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INTRODUCTION

Insect infestation is a major problem in grain storage where the preservation and availability of harvested grain for consumption and processing have to be guaranteed. The efficacy performance of the plant polyphenolic extract developed and patented by Groupe Berkem was evaluated in laboratory and in a field station against grain pests on stored wheat grains.

LABORATORY TRIAL

MATERIALS & METHODS

• Test insects:



Wheat weevil (adult) - *Sitophilus granarius*



Mediterranean flour moth (larvae) *Ephestia kuehniella*



Confused flour beetle (adult) *Tribolium confusum*

- **Treatments** (4 replicates): Plant polyphenolic extract from Berkem Biosolutions® - Untreated control
- 100g of infested wheat grains per treatment and per test insect
- Test insects were introduced onto grains before treatment
- **Test duration:** 15 days

RESULTS

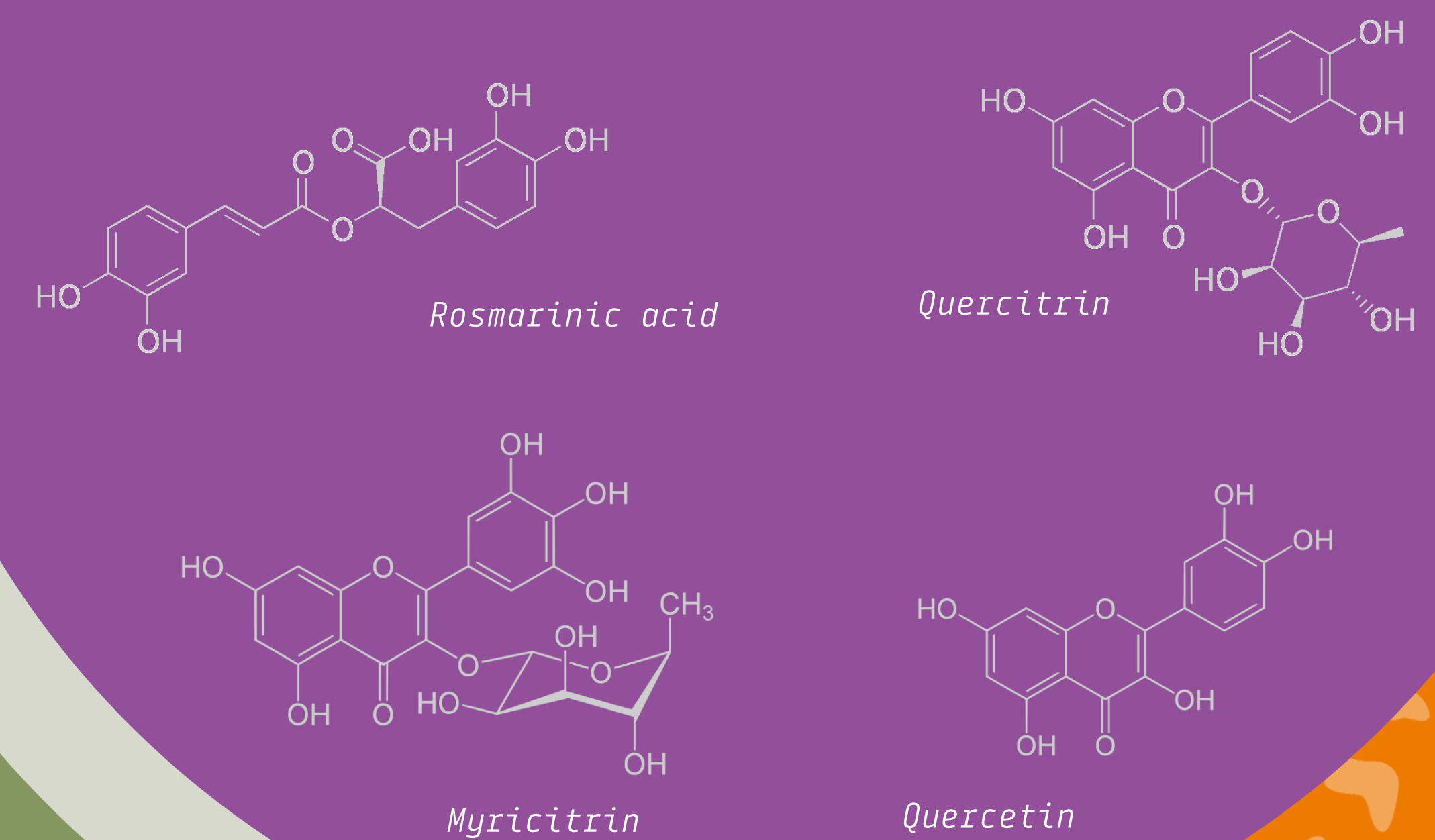
- 1 day after exposure, **100% mortality** for all test insects
- 15 days after exposure, 6% natural mortality in untreated controls

Grains 15 days after application of the plant polyphenolic extract



PLANT POLYPHENOLIC EXTRACT FROM BERKEM BIOSOLUTIONS®

Plant polyphenolic extract flavonoid-based obtained with the unique and original hydroalcoholic extraction developed by Groupe Berkem for the insecticidal treatment of stored wheat grain



FIELD TRIAL

MATERIALS

&

METHODS

- Test insect: Wheat weevil (adults) *Sitophilus granarius*
- Barley (*Hordeum vulgare*)
- **Controlled conditions** (mean): 17°C, 64% RH
- 3 different treatments:
 - Polyphenolic extract from Berkem Biosolutions®
 - Concentration: 1L/100kg of grains
 - Reference product 80g/L cypermethrin
 - Concentration: 25mL/100kg of grains
 - Untreated control

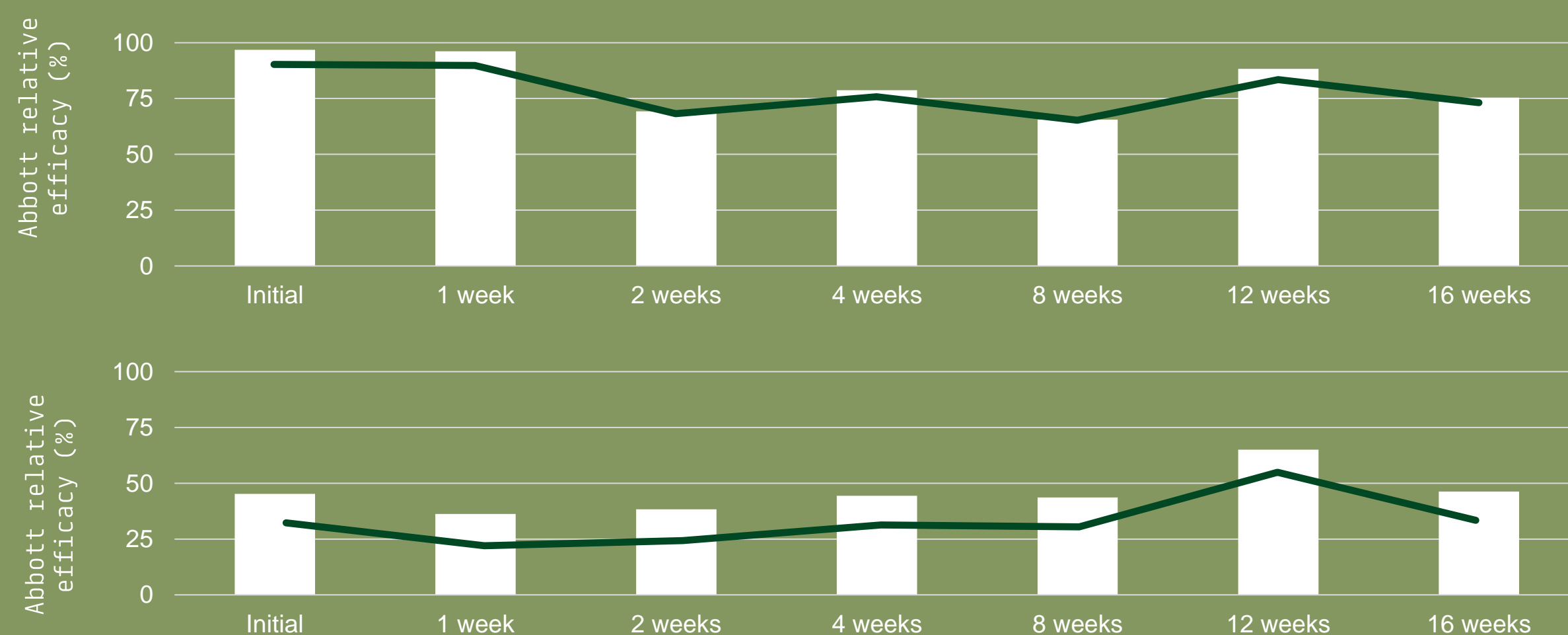
1. Product application on 50kg of grains (cement mixer)
2. 250 to 500 g of grains treated at several times: t0, 1, 2, 4, 8, 12, 16 weeks. Each sample is splitted into three parts
3. Insects are deposited on each part and monitored 2, 7 and 14 days after exposure
4. After being treated, the insects are either directly analyzed, either put on untreated grain during 7 days before being analyzed.

RESULTS

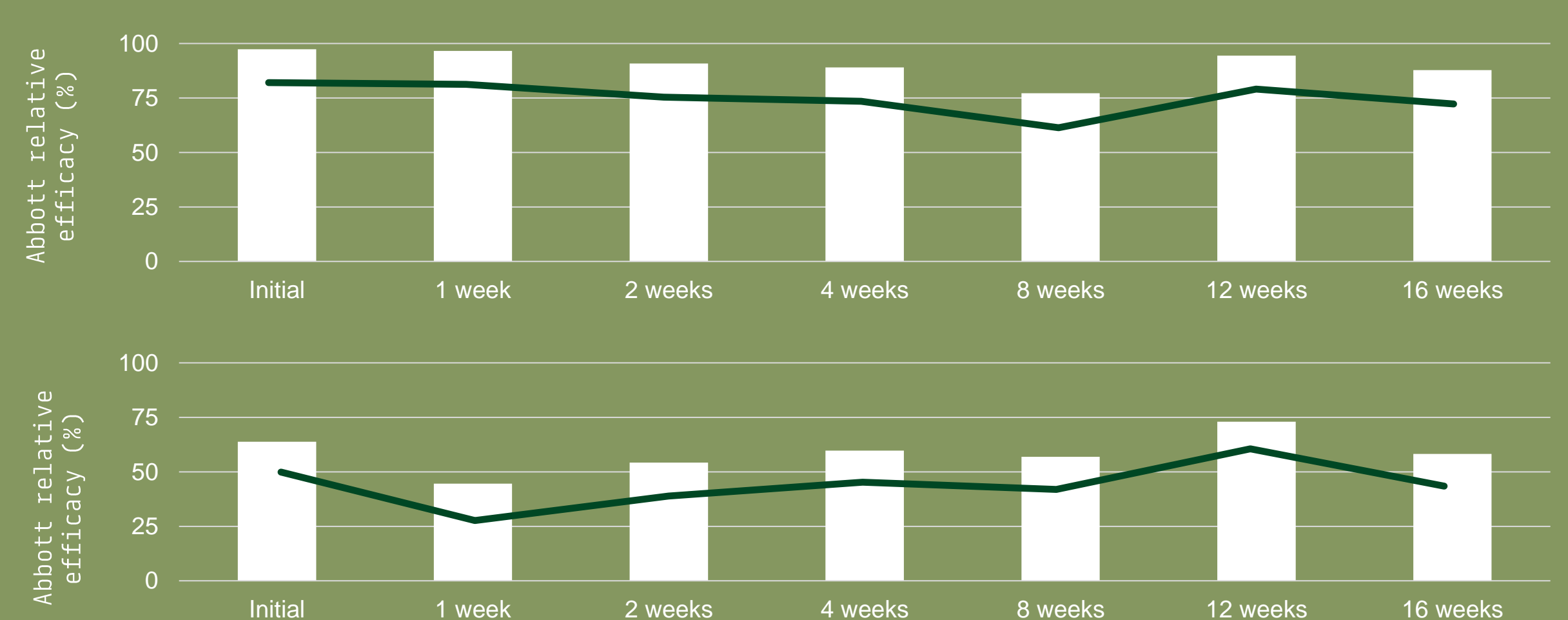
The relative efficacy of each treatment is measured with Abbott's formula

$$\text{Abbott efficacy} = \left(1 - \frac{\text{Number of alive insects after treatment}}{\text{Number of alive insects in the untreated control}}\right) \times 100$$

INSECTS DIRECTLY ANALYZED



INSECTS DEPOSITED ON GRAINS DURING 7 DAYS AND THEN ANALYZED



AT THE END, THE GERMINATION RATE IS THE SAME FOR BOTH TREATED AND UNTREATED GRAINS (88-89%)

CONCLUSION

This work reported the high potential of the plant polyphenolic extract from Berkem Biosolutions® as bio-based grain protectant that can be used in combination with non-chemical or other biocontrol alternatives. In lab, all test insects showed 100% mortality. On field, mean mortality of the test insects is about 57-60% (maximum 76%). The treatment has not impacted the grain germination.