

S U M M A R Y

This investigation aimed to evaluate the effect of some horticultural and environmental aspects on the growth and appearance of some garden elements, as well as trees, lawns, hedges, succulent and cacti plants as principle elements in landscape.

The study included the effect of bed orientation on the growth sight under shade or sunlight spot in the garden. The criticism of some garden in foriegn countries and in Egypt was also considered in this work.

The most important parts are the following

I. Effect of plant material on air temperature

1- Effect of trees:

Trees are the dominant visual elements of plant materials used to modify air temperature especially in the aird zone climates. They provide shelter from sun burn in Summer, and minimize the hot day temperature. This was found to depend on the tree forms and shape of foliage tree as well as the density. For example Casimiroa edulis cover 22.89 m^2 from the ground area and participate by 3.75°C in lowering the air temperature. As for Cassia nodosa cover 21.72 m^2 from the ground area

and participate by 2.20°C, but Grevillea robusta tree decrease air temperature by 1.49°C when tree occupied 10.75 m² from the ground area.

However, number of branches, shape of foliage, density and kind of leaves were affected on air temperature. The needle leaves tree i.e. Pinus halepensis reduced air temperature by 10.8°C compared with 3.2°C for broad leaves tree as Ficus elastica. It seems that Coniferous evergreens absorb more sunlight and thus they are very effective in reducing air temperature around their spots. As for the fine leaves tree Jacaranda ovalifolia reduced air temperature by 7.1°C in April.

Concerning garden buildings the study proved a reduction of 9°C indoors, Casimiroa tree shared the buildings in reducing the air temperature by 12.23°C in August, while Casimiroa tree shared by 3.23°C as compared to temperature of sand walk.

Fastigate and Columnar trees act as accentual and exclamation points similar to a church steeple on the skyline of the country town. Spreading trees not only give the feeling of breadth and extend but also they modify air temperature in different ways due to the

number of branches carried on the tree and the shape of leaves as well as the method of branching.

The obtained data in this thesis proved the above points.

2- Effect of lawns:

During November, Bermuda grass minimized the hot day temperature by 1.5°C when the soil humidity was 16.77%. When soil humidity increased to 18.93%, the reduced temperature was 4.38°C . Lawn irrigation decreased air temperature by 3.4°C compared with the dry lawn which decreased air temperature only by 1.5°C .

II. Hedges

1- Thuja orientalis, L.hedge

1.1- Effect of short level trimming at 70 cms

The establishment of the hedge depended upon the direction of hedge. It was found that South and West directions were more agreeable to establish short Thuja hedges, since that provided complete separation of the garden parts.

1.2- Effect of high level trimming at 90 cm

Thuja shrub added 0.259 m^2 as a living wall to the hedge exposed to the West direction, South direction created 0.271 m^2 as living greenery in the garden.

All directions of tall trimming increased the shrub width; East and North tall trimmed shrubs showed the largest gap area inbetween. Whereas West and South directions gave little gap areas. The sight and screening of the hedge depended upon trimming level as well as to their direction.

2- Ficus nitida hedge

The data for Ficus nitida hedge took similar trend of the Thuja hedge. However, all transplants should be shortened in early stage of growth to a minimum to enhance branch formation. It was proved that increasing planting distance had a negative correlation with the rate of the hedge furnishing in the garden.

3- Lantana camara hedge

Pruning of Lantana camara hedge once/year stimulates the basic growth at the end of the growing season compared with the frequent pruning. The frequent pruning also increased shoots number to 82 compared to 32 shoots for pruning once/year. Thus low hedge trimming produced shorter and more compact hedges compared to pruning once/year.

4- Duranta plumeria var variegata

The growth of hedge grown as low hedge was very slow, in order to overcome this problem, Pelargonium zonal was planted in the gaps of hedge to complete its beauty.

On this ground, it could be emphasized that some flowering perennials could help in creating a lovely scenery and a harmony effect if incorporated with a slow growing hedge especially at the starting years.

III. The contribution of succulent plants on succulent garden construction

Succulents take several years before they appear their effects on the garden view. Agave plant occupied between 0.307 m^2 - 0.502 m^2 from the garden and 0.059 m^3 - 0.109 m^3 at space in the first stage of its creation.

The scenery of succulent plants became large enough to attract the attention of garden visitors in maturing stage. Opuntia vulgaris and Lophocereus shottii occupied 6.039 m^3 and 0.174 m^3 respectively from the garden space after (8) years from planting. Agave americana var marginata could share by 2.264 m^3 from the garden space when the plant facing West side, while it will share by 2.649 m^3 if they facing the East side of succulent

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garden. Generally, the growth of succulents was more larger when the plants were facing the West direction. The leaves and some branches of succulent plant had to be thinned in order to allow sunlight to interfere between the plants.

The scenery of different succulent and cactus genera in constructing the garden will vary due to their combination as well as the individuality distribution. If one genus is only used it may create a repeated scenery. In formal garden it may be useful.

IV. The effect of plant orientation on the plant growth and sight appearance

1- Salvia splendens

Shade and sunlight in the garden can determine the growth and its appearance in the garden, Salvia splendens may be grown under shade garden conditions and it will show some ornamental growth under such conditions. The plant will occupy a smaller area, about 0.581 m^2 . Whereas under full sunlight it will occupy about 0.916 m^2 . Hence the number of plants needed to blossom in the garden bed or borders has to be perfectly calculated depending on the position in sun or shade.

2- Hybrid Tea Roses

Hybrid Tea Roses grown under sunny conditions occupied 0.635 m^2 from the garden. Calculating the number of Hybrid Tea Roses plants needed to cover 10 m^2 in a sunny location, it was found to be 15.7 shrubs compared to 20.7 shrubs needed to fulfill the same effect, and sharing by 3.01 m^3 of a flowering surface in sunny location compared to 1.66 m^3 in shade one.

In our opinion Floribunda Roses may create more effective groups when planted in front bed, in combination with Hybrid Tea Roses.

3- Senecio doria

Planting Senecio doria in the garden depends upon the amount of light which will be exposed to them. Shady locations are more suitable to its growth as single specimen. Under those conditions, every plant creates large size and more vigour and occupies about 1.33 m^2 . Plant exposed to full sunlight occupies less area of 0.580 m^2 in the garden. Also, it must be planted in combination with flowering annual plants.

4- Dracaena draco

Dracaena draco plants grown in sunny locations completely different from those grown under shady conditions. The plant creates a strong focal point in the

garden with 3 branches and 410 cm tall trunk. The crown produces 11 crown divisions. Whereas, in shady locations it has only 2 branches, with 340 cms length trunk.

5- Agave americana var marginata

Agave americana var marginata is preferably grown in sunny location in the garden to create a focal point of great visual interest in a sunny corner. The plant occupied about 6.61 m^2 in the garden area and shared by 3.90 m^3 for ornamenting the garden. While, plants grown in shady locations were not too showy.

V. Evaluation of Citadel gardens

Landscape gardening has an important role in beautifying touristic areas, the business of landscape gardening not only gives our monument places the glorious and beauty, but also they have not harm or to change their essential characteristics. Plant materials chosen for those places should be connected with their historical importance.

Fan young palms should be lied out in the poole location to complete the historical panorama of the Citadel garden. There are two suggestions for redesigning

of the garden which in front Citadel gardens facing Salah Salm's street, the first suggestion is: creating formal garden or creating Succulent garden. Lawns should share in gardens design. The width of East side lawn is agreeable to create a mixed border facing the Citadel wall.

Some harmful effects may affect the gardening creation such as ground water which may increase due to use of much irrigation which could affect the historical buildings. However, irrigation by droplets and/or sprinkling methods could be adopted.

To ask more safety to Citadel constructions, the level of ground water, and slope of ground must be examined and a distance of 10-15 m must be left to surround the Citadel wall.

VI. Evaluation of the development of Tahrir square garden

The development of Tahrir square garden passed by different stages from 1958 to 1988.

The distribution of trees was well organized in the period from 1958 to 1964. Although, the garden contained a large lawn area, but this area was divided to many parts. The design of (1958-1964) contained different elements of

design, lawns, trees and shrubs, but it was lacking the herbaceous plants which had the colouring effects.

In the second period from 1964 to 1981 the designer created a formal carpet garden facing Tahrir administrative building. The annual and herbaceous plants were used in the different levels of beds in the central garden.

In the third period from 1983 to 1985 during the constructing of the under ground metro, the garden was neglected and became in a bad statement. All the plants died and its colour changed to yellow brown. However, the trees groups were in a better case since they tolerated the negligence.

The new design (1988) of Tahrir square gardens depended upon the modern landscape lines, with smooth curving lines.

Generally, it could be concluded that Tahrir square garden in 1988 is very suitable state, although this arrangement is not quite enough to overcome the future requirement.

VII. Criticism studies in the gardens

1- Agha-Khan garden in Shoubra

The new direction of Agha-Khan garden depended upon:

1. Minimizing the garden maintenance and increasing their park size by using lawn edged by short annual plants as Viola tricolor , Tropaeolum majus and Tagetes patula.
2. Providing new garden appearance by used palm trees.
3. The connecting between garden design and town planning.
On this ground, the garden could complete the planning by using iron frame around the garden.

2- Evaluation of some green area in Cairo streets

The green colour decreased in Cairo, due to many distructions of many plant materials. Such partition may lead to poor maintenance and sharp edges of the bed corners which cause many troubles for the well maintenance.

Generally, it was noticed that the designs and connection of plant materials in Cairo streets were not well organised, many plant materials are grown under unfavourable conditions which loose them the charmness and minimize

their function in urban conditions. Plant materials in Cairo streets are not properly maintained.

We recommend, using different genera of trees in a vertical and horizontal shapes in landscape design which modify the air temperature especially in hot arid zones beside increasing soil lawn humidity which reflect decreasing the garden air temperature.

South and West directions are more agreeable to establish Thuja orientalis, Ficus nitida hedges, their sight and screening depend upon trimming level as well as their directions. The low hedge trimming and frequent pruning produce more compact hedge. Using some flowering perennials could help in creating a lovely scenery in the garden.

The scenery of different combinations of succulent genera in succulent garden is more effective than using only one. The leaves and some branches of succulents had to be thinned to allow sunlight inbetween.

Growth, appearance and number of plants as well as Salvia splendens , Hybrid Tea Roses , Dracanaena draco

and Agave americana were more effective in sunny spots but Sencio doria prefers shady location in the garden.

The designer of living landscape must have an entire knowledge of the plants and the long term effect of his design for future maintenance based on the town conditions.