ACTA SCIENTIARUM POLONORUM
Acta Sci. Pol. Agricultura 18(1) 2019, 21–27
www.agricultura.acta.utp.edu.pl pISSN 1644-0625 eISSN 2300-8504 DOI: 10.37660/aspagr.2019.18.1.2

ORIGINAL PAPER

Received: 12.02.2019
Received in revised form: 04.04.2019
Accepted: 10.04.2019

WEED INFESTATION AND YIELDING OF FIELD PEA AND YELLOW LUPINE DEPENDING ON VARIOUS DOSES OF HERBICIDE MIXTURES

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ABSTRACT

Background. When searching for safer for the environment and effective methods of weed control in the plants of field pea and yellow lupine, possibility of applying reduced doses of soil herbicides should be taken into account.
Material and methods. One-way field experiments carried out in the years 2014–2015 assessed the effect of herbicide mixtures applied at various doses, Afalon Dyspersyjny 450 SC and Command 480 EC, containing linuron and clomazone, on weed infestation and yielding of field pea and yellow lupine.
Results. Compared with the control, soil application of herbicide mixtures, Afalon Dyspersyjny 450 SC (linuron) and Command 480 EC (clomazone), at a full dose and at doses reduced by 25 and 50%, decreased the number and weight of weeds, as well as their species diversity, which was reflected in an increased seed yield of field pea, cv. Turnia, and yellow lupine cv. Perkoz. No harmful phytotoxic effect was found in the experiment of the applied herbicide doses containing linuron and clomazone, on emerging plants of field pea and yellow lupine.
Conclusion. Doses of herbicide mixtures containing linuron and clomazone reduced by 25%, and even 50% enable maintaining a low level of weed infestation, and ensure a high seed yield level in field pea and yellow lupine.

Key words: *Lupinus luteus* L., *Pisum sativum* L., yield of seeds, weed control methods, weeds

INTRODUCTION

Field pea (*Pisum sativum* L.) and yellow lupine (*Lupinus luteus* L.) are indigenous fabaceae plants with a great potential for protein production, depending on rainfall and thermal conditions in the growing period (Podleśny and Bieniaszewski, 2012; Małecka-Jankowiak *et al*., 2016). A very important factor determining height of pea and lupine yields is maintaining 'purity' of their stands (Gugała *et al*., 2014; Rychcik *et al*., 2015). Effective weed control enables protection of these plants against harmful competition in the critical period at the beginning of growth, which among other things ensures optimal seed yields (Gugała and Zarzecka, 2011; Gugała *et al*., 2014). Non-chemical methods have a fundamental meaning in maintaining fields intended for the cultivation of pea and lupine free of weeds (Bakht *et al*., 2009; Gugała and Zarzecka, 2009, 2012b; Blecharczyk *et al*., 2011; Rychcik *et al*., 2015). However, the most effective weed control in the stands of these plants is obtained as a result of applying soil herbicides (Gugała and Zarzecka, 2011, 2012a), supplemented, if it is necessary, with foliar preparations (Szwejkowska, 2006; Sekutowski and Badowski, 2011). The pressure of protecting the natural environment is the reason of withdrawing subsequent very effective and important active

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substances in herbicides, which directly affects reduction in the possibility of effectively controlling weeds in stands of many crop plants. However, negative environmental effects of applying soil herbicides may be reduced, among other things, through reducing doses of preparations (Piekarczyk, 2006; Jędruszczak *et al*., 2010). In the available literature, there are very few papers on the topic of reducing herbicide doses in fabaceae plants. Reduction in the intensity of chemical weed control must be introduced cautiously, based on the condition of weed infestation so as to prevent excessive colonization of fields by weeds, or to avoid weed resistance to active substances in herbicides (Adamczewski, 2017). Due to the prevailing conventional plough tillage in Poland, as well as a lack of fabaceae crops in monoculture, it may be assumed that such threat is minimal.

The aim of the conducted research was assessment of the possibility of applying herbicide mixtures containing linuron and clomazone (Afalon Dyspersyjny 450 SC and Command 480 EC) for weed control of field pea and yellow lupine, at doses reduced by 25 and 50%. A research hypothesis was assumed in the paper that reduced doses of these preparations will enable maintaining a low level of weed infestation in the cultivation of field pea and yellow lupine and will ensure a high yield level.

MATERIAL AND METHODS

The adopted research aim was carried out with the use of two one-way field experiments in a randomized block design in four replications. Size of the plots for sowing and harvest was 15 m^2. The experiments included assessment of the effect of herbicide mixtures applied at various doses, Afalon Dyspersyjny 450 SC (linuron) and Command 480 SC (clomazone), on weed infestation and yield of field pea and yellow lupine. The studied factors included methods of treatment:

1) control plot – without weed control,
2) Afalon Dyspersyjny 450 SC (1.0 $dm^3 \cdot ha^{-1}$) + Command 480 EC (0.2 $dm^3 \cdot ha^{-1}$),
3) Afalon Dyspersyjny 450 SC (0.75 $dm^3 \cdot ha^{-1}$) + Command 480 EC (0.15 $dm^3 \cdot ha^{-1}$),
4) Afalon Dyspersyjny 450 SC (0.5 $dm^3 \cdot ha^{-1}$) + Command 480 EC (0.1 $dm^3 \cdot ha^{-1}$).

The research was carried out in the years 2014 and 2015 at the Research Station in Mochełek (53°13'N; 17°51'E), property of the Faculty of Agriculture and Biotechnology of the University of Science and Technology in Bydgoszcz, Poland. The research was carried out on lessive soil with a granulometric composition of fine loamy sand, bonitation class IVa, good rye complex. The forecrop for field pea and yellow lupine was winter wheat.

Before sowing, phosphorus-potassium fertilization was applied at doses 30.5 kg $P \cdot ha^{-1}$ and 66.4 kg $K \cdot ha^{-1}$. Sowing was carried out in early April with row spacing of 21 cm into a depth of 4 cm. The sowing dose was: field pea – 100 germinating seeds$\cdot m^{-2}$, cv. Turnia; yellow lupine – 100 germinating seeds$\cdot m^{-2}$, cv. Perkoz. Soil herbicides were applied according to the experiment design, directly after sowing. Phytotoxicity of herbicides was determined after plant emergence (BBCH 12–13) with the bonitation method on a 9-degree scale. The assessment of condition and degree of weed infestation was carried out app. 7–8 weeks after weed control treatment (BBCH 68-69) with a square-frame and gravimetric method from an area of 1m^2 on each plot (Domaradzki *et al*., 2001). Harvest was carried out from an area of 15 m^2 with a plot harvester, Wintersteiger, in the stage of full seed maturity, next 1000 seed weight was determined in field pea and yellow lupine.

Research results were statistically elaborated with the use of the analysis of variance, while significance of differences between the means was estimated with Tukey test, with a significance level of $P < 0.05$. Package of statistical programs FR – ANALWAR 5.2 was used in calculations.

RESULTS

The course of meteorological conditions during vegetation over the research years is presented in Table 1. In 2014, average air temperatures were on a slightly higher level compared with the mean from the years 1981–2010, while rainfall totals at the beginning of vegetation were higher than the average ones, which was favorable for the effect of soil herbicides and for the growth of pea and lupine plants. Weather conditions in 2015 were less favorable for the effectiveness of the applied soil herbicides

and for the plant yield. Low rainfall totals in spring of that year impeded full filtration of the applied soil herbicides into the solution of soil and weeds. Very low rainfall totals at the beginning of vegetation also unfavorably affected growth and development of the plants of field pea and yellow lupine.

The predominant weed species in the experiment included: field pansy (*Viola arvensis* Murray), lambsquarter (*Chenopodium album* L.), small bugloss (*Lycopsis arvensis* L.), and self-sown rapeseed (*Brassica napus* L.).

9 weed species were identified in field pea. Application of herbicide mixture, Afalon Dyspersyjny 450 SC + Command 480 EC, reduced weed biodiversity to 3–4 taxa. Species most resistant to linuron and clomazone turned out to be: field pansy (*Viola arvensis*), small bugloss (*Lycopsis arvensis*), and rapeseed (*Brassica napus*) (Table 2).

Table 1. Weather conditions in Mochełek in 2014–2015

Month	Year					
	Temperature, °C			Precipitation, mm		
	2014	2015	1981–2010	2014	2015	1981–2010
March	5.6	4.1	2.5	49.7	35.7	31.9
April	9.9	7.5	7.9	40.7	15.6	27.0
May	13.3	12.4	13.3	65.7	21.6	49.3
June	16.0	15.7	16.1	44.9	33.0	52.8
July	21.5	18.5	18.6	55.4	50.4	69.8
August	17.2	20.9	17.9	57.3	20.3	62.6
September	14.4	13.8	13.1	25.9	52.4	46.0
Mean	14.0	13.3	12.8			
Total				339.6	229.0	339.4

Table 2. Weed communities in agrocenosis of field pea (cultivar Turnia) depending on the dose of linuron (Afalon Dyspersyjny 450 SC) and clomazone (Command 480 EC), in 2014–2015 (pcs·m^{-2})

Weed species	Control	Afalon Dyspersyjny 450 SC + Command 480 EC		
		doses of herbicide mixtures, dm^3·ha^1		
		1.0 + 0.20	0.75 + 0.15	0.50 + 0.10
Viola arvensis	57.2	6.6	11.8	18.4
Chenopodium album	2.8	–	0.2	0.2
Lycopsis arvensis	2.1	0.5	0.7	1.0
Brassica napus	1.1	0.3	0.3	1.0
Capsella bursa-pastoris	0.5	–	–	–
Erodium cicutarium	0.3	–	–	–
Centaurea cyanus	0.1	–	–	–
Lamium amplexicaule	0.2	–	–	–
Matricaria inodora	0.2	–	–	–
Number of species	9	3	4	4

Application of a herbicide mixture containing linuron and clomazone at a full dose and at doses reduced by 25 and 50% in field pea cv. Turnia, affected a significant decrease in the number of weeds and the air-dry weight of weeds compared with the control variant, while as a result of reducing the doses by 25 and 50%, compared with the full dose, a tendency of an increased weed number and their air-dry weight was observed (Table 3). In the experiment, no phytotoxic effect was found of the applied preparation doses on the emerging pea plants. Application of herbicide mixtures, Afalon Dyspersyjny 450 SC + Command 480 EC, at each of the tested doses, significantly affected the seed yield of field pea cv. Turnia, compared with the control plot. Based on the conducted research it was indicated that after reducing herbicide doses by 25 and 50%, compared with the full dose, a tendency was observed of the pea seed yield decreased by 0.15 Mg·ha^{-1} (3.8%) and 0.36 Mg·ha^{-1} (9.2%), respectively. No significant effect was found of the applied levels of the factor on 1000 seed weight in field pea, cv. Turnia (Table 3).

The predominant weed species in yellow lupine included: field pansy (*Viola arvensis*), lambsquarter (*Chenopodium album*), small bugloss (*Lycopsis arvensis*), self-sown rapeseed (*Brassica napus*), and common horsetail (*Equisethum arvense* L.). In total, 12 weed species were identified, while application of herbicide mixtures, Afalon 450 SC and Command 480 EC, reduced weed biodiversity to 2-4 taxa (Table 4).

After sowing, direct application of soil herbicide mixtures, Afalon Dyspersyjny 450 SC + Command 480 EC, in yellow lupine cv. Perkoz at a full dose and at doses reduced by 25 and 50%, significantly affected a decrease in the number and weight of weeds compared with the control plot without weed control (Table 5). As a result of using doses of herbicide mixtures lower by 25%, compared with the full dose, a slight statistically insignificant increase was observed in the number and weight of weeds. Reduction in the dose of linuron and clomazone mixture by 50% caused an increase in the number and weight of weeds by 82 and 317%, respectively. No phytotoxic effect was found of the applied doses of preparations on emerging yellow lupine plants. Weed control in yellow lupine with the herbicide mixture, Afalon Dyspersyjny 450 SC + Command 480 EC, used at various doses significantly increased seed yield in yellow lupine compared with the control variant. Reduction in the doses of linuron and clomazone by 25 and 50%, affected a decrease in the seed yield in yellow lupine by 0.08 Mg·ha^{-1} (5.8%) and 0.17 Mg·ha^{-1} (12.3%), respectively, however the differences between these values were statistically insignificant. In the conducted research, no significant effect of herbicide mixtures was indicated on 1000 seed weight (Table 5).

Table 3. Weed infestation and yielding of field pea cultivar Turnia (mean from the years 2014–2015)

Weed control methods	Dose dm^3·ha^{-1}	Number of weeds, pcs·m^{-2}	Air-dry weight of weeds, g·m^{-2}	F (1:9)*	Yield of seeds, Mg·ha^{-1}	Thousand seeds weight, g
Control	–	64.5	51.4	1	3.04	193
Afalon Dyspersyjny 450 SC + Command 480 EC	1.0 + 0.20	7.4	5.7	1	3.93	194
Afalon Dyspersyjny 450 SC + Command 480 EC	0.75 + 0.15	13.0	9.5	1	3.78	194
Afalon Dyspersyjny 450 SC + Command 480 EC	0.50 + 0.10	20.6	13.1	1	3.57	193
Mean	–	26.4	19.9	1	3.58	194
$HSD_{0.05}$	–	23.59	8.82	ns	0.377	ns

*F – phytotoxicity – susceptibility of plants to a herbicide on a scale 1:9, where: 1 – no reaction of crop, 9 – damaged crop
ns – non-significant differences

Table 4. Weed communities in agrocenosis of yellow lupine (cultivar Perkoz) depending on the dose of linuron (Afalon Dyspersyjny 450 SC) and clomazone (Command 480 EC), in the years 2014–2015 (pcs·m^{-2})

Weed species	Control	Afalon Dyspersyjny 450 SC + Command 480 EC		
		doses of herbicide mixtures, dm^3·ha^1		
		1.0 + 0.20	0.75 + 0.15	0.50 + 0.10
Viola arvensis	136.9	31.1	42.5	55.5
Chenopodium album	3.1	–	0.2	0.5
Lycopsis arvensis	1.6	–	0.2	0.4
Brassica napus	1.2	0.5	0.7	1.3
Equisetum arvense	3.3	–	–	–
Capsella bursa-pastoris	1.8	–	–	–
Erodium cicutarium	0.3	–	–	–
Centaurea cyanus	0.2	–	–	–
Lamium amplexicaule	0.5	–	–	–
Matricaria indora	0.2	–	–	–
Triticum aestivum	0.2	–	–	–
Poa annua	0.1	–	–	–
Number of species	12	2	4	4

Table 5. Weed infestation and yielding of field pea cultivar Perkoz (mean from 2014–2015)

Weed control methods	Dose dm^3·ha^{-1}	Number of weeds, pcs·m^{-2}	Air-dry weight of weeds, g·m^{-2}	F (1:9)*	Yield of seeds, Mg·ha^{-1}	Thousand seeds weight, g
Control	–	149.4	161.1	1	0.94	127
Afalon Dyspersyjny 450 SC + Command 480 EC	1.0 + 0.20	31.6	17.4	1	1.38	128
Afalon Dyspersyjny 450 SC + Command 480 EC	0.75 + 0.15	43.6	36.3	1	1.30	126
Afalon Dyspersyjny 450 SC + Command 480 EC	0.50 + 0.10	57.7	72.6	1	1.21	127
Mean	–	70.6	71.8	1	1.21	127
$HSD_{0.05}$	–	30.00	36.11	ns	0.235	ns

*F – phytotoxicity – susceptibility of plants to a herbicide on a scale 1:9, where: 1 – no reaction of crop, 9 – damaged crop
ns – non-significant differences

DISCUSSION

The results of the conducted research confirm the great yield-protecting role of the herbicide mixtures, Afalon Dyspersyjny 450 SC + Command 480 EC applied into soil, in the cultivation of fabaceae plants (Luboiński, 2017; Szymańska *et al*., 2017), although their effectiveness, due to unfavorable meteorological conditions in 2015, was not completely satisfying. Optimal soil moisture is the condition for the effective activity of soil preparations (Sekutowski and Badowski, 2011). Therefore, an early sowing

date in pea and lupine determines a usually good effectiveness of the applied herbicides (Piekarczyk, 2006, Gugała *et al*., 2017). Under such conditions, decreasing the doses of linuron and clomazone mixture is purposeful, and a prospective increase in weed infestation does not significantly affect a decrease in the yield of field pea and yellow lupine. Due to a slow initial growth and development of fabaceae plants, segetal flora threatens yielding, hence the applied chemical weed control should be effective with respect to species-diversified weed communities. In the conducted experiments, occurrence of 9–12 weed species was observed. In fabaceae plants, many more species may be found, also including very burdensome ones, such as wild buckwheat (*Fallopia convolvulus* L.), cleavers (*Galium aparine* L.), creeping thistle (*Cirsium arvense* L.), couch grass (*Elymus repens* L.), and scentless mayweed (*Matricaria inodora* L.) (Rychcik *et al*., 2015). However, this does not exclude the possibility of reducing herbicide doses, as even with a higher level and species diversity of weeds, it is reasonable to apply herbicides at reduced doses (Piekarczyk, 2006; Jędruszczak *et al*., 2010). Such proceeding is highly significant in terms of reducing the potentially harmful effect of pesticides on the natural environment (Gołębiowska and Domaradzki, 2010), and may revise plans for withdrawing subsequent highly effective and necessary for agriculture active substances in herbicides (Gugała and Zarzecka, 2009; Rychcik *et al*., 2015). In the situation of currently increasing threat of the occurring ecotypes of weeds resistant to herbicides, reduction in the doses of active substances in herbicides must be introduced very cautiously. This cannot cause escalation of this phenomenon due to the intensification of selection and prospective genetic mutations, which may be promoted by the application of very small doses of herbicides (Adamczewski and Dobrzański, 2012; Adamczewski, 2017). However, fabaceae plants are not cultivated in monoculture, and the risk of compensation and of weeds becoming resistant is relatively small.

CONCLUSIONS

1. Compared with the control plot, application of soil herbicide mixture, Afalon Dyspersyjny 450 SC (linuron) + Command 480 EC (clomazone), at a full dose and at doses reduced by 25 and 50%, decreased the number and weight of weeds and their species diversity, which was reflected in an increase in the seed yield in field pea and yellow lupine.
2. No harmful phytotoxic effect of the applied doses of herbicides containing linuron and clomazone was observed on emerging plants of field pea cv. Turnia and yellow lupine cv. Perkoz.
3. Doses of herbicide mixtures containing linuron and clomazone, reduced by 25%, and even by 50%, enable maintaining a low level of weed infestation, and ensure a high level of seed yield in field pea and yellow lupine.

REFERENCES

Adamczewski, K. (2017). Odporność chwastów na herbicydy a problem progów szkodliwości (artykuł dyskusyjny). Fragm. Agron., 34(4), 208–210.

Adamczewski, K., Dobrzański, A. (2012). Fitness chwastów w badaniach odporności na herbicydy. Prog. Plant Prot./Post. Ochr. Roślin, 52(3), 549–555.

Bakht, T., Khan, I.A., Khan, M.I., Khan, I., Khattak, A.M. (2009). Weed control in pea (*Pisum sativum* L.) through mulching. Pak. J. Weed Sci. Res., 15(1), 83–89.

Blecharczyk, A., Małecka, I., Sawinska, Z., Waniorek, B. (2011). Wpływ uprawy roli na zachwaszczenie roślin w trójpolowym zmianowaniu. Prog. Plant Prot./Post. Ochr. Roślin, 51(2), 827–831.

Domaradzki, K., Badowski, M., Filipiak, K., Franek, M., Gołębiowska, H., Kieloch, R., Kucharski, M., Rola, H., Rola, J., Sadowski, J., Sekutowski, T., Zawerbny, T. (2001). Metodyka doświadczeń biologicznej oceny herbicydów, bioregulatorów i adiuwantów. Część I. Doświadczenia polowe. Puławy: Wyd. IUNG, 1–167.

Gołębiowska, H., Domaradzki, K. (2010). Systemy chemicznej regulacji zachwaszczenia upraw rolniczych w aspekcie rolnictwa zrównoważonego. Fragm. Agron., 27(1), 32–43.

Gugała, M., Zarzecka, K. (2009). Wpływ gęstości siewu i sposobów pielęgnacji na plonowanie grochu siewnego (*Pisum sativum* L.). Fragm. Agron., 26(2), 64–71.

Gugała, M., Zarzecka, K. (2011). Regulacja zachwaszczenia w uprawie grochu siewnego odmiany Wiato. Prog. Plant Prot./Post. Ochr. Roślin, 51(1), 342–347.

Gugała, M., Zarzecka, K. (2012a). Skuteczność i selektywność herbicydów stosowanych w uprawie łubinu wąskolistnego. Prog. Plant Prot./Post. Ochr. Roślin, 52(2), 261–265.

Gugała, M., Zarzecka, K. (2012b). Wpływ metod uprawy roli i sposobów pielęgnacji na zachwaszczenie i plonowanie łubinu wąskolistnego odmiany Sonet. Fragm. Agron., 29(1), 16–24.

Gugała, M., Zarzecka, K., Sikorska, A. (2014). Wpływ metod uprawy roli i pielęgnacji chemicznej na zachwaszczenie i plonowanie grochu siewnego (*Pisum sativum* L.) odmiany Merlin. Prog. Plant Prot./Post. Ochr. Roślin, 54(3), 349–354.

Gugała, M., Zarzecka, K., Sikorska, A., Kapela, K. (2017). The effect of tillage systems and weed control on the yield of yellow lupine (*Lupinus luteus* L.). Acta Sci. Pol. Agricultura, 16(1), 25–33.

Jędruszczak, M., Bujak, K., Wesołowski, M. (2010). Weeds in soybean canopy cultivated under direct sowing with winter rye mulch and reduced herbicide doses. Ann. UMCS, Sec. E, 65, 29–37.

Luboiński, A. (2017). Ochrona konwencjonalnych odmian soi (*Glycine max* L.) przed zachwaszczeniem komosą białą (*Chenopodium album* L.) i chwastnicą jednostronną (*Echinochloa crus-galli* L.). Prog. Plant Prot./Post. Ochr. Roślin, 57(2), 135–140.

Małecka-Jankowiak, I., Blecharczyk, A., Swędrzyńska, D., Sawinska, Z., Piechota, T. (2016). The effect of long--term tillage systems on some soil properties and yield of pea (*Pisum sativum* L.). Acta Sci. Pol. Agricultura, 15(1), 37–50.

Piekarczyk, M. (2006). Możliwość redukcji dawki herbicydu Afalon 50 WP przy różnej uprawie pożniwnej pod łubin wąskolistny. Acta Sci. Pol. Agricultura, 5(1), 37–44.

Podleśny, J., Bieniaszewski, T. (2012). Ocena plonowania grochu siewnego (*Pisum sativum* L.) w różnych rejonach Polski. Fragm. Agron. 29(4), 125–135.

Rychcik, B., Kaźmierczak, M., Michalska, M., Bepirszcz, H. (2015). Kształtowanie się zbiorowisk chwastów grochu siewnego (*Pisum sativum* L.) pod wpływem herbicydu i następstwa roślin. Prog. Plant Prot./Post. Ochr. Roślin, 55(1), 25–29.

Sekutowski, T., Badowski, M. (2011). Wpływ zachwaszczenia oraz ochrony herbicydowej na plonowanie grochu siewnego (*Pisum sativum* L.). Prog. Plant Prot./Post. Ochr. Roślin, 51(4), 1858–1863.

Szwejkowska, B. (2006). Reakcja odmian grochu siewnego (*Pisum sativum* L.) na różne metody zwalczania chwastów. Acta Sci. Pol., Agricultura, 5(1), 71–82.

Szymańska, G., Faligowska, A., Panasiewicz, K., Szukała, J., Koziara, W. (2017). The productivity of two yellow lupine (*Lupinus luteus* L.) cultivars as an effect of different farming systems. Plant Soil Environ., 63(12), 552–557.

ZACHWASZCZENIE I PLONOWANIE GROCHU PASTEWNEGO ORAZ ŁUBINU ŻÓŁTEGO W ZALEŻNOŚCI OD ZRÓŻNICOWANYCH DAWEK MIESZANIN HERBICYDÓW

Streszczenie

W doświadczeniach polowych jednoczynnikowych zrealizowanych w latach 2014–2015 badano wpływ zróżnicowanych dawek mieszanin herbicydów zawierających linuron (Afalon Dyspersyjny 450 SC) i chlomazon (Command 480 EC) na zachwaszczenie i plonowanie grochu siewnego pastewnego i łubinu żółtego. Zastosowanie mieszanin herbicydów doglebowych Afalon Dyspersyjny 450 SC (linuron) + Command 480 EC (chlomazon) w dawkach pełnej i zredukowanych o 25 i 50% zmniejszyło na tle obiektu kontrolnego liczbę i masę chwastów oraz ich różnorodność gatunkową, co znalazło odzwierciedlenie w zwiększeniu plonu nasion grochu siewnego pastewnego odmiany Turnia i łubinu żółtego odmiany Perkoz. Nie stwierdzono szkodliwego fitotoksycznego oddziaływania aplikowanych dawek herbicydów zawierających linuron i chlomazon na wschodzące rośliny grochu siewnego i łubinu żółtego. Obniżone o 25%, a nawet 50% dawki mieszanin herbicydów zawierającej linuron i chlomazon pozwalają utrzymać mały stan zachwaszczenia i zapewnić wysoki poziom plonu nasion grochu siewnego i łubinu żółtego.

Słowa kluczowe: chwasty, *Lupinus luteus* L., *Pisum sativum* L., plon nasion, sposoby pielęgnacji