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THE INFIUENCE OF TILLAGE METHODS AND HERBICIDES ON THE YIELD OF CULTIVATED CROPS IN LEFT-BANK FORREST-STEPPE

The article is presented the results of applying six-year data of tillage and soil herbicides in growing sunflower and sugar beet. Are determined the most efficient growing of cultivated crops with a combination of chisel tillage with herbicide, as well as the possibility of replacing arable cultivation non-plow tillage PRN 31000 with the introduction of herbicide in growing sunflower.
Keywords: *soil tillage, herbicide, crop, weeds, sunflower, sugar beet*

Results and discussion. Modern systems of tillage overwhelmingly made up of a combination of different methods and depths of basic tillage under crops in the rotation, which is consistent with the conclusions and proposals of the leading institutions and researchers [5, 7]. However, they remain relevant development and improvement in relation of the phytosanitary state fields based on rational combination of mechanical practices and herbicides. The combination of agrotechnical and chemical weeds control in the crop rotation would reduce the weed-infested crops by 8% and increased yields per hectare of crop rotation area 27.9 kg k.ed. [1].

It is known that crops of wide-row sowing method require a longer period of active protection against weeds that can last an average of 50 days after germination [3]. Thus the observed high enough efficiency of soil herbicides during the growing row crops , which greatly reduces the most harmful first weeding wave [2, 4 , 6].

However, currently very little material collected on the effectiveness of combination of different methods of tillage using herbicides. In addition, one of the main causes of low efficiency of non-plowing tillage in growing row crops , most determined inadequate control of weed-infested compare of plowing that leads to the need for further research in this direction.

The purpose of research. The main goal of the research conducted in the inpatient Farming Chair experiment Kharkov National Agrarian University named after V.V. Dokuchayev is to establish the possibility of expanding the scope of application of non-plowing tillage in growing cultivated crops by combining them with the use of soil herbicides.

Materials and methods. Research conducted during the 2003-2008 in crops of sugar beet and sunflower seed of seven-years grain-fallow-cultivated crop rotation, where are studied the most common in international practice tillage methods non-plowing treatment of SibIME, diagonal loosening of PRN 31000 and chisel tillage PC-2,5 compared of plowing under control and in system disk-plowing system in crop rotation. Depth of tillage was the same for all variants and was in growing sugar beets 28-30 cm and 25-27 cm in sunflower.

The system included the use of herbicides entering soil herbicides during pre-sowing cultivation of sugar beet (Avanguard – 2,0 l/ha, metolachlor, 960 g/l) and sunflower (Positive – 3,0 kg/ha, prometryn, 500 g/kg) or their analogues in comparison with the background without herbicides.

Soil research field – chernozem typical heavy on calcareous loess. Experiment fourfold repetition inherent in series with the cultivated land area of 150 m^2, accounting - 50 m^2.

The weediness of seeding in the experiment is determined by account-weighting methods, crops yield – handily from accounting area and standard humidity transformation.

Results of research. Weather conditions little different years of research by the average long-term indicators of moisture, but in certain periods of the spring months were accompanied by dry periods and high temperatures up to 2^0C.

Using of non-plowing tillage, as indicated by investigations (table 1), caused an increase in the number of weeds compared to plowing in crops of sugar beet at 13-19%, sunflower - by 12-29%.

The application of soil herbicides before sowing crops contributed to the reduction of the total number of weeds under different tillage and 3-4 times, while reducing the number and perennial species.

Table 1

Weediness with sunflower and sugar beet depending of tillage and herbicides (average for 2003-2008)

Methods of tillage	Background	Weed account in seeding, p/m^2			
		sugar beet		sunflower	
		all	perennial	all	perrenial
1. Plowing PLN-4-35 (control)	non-herbicide	94	3	62	4
	herbicide	24	1	21	2
2. Non-plowing tillage SibIME	non-herbicide	112	4	78	6
	herbicide	30	2	26	3
3. Diagonal loosening PRN 31000	non-herbicide	111	5	80	6
	herbicide	33	2	28	3
4. Plowing in disk-plowing system	non-herbicide	99	3	64	4
	herbicide	22	1	18	2
5. Chisel tillage PC-2,5	non-herbicide	109	4	70	5
	herbicide	28	2	24	2
$LSD_{0,05}$	non-herbicide	5,3	0,8	3,2	1,0
	herbicide	3,1	0,7	2,5	0,7

In the background was kept herbicidal tendency to increase after the application of weed-infested of non-plowing tillage, but given their small mass before harvest (Fig. 1), we can say their little validity in relation to cultivated plants, especially sunflower.

Determination of crop yield indicates worsening conditions under sugar beet cultivation after non-plow application where yields fell compared with plowing in the background without herbicide to 2,2-3,1 t/ha as against the background of herbicide - on 3,0-3,4 t/ha (table 2).

Only use chisel tillage combined with herbicide constituted a plowing competition with the smallest decrease in the yield of 1,3 t/ha and the highest return on investment herbicide. Due to a reduction of basic tillage with 35-37% overall efficiency technologies chiseling combined with herbicide is most effective.

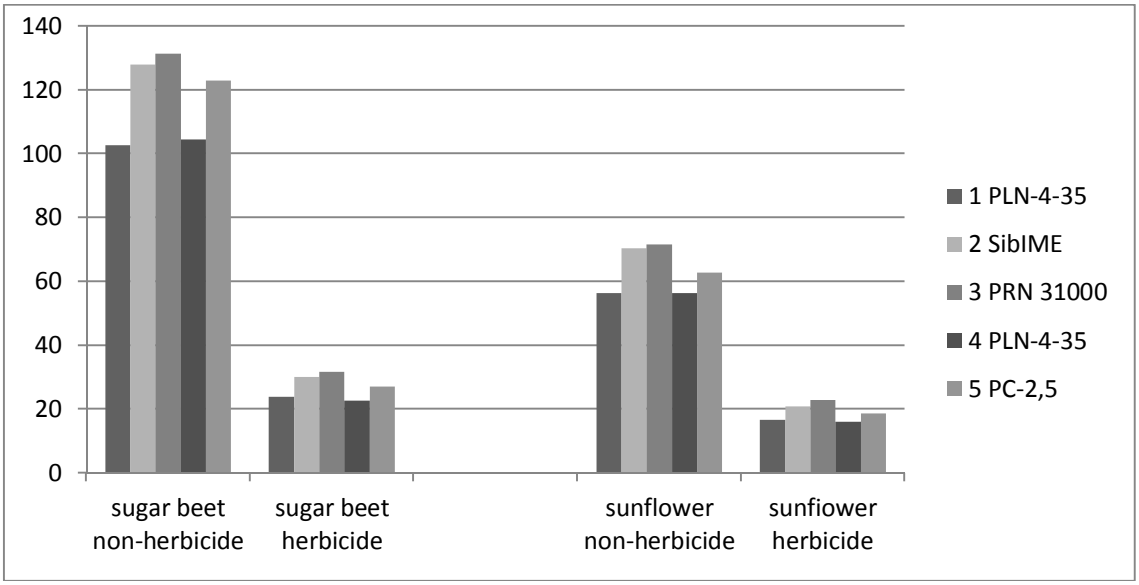

Fig. 1. Dry weight of weeds in crops plants depending of tillage and herbicides g/m^2

Growing sunflowers without herbicide proved ineffective when used tillage SibiME and PRN 31000, which after applying it yields fell by 0,14-0,15 t/ha.

Table 2

The yield of cultivated crops, depending on the methods of tillage and herbicides payback (average for 2003-2008)

Methods of tillage	Sugar beet			Sunflower		
	non-herbicide t/ha	herbicide, t/ha	herbicides payback, grn.	non-herbicide t/ha	herbicide, t/ha	herbicides payback, grn.
1. Plowing PLN-4-35 (control)	31,0	36,8	4,60	1,61	2,02	3,82
2. Non-plowing tillage SibIME	27,9	33,8	4,63	1,46	1,90	4,10
3. Diagonal loosening PRN 31000	28,0	33,4	4,26	1,47	1,97	4,71
4. Plowing in disk-plowing system	30,8	37,0	4,86	1,61	2,08	4,41
5. Chisel tillage PC-2,5	28,7	35,5	5,33	1,60	2,08	4,51
$LSD_{0,05}$	0,7	0,8		0,12	0,07	

The use of herbicide has contributed close to getting control yields a variant of the diagonal loosening PRN 31000. The use of chisel tillage as plowing in the system of differential rotation contributed to obtaining equal yields seed in the background without herbicide and its upward trend with a combination of mechanical and chemical protection.

The research results indicate that increasing weed-infested crops cultivated crops is the main reason for reducing their productivity. Apply once only soil herbicides contributed to increasing sugar beet yields by an average of 22-24%, and sunflower - by 25-35%. The highest increase in yield observed in growing sunflower cultivation after application PRN 31000 and PC-2,5.

Conclusions. The use of herbicides has greatly to the improvement of the initial plant growth, removes the competition of weeds and significantly reduces their size and weight. However, the use of any non-plowing tillage in growing sugar beets, even after the tough competition from undesirable vegetation is ineffective , which affects the lower yields .

The most economically advantageous is the use of chisel tillage in combination with chemical protection while growing as sugar beet and sunflower. Possible replacement chisel plowing on soil without herbicides when growing sunflowers, diagonal or loosening of a combination of mechanical and chemical methods of control.

References

1. Борона В.П. Контролювання бур'янів у Лісостепу / В.П. Борона, В.С. Задорожний // Захист рослин. – 2002. – № 10. – С. 8-10.

2. В'ялий С.О. Підвищення ефективності хімічного захисту посівів кукурудзи від бур'янів / С.О. В'ялий, М.П. Косолап // Рослини-бур'яни та ефективні системи захисту від них посівів сільськогосподарських культур : матеріали 6-та наук.-теорет. конф. гербологів. – К.: Колобіг, 2008. – С. 33-38.

3. Іващенко О.О. Наші завдання сьогодні / О.О. Іващенко // Забур'яненість посівів та засоби і методи її зниження : мат-ли 3-ої наук.-теорет. конф. гербологів – К., 2002. – С. 3-6.

4. Кирилюк В.П. Вплив систем основного обробітку ґрунту та удобрення на забур'яненість посівів буряків цукрових / В.П. Кирилюк // Землеробство. – Вип. 83. – 2011. – С. 54-60.

5. Наукові основи агропромислового виробництва в зоні Лісостепу України / ред.: М.В. Зубець; Нац. акад. аграр. наук України. – К.: Логос, 2010. – 980 с.

6. Радзіцька Г.В. Основний обробіток ґрунту як фактор впливу на забур'янення посівів цукрових буряків та продуктивність / Г.В. Радзіцька // Рослини-бур'яни та ефективні системи захисту від них посівів сільськогосподарських культур : матеріали 6-та наук.-теорет. конф. гербологів. – К. : Колобіг, 2008. – С. 146-153.

7. Сайко В.Ф. Системи обробітку ґрунту в Україні / В.Ф. Сайко, А.М. Малієнко. – К., 2007. – 42 с.

Анотація

Шевченко М.В.

Вплив способів обробітку ґрунту та гербіцидів на врожайність просапних культур в Лівобережному Лісостепу

В статті подано шестирічні дані результатів застосування способів обробітку ґрунту та ґрунтових гербіцидів при вирощуванні соняшника і цукрових буряків. Встановлено найвищу ефективність вирощування просапних культур при поєднанні чизельного обробітку з гербіцидом, а також можливість заміни оранки безполицевим обробітком ПРН 31000 із внесенням гербіциду при вирощуванні соняшника.

Ключові слова: *обробіток ґрунту, гербіцид, урожайність, бур'яни, соняшник, буряки цукрові*

Аннотация

Шевченко Н.В.

Влияние способов обработки почвы и гербицидов на урожайность пропашных культур в Левобережной Лесостепи

В статье представлены шестилетние данные результатов применения способов обработки почвы и почвенных гербицидов при выращивании подсолнечника и сахарной свеклы. Установлено наивысшую эффективность выращивания пропашных культур при сочетании чизельной обработки с гербицидом, а также возможность замены вспашки безотвальной обработкой ПРН 31000 с внесением гербицида при выращивании подсолнечника.

Ключевые слова: *обработка почвы, гербицид, урожайность, сорняки, подсолнечник, сахарная свекла*