

# Investigate the effect tillage methods and chemical weed control on the yield of forage corn

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**ABSTRACT:** Conservation tillage systems have in recent years because of the benefits that our country has been welcomed by farmers and agricultural professionals. But there is a problem weed conservation systems compared with conventional systems which is attributed to the lack of soil disturbance caused to the control and elimination measures to be taken accordingly, in order to investigate the effect of tillage practices on weed control sprayers and forage corn experimental farm located in north of Ahwaz in Khuzestan Ramin University research farm was 93-1392. The experimental design was split plot in a completely randomized block design with three Tillage treatments included conventional tillage, reduced tillage and no tillage and weed control include spraying with five treatments microner sprayers, Atomizer and hydraulic (with nozzle Teejet) were performed three replications. Results showed that between tillage methods of weed density before spraying, there was no significant difference in the tillage and weed plants per 172 square meters which is the highest density with reduced tillage (131 plants m) was not significant. However, conventional tillage (70 plants per square meter) was significant. Between hydraulic sprayers microner respectively 82 and 78.03% effect, but no significant difference was observed between the two sprayers with spray Atomizer (64.14% of the effect) was significant. Fresh matter yield between tillage methods were different at 5% level. New treatment maximum of forage yield of 85,093 kg per hectare with reduced tillage and no tillage treatments with the lowest yield of 70,491 kg per hectare. Weed control treatments, there was no significant difference in the yield of fresh forage. Fresh corn forage maximum of forage yield of hand weeding (9018.7 kg) with a hydraulic sprayer (8638.1 kg) and microner (8362.1 kg) was not significant, but the sprayer Atomizer (7027.3 kg) and hand weeding (6042 kg) was significant.

**Keywords:** Tillage, Sprayers, Forage Corn, Weeds

## INTRODUCTION AND OVERVIEW OF THE RESEARCH

Today, with the rising costs of fossil fuels, massive soil erosion, intensive use of chemical fertilizers and pesticides and environmental concerns associated with water pollution and public spending do need to Technology New agricultural felt. Studies show that each year a large area of arable land in the world due to compaction and soil erosion are destroyed. The use of appropriate strategies to reduce nutrient losses and soil erosion is essential. Conservation tillage systems include reduced tillage and no-tillage is one of the useful methods to avoid this problem is (Limousin and Tessier, 2007). Maize (*Zea mays* L.) is one of the most important crops that produce more than 864 million tons, the highest rate among cereal crop production accounted for and a major source of food for millions of people around the world. (Anonymous, 2012). Aikins et al (2012) in corn tillage methods to reach the conclusion that conventional tillage with 10.61 tons per hectare, the highest grain yield and tillage 6.86 tons per hectare, the lowest yield of and reduced tillage with 8.99 tons was between the two placed. In a study in the

Philippines, it was found that conventional tillage system resulted in 9 to 18% increase compared to the no-tillage was corn yield and seed rate was by 17 to 19 % followed (Chen, 2013). Conservation tillage can increase soil moisture and reduce soil temperature increases the yield of maize (AfzaliNia, et al, 2011). Tillage systems affect the composition of weeds in a field. Changes in the vertical distribution of seeds in the soil and spread of herbicide resistance in weeds most important factors in the region are combined (Tow et al, 2011). Typically, perennial weeds in conventional tillage systems due to repeated plowing cannot be fixed But the population of this species and broadleaf weeds in conservation tillage systems with small seed a year would be increased (Kochaki et al, 1384; Kochaki and Bremndrazadh, 1388; Swanton et al, 1993; Meyer and Millard, 1995; Clement et al, 1996; Childs et al, 2001; Nalewaja, 2001). Population growth of perennial weeds in conservation tillage systems was not transferred to the proliferation of vegetative organs and the central place that may not be suitable conditions for germination, has been linked. However, in these systems, the plant roots are not removed shall be subject to the death (Shrestha et al, 2006). Mansouri and et al (1380) reported that dry weight of weeds in crops without plowing method compared to conventional tillage crops decreased by respectively 61 and 77 %. Today, weed control is to achieve efficient management component of modern agricultural purposes (Kohansal, et al, 1386). Herbicide use, and sometimes the most cost effective way to combat weeds is. High-yield agriculture is heavily dependent on herbicides. Despite the environmental problems that have been mentioned herbicides, these compounds are still important components of integrated weed management are considered (Zand et al, 1387). Bunting and et al (2005) reported that the use of herbicides for weed Nicoslfuron foxtail, wild millet, Polygonaceae and the ophrasti weed, Chenopodium album and Amaranthus, respectively, 80, 89, 47, 42 and 46% of control, but no had no effect on the Xanthiumstrumarium. Sikkema (2007) reported that 44% of Nicoslfuron herbicides reduced weed density and dry weight of maize increased by 70% and by up to 18% increased maize yield. Banijan et al (2012) reported that fresh matter yield between herbicide treatments Nicoslfuron and manual control, there is no significant difference but increased by 20% compared to untreated control is shown. According to increased cultivation of maize, as well as conservation tillage in the country and weeds as a major obstacle to the increase in production seems to be due to chemical control in conservation tillage systems is necessary.

### MATERIALS AND METHODS

The experiments in agricultural research farm of Agriculture and Natural Resources Ramin 1391-92 35km north of Ahwaz, Khuzestanin latitude 31 degrees 36 minutes and longitude 48 degrees 53 minutes and was conducted at an altitude of 20 meters above sea level. Field tested in the previous crop was cultivated the crop was harvested with combines. Before the implementation of the physical and chemical properties of soil were tested. Table 1 Physical and chemical soil test shows.

Table 1. Physical and chemical soil test

Factors tested	Soil texture	Amount of sand	Amount silt	Amount of clay	Acidity (ph)	Electrical conductivity of saturation extract ( $\frac{dc}{m}$ )	Organic materials
Amount	Clay loam	19%	44.5%	36.5%	7.6	5.2	1.03%

The experiment was a split plot in a randomized complete block design with three replications. That was the main factor tillage plots and each main plot was divided into three sub-plots and weed control methods were used in these plots. Subplots of 20 × 3, respectively. Three methods of tillage consisted of conventional tillage (CT) (moldboard + disk once), reduced tillage (RT) (combined Tillage) and No- tillage (NT) (culture direct) as main plots and three weed control methods include chemical control (chw), the control treatments without weed control (nw) and hand weeding control treatment (hw) (for performance comparison) as were subplots. The distance between rows and 75 cm in row 13.7 cm were considered. Four rows of each replicate were considered as an experimental unit and between the units were placed in a row away. Planting seeds of maize KSC.704 by 25 kg per hectare. And the rate of 150 kg and 300 kg of phosphate fertilizer N was applied based on soil test all fertilizer phosphate and 100 kg of nitrogen fertilizer with planting and 200 kg twice in a six- and eight-leaf stage of corn was added to the soil. After planting, irrigation was first and the second three days after the first irrigation water to irrigate the subsequent emergence of uniform seeds carried by air temperature as early as 5 to 7 days and at the end of the growing season once every 7 to 10 days, once took. Spraying operations to combat weeds 15 days after planting and from 2 to 4 leaf stage of corn using different canvas backpack sprayers Microner skn-3000 model sabzkooshnegin working on setting the fields of Iran it is designed to droplets produced while using the techniques of spinning plates, nozzles mounted on canvas users took advantage of this type of sprayer can easily mount the

device on its side to and move into the field to spray the back of his head, was carried out. Nicosulfuron herbicide used in this experiment at a rate of 2 liters per hectare. In order to measure the number and dry weight of weeds per square meter sampled Weeds during the growing season three times using a wooden box with dimensions 27 × 75 cm from each plot were randomly performed. I sampled before spraying 2 to 4 leaf stage of corn and two other sampling intervals was two weeks and one month after treatment. At each sampling, two plants of each plot was harvested corn and weeds around it and the number of weed species were counted separately. In order to measure the dry weight of the samples for 48 h at 72 ° C in the oven dry weight of each was measured. To reduce weeds calculated from equation (1) was used.

$$\text{Congestion reduction} = \frac{\text{Congestion after spraying} - \text{Congestion before spraying}}{\text{Congestion before spraying}} \times 100$$

To determine the yield and yield components measured at the end of the growing season when crops were in the early dough stage the two central rows of each plot by taking 0.5 m from the edge of both sides of each line were harvested plants harvested by hand sickles and weighed in the field to measure the dry matter yield of each of the limbs, 10 plants of each line in the final harvest after installing the measuring and weighing of the label were transferred to the laboratory. In the laboratory to measure the dry weight of plant organs, leaf, stem and ear separately for 48 hours at a temperature of 75 ° C in an oven and then weighed. All the calculations and the results of tests carried out using the SAS statistical analysis software Lsd test was used for comparison. Also charting was done by Excel software.

### RESULTS AND DISCUSSION

The most important weeds that was included in the experimental farm of weeds *Cyperus*, *Convolvulaceae*, *Convolvulus avensis*, *Malvaparviflora*, *Portulacaolaracea*, *Circiumarvense*, *Alhajicamelerum* and *hinochloa crus-galli* there were almost equally on the farm. Variance analysis of the impact of different tillage methods on the number and dry weight of weeds before spraying in Table 2 indicate that tillage methods at 5% level on the impact of weeds have been significant. But has no significant effect on the dry weight of weeds The results Freebairn et al (2003) and Arzanesh et al (1387) corresponded with the results of Mansouri et al (1383) and Jajry et al (1999) does not correspond.

Table 2. Analysis of variance of number and dry weight of weeds before spraying

Sources of change	Degrees of freedom	Means of square	
		Number of weeds	Dry weight of weeds
Blocks (R)	2	15136.82	3013.75
Tillage (T)	2	40122.75*	16665.07
Error (E)	2	5855.88	7417.99
The coefficient of variation (C.V%)		22.88	16.73

\* And ns, respectively, with no significant difference at 5%, 1% and did not show significant differences

Chart 1 shows the number of weeds in the area between conventional tillage and no tillage systems, there was no significant difference but the reduced tillage method with other two methods showed no significant difference. Most of the weeds without tillage, with 172 plants per square meter and the lowest number of weeds associated with conventional tillage and reduced tillage with 65 plants per square meter, with 130 plants per square meter of weed It was between the two located. The vertical distribution of weed seeds in the soil due to tillage and soil characteristics are changed, the vertical distribution of seeds in layers moldboard plow tillage depth is almost identical. In contrast, under no-till conditions, the seeds are concentrated near the soil surface. On the other hand, because of are not no-tillage and no tillage systems Remain undisturbed soil and weed seeds germinate as providing appropriate environmental conditions, but in the conventional tillage system, weed rhizome fragmented due to the inversion weed seeds in the soil with weed is taken deep into the depths of appropriate conditions for germination and growth of their weeds.

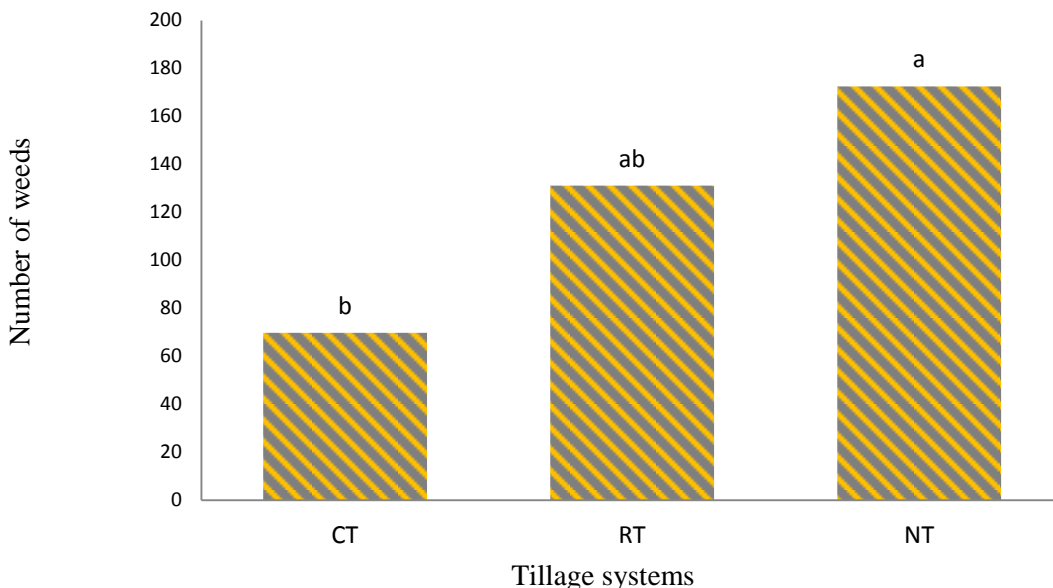


Figure 1. compares the average number of weeds before spraying the tillage system

Table (2) Effect of tillage systems on weed density in samples 15 and 30 days after spraying was not significant. But the greatest density of sampling in both conventional tillage (56.53, 79%) and the lowest density of reduced tillage (43.79 and 65%, respectively). Chemical control of weeds at 15 and 30 days after spraying in order to reduce the 54.07 and 87.79 % were weeds. The effect of tillage on yield of fresh forage maize: analysis of variance tillage and weed control on the yield of forage maize showed that tillage and weed control at 5% level at 1% are significantly different however, the interaction of tillage and weed control methods on any level was not significant (Table 3). Reduced tillage and no tillage with an average of 85,093 kg to 70,491 kg ha-ha fresh forage yield was lowest (Figure 2). Due to lower performance in the tillage method versus other methods of tillage of no-till in corn seedlings settlement weaker, less air, soil and weeds compete with corn in the early stages of growth. And increased performance due to reduced tillage systems compared with conventional tillage increased accessibility of phosphate and nitrate in the soil (Wright et al, 2007). Figure 3 shows that hand weeding with the average yield was 8930 kg ha that chemical control was not significantly and treated untreated control had the lowest yield averaged 5994 kg ha the other two treatments were different at the one percent level. The results are Abeen et al (1388) reported that the lack of weed control was reduced to 60% of fresh forage yield corresponded.

Table 3. Analysis of yield components of forage maize

Sources of change	Degrees of Freedom	Means of square	Wet weight of forage	Dry weight per ear
Blocks (R)	2	481.44	3118012.5 ns	7451.94 ns
Tillage (T)	2	1083.11 ns	5392923.7*	27075.02 ns
E <sub>a</sub>	4	317.88	1288889.69 ns	22013.01 ns
Weed control (CO)	2	1610.77**	23044568.06**	168239.29**
Tillage x weed control (TxCO)	4	12.88ns	1593942.80 ns	14792.43 ns
E <sub>b</sub>	12	48.40	1221858.33	18444.43
The coefficient of Variation (C.V%)		3.55	14.11	17.2

\*, \*\* And ns, respectively, with no significant difference at 5%, 1% and did not show significant differences

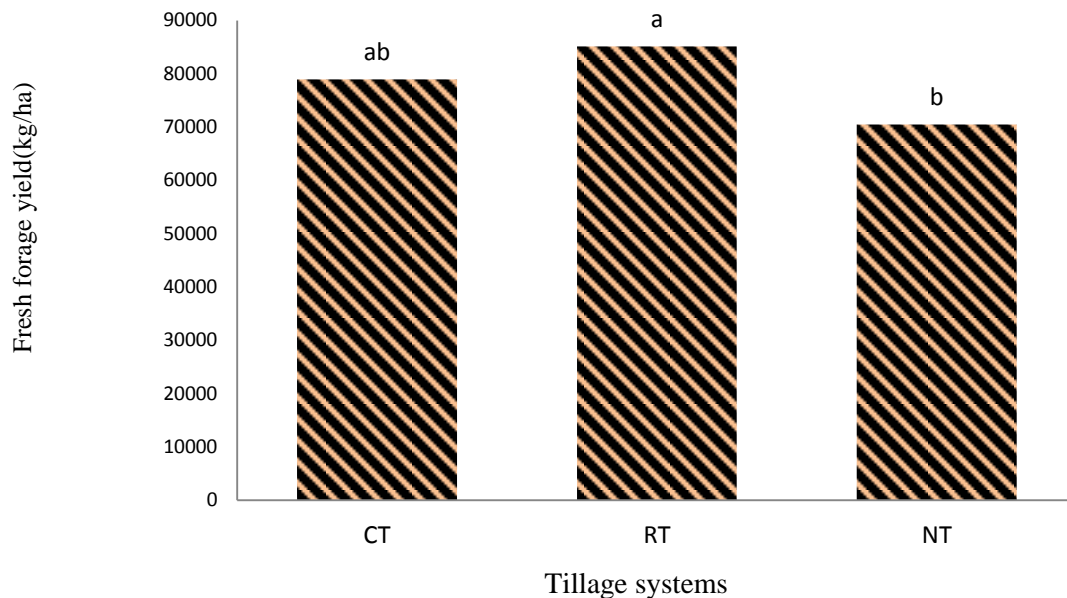


Figure 2. compares the average effect of different tillage methods on yield of fresh corn

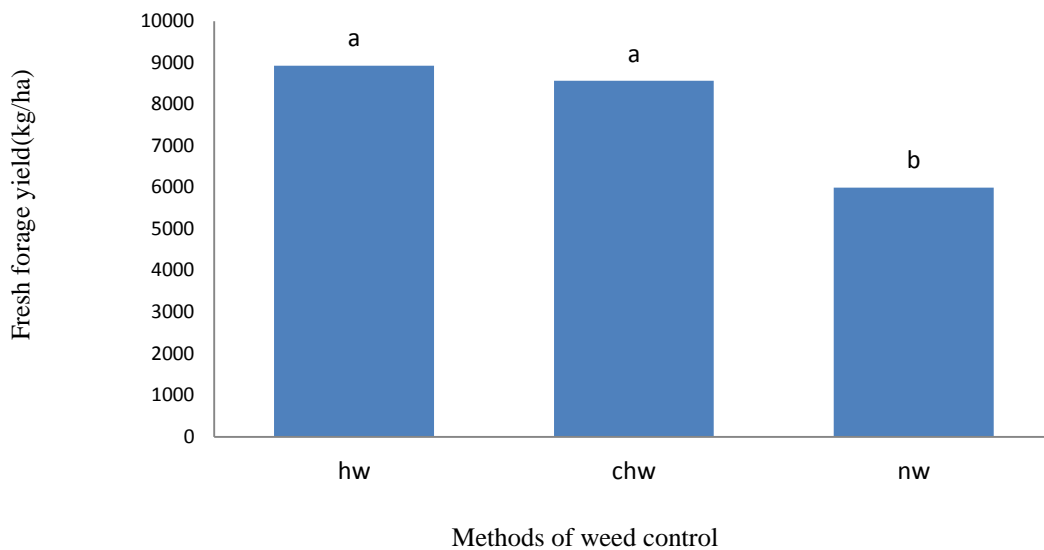


Figure 3. compares the average effect of weed control methods on yield of fresh corn

Effect of tillage methods on corn plant height, according to Table 3 tillage corn had no significant effect on plant height. However, weed control methods on plant height was significant at the 1% level. Hand weeding and plant height 205.7 Sunny meters Maximum plant height was not significantly different from that of chemical control and non-control treatments with average 180.6 cm, had the lowest plant height (Figure 4). One of the competitors tenacious weeds are growing crops for resources. One of the main sources of dietary nitrogen requirement of crops. Nitrogen increases the growth rate of the product is high (MollaHossen et al, 1385). So it can be inferred observational high density growth and simultaneously reduce the growth of weeds and their control of the corn has been height.

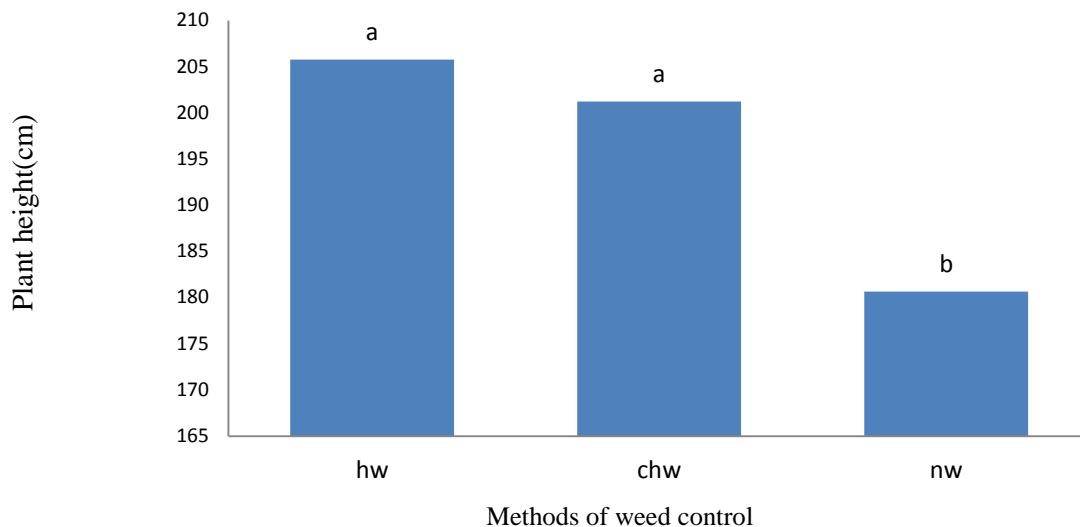


Figure 4. compares the average effect of weed control methods on maize plant height

Effect of tillage and weed control methods on maize dry weight: Analysis of variance showed that the effect of tillage method on corn ear weight, there was no significant difference but the effect of weed control methods on maize dry weight was significant at the 1% level (Table 3). Hand weeding, averaging 865.15 g dry weight m highest ranked ear with the same level of chemical control and non-control treatments with average 627.5 grams per square meter ear had the lowest dry weight (Figure 5). Gupta (2004) stated that in addition to the height and weight of weeds in corn and grain number per ear, ear length decreases as well as Ghyasvand et al (1388) reported that the effect of herbicide on the weight, ear length corn is very significant.

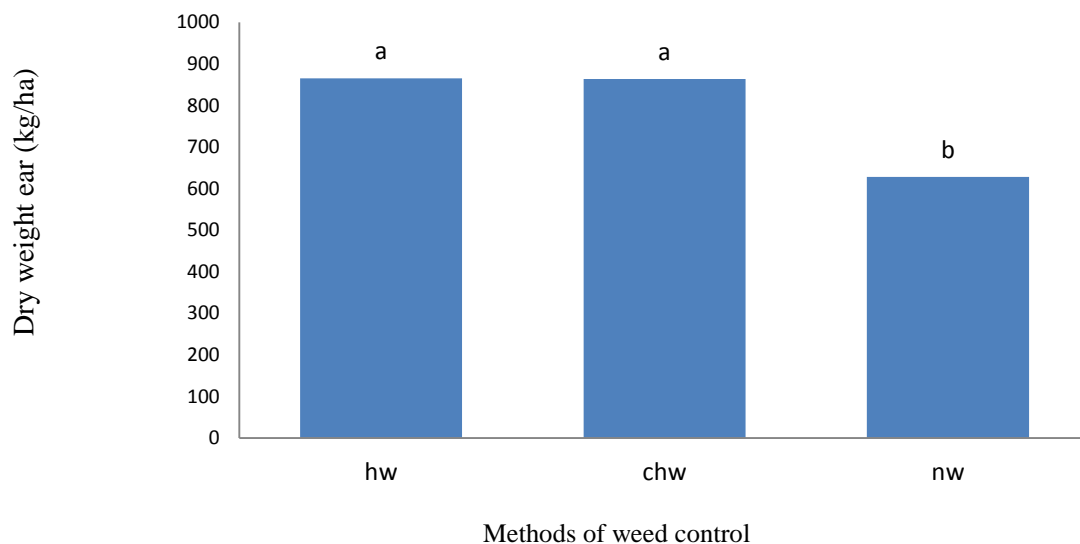


Figure 5 .compares the average effect of weed control methods on maize ear dry weight

### CONCLUSIONS

Results in reduced tillage most with an average 85,093 kg ha and no-Tillage and minimum yield of 70,491 kg per hectare was fresh. Chemical control of weeds at 15 and 30 days after spraying in order to reduce the 54.07

and 87.79 % were weeds. Since the chemical control of weeds by hand weeding and no significant differences in any of the parameters evaluated were observed in forage maize it can be said in three tillage systems on weed chemical control is recommended. Density and weed dry weight in terms of reduced tillage increased. The difference between the density and dry weight of weeds. Seed of different tillage treatments were applied before weed control was more. And treatments, the difference was less than the maximum reduction in weed density treatments of conventional tillage + hand weeding treatments on weed density and the lowest percentage of low tillage + the lack of control.

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