THE INFLUENCE OF MINIMUM TILLAGE SYSTEM ON CORN PRODUCTION DURING THE PERIOD 2014-2015 AT ARDS TURDA

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Abstract. *Minimum tillage systems on soil chasing the conservation and efficient use of natural resources, biological and water. By surrendering to plowghing with moldboard plow in whole or in part by streamlining periodic tillage and keep at the ground surface of at least 15-30% of all plant debris, protect soil the sheeterosion, it also eliminating at the same time the phenomenon of soil compaction. A proper crop rotation is alternating in culture plants with strong rooting with shallow rooting plants, leguminous plants have favorable effect for the successor cultures, soil nitrogen impruvement and contributing to the development of the root system. The experiment realised at ARDS Turda, is being organized by the method of the plots subdivided. The experimental factors are: The system of soil work (A): 2 graduation: a_1 – conventional method with plowghing – preparation of the soil – seeding + fertilizing; a_2 – minimum tillage: work with chisel. Fertilization (B): 2 graduation: b_1 – fertilizing with $N_{40}P_{40}$ at the same with seeding; b_2 - fertilizing with $N_{40}P_{40}$ at the same with seeding + fertilizing with N_{40} in 4 - 6 leaves of maize. Year factor (C) 2 graduation: c_1-2014; c_2 -2015. In research conducted at ARDS Turda on 2014-2015, in the cultivation of corn in the system with minimal compared to classic productions obtained system reflects the fact that maize is still a pretentious plant both climatic conditions and approach towards soil requirements.The positive influence of classical system of soil work on corn production conducted to realized a production of 5300 kg/ha (grains) comparative with minimum tillage whwrw productions registered was value 4531 kg/ha, differents is 769 kg/ha. Adittional fertilization with N_{40} increase production with 242 kg/ha in the classical system and 249 kg/ha in the minimum tillage. By applying minimum tillage system soil aims primarily to combat soil erosion and water retention in the soil so it is so specially important to watch the long term effect of applying them to the environment.*

Key words: *climatic conditions, corn, minimum tillage system, production.*

INTRODUCTION

World demand and grain growing, being subject to overload earth it will exhaust resources, accelerating the process of erosion with serious long-term consequences (BROWN, 1984). Maintaining a certain ballances in agroecosystem is the foundation of sustainable agriculture through agrotechnics measures and the works required, ensure the adjustment its components, without irreversible ecological consequences (RUSU ET AL., 2005). The interaction of environmental factors in relation to antropogenic land condition influenced with many soil degraded by erosion or temporaly excess of moisture (GUS ET RUSU, 2011; CHETAN ET AL., 2013) which impose restrictions on the structure of the system, machine and tractor station to ensure the mechanization on the slope. According to the INS (STATISTICAL YEARBOOK OF ROMANIA, 2016), although the area cultivated with corn in 2015 have increased with 15.2 thousand hectares compared to 2014, the average yield was achieved by comparing 3509 kg/ha (figure 1).

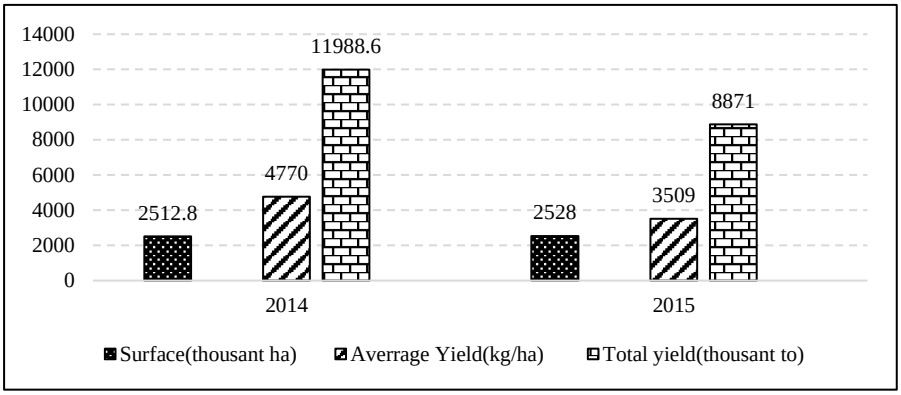

Fig.1. Areas and production obtained in Romania in the year 2014

Maize is one of the most important culture crops worldwide, its use is: people food, feedstuff industry in the manufacture of bioethanol (Scurtu, 2001). Corn has high demands of climatic factors and approach towards edaphic, temperature being the limiting factor in the area of culture's expansion throughout the duration of vegetation and requiring monthly average temperatures: 20ºC in 16 may, 19-20ºC in June, than 21ºC -23ºC in July, 19-22ºC in august and 14-17ºC in September, in close conection with the production. Approach towards moisture, corn is pretentious but, due to the coefficient reduced sweating (230-440), a well developed root system and opportunities opening not only to reduce the surface of sweating through the leaf in case of twining leaves, is considered a plant resistance to drought (Muntean et al., 2008; HAŞ ET AL., 2010). Of great importance are high rainfall from October to April, and soil water reserve in the magic corect to entail the establishment of sowing density (GUŞ ET AL., 2004).

Part of the conservative, non-conventional systems agriculture, minimum soil tillage system that represents one of the most important elements of technology. Unconventional system, means giving up plowing with moldboarg plow total or periodically, the rationalization of the number of works and keeping the soil surface of at least 15-30% of the total vegetable scraps (RUSU, 2005; MARIN ET AL., 2012; CHEŢAN ET AL., 2013; ŞIMON ET AL., 2013; CHEŢAN ET AL.,2016). By applying this system aims to reduce soil erosion and compactation, soil and water conservation, protection of plants with non-polluting substances to the environment (FABRIZZI ET AL., 2005; MORARU ET AL., 2010; BUCUR ET AL., 2011).

Purpose of research is the development an the conservativ system through the experimentation in conventional system and minimum tillage in relation with fertilization.

MATERIALS AND METHODS

The experiment realised in 2014-2015 at ARDS Turda, situated in Transylvania Plain, on a preluvosol with texture sandy loam-clay type, pH-neutral, supply good and very good with mobile phosphorus and potassium, soil in humus content is medium (3.5%).

The experiment realised is an threefactorial experiment, organized by the method of the plots subdivided. Experimental plots is a surface of 48 m^2. In the experience of maize seeding he was realised with, MT 6-Maschio Gaspardo machine, used Turda Star hybrid created at ARDS Turda, seeds treated with insecto- fungicides against deseases and pest (Royal Flo 42 S 3.5 l/ton of seeds). Density of seeding was 65.000 plants/ha and incorporation on 5 cm depth.

The experimental factors are: The system of soil work (**A**): 2 graduation: a_1 – classical method with plowghing – preparation of the soil – seeding + fertilizing; a_2 – minimum tillage: work with chisel. Fertilization (**B**): 2 graduation: b_1 – fertilizing with $N_{40}P_{40}$ at the same with seeding; b_2 - fertilizing with $N_{40}P_{40}$ at the same with seeding + fertilizing with N_{40} in 4 - 6 leaves of corn. Factor (**C**) year: 2 graduation: c1 -2014 and c_2 -2015. For weed control herbicide was applied: preem 0,4 l/ha Merlin Flex + Glifosat 3,0 l/ha and on the vegetation was applied Esteron (0.8 l per ha) + adjuvant Trend (0.3 l per ha). Determination of production was achieved through harvesting, calculated per hectare, followeed by correcting the STAS humidy of 14%. The experimental data were processed by analysing the variant and setting up the Least Significant Difference - LSD (5%, 1%, and 0.1%).

The climatic conditions of the experimental period are presented in *figure 2* and *figure 3* (Turda Weather Station).

As seen in *figure 2*, over the last 13 years the average monthly values of temperatures are higher as compared to the average of the last 59 years. From the thermic point of view, having the annual average value of 11,1ºC, the year 2014 is characterised as being the hottest of the last 59 years (the average multiannual temperature is of 9,1ºC). The year 2015 was a hot year with the average annual temperature of 10,7ºC. *Figure 3* presented the pluviometric regime: the year 2014 was rainy, as only four months were normal from the pluviometric perspective (May-August), the rainfall was low during the first half of the year 2015, whereas the second half of the year was to be rainy, the highest values of rainfall being registered in the month of September (172,5 mm).

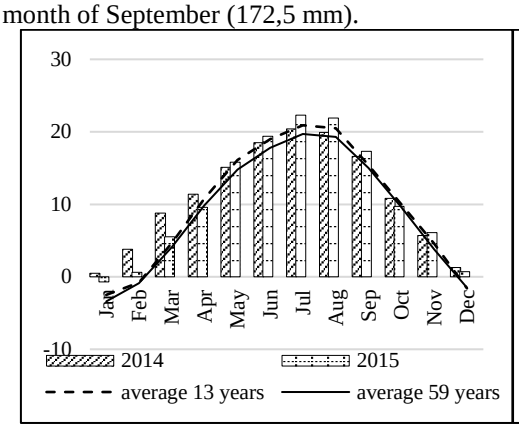

Fig.2. The thermal regime ARDS Turda, 2014-2015

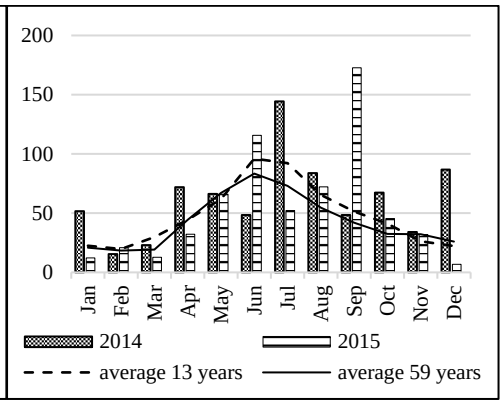

Fig.3.The rainfall regime ARDS Turda, 2014-2015

RESULTS AND DISCUSSIONS

Maize production, is influenced by the system tillage, influences induced by it in the culture protection, but also under the influence of climatic factors, in specially temperature and precipitation.

At the cultural hygiene corn contributes directly a rotation crops, work the soil, fertilization, sowing, crop-weed maintenance, disease, pests. Choosing the right hybrid that take full advantage of the potential of soil and climatic factors along with compliance with all technological chain, represents the basic element to produce a healthy and high production. Maize has demonstrated that needs a piece of soil aeration, that is why it calls each year to a slaughter of the experimental plots where they are seeding corn.

The positive influence of classical system of soil work on corn production conducted to realized a production of 5300 kg/ha (grains) comparative with minimum tillage where productions registered was value 4531 kg/ha, differents is 769 kg/ha (table 1).

Table 1

The influence of tillage system on maize yield capacity, ARDS Turda, 2014 - 2015

Tillage system (A)	Yield, kg/ha	Yield %	Differences, ± kg/ha	Semnification
Classic a_1	5300	100.0	0.00	mt
Minimum tillage a_2	4531	85.5	-769	000

LSD 5% = 62 kg/ha; LSD 1% = 102 kg/ha; LSD 0.1% = 192 kg/ha.

In the 3 leafs phenophases, when the root of maize has already recorded a rapid growth and capacity of absorption of nutrients and water, additional fertilization is very important, an addition of nutrients. In the 3 leafs phenophases, when the root of maize has already recorded a rapid growth and capacity of absorption of nutrients and water, additional fertilization is very important, an addition of nutrients. Additional fertilization (with N_{40}) very significant influence maize production, increase production with 245 kg/he (table 2).

Table 2

The influence of fertilization on maize yield capacity, ARDS Turda, 2014 – 2015

Fertilization (B)	Yield, kg/ha	Yield %	Differences, ± kg/ha	Semnification
b_1 (one fertlilizing)	4793	100.0	0.00	mt
b_2 (two fertilizing)	5038	105.1	245	***

LSD 5% = 37 kg/ha; LSD 1% = 54 kg/ha; LSD 0.1% = 82 kg/ha.

The year in complex with other factors influencing production. Higher production values are obtained in the richer in precipitation that provide fertilizer applied in solubilizing the early stages of vegetation, therefore production increases were relatively small in both 2014 and 2015, the differences being between 168-332 kg/ha (table 3).

Table 3

Influența interacțiunii factorilor sistem de lucrare a solului x fertilizare x an asupra producției de porumb în 2014-2015, la SCDA Turda

Year	System of work	Fertilization	Yield, kg/ha	Differences, ±kg/ha	Semnification
2014	Classic	b_1 (one fertlilizing)	5277	0	Mt.
2015	Classic	b_1 (one fertilizing)	5081	196	-
2014	Classic	b_2 (two fertilizing)	5506	0	Mt.
2015	Classic	b_2 (two fertilizing)	5338	168	-
2014	Minimum tillage	b_1 (one fertlilizing)	4583	0	Mt.
2015	Minimum tillage	b_1 (one fertilizing)	4230	353	0
2014	Minimum tillage	b_2 (two fertilizing)	4821	0	Mt.
2015	Minimum tillage	b_2 (two fertilizing)	4489	332	0

LSD 5% = 75 kg/ha; LSD 1% = 109 kg/ha; LSD 0.1% = 163 kg/ha.

CONCLUSION

Maize production is influenced by the system tillage, fertilization and climatic condition.

The positive influence of classical system of soil work on corn production conducted to realized a hight production comparative with minimum tillage whwere productions registered was lower, differents is 769 kg/ha.

Adittional fertilization with N_{40} increase production with 242 kg/ha in the classical system and 249 kg/ha in the minimum tillage.

Higher production values are obtained in the richer years in precipitation that provide fertilizer applied in solubilizing the early stages of vegetation, the year 2015 characterized as a dry spring, have had a negative effect on the crop.

The influence of the years are very strong, for the production of corn, has led to the overcoming of the classical minimum system with differences being recorded productions of 263 kg/ha.

The production results obtained in the two systems work the soil have close values, but it should be borne in mind that by applying minimum tillage systems on soil chasing the fight against soil erosion and retention of water in the soil.

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