Effects of Wheat Stubble Management on Corn Performance in North of Khozestan Province, Iran

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Abstract: Increasing of straw and other organic materials is resulted in accumulation of non-decayed material on the soil surface. These non-decayed materials which cover the soil surface can improve soil organic matter. Adding of organic matters such as livestock manure, green manure and compost combined with using suitable tillage method can improve the soil texture. To examine the effects of crop stubble and tillage equipment on corn grain yield a study was conducted where residue was covered the soil. Four tillage methods, three amount of wheat residues and three levels of nitrogen fertilizer were applied. A split plot with completely randomized block design with three replication was conducted in shoushtar, Khozestan province, Iran in 2009-2010 growing season. Three levels of wheat residue, 2, 3 and 4 ton/ha were applied and wheat residue was burnt in conventional method. Tillage methods were (shredder + moldboard plow + disk), (shredder + double disk), (moldboard plow + disk and double disk). Three levels of nitrogen fertilizer 400, 500, 600 kg/ha were used for this experiment. Analysis of the resulted data showed that using (stalk shredder + moldboard plow + disk), 3 ton/ha wheat residue and 500 kg/ha nitrogen had the significant effect (p<1%) on grain yield, which produced 35% more in grain yield. There were significant effects on tillage and interaction between tillage and nitrogen amount (p<1%) in weed population. Also shredder treatment showed minimum number of weed, which was decreased by 28%. The harvest index was 32/24% where (shredder + moldboard plow + disk), 3 ton/ha wheat residue and 500 kg/ha nitrogen were applied.

Key words: tillage, wheat stubble, corn yield, nitrogen, shredder

INTRODUCTION

Using advance methods for planting corn will cause a balance in spreading seeds on the surface of field will lead to save seeds and decrease most of the problems beyond planting such as competition for using of water supplies and soil nutrients. The significance of using different plating methods for crop production was identified by attending the agro technique, economic and social situations. Increasing production potential in the area of field, using of machinery technology can be effective in agricultural projects. In recent years using of planting techniques which prepare a suitable seed bed and plant seeds in apparently equaling depth is necessary. Result of the combination of planting irrigation caused a decreased in percentage of the number of seeding in the area of field (Darbiy and lowery, 1986).

Add organic matter to increase the variety of animal manure, green manure, compost, along with proper tillage is possible. In addition, environmental pollution resulting from the use of chemical fertilizers has focused the majority of farmers to use organic fertilizer (Jarlhy, 1998; Taky, 1999; Afzali, 2006; Griffith et al., 2000; Aswan et al., 1995; Lmaras et al., 2001) reported that due to crop residue on the soil surface in no-till and minimum tillage systems, and ghosting the soil surface and the reflected solar rays, the temperature of these soils lesser than soils which has been tilled. Soil temperature in reduced tillage and no tillage systems has been attributed to amount of crop residue on the soil surface. Hulburt and Menzw, 2002 reported that In a soft soil Or in the land tillage, using twice of conventional rotating intern placement high percentage of surface materials is at a depth of 15 cm of soil. But once using of this appliance added the maximum amount of material the depth of 5 cm into the soil (Hulburt and Menzw, 2002; Afzali, 2006) achieved in most the treatments, chopping the remains didn't have significant impact in their buried But there were also much differencing in the treatments that The disk is used. So we can say if we chopping Stubbles before disc will become cause of burring more remains (Almasi, et al.,1998; Afzali, 2006).

MATERIALS AND METHOD

The experiment was conducted at Shuoshtar region (49° 14’ E and 23° 2’ N), 90 Km north of khozestan, province, Iran. In order to determine the physical and chemical properties of soil land which is on the test, before planting in soil samples were taken in depth of 30-0 and 60-30 cm. After breaking out conglomerate and
sifting them then Samples mixed together and prepared a composite sample. Testing was conducted by split-split plot design in randomized complete block design in three repeated, that every repeated had 37 plot which their dimensions were 6 meter in 10 meter. This experiment was conducted on July 2010 and then quantity of crop residues identified via Photos from the standard and based on treatments residual quantity determined 2000, 3000 and 4000 kg per ha. Tillage treatments were included: 1 - Moldboard + Disk, 2 - Doing twice disk, 3 - Stalk Crushing + Moldboard + Disk, 4 - Stalk Crushing + Doing twice disk. Doing cultivator was done between the rows in order to destroy weeds, also cultivator equipment was mechanical weeding. In order to determine yield components, the area of three square meters of each plot was harvested by hand then they were put in a dryer for 24 hours and at 75 °C and next step samples were dried and the grain were separated from the cob and then they weighted (jamshidi and asoodar 2006). To examine changes in plant dry matter during the growing season sampling from 3 m square was done in stages of stem elongation, to spike, flowering, deciduous, the dough, and physiological maturity then Samples were put in a dryer for 24 hours and at 75 °C and next step they weighted (jamshidi and asoodar 2006). In order to determine the overall performance of the yield 3 m square from each plot was harvested and after separation and drying, was weighed and then was considered as biological performance.

RESULT AND DISCUSSION

Figure (1) shows comparison of effect of wheat crop residues on maize performance. Different level of wheat crop residue have significant impact on maize yield, it also has become caused increasing performance. The most yield performance that is 7491.33 kg per hectare in average is related to 3 tons residue per hectare. this result is due to residue on the soil, being residue in soil is caused to hollow soil, increase soil organic matter, improve of microorganism activity, improve keeping soil moisture Which acts like a sponge and also, Prevent of burning crop residue that are very good resources for soil and agricultural. Reicosky, and Lindstrom, 1995, jamshidi and asoodar 2006, found that preservation of crop residue on the soil is caused Soil fertility, increasing soil organic matter and increasing yield of maize (Jarllhy, 1998., Oderdonk and Kercheson, 2002).

According Figure (2) Maximum harvest index with average of 33.506 percent is belong to tillage (moldboard plow + disk + shredder) and 3 tons of crop residues per hectare and also minimum harvest index with average 28.924 percent is belong to Tillage (shredder + Doing twice Disc) and 4 tons crop residue per hectare. This could be the result of using shredder that is caused of better crushing of wheat residues and also using moldboard plow and disk is caused of better mixing nitrogen with soil and residue. Griffith et al., (2000) found that using moldboard plow is caused of better mixing crop residue with soil, that this matter is effective in harvest index (Hulburt and Menzwl, 2002).
Fig. 2: Interaction effect of tillage on the average harvest index

According to Figure 3 that shows the effect of tillage on mean 1000 seeds weight, it can be seen that maximum weight 222.87 gram and minimum weight 209.24 gram are belonged to moldboard plow and disk and shredder treatment and moldboard plow and disk treatment, respectively. This difference can be effect of using shredder that is caused of better mixing crop residue with soil. Nourian et al., 1385, found that if tillage be done appropriately, which can be caused of remaining crop residues on the soil, it would have effect in increasing mean 1000 seeds weight (Drury et al., 2003, Nourian et al., 2006).

Fig. 3: Effect of tillage on mean 1000 seeds weight

Conclusion:
Moldboard plow and disk and shredder treatment and 3 tons wheat residue per hectare and 500 kg nitrogen fertilizer increased 35% performance in comparison with performance of witness treatment. The Lowest number of weed is belonged to this treatment which have had 25% decreasing in comparison with witness treatment. The most harvest index value 32.2 percent is belonged to treatment that is included moldboard plow, disk, shredder, 3 tons wheat residue per hectare and 500 kg nitrogen fertilizer.
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