

RESEARCHES ON THE EFFICACY OF HERBICIDE TREATMENTS AT MAIZE CROPS ON THREE TYPES OF SOIL IN ENVIRONMENT CONDITIONS OF SATU MARE COUNTY

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Abstract

In this paper we present the results obtained during year 2016 on the maize crops. The obtained results from the experiments located on three types of soil from Satu Mare County are presented below.

Two areas characterized by the different soil conditions: Livada (Satu-Mare County) with a typical clay soil and Bervenii (Satu-Mare County) with typical chernozem and histosol were used in this study.

In this experiment, the floral composition of weeds and the effectiveness of herbicide treatments on the three soil types were followed.

Key words: maize, soil type, efficacy of herbicides.

INTRODUCTION

By the nature of their biology, the maize plants are characterized as totally unlikely to compete with weeds because they have a slow growth in the first 4-6 weeks, which associated with the reduced number of plants per 1 square meter (4-7 plants / sq.meter), it creates a competition from the beginning with a major advantage in favor of weeds.

Recent global research has helped to synthesize new chemicals, making new herbicides, combined herbicides (based on 2-3 active substances). These substances have a number of advantages such as increasing efficiency by widening the spectrum of weed control, diminishing the residual effect and the environmental impact, reducing doses and spending with the application of herbicides(Ciobanu Cornelia 2005).

MATERIAL AND METHOD

The experiments were located in Satu-Mare County at SCDA Livada on a typical clay soil with a pH of 5.6, a clay content of 22.4% and a humus content

of 1.8 and at Berveni (Satu Mare County) on two soil types: typical chernozem with a pH of 7.9, a clay content of 27.5% and a humus content of 3.4 and histosol with a pH of 5.1 and the organic content of 86% being a nutrient-rich soil.

The experiment were conducted on the Latin rectangle method in three blocks, the plot area being 21 square meters.

The treatment variants for which the herbicide effectiveness was tested were:

Table 1

The application scheme of herbicide treatments at maize crop during year 2016 on typical clay soil, typical chernozem and histosol in Livada and Berveni

No. Var	Herbicide Treatments	Dosage l, kg/ha	Active Substance
1	Dual Gold + Lancelot Super	1.5+0.033	(S-metolaclor 960g/l) + (aminopiraliid 30% + florasulam 15%)
2	Adengo	0.3	Isoxaflutol 225g/l + tiencarbazon 90g/l + (safener)
3	Adengo	0.4	Isoxaflutol 225g/l + tiencarbazon 90g/l + (safener)
4	Dual Gold + 2,4D	1.2+1.0	(S-metolaclor 960g/l) + acid 2,4D
5	Dual Gold + 2,4D	1.5+1.0	(S-metolaclor 960g/l) + acid 2,4D
6	Frontier Forte + 2,4D	0.8+1.0	(dimetenamid 720g/l) + acid 2,4D
7	Frontier Forte	1.2	dimetenamid 720g/l
8	GardoprimPlusGold + Elumis	3.5+2.0	(S-metolaclor 312,5g/l+terbutilazin 187,5g/l) + (mesotrione75g/l+nicosulfuron30g/l)
9	GardoprimPlusGold+ Elumis	4.0+1.0	(S-metolaclor 312,5g/l+terbutilazin187,5g/l) + (mesotrione 75g/l + nicosulfuron 30g/l)
10	Laudis 66 OD	2.0	tembotrione 44g/l + (safener)
11	Laudis 66 OD	2.25	tembotrione 44g/l + (safener)
12	Lumax	3.5	mesotrione 37,5+S-metolaclor 375g/l+terbutilazin 125g/l
13	Merlin Duo	2.0	terbutilazin 375g/l + isoxaflutol 37,5g/l
14	Merlin Duo	2.5	terbutilazin 375g/l + isoxaflutol 37,5g/l
15	Pendigan +2,4D	4.0+1.0	Pendimetalin 330g/l + 2,4 D
16	Zeagran+Crew	2.0+1.5	(bromoxinil 90g/l+terbutilazin250g/l)+nicosulfuron 40g/l
17	Principal + Trend	0.09+0.25	nicosulfuron 42,90% + rimsulfuron 10,70% + adjuvant
18	Principal + 2,4D + Trend	0.09+1+0.25	nicosulfuron 42,90% + rimsulfuron 10,70% + 2,4 D + (adjuvant)
19	Callisto Max	1.25+0.25	nicosulfuron 40g/l + mesotrione 480g/l
20	Callisto Max	1.5+0.33	nicosulfuron 40g/l + mesotrione 480g/l
21	Untreated	-	-

The moment of herbicide treatment application was different: pre-emergence, pre-emergence + post-emergence, post-emergence.

The biological material used in the experimental fields was DK4590 maize hybrid. This maize hybrid is an early hybrid from Dekalb, is from FAO

350 group, with an excellent production potential and water stress tolerance. It is resistant to the main maize diseases, at break and fall, quickly loses water to maturity. It reacts very well at the high intake of fertilizer.

RESULTS AND DISCUSSION

The floral composition of weeds from maize crops on the three types of soil is different, and is generally determined by the climatic conditions, by the level of fertilization, by the location conditions, by the level of applied technologies, by the effectiveness of control measures and last but not least by the type of soil.

The estimation of herbicide treatment efficacy was done by counting weeds by species at 1 square meter in each variant.

Analyzing the efficacy of herbicide treatments on typical clay soil we found that the best weed control was obtained in the variant treated with Gardoprim Plus Gold (3.5 l/ha) applied preemergent and associated with the post-emergence application of herbicide treatment of Elumis (2.0 l/ha) and in the variant treated with Merlin Duo (2.5 l/ha) applied preemergent.

On the typical chernozem we obtained the highest efficacy in variant no. 8, treated with herbicides Gardoprim Plus Gold (3.5 l/ha) applied preemergent associated with the herbicide Elumis (2.0 l/ha) applied post-emergence, followed by the variant treated with Zeagran (2.0 l/ha) + Crew (1.5 l/ha) applied post-emergence.

As with typical clay soil and typical chernozem, and also on histosol, the best efficacy was obtained for the variant treated with Gardoprim Plus Gold (3.5 l/ha) applied preemergent + Elumis (2.0 l/ha) applied post-emergence. Very good weed control was also obtained in the variant treated with Laudis (2.0 l/ha) applied in postemergence.

The results obtained from the experiments on the three soil types: typical clay soil, typical chernozem and histosol show that a very good efficacy was obtained on all soil types in the variant treated with the herbicide Gardoprim Plus Gold (3.5 l/ha) applied preemergent associated with the herbicide Elumis (2.0 l/ha) applied postemergence.

Table 2

The efficacy of herbicide treatments at maize crops on typical clay soil, typical chernozem and histosol

No. Var	Herbicide Treatments	Dosage l, kg/ha	The efficacy %		
			typical clay soil	typical chernozem	histosol
1	Dual Gold +Lancelot Super	1.5+0.033	43	31	16
2	Adengo	0.3	52	32	18
3	Adengo	0.4	53	53	35
4	Dual Gold + 2,4D	1.2+1.0	58	34	39
5	Dual Gold + 2,4D	1.5+1.0	72	42	43
6	Frontier Forte + 2,4D	0.8+1.0	66	41	28
7	Frontier Forte	1.2	44	43	42
8	GardoprimPlusGold + Elumis	3.5+2.0	96	81	87
9	GardoprimPlusGold + Elumis	4.0+1.0	82	75	71
10	Laudis 66 OD	2.0	43	62	85
11	Laudis 66 OD	2.25	74	46	85
12	Lumax	3.5	80	55	44
13	Merlin Duo	2.0	81	49	67
14	Merlin Duo	2.5	88	59	56
15	Pendigan +2,4D	4.0+1.0	78	70	42
16	Zeagran+Crew	2.0+1.5	54	76	55
17	Principal + Trend	0.09+0.25	19	34	21
18	Principal + 2,4D +Trend	0.09+1+0.25	55	51	35
19	Callisto Max	1.25+0.25	47	41	15
20	Callisto Max	1.5+0.33	60	31	33
21	Untreated	-	-	-	-

From Table 3 where we analyzed the influence of soil types over the maize yield, it was found that in the climatic conditions of the year 2016, distinctly significant differences were achieved on typical chernozem and significantly positive differences on histosol as compared to the control, the typical clay soil.

Table 3

The influence of soil types over the maize yield

Type of soil	Yield q/ha	Difference q/ha	Relative Yield %	Significance
Typical Clay Soil	57.60	-	100	-
Typical Chernozem	85.37	27.77	148.2	xx
Histosol	71.57	13.97	124.2	x

LSD 5% = 11.86 q/ha LSD 1% = 27.40 q/ha LSD 0,1% = 87.21 q/ha

Regarding the production results on each studied type of soil, very significant production increases were obtained in the variant treated with herbicide Gardoprim Plus Gold (3.5 l/ha) applied preemergent associated with Elumis (2.0 l/ha) applied in postemergence in the variant treated with herbicide

Gardoprim Plus Gold (4.0 l/ha) applied preemergent associated with Elumis (1.0 l/ha) applied in postemergence

Production increases against the control variant were obtained for each type of soil, but not all variants have the production increase statistically assured.

Table 4

The influence of herbicide treatments over yield in maize crops on typical clay soil, typical chernozem and histosol

No. Var	Yield q/ha			Difference +/- Vs Control			Significance		
	Typical Clay Soil	Typical Chernozem	Histosol	Typical Clay Soil	Typical Chernozem	Histosol	Typical Clay Soil	Typical Chernozem	Histosol
1	21.6	63.1	40.9	21.5	19.1	8.4	x		
2	39.4	58.2	36.6	39.3	14.2	4.1	xxx		
3	42.4	65.1	41.3	42.3	21.1	8.8	xxx		
4	62.6	66.9	40.3	62.5	22.9	7.8	xxx		
5	85.8	76.8	58.1	85.7	32.8	25.6	xxx	x	x
6	53.9	91.1	39.4	53.8	47.1	6.9	xxx	xx	
7	12.6	70.4	57.7	12.5	26.4	25.2			x
8	74.5	159.3	160.2	74.4	115.3	127.7	xxx	xxx	xxx
9	82.7	159.6	94.6	82.6	115.6	62.1	xxx	xxx	xxx
10	52.7	66.4	157.6	52.6	22.4	125.1	xxx		xxx
11	76.5	70.4	254.8	76.4	26.4	222.3	xxx		xxx
12	67.4	90.8	58.5	67.3	46.8	26.0	xxx	xx	x
13	90.6	79.6	81.6	90.5	35.6	49.1	xxx	x	xxx
14	86.6	91.4	65.5	86.5	47.4	33.0	xxx	xx	xx
15	79.5	160.2	56.3	79.4	116.2	23.8	xxx	xxx	x
16	61.4	101.1	61.8	61.3	57.1	29.3	xxx	xxx	xx
17	0.04	66.2	42.6	0.03	22.2	10.1			
18	66.9	92.7	43.0	66.8	48.7	10.5	xxx	xxx	
19	64.8	62.6	39.6	64.7	18.6	7.1	xxx		
20	63.8	56.0	39.5	63.7	12.0	7.0	xxx		
21	0.007	44.0	32.5	-	-	-			

Typical Clay Soil LSD 5%=18.82 q/ha LSD 1%=25.16 q/ha LSD 0.1%=33.08q/ha

Typical Chernozem 27.35 q/ha 36.55 q/ha 48.06q/ha

Histosol 22.78q/ha 30.45q/ha 40.04q/ha

CONCLUSIONS

Research was carried out in the agricultural year 2016 on three soil types in maize crops.

Experiments were located in Satu-Mare County at the Agricultural Research Development Station Livada on a typical clay soil and in the Berveni commune near Carei on the typical chernozem and histosol.

The herbicides applied on the three soil types were selective for maize plants.

On all soil types, a very good efficacy in combating weed species was achieved by pre-emergence application of the herbicide Gardoprim Plus Gold (3.5 l/ha) associated with Elumis (2.0 l/ha) with post-emergence application.

Maize production is influenced by both soil fertility and the efficacy of herbicide treatments.

Herbicides remain one of the most effective means of controlling weeds in maize crops.

REFERENCES

1. Chirilă C., 2001, *Biologia Buruienilor Organografie, Corologie, Dinamică, Importanță*. Ed. Ceres București
2. Ciocârlan V., Berca M., Chirilă C., Coste I., Popescu Gh., 2004, *Flora segetală a României* București, Ed. Ceres
3. Ciobanu Gh., Domuța C., Lazány János, 2005, *Tehnologii de cultură pentru grâu și porumb în condițiile sistemului de agricultură durabilă*. Ed. Universității din Oradea
4. Fritea T., Ghinea L., 1995, *Dinamica rezervei de semințe de buruieni și a îmburuienării culturilor în cadrul unei rotații de trei ani pe luvisolul albic de la Livada*. Anale ICCPT vol. LXII pp. 255-279
5. Fritea T., Vlăduțu I., Ghinea L., 1996, *Dinamica speciilor perenede buruieni (Elymus repens, Cirsium arvense și Convolvulus arvensis) ca urmare a tratamentelor cu erbicide în cadrul unei rotații de 3 ani*. Al X-lea Simpozion Național de Herbologie, Sinaia.
6. Fritea T., 1998, *Cercetări privind efectele colaterale ale utilizării erbicidelor pe solurile acide din nord-vestul țării*. Teză de doctorat A.S.A.S. Gh. Ionescu Sisesti, București.
7. Fritea T., Bulică I., Ionescu Fl., Păunescu G., 2001, *Eficacitatea unor erbicide aplicate la cultura porumbului în condițiile climatice ale anilor 1999-2000*. Proplan, Călimănești, pp.38.
8. Fritea T., Nistea Adriana, Mondici Susana, 2016, *Eficacitatea erbicidelor postemergente la cultura porumbului în zona de Nord-Vest a țării. Oferta Cercetării Științifice pentru transfer tehnologic în agricultură, industria alimentară și silvicultură*. Editura Academiei Române București
9. Mondici Susana, Fritea T., 2016, *Combaterea buruienilor din cultura de porumb pentru sămânță în zona de Nord-Vest a țării. Oferta Cercetării Științifice pentru transfer tehnologic în agricultură, industria alimentară și silvicultură*. Editura Academiei Române București
10. Mondici Susana, Fritea T., Nagy D., 2017, *Interaction between the rainfalls deviation compared to multi-annual average recorded in the period april-june and the efficacy of herbicides in corn silos culture on the luvisols in ARDS Livada*. RJGFC – Romanian Journal of Grassland and Forage Crops, Nr. 15/2017. Cluj Napoca, pp 57-64
11. Nagy C., Fritea T., Ghinea L., 2004, *Soluții economice de combatere a buruienilor din culturile de porumb*. Editor Total Publishing
12. Șarpe N., Ciorlăuș At., Ghinea L., Vlăduțu I., 1975, *Erbicidele – principiile și practica combaterii buruienilor*. Ed. Ceres pag.52-64
13. Șarpe N., Ciorlăuș At., Ghinea L., Vlăduțu I., 1975, *Erbicidele-Principiile și practica combaterii buruienilor*. Ed. Ceres, București
14. Șarpe N., Strejan Gh., 1981, *Combaterea chimică a buruienilor din culturile de câmp*. Editura „Ceres” București
15. Șarpe N., Popescu Alexandrina, Segărceanu O., Nagy C-tin., et.al., 1980, *Noi rezultate cu erbicide asociate aplicate la porumb în vederea eliminării dificultăților în rotația culturilor*. Al II-lea Simpozion Național de Herbologie. Folosirea rațională a erbicidelor, Pitești, pp.61-69
16. Șarpe N., Popescu Alexandrina, Ciorlăuș At., Vlăduțu I., Fritea T., *Câteva strategii de luptă pentru a realiza o combatere integrală a buruienilor din cultura porumbului, folosind diverse asociații de erbicide*.
17. Vlăduțu I., Fritea T., Santău M., Piț E., Bertel M., 1987, *Combaterea chimică a buruienilor din cultura porumbului pe solurile acide ale SCA Livada. Necesitate și eficiență*. Lucrări științifice SCA Livada, București, 1987, pp.389-399
18. Vlăduțu I., 1967, *Buruienile specifice solurilor podzolice și combaterea lor prin erbicide*. Agrotehnica solurilor acide din nord-vestul României. I.P. Maramureș Baia Mare pag.135-160.
19. Vlăduțu I., 1970, *Cercetări privind folosirea erbicidelor la cultura porumbului și soiului pe solurile din nord-vestul Transilvaniei*. Teză de doctorat. I.A. Nicolae Bălcescu București.
20. <https://www.agrolegvaro.ro/dekalb1/seminte-de-porumb-dkc-4590-p-922.htm>