

EFFECT OF WEED MANAGEMENT PRACTICES ON WEED COVER IN FIELD PEA (*PISUM SATIVUM L.*)

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ABSTRACT

Field pea (*Pisum sativum L.*) are planted on small area in Hungary, although it is a precious source of protein (22-28%), and it also plays a significant role like a component in fodder mixture and green forage. It is a great part in crop rotation as a short growing-season legume. Furthermore, it has beneficial effects of nitrogen-fixing nodules being able to obtain N derived from air. One of the most critical limiting factors is to find out weed management practise for control of weeds in field pea.

Our field experiment was carried out on site of the National Agricultural Research and Innovation Centre, the Department of Field Crops Research in Óthalom for comparing weed management strategies by evaluate their efficacy and weed flora. We used 6 herbicides or herbicide combination and observed weed density in 5 times during the growing season.

The most important weeds were: common chickweed (*Stellaria media*), wild mustard (*Sinapis arvensis*), branching lackspur (*Consolida regalis*), mieldweed (*Chenopodium album*). Among the treatments the highest weed cover was the weedy check, followed by Stomp Super, obtained maximum weed control and long lasting effect. With the application of Basagran 480 SL and Pulsar 40 SL have a significantly lower weed density was recorded than preemergence applications. In case of Corum application, it was the lowest weed cover of all even at harvesting time. According to our experiments use of Dash does not control weeds considerably.

KEYWORDS: field pea, weed management, weed cover, herbicidal effect

INTRODUCTION

Field pea in both sowing time has very high level of protein (22-28%) and it also plays a significant role like a component in fodder mixture and green forage. Field pea (*Pisum sativum L.*) are harvested 14 million tonnes from about 7,6 million hectares worldwide in 2016 (FAOSTAT, 2018). In Hungary the total area under filed pea were in small size: the complete harvested area was 15,4 thousand ha in 2017, with 2,75 t/ha yields (BÁBÁNÉ, 2017).

Plant protection is an extremely important part of the crop management in the case of field pea. It has numerous pathogens and pests, but reducing weeds infestation has become one of the challenging aspects in agriculture in the last few years. Because of the importance of weed effects research is needed to use suitable integrated weed management (HARKER ET AL, 2001, WOZNIAK AND SOROKA 2014). We have to choose chemical weed control with the knowledge of the environment effect of seed placement (abiotic and biotic effect), cultivation purpose and the kind of trait (KÁDÁR, 2016).

An early sowing date of field pea in March has determined the weed species in the area (WÁGNER AND NÁDASYNÉ, 2008a, WÁGNER AND NÁDASYNÉ 2009). According to NÁDASYNÉ (2015) the weed suppression ability of field pea depends on the structure of the weed, the foliage size, which means how fast as it can shade the soil. There are 2 critical

period of weed control in spring field pea. The first critical period is the first month after planting. Because of its early sowing date, weeds, such as red poppy (*Papaver rhoeas* L.), cleavers (*Galium aparine* L.), field chamomile (*Anthemis* spp.), wild chamomile (*Matricaria* spp.) emerge early in the season (REISINGER, 2000). Afterwards appear weeds in the area, which is germinating in spring, and flowering in summer including wild mustard (*Sinapis arvensis* L.), wild radish (*Raphanus raphanistrum* L.), black oats (*Avena fatua* L.). The second critical period of weed control is at the end of the growing season, after the lower leaves dried (GYULAI, 2014). Then emerged prickly grass (*Echinochloa crus-galli* L.P.B.), common amaranth (*Amaranthus retroflexus* L.), meldweed (*Chenopodium album* L.) (REISINGER, 2000). Volunteer sunflower (*Helianthus annuus* L.) and perennials: field bindweed (*Convolvulus arvensis* L.), creeping thistle (*Cirsium arvense* L. SCOP.), Johnson-grass (*Sorghum halepense* L. PERS.) are important also in the arable land. Dicotyledon weeds are the highest problem in the weed control of field pea (WÁGNER AND NÁDASYNÉ, 2008a, WÁGNER AND NÁDASYNÉ, 2008b). Mostly dicotyledon weeds which has germinated from deeper parts of soil are the most difficult to eradicate (SZENTÉY, 2003), where the basic treatment are not effective (NAGY, 2017). Furthermore these weeds have only 2-3 days in optimal phenological phase to maximize weed control against them.

Our aim to examine the effect of different weed management of field pea to the cultivated plant and its weed flora.

MATERIALS AND METHODS

The research was established in the Department of Field Crops Research of National Agricultural Research and Innovation Centre, in Szeged-Öthalom. The research farm has a flat relief, salt meadow chernozem soil, humus content: 2.8-3.2 %, pH value: 7.9, liquid limit (K_A): 42, nutrient supply capacity: N medium, P_2O_5 good, K_2O good. The variety is Impulse, which is a middle-maturated, white flowered, afila type, high fertility and protein content spring shelling pea. Preceding crop was winter wheat. After the winter wheat has been harvested we made shallow stubble stripping, then loosened area with a middle deep brush weeder (25-30 cm deep) and smoothed down. Later the loosened stubble was disking, and supplied 280 kg ha⁻¹ NPK (15:15:15) multinutrient fertilizer. In the last 5 years, we couldn't use organic fertilizer, and there's no possible to irrigate the area. Seedbed preparation was made by cultivator and combinator. Sowing was made in 14th of March in 2018, the row width was 12 cm, sowing depth was 5 cm, seed quantity was 250 kg ha⁻¹ (1 million germ ha⁻¹). Field pea was emerged in 23th of March in 2018. We designated random layout plots for 8 treatments in 4 repeats. Each plot has 10 m² area. Weed survey was made by the method of Balázs-Ujvárosi in 19th of March, 2nd and 21th of April, 4th of May and 12th of June in 2018. Based on the weed surveys we calculated the measure of the weed cover and effect of the weed control.

Applications were in *Table 1*, meteorological data on the date of applications were in *Table 2*.

Table 1: Applications

Number of applications	Pesticide	Active substance/agent	Dose (l ha ⁻¹)	Phenological phase of field pea
1	weedy check control			
2	Stomp Super	<i>pendimetalin</i>	4.5	Preemergens
3	Basagran 480 SL	<i>bentazon</i>	2	6-8 leaves
4	Stomp Super + Basagran 480 SL	<i>pendimetalin</i> + <i>bentazon</i>	4.5+ 2	Preemergens and 6-8 leaves
5	Corum	<i>imazamox</i> + <i>bentazon</i>	1.25	6-8 leaves
6	Pulsar 40 SL	<i>imazamox</i>	1	6-8 leaves
7	Corum + Dash HC	<i>imazamox</i> + <i>bentazon</i> + <i>metiolelát, metilpalmitát</i>	1.25+ 0.5	6-8 leaves
8	hand weed control			

Table 2: Meteorological datas on the date of applications

Meteorological conditions		
Parameters	19th of march in 2018	21th of April in 2018.
Air temperature (°C)	12	21
Relative humidity %	75	65
Wind speed (m/s)	2	1
Cloud cover (%)	50	50
Precipitation (mm) 2 weeks before the application	47.5	0.9
Precipitation (mm) 2 weeks after the application	30.1	0
The first >5 mm precipitation after the application	21th of March in 2018	15th of May in 2018
Weather on the last week before the application	moderately chill and wet	warm and dry
Weather on the next week after the application	chill and wet	warm and dry

RESULTS AND DISCUSSION

In *Table 3* we can see the weed cover of weedy check control/ date of weed survey. In the first 2 times we made only a few experiences, then on the third weed survey we got 10%. In this time persian speedwell (*Veronica persica*), chickweed (*Stellaria media*), shepherd's purse (*Capsella bursa-pastoris*), wild mustard (*Sinapis arvensis*), cleavers (*Galium aparine*), corn poppy (*Papaver rhoeas*), branching lackspur (*Consolida regalis*) and volunteer wheat (*Triticum aestivum*) were on the plots. On the next weed survey in the 4th of May we can see secondary weed period, where black nightshade (*Solanum nigrum*), meldweed (*Chenopodium album*), common ragweed (*Ambrosia artemisiifolia*), and giant sumpweed (*Iva xanthiifolia*) were appeared. By the last weed survey weed cover of the weedy check plot was reached 34.25 %.

	06.12.	100	100	100	100	100	100	100	100	100	100	100	100	100
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By the results of our experiments preemergence herbicides itself (in application 2 and 4) were less effective than postemergence herbicides. By using Stomp Super in filed pea in the early stage of development we reduced winter annual weeds, and has long last effect. Then field pea presumably could be able to overshadow the soil, which increased its weed suppression ability. However the effect of Basagran 480 SL with *bentazon* was much better than preemergence herbicide (3. application). Combination of these two herbicides (4. application) had obviously better values than the unmatched. Weed cover of the Corum handling plot (5. application) has the lowest values from all even 5 days before harvesting. Compare with Corum and Corum with Dash HC combination in this year there was no significant difference between the effect of applications (7. treatment). Pulsar 40 SL which contains only *imazamox* was significantly worse herbicidal effect than the application with Corum. Examining the efficiency of herbicides the best choice were Corum, and Corum with Dash HC combination.

CONCLUSIONS

In our experimental field the biggest number were common chickweed (*Stellaria media*), wild mustard (*Sinapis arvensis*), branching lackspur (*Consolida regalis*), mieldweed (*Chenopodium album*). Probably the warming climate late summer annuals were the most in filed pea.

The highest values of weed cover were the hand weed control plot and the preemergence herbicide handling parcel with pendimetalin. But the number of weeds during the whole growing season was the lowest by Stomp Super application. It is probably causes the faster development and higher overshadow of field pea, which is the same results as DÁVID AND KISS (2015). According to their opinion preemergence application is very important against strict requirements of postemergence application (for example: development of cultivated plant and weed, temperature criteria). In contrast in our experiments the herbicidal effect of preemergence application was weaker than the posztemergence application, as VARGA AND GARA (2004) have determined it formely. Basagran 480 SL with *bentazon* active substance has a short residual action, because of the increased number of weeds which emerged at the end of the growing season. According to DÁVID AND KISS (2015) *imazamox* is a wide spectrum active substance, which proves to be true, but combination with *bentazon* was much more effective. There were no significant differences between the herbicidal effect of Corum and Corum with Dash HC combination.

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