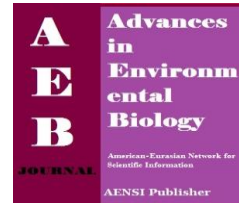




AENSI Journals

## Advances in Environmental Biology

ISSN-1995-0756 EISSN-1998-1066

Journal home page: <http://www.aensiweb.com/aeb.html>

# The Effect of the Different Tillage Methods on Soil cone Index and Porosity of the Research Farm's Soil of Islamic Azad University of Shoushtar City

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### ARTICLE INFO

#### Article history:

Received 15 April 2014

Received in revised form 22 May 2014

Accepted 25 May 2014

Available online 15 June 2014

#### Keyword:

soil cone index •tillage•soil porosity

### ABSTRACT

Degree of soli weakness and mixing the soil is depended on soil kind•soil moisture and type of the tillage practices. Some feature of soil which can be affected by tillage practices are soil bulk density•lathe of the soil•uniformity of water distribution in the soil and soil moisture percent. For this purpose•farm research is done in shoushtar city in 2012 on clay loam silt soil in order to checking the effects of the tillage on lathe and porosity of soil at three depths 0-10•10-20 and 20-30Cm. treatments are involved four tillage ways: conventional tillage•reduced tillage•conservation tillage and no tillage in randomized complete block design with four replications. Lathe penetrometer system was used in order to measuring lathe of soil and the cylinders with 7Cm diameter and 5Cm height are used in order to determine soil porosity level. Results shows that the most amount of porosity is related to 0-10Cm depth in treatment of conventional tillage and the lowest amount is related to treatment of no tillage which is at 10-20Cm depth. Also the most amount of soil moisture is resulted 1/89 MPa/Cm rate at 10-20Cm depth in treatment of no tillage and the lowest amount is resulted at 0-10Cm depth in treatment of conventional tillage about 0/752 MPa/Cm.

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**To Cite This Article:** Jamshidi A.R, Tayari, E and A. Neisy., The effect of the different tillage methods on Soil cone Index and Porosity of the Research Farm's Soil of Islamic Azad University of Shoushtar City. *Adv. Environ. Biol.*, 8(11), 47-49, 2014

## INTRODUCTION

Tillage practices cause the weakness of soil and the soil mixing. Degree of the weakness and soil mixing is related to soil type•moisture of soil and type of the tillage practices. Some of soil features which can be affected by soil bulk density•soil stability•soil cone index •uniformity of water distribution in the soil and soil moisture percent. Generally tillage is physical mixing of soil in order to preparing the suitable place for planting•maintain soil moisture•soil grains stability•eliminating the compaction and mechanical resistance of soil and weed control [1].

[5] by studying the effect of different tillage ways on soil hydraulic properties and cone index in 5•10•15 depths on different soils in southwestern of Nigeria in randomized complete block design that involved no tillage treatments•manual tillage•two times tillage with disk plow and tillage with plate plow + plate pruning are achieved to below results. Different tillage ways shows significant effect on soil bulk density which are sorted I this way: PH<PP<MT<NT •it means that soil bulk density was recorded in NT treatment by having the most amount (1/2 gm<sup>-3</sup>) and in PH treatment by having the lowest amount (1/09 gm<sup>-3</sup>). Soil cone index is adapted with data of soil bulk density• and in NT treatment with the most amount lathe of soil by (0/65 kg cm<sup>-2</sup>) amount is recorded. The most amount of saturated hydraulic conductivity was recorded in NT treatment with (0/0072 cm s<sup>-1</sup>) amount and the lowest amount in PH treatment with (0/0061 cm s<sup>-1</sup>) amount [4].

[8] There were paid attention in randomized complete block design with four replications for checking effect of four different tillage ways which is involved moldboard plow as a conventional way•moldboard plow and heavy disc• subsoiler and heavy disc and subsoiler and moldboard on some physical feature of soil• in a potato field with loam-sandy tissue. Results show that soil; bulk density is reduced in all treatments•the most amounts are reduced from (1/220 g cm<sup>-3</sup>) to (1/021 g cm<sup>-3</sup>) equal with 13/9 percent in SM treatment. Different tillage ways have significant effect on the amount of water penetration in the soil so that water infiltration rate in soil in SM and M treatments is more than MD treatment. Also soil cone index in four tillage ways in different depths especially in depths more than 150ml have significant difference with each other and this difference is significant in every three measuring levels.

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[2] By comparing the effect of no tillage practices with different tillage methods belongs management plant remains by spatial and temporal variability on soil hydraulic properties the following results were achieved. Work process is in this way that in order to increasing Mackropo connection, generated competing responses about porosity of total soil and soil bulk density in NT operations are compared with different conventional ways that it is related to overall increasing in blocking or closing infiltration rate of tension to zero and conductivity of hydraulic saturated. Spatial and temporal variability often overshadowed by the effects of specific management and some writers prove it in their analysis and interpretation. Difference between temporal variability is related to space places between rows, in within the field to horizontal positions, and between different places with weather conditions and dominant soil type. The most of the tillage ways immediately affected on hydraulic features of soil after tillage operations, but can reduce these effects quickly [6].

## MATERIALS AND METHODS

This research is done in one of salty-clay-loam field from fields of research of Islamic Azad University of Shoushtar city in 2012. Before tillage, field is divided to 16 plots (16×15 meters) as a randomized complete block design, so that between plots are determined 4 meters as transverse and 8 meters as longitudinal in order to moving the Tractor and implements of marginal. Then experiments which are related to determining the soil porosity with 7 Cm in diameter and 5Cm in height cylindrical are done. For obtaining soil cone index is used as lathe which is made of Eijkelkamp Agricultural Equipment Company. Sampling is done in three levels during the 15 days that in every sampling levels is done four experiment samples in each three depths of experiment samples from plots. Treatments are involved four tillage ways: conventional tillage (Plow + Disc Harrow + Disk Harrow moldboard), reduced tillage (Disk Harrow + Disk Harrow), conservation tillage (Plow Chisel) and no tillage (No Tillage).

## RESULTS AND DISCUSSION

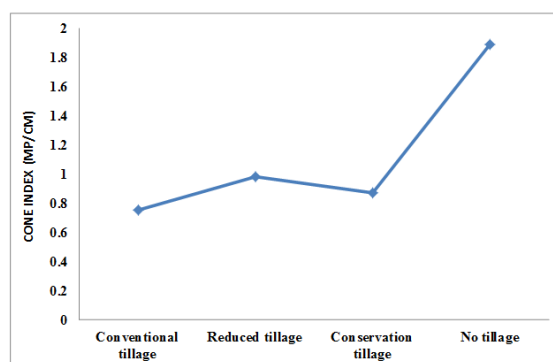
In related experiments for determining the soil cone index's data from penetrometer of soil resistance against the penetration each Cm of soil. Statistical analysis by using SPSS software clearly shows the significant different between tillage treatments in probability level in 5%. Also for amount of soil cone index between treatments in probability level 1% in between different tillage in uniform depths the significant different was showed [7].

Also results showed that in no tillage treatment by passing the time reduce from soil cone index cone index and it is happened when in other treatments its amount would increase.

### *Cone index:*

Figure 1 indicates the process of soil cone index in 10-15Cm depths of soil in experimental treatments. The primary difference in amount of soil cone index is fairly more between no tillage treatments with other treatments but by passing the time this difference is educed. As process of changes in charts shows that rate of changes over time in no tillage treatments is more than other treatments.

Porosity changes in all treatments against the changes of soil cone index, completely are uniform and porosity amount in them are reduced by passing the time that this reduction in different treatments are different.

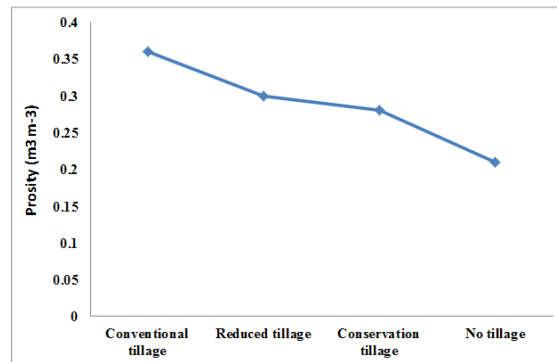


**Fig. 1:** Soil cone index changes.

### *Porosity:*

Figure 2 indicates the process of soil porosity changes in 0-10 Cm depths in soil in experimental treatments. In all treatments the rate of soil porosity by passing the time has a downward trend. The most amount of porosity which is conventional tillage treatments is recorded  $0/36 \text{ m}^3 \text{ m}^{-3}$  and it's the lowest amount in no tillage

treatments is recorded  $0/21 \text{ m}^3 \text{ m}^{-3}$ . it is necessary to said that the most amount is related to a day after tillage and the lowest amount is related to 15 days after tillage.



**Fig. 2:** soil porosity changes.

### Conclusions:

The results shows that kinds of tillage ways (combining the tillage implements) have different effects on physical features of soil. So that reducing the soil bulk density and as result increasing the porosity of soil after tillage in all treatments are happened. Although these changes are not same between all treatments. According to results the best position of soil about porosity and cone index in conventional tillage treatments is related to plow with moldboard + Disc + Disc so that soil permeability in mentioned treatments until 45percent is reduced.

### REFERENCES

- [1] Akef, M., and I. Bagheri, 2009. Agricultural soil management on soil physical properties and the machine. Translation. Gilan University Press. (in Persian)
- [2] Jamshidi, A.R. and M. Almassi, Minaee, S. Jafari., K. 2013. Effects of Tillage Intensity and Tractor Traffic on Soil Compaction in potato yield in North of Khuzestan, Iran. *Advances in Environmental Biology*, 7(4): 730-734
- [3] Culpin, C., 1986. *Farm Machinery*, 11th ed. Collins Professional and Technical Books, London, pp: 55.
- [4] Kay, B.D., A.J. Vanden bygaart, 2002. Conservation tillage and depth stratification of porosity and soil organic matter. *Soil Tillage Res.*, 66: 107-118.
- [5] Osunbitan, J.A., D.J. Oyedele, K.O. Adekalu, 2005. Tillage effects on bulk density, hydraulic conductivity and strength of a loamy sand soil in southwestern Nigeria. *Soil Tillage Res.*, 82: 57-64.
- [6] Jacob, W., R. Lal, 2008. Tillage effects on physical properties of agricultural organic soils of north central Ohio. *Soil Tillage Res.*, 98: 20-210.
- [7] Mossadegh, M.R., M. Opiate and A.S. Effort, 2001. Effect of different tillage practices, soil Brbrkhy → → physical characteristics of soils in North Carolina, America and a comparison with the situation in Iran. Iran's Seventh Congress of Soil Science, Shahrekord University. (In Persian).
- [8] Rasouli, S.H. and G.A. Abbaspour, 2004. Effects of different tillage on some soil physical properties. Fifth National Conference on Agricultural Machinery Engineering-1387 Mashhad. Article code 541. (in Persian)