ERGON WG – A NEW OPPORTUNITY FOR AN EFFICIENT CHEMICAL CONTROL OF BL WEEDS IN WHEAT

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Abstract

Field trials were carried out with the wheat cultivar Enola in the period 2013-2014, using the same method in two different sites – the Experimental fields of the Agricultural University – Plovdiv and in the village of Krumovo near Plovdiv.

The fields were infested by the following important broad-leaved weeds: black-bindweed (*Falopia convolvulus* L.); common poppy (*Papaver rhoeas* L.); charlock mustard (*Sinapis arvensis* L.); flixweed (*Descurainia sophia* L.); cleavers (*Galium aparine* L.); field larkspur (*Delfinium consolida* L.); creeping thistle (*Cirsium arvense* L.); corncockle (*Agrostemma githago* L.) and the grassy weed wild oats (*Avena fatua* L.).

The efficacy, selectivity and tank-mixability of the tested herbicides and their combinations were studied: ready mixture Ergon WG (68 g/kg metsulfuron-methyl + 682 g/kg thifensulfuron-methyl) at the rates of 6, 7, 8, 9 and 18 g/da, ready mixture Granstar super (250 g/kg tribenuron-methyl + 250 g/kg thifensulfuron-methyl) – 4 g/da, mixture of Ergon WG – 7 g/da + Puma Super 7,5 EW (69 g/l fenoxaprop-P-ethyl) – 100 ml/da, mixture Ergon WG – 7 g/da + Topic 080 EC (80 g/l clodinafop) – 50 ml/da and mixture Ergon WG – 7 g/da + Axial 050 EC (50 g/l pinoxaden) – 90 ml/da.

All the products were tested at the rates registered in Bulgaria and they were compared to untreated control areas. The treatments were carried out during the tillering stage untill 2nd node of the crop (BBCH 29-31). All the trials were conducted on plots of 25 m² in 4 replicates and a demonstration trial on 20 da was implemented. The trials were carried out based on EPPO Standards of the EU. Climatic conditions in 2013 were normal, but in 2014 it was unusually rainy.

Ergon WG herbicide applied at the rate of 70 g/ha, successfully controlled most of the broad-leaved weed species on the three sites. The efficacy of Ergon WG, against *Galium aparine* (L.) and *Cirsium arvense* (L.) was excellent only when applying the higher rates of 8 and 9 g/da. Mixtures of the products Ergon WG + Puma Super 7,5 EW; Ergon WG + Topic 080 EC and Ergon WG + Axial 050 EC showed excellent tank-mixability, without any antagonism in the efficacy against both broad-leaved and grassy weed species.

Ergon WG showed very high selectivity for the crop even when used at the double rate of 18 g/da. External symptoms of phytotoxicity were not observed in the crop after treatment with any of the herbicides and their mixtures.

Key words: wheat, herbicides, efficacy, weeds, tank-mixability, antagonism.

INTRODUCTION

Weeds are among the key factors, which prevent producers from obtaining higher and stable yields from agricultural crops (Mitkov et al., 2009; Tityanov & Tonev, 2011). This is due to their competitive relationship with crops for nutrients, water and light, at the same time being hosts and mediators of a number of pests and causative agents of diseases (Tonev et al., 2007). Chemical weed control in wheat fields is one of the major means of providing weed-free wheat fields and ensuring high yields. Weed control is among the most important and money-consuming practices in modern growing technologies (Sabev, 1998, 2000; Tonev, 2000; Tityanov et al., 2009).

The dynamics of weed associations, the development of compensation processes, the risk of the emergence of weed resistance to herbicides, as well as the competition between the herbicide producers require continuous updating of the list of herbicides registered for weed control in wheat (Dimitrova & Georgieva, 2005; Tityanov, 2006; Tonev et al., 2011).

The aim of the present study was to establish the possibilities of providing an efficient control of broad-leaved weeds in wheat by applying different rates of the herbicide Ergon WG (68 g/kg metsulfuron-methyl + 682 g/kg thifensulfuron-methyl) as well as combining it with various herbicides for control of grassy weed species, such as Puma super 7,5 EW (69 g/l fenoxaprop-P-ethyl), mixture Topic 080 EC (80 g/l clodinafopand Axial 050 EC (50 g/l pinoxaden) for achieving a total weed control.

MATERIALS AND METHODS

The study was carried out in the period 2013-2014 on the Experimental fields of the Agricultural University – Plovdiv, in the village of Krumovo (Plovdiv region), using the EPPO methods PP 1/93(3); HCP3 EX1/003(2) for evaluation of the efficacy of herbicide products applied against weeds in wheat crops. Field trials were carried out with wheat of Enola cv. in four replicates, the area of the plot being 25 m². Adjacent untreated controls of 10 m² for each variant were included in the trial. The predecessor was Express-tolerant sunflower.

The following herbicides and tank-mixtures were tested: Ergon WG (68 g/kg metsulfuron-methyl + 682 g/kg thifensulfuron-methyl) at the rates of 6, 7, 8, 9 and 18 g/da; Ergon WG – 7 g/da + Puma super 7,5 EW (69 g/l fenoxaprop-P-ethyl) – 100 ml/da; Ergon WG – 7 g/da + Topic 080 EC (80 g/l clodinafop) – 50 ml/da; Ergon WG – 7 g/da + Axial 050 EC (50 g/l pinoxaden) – 90 ml/da; Granstar Super 50 SG (250 g/kg tribenuron-methyl + 250 g/kg thifensulfuron-methyl) – 4 g/da.

All the herbicides and herbicide tank-mixtures were applied at the phenological stage end of tillering to beginning of stem elongation of the wheat crop (BBCH 29-31) and before the beginning of stem elongation of the grassy weed species and by the end of the rosette growth stage of the major BL weeds.

The efficacy of the tested herbicides against the following broad-leaved weed species was studied: black-bindweed (*Falopia convolvulus* L.); common poppy (*Papaver rhoeas* L.); charlock mustard (*Sinapis arvensis* L.); flixweed (*Descurainia sophia* L.); cleavers (*Galium aparine* L.); field larkspur (*Delfinium consolida* L.); creeping thistle (*Cirsium arvense* L.); corncockle (*Agrostemma githago* L.) and the grassy weed wild oats (*Avena fatua* L.).

The efficacy of the applied herbicides was reported on 14th, 28th and 56th days after treatment, by visual assessment using the 0 to 100 percent linear scale of EWRS.

RESULTS AND DISCUSSION

The results about the efficiency of the tested herbicides and herbicide combinations applied against the most widely spread weed species in the agrophytocoenosis of wheat were reported for the two years of the trial conducted in the Experimental fields of the Agricultural University – Plovdiv and in the village of Krumovo.

The experimental fields were infested with a total of 9 weed species of the three major groups. Weed infestation is of natural origin and it is represented by species typical for Plovdiv region. Wheat was sown after Express-tolerant sunflower as a predecessor, relying on natural self-sowing of sunflower. The highly competitive wheat crop was able to eliminate the non-competitive sunflower plants at the earliest stages of their development.

Treatment with herbicides was carried out in the first week of April at the stage of 3rd – 5th leaf. 25 l/da of working solution was applied with Solo sprayer with flat spray nozzles.

Extreme temperature values that could have a negative impact on the activity and selectivity of the tested herbicides were not reported at the time of treatment – the average day and night temperatures for the first decade of April varied from 5,3°C to 17°C. The low values of the wind velocity (from 2 to 3,3 m/s) also did not have a negative influence on the quality of the herbicide treatment.

The results of the experiment show that the efficacy of Ergon WG applied at the rate of 6 g/da is almost 100% against the weeds: common poppy (*Papaver rhoeas* L.); charlock mustard (*Sinapis arvensis* L.); flixweed (*Descurainia sophia* L.); field larkspur (*Delfinium consolida* L.) and corncockle (*Agrostemma githago* L.). Against black-bindweed (*Falopia convolvulus* L.) the efficacy is 85%, against cleavers (*Galium aparine* L.) – 80% and against creeping thistle (*Cirsium arvense* L.) – 70% (Table 1, Fig. 1, Fig. 2).

The increase of the rate of Ergon WG from 7 to 9 g/da led to an increased efficacy against the weeds, reaching that of the reference – 100%. Lower efficacy of 80% was reported against the two weed species: creeping thistle (*Cirsium arvense* L.) and cleavers (*Galium aparine* L.), (Fig. 3, Fig. 4). The results of the reference product in the trial – Granstar Super 50 SG fully complied with our expectations about its action in the concrete weed infestation conditions. Its effect against the weed species creeping thistle (*Cirsium arvense* L.) and cleavers (*Galium aparine* L.) was 85% and 95%, respectively. The efficacy of the herbicides applied as tank-mixtures for control of the only studied grassy

weed species wild oats (*Avena fatua* L.) was 100% (Fig. 5). Incidence of antagonism, synergy and phytotoxicity was not detected when mixing the different herbicides. It was established that the herbicide Ergon WG applied at the increased rate of 18 g/da proved to be selective for the crop.

Table 1. Biological efficacy against major weeds, in percentage by EWRS scale

№	Product	Active Substance	Dose	FALCO	PAPRE	SINAR	DESSO	GALAP	DELCO	CIRAR	AGRGI	AVEFA
1	ERGON WG	68 g/kg metsulfuron methil + 682 g/kg thifensulfuron-methyl	6 g/da	85	100	100	100	80	100	70	100	-
2	ERGON WG	68 g/kg metsulfuron methil + 682 g/kg thifensulfuron-methyl	7 g/da	90	100	100	100	85	100	75	100	-
3	ERGON WG	68 g/kg metsulfuron methil + 682 g/kg thifensulfuron-methyl	8 g/da	95	100	100	100	87	100	80	100	-
4	ERGON WG	68 g/kg metsulfuron methil + 682 g/kg thifensulfuron-methyl	9 g/da	95	100	100	100	87	100	80	100	-
5	ERGON WG	68 g/kg metsulfuron methil + 682 g/kg thifensulfuron-methyl	18 g/da	100	100	100	100	95	100	85	100	-
6	ERGON WG + PUMA SUPER	68 g/kg metsulfuron methil + 682 g/kg thifensulfuron-methyl + 69 g/l fenoxaprop-P-ethyl	7 g/da + 100 ml/da	90	100	100	100	85	100	80	100	100
7	ERGON WG + TIPOC 080 EC	68 g/kg metsulfuron methil + 682 g/kg thifensulfuron-methyl + 80 g/l clodinafop	7 g/da + 50 ml/da	90	100	100	100	85	100	80	100	100
8	ERGON WG + AXIAL 050 EC	68 g/kg metsulfuron methil + 682 g/kg thifensulfuron-methyl + 50 g/lpinoxaden	7 g/da + 90 ml/da	90	100	100	100	87	100	80	100	100
9	GRANSTAR SUPER 50 SG	250 g/kg tribenuron-methyl + 250 g/kg thifensulfuron-methyl	4 g/da	100	100	100	100	95	100	85	100	-
10	Untreated Control			0	0	0	0	0	0	0	0	0

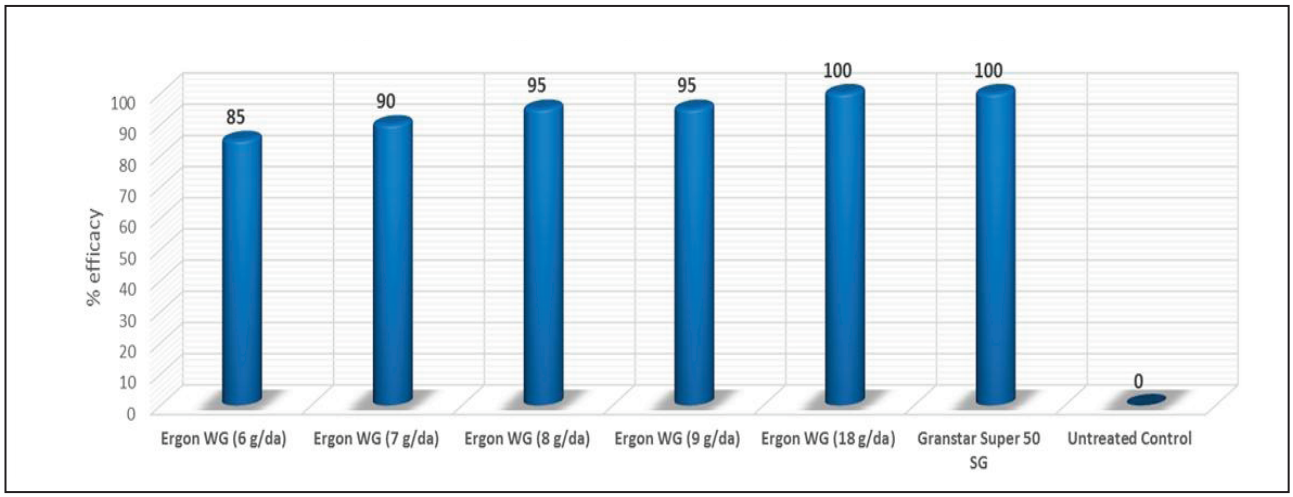

Fig. 1. *Percentage efficacy against Falopia convolvulus* (L.)

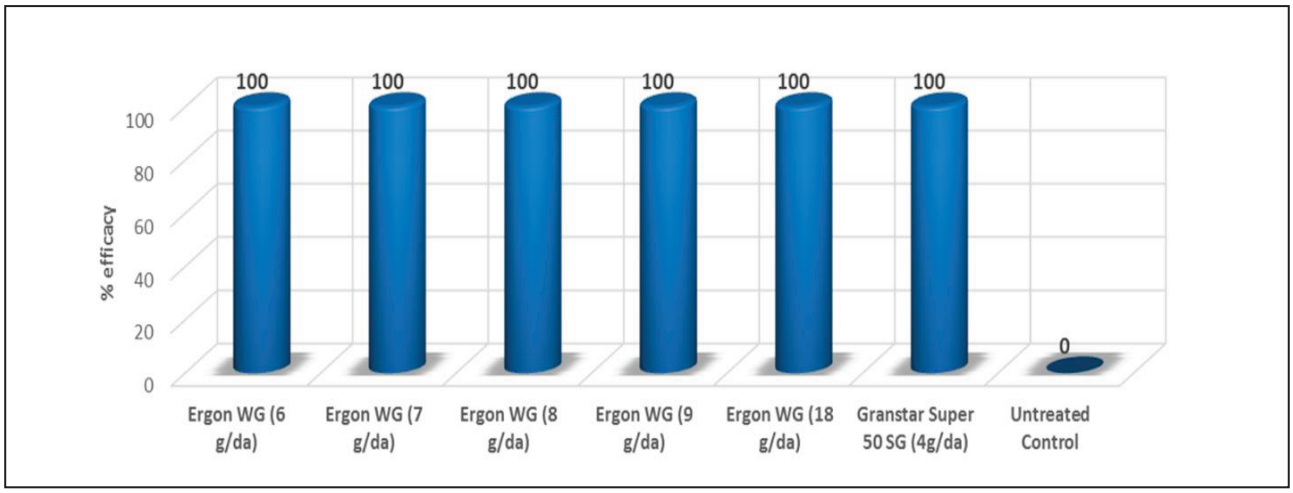

Fig. 2. *Percentage efficacy against Papaver rhoeas* (L.), *Sinapis arvensis* (L.), *Descurainia sophia* (L.), *Agrostemma githago* (L.)

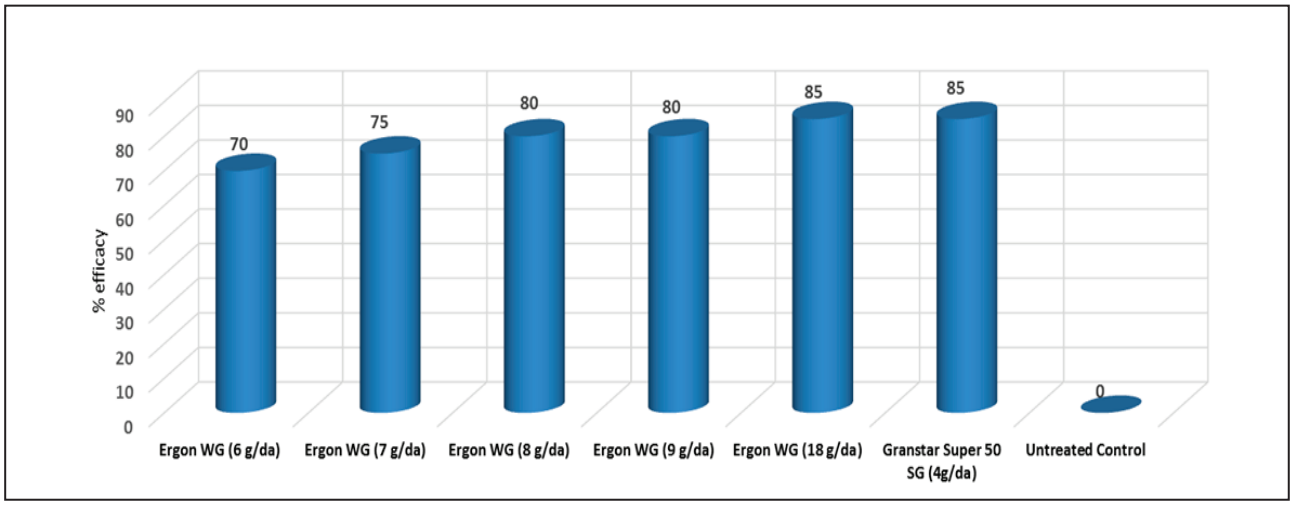

Fig. 3. *Percentage efficacy against Cirsium arvense* (L.)

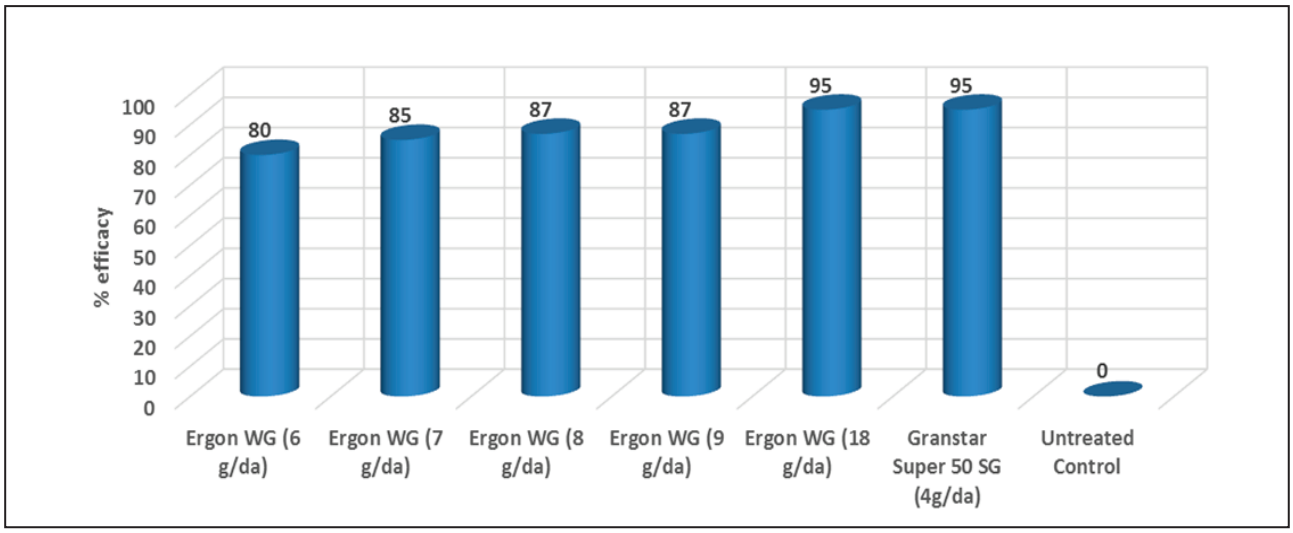

Fig. 4. *Percentage efficacy against Calium aparine* (L.)

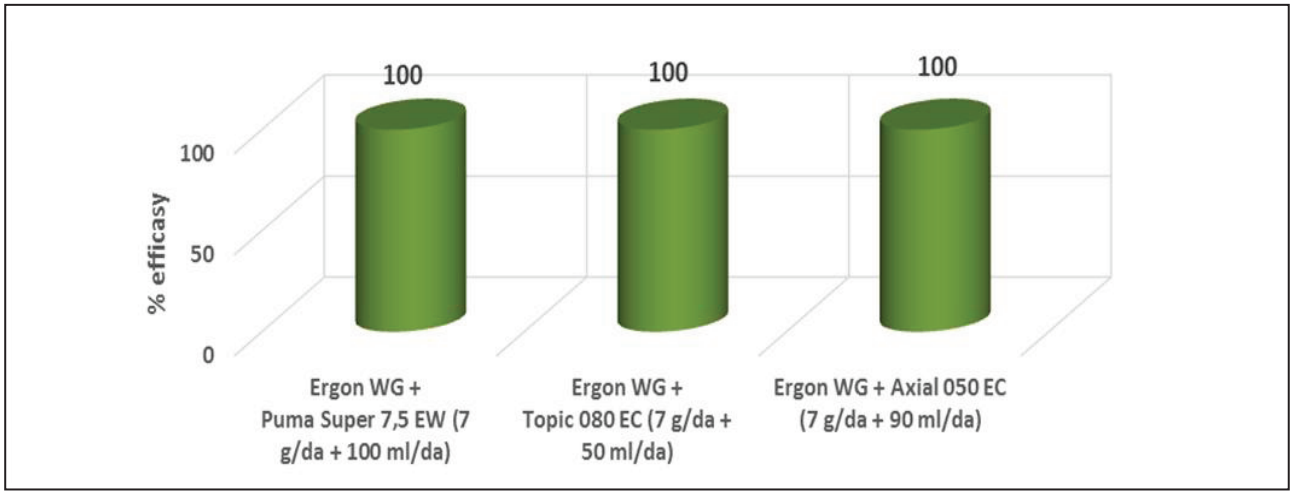

Fig. 5. *Percentage efficacy against Avena fatua* (L.)

CONCLUSIONS

1. The results of the study showed that the herbicide Ergon WG applied at the rate of 7 g/da and 8 g/da controlled successfully the broad-leaved weeds common poppy (*Papaver rhoeas* L.); black-bindweed (*Falopia convolvulus* L.); charlock mustard (*Sinapis arvensis* L.); flixweed (*Descurainia sophia* L.); field larkspur (*Delfinium consolida* L.) and corncockle (*Agrostemma githago* L.) and its efficacy at the rates mentioned almost reached the one of the reference herbicide Granstar Super.

2. Ergon WG should be applied at the rate of 9 g/da for achieving a total weed control of cleavers (*Galium aparine* L.) and creeping thistle (*Cirsium arvense* L.). In future studies we would recommend to look for a partnering product in the tank-mixture with the aim of increasing the efficacy against those two weed species.

3. The products included in the present study are fully compatible with each other and they could be used in tank mixtures.

4. The tank mixtures of the herbicides Ergon WG with Puma Super 7,5 EW, Topic 080 EC and Axial 050 EC, applied at the registered rates, exhibited also good control of the grassy weed species wild oats (*Avena fatua* L.).

5. Symptoms of phytotoxicity were not detected in wheat of Enola cv. in any of the variants in the trial, even when Ergon WG was applied at the higher rate of 18 g/da.

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