# *SUMMARY AND CONCLUSION*

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The current work intends to study the contributive effect of some soil constituents and behavioural properties on the compaction process in Egyptian soils. The study aims also to evaluate the effectiveness of plowing and organic matter application in reducing the soil compactness and promoting soil productivity.

To achieve the first goal, five sites were chosen along a transect extended from Nubaseed Agricultural company Behaira Governorate, on the east to Al-Gharbaniat region, Matruh Governorate on the west so as to take into consideration most of the pertinent soil parameters, e.g. texture, structure, $CaCO_3$%, organic matter %, soil wetness and the applied management practices. In each site soil penetration resistance was periodically measured using electrical computerized penetrometer.

In the second part of this study, a field experiment was performed in the mechanized farm of West Nubaria Agricultural company. The experiment conducted in a split-plot design and included four plowing treatments viz.; chiseling, moldboad subsoiler and subtiller, as well as two organic matter treatments; zero and 20 ton/fedden. Soil physical properties, e.g. penetration resistance, bulk density, hydraulic conductivity, infiltration rate were determined immediately after seedbed preparation and after harvesting. Moreover, at the end of growth season corn yield was determined.

**From this study the following results were obtained;**

1- The area under study differs in texture, content and size distribution of $CaCO_3$, salinity, gypsum and organic matter, as well as bulk density, total and size-distribution of aggregate.

2- Both naturally and induced machinery induce compacted layers are commonly found in the study area just below the disturbed zone via normal tillage operations.

3- Soil hardness expressed by the values of penetration resistance, in MPa, sharply decreases with increasing soil moisture content. Nevertheless, it linealy increases with increasing each of clay and silt content.

4- $CaCO_3$ content in the clay fraction was the most effective constituent in increasing the penetration resistance of soil. On the other hand, organic matter content is a powerful factor in controlling and alleviating soil compaction problems.

5- At the end of seedbed preparation, tiltage treatments caused a remarkable decrease in penetration resistance of the top soil layer.

However, for the machinary induced compacted layer (22-50 cm) the data showed that chisel plow did not affect the degree of compactness of such layer. Meanwhile, moldboard is the most successful treatment for rectifying soil compaction within the top 30 cm of the soil. On the other hand, subtiller plow is the most effective tool for loosening and disruption of deep compacted layer followed by subsoiler plow.

6- The loosening effect of chiseling disappeared by the expiry of the growth season. However, the effect of other plows on reducing penetration resistance of the machinery-induced hard pan at the end of growth season still pronounced and seems to persist for more than one season.

7- Soil tilling markedly improve the studied soil physical properties by increasing the values of total porosity, quickly drainable pores, slowely drainable pores, saturated hydraulic conductivity, infiltration rate and decreasing the value of bulk density for the plowing soil layer after seedbed preparation as compared with the unplowed soil plots. Such improvement mainly depends on the effective depth of the applied plows.

The comparative effectiveness of the four types of flows on improving soil physical properties of soil compaction can be arranged in the ascending order Chisel, moldboard; subsoiler; subtiller.

8- Plowing has resulted in a considerable increase in corn grain yield relative to the control. Organic matter application at any plowing treatment has resulted in pronounced increase in crop yield, especially under moldboard treatment, as compared to zero organic matter treatment.

9- The study proved that subtiller is superior to the other employed plows for deep soil loosening and rectifying the subsurface compacted hard pans.

The study substantiated that the subsurface compacted layter is on of the limiting factors for plant growth under the condiations of the study area. Moreover, this investigation emphasized that lossening of such layer using subsoilers especially subtiller plows is a must.