

RESEARCH ON THE CHEMICAL CONTROL OF THE INVASIVE SPECIES *AILANTHUS ALTISSIMA* FROM PASTURES

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ABSTRACT

The present paper presents the results of the chemical control research of the species *Ailanthus altissima*, an invasive species that damages the lands on which it appears spontaneously, in the form of restricted areas. The total systemic herbicide Roundup, based on glyphosate, 360 g/l was used. Two methods of application were investigated, namely, by brushing on a 30 cm height of the tree trunk and by injection into holes made in the tree trunk. Undiluted herbicide was applied. The first method of application had almost no effect on *Ailanthus altissima* trees due to the fact that the herbicide cannot be absorbed through the mature bark of the trees. The second method of application gave very good results.

INTRODUCTION

Ailanthus altissima (tree of heaven or Japan varnish tree) is an invasive species, native to Taiwan and Central China, causing significant damage to grasslands. The scientific name refers to the height of this tree (ailanto = tree that reaches the sky and altissima = the tallest. It is an exotic ornamental tree, introduced in Europe in the eighteenth century, widespread in the Romanian Plain. It has a tall stem of 15–30 m, with a broad crown and it lives around 50 years. The bark is smooth, shiny, with long compound leaves like acacia leaves, which give off an unpleasant odor when crushed. It blooms in May-June with small, yellow-green, unpleasant-smelling flowers, clustered in compound panicles. The fruits are red, with winged seeds. This tree makes lot of root suckers and it vegetates well in hot and dry climate; it resists to smoke and gas, but suffers from frost. It is used in works to improve degraded lands and to fix the coasts in dry regions, as an ornamental tree, and the leaves and bark have medicinal uses (deworming). It has colonized the natural areas of Hungary and it is considered a threat to biodiversity. It multiplies by seeds that are transported by wind and water and by root suckers. The root suckers can extend up to 25 m from the

primary root. It does not tolerate shade. Specimens that have reached 150 years have been reported. Mechanical control is done by removing the bark on the entire circumference. Modern biotechnology is involved in protection of the environment and maintaining biodiversity, but also in keeping the attack of diseases, pests or invasive species below the damage threshold (Bonciu Elena, 2019, 2020; Paraschivu Mirela, 2013, 2017, Bonea Dorina, 2016, 2016). It is important to discourage the use of this species for ornamental purposes, for soil fixation, in horticulture or forestry. Destruction by pulling or cutting is not recommended as the process stimulates the formation of root suckers. It prefers fertile soils, rich in humus, well drained, deep and loose, but also grows well on compact, heavy, clayey, sandy, loamy, calcareous or degraded soils (slopes, coasts, sea sands). Chemical control can be done with glyphosate or triclopyr. The air temperature at the time of treatment should be at least 18°C to ensure absorption of the herbicide. It is resistant to smoke and gas pollution. It has a very fast growth rate, reaching 2 m in the first year of vegetation. It is a unisexual dioecious species, with male and female plants. Male plants emit a foul odor during

flowering to attract pollinating insects. This tree has been widely cultivated both in China and abroad as a host plant for

MATERIAL AND METHOD

The experiment took place in Bailesti, Dolj County. The aim of the research was to find the best method to chemically control the species *Ailanthus altissima* from a meadow with an area of 3 ha. The area infested with *Ailanthus altissima* was about 500 square meters, where 183 trees spontaneously appeared. The soil where the experiment took place is of the chernozem type with a high percentage of sand.

Two methods of chemical control were tested using the total systemic herbicide Roundup containing the active ingredient glyphosate at a concentration of 360 g / l (Dobre M., 2019). Thus, the first method was to apply the undiluted herbicide to the bark of *Ailanthus altissima* trees with a brush. The application was made on the entire circumference of the tree, on a length of 30 cm, starting from 30 cm from the soil surface. This treatment was done on 10

the moth (*Sililoth ailanthus*) involved in silk production.

trees with a diameter of about 6 cm and a height of 5-6 m. This method of control was applied on May 31, 2020. The assessment of the effectiveness of the treatment was made over 2 weeks, in mid-June.

The second method of chemical control was to inject *Ailanthus altissima* trees with undiluted herbicide. This operation was performed by inserting the herbicide into the holes made in the trunk of the tree, with a drill. The number of holes varied depending on the diameter of the trees. Thus, in the case of trees with a diameter of less than 10 cm, a single hole was made. The amount of herbicide that was introduced into the hole was 2 ml per cm of the diameter of the tree. Thus, a quantity of 10 ml of pure herbicide was applied to a tree with a diameter of 5 cm. In the case of the trees with a diameter of about 20 cm, 3 holes were made in which 40 ml of herbicide were introduced. This type of treatment was also performed on 10 trees.



Figure 1. The way Roundup herbicide has been applied by brushing.



Figure 2. The way Roundup herbicide has been applied by injecting.

RESULTS AND DISCUSSIONS

After applying two methods of chemical control of *Ailanthus altissima* we obtained different results depending on

the method of application of the total systemic herbicide. The evaluation of the results obtained for the two experimented methods was done using the European Weed Research Council (EWRC) scale.

Table 1.

EWRC (European Weed Research Council) scale for assessing the control effectiveness of herbicides on weeds

Mark	Control (%)	Description
1	100	Total control
2	99,0-96,5	Very good control
3	96,5-93,0	Good control
4	93,0-87,5	Medium control
5	87,5-80,0	Lower than medium control
6	80,0-70,0	Unsatisfactory control
7	70,0-50,0	Unsatisfactory control
8	50,0-1,0	Unsatisfactory control
9	1,0-0,0	No control

a. Results obtained in the case of the first method of application

Following the application of the total systemic herbicide roundup, based

on glyphosate, by brush lubrication, on the height of 30 cm of the trunk to 10 trees of *Ailanthus altissima*, the following results were obtained:

Table 2.

The evaluation of the control of *Ailanthus altissima* trees by applying Roundup total systemic herbicide (glyphosate 360 g/l), by lubricating the tree trunk, in 2020, on a meadow in Bailesti area, Dolj County

Tree number	Tree diameter, cm	Tree height, cm	EWRC mark	Observations
1	5	350	7	Slight yellowish, but total recovery after 2 weeks
2	7	400	9	no effect
3	4	280	7	Slight yellowish, but total recovery after 2 weeks
4	5	330	9	no effect
5	5	320	8	no effect
6	10	550	9	no effect
7	6	370	9	no effect
8	6	350	9	no effect
9	7	390	9	no effect
10	9	450	9	no effect

This type of herbicide is not absorbed through the mature (browned) bark of trees. In younger trees, where the bark is not thick, a slight yellowing effect was observed, but after a period of 3 weeks, the trees fully recovered. From these results we can conclude that the application of this herbicide on the tree trunk by lubrication has no effect. We mention that the treatment was done at the end of May, when the bark of the trees was ripe, reason for which the herbicide was not absorbed by the plants. Another reason why the absorption did

not take place was the phenomenon of herbicide volatilization due to the longer persistence on the bark of the tree and higher temperatures during this period. In order to clarify this aspect, we will continue by experimenting with the application of this herbicide in the first decade of March.

b. Results obtained in the case of the second method of application.

By applying the herbicide by injection method, in the holes made in the tree trunks, the following results were obtained:

Table 3.

The evaluation of *Ailanthus altissima* tree control by applying Roundup total systemic herbicide (glyphosate 360 g / l), by injecting tree trunk, in 2020, on a meadow in Bailesti area, Dolj County

Tree number	Tree diameter, cm	Tree height, m	EWRC mark	Observations
1	20	18.0	1	Total control
2	15	14.0	1	Total control
3	12	10.0	1	Total control
4	8	5.0	1	Total control
5	5	3.0	1	Total control
6	10	8.0	1	Total control
7	7	4.0	1	Total control
8	7	4.0	1	Total control
9	6	3.5	1	Total control
10	4	3.0	1	Total control

By this method, all the treated trees were dried due to the good absorption of the herbicide in the vascular system of the plants. For the radical control of this species, we recommend

the application of the total systemic herbicide Roundup, based on glyphosate, by injecting into the tree trunk in holes made with the drill.



Figure 3. *Ailanthus altissima* tree dried by glyphosate injection.

CONCLUSIONS

After doing the research, the following conclusions were drawn:

- *Ailanthus altissima* species (tree of heaven or Japan varnish tree) is an invasive species that appears spontaneously on pastures, vineyards, orchards, wild places, etc. This species damages by the fact that it shades the crops where it appears and multiplies rapidly through seed and root suckers;
- for the chemical control of this species two methods of application of the total systemic herbicide Roundup were used, which has as active ingredient glyphosate, 360 g / l, namely, by brushing directly on the bark of trees and by

injection into the trunk of trees, in holes made with a drill. Undiluted herbicide was applied;

- the first method of application, by brushing, did not determine the absorption of the herbicide in the plant because the mature bark of the *Ailanthus altissima* trees prevented the translocation of the substance in the conducting vessels of the tree;
- the second method of application, by injection into the holes made with the drill in the trunk of the trees determined their total control due to the fact that the herbicidal active substance entered the vascular system of the plants and did not volatilize.

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