Journal of Middle East Applied Science and Technology (JMEAST)

ISSN (Online): 2305-0225
Issue 18(2), August 2014, pp. 515-517

Soil compaction, causes the soil compaction in green space and ways to improve

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***Abstract*—** The main environmental impacts of urban green space is a function that creates a balance in the animated and inanimate city and plants in cities are an important part of the foundation. The major factor in the establishment, growth and survival of plants and create sustainable green space, is the soil condition of their bed. Soil compaction prevents proper penetration of plant roots in the soil and plant maintenance costs and increases protection. Evaluation of soil compaction before planting the plants to prevent its later stages, and provide effective methods of control and prevention enhances the quality and quantity of green areas can be rejuvenated.

***Keywords*—** Soil Compaction, Pores, Urban green space

I. INTRODUCTION

Green space as part of the face of the city is one of the most important phenomena and is the first things that has dimension of environmental, social, cultural and economical which human beings are interconnected with it.

The main effects of green space in cities are reducing pollution, noise, adjust the temperature relative humidity increases and attract dust. The quality and quantity of green space urban landscape and increasing development and maintenance of the principles of urban management is important.

Soil compaction is one of the serious consequences of urban development and has been problems for foundation contractors and city managers. In urban areas, soil compaction has been leading to problems of drainage nutrient cycling and plant growth [8]. Soil compaction occurs when soil particles are pressed together and the number and size of pores between soil particles is reduced [7].

Soil compaction in urban areas often results from the use of heavy construction equipment and heavy traffic in these places [9]. Soil compaction can be exacerbated when heavy equipment is used in very wet soil [8]. Compacted soils for plant growth and water movement in soil are not ideal, the growth and establishment of plants in compacted soils is almost impossible. Soil compaction reduces the pore size and number of the pores that have the task of supplying oxygen to the plant roots [8].

Increasing soil pores reduces soil compaction and reduced soil oxygen and Carbone dioxide increases which have negative impact on plant growth. If resistance to root penetration is greater than root growth, so, root growth stops [7]. Soil compaction also increases the resistance to root penetration and reduces growth in the soil; as a result weak roots need more fertilizer and irrigation [7]. Soil compaction damage to plants and thus increases the cost of maintaining the plant and they will be removed [8]. Soil compaction due to harmful effects on the environment will decrease the permeability and increase soil erosion which in turn increases pollution and increase nutrients in water [7].

Soil compaction occurs when an external force imposed on the soil surface so that the voids between particles are reduced or eliminated [5]. One of the Common symptoms of dryness of soil compaction in the soil surface layer increased after flooding is severe wilt disease and plant roots in warmer months of the year [9].

Soil compaction may occur quickly or gradually. Soil compaction prevents the penetration of water, oxygen and plant growth in the soil. The effect of soil compaction on plant is gradual. Inadequate growth of roots in the soil causes cracking of asphalt and pavements due to grow of shallow roots [5].

Urban areas often restricts root growth, causing compacted soil, limited air vents, poorly drained and lots of features, such as air and space is limited, root growth to soil compaction [9]. Soil compaction in urban areas is often severe [8]. This urban landscape is seen particularly in parks and recreation areas. Compacted soil causes root penetration and restrict root

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ISSN (Online): 2305-0225
Issue 18(2), August 2014, pp. 515-517

growth slows or stops resulting in increased root branching and root radial thickness [10]. Compacted soil causes root penetration and restrict root growth slows or stops resulting in increased root branching and root radial thickness. Compact soils in urban communities, particularly for urban green spaces will create a lot of problems. According to the need for green space in urban communities today, and more importantly, the necessity of maintaining them is the duty of organizations such as the parks and green Municipalities.

II. THEORY AND LITERATURE

One of the key factors in the establishment, growth and survival of plants and creates sustainable green space, is the soil assessed. soil Keep the plant body and helps the roots absorb water and nutrients [7].

According to many researchers, the origin of most root problems is related to landscaping bed. The root systems of trees in urban environments developed does not in parallel with the growth of other parts. Poor soil conditions and poor soils used in landscaping trees is causing feeding problems [5].

Soil Constraints Study has shown that one of the main difficulties and limitations of landscaping soil is soil compaction and lack of proper ventilation. Other factors limiting constraints, is soil depth and high gravel percentage [8].

In many cases kicking off the grass gradually compacted soil and the exchange of gases between the soil and the surrounding air is minimized and as a result , water penetration in the soil and root respiration is impaired. Another side effect of soil compaction is reduces permeability of underground organs such as grass roots [10].

This study is done to evaluate soil compaction and landscaping and also introduces effective techniques in reducing the above problems. So, many improved methods and techniques of planting and proposed solutions will be located to deal with the effects of soil compaction in the green space.

III. SIGNS OF SOIL COMPACTION

Construction sites, agricultural fields and soils with high clay content are often affected by condensation [8]. Unfortunately, soil compaction is difficult to diagnose because the symptoms are similar to other indicators, But generally bad form roots of plants, water, soil, digging and digging hard soil, the plants stop growing and changing colors is a sign of soil compaction [9].

IV. METHODS TO MEASURE SOIL COMPACTION

Measuring soil compaction is done with a tool called penetrometer. The easiest way to find compaction of the soil is to hollow metal rod into the soil. If these tools are hardly entered, it means that the soil is compacted. In addition, the best way to determine soil compaction, is measuring soil density, which is achieved from the total volume of soil to dry soil weight ratio. The reduced amount of soil pore increased density so indicating that there is soil compaction [8],[9].

V. CAUSES OF SOIL COMPACTION

Construction operations, frequent use of mowing machines, cross the pedestrian paths into flakes of green space causes soil compaction [9]. Non-covered wasteland is influenced with rain erosion so this causes to prevent water entry to the soil [6]. Organic matter, reduce soil compaction oils with high clay content because of the small clay particles are highly susceptible to compaction [7].

VI. MODIFICATION TECHNIQUES, CONTROL AND PREVENTION OF SOIL COMPACTION

Tillage and cultivation of proper humidity can cause pores to remove more soil compaction. In such circumstances, infiltration and root growth improves. Deep plowing with rummage soil can reduce congestion .This type of plow 24 to 36 inch but need large machinery and features. Shallow plowing with rototiler is the most effective way to break up compacted soil surface. This method of soil compaction to a depth of 6 inch heals. To eliminate soil compaction around the roots of trees and no damage to their root aeration method used. In this way, loosen the soil with a high pressure compressed air is used [8],[9].

Adding organic matter to the soil to reduce compaction, increase water infiltration into the soil and increase soil nutrients. Animal manure can be used as organic amendments into the soil by shallow plowing [6]. Surface spread of material correcting in organic matter and improve soil tillage reduces soil compaction compared to when the mixture is less effective. The hardest and most expensive way to amending compacted soil, is replace it. In this way the desired compacted soil was removed and replaced with other suitable materials [8].

VII. CONCLUSIONS

Amended soil compaction, especially in the deep layers does not easily. So the best way to deal with the problem is to

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prevent soil compaction. Management plan to protect and prevent soil compaction and landscaping is the best method of preventing this phenomenon [8].

Ways to combat soil compaction and green space is included:

a) **Avoid walking on the bed of plants:** walking is restricted on bedding plants places. Apply a heavy tool plowing should be avoided.

b) **Taking proper soil moisture during operation:** Very wet soils due to water filling the air voids are easily compressible. Dry soil due to more friction between the particles can be compressed easily so, taking the proper humidity will be effective in reducing soil compaction.

c) **Choose plants adapted:** Semi-compact soil in wet areas can be adapted to certain plants. The choice of plant species with dense root system will be effective in reducing soil compaction.

d) **Use mulch or ground cover:** Apply a thick layer of mulch reduces soil compaction and density. Moorland with a shell layer, preventing water infiltration into the soil. So, 2 to 3 inch layer of plants mulch can prevent the occurrence of this type of compression. The green spaces with cover plants on soil can protection and prevent condensation [8],[9].

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VIII. SUGGESTIONS

The necessity of maintaining urban green space in the metropolitan goals is important. Given the context of plants as the main factor in plant growth and stability are necessary for the preservation of green space. The largest organization in this part is municipal parks and green space. In this regard, the location of urban parks and green space, taking into account soil conditions in the absence of initial compaction will contribute to this phenomenon. On the other hand observing the principles of prevention and protection, creating soil compaction and density will reduce maintenance costs and preserve green space. In this regard, it is proposed landscaping soils in terms of density and compactness are examined. This could be in the form of a research project. Application procedures outlined in green space areas to improve soil compaction and application of best practice for green space can be studied in Iran.

REFERENCES

[1] Alberty, C.A., H.M. Pellett, and D.H. Taylor, Characterization of soil compaction at construction sites and woody plant response. J. Environ, 1984, Hort. 2, pp. 48-53.
[2] Alizadeh, A.,"Soil Physics book, Pherdosi University Publiction", 2005.
[3] Amy L. Shober and Geoffrey C. Denny, Soil Compaction in the Urban Landscape. Soil and Water Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, 2012.
[4] Avestan,SH., Environmental Soil Chemistry book vision by Donald.L.Spikes, Tabriz University Publication.
[5] Entezari, M., Shariatmadari, H., Jalaliyan, A. , Improve the nutritional status of a number of trees, in green space, in Isfahan by Chalkod method. Kish Island, Third National Conference of green space and urban landscape, 2007.
[6] Gurpal S. Toor and Amy L.shober,. Soils and fertitizers for master gardeners: Soil organic matter and organic amendments. University of Florida. IFAS extension. SL 273 , 2012.
[7] Haghniya,GH., challenges the soil infiltration book, Pherdosi University Publication ,1995.
[8] Jalalyan,A.,Shariatmadari,H.,Khademi,H.,Taban,M., Soil physical constraints of morphology and the sustainable development of green space in Isfahan, Kish Island, Third National Conference of green space and urban landscape, 2007.
[9] Rebecca Pineo, Susan Barton, Combating Soil Compaction . Extension Specialist University of Delaware,Sustainable Landscapes Series, 2009
[10] Zisa, R.P., H.G. Halverson, and B.B. Stout, 1980. Establishment and early growth of conifers on compact soils in urban areas. For. Ser. Res. Paper NE-451, 1980.