

EFFICIENCY FOR COMBINATIONS OF RIMSULFURON WITH ADHESIVES IN MAIZE CROPS

Yu. I. Tkalich, A. I. Tsyliuryk, V. I. Kozechko

Dnipro State Agrarian and Economic University, 25 Serhii Yefremov St., Dnipro, 49600, Ukraine

Topicality. Adjuvants are an integral part of the weed control system in the maize crops, because they increase the efficiency of herbicide application. They significantly reduce the cost of plant protection products and increase their efficiency, as well as increase the adjuvant properties of the herbicide solution to prevent its runoff and prolong its action. Development of new herbicides, constant weather and climate changes require to study further the efficiency of the combined action of herbicides and adjuvants. Among the adjuvants for maize, it is generated interest such products as Synergen SOC, Eco Oil Spray, Esterlip, etc. **Purpose.** To reveal the efficiency for combinations of herbicides with adjuvants in the maize crops, as well as their impact on plant growth and development. **Materials and Methods.** The experimental scheme included the following combinations of rimsulfuron with adjuvants: 1. Control (Rimsulfuron without adjuvant); 2. Rimsulfuron (40 g/ha) + Trend 90 (0.15 % working solution); 3. Rimsulfuron (40 g/ha) + Synergen (0.15 % working solution); 4. Rimsulfuron (40 g/ha) + Eco Oil Spray (0.15 % working solution); 5. Rimsulfuron (40 g/ha) + Esterlip (0.15 % working solution); 6. Rimsulfuron (35 g/ha) + Esterlip (0.15 % working solution); 7. Rimsulfuron (25 g/ha) + Esterlip (0.15 % working solution). **Results.** The combination of rimsulfuron with adjuvant Esterlip had the highest technical efficiency compared to other adjuvants, in particular, on the redroot pigweed (*Amaranthus retroflexus* L.) was 75–100 % (complete destruction) and lamb's quarters (*Chenopodium album* L.) – 85.7–92.9 %, slightly less on common ragweed (*Ambrosia artemisiifolia* L.) – 83.3 %. Common purslane (*Portulaca oleracea* L.) was highly resistant to almost all combinations of rimsulfuron with adjuvants. The highest maize yield of 8.99 t/ha was in the variant with Rimsulfuron (40 g/ha) + Esterlip. Reduced application rate of Esterlip to 25–35 g/ha decreased the maize yield to 7.34–7.65 t/ha, or by 1.34–1.65 t/ha (14.9–18.3 %) due to increased weed infestation of crops. The application of adjuvants Trend 90, Synergen, Eco Oil Spray also decreased maize yields to 8.48 t/ha, 8.07 t/ha and 8.62 t/ha, respectively, which was less by 0.51 t/ha (5.6 %), 0.92 t/ha (10.2 %) and 0.37 t/ha (4.1 %). The lowest yield was in the control – 5.30 t/ha due to significant weed infestation of grain crops, which decreased by 3.69 t/ha (41.0 %) compared to the best variant (Rimsulfuron (40 g/ha) + Esterlip). **Conclusions.** Considering the ongoing development of new adjuvants and herbicides for maize, as well as climate changes, it is necessary to continue research in this area to determine the most optimal ratio of herbicide rates with adjuvants.

Key words: maize, weeds, herbicides, adjuvants, yield, technical efficiency

Introduction. The high potential weed infestation of soil is explained by the high adaptability of weeds to environmental conditions. Based on long-term observations by research institutions of Ukraine (NSC Institute of Agriculture of NAAS of Ukraine, the Institute of Plant Protection of NAAS of Ukraine, the Institute of Bioenergy Crops and Sugar Beet, the Institute of Grain Crops of NAAS of Ukraine, and others), it was found that only 10 % of the surveyed areas have minor weed infestation, 60 % of the areas have medium weed infestation (10–50 plants/m²) and 30 % of arable land has high weed infestation (over 50 plants/m²). Potential

weed infestation of arable land ranges from 400–500 million to 1–2 billion seeds per hectare [1–5].

In view of the high level of weed infestation, maize cultivation is practically impossible without the regulated application of the most effective herbicides with different spectrums of action. Controlling weeds with chemicals is an important agricultural practice, and its efficiency depends on the right choice of herbicide among a wide range of products, while complying with the manufacturer's regulatory guidelines for maximum impact on weeds without excessive environmental impact [6].

Author information:

Yurii I. Tkalich, Doctor of Agricultural Sciences, Professor, Head of the Department of General Agriculture and Soil Science, e-mail: tkalich yuriy@ukr.net, <https://orcid.org/0000-0003-2208-0163>

Oleksandr I. Tsyliuryk, Doctor of Agricultural Sciences, Professor, Head of the Department of Plant Science, e-mail: tsilurik_alexander@ukr.net, <https://orcid.org/0000-0002-7479-8401>

Volodymyr I. Kozechko, Candidate of Agricultural Sciences, Associate Professor of the Department of General Agriculture and Soil Science, e-mail: kozechko.v.i@dsau.dp.ua, <https://orcid.org/0000-0002-3843-3093>

The weeds have a critical impact on maize for 40–50 days, from germination to the tassel initiation and flowering. The biological prerequisite for weed infestation is the slow growth of maize plants at the beginning of the growing season, especially with wide-row sowing, which creates favourable conditions for weed seed germination. The peculiarity of maize cultivation is terms of major weed control measures, which include the application of soil herbicides before the crop germination. Later, post-emergence herbicides are used to control weeds [7–8].

However, the efficiency of herbicides is not always high due to the low penetration of the active ingredient through the wax coating and epidermis of weed leaves. At the present stage of development of plant protection, adjuvants are used to offset the factors of low penetration of herbicide active ingredients into weed leaf [9–11].

Adjuvants are a group of adjuvants that ensure fast and high-quality spreading of the working solution over the surface and its penetration into the treated object. An important characteristic is the inertness of the adjuvant to the working solution and the treated object surface, thus the change in the chemical characteristics of pesticides is excluded, and the leaf surface remains undamaged.

Over the past five years, adjuvants have become an integral part of the crop protection system. Among them, many new products contribute to high-quality herbicide application, but require further study of their efficiency due to climatic changes in the region. Among the adjuvants, such adjuvants as Synergen SOC, Eco Oil Spray, Esterlip, etc. are of great interest. Adjuvants contribute to reducing the cost and increasing the efficiency of crop protection products, helping to fix the working solution on the leaf surface and grain, preventing their run-off and prolonging their action over time.

In addition, due to climate change, the development of new varieties/hybrids, new cultivation technologies, and chemical plant protection products, new research is required to further study the biological (technical) efficiency of herbicides in interaction with adjuvants to identify the best and most optimal combinations and develop regulations for their environmentally responsible application to pro-

tect maize crops from weeds [12].

Purpose. To determine the efficiency of combination of herbicides and adjuvants for weed control in maize crops, as well as the effect on the plant growth and development.

Materials and Methods. The research was carried out at field of the Educational and Research Centre of Dnipro State Agrarian and Economic University in 2019–2021. Soils of plot were ordinary low-humus medium-powerful dusty-medium loamy black soils on loess, which are characterised by potential and effective fertility: the content of humus in the arable layer (0–30 cm) is 3.9 %, total nitrogen – 0.22 %, mobile phosphorus – 0.13 %, exchangeable potassium – 2.2 %.

At the experimental fields, the potential weed infestation with vegetative organs of perennial offset weeds was 100–120 thousand units/ha (i.e., medium weed infestation) and with seeds of biennial weeds – 800–900 million units/ha in the arable layer (high weed infestation).

Maize cultivation techniques (mid-early hybrid Poltava 270 MV) were in line with zonal recommendations. Winter wheat was the predecessor, ploughing was carried out to a depth of 25–27 cm, levelling the soil was carried out with tooth harrows in spring, and fertiliser N₃₀P₅₀ was applied for pre-sowing cultivation. In the experiment, herbicides were applied with a small-sized sprayer OM-4 developed by the Department of General Agriculture and Soil Science of the Dnipro State Agrarian and Economic University and Ahromodul LLC. Maize was sown with a seeder VESTA 8 PROF. Weed infestation of maize crops was determined by method of overlapping the accounting frame (0.25 m²) along the diagonal of the plot at 10 points. Later, the quantitative and species composition of weeds was determined, and the weed abundance per 1 m² of field was recalculated. The weed infestation was determined before the herbicide application and 25 days after the herbicide application.

The maize yield was determined by the number of ears in two non-contiguous rows of 14.3 m length, then the yield structure was analysed and the grain yield was determined by converting to a standard moisture content of 14 %. The weed infestation of maize crops was determined by the quantitative weight method. The efficiency of the post-emergency herbicides

was calculated according to the following generally accepted method [13–14].

The experimental design included the following variants of the combination of Rimsulfuron with adjuvants: Control (Rimsulfuron (40 g/ha) without adjuvant); Rimsulfuron (40 g/ha) + Trend 90 (0.15 % working solution); Rimsulfuron (40 g/ha) + Synergen (0.15 % working solution); Rimsulfuron (40 g/ha) + Eco Oil Spray (0.15 % working solution); Rimsulfuron (40 g/ha) + Esterlip (0.15 % working solution); Rimsulfuron (35 g/ha) + Esterlip (0.15 % working solution); Rimsulfuron (25 g/ha) + Esterlip (0.15 % working solution).

The experimental plots had a systematic arrangement. Two-factor experiment was replicated three times.

The adjuvant Trend (90 % isodecyl alcohol ethoxylate) is a surface-active agent developed for application with rimsulfuron herbicides manufactured by DuPont. The adjuvant Trend 90 enhances herbicide activity, reduces the surface tension of the droplets, and increases the contact angle with the leaf surface, which leads to an increase in the leaf coating surface and the absorption area. Trend 90 promotes and significantly accelerates the penetration of rimsulfuron herbicides into weed leaves, as well as enhances the phytotoxicity of the products. The adjuvant improves the uniformity of leaf surface coverage with the working solution at spraying, increases the penetration capability of pesticides, their resistance to the action of rain, heavy dew and UV rays.

The adjuvant Synergen SOC (esterified vegetable oil – 50 %, nonionic surfactants – 45 %, other substances (emulsifiers/solubilisers) – 5 %) is a multifunctional adjuvant designed to increase the efficiency of plant protection products in tank mixtures. Its main advantages are a reduction in the application rate of the working solution, improved adhesion (sticking), improved wetting and coating abilities, increased penetration, reduced evaporation, increased photostability, improved resistance to rainfall washout.

Eco Oil Spray (highly refined mineral oil) is used to enhance the biological activity of herbicides, fungicides and insecticides, as well as for integrated protection of fruit crops and pest control. It also has a number of advantages, including enhancing the effect of herbicides in

cool and dry weather, reducing the surface tension of aqueous working solutions, increasing the penetration capacity of the products, protecting the products against wash-off by rainfall and heavy dew, and the absence of phytotoxicity during application. Application of this product in early spring provides reliable control of overwintering stages of pests.

The adjuvant Esterlip is an auxiliary surfactant used in combination with modern plant protection products in Ukraine. Esterlip reduces the surface tension of a chemical product or its aqueous solution applied to a plant, usually to the leaves of crops. A special homogeneous film formed on the leaf surface holds the pesticides (herbicides, insecticides or other similar chemicals) on the plants and promotes their maximum absorption.

The advantages of Esterlip include the following functions: increasing the rate of action and effectiveness of plant protection products and fertilisers, retaining moisture and firmly fixing the main product, a mixture of products on the crop, especially in cold weather or, conversely, in dry periods. Esterlip also protects plants from damage, enhances the action of growth stimulants, macro- and microelements.

It should be noted that water hardness does not affect the properties of Esterlip. The product also reduces the surface tension of droplets, increasing the leaf surface coverage, which increases the absorption surface, and accelerates the assimilation rate of herbicide by the leaf surface of weeds, increases the phytotoxicity of chemicals.

In 2019–2021, hydrothermal conditions in the experimental zone were characterised by an uneven distribution over time. In early spring of 2021, quite sharp fluctuations in day-time and night-time air temperatures restrained the onset of physical soil ripeness. In April, a rapid rise in average daily temperatures was recorded, with an increase of 1.8–3.5 °C compared to the long-term average. Temperature peak (+30 ... +33 °C) occurred in the first (2020 and 2021), second and third (2019) ten-day periods of May.

The meteorological conditions of the summer were characterized by an uneven distribution of precipitation over time, so the total amount of precipitation for the summer in 2019 was 147.3 mm, in 2020 – 90.9 mm, in 2021 –

333.0 mm, which was 44.2, 27.2 and 97 % of the norm, respectively. Precipitation periods often coincided with critical stages of maize water consumption (10–15 days before tassel initiation – milk ripeness), causing a negative impact on its yield.

Annually, several periods of hot weather were observed during the summer, when the air temperature reached +35...+38 °C and the soil temperature – +55...+65 °C. The driest months were June in 2019, July in 2020, and August in 2021.

Weather conditions during the research were relatively favourable for maize. Unfavourable moisture conditions for maize cultivation were observed in 2020. Hydrothermal coefficient during the period of the highest water consumption of plants in the stages of tassel initiation and flowering (July) was equal to 0.8 in 2019, 0.7 in 2020, and 1.0 in 2021. The GTC indicator of less than 0.7 indicates the presence of soil and air drought, which negatively affects the maize grain formation and filling.

Results and Discussion. In terms of biological suppression of weeds, maize is significantly inferior to cereals (wheat, barley, and

oats) of solid sowing; however, it is superior to sorghum. That means that maize requires reliable protection at the 9–17 stages of organogenesis, since during this period cultivated plants are unable to fill free ecological niches in the agrophytocenosis. When the rows are closed and a strong root system is formed, maize plants deprive weeds of optimal lighting and become more competitive with them for nutrients [15–23].

In 2019–2021, maize crops in spring were characterised by high weed infestation, especially by common ragweed (*Ambrosia artemisiifolia* L.) and lambsquarters (*Chenopodium album* L.). These weeds cause the greatest losses in maize grain yield. In addition, we also found redroot pigweed (*Amaranthus retroflexus* L.), common purslane (*Portulaca oleracea* L.), etc. in the crops.

According to the data on the technical efficiency of herbicides in combination with adjuvants, it should be noted that the adjuvants had a positive effect on the herbicide efficiency. The control (Rimsulfuron, (40 g/ha) without adjuvant) significantly differed from the variants where both outdated and new experimental adjuvants were applied (Table 1).

Table 1. Technical efficiency of rimsulfuron application in combination with adjuvants on average for 2019–2021, %

Herbicide and adjuvant	Technical efficiency on weeds, %.			
	common ragweed	lambsquarters	common purslane	redroot pigweed
Control (Rimsulfuron without adjuvant)	–	–	–	–
Rimsulfuron (40 g/ha) + Trend 90 (0.15 % working solution)	64,0	78,6	60,0	100,0
Rimsulfuron (40 g/ha) + Synergen (0.15 % working solution)	66,7	64,3	54,7	50,0
Rimsulfuron (40 g/ha) + Eco Oil Spray (0.15 % of working solution)	50,0	57,1	51,6	75,0
Rimsulfuron (40 g/ha) + Esterlip (0.15 % working solution)	83,3	85,7	64,0	100,0
Rimsulfuron (35 g/ha) + Esterlip (0.15 % working solution)	83,3	92,9	63,2	100,0
Rimsulfuron (25 g/ha) + Esterlip (0.15 % working solution)	83,3	92,9	47,4	75,0

Esterlip showed the maximum technical efficiency of rimsulfuron compared to other adjuvants, providing the highest technical efficiency of the herbicide against redroot pigweed (*Amaranthus retroflexus* L.) of 75–100 % (complete destruction) and lambsquarters (*Chenopodium album* L.) of 85.7–92.9 %, slightly less against common ragweed (*Ambrosia artemisiifolia* L.) of 83.3 %. Common purslane (*Portulaca oleracea* L.) was the most resistant to combination of rimsulfuron with almost all adjuvants; especially low technical efficiency was the mix-

ture with Eco Oil Spray – only 51.6 %, due to the biological characteristics of the weed, which is highly resistant to all herbicides due to the dense epidermis covered with cuticle. The application of other adjuvants, in particular Synergen, Eco Oil Spray, provided significantly worse results, their technical efficiency was 50.0–66.7 % and 50.0–75.0 %, respectively, which was lower than the application of Esterlip by 33.3–50 and 25.0–33.3 percentage points.

Weeds in maize crops that were not destroyed by the herbicide had a negative impact

on maize growth and development. In particular, the plant height as one of the most important morphological parameters indicates that maize

plants responded significantly to changes in growing conditions.

Measurements of plant height in the tassel

Table 2. Height of maize plants under the influence of weed infestation on average for 2019–2021, cm

Herbicide and adjuvant	Height of maize plants, cm	% to control
Control (Rimsulfuron without adjuvant)	250	–
Rimsulfuron (40 g/ha) + Trend 90 (0.15 % working solution)	255	+ 2.0
Rimsulfuron (40 g/ha) + Synergen (0.15 % working solution)	259	+ 3.6
Rimsulfuron (40 g/ha) + Eco Oil Spray (0.15 % of working solution)	256	+ 2.4
Rimsulfuron (40 g/ha) + Esterlip (0.15 % working solution)	265	+6.0
Rimsulfuron (35 g/ha) + Esterlip (0.15 % working solution)	260	+ 4.0
Rimsulfuron (25 g/ha) + Esterlip (0.15 % working solution)	260	+ 4.0

initiation and flowering stages revealed that the most intensive growth of plants was observed after application of Rimsulfuron herbicide (40 g/ha) in combination with Esterlip adjuvant – 265.0 cm, slightly less with Trend 90 – 255.0 cm, Synergen – 259.0 cm and Eco Oil Spray – 256.0 cm. Naturally, the lowest height of maize plants was in the control (without adjuvant) – 250.0 cm. In addition, maize plant height reduction was also detected when the application rate of Rimsulfuron was reduced to

25 g/ha – 260.0 cm, or by 5 cm compared to the application rate of Rimsulfuron 40 g/ha.

Studies of maize cultivation technology show that the maximum grain yield is formed only when life support factors are optimised at all stages of the plant organogenesis. Reduction of maize yield is caused by the development of weeds that compete for nutrients and moisture during the most unfavourable weather conditions (Table 3).

Table 3. Maize grain yield depending on the application of combination of Rimsulfuron and adjuvant on average for 2019–2021, t/ha

Herbicide and adjuvant	Yield, t/ha	+/- to control, t/ha
Control (Rimsulfuron without adjuvant)	5.30	–
Rimsulfuron (40 g/ha) + Trend 90 (0.15% working solution)	8.48	3.18
Rimsulfuron (40 g/ha) + Synergen (0.15% working solution)	8.07	2.77
Rimsulfuron (40 g/ha) + Eco Oil Spray (0.15% of working solution)	8.62	3.32
Rimsulfuron (40 g/ha) + Esterlip (0.15% working solution)	8.99	3.69
Rimsulfuron (35 g/ha) + Esterlip (0.15% working solution)	7.65	2.35
Rimsulfuron (25 g/ha) + Esterlip (0.15% working solution)	7.34	2.04
LSD _{0.95} , t/ha	0.35	–

In addition to weed infestation, the yield of the grain crop was generally adjusted by the weather conditions of the growing season, in particular the moisture supply of crops. In 2019 and 2020, dry conditions were observed during the growing season, which significantly affected the maize yield. Thus, on average, the yield for 2019–2021 ranged from 5.30 to 8.99 t/ha in the experimental variants.

The highest yield was 8.99 t/ha in the variant with Rimsulfuron (40 g/ha) + Esterlip. Rimsulfuron in lower application rate of 25–35 g/ha reduced the maize yield to 7.34–7.65 t/ha, or by

1.34–1.65 t/ha (14.9–18.3 %) due to increased weed infestation. The application of Trend 90, Synergen, and Eco Oil Spray also led to a decrease in maize yields to 8.48, 8.07, and 8.62 t/ha, respectively, which was 0.51 t/ha (5.6 %), 0.92 t/ha (10.2 %), and 0.37 t/ha (4.1 %) less. The minimum yield was obtained on the control (5.30 t/ha) due to significant weed infestation of the crops, which decreased by 3.69 t/ha (41.0 %).

Conclusions. Rimsulfuron showed the maximum technical efficiency in combination with Esterlip compared to other adjuvants that ensured the highest efficiency against weeds, in

particular against redroot pigweed (*Amaranthus retroflexus* L.) – 75–100 % (complete destruction) and lambsquarters (*Chenopodium album* L.) – 85.7–92.9 %, slightly less against common ragweed (*Ambrosia artemisiifolia* L.) – 83.3 %. Common purslane (*Portulaca oleracea* L.) was the most resistant to Rimsulfuron in combination with almost all adjuvants; especially low technical efficiency was with Eco Oil Spray – only 51.6 %. The reason for this was the biological characteristics of purslane, which is highly resistant to all herbicides due to its dense epidermis covered with cuticle (wax) coating. The application of other adjuvants, in particular Synergen, Eco Oil Spray, provided results that were significantly worse, their technical efficiency on weeds was 50.0–66.7 % and 50.0–75.0 %, respectively, which was 33.3–50 and 25.0–33.3 percentage points less than Esterlip.

2. The highest maize plants was formed at the application of the herbicide Rimsulfuron (40 g/ha) with Esterlip adjuvant (265.0 cm), slightly less when using Trend 90 (255.0 cm), Synergen (259.0 cm) and Eco Oil Spray (256.0 cm) adjuvants. Naturally, the lowest plant height was in the control (without adhesive) – 250.0 cm.

Plant height of maize was also reduced when the application rate of Rimsulfuron was 25 g/ha – 260.0 cm, or 5 cm compared to the application rate of 40 g/ha.

3. The maximum maize yield was 8.99 t/ha in the variant with the application of Rimsulfuron (40 g/ha) + Esterlip. Lower application rate of Rimsulfuron of 25–35 g/ha reduced the maize yield to 7.34–7.65 t/ha, or by 1.34–1.65 t/ha (14.9–18.3 %) due to increased weed infestation. The application of Trend 90, Synergen, and Eco Oil Spray also resulted in a decrease in maize yields to 8.48, 8.07, and 8.62 t/ha, respectively, which was 0.51 t/ha (5.6 %), 0.92 t/ha (10.2 %), and 0.37 t/ha (4.1 %) less. The minimum yield was obtained in the control at 5.30 t/ha, due to significant weed infestation of the crops, which was reduced by 3.69 t/ha (41.0 %) compared to the best variant with Rimsulfuron (40 g/ha) + Esterlip.

Given the constant development of new adjuvants and herbicides for maize, as well as climatic changes, further research in this area should be continued to determine the most optimal ratio of dosages in mixtures of herbicides with adjuvants.

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Ткаліч Ю. І., Циліорик О. І., Козечко В. І. Ефективність прилипачів при використанні римсульфурону в посівах кукурудзи. *Зернові культури*. 2022. 6 (2). 129–136.

Дніпровський державний аграрно-економічний університет, вул. Сергія Ефремова, 25, м. Дніпро, 49600, Україна

Актуальність. Прилипачі – це невід’ємна частина системи захисту кукурудзи від бур’янів, адже сприяють якісному внесенню гербіцидів на кукурудзі. Вони мають велике значення для зменшення собівартості та підвищення ефективності засобів захисту рослин, допомагають закріпити робочий розчин препаратів на листовій поверхні та насінні, запобігають їх стіканню та пролонгують їх дію. Поява нових гербіцидів, постійна зміна погодньо-кліматичних умов вимагають подальшого вивчення ефективності сумісної дії гербіцидів і прилипачів. Серед прилипачів на кукурудзі значний інтерес мають такі препарати як ад’ювант Синерджен SOC, Еко Ойл Спрей, Естерліп тощо. **Мета дослідження** – виявити ефективність дії гербіцидів в поєднанні з прилипачами на бур’яни в посівах кукурудзи, а також їх вплив на ріст і розвиток рослин культури. **Матеріали і методи.** *Схема дослідю вклочала наступні варіанти комбінації римсульфурону з прилипачами: 1. Контроль (Римсульфурон без прилипача); 2. Римсульфурон (40 г/га) + Тренд 90 (0,15 % робочого розчину); 3. Римсульфурон (40 г/га) + Синерджен (0,15 % робочого розчину); 4. Римсульфурон (40 г/га) + Еко Ойл Спрей (0,15 % робочого розчину); 5. Римсульфурон (40 г/га) + Естерліп (0,15 % робочого розчину); 6. Римсульфурон (35 г/га) + Естерліп (0,15 % робочого розчину); 7. Римсульфурон (25 г/га) + Естерліп (0,15 % робочого розчину).* **Результати.** Застосування прилипача Естерліп показало максимальну технічну ефективність римсульфурону порівняно з іншими прилипачами, зокрема на щиріці загнутій (*Amaranthus retroflexus* L.) – 75–100 % (повне знищення) та лободі білій (*Chenopodium album* L.) – 85,7–92,9 %, дещо менше на амброзії полинолистій (*Ambrosia artemisiifolia* L.) – 83,3 %. Портулак городній (*Portulaca oleracea* L.) був максимально стійким до дії римсульфурону в поєднанні практично з усіма прилипачами. Максимальний рівень врожайності кукурудзи отримали за застосування Римсульфурону (40 г/га) з Естерліпом – 8,99 т/га. Зниження норми застосування Естерліп до 25–35 г/га понижувало урожайність кукурудзи до 7,34–7,65 т/га, або на 1,34–1,65 т/га

(14,9–18,3 %) через збільшення забур'яненості посівів. Використання прилипачів Тренд 90, Синерджен, Еко Оїл Спрей також давало зниження врожайності кукурудзи до 8,48 т/га, 8,07 т/га та 8,62 т/га відповідно, що було менше на 0,51 т/га (5,6 %), 0,92 т/га (10,2 %) та 0,37 т/га (4,1 %). Мінімальну урожайність отримано на контролі 5,30 т/га через значну забур'яненість посівів зернової культури, яка знижувалась на 3,69 т/га (41,0 %) в порівнянні з найкращим варіантом (Римсульфурон (40 г/га) + Естерліп). **Висновки.** Враховуючи постійну появу нових прилипачів та гербіцидів для використання на посівах кукурудзи, а також зміну кліматичних умов слід і надалі продовжувати дослідження в даному напрямі для визначення найбільш оптимальних співвідношень доз сумішей гербіцидів з прилипачами.

***Ключові слова:** кукурудза, бур'яни, гербіциди, прилипачі, урожайність, технічна ефективність*