

**Original Article****Testing the Effect of Different Herbicidation Solutions Administered to Maize Crops at SCDA Turda****POP Horia Alexandru<sup>1</sup>, Teodor RUSU<sup>1\*</sup>, Camelia OROIAN<sup>2</sup>**<sup>1</sup>*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, 3-5 Calea Manastur, 400372 Cluj-Napoca, Romania*<sup>2</sup>*Faculty of Horticulture, University of Agricultural Sciences and Veterinary Medicine, 3-5 Calea Manastur, 400372 Cluj-Napoca, Romania*Received 18 September 2015; received and revised form 29 September 2015; accepted 25 October 2015  
Available online 31 December 2015

---

**Abstract**

It is well known that weeds have important implications in agriculture. In particular case of maize, we must mention that the importance of weeds influence is determined by the fact that maize has major importance as food and feed source, at global level. The trial was carried out in 2015, at SCDA Turda, according to "latin rectangle" design, with 8 experimental variants. The "Turda Star" maize hybrid was used. The following herbicides were used: Basis, Arigo, Principal, Principal Plus, Titus Plus, Kelvin Top, Cambio, Collage. Trend and Dash products were added as adjuvants. The best results were obtained when treatment is performed with the mixture Collage 1L/Ha + Trend 0.3 L/Ha. Among reported weed species, *Chenopodium album* had the highest occurrence and presence, being followed by *Lathyrus tuberosus*, *Xanthium strumarium*, *Amaranthus lividus* and *Polygonum convolvulus*.

**Keywords:** weed, treatment, specie, experimental variant.

---

**1. Introduction**

It is well known that weeds have important implications in agriculture. According to <http://extension.psu.edu/pests/ipm/schools-childcare/schools/educators/curriculum/weeds/introweeds> [6]: "Weeds are plants whose undesirable qualities outweigh their good points, according to man."

Our human activities create weed problems since no plant is a "weed" in nature. Though we may try to manipulate nature for our own good, nature is persistent.

Through the manipulation process, certain weeds are controlled, while, other more serious weeds may thrive because favorable growing conditions for them also have been met. Weeds are naturally strong competitors and those weeds that can best compete always tend to dominate. Both humans and nature are involved in plant breeding programs. The main difference between the two programs is that man breeds plants for yield, while nature breeds plants for survival." [6]. According to the same source, "certain characteristics are associated with and allow the survival of weeds. Weeds possess one or more of the following:

- a) abundant seed production;
- b) rapid population establishment;
- c) seed dormancy;
- d) long-term survival of buried seed;

---

\* Corresponding author.  
Fax: +40-264-593792  
Tel: +40-264-596384  
e-mail: teodor.rusu@usamvcluj.ro

- e) adaptation for spread;
- f) presence of vegetative reproductive structures; and
- g) ability to occupy sites disturbed by human activities.

There are approximately 250,000 species of plants worldwide; of those, about 3% or 8000 species behave as weeds. Weeds are troublesome in many ways. Primarily, they reduce crop yield by competing for water, light, soil nutrients, and space. Other problems associated with weeds in agriculture include:

- a) reduced crop quality by contaminating the commodity;
- b) interference with harvest;
- c) serve as hosts for crop diseases or provide shelter for insects to overwinter;
- d) limit the choice of crop rotation sequences and cultural practices; and
- e) production of chemical substances which are toxic to crop plants (allelopathy), animals, or humans.” [6].

In particular case of maize, we must mention that the importance of weeds influence is determined by the fact that maize has major importance as food and feed source, at global level [2, 3]. If we take into consideration the specific pedo-climatic conditions from our country [4], we find that here, this culture has appropriate developmental conditions. On Romanian territory, there are several genuine maize varieties successfully cultivated. Beside genuine maize varieties, new hybrids with high production traits are also used. Thus the weeds threat remains an important issue to be solved in maize culture [1, 3]. The aim of our study was testing the influence of different herbicide types on weeds development.

## 2. Material and Method

Our trial was developed in 2015, at SCDA Turda, in specific pedo-climatic conditions of West Plain [4], according to "latin rectangle" design (45

m<sup>2</sup>/variant), with 8 experimental variants. The "Turda Star" maize hybrid was used, planted at 70,00 plants/Ha density (23 kg seed/Ha).

The following herbicides were used: Basis, Arigo, Principal, Principal Plus, Titus Plus, Kelvin Top, Cambio, Collage (nicosulfuron 60g/Kg + thifensulfuron-methy 4 g/L). Trend and Dash products were added as adjuvants.

The treatments were administered, by variants with one or a combination of herbicides, taking into account that two control groups were considered (variant 1 and Variant 2):

Variant 1 – Control, no herbicide administration

Variant 2 – Control, no hoeing

Variant 3 – Basis 20g/Ha + Principal 90 g/Ha + Trend 0.3 L/Ha

Variant 4 – Arigo 330 g/Ha + Trend 0.3 L/Ha

Variant 5 – Principal Plus 440 g/Ha + Trend 0.3 L/Ha

Variant 6 – Titus Plus 307g/Ha + Principal 90 g/Ha + Trend 0.3 L/Ha

Variant 7 – Kelvin Top 1-1.4 L/Ha + Cambio 2L/Ha + Dash 1L/Ha

Variant 8 – Collage 1L/Ha + Trend 0.3 L/Ha.

## 3. Results and Discussions

The administration of different treatments in function of experimental variant led to specific results.

Thus, in control groups, as expected, were reported large variety of weeds in big amounts. Thus in Variant 1, where herbicides were not administered, 12 weed species are reported in number of 32 (Table 1), *Chenopodium album* having the highest frequency, 10 individuals being noticed. In Variant 2, also considered control, where not hoeing was practiced, were reported only 8 weed species in number of 29 (Table 2), *Chenopodium album* having the highest frequency. A number of 10 individuals were reported for this specie.

Table 1. The occurrence of weeds by experimental Variant 1

| No.crt | Weed                         | No. of weeds |
|--------|------------------------------|--------------|
| 1      | <i>Raphanus raphanistrum</i> | 1            |
| 2      | <i>Hibiscus trionum</i>      | 1            |
| 3      | <i>Anagallis arvensis</i>    | 4            |
| 4      | <i>Setaria glauca</i>        | 3            |
| 5      | <i>Sonchus arvensis</i>      | 2            |
| 6      | <i>Silene noctiflora</i>     | 2            |
| 7      | <i>Convolvus arvensis</i>    | 2            |
| 8      | <i>Polygonum convolvulus</i> | 2            |
| 9      | <i>Xanthium strumarium</i>   | 1            |
| 10     | <i>Chenopodium album</i>     | 10           |
| 11     | <i>Delphinium consolida</i>  | 1            |

|    |                     |   |
|----|---------------------|---|
| 12 | <i>Cirsium arv.</i> | 3 |
|----|---------------------|---|

Table 2. The occurrence of weeds by experimental Variant 2

| No.crt | Weed                         | No. of weeds |
|--------|------------------------------|--------------|
| 1      | <i>Chenopodium album</i>     | 10           |
| 2      | <i>Silene noctiflora</i>     | 2            |
| 3      | <i>Xanthium strumarium</i>   | 6            |
| 4      | <i>Polygonum convolvulus</i> | 1            |
| 5      | <i>Setaria glauca</i>        | 2            |
| 6      | <i>Hibiscus trionum</i>      | 6            |
| 7      | <i>Thalspi</i>               | 1            |
| 8      | <i>Delphinium consolida</i>  | 1            |

In experimental Variant 3, 9 weed species are reported in number of 37 (Table 3), *Chenopodium album* having the highest frequency, 8 individuals being noticed.

In experimental Variant 4, were reported 13 weed species in number of 28 (Table 4), *Xanthium strumarium* and *Chenopodium album* having the highest frequency. A number of 5 individuals were reported for each above mentioned specie.

In experimental Variant 5, 12 weed species are reported in number of 37 (Table 5), *Cirsium arvense* and *Chenopodium album* having the highest frequency. A number of 5 individuals were reported for each above mentioned specie.

In experimental Variant 6, were reported 11 weed species in number of 21 (Table 6), *Lathyrus tuberosus* having the highest frequency, 8 individuals being noticed.

Table 3. The occurrence of weeds by experimental Variant 3

| No.crt | Weed                          | No. of weeds |
|--------|-------------------------------|--------------|
| 1      | <i>Silene noctiflora</i>      | 3            |
| 2      | <i>Xanthium strumarium</i>    | 7            |
| 3      | <i>Chenopodium album</i>      | 8            |
| 4      | <i>Hibiscus trionum</i>       | 6            |
| 5      | <i>Amaranthus retroflexus</i> | 7            |
| 6      | <i>Convulvus arvense</i>      | 2            |
| 7      | <i>Setaria glauca</i>         | 2            |
| 8      | <i>Polygonum convolvulus</i>  | 1            |
| 9      | <i>Galeopsis tetrahit</i>     | 1            |

Table 4. The occurrence of weeds by experimental Variant 4

| No.crt | Weed                         | No. of weeds |
|--------|------------------------------|--------------|
| 1      | <i>Viola arvense</i>         | 2            |
| 2      | <i>Anagallis arvensis</i>    | 3            |
| 3      | <i>Amaranthus lividus</i>    | 2            |
| 4      | <i>Polygonum convolvulus</i> | 1            |
| 5      | <i>Setaria glauca</i>        | 2            |
| 6      | <i>Xanthium strumarium</i>   | 5            |
| 7      | <i>Chenopodium album</i>     | 5            |
| 8      | <i>Euphorbia helioscopia</i> | 2            |
| 9      | <i>Arctium lappa</i>         | 1            |
| 10     | <i>Silene noctiflora</i>     | 1            |
| 11     | <i>Convulvus arvense</i>     | 1            |
| 12     | <i>Cirsium arv.</i>          | 2            |
| 13     | <i>Galeopsis tetrahit</i>    | 1            |

In experimental Variant 5, 12 weed species are reported in number of 37 (Table 5), *Cirsium arvense* and *Chenopodium album* having the highest frequency. A number of 5 individuals were reported

for each above mentioned specie. In experimental Variant 6, were reported 11 weed species in number of 21 (Table 6), *Lathyrus tuberosus* having the highest frequency, 8 individuals being noticed.

Table 5. The occurrence of weeds by experimental Variant 5

| No.crt | Weed                         | No. of weeds |
|--------|------------------------------|--------------|
| 1      | <i>Anagallis arvensis</i>    | 1            |
| 2      | <i>Raphanus raphanistrum</i> | 1            |
| 3      | <i>Sonchus arvense</i>       | 1            |
| 4      | <i>Xanthium strumarium</i>   | 2            |
| 5      | <i>Setaria glauca</i>        | 2            |
| 6      | <i>Chenopodium album</i>     | 5            |
| 7      | <i>Hibiscus trionum</i>      | 1            |
| 8      | <i>Cirsium arvense</i>       | 5            |
| 9      | <i>Galeopsis tetrahit</i>    | 1            |
| 10     | <i>Silene noctiflora</i>     | 4            |
| 11     | <i>Convulvus arvense</i>     | 1            |
| 12     | <i>Amaranthus lividus</i>    | 1            |

Table 6. The occurrence of weeds by experimental Variant 6

| No.crt | Weed                         | No. of weeds |
|--------|------------------------------|--------------|
| 1      | <i>Amaranthus lividus</i>    | 1            |
| 2      | <i>Polygonum convolvulus</i> | 2            |
| 3      | <i>Convulvus arvense</i>     | 1            |
| 4      | <i>Xanthium strumarium</i>   | 3            |
| 5      | <i>Chenopodium album</i>     | 3            |
| 6      | <i>Anagallis arvensis</i>    | 2            |
| 7      | <i>Lathyrus tuberosus</i>    | 4            |
| 8      | <i>Sonchus arvense</i>       | 1            |
| 9      | <i>Silene noctiflora</i>     | 1            |
| 10     | <i>Hibiscus trionum</i>      | 2            |
| 11     | <i>Raphanus raphanistrum</i> | 1            |

In experimental Variant 7, 11 weed species are reported in number of 24 (Table 7), *Amaranthus lividus* and *Chenopodium album* having the highest frequency. A number of 4 individuals were reported

for each above mentioned specie. In experimental Variant 8, were reported 10 weed species in number of 18 (Table 8), *Polygonum convolvulus* having the highest frequency, 4 individuals being noticed.

Table 7. The occurrence of weeds by experimental Variant 7

| No.crt | Weed                         | No. of weeds |
|--------|------------------------------|--------------|
| 1      | <i>Xanthium strumarium</i>   | 3            |
| 2      | <i>Sonchus arvense</i>       | 3            |
| 3      | <i>Chenopodium album</i>     | 4            |
| 4      | <i>Setaria glauca</i>        | 2            |
| 5      | <i>Amaranthus lividus</i>    | 4            |
| 6      | <i>Polygonum convolvulus</i> | 2            |
| 7      | <i>Galeopsis tetrahit</i>    | 1            |
| 8      | <i>Lathyrus tuberosus</i>    | 1            |
| 9      | <i>Cirsium arv.</i>          | 2            |
| 10     | <i>Silene noctiflora</i>     | 1            |
| 11     | <i>Raphanus raphanistrum</i> | 1            |

Table 8. The occurrence of weeds by experimental Variant 8

| No.crt | Weed                         | No. of weeds |
|--------|------------------------------|--------------|
| 1      | <i>Agropyron repens</i>      | 2            |
| 2      | <i>Xanthium strumarium</i>   | 2            |
| 3      | <i>Sonchus arvensis</i>      | 2            |
| 4      | <i>Cirsium arv.</i>          | 1            |
| 5      | <i>Chenopodium album</i>     | 3            |
| 6      | <i>Galeopsis tetrahit</i>    | 1            |
| 7      | <i>Silene noctiflora</i>     | 1            |
| 8      | <i>Polygonum convolvulus</i> | 4            |
| 9      | <i>Veronica persica</i>      | 1            |
| 10     | <i>Galinsoga parviflora</i>  | 1            |

Our research shows that in control variant where no herbicide were administered, in experimental Variant 4 treated with Arigo 330 g/Ha + Trend 0.3 L/Ha, and in experimental Variant 5 treated with Principal Plus 440 g/Ha + Trend 0.3 L/Ha, is reported the biggest number of weed species (Table 1, Table 4, Table 5). The smallest number of weed species, 8 respectively, is noticed in control variant 2, where no hoeing works were performed (Table 2). We also mention here the experimental Variant 3 treated with Basis 20g/Ha + Principal 90 g/Ha + Trend 0.3 L/Ha (Table 3), where only 9 weed species are reported. The biggest number of weeds were reported in control variant with 32 individuals (Table 1), and experimental Variants 3 treated with Basis 20g/Ha + Principal 90 g/Ha + Trend 0.3 L/Ha (Table 3) and 5 treated with Principal Plus 440 g/Ha + Trend 0.3 L/Ha (Table 5), where a number of 37 weed individuals are reported. Variant 8, treated with Collage 1L/Ha + Trend 0.3 L/Ha, differs, by far, by the other experimental variants and control, because here we notice the smallest number of weed individuals, 18, respectively (Table 8). We also notice that in all experimental variants occurs *Chenopodium album* specie, and in 6 of 8 experimental variants (75%), as number of individuals, with values between 10 (control Variants 1, and 2) and 4 (Variant 7).

#### 4. Conclusions

The study performed within experimental field located at SCDA Turda on maize culture, concerning herbicide efficacy demonstrate that best

results were obtained when treatment is performed with the mixture Collage 1L/Ha + Trend 0.3 L/Ha. This is demonstrate by the smallest number of weed individuals obtained by entire experiment, 18 respectively, and also by the small number of weed species, 10 respectively.

Among reported weed species, *Chenopodium album* had the highest occurrence being found in all experimental variants, an in majority being present in biggest number, compared to the other species. As occurrence and presence it is followed by *Lathyrus tuberosus*, *Xanthium strumarium*, *Amaranthus lividus* and *Polygonum convolvulus*.

#### References

- [1] Borcean I., 2003, Phytotechnics, Ph. Ion Ionescu de la Brad, Iasi.
- [2] Muntean L.S., S. Cernea, G. Morar, M.M. Duda, D.I. Vârban, S. Muntean and C. Moldovan, 2014, Phytotechnics, Ph. Risoprint, Cluj-Napoca.
- [3] Oroian I., V. Florian, L. Holonec, 2006, Atlas de fitopatologie trilingv, Ed. Academiei Române, Bucuresti.
- [4] Sandulache M I., 2015, West Plain – Location and characteristics, on-line: [http://www.unibuc.ro/prof/sandulache\\_m\\_i/Campia\\_de\\_Vest.php](http://www.unibuc.ro/prof/sandulache_m_i/Campia_de_Vest.php)
- [5] \*\*\*, 2003, SRTS, Romanian System of Soil Taxonomy, Estfalia Publishing House, Bucharest.
- [6] \*\*\*, <http://extension.psu.edu/pests/ipm/schools-childcare/schools/educators/curriculum/weeds/>

"This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited."