OILSEED RAPE CROP IN ROMANIA: RESEARCH REGARDING TECHNOLOGICAL ALTERNATIVES FOR WEED CONTROL

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Abstract

Weeds compete against cultivated plants, taking their water, nutrients, light and heat. Weeds proliferation is a major limiting factor for profitable and quality crops, knowing that early weeds proliferation in rape crops may lead to compromised crops in autumn. In order to contribute to finding technical solutions for an effective control of problematic weeds affecting rape crops, cruciferous especially, we carried out a monofactorial experiment with 10 experimental variants. The experiment was carried out during the agricultural year 2011 - 2012 and it took place in South Romania, near Bucharest (in Otopeni, Ilfov County), at "Agricola Otopeni" company, on a red phaeozem soil. Within current research we present the experimental results obtained in 2011 - 2012 related to weeds control on rape crops.

Key words: oilseed rape; weeds control; herbicides

Weeds have a negative effect by reducing crops both quantitatively and qualitatively, by making crop attendance and harvesting more difficult, by increasing costs of drying, by toxic effects on humans and animals and by favoring the transmission of diseases and pests to plants. (Chirilă C., 2001) Weeds compete against cultivated plants, taking their water, nutrients, light and heat. Weeds use large quantities of nutrients and they host numerous pests and pathogens of cultivated plants. Due to deterioration of living conditions, the quality of the production become lower. Moreover, numerous weeds have a bad taste and smell or they are poisonous, being considered dangerous when they get into seeds, flour or animal feed. It has become stringently necessary to fight chemically against the weeds affecting rape crops, due to contamination with an extremely diverse spectre of dicotyledonous and monocotyledonous weeds; some of them are difficult to fight against since they are part of the same botanical family (Popescu A., 2007). Weed proliferation is a major limiting factor for profitable and high-quality crops, knowing that early weeds proliferation in rape crops may lead to compromised autumn crops.

MATERIAL AND METHOD

The experiment carried out during the agricultural year 2011 - 2012 took place in Otopeni, Ilfov County, at the company "Agricola Otopeni", on red phaeozem soil. In order to contribute to finding technical solutions for an effective control of problematic weeds affecting rape crops, *Brassica* especially, we carried out a monofactorial experiment with 10 experimental variants, 9 treatments and a sample which was not subject to treatment (table 1). The monofactorial experiment was located on the field, according to the method of randomized blocks in 4 replications, the experimental lot having an area of 25 m^2 (2.5m wide x 10 m long). Except the treatments specific to each variant, the technology was the same, namely that used in production. Hybrid PR44D06 was cultivated and the previous crop was winter wheat.

Treatments were applied as follows:

- Variant 1 – pre emergent;
- Variants 2 - 8 – post emergent, 4 leaves max (BBCH 11 – 14);
- Variants 7 – 9 – post emergent, 3 visible internodes max (BBCH 18 – 30).

The structure of present weed species was determined with the help of a frame of 50x50 cm (0.25 m^2). The weeds comprised in the frame were counted and the present species were recorded. Regarding the efficacy of herbicides, two issues were taken into account, namely:

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- Efficacy per weed species determined within 28 days during the autumn (table 3) and within 21 days during the spring after post emergent treatments were performed (table 4).
- Herbicides efficacy – visual inspection per plot, determined within 14, 21 and 28 days after post emergent treatments were applied during autumn and within 14 and 21 days after treatments were applied during spring. Following determinations related to presence of weeds by species for all variants, treatment efficacy was reported per species, in %, by comparing the data determined after the post emergent treatments during the autumn with the data determined before those treatments were applied. The same report and comparison were carried out during spring as well.

Table 1

Experimental variants

Variant	Product	Active substance	Dose / ha
1	Brasan	500 g/l dimethachlor + 40 g/l clomazone	2.5 l /ha
2	Butisan Max	200 g/l dimethenamid-P + 200 g/l metazachlor	2.5 l/ha
3	Butisan 400 SC	400 g/l metazachlor	2.5 l /ha
4	Butisan Max + Salsa	(200 g/l dimethenamid-P + 200 g/l metazachlor) + 750 g/l etametsulfuron	2 l/ha + 25 gr/ha
5	Butisan 400 SC + Salsa	400 g/l metazachlor + 750 g/l etametsulfuron	2 l/ha + 25 gr/ha
6	Salsa	750 g/l etametsulfuron	25 gr/ha
7	Salsa (T2)+ Lontrel (T3)	750 g/l etametsulfuron + 300 g/l clopyralid	25 gr/ha + 300 ml/ha
8	Salsa (T2)+ Galera(T3)	750 g/l etametsulfuron + 267 g/l clopyralid + 67 g/l picloram)	25 gr/ha + 250 ml/ha
9	Galera Super (T3)	240 g/l clopyralid + 40 g/ l aminopyralid + 80 g/l picloram	250 ml /ha
10	Sample	-	-

RESULTS AND DISCUSSIONS

The weed species present in the experimental field and determined upon the first assessment, in October, before applying herbicide treatments, where in amount of 16 and they are mentioned in table 2.

Table 2

Code and scientific name of weeds present on the experimental field

Code	Scientific name	Code	Scientific name
THLAR	*Thlaspi arvense*	MATIN	*Matricaria inodora*
CAPBP	*Capsella-bursa pastoris*	GALAP	*Galium aparine*
VERHE	*Veronica hederifolia*	SINAR	*Sinapis arvensis*
TRZAX	*Triticum aestivum*	SONAR	*Sonchus arvensis*
GERDI	*Geranium dissectum*	CIRAR	*Cirsium arvense*
STEME	*Stelaria media*	ANTAR	*Anthemis arvensis*
DESSO	*Descurainia sophia*	CONAR	*Convolvulus arvensis*
CHEAL	*Chenopodium album*	RAPRA	*Raphanus raphanistrum*

At the first determination of weed species structure performed before post emergent products were applied, in October 2011, from the total number of weeds within our experience, 91% of them were broadleaf weeds and 9% were grasses weeds represented by volunteer cereals from the previous crop. *Brassica* weeds are difficult to control and they represented more than 50% of the total number of weeds identified. After 28 days since post emergent treatments were applied during autumn, was noticed a reduction of weeds with 72%, between them broadleaf weeds represented 97% and grasses weeds 3%. During the spring was noticed a slight increase by 20% in the average number of weeds per experiment, after treatment application (figure 1). The data in table 3 related to herbicides efficacy for weeds species after 28 days since the application of post emergent treatments during autumn, shows excellent efficacy, especially for variants 4, 5 and 8, with an average of efficacy between 86% and 90%. In variants 4, 5 and 6 it can be see an efficacy of 100% on *Brassica* weeds such as *Capsella-bursa pastoris*, *Stelaria media. Sinapis arvensis, Raphanus raphanistrum*. Upon application of post emergent

treatments during autumn, the number of weeds was significantly reduced in variants 4 - 8.

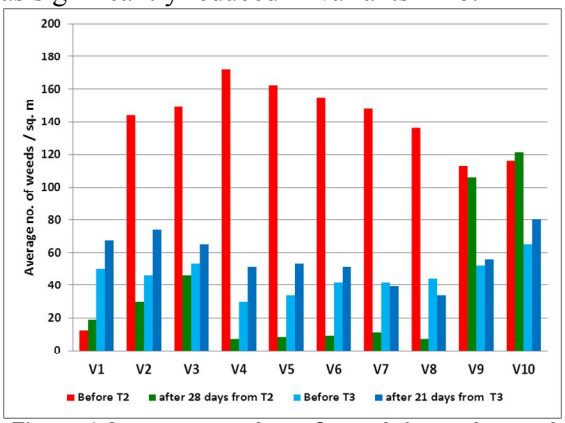

Figure 1 **Average number of weeds/experimental variant before and after post emergent products were applied**

In variant 1, as a result of the absence of a post emergent treatment, was noticed the increase of number of weed species such as *Geranium dissectum*, *Sinapis arvensis* and *Cirsium arvense*. We also note an increase of weeds in variant 9, where *Chenopodium album* grew from an average of 3 weeds/m^2 to 5 weeds/m^2. The untreated variant showed an increase of weed number with an average of 4% of the total number of weeds.

The data in table 4 show an increase of the weeds number during spring, generally for all variants treated during the autumn, which which can be explained due to the rainfall as snow during the first ten days of March, thus creating favourable conditions for weeds proliferation, with an average of 39%; a higher weed proliferation was found in variants 4, 2 and 5. Figure 2 illustrates the herbicides efficacy detected via visual inspection of the plot, established within 14, 21 and 28 days since the application of post emergent treatments during autumn and within 14 and 21 days since the application of treatments during spring, respectively.

Table 3

Herbicides efficacy after 28 days from the application of post emergent treatments during autumn (19.11.2011) (%)

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
THLAR	0%	76%	88%	96%	97%	97%	97%	97%	0%	-7%
CAPBP	0%	94%	93%	100%	100%	100%	100%	100%	0%	0%
VERHE	0%	93%	0%	94%	100%	93%	100%	100%	0%	0%
TRZAX	0%	92%	92%	100%	93%	94%	93%	100%	91%	0%
GERDI	-50%	71%	20%	100%	86%	100%	92%	86%	0%	0%
STEME	0%	86%	80%	100%	100%	100%	100%	100%	0%	0%
DESSO	0%	80%	80%	100%	100%	80%	92%	100%	0%	0%
CHEAL	0%	67%	100%	100%	100%	100%	100%	100%	-67%	-14%
MATIN	0%	100%	88%	100%	83%	67%	83%	75%	0%	0%
GALAP	0%	67%	0%	33%	67%	33%	0%	50%	0%	-25%
SINAR	-200%	0%	0%	100%	100%	100%	33%	100%	0%	0%
SONAR	0%	0%	33%	100%	100%	100%	100%	75%	0%	0%
CIRAR	-100%	0%	0%	50%	50%	0%	67%	50%	0%	-100%
ANTAR	0%	100%	0%	100%	100%	100%	100%	100%	0%	0%
CONAR	0%	0%	0%	0%	0%	100%	100%	100%	0%	0%
RAPRA	0%	0%	0%	100%	100%	100%	100%	100%	0%	0%

After 14 days from the application of post emergent treatments during autumn, treatment efficacy varied from 73% for variants 3 and 6 to 89% for variant 4. On those variants treated with Butisan Max and Butisan 400 SC, the efficacy oscillated between 73% in variant 3 and 76% in variant 2, the efficacy difference between Butisan and Butisan Max being determined by the active substance dimethenamid contained in Butisan Max. Upon mixing the same products with Salsa in variants 4 and 5, product efficacy grew due to the *Brassica* weed control provided by Salsa. Within 21 days since treatment application, product efficacy rose with an average by 2% in all variants subject to post emergent treatments during autumn. For variants 6, 7 and 8, where only Salsa was applied, *Brassica* weeds were excellently controlled but a lower control of weeds such as *Matricaria inodora, Galium aparine* and *Cirsium arvense* was noted, indicating the need to apply the product in conjunction with a complementary herbicide, such as metazachlor. During spring, for

variant 8 the efficacy of the product varied between 16% within 14 days since treatment application and 23% within 21 days since treatment application. For the other 2 variants, 7 and 9, treated during spring, was noticed a slight increase of product efficacy from 14 days to 21 days after treatment application.

Table 4

Efficacy of herbicidation within 21 days since the application of post emergent treatments during spring (14.04.2012) (%)

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
THLAR	-86%	-100%	-38%	-167%	-40%	-100%	-40%	0%	-63%	-40%
CAPBP	-57%	-38%	-29%	-50%	-300%	-150%	-25%	-14%	-17%	0%
VERHE	-75%	-67%	0%	0%	-50%	0%	-20%	-200%	0%	-17%
TRZAX	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
GERDI	-20%	-17%	-100%	-100%	-25%	-20%	-33%	0%	0%	0%
STEME	0%	-75%	-67%	-200%	-100%	-50%	0%	100%	100%	-67%
DESSO	0%	-29%	0%	-100%	-67%	-40%	0%	0%	0%	-50%
CHEAL	0%	-50%	-100%	-100%	-33%	0%	-50%	100%	0%	-50%
MATIN	-67%	-200%	0%	-100%	-67%	0%	75%	100%	100%	-150%
GALAP	-100%	-300%	0%	-33%	-50%	0%	0%	0%	0%	0%
SINAR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SONAR	0%	0%	0%	-100%	0%	0%	100%	100%	100%	0%
CIRAR	0%	0%	0%	0%	0%	0%	100%	100%	100%	0%
ANTAR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
CONAR	0%	0%	0%	-100%	0%	0%	100%	100%	100%	0%
RAPRA	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

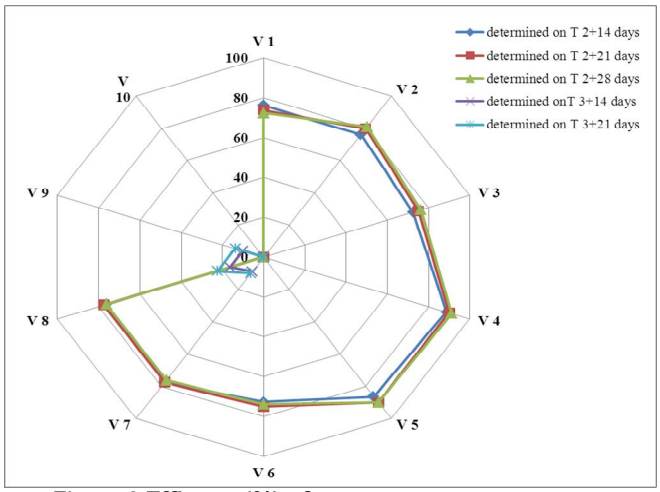

Figure 2 **Efficacy (%) of post emergent treatments applied during the experiment**

CONCLUSIONS

Weed proliferation is a major limiting factor for profitable and high-quality crops, knowing that early weed proliferation in rape crops may lead to compromised crops in autumn.

The structure of weed species established during the experiment was found to be as follows: 91% of them were weeds with broad leaves and 9% were gramineous weeds, namely spontaneous wheat from the previous crop. Crucifer weeds, difficult to control, represented over 50% of the total number of identified weeds.

The results showed that the best variant was no. 4, Butisan Max + Salsa, with a control of 90% after 14 days from the application of treatments on weed species present, including *Brassica* weeds. The application of Salsa during autumn determines a good control of *Brassica* weeds such as *Sinapis arvense, Capsella bursa-pastoris, Thlaspi arvense, Raphanus raphanistrum, Stellaria media* and *Descurainia*

sophia, but it cannot control gramineous weeds and it has low control on *Galium aparine*, *Matricaria inodora* and *Cirsium arvense*. The application only during spring triggers high weed proliferation during autumn, which influences the development of rape crops.

ACKNOWLEGMENTS

This paper work is supported by POSDRU/107/1.5/S/76888 project

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