

EFFECT OF PREEMERGENT HERBICIDES ON GERMINATION AND GROWTH OF ONION

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ABSTRACT

Weed control of onion is very important because this plant has a bad weed competition. All landscape weeds can be found in an onion culture. Among preemergent herbicides we can use those which are not dangerous for onion or strongly adsorb at the soil, so they couldn't leach to the seeds, as a result of a heavy rain. The aim of our experiment was to study the effect of three pre-emergent applicable herbicides: Stomp 330 (pendimethalin), Satecid 65 WP (propachlor) and Reglon (diquat-dibromide) on seedlings and growth of different varieties of onion. Chosen varieties were Braunschweiger, Barletta, Stuttgart giant, and Silver white.

Pot experiment was carried out under greenhouse conditions. Herbicides were applied at usually suggested doses. We followed germination and growth of plants, changing of fresh matter production and dry matter production of onion varieties influenced by applying herbicides. We established, that examined pre-emergent herbicides could influence these parameters in different extent. Stomp strongly hindered germination and damaged onion seedlings.

Key words: germination, growth, onion, Reglon, Satecid

IZVLEČEK

VPLIV HERBICIDOV, KI SE UPORABLJAJO PRED VZNIKOM NA KALITEV IN RAST ČEBULE

Zatiranje plevela v posevku čebule je pomembno, ker ima ta vrtnina proti plevelom slabo tekmovalno sposobnost. V posevku čebule lahko najdemo vse plevelne vrste, ki so značilne za pokrajino. Med herbicidi, ki se aplicirajo pred vznikom lahko uporabimo tiste, ki za čebulo niso nevarni ali se močno vežejo na talne delce in se ne izperejo do semena. Namen poskusa je bil, ugotoviti vpliv 3 herbicidov, ki se aplicirajo pred vznikom: stomp 330 (pendimetalin), satecid 65 WP (propaklor) in reglone (dikvat-dibromid) na sejance in rast različnih sort čebule. Izbrane sorte so bile: Braunschweiger, Barletta, Stuttgart giant in Silver white. Lončni poskus smo izvedli v rastlinjaku. Uporabili smo priporočene hektarske odmerke herbicidov. Spremljali smo kalitev in rast rastlin ter vpliv herbicidov na spremembo vsebnosti sveže in suhe snovi pri različnih sortah čebule. Ugotovili smo, da preizkušani herbicidi lahko vplivajo na te parametre v različnem obsegu. Stomp je močno zaviral kalitev in je povzročil poškodbe čebulnih sejancev.

Ključne besede: kalitev, rast, čebula, Reglon, Satecid

1 INTRODUCTION

Weed control of onion is very important because of its thin leaves and in consequence of this a very bad weed competition (Szalay, 1994). So we must keep the onion crop free of weeds during all vegetation period with herbicides and mechanical weed killing (Durante-Cuocolo, 1989). All landscape weeds can be found in an onion crop.

Onion seed is sowed lightly, 2-3 cm deep. Among preemergent herbicides we can use those which are not dangerous for onion seeds or strongly adsorb at the soil, so they couldn't leach to the seeds, as a result of a heavy rain. Onion is very sensitive to herbicides from germination to 1-2 leafy growth stage (Kádár, 2001).

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The aim of our experiment was to make a comparison between two preemergent herbicides with different herbicidal effect on germination and growth of onion.

Satecid 65 WP is a propachlor active agent's trade name, a preemergence selective herbicide effective against annual monocotyledons. Propachlor is absorbed by germinating plants mainly through the stem, but also through the roots. This herbicide inhibits growth of roots and stems, cell division, synthesis of proteins and nucleic acids. It must be applied within three days after sowing of onion.

Reglon is a bipyridylum herbicide with diquat-dibromide active agent (Matolcsy *et al.*, 1988). Reglon kills both monocotyledons and dycotiledons. Diquat-dibromide after spraying strongly adsorb by the soil so it doesn't harm onion seeds. This herbicide catalyses the noncyclic and cyclic phosphorilation reactions, but also produces changes in other biological processes of plants, as respiration and photosynthetic oxygen production (Loch-Nosticzius, 1992).

The herbicide sensitivity of varieties aren't the same, because in our experiment we tested onion varieties with different characteristics. We followed germination and growth of plants, changing of fresh matter production and dry matter production of onion varieties influenced by applying herbicides.

2 MATERIALS AND METHODS

Pot experiment was carried out under green house conditions from May till June in 2002. Twenty-five onion seeds were sowed into pots which contained 1 kg air dried soil in four replications. So we had 48 pots. We examined four different onion varieties (Table1.).

Table1: Characteristics of examined varieties

name of variety	form of bulb	colour of skin	keeping quality	cultivation
Braunschweiger	flatted ball	violet	Medium	seed sowing
Barletta	ball	white	Bad	pearl onion, seed sowing
Stuttgart Giant	ball	bronze red	Good	seed sowing
Silver White of Fertöd	flatted ball	white	Bad	seed sowing

Applied herbicides were dosed immediately after sowing by field suggested doses converted into the surface of the pots in 25 ml solution (Table 2.).

Table 2: Doses of applied herbicies

Herbicide	Field suggested doses	Doses ml/pot
Satecid 65 WP (propachlor)	5 kg/ha	3,18
Reglon (diquat-dibromide)	2,5 l/ha	1,6

Water was supplied by weigh using irrigation until the 60% of maximal water holding capacity of the soil.

We observed germination and growth of plants. Experiment was ended after 8 weeks of shooting. Length of leaves, leaf area, fresh- and dry mass of leaves and bulbs were measured.

3 RESULTS AND DISCUSSION

We summarised results of experiment in table 3. The germination and the proteins- and nucleic acids synthesis inhibiting propachlor decreased the germination of onion seeds significantly at all examined varieties. Diquat-dibromide didn't reduce the number of germinating seeds considerably except of Silver White of Fertőd. Germination energy of this variety was the most slender during our experiment and Stuttgart Giant was the most vigorous.

Length of onion leaves was measured at the end of experiment. The leaves of Barletta pearl onion were shorter as a result of varietal nature. Silver White of Fertőd grew stretched thin leaves. Leaves length of Stuttgart Giant and Braunschweiger hardly lagged behind it. Herbicides had no significant decreasing effect on length of leaves. The characteristics of varieties were dominant in change of this parameter.

The leaf area of varieties showed higher differences influenced by herbicides. Satecid made an important decreasing effect on leaf area mainly with Barletta and Braunschweiger. Reglon hardly influenced the leaf area of varieties.

The higher fresh mass quantity of leaves was found at powerfully growing Stuttgart Giant and the smallest at Silver White of Fertőd. Satecid reduced fresh mass production significantly except for Stuttgart Giant. By the effect of Reglon was a little loss of fresh mass.

We measured fresh mass of bulbs too. It was about half of leaves' fresh mass quantity because of plants were young and undeveloped at time of examination. Tendency of changing this parameter was similar to fresh mass of leaves in the case of all four varieties. Differences were significant but not between Barletta and Stuttgart Giant. Satecid decreased fresh mass of bulbs also significantly to the highest degree at Barletta variety.

Tendency of dry mass of leaves changed similarly than the fresh mass production. Dry mass of leaves was reduced by both examined herbicides. Greatest loss was caused by Satecid in average of varieties.

Dry bulbs' mass of Barletta was the highest followed by Stuttgart Giant, Braunschweiger and in the and Silver White of Fertőd. Herbicides decreased dry matter of bulbs but not in significant degree. Dry mass quantity of Satecid treated plants proved to be the smallest.

4 CONCLUSIONS

It was established that Satecid and Reglon had a reducing effect on germination and growth of onion. Satecid decreased germination and fresh mass production powerfully. Reglon reduced the rates of studied parameters at smaller degree.

Herbicide sensitivity of examined onion varieties were different. We found that reaction of Barletta and Braunschweiger was the strongest in Satecid treatment.

5 REFERENCES

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Table 3: Results of experiment

Variety	Treatment	Germinated seeds /pot	Length of leaves (cm)	Leaf area (cm ²)	Fresh mass of leaves (g)	Fresh mass of bulbs (g)	Dry mass of leaves (g)	Dry mass of bulbs (g)
Barletta	Control	18,5	15,57	84,81	4,16	2,45	0,466	0,697
	Reglon	17,7	16,77	86,73	4,16	2,37	0,298	0,573
	Satecid	12,2	16,21	56,25	2,75	1,49	0,188	0,461
Braunschweiger	Control	14,5	19,34	88,16	4,45	1,41	0,323	0,187
	Reglon	16,5	17,72	83,09	3,89	1,36	0,283	0,161
	Satecid	11,0	17,81	60,01	3,16	1,51	0,264	0,320
Silver white	Control	11,7	21,45	70,08	3,79	1,15	0,287	0,287
	Reglon	9,0	19,51	54,26	2,90	0,97	0,198	0,188
	Satecid	11,5	19,48	67,93	3,50	0,94	0,243	0,111
Stuttgart giant	Control	21,5	18,37	108,78	4,74	2,22	0,375	0,432
	Reglon	20,5	18,34	105,38	5,15	2,21	0,300	0,551
	Satecid	16,5	19,44	99,88	4,64	1,69	0,336	0,293
LSD_{5%}		3,7	1,96	15,14	0,71	0,34	0,075	0,150