Impact of Different Weed Control Treatments on Weed Infestation, Soybean Yield Components, and Yield

Utjecaj različitih tretmana suzbijanja korova na zakorovljenost, komponente prinosa i prinos soje

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Poljoprivreda / Agriculture

ISSN: 1848-8080 (Online)
ISSN: 1330-7142 (Print)

https://doi.org/10.18047/poljo.31.2.3

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ISSN 1330-7142
UDK=633.34+631.559:632.51
https://doi.org/10.18047/poljo.31.2.3

IMPACT OF DIFFERENT WEED CONTROL TREATMENTS ON WEED INFESTATION, SOYBEAN YIELD COMPONENTS, AND YIELD

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Original scientific paper
Izvorni znanstveni članak

SUMMARY

High demand for soybeans requires farmers to achieve higher yields. One of the most important challenges in soybean production is weed control management, especially in the early growing stages. Successful soybean production is inconceivable without the use of herbicides, which can be applied as PRE-em—before seedling emergence, and as POST-em—after seedling emergence. On the other hand, herbicides can negatively affect germination capacity and can cause plant damage/injury, and finally result in lower seed yield. Therefore, this research aimed to examine the possible influence of different weed management treatments on weed infestation, soybean yield, and its components. A field experiment was set up during 2014 and 2015 in a randomized block design. The research included 7 treatments: a control treatment and 6 different herbicide treatments with the active substances metribuzin, oxasulfuron, thifensulfuron, s-metolachlor, and cycloxydim in full and reduced doses. Dominant weeds were Abutilon theophrasti, Amaranthus retroflexus, Ambrosia artemisiifolia, Chenopodium album, and Fallopia convolvulus. Herbicide application resulted in weed density reduction from 62.7 to 76.8% in 2014 and from 26.4 to 71.9% in 2015 compared to the control. Lack of herbicide efficacy due to adverse weather conditions during application and vegetation resulted in higher weed infestation and ultimately lower yields, lower nodes, and pods in 2015. Statistically significant differences were found between herbicide treatments regarding yields, whereby average yields were highest on POST-em treatments with split application.

Keywords: PRE-em, POST-em, split application, herbicide, pods

INTRODUCTION

Soybean (*Glycine max* (L.) Merr.) is the most important oilseed produced on arable land worldwide. According to FAOSTAT, the world's biggest producers of soybeans during the 5-year period 2019-2023 were Brazil with 128.87 billion tons on average, followed by the USA with 112.5 billion tons in average, and Argentina with 43.83 billion tons on average (FAOSTAT, 2025). Croatia's production of soybeans during the same periods was about 132 thousand tons on average (2006-2015) and about 229 thousand tons on average (2019-2023). Kostić et al. (2007) stated that soybean is a plant species that belongs to the most important cultivated plants, and its importance is reflected primarily in the chemical composition of the seed, which contains about 40% protein and about 20% oil, so that it is today an irreplaceable source of nutrients used for various purposes such as human food and livestock feed. The demand for soybeans is growing globally, which requires producers to achieve higher yields of soybeans. In order to be successful in this, they must not only use optimal and timely agrotechnical measures to meet the challenges of climate change, but must also take care of weed control, which is extremely important, especially in soybean production. Pacanoski et al. (2021) stated that a major A constraint to soybean productivity is weed competition, with

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potential losses ranging from 20 to 90% globally without proper control measures, which is often economically more significant than losses due to insects, pathogens, or other biotic constraints altogether. Movahedpour et al. (2011) reported that weeds should be eradicated as soon as possible, because weeds, competing with soybean at the same time, grow faster and higher, which could lead to lower seed yield and diminished seed quality. Akter et al. (2016) stated that the reduction in soybean seed yield caused by the appearance of weeds has a greater impact than other yield-limiting factors. Therefore, the profitability of soybean cultivation is largely dependent on the effective elimination of weeds by using properly selected herbicides (Tehulie et al., 2021; Saharan et al., 2023; Yamashita et al., 2023) and by providing optimal preventive agrotechnical measures (crop rotation, plant density, timely and high-quality basic soil cultivation).

On the other hand, many authors pointed out that herbicide application in soybean can negatively affect the germination capacity of soybean seeds if treated before seedling emergence, PRE-em, and can cause plant damage resulting finally in lower seed yield if applied after seedling emergence, POST-em (Mahoney et al., 2014; Steppig et al., 2019; Ceretta et al., 2023). Also, some authors stated that herbicides applied may adversely affect soybean development, root nodulation, and nitrogen fixation (Ribeiro et al., 2021) as well as the yield quality, including protein and oil content (Peer et al., 2013).

Therefore, the aim of this research was to examine the possible influence of different weed management treatments on weed infestation, soybean yield, and its components.

MATERIALS AND METHODS

Field Trial

The field experiment was set up on the agricultural land of the Institute for Seed and Seedlings based in Osijek during 2014 and 2015 in a randomized block design and included seven weed control treatments in three replications (21 basic plots). The area of the basic plot was 33.33 m^2. The research included seven treatments: a control treatment and 6 different weed control treatments with the active substances metribuzin, oxasulfuron, thifensulfuron, s-metolachlor, and cycloxydim. The preparations were applied in recommended and reduced doses by 30% before and after crop emergence. The treatments were “C”—control without herbicide application, then the treatment “MM” and the corresponding reduced treatment “RMM” by 30% were applied before crop emergence. Furthermore, the treatment “OTS” and the corresponding reduced treatment “ROTS” by 30% were applied at once after crop emergence, while the treatment “SOTS” and the corresponding reduced treatment “SROTS” by 30% were applied as split applications after crop emergence with an interval of 10 days between treatments. Three days after the application of preparations for broadleaf weeds, Cycloxydim was applied for grass weeds at a rate of 1.5 L ha^{-1} (Table 1).

Table 1. Weed control treatments applied

Tablica 1. Primijenjeni tretmani suzbijanja korova

Treatment/ *Tretman*	**Active component/** *Aktivna tvar*	**Application time/** *Vrijeme primjene*	**Water amount/** *Količina vode*	**Way of application/** *Način primjene*	**Surfactant used/** *Korištenje okvašivača*
C	-	-	-	-	-
MM	Metribuzin (0.75 kg ha^{-1}) S-metolachlor (1.2 L ha^{-1})	Pre-EM	300 L ha^{-1}	Full dose	No
RMM	Metribuzin (0.525 kg ha^{-1}) S-metolachlor (0.84 L ha^{-1})	Pre-EM	300 L ha^{-1}	Full dose	No
OTS	Oxasulfuron (0.06 kg ha^{-1}) Thifensulfuron (0.008 kg ha^{-1}) Cycloxydim (1.5 L ha^{-1})	Post-EM	300 L ha^{-1}	Full dose	Yes
ROTS	Oxasulfuron (0.042 kg ha^{-1}) Thifensulfuron (0.0056 kg ha^{-1}) Cycloxydim (1.5 L ha^{-1})	Post-EM	300 L ha^{-1}	Full dose	Yes
SOTS	Oxasulfuron (0.06 kg ha^{-1}) Thifensulfuron (0.008 kg ha^{-1}) Cycloxydim (1.5 L ha^{-1})	Post-EM	300 L ha^{-1}	Split	Yes
SROTS	Oxasulfuron (0.042 kg ha^{-1}) Thifensulfuron (0.0056 kg ha^{-1}) Cycloxydim (1.5 L ha^{-1})	Post-EM	300 L ha^{-1}	Split	Yes

Agrotechnics included deep autumn ploughing (30 cm depth) with basic mineral fertilization of 300 kg h^{-1} NPK 7:20:30. Pre-sowing preparation and mineral fertilization (200 kg ha^{-1} NPK 15:15:15) were carried out in spring. Immediately before sowing, seed inoculation with *Bradyrhizobium japonicum* bacteria was carried out. Sowing dates were on 7 May 2014 and 23 April 2015, to a depth of 4-6 cm using a Kuhn seeder (PL Junior model) with a row spacing of 50 cm and a density of 620,000 plants ha^{-1}. Soybean variety “IKA“ from the Institute of Agriculture in Osijek, which belongs to the 0-I maturity group, i.e., a medium-early variety, was sown during both years of research. To protect against herbicide drift, a protective row of the same variety was sown between individual basic plots. Winter wheat was grown as a pre-crop in the years studied.

Weed and Soybean Analysis

Weed population monitoring was carried out by determining weed species on three occasions after herbicide application and by determining the abundance of weed species. Weed infestation was determined based on the number and fresh weight of weeds three times per season. Samples for botanical analysis were taken from an area of 0.25 m^2 at four randomly selected locations in each basic plot. Weed species were determined in the laboratory according to the appropriate manuals (Čanak et al., 1978; Domac, 2002; Knežević, 2006). After counting weeds and determining the biomass of weeds, the efficiency coefficients were calculated according to the following formula, showing the percentage reduction in weeds due to treatment:

$$\text{Weed Control Efficacy (\%)} = \frac{C-T}{C} \times 100$$

where:

- C is the average weed density/biomass in the control plot,
- T is the average weed density/ biomass in treated plots.

Harvesting was carried out at full soybean maturity using a specialized experimental harvester, type Wintersteiger Elite. Thousand seed weight (TSW) was determined. Seed yield was expressed in kg ha^{-1} and converted to a soybean moisture standard of 13%. Before harvest, node and pod counts were performed on 20 randomly selected plants in each basic plot.

Weather Characteristics

Data on average monthly air temperatures (ºC) and monthly precipitation amounts (mm) for 2014 and 2015 were obtained from the Institute for Seed and Seedlings Osijek, which has its own meteorological station (Brijest Station). During the research, the amount of precipitation was monitored, which may have an impact on herbicide efficacy, primarily those applied PRE-em. Meteorological data for 2014, shown in Table 2, indicate that there was sufficient precipitation for the emergence and development of all phenophases of soybean plants and weeds.

Table 2. Weather conditions during soybean vegetation in 2014 and 2015 (Brijest station)

Tablica 2. Vremenske prilike za vegetacijsko razdoblje soje u 2014. i 2015. godini (Postaja Brijest)

Month/ *Mjesec*	**Monthly precipitation (mm)/** *Mjesečna količina oborina (mm)*		**Average temperature (°C)/** *Prosječna temperatura (°C)*	
	2014	2015	2014	2015
April/ *Travanj*	69.8	7.4	12.9	12.6
May/ *Svibanj*	142.4	96.6	15.7	17.4
June/ *Lipanj*	59.6	25.8	20.3	20.6
July/ *Srpanj*	65.2	11.8	21.8	24.3
August/ *Kolovoz*	64.0	45.8	20.6	23.7
September/ *Rujan*	86.0	28.6	16.7	18.0

Favorable distribution and amount of precipitation were conducive to the normal development and yield of soybeans. The distribution and amount of precipitation were also favorable for pre-emergence treatments, which require a certain amount of precipitation due to the activation of herbicides. Completely opposite climatic conditions were in 2015, with insufficient precipitation during the growing season in all months except May. July and August were particularly unfavorable for soybean growth, where, in addition to the lack of precipitation, average monthly temperatures were higher compared to 2014 (Table 2).

Statistical Data Analysis

The data were statistically processed by the analysis of variance (ANOVA) using the statistical program SAS/STAT ver. 9.4 (SAS Institute, Inc., Cary, NC, 2002–2012). Testing of homogeneity of error variances between years was performed by combined analysis of variance using the PROC GLM procedure, and significant differences between the treatments were determined by multiple Least Significant Difference (LSD) test at a significance level of 0.05.

RESULTS AND DISCUSSION

Weed Infestation

A total of 17 different weed species were identified in soybean crops in 2014 and 2015 (Table 3).

Table 3. Determinate weed species during 2014 and 2015

Tablica 3. Determinirane korovne vrste u 2014. i 2015. godini

	Weed species/ *Korovne vrste*	
	2014	**2015**
1.	*Abutilon theophrasti* Medik.	*Abutilon theophrasti* Medik.
2.	*Amaranthus retrflexus* L.	*Amaranthus retrflexus* L.
3.	*Ambrosia artemisiifolia* L.	*Ambrosia artemisiifolia* L.
4.	*Brassica napus* L.	*Chenopodium album* L.
5.	*Capsella bursa pastoris* (L.) Med.	*Convolvulus arvensis* L.
6.	*Chenopodium album* L.	*Datura stramonium* L.
7.	*Cirsium arvense* (L.) Scop.	*Helianthus annuus* L.
8.	*Convolvulus arvensis* L.	*Fallopia convolvulus* (L.) À Löve
9.	*Datura stramonium* L.	*Solanum nigrum* L.
10.	*Echinochloa crus-galli* (L.) PB.	*Echinochloa crus-galli* (L.) PB.
11.	*Fallopia convolvulus* (L.) À Löve	*Xanthium strumarium* L.
12.	*Sorghum halepense* (L.) Pers.	*Sorghum halepense* (L.) Pers.
13.	*Stellaria media* (L.) Vill.	
14.	*Veronica persica* Poir.	
15.	*Xanthium strumarium* L.	

The most abundant broadleaf weed species that dominated during the research were: *Ambrosia artemisiifolia*, *Chenopodium album*, *Abutilon theophrasti*, *Solanum nigrum*, *Cirsium arvense*, and *Amaranthus retroflexus*. Regarding annual grass weed species, *Echinochloa crus-galli* was the most dominant weed present in soybean crops. During both years, statistically significant differences (SSDs) between the control variant and all other variants regarding weed density were observed. In 2014 lowest weed density was achieved at variant „MM" and in 2015 at variant „SOTS". Statistically significant differences between herbicide treatments in weed density in 2014 were observed only between variants „MM" and „ROTS", while in 2015 SSDs were observed between „MM" and „RMM" compared to all other herbicide treatments („OTS," „ROTS," „SOTS," „SROTS") and between „ROTS" and both split application treatments („SOTS," „SROTS"). All applied treatments with full doses in both research years had a lower number (3.6 to 19.9%) of weed individuals per m^2 than treatments with reduced doses (Table 4).

Table 4. Number of weeds, weed biomass, and weed control efficacy (WCE) in 2014 and 2015

Tablica 4. Broj korova, biomasa korova i učinkovitost suzbijanja korova (WCE) u 2014. i 2015. godini

Treatment/ *Tretman*	2014					
	Weed density/ *Broj korova*		**Weed biomass/** *Masa korova*		**WCE (density)/** *WCE prema broju*	**WCE (biomass)/** *WCE prema masi*
	n	(Number per m^{-2})	n	(g m^{-2})	(%)	(%)
C	9	99.78 a	9	1150.00 a	-	-
MM	9	23.22 c	9	70.00 b	76.59 a	94.25 ab
RMM	9	29.00 bc	9	143.33 b	71.06 b	87.92 ab
OTS	9	32.33 bc	9	88.33 b	67.78 c	92.37 ab
ROTS	9	37.22 b	9	175.00 b	62.50 d	85.06 b
SOTS	9	28.44 bc	9	46.67 b	71.48 bc	95.86 a
SROTS	9	32.22 bc	9	48.33 b	67.67 c	95.50 a
	2015					
Treatment/ *Tretman*	**Weed density/** *Broj korova*		**Weed biomass/** *Masa korova*		**WCE (density)/** *WCE prema broju*	**WCE (biomass)/** *WCE prema masi*
	n	Number per m^{-2}	n	(g m^{-2})	(%)	(%)
C	9	100.56 a	9	1193.33 a	-	-
MM	9	71.33 b	9	553.33 b	28.17 c	51.16 b
RMM	9	74.00 b	9	465.00 bc	26.26 c	56.17 b
OTS	9	33.56 cd	9	183.33 d	65.97 ab	83.64 ab
ROTS	9	39.67 c	9	220.00 cd	60.22 b	80.56 ab
SOTS	9	28.22 d	9	120.00 d	71.01 a	89.03 a
SROTS	9	31.11 d	9	93.33 d	68.60 a	91.41 a

Lowercase letters indicate significant differences between treatments within the same column.

Regarding weed biomass in 2014 and 2015, a statistically significant difference (SSD) was observed between the control and all other treatments. In 2014, no SSD was registered between herbicide treatments, whereas in 2015, SSD was registered between PRE-em and POST-em treatments except between treatments „RMM" and „ROTS". In 2014, weed control efficacy according to weed density was highest at treatment „MM" (76.59%), followed by treatment „SOTS" (71.48%), while WCE according to weed biomass was highest at both split application treatments „SOTS" and „SROTS". In 2015 highest WCEs were achieved on split application treatments „SOTS" and „SROTS", while the lowest WCEs were achieved at „MM" and „RMM". Taking the average of both WCEs during both years, treatment „SOTS" had the highest coefficient of 70.61% (Table 4). This is mostly the result of very low amounts of rainfall during the application of herbicides in 2015 and its influence on the poor activation of soil-applied herbicides, which were less effective than in 2014. The above coincides with the statements of Belfry et al. (2015) and Alonso et al. (2010), who stated that the planting season, whether rainy or dry, influences factors, such as soil moisture and rainfall patterns, which critically impact herbicide phytotoxicity and efficacy. Also, Landau et al. (2021) mentioned that adequate rainfall, to dissolve the herbicide into soil water solution so that it can be absorbed by developing weed seedlings within the first 15 days after PRE application, is essential for effective weed control.

Soybean Yield Components and Yield

The number of nodes per plant was between 9.6 and 12.32 in 2014, while in 2015 it was a little bit lower and ranged between 9.07 and 10.07. Although there was an SSD between the control and some herbicide treatments („RMM", „OTS", „ROTS", „SOTS", „SROTS") in 2014, no SSDs between herbicide treatments were found in both years. Mentioned indicates that there is no influence between herbicide applications on the number of nodes and that the number of nodes mostly depends on weather conditions during the vegetation period, so that higher temperatures and less rainfall can decrease the number up to 48% as in „RMM" (Table 5).

Table 5. Number of nodes and pods per plant during 2014 and 2015

Tablica 5. Broj etaža mahuna i broj mahuna po biljci tijekom 2014. i 2015. godine

Treatment / *Tretman*	**Number of nodes** / *Broj etaža mahuna*					
	2014		2015		**Average** / *Prosjek*	
	n	Nodes per plant	n	Nodes per plant	n	Nodes per plant
C	60	9.60 b	60	9.07 a	120	9.33 b
MM	60	11.40 ab	60	9.60 a	120	10.52 ab
RMM	60	12.08 a	60	8.13 a	120	10.11 ab
OTS	60	12.00 a	60	9.87 a	120	10.93 a
ROTS	60	12.00 a	60	10.07 a	120	11.03 a
SOTS	60	12.32 a	60	9.87 a	120	11.09 a
SROTS	60	11.76 a	60	9.73 a	120	10.75 a
	Number of pods / *Broj mahuna*					
	2014		2015		**Average** / *Prosjek*	
	n	Pods per plant	n	Pods per plant	n	Pods per plant
C	60	29.40 b	60	31.07 c	120	30.23 c
MM	60	56.53 a	60	34.13 bc	120	45.33 ab
RMM	60	54.00 a	60	38.40 abc	120	46.20 ab
OTS	60	48.00 a	60	40.67 abc	120	44.33 b
ROTS	60	56.30 a	60	39.33 abc	120	47.82 ab
SOTS	60	54.80 a	60	49.33 a	120	52.07 a
SROTS	60	54.40 a	60	44.80 ab	120	49.60 ab

Lowercase letters indicate significant differences between treatments within the same column

Regarding the number of pods per plant, in 2014, the number ranged from 29.4 („C") up to 56.53 („MM) and SSD was achieved between control and all other treatments. No differences were found between herbicide treatments in 2014. Highest pods number in 2015 was achieved on POST-em treatments with split application („SOTS", „SROTS"). SSDs were found between control and two herbicide treatments („SOTS", „SROTS") and between treatment „MM" and „SOTS". Pods number was higher up to 65% („MM") in 2014 compared to the same treatment in 2015, while on average highest pods number was achieved on POST-em treatments in split application. In 2014, herbicide treatments produced between 63.3 and 92.3% extra pods compared to control, while in 2015 the percentage was lower because of higher weed infestation supported by unfavorable weather conditions and ranged between 9.8 to 58.8% (Table 5). Low pods number on control plots is mostly the result of high weed infestation supported by unfavorable weather conditions. Peer et al. (2013) reported that during their research weed free treatment produced 60.08% and 56.67% extra pods than control. Also, Nainwal and Saxena (2023) reported that weed free treatment produced 138.5% extra pods.

Although thousand seed weight (TSW) varied between the years from 139.4 g to 151.38 g in 2014 and from 115.07 g up to 125.67 g in 2015, no SSDs were found between treatments. In some treatments („OTS“) the TSW difference was up to 24.4% between the years, which could be the result of unfavorable weather conditions during the vegetation and weed infestation. Peer et al. (2013) also achieved higher 100-seed weight on treated and weed free plots compared to the control during their 2-year research. The increase was about 6.7% to11.5% in the first year and from 8% to 19.3% in the second year (Table 6).

Table 6. Thousand seed weight and yields during 2014 and 2015

Tablica 6. Masa tisuću zrna i prinosi tijekom 2014. i 2015. godine

Treatment / *Tretman*	**Thousand seed weight (TSW) during 2014 and 2015** / *Masa tisuću zrna (TSW) u 2014. i 2015 godini*					
	2014		2015		**Average** / *Prosjek*	
	n	TSW (g)	n	TSW (g)	n	TSW (g)
C	3	139.40 a	3	118.67 a	6	129.04 a
MM	3	150.01 a	3	125.67 a	6	137.84 a
RMM	3	147.75 a	3	121.93 a	6	134.84 a
OTS	3	150.28 a	3	115.07 a	6	132.67 a
ROTS	3	145.76 a	3	119.33 a	6	132.55 a
SOTS	3	151.38 a	3	124.87 a	6	138.12 a
SROTS	3	147.33 a	3	123.80 a	6	135.57 a
	Seed yield in harvest during 2014 and 2015 / *Prinos sjemena soje u 2014. i 2015. godini*					
	2014		2015		**Average** / *Prosjek*	
	n	Yield (t ha^{-1})	n	Yield (t ha^{-1})	n	Yield (t ha^{-1})
C	3	1.53 c	3	1.13 d	6	1.33 e
MM	3	3.64 ab	3	1.86 bc	6	2.75 cd
RMM	3	3.33 b	3	1.53 cd	6	2.43 d
OTS	3	3.53 ab	3	2.19 ab	6	2.86 bc
ROTS	3	3.73 ab	3	2.29 ab	6	3.01 abc
SOTS	3	3.70 ab	3	2.58 a	6	3.14 ab
SROTS	3	3.87 a	3	2.57 a	6	3.22 a

Lowercase letters indicate significant differences between treatments within the same column

Generally, yields were from 26% up to 54% higher in 2014 compared to the same treatments in 2015. In 2014 yield ranged from 1.53 t ha^{-1} („C“) to 3.87 t ha^{-1} („SROTS“). SSDs in yields were found between the control and all other treatments, and within the herbicide treatments „RMM“ and „SROTS“. Regarding 2015, yield ranged from 1.13 t ha^{-1} („C“) to 2.58 t ha^{-1} („SOTS“). SSDs were found between control and almost all other treatments and also within some herbicide treatments as well. On average, highest yields were recorded on POST-em treatments with split application („SOTS“ and „SROTS“) at the same treatments where highest WCEs were achieved (Table 6). The low yields on control plots are the result of high weed infestation which leads to lower numbers of nodes and pods, lower TSW and finally to lower yields. Similar reductions in soybean yield due to weed infestation were reported by many authors during the last few decades (Nainwal and Saxena, 2023; Peer et al., 2013; Kachroo et al., 2003; Gogoi et al., 1991). Lower yields at PRE-em treatments are mostly the result of lower herbicide efficacy, consequently higher weed infestation, supported by unfavorable weather conditions. Many authors reported that planting season, whether rainy or dry, profoundly influences soil moisture and rainfall patterns, which can critically impact herbicide phytotoxicity and efficacy (Alonso et al., 2010; Belfry et al., 2015).

CONCLUSION

Based on the results obtained, it can be concluded that a total of 17 different weed species were identified during the two years of research, whereby the dominant ones were *A. theophrasti*, *A. retroflexus*, *A. artemisiifolia*, *C. album*, and *F. convolvulus*. Furthermore, the application of different herbicide treatments had a statistically significant effect on the reduction of weed infestation compared to the untreated control, which ultimately resulted in an increase in the number of nodes, pods, seed mass, and yield. It can also be concluded that the herbicide efficacy is highly dependent on weather conditions, and the lack of herbicide effectiveness greatly reduces successful soybean production. Additional research is needed to find solutions to avoid negative extremes that reduce the efficacy of herbicides due to climate change.

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UTJECAJ RAZLIČITIH TRETMANA SUZBIJANJA KOROVA NA ZAKOROVLJENOST, KOMPONENTE PRINOSA I PRINOS SOJE

SAŽETAK

Velika potražnja za sojom zahtijeva od poljoprivrednika postizanje većih prinosa. Jedan od najvažnijih izazova u proizvodnji soje jest suzbijanje korova, posebno u ranim fazama rasta. Uspješna proizvodnja soje nezamisliva je bez uporabe herbicida koji se mogu primjenjivati kao PRE-em — prije nicanja usjeva — i/ili kao POST-em — nakon nicanja usjeva. S druge strane, herbicidi mogu negativno utjecati na klijavost i mogu uzrokovati oštećenje/ozljede biljaka te na kraju rezultirati nižim prinosom sjemena. Stoga je cilj ovoga istraživanja bio ispitati moguć utjecaj različitih tretmana herbicida na zakorovljenost usjeva, prinos soje i njegove komponente. Poljski pokus postavljen je tijekom 2014. i 2015. godine u slučajnome bloknom rasporedu. Istraživanje je uključivalo 7 tretmana: kontrolni tretman i 6 različitih tretmana herbicidima s aktivnim tvarima metribuzin, oksasulfuron, tifensulfuron, s-metolaklor i cikloksidim u punim i reduciranim dozama. Dominantni korovi bili su Abutilon theophrasti, Amaranthus retroflexus, Ambrosia artemisiifolia, Chenopodium album i Fallopia convolvulus. Primjena herbicida rezultirala je smanjenjem zakorovljenosti od 62,7 do 76,8 % u 2014. i od 26,4 do 71,9 % u 2015. u usporedbi s kontrolom. Nedostatak učinkovitosti herbicida zbog nepovoljnih vremenskih uvjeta tijekom primjene i vegetacije rezultirao je većom zakorovljenošću i u konačnici nižim prinosima, manjim brojem etaža mahuna i mahuna u 2015. godini. Statistički značajne razlike utvrđene su između pojedinih tretmana herbicidima u pogledu prinosa, pri čemu su prosječni prinosi bili najveći na POST-em tretmanima s dvokratnom primjenom.

Ključne riječi: PRE-em, POST-em, podijeljena primjena, herbicid, mahune

(*Received on October 8, 2025; accepted on November 4, 2025* – Primljeno 8. listopada 2025.; prihvaćeno 4. studenoga 2025.)