VYTAUTAS MAGNUS
UNIVERSITY
AGRICULTURE
ACADEMY

EFFECT OF HERBICIDE MIXTURES ON *HERACLEUM SOSNOWSKYI* CONTROL

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IECAG 2021

The 1st International Electronic Conference on Agronomy

03–17 MAY 2021 | ONLINE

Introduction

- *Some non-native plants, centuries ago brought to flower gardens, orchards or parks as an adornment, began spontaneously spread and become invasive.*
- *Some invasive species causes detrimental effects to human health, agriculture and natural ecosystem.*
- *There are about 11,000 alien species in Europe, and this number is rising rapidly.*
- *Currently, there are about 550 non-native plant species in Lithuania, of which about 20 species are invasive and > 60 non-native species are potentially invasive, which can cause serious ecological problems.*

Sosnowsky's hogweed

(Heracleum sosnowskyi)

A plant originated from the Caucasus. In the 1950s in Lithuania was intended to grow as a fodder. Later it was widely distributed by florists and beekeepers, and then it began to spontaneously spread. It is dangerous to human health - juices cause skin burns. Extremely hazardous to children. It completely replaces habitats and is very hard to control spread.

Experimental site

- Field experiments, designed to compare the efficacy of different herbicide mixtures used to control Heracleum sosnowskyi, were conducted in 2017–2018 in Lithuania, Marijampolė district, Varnupiai (coordinates 54° 29’ 19.54” north latitude, 23° 30’ 45.9” east longitude).
- The soil at the experimental site was classified as Calc(ar)i-Endohypogleyic Luvisol (Drainic), according to the WRB 2014.

Treatments of the experiment:

1. **Fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1}** (Tomigan® 180 EC 2 l ha^{-1} + Accurate ® 200 WG 20 g ha^{-1}),
2. **Fluroxypyr 360 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1}** (Tomigan® 180 EC 2 l ha^{-1} + Nuance® 75 WG 10 g ha^{-1}),
3. **Fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1}** (Tomigan® 180 EC 2 l ha^{-1} + Accurate® 200 WG 20 g ha^{-1} + Nuance® 75 WG 10 g ha^{-1}).
4. **Metsulfuron-methyl 4.0 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1}** (Accurate® 200 WG 20 g ha^{-1} + Nuance® 75 WG 10 g ha^{-1}),
5. **Metsulfuron-methyl 6.0 g ha^{-1} + tribenuron-methyl 11.3 g ha^{-1}** (Accurate® 200 WG 30 g ha^{-1} + Nuance® 75 WG 15 g ha^{-1}).

Experiment carried out in three replications. The area of one experimental plot was 18 m^2 (6 x 3 m).

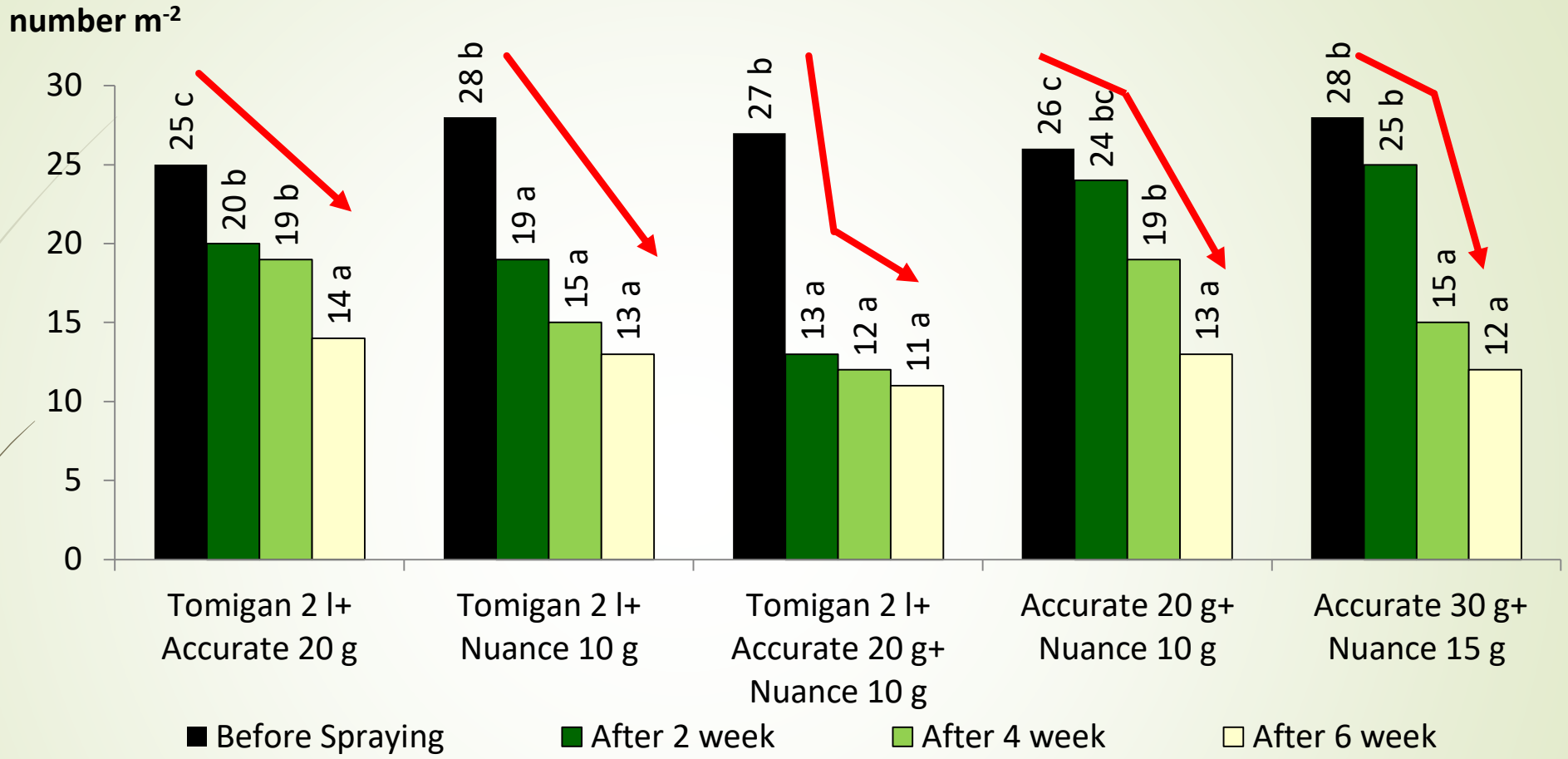


Fig.1. Effect of herbicide Tomigan® 180 EC, Accurate® 200 WG, Nuance® 75 WG mixtures on plants density of Sosnowsky's hogweed, 2017

Note: Values followed by different letters are significantly different ($P \leq 0.05$) based on Fisher's least significant difference (LSD) test

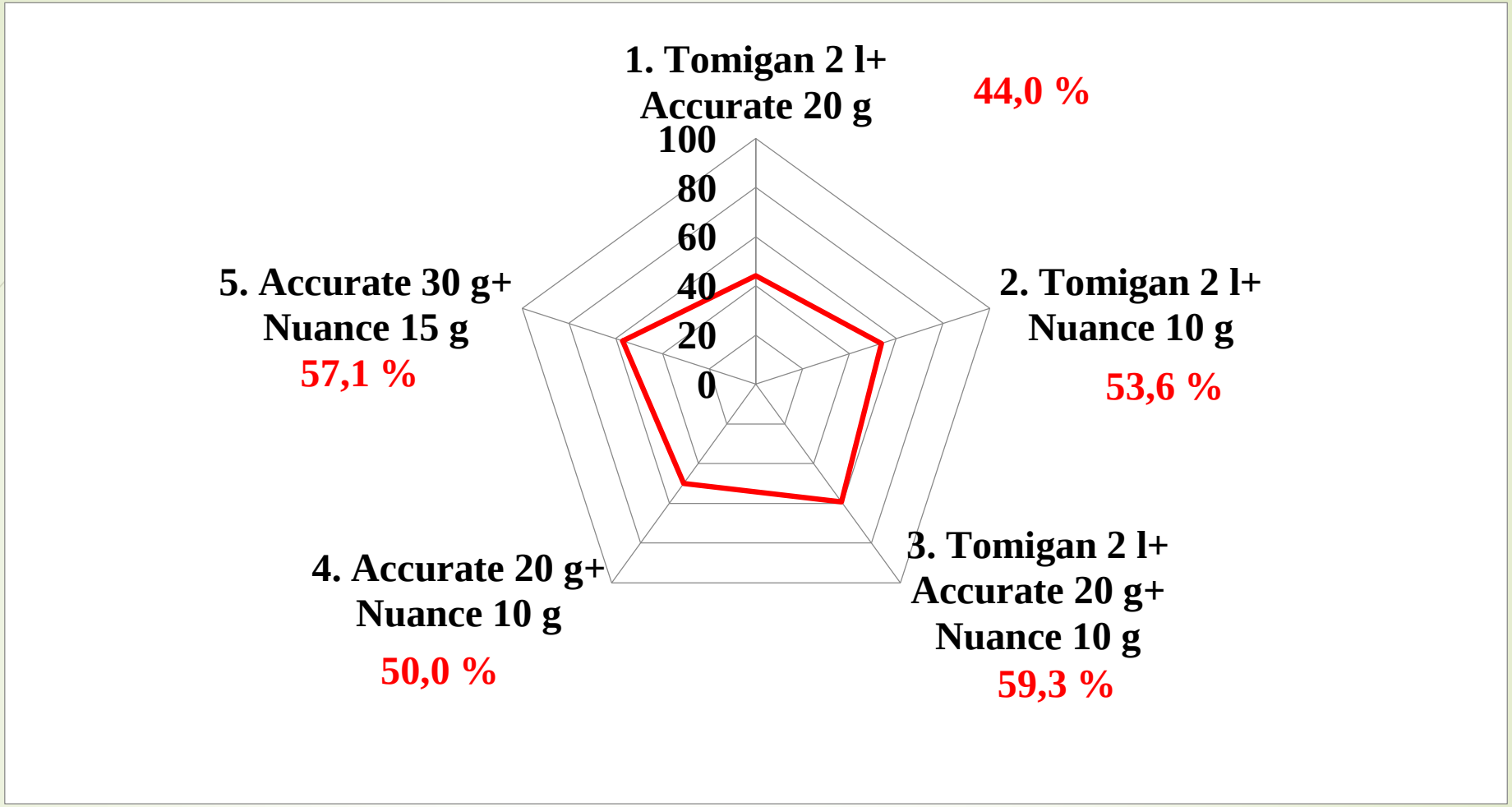


Fig 2. Effectiveness of herbicide Tomigan® 180 EC, Accurate® 200 WG, Nuance® 75 WG mixtures on Sosnowsky's hogweed after 6 week, 2017

2 week after spraying

6 week after spraying

1. Tomigan® 180 EC 2 l ha^{-1} + Accurate® 200 WG 20 g ha^{-1}
   (fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1})

2 week after spraying

6 week after spraying

2. Tomigan® 180 EC 2 l ha^{-1} + Nuance® 75 WG 10 g ha^{-1}
(fluroxypyr 360 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1})

2 week after spraying

6 week after spraying

3. Tomigan® 180 EC 2 l ha^{-1} + Accurate® 200 WG 20 g ha^{-1} + Nuance® 75 WG 10 g ha^{-1} (**fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1}**)

2 week after spraying

6 week after spraying

4. Accurate® 200 WG 20 g ha^{-1} + Nuance® 75 WG 10 g ha^{-1}
(metsulfuron-methyl 4.0 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1})

2 week after spraying

6 week after spraying

5. Accurate® 200 WG 30 g ha^{-1} + Nuance® 75 WG 15 g ha^{-1}
(metsulfuron-methyl 6.0 g ha^{-1} + tribenuron-methyl 11.3 g ha^{-1})

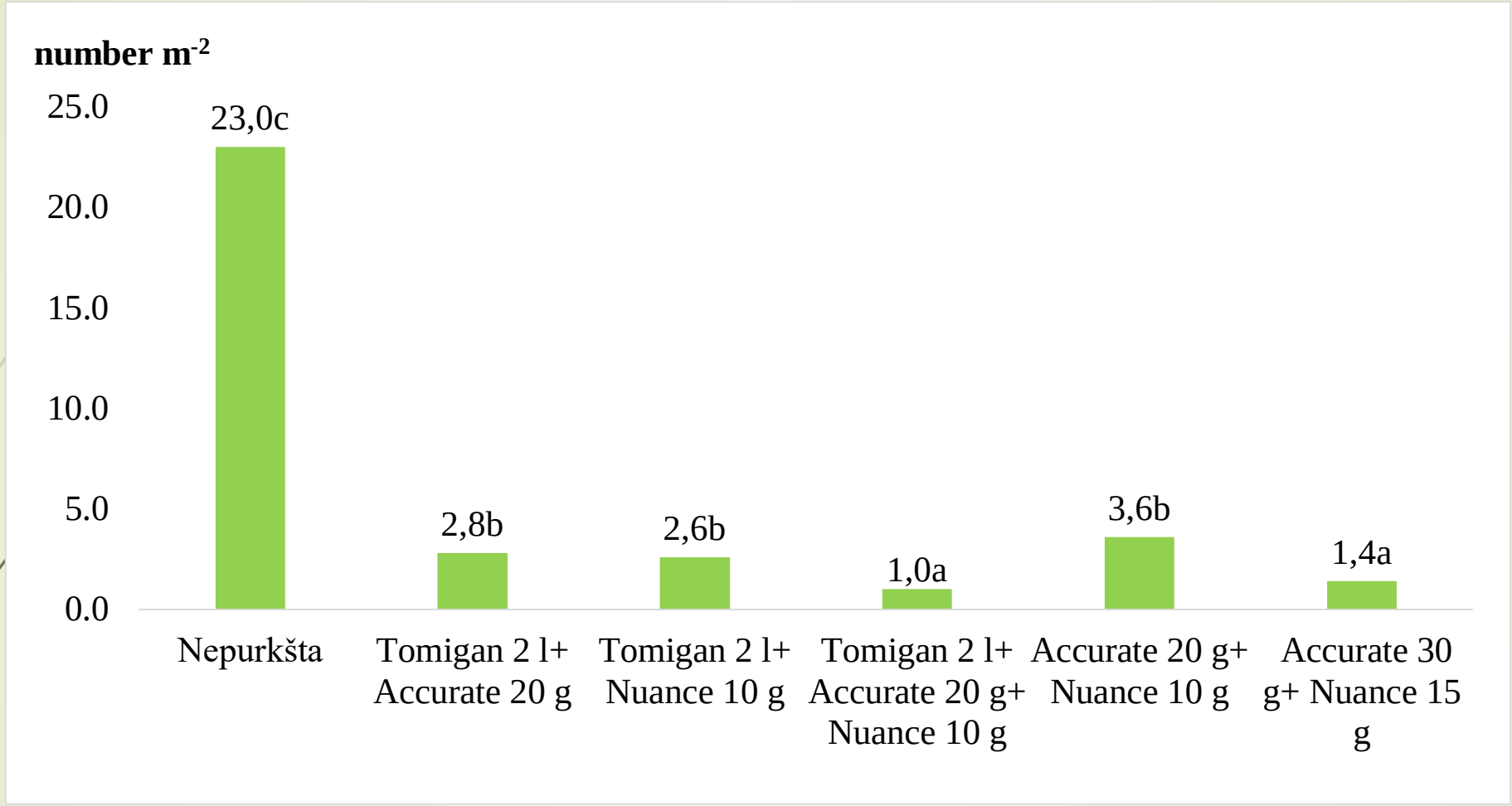


Fig.3. Effect of herbicide Tomigan® 180 EC, Accurate® 200 WG, Nuance® 75 WG mixtures on plants density of Sosnowsky's hogweed, 2018

Note: Values followed by different letters are significantly different ($P \leq 0.05$) based on Fisher's least significant difference (LSD) test

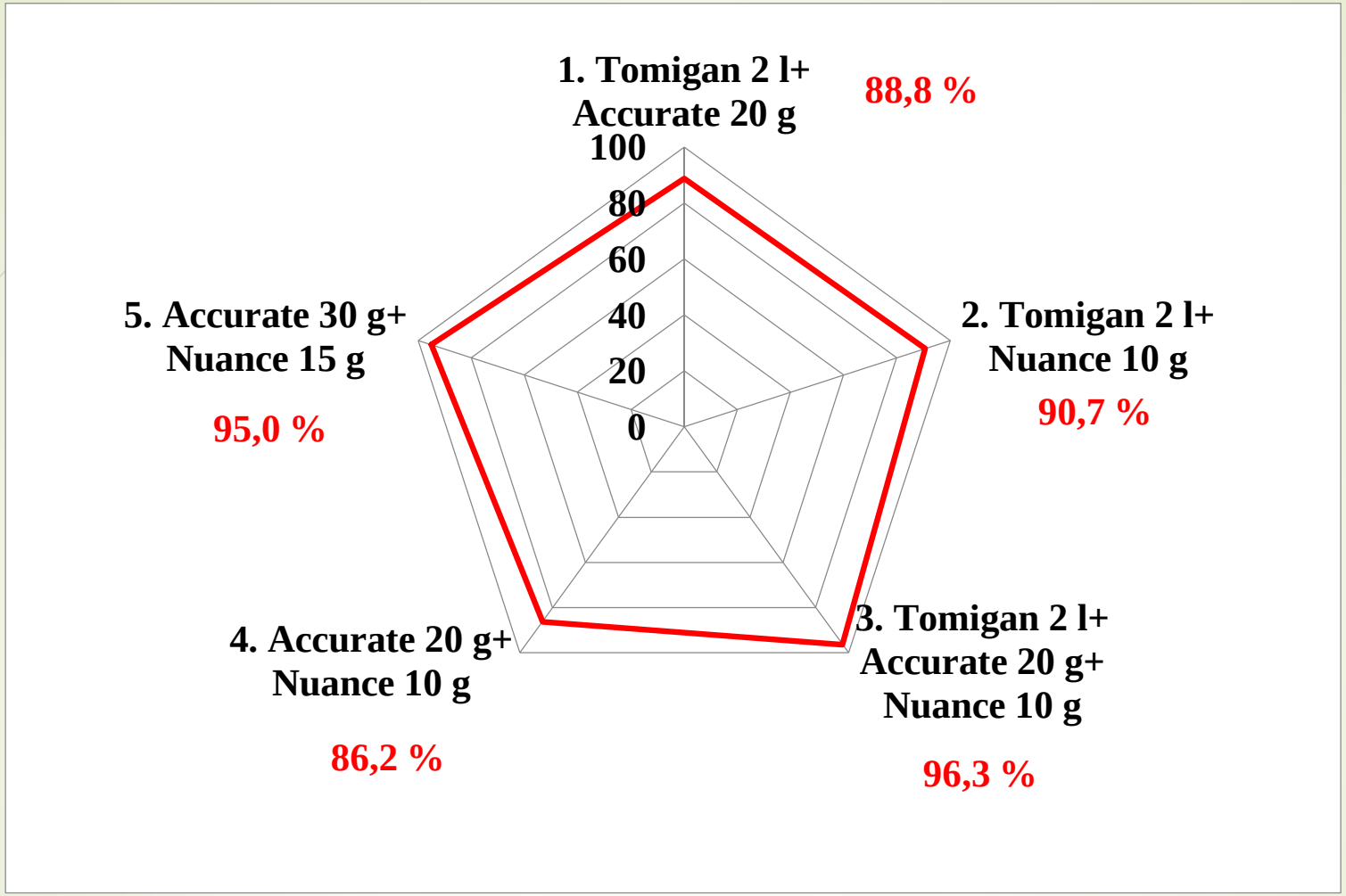
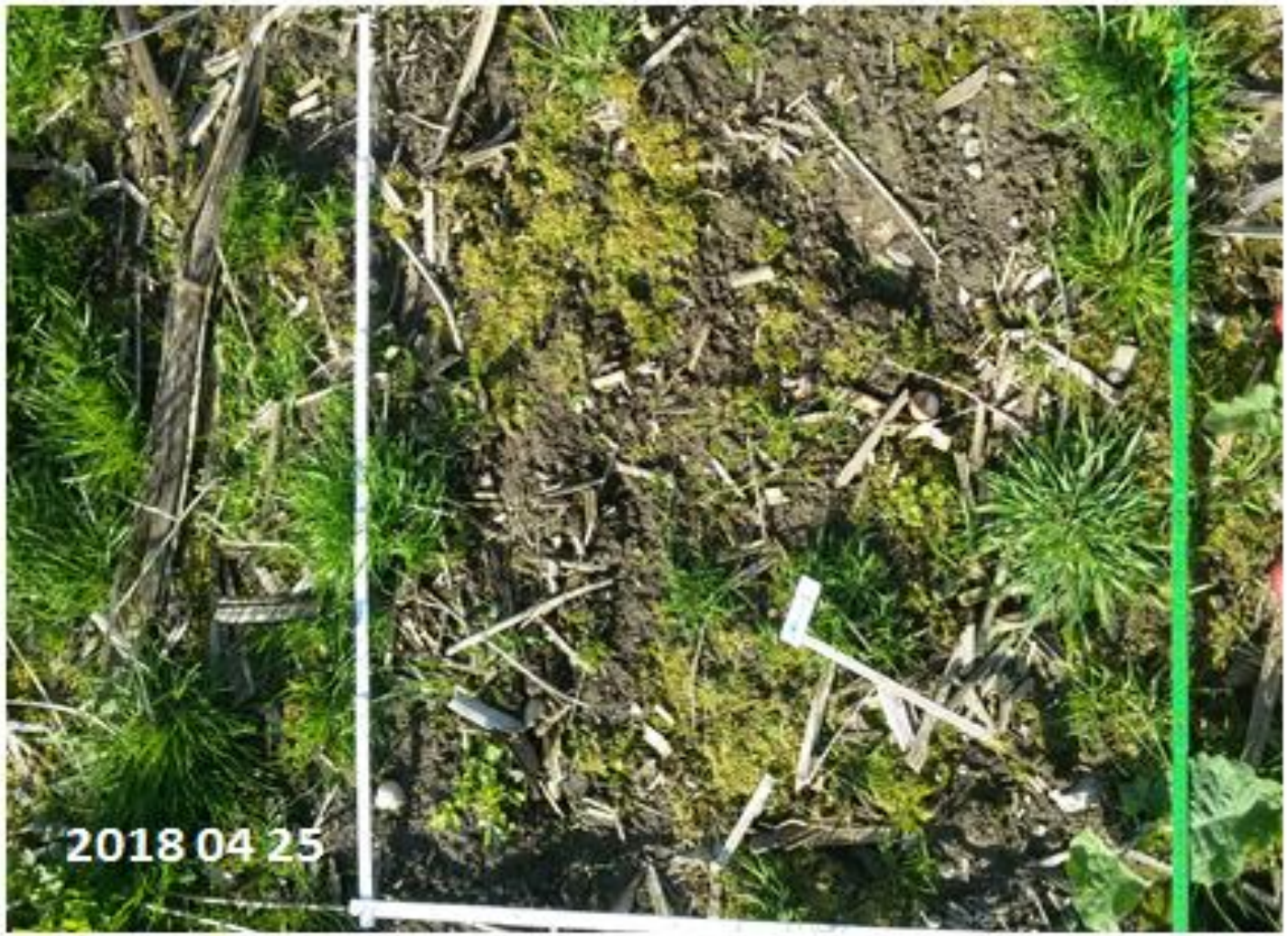


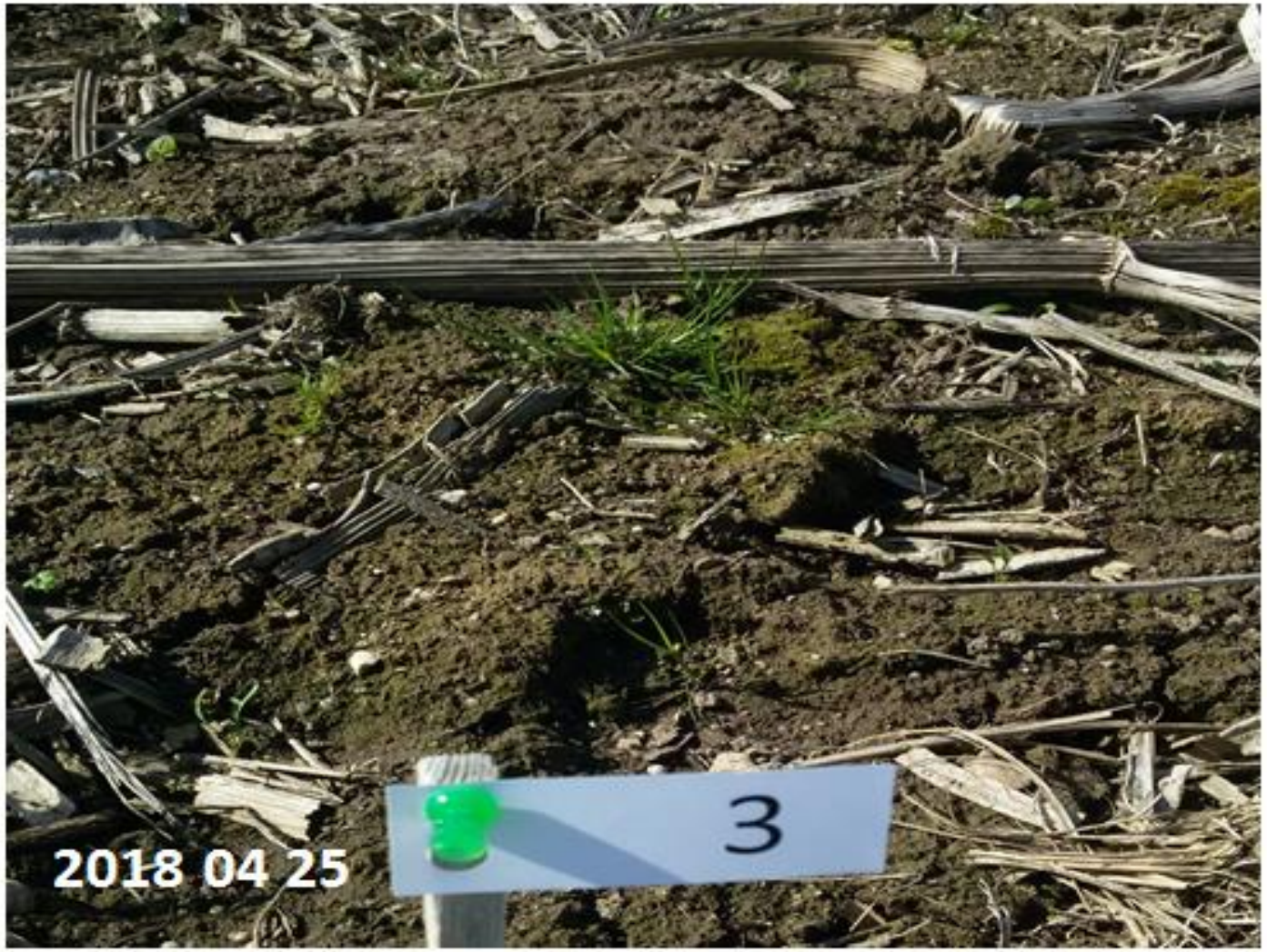
Fig 2. Effectiveness of herbicide Tomigan® 180 EC, Accurate® 200 WG, Nuance® 75 WG mixtures on Sosnowsky's hogweed in spring, 2018

Without spraying, in spring



1. Tomigan® 180 EC 2 l ha^{-1} + Accurate® 200 WG 20 g ha^{-1}
(fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g)

2. Tomigan® 180 EC 2 l ha^{-1} + Nuance® 75 WG 10 g ha^{-1}
(fluroxypyr 360 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1})



3. Tomigan® 180 EC 2 l ha^{-1} + Accurate® 200 WG 20 g ha^{-1} + Nuance® 75 WG 10 g ha^{-1}
(fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1})

4. Accurate® 200 WG 20 g ha^{-1} + Nuance® 75 WG 10 g ha^{-1}
(metsulfuron-methyl 4.0 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1})

5. Accurate® 200 WG 30 g ha^{-1} + Nuance® 75 WG 15 g ha^{-1}
(metsulfuron-methyl 6.0 g ha^{-1} + tribenuron-methyl 11.3 g ha^{-1})

Conclusions

- Significant control (reduction of hogweed stands by 1.3 and 1.5 fold) was also identified with mixtures of fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1} and fluroxypyr 360 g ha^{-1} + tribenuron-methyl 7,5 g ha^{-1}. A mixture of metsulfuron-methyl + tribenuron-methyl at both lower and higher rates substantially reduced the amount of Sosnowsky's hogweed plants at four weeks after spraying.
- Six weeks later, the efficacy of herbicide mixtures ranged from 44 percent with fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1} to 59.3 percent with fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1}.
- In the spring of 2018, control was evaluated and the plant stand in infested fields sprayed with herbicide mixtures fluctuated from 1.0 to 3.6 plants/m^2 and was significant lower (by 6.4 to 23.0 fold) in contrast to control fields that were not treated. Herbicide efficacy observed was as high as 86.2–96.2 %.
- Most efficacious herbicide mixtures included fluroxypyr 360 g ha^{-1} + metsulfuron-methyl 4.0 g ha^{-1} + tribenuron-methyl 7.5 g ha^{-1} and metsulfuron-methyl 6.0 g ha^{-1} + tribenuron-methyl 11.3 g ha^{-1}.