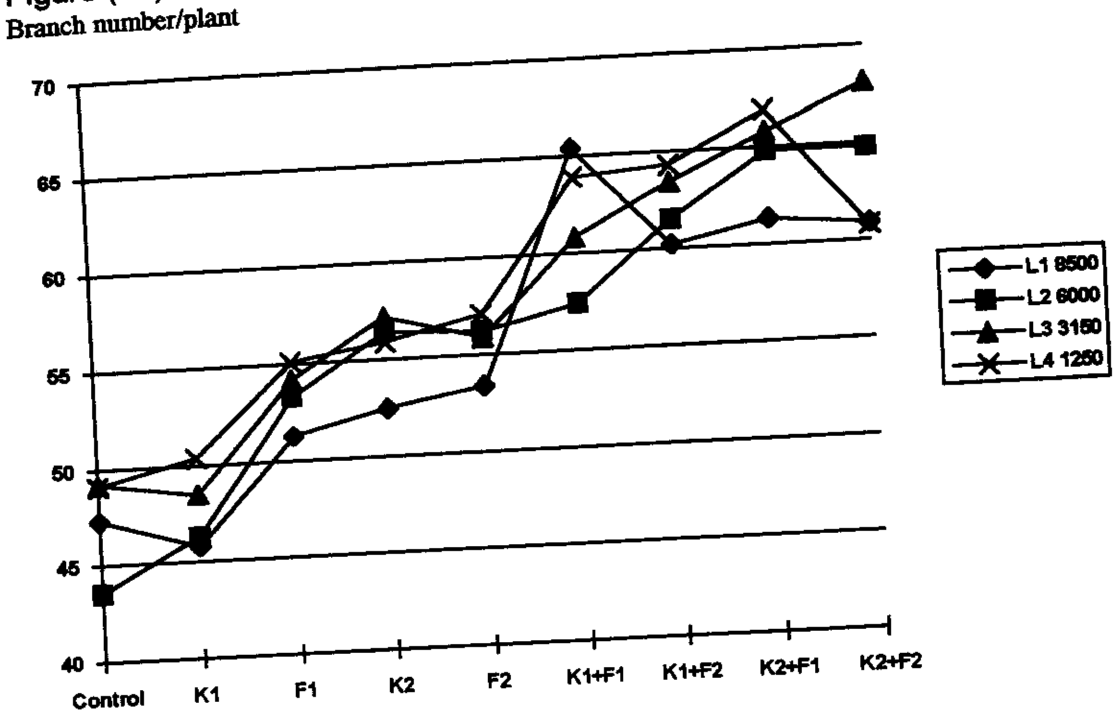
Table (19) The effect of light intensities and plant nutrition on the branch number of *Cupressus sempervirens* L. (1992)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	47.3	43.5	49.2	49.1	47.3
K_1 : 1 gm/pot	45.8	46.3	48.5	50.4	47.8
F_1 : 3 gm/Liter	51.3	53.3	54.2	55.1	53.5
K_2 : 1.5 gm/pot	52.5	56.4	57.2	55.9	55.5
F_2 : 5 gm/Liter	53.4	56.2	55.9	57.1	55.7
$K_1 + F_1$	56.4	57.4	60.8	63.9	61.9
$K_L + F_2$	60.2	61.5	63.4	64.3	62.4
$K_2 + F_1$	61.3	64.8	65.8	66.9	64.7
$K_2 + F_2$	60.9	64.8	68.1	60.8	63.7
Mean	55.3	56.0	58.1	58.1	56.9

+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = 4.1
1% = 8.3
(Light) L.S.D. 5% = N.S.
1% = N.S.
N × L L.S.D. 5% = 8.5
1% = 13.7

Figure (40)



The Effect of light intensities and plant nutrition on the branch number of *cupressus sempervirens* L. (1992)

This indecated that the nutrition when light intensities are low is very important to improve the branch number which reflects on better growth.

These results agree with those reported by ***Foong and Yang (1986) and Rao and Singh (1989)*** who found that both light intensities and nutrition, are important for improving growth.

9.3. Vegetative fresh weight :

As shown in Table (20) the of foliar or soil application of fertilizer increased the vegetative freshed weight of *Cupressus sempervirens L.* plants. The increases were only significant when the doses of foliar nutrition or addition of soil application were increased. The significance was at the 0.01 level. Both Kristalon 2 or F_2 treatments gave significantly more vegetative fresh weights. Also, all other combinations gave the same trend. The least fresh weight was observed with control plants. The fresh weight reached 114.1 with K2 + F2 treatment, compared to 97.2 gms produced by control. On the other side, the light intensity seemed to have more inducing effect on vegetative fresh weight, light intensity as 8500 lux gave the heaviest fresh weight 126.4 g/plant. This value was significantly at 0.01 level more than that of any other treatment. The least value of 91.7 g /plant which resulted from the 1250 lux.

Also, for the interaction of N x L the most increasing effect which gave significantly higher of vegetative fresh weights of *Cupressus sempervirens L.* was the 8500 lux x Kristalon 2 + F_2.. The value was

Table (20) The effect of light intensities and plant nutrition on the Vegetative fresh weight of *Cupressus sempervirens* L. (1991)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	109.4	102.4	89.5	87.3	97.2
K_1 : 1 gm/pot	115.4	103.2	88.5	88.1	98.9
F_1 : 3 gm/Liter	119.3	110.3	91.2	88.5	102.3
K_2 : 1.5 gm/pot	121.5	119.5	93.3	89.4	105.9
F_2 : 5 gm/Liter	126.3	120.6	96.5	93.2	109.2
$K_1 + F_1$	134.5	121.1	96.9	95.1	111.9
$K_L + F_2$	136.2	120.5	97.2	93.2	111.8
$K_2 + F_1$	136.8	122.5	97.0	94.6	112.7
$K_2 + F_2$	138.2	123.6	98.2	96.3	114.1
Mean	126.4	116.0	94.3	91.7	107.1

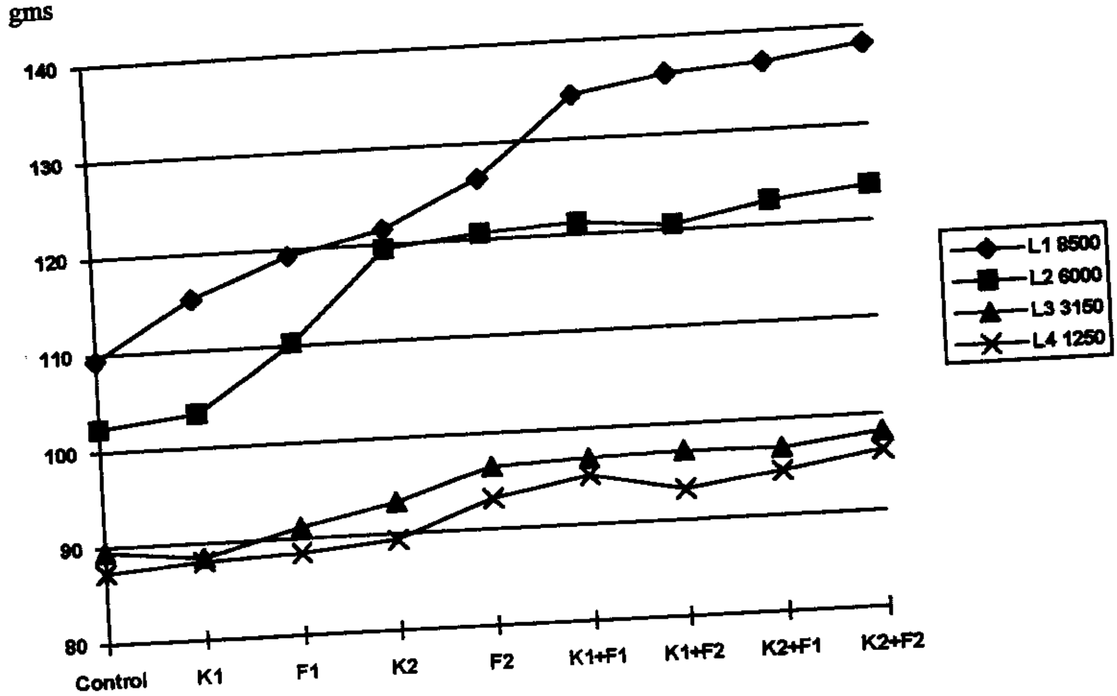
+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = 1.3
1% = 2.9

(Light) L.S.D. 5% = 4.2
1% = 7.6

N × L L.S.D. 5% = 6.4
1% = 11.3

Figure (41)



The effect of light intensities and plant nutrition on the vegetative fresh weight of *Cupressus Sempervirens* L. 1991

138.2 g/ plant to the least value of 87.3 g/plant under light intensity of 1250 lux and 0.0 nutrition (control treatment).

This means that the plants under low light intensity may suffer in their growth due to a decreases in the nutrition, besides the effect of the lack of enough light. On this ground, a minimum requirement of light intensity is needed for efficient growth.

Many investigators come to similar conclusions,as, ***Collard et al.* *(1977)*** on *Ficus benjamena* who stated that compensation point of plants decreased with the increasing in the level of shade, and ***Horn and Huber (1983)***, on *Ficus spp.* and *Schefflera spp. were* found that, the fresh weight was increased by 20 30% in response to the increase in light intensity from 300 to 3000 lux.

Second season :

Concerning the vegetative fresh weight data of the second season given in Table (21) similar trend of results for the light intensity,as the first season, was obvious.

However, with fertilization, the increases which were significant resulted with the high doses of the fertilizers addition either as foliar or soil application.

Table (21) The effect of light intensities and plant nutrition on the vegetative fresh weight of *Cupressus sempervirens* L. (1992)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	114.3	110.2	96.3	89.4	102.6
K_1 : 1 gm/pot	117.5	106.2	92.8	90.3	101.7
F_1 : 3 gm/Liter	117.8	115.4	94.8	92.1	105.0
K_2 : 1.5 gm/pot	118.6	120.4	96.4	93.6	107.3
F_2 : 5 gm/Liter	124.8	118.5	98.4	96.5	109.6
$K_1 + F_1$	132.6	124.3	98.7	93.8	112.4
$K_L + F_2$	138.1	121.6	101.1	96.4	114.3
$K_2 + F_1$	135.9	124.3	100.8	96.3	114.3
$K_2 + F_2$	136.7	124.3	102.3	95.2	114.6
Mean	126.3	118.3	98.0	93.7	109.1

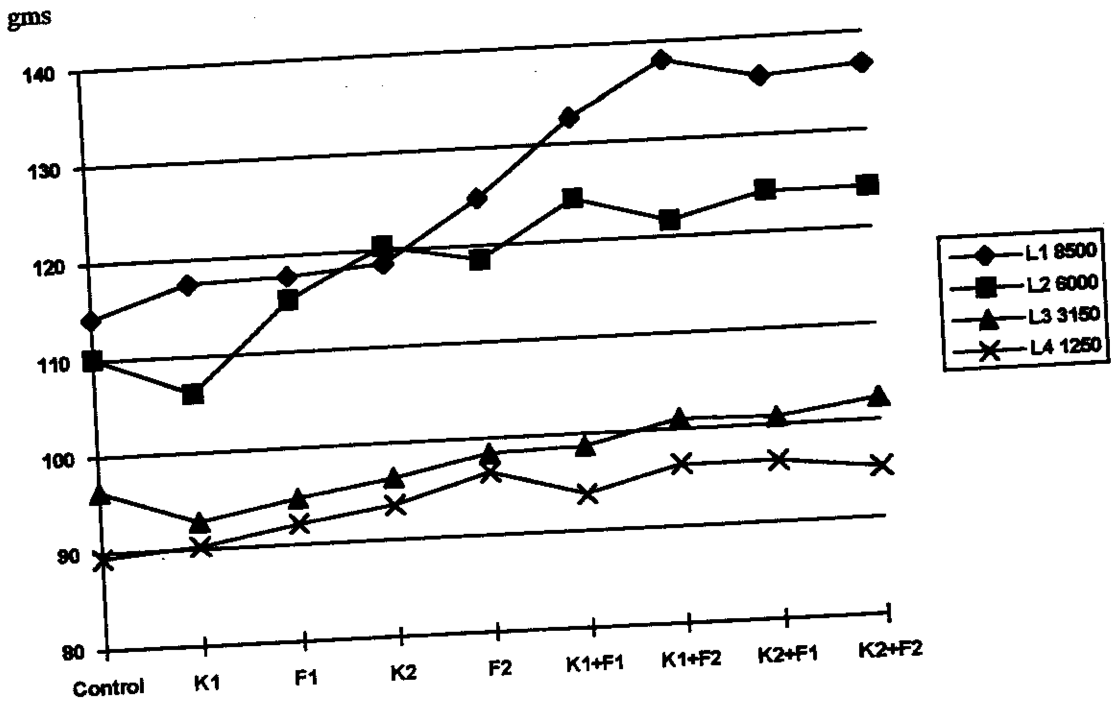
+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = 1.6
1% = 3.4

(Light) L.S.D. 5% = 5.1
1% = 9.2

N × L L.S.D. 5% = 7.3
1% = 13.1

Figure (42)



The effect of light intensities and plant nutrition on the vegetative fresh weight of *Cupressus Sempervirens* L. 1992

Comparing the effects of light intensties on the vegetative fresh weight, the least one was found with the plants of *Cupressus sempervirens L.* grown under the lowest light intensity as 1250 lux. This treatment gave the lowest value, 93.7 g /plant of vegetative fresh weight compared to 126.3, 118.3 and 98.0 gms/plant for the plants grown under lux 8500 , 6000 and 3150 respectively. The increases were significant at 0.01 level except the treatment of 3150 lux which showed insignificant increase as compared to the treatment 1250 lux.

For interaction influences, the treatments of vegetative fresh weight of Kristtalon 2 + F_2 x 8500 lux gave the heaviest weights of *Cupressus sempervirens L.* The obtained value of 138.1 g /plant was significantly more than control plants either at the maximum or minimum light intensities.

Moreover, foliar nutrition showed positive effects when interacted with the low light intensity especially when was combined with Kristalon.

In all these cases significant increases at 0.01 level were reached, when the high doses of nutrition are in comparison..

This indicated that the nutrition under the low light intensities is very important to improve the vegetative fresh weight which reflect on better growth.

These results are in agreement with those of , , ***Joiner et al. (1977)***, ***Abou-Dahab et al. (1978)*** on *Cupressus sempervirens* also **Horn and *Huber (1983)*, *Brand (1992)***, on *Kalmia latifolia* and ***Trinidad***

***et al.* (1992)**, on *Chamaedorea elegans*, who found that both light intensities and nutrition had positive effects on growth.

9.4. Total carbohydrates content :

As shown in Table (22) the application of foliar or soil fertilization increased the carbohydrate content in the shoots of *Cupresus sempervirens L.* plants. The increases were only significant with the increasing rates of foliar nutrition or soil applications . The significance occurred at the 0.05 level, where . Kristalon 2 or Foliar 2 gave significantly more content of carbohydrates, also, all other combinations gave almost similar trend . The least content of carbohydrates was obtained with control plants.

On the other side, the light intensity seemed to have more increasing effect on total carbohydrate content, light intensity from 3150 lux to 8500 lux which gave nearly the similar contents in the shoots as 20.5, 20.9 and 21.7 for the 8500, 6000 and 3150 lux, respectively. These values were significant at 0.01 level as compared with by the lowest light intensity -1250 lux- which yielded 17.1 mg/g dry weight.

As for the interaction of (N x L) -nutrition x light - that led to significantly more content of carbohydrates in the shoots of *Cupressus sempervirens* was the 3150 lux Kristtalon 1 + Foliar 2. The value was 22.5 mg/gm dry weight compared to the least value as 15.8 mg/g dry weight under light intensity of 1250 lux x and 0.0 N.

Table (22) The effect of light intensities and plant nutrition on the total carbohydrate mg/gm of *Cupressus sempervirens* L. (1991)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	18.5	19.7	20.3	15.8	18.6
K_1 : 1 gm/pot	19.4	20.3	21.2	16.5	19.3
F_1 : 3 gm/Liter	19.6	20.5	21.3	16.7	19.5
K_2 : 1.5 gm/pot	19.8	20.8	21.3	16.5	19.8
F_2 : 5 gm/Liter	20.5	21.4	21.9	17.3	20.2
$K_1 + F_1$	21.3	21.9	22.4	17.2	20.7
$K_L + F_2$	21.4	21.9	22.5	17.9	20.9
$K_2 + F_1$	21.9	20.9	22.3	18.1	20.8
$K_2 + F_2$	21.9	21.3	21.9	18.3	20.8
Mean	20.5	20.9	21.7	17.1	20.1

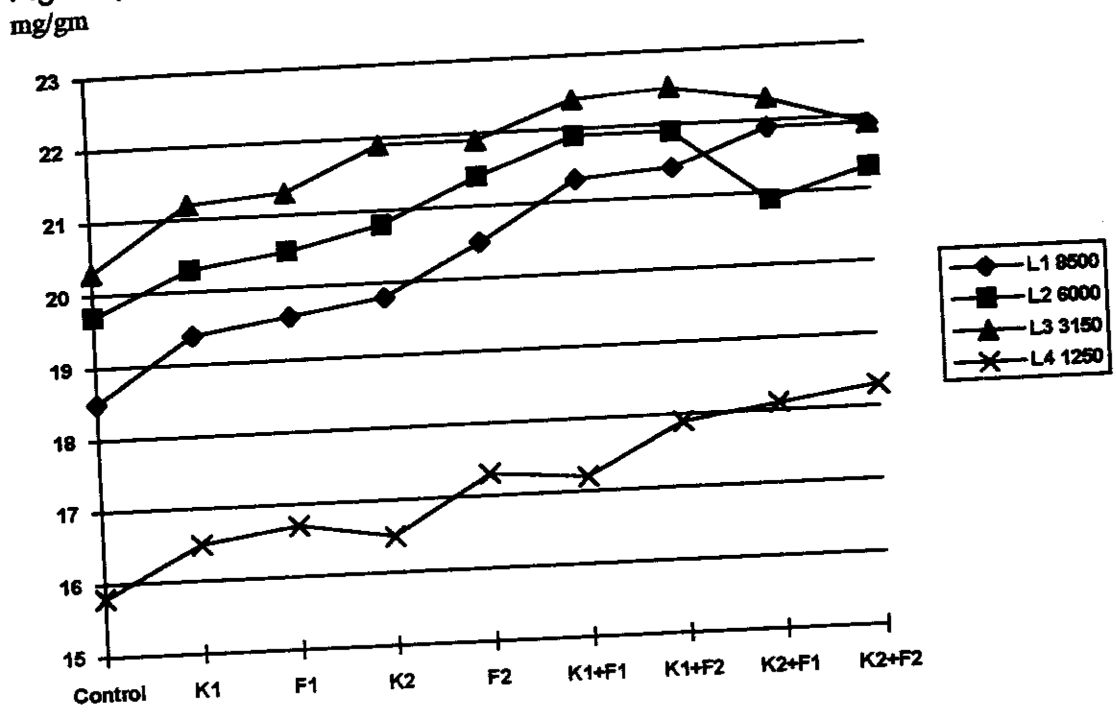
+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = 1.07
1% = 2.39

(Light) L.S.D. 5% = 2.14
1% = 4.38

N × L L.S.D. 5% = 3.27
1% = 5.31

Figure (43)



The effect of light intensities and plant nutrition on the total carbohydrate mg/g of *Cupressus Sempervirens* L. 1991

This means that the plants under low light intensity may suffer in their growth due to a decrease in the photosynthesis rates as will as their need of the fertilizer which partly correct the effect of the low light intensity. The plants also vary in their tollerance .

Many investigators came to simelar conclusions as ***Milks et al., (1979)*** , on *Ficus benjamina and* **Mansour *(1985)*** on *Chamaedorea elegans* who found that the light intensities showed possitive effects on growth. The requirement vary depending on the genetic factors.

Second season :

Concerning the carbohydrate content data of the second season in Table (23) show a trend of for the light intensities almost similar to the first season 1991. However, for fertilization the increases were insignificantly possitive whenever the fertilizers were applied either as foliar nutrition or as soil addition or when both were combined, at high doses.

Comparing the effects of light intensities on the carbohydrate content the least, content was found in the shoots of *Cupressus sempervirems L.* grown under the lowest light intensity , 1250 lux. This treatment gave the lowest value , 17.4 mg/g of total carbohydrate in the dry weight compared to 20.5 , 21.1 and 21.7 mg/g for 8500 lux where this effect was significant at 0.05 level.

Table (23) The effect of light intensities and plant nutrition on the total carbohydrate mg/gm of *Cupressus sempervirens* L. (1992)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	19.3	21.2	22.5	15.4	19.6
K_1 : 1 gm/pot	19.6	20.9	21.4	16.2	19.5
F_1 : 3 gm/Liter	19.9	20.2	22.4	16.5	19.7
K_2 : 1.5 gm/pot	20.1	21.1	21.6	16.8	19.8
F_2 : 5 gm/Liter	20.3	20.9	21.9	17.4	20.1
$K_1 + F_1$	21.2	22.5	22.5	18.5	21.2
$K_L + F_2$	21.6	21.4	21.3	18.7	20.7
$K_2 + F_1$	21.9	21.3	21.6	18.9	20.9
$K_2 + F_2$	20.8	20.2	20.4	18.9	20.1
Mean	20.5	21.1	21.7	17.4	20.2

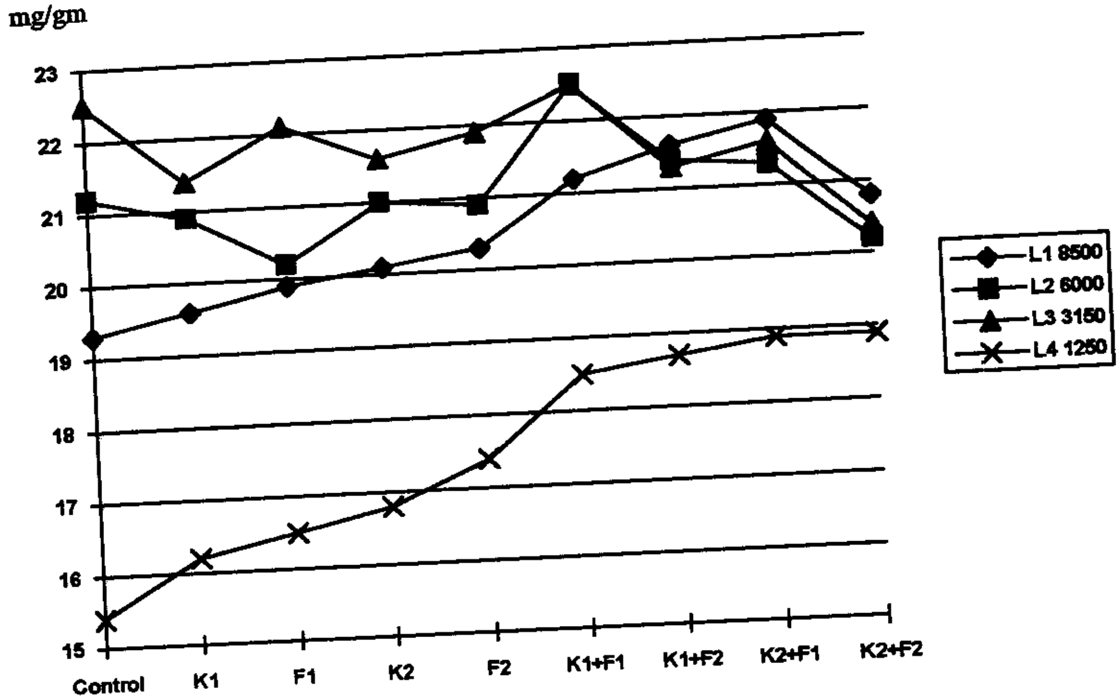
+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = N.S.
1% = N.S.

(Light) L.S.D. 5% = 1.16
1% = 2.03

N × L L.S.D. 5% = 3.1
1% = 5.7

Figure (44)



The effect of light intensities and plant nutrition on the total carbohydrate mg/g of *Cupressus Sempervirens* L. 1992

For interaction influences, the treatments of control 0.0 N x 3150 lux, Krist. 1 + F_1 6000 lux and Krist 1 + F_1 x 3150 lux gave the highest contents of total carbohydrate as 22.5 mg/g dry weight . This result give announce that both either fertilization or raising the light intensity can raise the carbohydrate content of seedlings.

The value of 22.5 was significantly more than that of control plants at the maximum and minimum light intensities.

Moreover, nutrition had positive effects when interacted with low light intensity especially when foliar nutrition was combined with Kristalon.

In all these cases significant increases at 0.05 level were reached.

This indicated that the nutrition under low light intensities is very important to improve the carbohydrate content which reflect on better growth.

These results agree with those reported by ***Mansour (1985)**, and* ***Trinidad (1992)*** , on *Chamaedorea elegans* who found that both light intensities and nutrition had positive effects on growth.

9.5. Total phenols :

As shown in Table (24) the foliar or soil fertilization decreased the total phenols in shoots of *Cupressus sempervirens* L. plants. The decreases were only significant when the doses of foliar nutrition or soil addition were increased. The significance was at the 0.01 level, and least content of total phenols yielded with the K2 + F2 treatment.

On the other hand, the light intensity seemed to have more promising effect on total phenols content. Light intensity from 1250 lux gave the greatest amount of total phenols contents that reached 169.2 mg/g dry ewight. This value was significant at 0.01 as compared with that reached by the greatest light intensity 8500 lux , 136.5 mg/g dry weight.As for interaction of N x L the most effective treatment which gave significantly higher content of total phenols in the shoots of *Cupressus sempervirens* L. was the 1250 lux without nutrition. The least value as 118.7 mg/g dry weight under 8500 lux x K2 + F2.

This means that the plants may suffer in their growth due to a decrease nutritional status well from the to low light intensity .

Table (24) The effect of light intensities and plant nutrition on the total phenols ppm of *Cupressus sempervirens* L. (1991)

Light Intensity / Nutrition	8500 Lux L_1	6000 Lux L_2	3150 Lux L_3	1250 Lux L_4	Mean
Control (K: 0.0) (F: 0.0)	136.5	139.8	155.4	169.2	150.2
K_1 : 1 gm/pot	130.9	136.2	150.1	162.9	145.0
F_1 : 3 gm/Liter	127.4	131.4	146.3	161.4	141.4
K_2 : 1.5 gm/pot	125.5	129.0	140.6	160.4	139.1
F_2 : 5 gm/Liter	125.0	129.0	141.2	161.3	139.1
$K_1 + F_1$	125.7	129.6	143.1	160.7	139.9
$K_L + F_2$	125.0	128.3	140.8	161.3	138.9
$K_2 + F_1$	120.4	121.5	138.4	159.4	134.1
$K_2 + F_2$	118.7	120.1	132.5	159.6	132.7
Mean	126.1	136.1	143.2	161.8	141.8

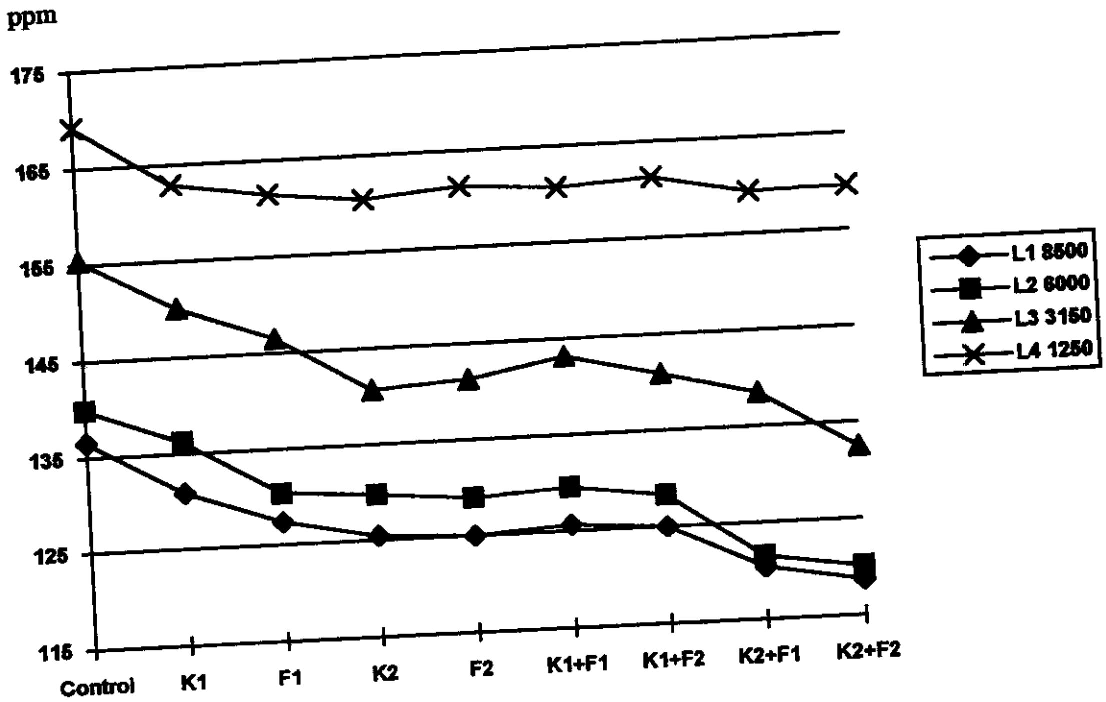
+K: Kristalon ++F: Foliar

(Nutrition) N L.S.D. 5% = 9.7
1% = 16.3

(Light) L.S.D. 5% = 11.4
1% = 19.6

N × L L.S.D. 5% = 13.4
1% = 21.5

Figure (45)



The Effect of light intensities and plant nutrition on the Total Phenols mg/gms of *cupressus sempervirens* L. (1991)

Second season :

Concerning the total phenols content, data of the second season in Table (25) showed a trend of results for the light intensities almost similar the first season 1991. This indicated that the total phenols contents increased in the plants suffered in their natural growth either from the too low light intensity especially with the plants which are not fully adapted to be grown indoors. Such plants could be fairly grown in moderate light intensity between 3150 and 6000 lux. This could be practiced 2-3 year old plants . Also, under the lower light intensities fertilization of the plants is very important , it is adviced to practice the two methods as dressing and foliar nutrition.

These results agree with those reported by ***Mansour (1985), on*** *Aspidestra lurida* ***, and Trinidad (1992),*** **on** *Chamaedorea elegans* who found that both light intensities and nutrition had positive effects on growth.