INFLUENCE OF CHEMICAL AND ORGANIC FERTILIZATION ON GROWTH AND CHEMICAL COMPOSITION OF *Chamaedorea elegans* PLANTS GROWN UNDER DIFFERENT LIGHT INTENSITY.

By

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B.Sc. Agric. Sci. (Ornamental Horticulture), Fac. Agric., Cairo Univ., Egypt, 2012

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DEDICATION

To all those without whom this thesis might not have been written. Great appreciation for their inspiration, supporting and patience.

*To my lovely husband "**wael**" and my daughter "**lara**", my wonderful parents " **Magdy & Amira**" my lovely sisters "**Hagher**", "**Eman**", my adorable brother "**Mohamed**" and special dedication to my lovely best friend " **Salma**".*

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ABSTRACT

This study was concluded in the Experimental Nursery of the Ornamental Horticulture Department, Faculty of Agriculture, Cairo University, during the two successive seasons 2014 and 2015. This work was aimed to evaluate the effect of chemical and organic fertilization treatments on the vegetative growth and biochemical constituents of *Chamaedorea elegans*, Mart. plants grown under different light intensity levels. The plants were placed under full sunlight, lath house and green house conditions provided light intensity levels of 100, 30 and 21% respectively. Plants grown under the three levels of light intensity were fertilized every 3 weeks with either chemical NPK (Kirstalon, 19-19-19) at the rate of 2 and 4 g/pot or organic Humic Acid (HA) applied as a soil drenching at the concentration of 3 and 6 ml/L, in addition to the control plants.

The Results showed that in most cases, the lower light intensities levels (30 or 21 %) significantly increased plant height, number of leaves/plant, stem diameter, root length, number of roots/plants, fresh and dry weights of shoots and roots as well as increased the contents of chlorophyll a, chlorophyll b, total chlorophylls (a + b), carotenoids in leaves,total carbohydrates in roots, N and P% in roots, K % in both shoot and roots and indoles content in leaves (with superiority effect of light intensity of 21%) as compared with full sunlight (100%). while they reduced the contents of total carbohydrates, N and P% in shoots as compared with full sunlight (100%). In both seasons, phenols content in leaves were significantly higher in plants grown under light intensity of 30 % than those grown under other light intensities (100% or 21%).

Application of either chemical NPK or organic HA treatments significantly increased all the tested vegetative parameters and chemical composition as compared with control plants. However, organic HA treatments were more effective than chemical NPK with superiority of the highest HA concentration (6 ml/L).

In addition, the result showed that in most cases, treating the plants grown under the lower light intensities levels (30 or 21 %) with either chemical NPK or organic HA treatments improved vegetative parameters, increased the contents of chlorophyll a, chlorophyll b, total chlorophylls (a + b), carotenoids in leaves,total carbohydrates in roots, N and P% in roots, K % in both shoot and roots as well as indoles content in leaves compared to plants grown under full sunlight (100%) and received the same fertilizer treatments. However, treatments of organic HA were more effective than chemical NPK treatments and among the two concentrations of HA, the highest concentration (6 ml/L) was the most effective one.

From the obtained results, it can be concluded that for the best growth and good quality of *Chamaedorea elegans*, the plants should grow under shade conditions with lower light intensitylevels (30 to 21%) and supplied with humic acid at rate of 6ml/L/ pot every 3 weeks as soil drenching. Moreover, if chemical fertilizations of NPK (19-19-19) are applied, the recommended rate is 2 g/pot every 3 weeks.

Key words: *Chamadorea elegans*, Fertilization, NPK, Humic acid, Light intensity.

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INTRODUCTION

Chamaedorea elegans Mart. is member of Arecaceae family, native to Guatemala and Mexico. It is known as parlor palm, neanthe bella palm, household palm and has been listed as *Collinia elegans* palm. It is reaching 2-3 m height (6 -10 feet) and 2 -3 feet spread with upright, slender and usually with one single trunk. The leaves are pinnately compound with 11-20 leaflets, lanceolate, entire margins and mostly stiff, each leaflet is 4 -8 inches long and glossy dark green in color. The flowers are dioeciously, small yellow followed by round black fruits; it blooms periodically through the year in late winter to early spring and it propagated by seeds. This species is one of the best foliage plants used in interiorscapes due to its ability to withstand low irradiance levels with slow rate of growth. The plant grows well with relatively low interior lighting and moist, porous soils and need exemplary temperatures 65°-75° F (18°-24°C) and less than ten degrees in winter (Reyes *et al.* 1996; Courtier and Clarke, 1997; Odenwald and Turner, 2006).

Light intensity is one of the most important environmental factors controlling the photosynthesis as it is the source of chemical energy required by plants and thus regulating the process contributing to plant growth and adaptation. As known, light intensity differs spatially, seasonally and diurnally, consequently the plants develop acclimation and plasticity mechanisms to cope with the changes of light regimes (Zhang and Chen, 2003). Most of plant species able to adjusting with varying light intensities through morphological, physiological, anatomical and biochemical change to

ensure light capture and utilization (Sousa *et al*. 2003; De Carvalho *et al*. 2005). General acclimation responses to low light, shade plants tend to have thinner leaves but larger in surface area, lower light compensation point and higher net photosynthetic rates at lower light levels compared with sun plants (Givnish, 1988 and Prasad *et al*. 1998). The chloroplast of the shade plants are generally larger, have greater chlorophyll content, and a smaller stromal volume than those of high light plants (Gunadasa *et al.* 2012). In this respect, some studies on the effect of light intensity on plant development, photosynthesis and morphology of some foliage plants have been investigated; Badawy *et al.* (1987) showed that the highest growth of *Chamaedorea elegans* was obtained in greenhouses with 70 % shade, Alvarenga *et al*. (2003) *on Croton urucurana*, found that increasing shading level caused increasing in plant height, leaf area, leaves and roots dry weights as well as chlorophyll concentration in leaves, while dry root biomass and photosynthetic rate were decreased. Gunadasa and Dissanayake. (2012) on *Polyscias balfouriana* clarified that the highest shade levels of 85 and 90% increased shoot length, leaf expansion and chlorophyll content, whereas highest leaves number was achieved at 85% shade level compared to control (50 % shade). Also, shade levels of 35% increased the growth parameters of *Coleus blumei*, increased anthocyanin and chlorophyll pigments as compared to unshaded plants (Alabdaly and Alkhalidy (2016). Moreover, light intensity affect nutrient accumulation, Singh *et al*. (2014) on *Nephrolepis exaltata* indicated that plants exposed to the lower light