PROJECT "TARGETED IMPLEMENTATION OF INTEGRATED PEST CONTROL UNDER CONDITIONS OF INTENSIVE FARMING", NO. 35BV-KK-17-1-03770-PR001

according to the Lithuanian Rural Development Programme 2014–2020 Measure "Cooperation", Activity Area "Support to EIP Operational Groups"

WEED CONTROL IN WINTER WHEAT AND RAPESEED

Recommendations

The applicant is **the Lithuanian Research Centre for Agriculture and Forestry.**

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1. WEED CONTROL IN WINTER WHEAT

Major weeds

The weediness of the crop depends on the soil, crops grown, used agronomic techniques, the weed control measures, etc. When winter wheat is sown in plowed soil, weediness is usually lower compared to zero tillage (e.g. there are lots of threshing remains after rapeseed). The weediness of wheat sown early is higher compared to that sown later as well.

Winter wheat, like other winter crops, is dominated by overwintering weeds. Field pansies, chickweeds, and field speedwells can be found in almost all crops; fairly common are shepherd‘s purses, field pennycresses, dead-nettles, sticky bobs, scentless false mayweeds, as well as cornflowers, forget-me-nots, campions and poppies. With the increasing use of zero tillage, common windgrasses, annual and common meadow-grasses, and rye bromes began to spread in the crops, and in some areas slender meadow foxtails were also found.

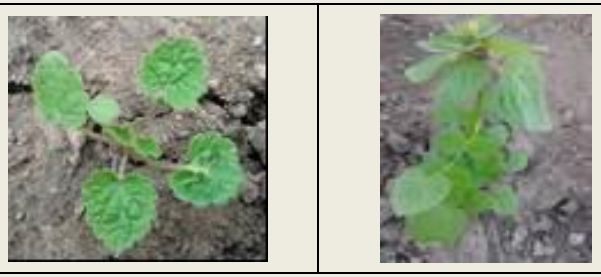
The weeds sprouting in spring are rarely harmful (because they are suppressed by the crop), but if the crop is sparse, sprouted weeds can take root and suppress the crop, and mature seeds contaminate the soil (especially common wild oats).

Selection of herbicides

The choice of herbicides depends on the species composition of weeds, pre-sowing, tillage technology, sowing time, meteorological conditions, etc.

In the case of early sowing, when weeds are widespread and there are lots of crop plant volunteers (e.g. rapeseed), if monocotyledonous weeds (e.g. windgrasses, foxtails) are present in the field, it is recommended to use herbicides in autumn.

In spring, whether the crop is sprayed in the autumn or not, first of all it is necessary to assess the condition of the crop, the species composition of the weeds, the need for herbicide spraying and the appropriate selection of herbicides. The choice of herbicides is quite wide, their list is supplemented with new products every year, and some are removed from the list of permitted uses, so you should check website www.vatzum.lt where there is information which herbicides are currently on the list and which are allowed to be used in Lithuania. This page also contains labels for all registered plant protection products.

Table 1. *Name and code of the main weeds found in the field experiments*		
Dycotyledonous		
Scentless false mayweed, MATIN	Shepherd‘s purse, CAPBP	Red dead-nettle, LAMPU
		
Sticky bob, GALAP	Field pennycress, THLAR	Cornflower, CENCY
		
Field pansy, VIOAR	Chickweed, STEME	Common poppy, PAPRH
		
Field speedwell, VERAR	Green field-speedwell, VERAG	Field forget-me-not, MYOAR

					
White campion, MELAL		Field larkspur *, CNCRE		Black-bindweed *, POLCO	
					
Monocotyledons					
Common windgrass, APESV		Annual meadow grass, POAAN		Common wild oat *, AVEFA	
					
* - usually germinates in spring (rhose germinated in autumn, usually does not overwinter)					

While spraying the crop it is important:

- before selecting and using a herbicide, it is necessary to read a product label and make sure that the product is used for its intended purpose and under proper conditions;
- the sprayer must be in order to distribute the herbicide evenly;
- favourable meteorological conditions: temperature +10–+25° C, wind speed <4 m/s.
- spraying after sowing until germination, the soil must be sufficiently moist, or rain is expected in the near future (>1 mm);
- spraying plants and weeds, the most important stage is the stage of development of weeds and plants, air temperature (do not spray before or after frost), good growth of plants and weeds; at least 2 hours should elapse after spraying before rain;
- the effectiveness of herbicides in an optimal density crop will be higher due to crop competitiveness, and plants will be less sensitive if the crop is even (plants are equally developed).

Results of precision field experiments

A study of weed control in winter wheat crop was conducted at the Institute of Agriculture, LRCAF, Akademija, Kėdainiai D. in 2018–2020 where dicotyledonous weeds dominated, and in Bobiniškiai, Panevėžys district, where, in addition to dicotyledons, there were also windgrasses and common wild oats present. In all 4 experiments, herbicides were applied only in autumn (two spray times), in autumn and spring, and only in spring. In the experiments against dicotyledonous weeds (Academija), diflufenican was used in autumn before and after germination, and a mixture of tribenuron-methyl and florasulam was used in spring in the non-sprayed and in once-sprayed plots before and after weed germination (BBCH 29-31). In the autumn windgrass trials, diflufenican + flufenacet and diflufenican + sodium mesosulfuron were used at the 1-3 leaf stage (BBCH 11-13) and at the 3-5 leaf stage (BBCH 13-15) when the plants germinated. In spring, at the beginning of stem growth (BBCH 29-31), piroxulam + florasulam + aminopyralide were applied to one of the variants sprayed in early autumn (diflufenican + flufenacet) and in one application sprayed in autumn – halauxifen-methyl + floraxipyr-methyl mixture with pinoxaden was used.

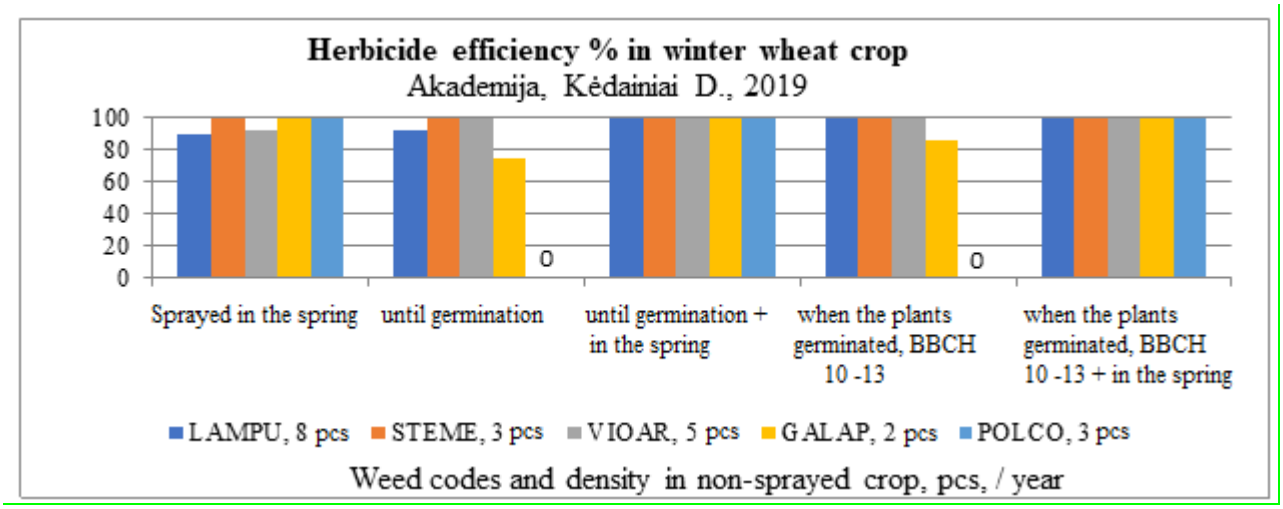


Figure 1. Herbicide efficiency % in winter wheat crop (2019-2020)

In order to optimize the use of herbicides, it is RECOMMENDED to:

- avoid monoculture,
- choose well-wintering varieties,
- sow treated seed, delay sowing time,
- make proper selection and timely use of herbicides,
- if the crop is very weedy (rich in rapeseed volunteers, chickweeds, windgrasses, foxtails), it is worth using herbicides in autumn and in spring to assess the crop weediness and (if necessary) choose the right herbicides,
- not to use herbicides of the same chemical group for several years in succesion,
- timely use appropriate protection of plants from diseases and pests.

2. WEED CONTROL IN WINTER RAPESEED

Major weeds

The crop weediness depends on the soil, cultivated plants, agrotechnics, applied weed control measures, etc. Sowing rapeseed after fallow, weeds are usually lower, while using tillage, it is higher.

In the early stages of development, rapeseed is poorly competitive, so it can be suppressed by widespread weeds. In the later stages, their competitiveness increases. For this reason, it is very important to control weeds in the early stages of rapeseed development (up to 4 leaves). Rapeseed is particularly sensitive to cereal volunteers, so it is important to control them in time (especiallyy, if they are winter cereal volunteers). Spring cereal volunteers may not be controlled, if the crop contains more than 10 pcs/$m^{2.}$

Winter rapeseed, like other winter crops, are dominated by overwintering weeds. Field pasies can be found in almost all crops; sticky bobs, scentless false mayweeds, shepherd‘s purses, field pennycresses, chickweeds, field speedwells, dead-nettles, annual meadow-grasses (especially where zero tillage is used) and other weeds can be found in many fields. Common windgrasses, cornflowers and, in some regions of Lithuania – common poppies are increasingly detected.

Field mustard, fat-hens, and sun spurges are also quite often found not only in spring rapeseed but also in winter rapeseed crops. Sprouted in autumn, these weeds are usually not harmful because they do not overwinter, but if they are widespread (especially mustard) they suppress the crop, that is why they should also be controlled. Perennial weeds, such as field thistles, sow thistles, and couch grasses usually grow in foci (not common) and are relatively easy to control.

Selection of herbicides

The choice of herbicides depends on the species composition of weeds, preceding crop, tillage, sowing time, soil texture and meteorological conditions.

Spraying herbicides on peat soils should be chosen after plants and weeds have germinated.Herbicides on mineral soils can be used both before sowing and after sowing before germination or after germination. However, in a nature-friendly manner, the use of soil herbicides on sandy soils before sowing or until plant germination should be avoided.

The choice of herbicides is quite wide, new products are added to the list every year, and some are removed from the list of permitted uses, so it should be checked which herbicides are currently on the list and which are allowed to be used in Lithuania. This can be done, for example, on the website www.vatzum.lt, where the labels of all registered plant protection products are also provided.

Table 2. *Main weeds, detection rate in crops % and average density pcs/m^2 (76 field data)*					
Overwintering					
Scentless false mayweeds, 82 %, 17 pcs.		Shepherd‘s purses, 75 %, 13 pcs.		Dead-nettles, 75%, 11 pcs	
					
Sticky bobs, 66 %, 7 pcs.		Field pennycresses, 66 %, 13 pcs.		Cornflower, 9 %, 23 pcs.	
					
Field pansies, 87 %, 55 pcs.		Chickweeds, 82 %, 10 pcs.		Commom poppies*, 13 %, 21 pcs.	
					
Field speedwells, 67 %, 11 pcs.		Commmon windgrasses, 5 %, 41 pcs.		Annual meadow grasses, 21 %, 5 pcs.	

					
Non-wintering					
Field mustard, 45%, 16 pcs.		Fat-hens, 70%, 9 pcs.		Sun spurges, 36%, 5 pcs.	
					
* - spread in some regions					

While spraying the crop it is important:

- before selecting and using a herbicide, it is necessary to read the product label and make sure that the product is used for its intended purpose and under proper conditions;
- the sprayer must be in order to distribute the herbicide evenly;
- favourable meteorological conditions: temperature +10–+25° C, wind speed <4 m/s.
- spraying after sowing until germination, the soil must be sufficiently moist or rain is expected in the near future (> 1 mm);
- spraying plants and weeds at the stage of development, the weed and plant development stage must correspond to the label, good growth of plants and weeds, at least 2 hours should elapse after spraying before rain;
- the effectiveness of herbicides in an optimal density crop will be higher due to crop competitiveness, and plants will be less sensitive if the crop is even (plants are equally developed).

Results of precision field experiments

The experiment was conducted at the Institute of Agriculture, LRCAF, Akademija, Kėdainiai D. in 2018–2020.

Figure 2. *Rapeseed yield t/ha (2019-2020)*

Spring crop volunteers can be left out uncontrolled, if their number in the crop (<10 pcs./m2) is low, as they often freeze out and do not compete with rapeseed in autumn, and they do not reduce yields. The sparse spread of winter crop volunteers does not affect the yield of winter cereals (<5 pcs./m2), but they often overwinter and can contaminate rapeseed yields.

In order to optimize the use of herbicides, it is RECOMMENDED to:

- avoid monoculture,
- choose well-wintering varieties,
- to sow certified seed at the optimal time (August 10–25), seed rate - ~ 50 hybrid and ~ 70 line varietyseeds per m^2,
- make proper selection and timely use of herbicides (so as not to repeat spraying),
- timely use appropriate protection of plants against diseases and pests.