UNIVERSITEIT GENT

FACULTEIT BIO-INGENIEURSWETENSCHAPPEN

Determination of phytotoxicity of adjuvants used in crop protection

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Introduction

adjuvant is defined as a substance, other than water, which is not in itself a pesticide, but which is intended to enhance the effectiveness of the pesticide with which it is used. Hence, adjuvants are not supposed to regulate plant growth by themselves. The possible plant growth regulatory effects of adjuvants have been analysed with the Phytotestkit microbiotest technology on several types of representative adjuvants, both separate and in combination with the herbicide propyzamid (trade name: Kerb).

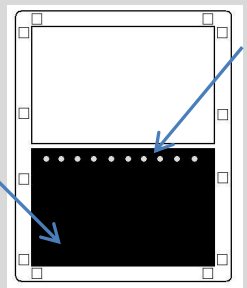
Materials & methods

1. Foam layer
2. Absorbing paper layer
3. Black filter paper
4. 20 ml of (herbicide-) adjuvant solution

Herbicide: propyzamid (trade name: Kerb, dose: 0.025 g/l)

Adjuvant dose: 1g/l

Test plate



10 seeds:
Sorghum saccharatum
Sinapis alba
Lepidium sativum

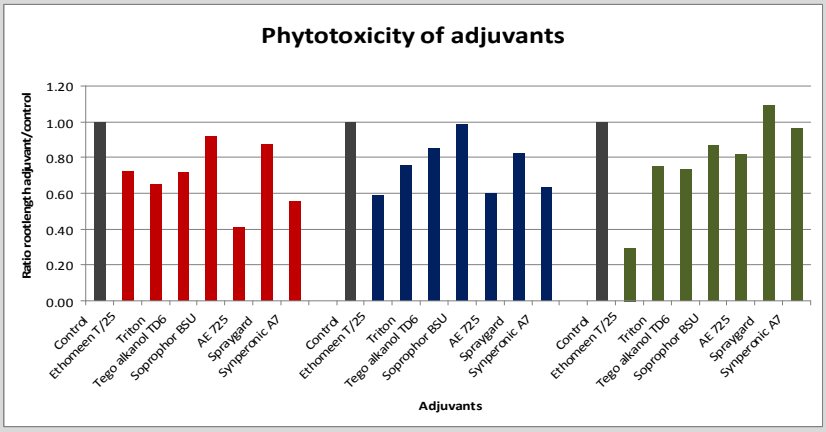
3 replicates per plant species

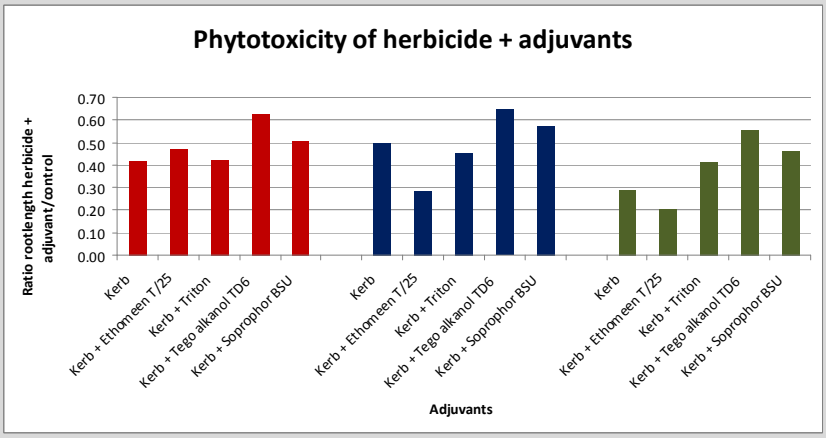
3 days incubation at 25°C

Test plate with germinated seeds

Measurement of root length by digital image analysis + count of germination percentage

Results & discussion





No significant differences in germination percentage were recorded over the different treatments.

The ratios of the root length of the germinated seeds in the sets with adjuvants, versus those in the controls are shown graphically in bars: red bars for *Sorghum saccharatum*, blue bars for *Sinapis alba* and green bars for *Lepidium sativum*.

By comparing the root lengths of germinated seeds, it was possible to detect statistically significant differences between the root lengths of seeds treated with different adjuvants, despite the high variability in root lengths between individual seeds within the same treatment. The effect of adjuvants is quite comparable over the different plant species, although a few exceptions can be noted.

No synergistical phytotoxic effects between adjuvants and the herbicide Kerb could be noted. One adjuvant showed additive phytotoxic effects (tallow alkyl amine ethoxylate) in two plant species, while all other adjuvants did not show any additional toxic effects when combined with propyzamid. Some adjuvants even lowered the toxicity of the herbicide.

Normally, adjuvants are used to increase adhesion and retention of pesticides on the leaves and to improve the spread over the leaves. In the Phytotoxkit test setup, the leaves of the germinated plants are not treated with the adjuvant/herbicide mixture, which might explain the lack of synergistical effects.

Conclusion

The Phytotestkit microbiotest assays revealed that adjuvants have a significant phytotoxic effect on the root growth of germinated seeds. No synergistic effects could, however, be noted when the adjuvants were combined with a herbicide.

The Phytotestkit microbiotest technology proved to be a suitable tool for rapid detection of the phytotoxicity of adjuvants.