



## ORIGINAL ARTICLE

# Comparison of performance production in three tillage systems in Barley cropping

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### ABSTRACT

The focus of this research was choosing the best tillage system for barley cropping in ORZOIE region. Three tillage systems (min tillage), (no tillage) and (conventional tillage) were evaluated and compared for their tillage quality. Analysis of variance of field performance of three tillage systems was significant in five percent level. Comparison of means by Duncan's multiple range test showed that the barley yield are placed in different masses in two segment groups. Average the barley yield was obtained in conventional tillage and min tillage no tillage system in 5000 kg, in 4500 and in 3500 kg per hectare respectively. Non-tillage system or planting system by using of direct seeding machine as its opener slot is a dish-kind are offered on non-irrigate field and the field are irrigated by sprinkler and reduced tillage system in different physical condition, suggested instead of Conventional method (maximum tillage) for agriculture field, non-irrigate field and the field are irrigated by sprinkler led to reducing of production cost and increasing of Income and reducing soil compaction caused by Reducing traffic of tractor in field.

**Key words:** conventional tillage, yield on field, min tillage, combination machine

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### INTRODUCTION

The planting time has a bearing on irrigation therefore has a direct impact on product performance and germination [2]. The implementation of mechanized methods of planting new crops and agricultural production is one of the goals of infrastructure development that will increase productivity and sustainability of this sector. The results of this comparison showed percentages of fractures in the laboratory and seed planting depth, there was no significant difference in the field. Percentages of broken seeds in the field, a percentage of Snabl planter machine is broken less seeds and in other cases a linear pneumatic Hamadan was successful [10]. The absorption of phosphate and potassium fertilizers placed below the seed at 5cm distance between the rows provides better food for the barley evident in an increased grain protein yield [13]. These machines are called direct seeding machine that generally is without unit of making irrigation groove and specially non-irrigation field and the field under classic irrigation (Although that can be installed on these devices barley-making mechanism on this machine can be proceeded to make barley simultaneously. Industrial and developing countries in order to reduce traffic and minimize on-farm agronomic operations (tillage, seedbed preparation and planting seeds) have been attempted over five decades.

Consuming of Instrument comprising in farmland of European and American countries becomes more popular every year. Performed studies show that the evolution of these devices in terms of their high operations during one phase of the work is in the field. Including the using of complex machine is to reduce energy consumption, reduce the costs of field operations (increasing the income), enhancing of production in per area unit of minimizing of soil compaction.

Compared the effects of different tillage methods, have investigated on irrigated wheat crop [4]. The experiments were carried out in four-year to find the appropriate tillage machine according to performance criteria and soil physical properties of the product.

For-years-old results showed the wheat production in Esfahan under management of non-tillage system is no possible without considerable decreasing on seed implementation. One reduced-tillage (Chisel plow to a depth of 15 cm) can be offered according to replacement system for Conventional tillage systems.

The investigated on experiment as two level of depth soil based on 30-35 and 40-45 as a working depth of Subsoil system with or without using of Moldboard plow in comparison with implementation of Moldboard plow in a year. The results showed [17]:

1 - Subsoil made significant effect on increasing mass of specific-appearance soil in comparison with evidence masses about 5 percent.

2 - Whole of tillage masses were caused to increase the speed of soil basic penetration.

3 - The results of variance decomposing have not shown the numbers relation to with implementation of all tillage masses, surveyed the effect of surface and depth plowing and production operation of barley. In this research, the farm was soil-sand field and the effect of different tillage methods such as Initial plowing (P), deep plowing (V), surface plowing (S), non-plowing (C), plowing to a depth of 15 cm by the Rotary Tiller and handling rollers (T) and no-tillage (N) on implementation of barley crop. The research showed that the soil Porosity, water hydraulic control and are improved by soil plowing and the efficiency of green farm will be increased. But in the N and C methods showed unstable conditions as T method and plowing the ground. In plowing condition was made better position for soil and gained crop of barley was on high implementation [16].

Dickey (1983) announced that new hybrid machines such as a disk or field cultivator or Chisel or Ripper were used for new and stable tillage systems [6].

The operated process shows that the conventional agriculture implementation is introduced as the highest soil implementation.

For comparing this method with using of min-tillage methods has been operated by omitting of one or several conventional tillage process or by mixing two or several tillage systems with each other as an implementation under minimized-tillage. Whereas, the tractor as well as its joined instrument was suggested even on min-tillage system from mentioned researchers have been entered and implemented on farm. Only in the case of was gone by Dickey the agriculture implementation has been operated in maximum level (conventional method) and non-tillage implementation [7].

The aim of this research was to survey the operation of barley crop in three tillage systems included conventional tillage machine as maximum of tillage implementation and agriculture implementation with Multifunctional machine as a min-tillage and implanting accomplishment with direct seeding as non-tillage.

## MATERIALS AND METHODS

Experiment was conducted at ORZOIE region (56° 37' E and 29° 14' N), 2300 Km Southwest of Kerman, at an average altitude of 1044 m. The experiment field (pervious planting) in a 2 year alternative rotation was barley, and barley in order be in 2012-2013 was under barley planting as well. The soil texture was silt and loom for the depth of 0 – 25 cm had possessed silt and loom texture with the electric conductivity (EC) 2/6 and BD 1.52.

Three tillage systems (min tillage), (no tillage) and (conventional tillage) were evaluated and compared for their tillage quality.

1 – The conventional methods as maximum of tillage implementation 2 – The min-tillage method as a minimum of tillage implementation 3 – non-tillage method, each of the three replicates in a randomized complete design block were analyzed. For this reason, the usable machines and Instruments are followed by:

A – The usable ways and instruments in conventional agriculture method

Moldboard plow 2 – first and second disk (at least twice) 3 - leveling (flattening) 4 – fertilizer-spray machine (if the planter is equipped fertilizer- plowing machine) 5 – Third disc (entomb fertilizer) 6 – seed planters (planter) 7 – Furrow (in the case of traditional irrigation (non-classical).

B – The usable ways and methods in min-tillage method

The agriculture multifunctional machine was used for this reason. The mentioned machine operates Tillage acts (depth 20 cm), seedbed preparation, planting, seed coating and stabilizing, creating of irrigation slot (if necessary) at one tern moving on the field.

The usable ways and instruments in non-tillage method

For this reason, direct seed planting system made of Turkey (MODEL 2010, OZDOKEH) was used. In this machine are created by available Chisels is created for seed sowing by considerable furrow in front of the machine and is consolidated and coated on the seed by available roller is located on back of the machine. The selected implementation side of farm researching is located on ORZOIE region in Kerman province and cultivated two times on that year (First crop wheat or barley and second crop maize- grass).

The power source was Messy Fergusson in all tillage implementation such as min-tillage and non-tillage machines. Wok depth was about 30 centimeters in conventional tillage and in min-tillage and non-tillage about 20 cm, Parts of a hectare of land, loamy soil and soil moisture during the operation between 10% and irrigation methods from classical irrigation type (sprinkler, using of sprinkler-rotary-Ejector system).

## RESULT AND DISCUSSION

Data in a randomized complete design block with three masses (styles) of agricultural operations (including conventional, min-tillage and non-tillage methods) were analyzed each of them in three replicates.

The obtained results showed that there is 1 percent significant different between variation of tillage implementation and sowing methods in statics level.

Table 1 shows the average of dry material mass (stems and clusters), farm operation and thousand seed weight of barley for three different tillage systems. According to this table is considered that gained dry material mass of min-tillage method is higher than both conventional tillage and non-tillage methods. But production accomplishment in conventional tillage method is a little higher than min-tillage and higher than non-tillage implementation.

Table 1: The average of dry material mass, agriculture implementation and thousand seed weight of barley crop during three different tillage systems

Sowing methods	Mass average of dry material (kg/ m <sup>2</sup> )	Farm yield (ton/ha)	1000 seed weight (gr)
Conventional tillage	1/31	5	28/8
Min tillage	1/42	4	26/8
No tillage	1/12	3	19

In a general comparison between the three methods of tillage, means comparison showed, there is significant different between selected masses at the five percent level (Table 2).

Table 2: Analysis of variance for barley crop yield in agricultural operations in three different ways:

S.v	df	M.S	M.S.A	F
tillage and sowing	2	2063/45	1374/32	123/18**
Block	2	19/83	8/45	0/69 <sup>ns</sup>
Error	4	54/53	12/22	
Total	8	2250/16		

\*: 5% significant      ns: non-significant

Table 3 shows Comparison of mean values of barley crop yield in Different masses of tillage and planting methods based on Duncan's multiple range tests at 5% level. According to Duncan's multiple range tests, barley yield in Different masses can be separated in two statistical categories.

Table 3 - Comparison of the mean value of obtained barley crop (in terms of tons per acre) in the different treatments

treatment	1 group	2 group
Conventional tillage	5/1	
Min tillage	4/4	4/5
No tillage	3/4	3/6

As mentioned the farm was chosen for this study was a land that the previous crop was grain corn production, so it passes through the sowing machine at the same time (tractor and harvest combine machine) and transportation trucks product caused to squeeze soil intense. Therefore, in such fields, tillage practices should be such a way that the soil is removed from the condensation mode, loosening and softening of soil to be provided possibility of seed contact to soil. Soil aeration has been better and expanding of root of the plant would be achieved to absorb water and nutrients that the plant needs. This act increases the yield will be caused to increase production yield. In according to table (3) is considered that Maximum tillage and min-tillage systems for the mentioned reasons is obtained more product than non- tillage system. Similar results have been obtained by other investigators.

Paterson et al [14] have assessed the Effects of conventional tillage, min-tillage and non-tillage systems on wheat yield in non-irrigation agriculture.

Their report showed that the tests were conducted under appropriate moisture conditions; all methods have produced a similar production. Platonov [15] have operated experiment in the farm with medium texture soil for comparison of six tillage methods. They announced that all decreasing of tillage methods caused to increase wheat yield. All methods were caused to increase implementation exception of non-tillage method for oatmeal crop. Dickey [6] was achieved in their investigation that the continuing system of non-tillage on soil with a tiny texture caused to decrease yield by effects of condensation and poor aeration and period using of the moldboard is significantly caused to increase performance.

Hargrave et al [8] have studied on Effect of tillage on soil fertility in five consecutive years and have concluded that non-tillage systems accumulation of Food stuffs manganese, zinc, phosphorus, magnesium and calcium in soil is prepared, but the amount of potassium in the soil has been less. In conventional tillage, the soil is more uniformly in terms of material food.

Hemat and Asadi [9] were concluded in their investigation that non-tillage system is less performance in comparison with other tillage systems. The operated process of research shows that conventional tillage has been considered as the most important tillage implementation. In terms of efficient use of time, space, energy, and reducing of production costs, the consuming of hybrid machine is necessity acting on agricultural activities.

## CONCLUSION

In a general conclusion of tillage and planting yield in conventional methods according to the frequency of movement tractors and equipment on a farm is caused to increase production costs (spend a lot of energy and time, tractor depreciation and so on), soil compaction and so on. Average the barley yield was obtained in conventional tillage and reduced-tillage non-tillage system in 5000 kg, in 4500 and in 3500 kg per hectare respectively (figure 1). Non-tillage system or planting system by using of direct seeding machine as its opener slot is a dish-kind are offered on non-irrigate field and the field are irrigated by sprinkler and reduced tillage system in different physical condition, suggested instead of Conventional method (maximum tillage) for agriculture field, non-irrigate field and the field are irrigated by sprinkler led to reducing of production cost and increasing of Income and reducing soil compaction caused by Reducing traffic of tractor in field.

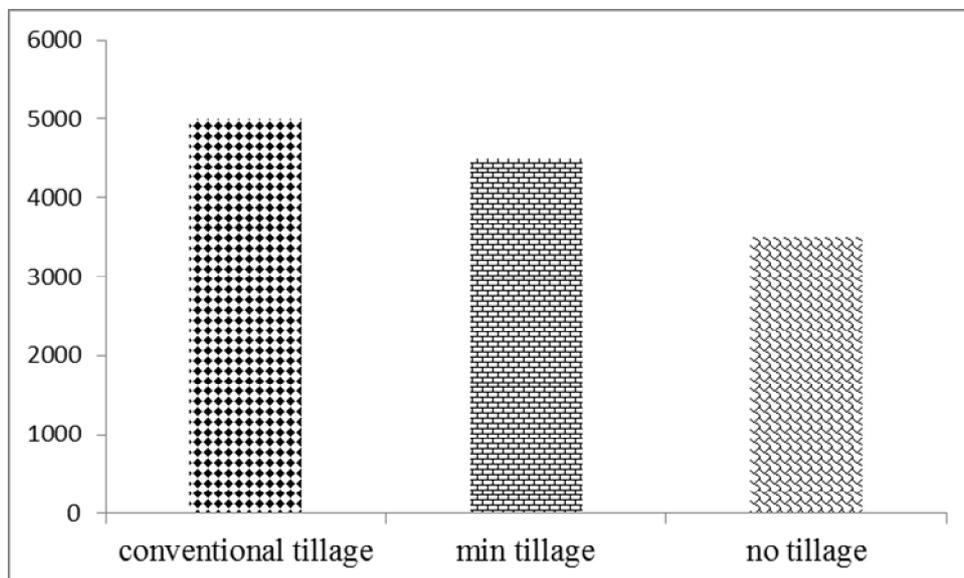


Figure1: Effects of tillage on barley yield

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