

RESEARCHES ON ONION AND GARLIC WEED CONTROL

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ABSTRACT

Onion and garlic crops are highly susceptible to weed infestation because they grow slowly on the first stages and can be easily compromised by weeds. Our study was made at the Didactical research Station of Banu maracine which belongs to the University of Craiova, Romania. We have tried three herbicide active ingredients: metolachlor, pendimetalin and oxyfluorfen. The crops were: sown onion, planted onion and planted garlic. On postemergence we have tried four concentrations of oxyfluorfen as Goal 2E herbicide. The reason why we tried these substances is that the information on the herbicide leaflet does not provide enough knowledge for postemergent application on sown onion and planted garlic. Our results have shown that the sown onion and garlic can not be sprayed by 5 ml in 5 litres water concentration while planted onion resists to even 33 ml in 5 litres water.

INTRODUCTION

The onion and garlic crops are infested by a wide spectrum of weeds, including monocotyledonous and dicotyledonous species, annual and perennial. Generally, the hoeing work that is made for their control is expensive and the labor is scarce. Herbicide applying is an efficient method, rapid and it allows large surfaces as well as good yields. There is well known that onion resists to high oxyfluorfen rates yet the information of the herbicide Goal 2E or Goal 4F does not provides enough information about the concentration of the herbicide in water for postemergent application on seeded onion during first stages of vegetation neither for garlic, also, for vegetation applying. Because oxyfluorfen is a contact active ingredient, in high concentration it can affect young onion plants that are sown or garlic plants. This is the reason why we tried several treatments, in order to choose the right concentration that will not affect the young onion plants or garlic plants and to distroy the weeds in the first stages of growing, when the cotyledons appear or the first true leaves and not to affect the onion and garlic crops.

MATERIAL AND METHOD

The experiment was located at Didactical Research Station (DRS) Banu Maracine, near Craiova in 2014 and 2015 years at the vegetable sector. There were set up three treatments for sown onion, planted onion and planted garlic. These treatment were:

- V1 – Dual Gold (metolachlor) 1.2 litres/ha in 300 litres water applied to sown onion;
- V2 – Stomp (pendimetalin) 6 litres/ha in 300 litres water applied to sown onion;
- V3- Goal 2E (oxyfluorfen) 1 liter/ha in 300 litres water applied to sown onion;
- V4 – Dual Gold (metolachlor) 1.2 litres/ in 300 litres water applied to planted onion;
- V5 – Stomp (pendimetalin) 6 litres/ha in 300 litres water applied to planted onion;
- V6 - Goal 2E (oxyfluorfen) 2 litres/ha in 300 litres water applied to planted onion;
- V7 – Dual Gold (metolachlor) 1.2 litres/ha in 300 litres water applied to planted garlic;
- V8 – Stomp (pendimetalin) 6 litres/ha in 300 litres water applied to planted garlic;
- V9- Goal 2E (oxyfluorfen) 2 litres/ha in 300 litres water applied to planted garlic;
- V10 – untreated control.

These substances have been applied on the soil. After crops and weeds emergence there were applied, accros the four treated strips (replications), 4 different concentrations of Goal 2E in water.

- V1 = 33 ml Goal 2E in 5 litres of water (2 000 ml in 300 litres water/ha);
- V2 = 7 ml Goal 2E in 5 litres of water (420 ml in 300 litres water/ha);
- V3 = 5 ml Goal 2E in 5 litres of water (300 ml in 300 litres water/ha);
- V4 = 5 ml Goal 2E in 7 litres of water (215 ml in 300 litres water/ha)
- V5 = untreated control.

For *Cynodon dactylon* and *Sorghum halepense* control there were applied, subsequently, when these weeds reached 15 cm height, Agil (propaquizafop) 1.2 litres/ha, after these two species resumed their growth, after oxyfluorfen applying which partially destroyed them, as a contact herbicide.

RESULTS AND DISCUSSIONS

a. With the case of herbicides applied on soil

The results of Dual Gold (metolachlor), Stomp (pendimethalin) and Goal 2E (oxyfluorfen) herbicides as well as the phytotoxicity on sown onion, planted onion and garlic are presented in the table below, after EWRS scale.

Table 1

The efficacy and selectivity of herbicides applied on soil for sown onion, planted onion and planted garlic in 2015, after EWRS scale

| Weed species | Biological category | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 | V9 |
|--------------------------------|---------------------|----|----|----|----|----|----|----|----|----|
| <i>Cirsium arvense</i> | d.p. | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| <i>Convolvulus arvensis</i> | d.p. | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| <i>Chenopodium album</i> | d.a. | 2 | 1 | 1 | 2 | 1 | 0 | 2 | 1 | 0 |
| <i>Stellaria media</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| <i>Amaranthus retroflexus</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| <i>Portulaca oleracea</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| <i>Galinsoga parviflora</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| <i>Abutilon theophrasti</i> | d.a. | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| <i>Sorghum halepense</i> | m.p. | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| <i>Cynodon dactylon</i> | m.p. | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| <i>Setaria glauca</i> | m.a. | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 2 |
| <i>Digitaria sanguinalis</i> | m.a. | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 | 2 |
| <i>Ambrosia artemisiifolia</i> | d.a. | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| <i>Xanthium italicum</i> | d.a. | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |

| | | | | | | | | | | |
|--------------------------|------|---|---|---|---|---|---|---|---|---|
| <i>Xanthium spinosum</i> | d.a. | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| Selectivity | | 0 | 0 | 1 | | | | | | |
| | | | | | 0 | 0 | 0 | | | |
| | | | | | | | | 0 | 0 | 0 |

d.a. – dicotiledonous, annual; d.p. – dicotiledonous, perennial; m.a. – monocotiledonous annual; m.p. – monocotiledonous perennial. EWRS scale for herbicide efficacy: (0-2 = control 100-80%, accepted as efficacy; 2-10, control 80-0%, not accepted as efficacy). For phytotoxicity on crop: 0-2 reduced harmful effect, accepted; 2-10 strong harmful effect, not accepted.

b. With the case of Goal 2E herbicide applied in different concentrations, postemergent.

Table 2

The efficacy and selectivity of Goal 2E herbicide applied in 4 concentrations with sown onion, planted onion and planted garlic, after EWRS scale, in 2015

| Weed species | Biological category | V1 | | V3 | | V5 | | V7 | |
|--------------------------------|---------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
| | | 3-4 crop leaves | 8-10 crop leaves | 3-4 crop leaves | 8-10 crop leaves | 3-4 crop leaves | 8-10 crop leaves | 3-4 crop leaves | 8-10 crop leaves |
| <i>Cirsium arvense</i> | d.p. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Convolvulus arvensis</i> | d.p. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Chenopodium album</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Stellaria media</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Amaranthus retroflexus</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Portulaca oleracea</i> | d.a. | 3 | 5 | 4 | 6 | 4 | 6 | 6 | 7 |
| <i>Galinsoga parviflora</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Abutilon theophrasti</i> | d.a. | 3 | 5 | 4 | 6 | 4 | 6 | 6 | 7 |
| <i>Sorghum halepense</i> | m.p. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Cynodon dactylon</i> | m.p. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Setaria glauca</i> | m.a. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Digitaria sanguinalis</i> | m.a. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| <i>Ambrosia artemisiifolia</i> | d.a. | 3 | 5 | 4 | 6 | 4 | 6 | 6 | 7 |
| <i>Xanthium italicum</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |

| | | | | | | | | | |
|--------------------------|------|---|---|---|---|---|---|---|---|
| <i>Xanthium spinosum</i> | d.a. | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 |
| Selectivitate | | 9 | 7 | 3 | 4 | 2 | 2 | 1 | 1 |
| | | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | 7 | 5 | 2 | 2 | 1 | 1 | 1 | 1 |

d.a. – dicotyledonous, annual; d.p. – dicotyledonous, perennial; m.a. – monocotyledonous annual; m.p. – monocotyledonous perennial. EWRS scale for herbicide efficacy: (0-2 = control 100-80%, accepted as efficacy; 2-10, control 80-0%, not accepted as efficacy). For phytotoxicity on crop: 0-2 reduced harmful effect, accepted; 2-10 strong harmful effect, not accepted.

CONCLUSIONS

From these experimental data we can conclude the following:

- The 33 ml Goal 2E concentration in 5 litres of water can not be applied on sown onion in the first stages of the crop unless the onion leaves become old enough in order to resist to herbicide burning. Though the herbicide leaflet does not specifies that it can not be applied in the first stages of onion crop, we have observed obvious burning phenomena on onion leaves or total destroying of young onion plants;
- The 33 ml Goal 2E concentration in 5 litres of water can not be applied on planted garlic either, whatsoever because the garlic plants do not form enough wax on its leaves in order to resist to such herbicide concentration;
- The other concentrations, of 7 ml in 5 litres of water, 5 ml in 5 litres of water and 5 ml in 7 litres of water can be applied to sown onion and planted garlic with the condition that the weeds must be just after emerging.
- All experimented concentrations had a good effect on most weed species, including the perennial ones.
- The resistant weed species have velvet like leaves or wax covered leaves that do not permit the herbicide action, e.g.: *Portulaca oleracea*, *Abutilon theophrasti* and *Ambrosia elatior*;
- Perennial weeds: *Cirsium*, *Convolvulus*, *Sorghum* and *Cynodon* resume their growth after 2 weeks but during this time the onion and garlic reach higher vegetation status and can support another application;
- If the treatment with Goal 2E is made on older weeds, higher than 15 cm, even with 33 ml in 5 litres of water concentration the effect is low, the weeds resume their growth after about ten days.

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