

## Assessing the efficacy of some herbicides on turf weeds

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**Abstract** The wide diversity of ecological areas covered by turf and the permanent change of weed associations infesting turf has made the weed control issue a permanent one. Our experiment started in the spring of the year 2015, using a special gramineae made up of *Lolium perenne*, *Festuca rubra* and *Poa pratensis*. The experiment was monofactorial and set after the randomised block method with the following experimental variants: V<sub>1</sub> – Buctril universal (1 l/ha), V<sub>2</sub> – DMA 6 (1 l/ha), V<sub>3</sub> – Premiant (1 l/ha), V<sub>4</sub> – Ceredin super 40 SL (1 l/ha), V<sub>5</sub> – Mustang (0.5 l/ha), V<sub>6</sub> – Lintur (150 g/ha), V<sub>7</sub> – Cerlit (0.8 l/ha), V<sub>8</sub> – control. Herbicide efficacy differed depending on weed species during the two experimental years. In the year 2015, when annual dicot weed species were predominant, maximum efficacy was with the herbicide Buctril universal 1 l/ha, followed by the herbicides Premiant 1 l/ha and Ceredin super 1 l/ha. The analysis of the efficacy of the herbicides on weeds in the year 2016 points out that with strong infestation by dicot weed species, particularly perennial ones, there is maximum efficacy with the systemic herbicides Premiant 1/ha and Ceredin super 1 l/ha. This decrease of herbicide efficacy in the year 2016 was caused by the different composition of the turf weed species.

### Key words

herbicides, *Lolium perenne*, *Festuca rubra* and *Poa pratensis*

The wide diversity of ecological areas covered by turf and the permanent change of weed associations infesting turf has made the weed control issue a permanent one. Cultural management of weeds in turfgrass is the use of mowing, fertilization, irrigation, cultivation, planting, and turfgrass selection to affect weed populations. Environmental stresses including drought injury, unnecessary aeration or vertical mowing, biotic stress such as nematode and insect herbivory, and diseases contribute to weed colonization [3].

Together with fertilising and repeated mows, weed control is one of the main conditions of establishing and maintaining a high-quality turf [1]. Weeds can be controlled both mechanically and chemically[4]. Mechanic weed control can consist in weeding and mowing [5].

Weeding consists in removing weeds manually. It can be done by either snatching weeds when they are still few or when they are sparse; mowing controls weeds considerably because it does not allow plants to seed or store nutrients [6].

However, when he weeds seed supply in the soil is high, turf fertilisation and irrigation also stimulate weed growth: they sprout and hinder turf development[7,8]. Some monocot weds such as *Setaria* sp., *Sorghum halepense*, *Digitaria sanguinalis*, *Echinochloa crus galli*, etc. can be controlled by weeding and mowing alone. Repeated mowing remove

*Setaria* sp. from the first year. Perennial gramineae that multiply through both seeds and subterranean roots such as *Sorghum halepense*, *Cynodon dactylon* and *Agropyron repens* are more difficult to control.

Dicots are easily controlled with herbicides. In general, all herbicides for straw cereals can also be sued on turf [2]. If dicots persist through the second year, we need to apply herbicides again in the first half of April, before the first mow.

Starting from these considerations, we chose for our research the pesticides Buctril universal, DMA 6, Premiant, Ceredin super, Mustang, Lintur and Cerlit. We monitored the turf for two years (2015-2016) to see which of these herbicides are best for weed control in turf.

### Material and Methods

The experiment started in the spring of the year 2015, using a special gramineae made up of *Lolium perenne*, *Festuca rubra* and *Poa pratensis*.

The experiment was monofactorial and set after the randomised block method with the following experimental variants: V<sub>1</sub> – Buctril universal (1 l/ha), V<sub>2</sub> – DMA 6 (1 l/ha), V<sub>3</sub> – Premiant (1 l/ha), V<sub>4</sub> – Ceredin super 40 SL (1 l/ha), V<sub>5</sub> – Mustang (0.5 l/ha), V<sub>6</sub> – Lintur (150 g/ha), V<sub>7</sub> – Cerlit (0.8 l/ha), V<sub>8</sub> – control.

Herbicides were applied with a portable sprinkler. Herbicide rates were established depending on weeding rate and on the directions of the manufacturers.

## Results and Discussions

Research aimed at determining the floristic composition of turf weeds and the influence of some herbicides on weeding rate. Establishing the number of weeds/m<sup>2</sup> was done through the quantitative numerical method for each variant and replicate.

Annual dicot were the dominating weed species: *Chenopodium album* (15.80%), *Polygonum aviculare* (14.04%), *Veronica hederifolia* (13.17%) (Table 1).

Table 1

**The floristic composition of turf weeds, in 2015**

<b>Crt. no.</b>	<b>Species</b>	<b>Weed number/m<sup>2</sup></b>	<b>% of participation</b>
1	<i>Chenopodium album</i>	14.32	15.80
2	<i>Polygonum aviculare</i>	12.72	14.04
3	<i>Veronica hederifolia</i>	11.93	13.17
4	<i>Polygonum convolvulus</i>	10.44	11.52
5	<i>Stellaria media</i>	9.27	10.22
6	<i>Capsella bursa pastoris</i>	8.87	9.78
7	<i>Polygonum persicaria</i>	6.98	7.70
8	<i>Sinapis arvensis</i>	4.04	4.45
9	<i>Raphanus raphanistrum</i>	3.27	3.60
10	<i>Lamium amplexicaule</i>	3.19	3.52
11	<i>Cynodon dactylon</i>	2.94	3.25
12	<i>Agropyron repens</i>	2.17	2.40
13	<i>Cirsium arvense</i>	0.49	0.55
<b>TOTAL</b>		<b>90.63</b>	<b>100.00</b>

The share of perennial dicot weeds was rather low: *Cirsium arvense* (0.55%). Annual monocots were absent, perennial monocots were represented by *Cynodon dactylon* (3.25%), and *Agropyron repens* (2.40%).

If we analyse the effect of herbicides on weed rate diminution in turf in 2015, we see that it ranged between 73.98% and 92.51% (Figure 1).

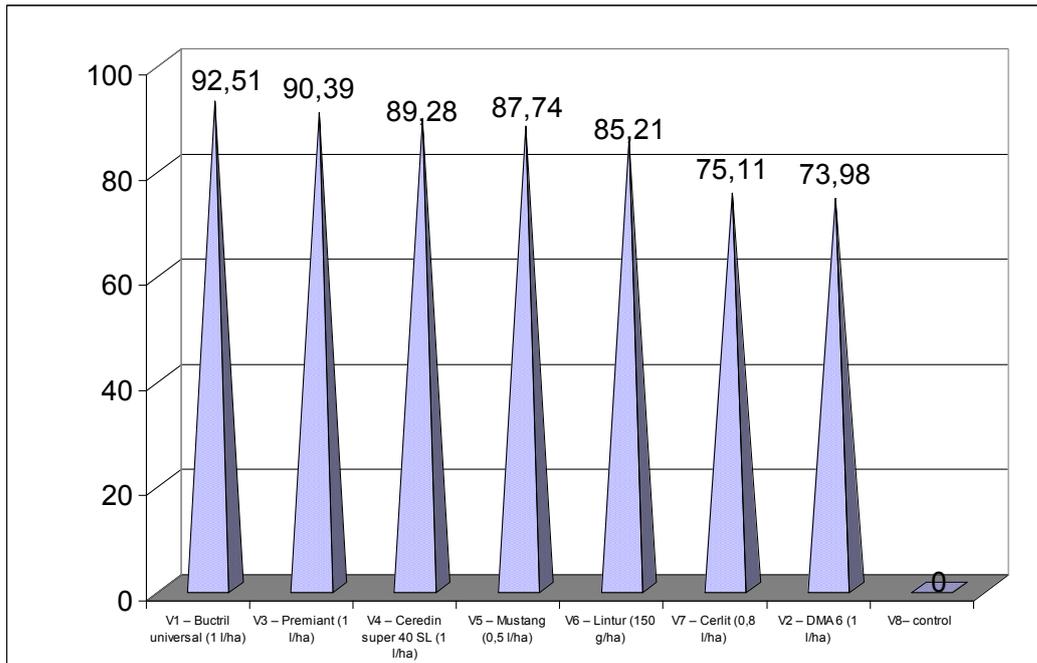


Fig. 1. The weed control degree (%) in turf, in 2015

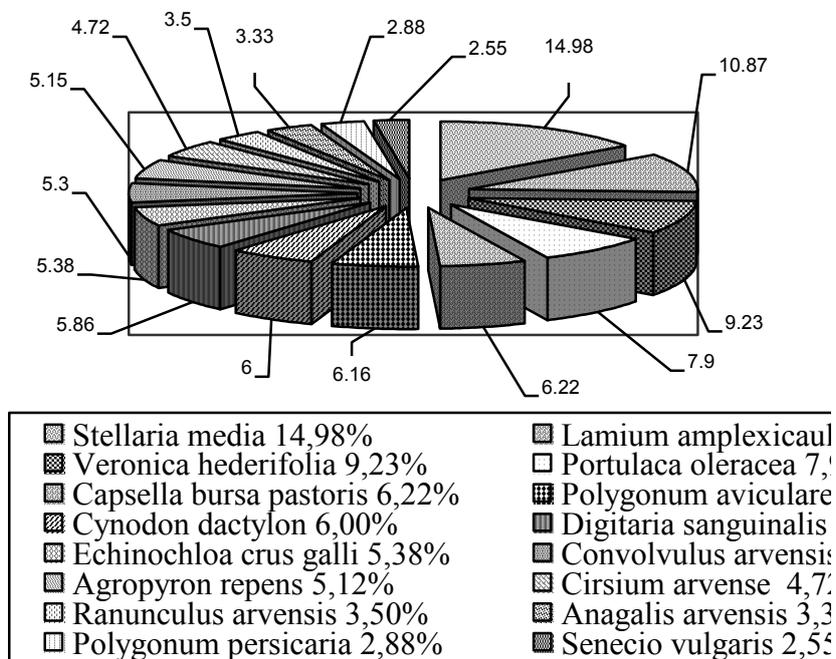


Fig. 2. The floristic composition of turf weeds, in 2016

The highest weed control share was 92.51% in the variant treated with Buctril universal 1 l/ha. There were also satisfactory results in the variants treated with Premiant 1 l/ha and Ceredin super 1 l/ha – 90.39% and 89.28%, respectively.

The lowest results were in the variants treated with DMA 6 (1 l/ha) where weed control rate was 73.98%.

Compared to the spring of the year 2015, in the spring of the year 2016, maintenance works, fertilisation and climate conditions changed the floristic composition of the turf weeds. The total number of weeds/m<sup>2</sup> dropped to 69.56.

As in the year 2015, in 2016 annual dicots were the dominant weed species: *Stellaria media* (14.98%), *Lamium amplexicaule* (10.87%), *Veronica*

*hederifolia* (9.23%), and *Portulaca oleracea* (7.90%). However, there was an increase of the perennial dicot species share: *Convolvulus arvensis* (5.30%) and *Cirsium arvense* (4.72%) (Figure 2).

Annual monocot weeds such as *Digitaria sanguinalis* and *Echinochloa crus galli* shared 11.24% of the total number of weeds, as well as the perennial monocot weed species *Agropyron repens* and *Cynodon dactylon* that shared twice as much as in 2015 (11.12%).

Assessing the efficacy of herbicides on turf weeds in the year 2016 points out a lower effectiveness than in 2015 (Figure 3). This was because of the higher share of annual and perennial monocot weeds and because the spectrum of herbicides used does not control monocot weed species.

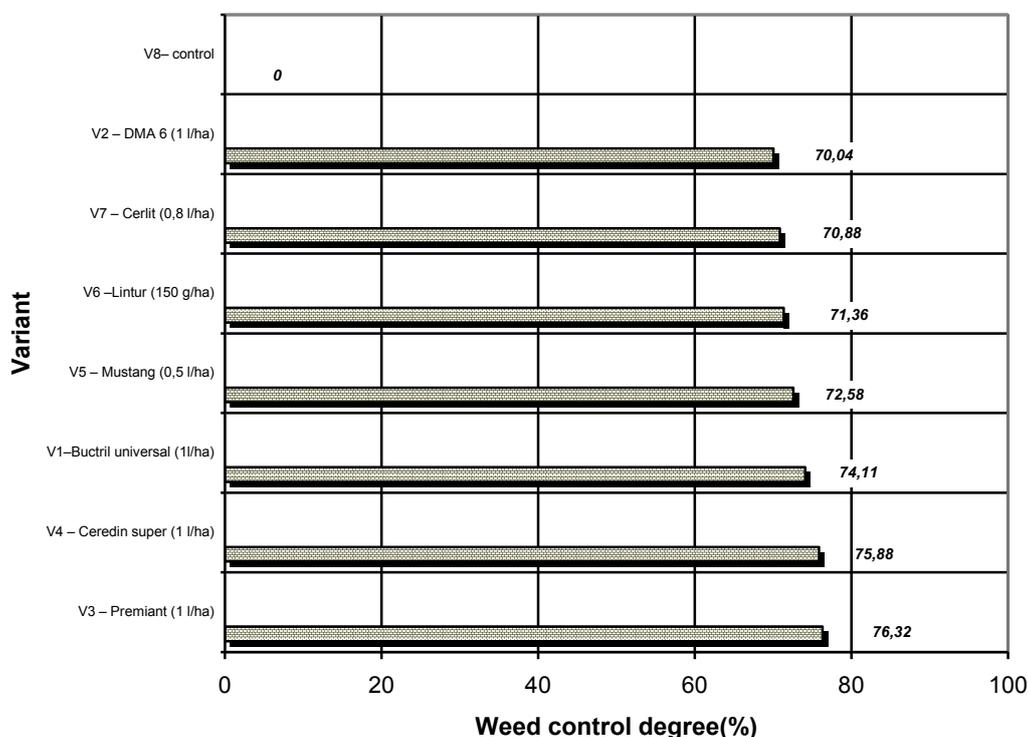


Fig. 3. The weed control degree (%) in turf, in 2016

However, there was satisfactory annual and perennial weed control with the systemic herbicides Premiant 1 l/ha and Ceredin super 1 l/ha (76.32% and 75.88%, respectively). The poorest results in weed control were in the variants treated with DMA 6 1 l/ha (70.04%).

## Conclusions

Research carried out during the two experimental years (2015-2016) on turf weeding shows the following:

-Though seen as a simple solution, treating turf with herbicides has its particular features that we need to take into account when applying this type of treatment. In most cases, treating turf with herbicides is done to control dicot weeds, the most common weeds in turf.

-The stages we need to take in optimal weed control in turf are identifying the weed spectrum, establishing the share of weeds per species, identifying problem-weeds, correlating maximum weed sensitivity and maximum tolerance of the crop, choosing the herbicide and the time of application.

-The very good selectivity of the herbicides studied and their application in the proper rates and at the proper time prevented phyto-toxic phenomena in turf.

-In the spring of 2015, annual dicot weed species were dominant (43.01%): *Chenopodium album*, *Polygonum aviculare*, *Veronica hederifolia*. The share of perennial dicot weeds was rather low: *Cirsium arvense* (0.55%). Annual monocot weed species were absent, perennial monocot weed species shared 5.65% and was represented by *Cynodon dactylon*, and *Agropyron repens*.

-In the year 2016, compared to the year 2015, the weeding spectrum changed substantially: together with annual dicot weed species, perennial dicot weed species such as *Convolvulus arvensis* and *Cirsium arvense* shared 10.02%. Perennial monocot weed species *Agropyron repens* and *Cynodon dactylon* shared the double of the previous year (11.12%) together with annual monocot weed species such as *Digitaria sanguinalis* and *Echinochloa crus galli* (11.24%).

-Herbicide efficacy differed depending on weed species during the two experimental years. In the year 2015, when annual dicot weed species were predominant, maximum efficacy was with the herbicide Bucril universal 1 l/ha, followed by the herbicides Premiant 1 l/ha and Ceredin super 1 l/ha. The analysis of the efficacy of the herbicides on weeds in the year 2016 points out that with strong infestation by dicot weed species, particularly perennial ones, there is maximum efficacy with the systemic herbicides Premiant 1/ha and Ceredin super 1 l/ha.

-The weed control share ranged between 73.98% and 92.51% in the year 2015 and between 70.04% and 76.32% in the year 2016. This decrease of herbicide efficacy in the year 2016 was caused by the different composition of the turf weed species. Thus, there were

annual monocot weeds (*Digitaria sanguinalis* and *Echinochloa crus galli*) that shared 11.24% and twice as much perennial monocot weed species (*Cynodon dactylon* and *Agropyron repens*) that shared 11.12%.

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