

**CHEMICAL CONTROL OF RAT'S TAIL FESCUE (*FESTUCA MYUROS*) IN RAPESEED FIELDS****Anyo Mitkov<sup>1</sup>, Mariyan Yanev<sup>1</sup>, Tonyo Tonev<sup>1\*</sup>, Miroslav Tityanov<sup>2</sup>**<sup>1</sup>Agricultural University – Plovdiv<sup>2</sup>University of Forestry – Sofia**\*E-mail: [tonytonev@abv.bg](mailto:tonytonev@abv.bg)****Abstract**

A field trial on chemical control of rat's tail fescue (*Festuca myuros*) in rapeseed fields was carried out in the period 2012-2014. The following herbicides registered for application in rapeseed, were used in the experiment: Butisan 400 SC (*metazachlor* – 400 g/l), Butisan Max (*metazachlor* – 200 g/l + *dimethenamid-P* – 200 g/l + *quinmerac* – 100 g/l), Stratus ultra (100 g/l *cycloxydim* + *tensid*), Agil (100 g/l *propaquizafop* + *surfactant*), Fusilade forte (150 g/l *fluazifop-P-butyl*) and Cleranda (17,5 g/l *imazamox* + 375 g/l *metazachlor*). It was established that very good results were achieved in the control of rat's tail fescue after timely treatment with the herbicide chemical Butisan 400 SC. Another reliable alternative for control of that weed species was the application of the herbicide Cleranda at the rate of 150-200 ml/dka, when using Clearfield technology.

The results of the trial showed that three of the registered herbicides against grassy weeds in rapeseed – Stratus ultra, Fusilade Forte and Agil, did not display any herbicide efficacy against rat's tail fescue, regardless of treatment rate and time of application. The only vegetation herbicide showing very good results is Cleranda.

The results of the present study show that treatment applied at the stage of 4<sup>th</sup>–6<sup>th</sup> leaf has a slightly better effect compared to the variants with earlier (2<sup>nd</sup>–4<sup>th</sup> leaf) and later (6<sup>th</sup>–8<sup>th</sup> leaf) treatments. The earlier treatment is more risky for secondary weed infestation, the level of which can be lower or higher in the different years. The delayed treatment, especially if carried out in spring, reduces the herbicide effect of the active substance imazamox against grassy weeds, including rat's tail fescue.

**Key words:** efficacy, herbicides, rat's tail fescue, rapeseed.**INTRODUCTION**

Herbicide application in rapeseed is among the most important and responsible tasks in the agrotechnical practices (Tonev et al., 2000; Senior and Dale, 2002; Frisen et al., 2003; Heard et al., 2003; Harker et al., 2003).

The choice of the herbicide depends on whether the rapeseed cultivar is grown following the conventional or Clearfield technology. Very good results of weed control in conventional cultivars are obtained after the application of the soil herbicides Butisan 400 SC, Butisan S, Sultan 500 SC with the active substance metazachlor, Dual Gold (S-metolachlor); Sencor 70 WP (metribuzin); Partner 75 WP (isoproturon); Stomp 330 E (pendimethalin); Teridox (dimethachlor), (Kutuzov, 1990; Shimi et al., 2010; Schneider et al., 2010; Chaudhry et al., 2011; Dimitrova et al., 2014; Tonev and Mitkov, 2015).

During the vegetation period, the control of monocotyledonous weeds and self-seeded wheat plants in rapeseed fields is carried out in autumn or early in spring with the following herbicides having a good effect against grassy species: Agil 100 EC

(propaquizafop + surfactant), Stratus ultra (cycloxydim + tensit), Fusilade forte 150 EC (fluazifop-p-butyl + surfactant), Pantera 40 EC (quizalofop-p-tefuryl), Targa super (quizalofop-p-ethyl), etc. (Dimitrova et al, 2014; Tonev and Mitkov, 2015).

Simultaneous control of grassy and broad-leaved weeds (including the stubborn weeds *Sinapis arvensis*, *Raphanus raphanistrum*) in winter oil rapeseed can be achieved by using the Clearfield tolerant hybrids. The herbicide Cleranda (375 g/l *metazachlor* + 17,5 g/l *imazamox*) is applied at the rate of 150 – 200 ml/da separately or with adding the surfactant DASH (Ádámzski et al., 2010; Tonev and Mitkov, 2015).

The successful control of weeds in rapeseed depends on the time of herbicide application and the optimal phenological stage of the development of weeds and the crop. Soil or early vegetation treatment is much more efficient compared to the traditional spring treatment especially when winter and spring weeds are available. Thus the rapeseed is timely protected from weed competition for light, water and nutrients (Fraser, 1994; Freeman and Lutman, 2004; Tonev and Mitkov, 2013).

The growing interest and demand for rapeseed have led to ploughing and cultivation of new, previously uncultivated areas – meadows and pastures. In result of that, the problem of *Festuca myuros* control becomes more serious, as the weed is predominant in those areas.

One of the reasons for the mass propagation of the weed is the improper soil tillage. Only deepening of the plough layer without turning it over and without burying the weed seeds, create conditions for a high density of *Festuca myuros*. Another reason for the rapid multiplication of the problematic weed is not ensuring the scientifically sound crop rotations.

The aim of the present study was to carry out comparative testing of the efficacy of a number of herbicides, used for control of grassy weed species, and herbicides of a mixed spectrum of activity, against *Festuca myuros* in Clearfield rapeseed.

### MATERIALS AND METHODS

A plot design field experiment on chemical control of the weed species rat's tail fescue (*Festuca myuros*) in rapeseed was carried out in the period 2012-2014. The trial was conducted in fields with natural infestation of the weed species in the vil-

lage of Tenevo and village of Gorska polyana, Yambol region. Two soil herbicides and four vegetation herbicides were tested in the trial. Rapeseed hybrid PX 100 CL of Pioneer Company grown by Clearfield technology was included in the experiment. Two soil herbicides Butisan 400 SC (*metazachlor* – 400 g/l) and Butisan Max (*metazachlor* – 200 g/l + *dimethenamid-P* – 200 g/l + *quinmerac* – 100 g/l) were applied immediately after sowing before the emergence of the crop and weeds. Their herbicide efficacy is directly influenced by the soil moisture and precipitation in the period after sowing. In the region of the meteorological station in the town of Elhovo, which is closer to both sites, the precipitation amount in the period 15 September – 15 October 2012 was e 44 l/m<sup>2</sup> and for the same period in 2013 – 56 l/m<sup>2</sup>.

Taking into account that rat's tail fescue is a grassy species, three of the most widely applied herbicides against grassy weeds in rapeseed were included in the study – Stratus ultra (100 g/l *cycloxydim* + *tensid*), Agil (100 g/l *propaquizafop* + *surfactant*) and Fusilade forte (150 g/l *fluazifop-P-butyl* + *surfactant*), as well as the chemical Cleranda (17,5 g/l *imazamox* + 375 g/l *metazachlor*), which is especially applied in Clearfield rapeseed. Four periods of herbicide appli-

**Table 1.** Variants of a trial with herbicides against grassy weeds for control of rat's tail fescue (*Festuca myuros*)

VARIANTS	RATE (ml/da)	TIME OF APPLICATION PHENOLOGICAL STAGE OF OILSEED RAPE BY BBCH	PHENOLOGICAL STAGE OF RAT'S TAIL FESCUE BY BBCH
1. UNTREATED CONTROL			
2. BUTISAN 400 SC	250	BBCH 00*	Before emergence BBCH 00
3. BUTISAN MAX	250	BBCH 00*	Before emergence BBCH 00
4. STRATUS ULTRA	100	BBCH 12 -14	AUTUMN 2-3 LEAF BBCH 12-13
5. STRATUS ULTRA	150	BBCH 12 -14	AUTUMN 2-3 LEAF BBCH 12-13
6. STRATUS ULTRA	200	BBCH 12 -14	AUTUMN 2-3 LEAF BBCH 12-13
7. AGIL	80	BBCH 12 -14	AUTUMN 2-3 LEAF BBCH 12-13
8. FUSILADE FORTE	80	BBCH 12 -14	AUTUMN 2-3 LEAF BBCH 12-13
9. CLERANDA + DASH	150 + 75	BBCH 12 -14	AUTUMN 2-3 LEAF BBCH 12-13
10. STRATUS ULTRA	100	BBCH 16 -18	AUTUMN 1-2 TILLER BBCH 21-22
11. STRATUS ULTRA	150	BBCH 16 -18	AUTUMN 1-2 TILLER BBCH 21-22
12. STRATUS ULTRA	200	BBCH 16 -18	AUTUMN 1-2 TILLER BBCH 21-22
13. AGIL	100	BBCH 16 -18	AUTUMN 1-2 TILLER BBCH 21-22
14. FUSILADE FORTE	100	BBCH 16 -18	AUTUMN 1-2 TILLER BBCH 21-22
15. CLERANDA + DASH	150 + 75	BBCH 16 -18	AUTUMN 1-2 TILLER BBCH 21-22
16. CLERANDA + DASH	200 + 100	BBCH 16 -18	AUTUMN 1-2 TILLER BBCH 21-22
17. STRATUS ULTRA	300	BBCH 31-50	SPRING STEM ELONGATION BBCH 32-33 2-3 stem node
18. AGIL	100	BBCH 31-50	SPRING STEM ELONGATION BBCH 32-33 2-3 stem node
19. FUSILADE FORTE	120	BBCH 31-50	SPRING STEM ELONGATION BBCH 32-33 2-3 stem node
20. CLERANDA + DASH	200 + 100	BBCH 31-50	SPRING STEM ELONGATION BBCH 32-33 2-3 stem node

\* After sowing before emergence



cation were selected: BBCH 00, BBCH 12-14, BBCH 16-18 and BBCH 31-50. The first three treatments were carried out in the autumn and the fourth one in spring, after the beginning of stem elongation till the emergence of the first flower buds in rapeseed. The experiment was carried out following the non-standard design method with systematic arrangement of the variants, in four replications, the area of the plot being 25 m<sup>2</sup>. Two adjacent untreated controls of 12,5 m<sup>2</sup> for each variant were included in the trial. The close positioning of the adjacent untreated controls helps to overcome the different weed infestation rate in the field, which contributes to a more objective evaluation of the efficacy of each of the studied products. The experiments were conducted in accordance with EPPO standards of the EU.

### RESULTS AND DISCUSSION

Table 2 presents the average results of the experiments with the established efficacy of the tested herbicides (in % of EWRS scale) for control of the grassy weed species rat's tail fescue. Data from the table show that the timely application of the herbicide Butisan 400 SC (*metazachlor* – 400 g/l) leads to very good results in control of rat's tail fescue. The efficacy of Butisan Max against the weed is considerably lower – by 10 to 20%. In both variants, it was reported that in spring the weed plants restored slightly and secondary infestation was minimal. Out of all the

variants in the trial, only those two herbicides showed rather limited selectivity to rapeseed. When the autumn season is long, warm and humid and the rapeseed is sown in time, the suppressed growth caused by the active substance metazachlor did not have a negative effect on later crop development.

The results of the trial with three of the registered herbicides providing good control of grassy weeds – Stratus Ultra, Fusilade Forte and Agil, did not display any herbicide efficacy against rat's tail fescue regardless of treatment rate and time of application.

The only vegetation herbicide showing very good results against rat's tail fescue is Cleranda. The most reliable alternative for control of that problematic weed is the application of the herbicide Cleranda (17,5 g/l imazamox + 375 g/l metazachlor) in Clear-field technology, applied at the rate of 150-200 ml/da.

Data from the present study show that treatment with Cleranda at the phenological stage 6<sup>th</sup> – 8<sup>th</sup> leaf surpassed in efficacy (although slightly) the variants with the earlier treatment conducted at the stage of 2<sup>nd</sup> – 4<sup>th</sup> leaf of crop development. The earlier herbicide application led to secondary infestation that was expressed to different degree in the separate years. The delayed treatment, which is applied in spring, showed that the efficacy of the active substance imazamox against grassy weeds, including rat's tail fescue, is lower.

**Table 2.** Average efficacy rates of some herbicides against grassy weeds (following EWRS scale) for control of rat's tail fescue (*Festuca myuros*) on 14<sup>th</sup>, 28<sup>th</sup> and 56<sup>th</sup> day after treatment

VARIANTS	RATE (ml/da)	SELECTIVITY FOR THE CROP (%) 10 days after treatment	EFFICACY (%) 14 <sup>th</sup> day after treatment	EFFICACY (%) 28 <sup>th</sup> day after treatment	EFFICACY (%) 56 <sup>th</sup> day after treatment
1. UNTREATED CONTROL		100	0%	0%	0%
2. BUTISAN 400 SC	250	85	100	80	70
3. BUTISAN MAX	250	90	90	60	50
4. STRATUS ULTRA	100	100	0	0	0
5. STRATUS ULTRA	150	100	0	0	0
6. STRATUS ULTRA	200	100	0	0	0
7. AGIL	80	100	0	0	0
8. FUSILADE FORTE	80	100	0	0	0
9. CLERANDA + DASH	150 + 75	100	100	85	70
10. STRATUS ULTRA	100	100	0	0	0
11. STRATUS ULTRA	150	100	0	0	0
12. STRATUS ULTRA	200	100	0	0	0
13. AGIL	100	100	0	0	0
14. FUSILADE FORTE	100	100	0	0	0
15. CLERANDA + DASH	150 + 75	100	90	80	80
16. CLERANDA + DASH	200 + 100	100	100	100	90
17. STRATUS ULTRA	300	100	0	0	0
18. AGIL	100	100	0	0	0
19. FUSILADE FORTE	120	100	0	0	0
20. CLERANDA + DASH	200 + 100	100	85	75	65

## CONCLUSIONS

1. Out of the two soil herbicides, Butisan 400 SC and Butisan Max, included in the trial, the former is more efficient against rat's tail fescue and has a longer-lasting effect.

2. The herbicides applied for control of grassy weeds – Stratus Ultra, Agil and Fusilade Forte, proved to be inefficient against the grassy weed species rat's tail fescue (*Festuca myuros*). The lack of any herbicide efficacy is related neither to the phenological stage of crop development at the time of treatment, nor with the rate at which applied.

3. The efficacy of Cleranda against rat's tail fescue is closely related to the rate and time of application. Total initial efficacy (100%) is achieved even at the rate of 150 ml/da when the product is applied in the autumn, before tillering of rat's tail fescue (BBCH 12-13). Very early treatment with Cleranda is more risky for secondary weed infestation of the crop, including with rat's tail fescue.

4. The phenological stage 6<sup>th</sup> – 8<sup>th</sup> leaf of rapeseed is considered the optimal time for treatment with Cleranda in fields with a high level of weed infestation with rat's tail fescue. Treatment is carried out in autumn, at the beginning of tillering of *Festuca myuros* L. As a weed developing in winter and spring, the rat's tail fescue has already emerged at that time, but still not vigorously tillering and it is susceptible to the product.

5. The worst time for applying the herbicide Cleranda is springtime. The 2-3 stem nodes formed and the grown and tillered rat's tail fescue plants become relatively more resistant and their total control is impossible.

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