

## Introduction

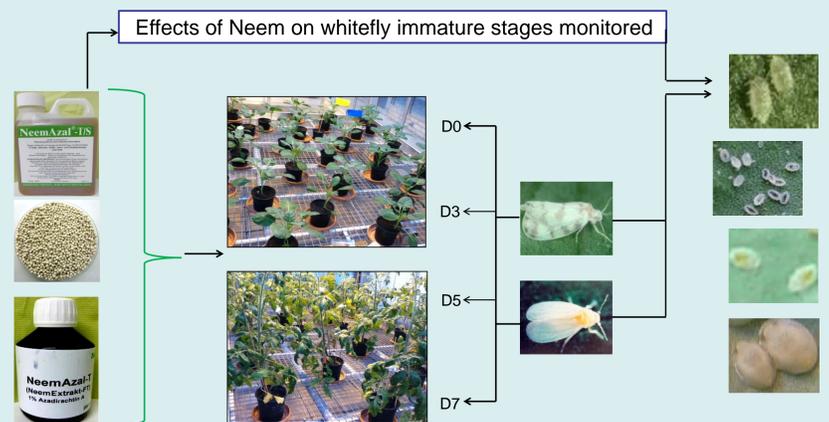
Whiteflies are one of the most important pests worldwide. Fast developing resistance against synthetic pesticides makes control more difficult. Biocontrol e.g. with parasitoids, can be successful in some crops in case of *Trialeurodes vaporariorum* but not with *Aleyrodes proletella*. Therefore there is a growing interest for efficient pesticides of natural origin (“bio-pesticides”) such as Neem.

A major disadvantage is that most of the Neem products in the market are formulated for foliar applications since they are prone to UV degradation affecting bioactivity. Moreover they can be harmful to natural enemies in case of direct contact. An application of Neem to the soil and subsequent systemic distribution could help to overcome these problems. However, new formulations are needed which provide high and long-term supply in the root system without detrimental side effects.

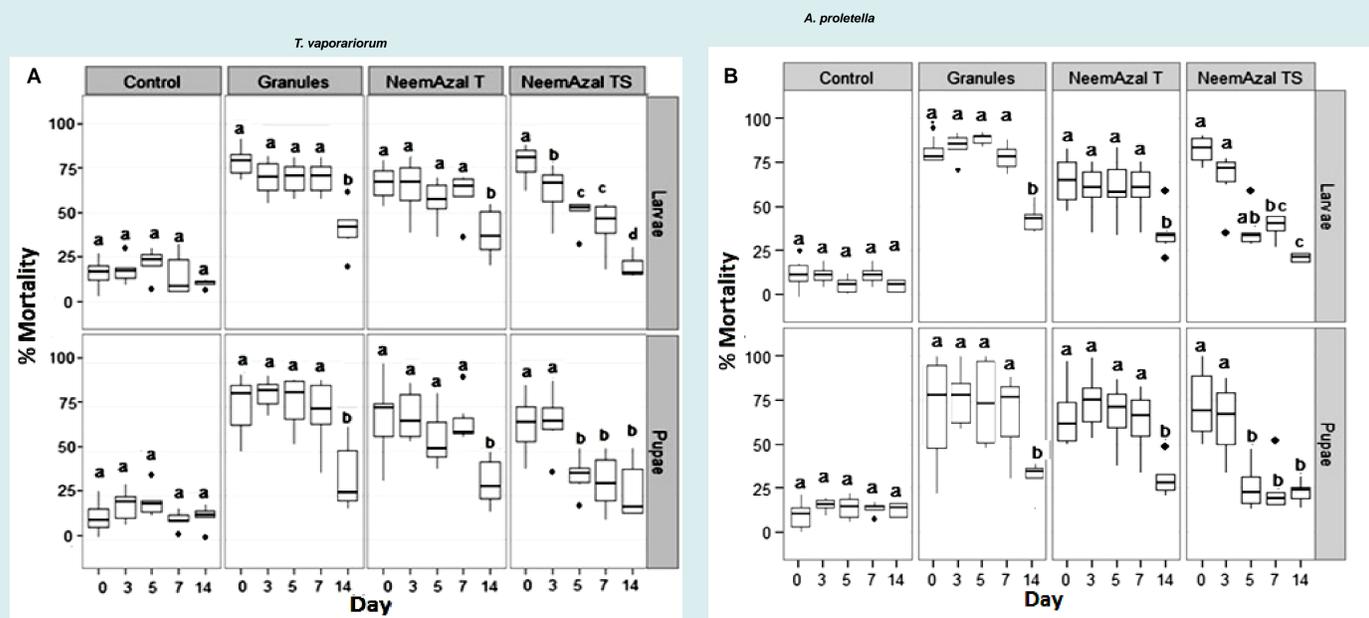
This study evaluated the efficacy and persistence of special “soil formulations” of NeemAzal (Trifolio-M) for the control of *A. proletella* on Brussels sprouts and *T. vaporariorum* on tomatoes.

## Materials and methods

- Three Neem formulations were tested:
  - NeemAzal granules (7 % Azadirachtin) mixed with the soil at 150 mg/kg soil.
  - NeemAzal-T (1 % Azadirachtin), a water-based formulation, drenched to the substrate at 1 ml/kg of soil.
  - NeemAzal-T/S (1 % Azadirachtin), a registered oil formulation, sprayed on the plant at a rate of 0.5 % compound solution.
- Five whitefly females were allowed to deposit eggs 24 hours on the underside of leaves 0, 3, 5, 7, 14 days after treatments.
- Subsequent development of F1 stages was monitored to calculate stage specific mortality rates.



## Results



Mortality (%) of immature stages (larvae and pupae) of (A) *Aleyrodes proletella* (B) *Trialeurodes vaporariorum* caused by three NeemAzal formulations at company recommended rates (granules: 10.5mg AZA per kg of soil; NeemAzal-T: 10mg AZA per kg of soil; NeemAzal T/S: 10mg AZA per kg of soil). Plants were infested with whiteflies at zero (D0), three (D3), five (D5), seven (D7) or fourteen (D14) days after treatment. Different letters within each panel indicate significant differences among the days at a multiple type I error level of 5% (quasi-binomial GLM, Tukey's pairwise mean comparisons).

- Foliar treatment: Efficacy decreased with time, only effective when whiteflies were exposed to fresh residues
- Soil treatments were more persistent in general compared to foliar treatments,, attaining > 50% mortality up to 7d.a.t.
- Granular formulation lead to longest control with consistently >60% mortality of Whiteflies immature stages for both species.

## Conclusion

- NeemAzal can efficiently control immature stages of *A. proletella* and *T. vaporariorum* on cabbage and tomato respectively.
- Topical application of oil formulated NeemAzal TS gives high initial efficiency, but the fast decrease in bioactivity, most likely due to degradation of the residues, requires multiple treatments in short time intervals to achieve sufficient long-term control.
- High initial efficacy and long persistence of soil applied formulations indicate fast uptake and systemic translocation of active ingredients in the plant. Moreover the dispensation of oil from the formulation of NeemAzal prevents any damage of the root system.
- Soil applied NeemAzal is slower degraded compared to the foliar residues. In particular the granular formulation shows most intensive control and persistence indicating a kind of slow release mechanism from the continuously dissolving granules.