

Weed management strategies with *Picea abies* L. sawmill by-products



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1. Introduction

Weeds can cause a significant impact on agriculture and require effective management; however, traditional control measures can lead to serious environmental damage. Considering the need and demand for more sustainable use of pesticides in Europe, regenerative natural solutions are gaining much attention, especially the possibilities for by-product usage.

➔ **Objectives:** The main aim is to develop weed control tools through the use of *Picea abies* L. bark and sawdust, among the main sawmill by-products.

2. Materials and methods

The phytotoxicity of spruce bark and sawdust aqueous extracts (from 0 to 100% v/v concentration) on the **germination** and **root growth** of two weeds *Abutilon theophrasti* Medik. (ABUTH), *Lolium rigidum* Gaudin (LOLRI) and two crops *Triticum aestivum* L. (TRZAX) and *Sinapis alba* L. (SINAL), was evaluated by a germination test in **Petri dishes**.

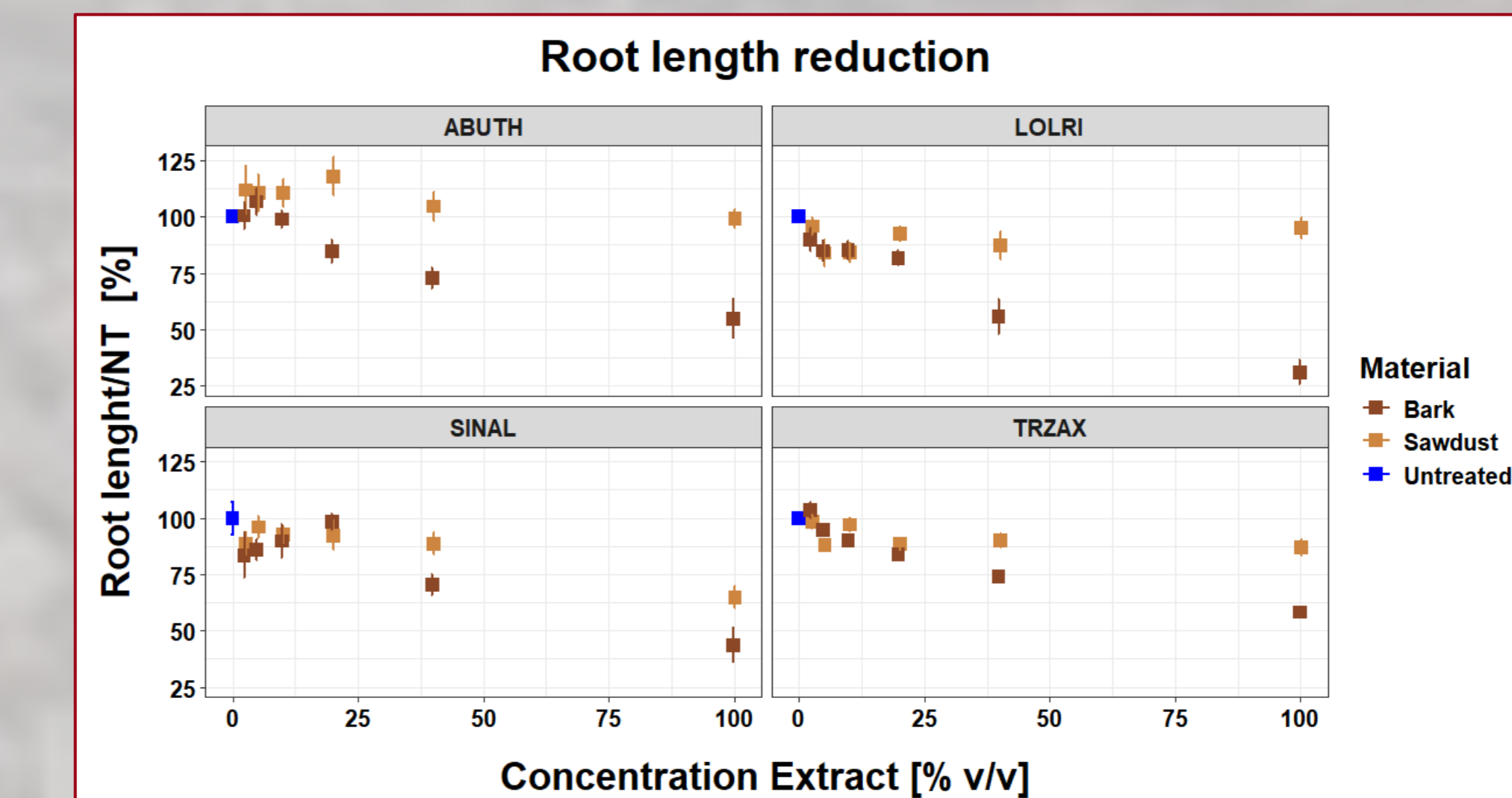


Additionally, **seedling emergence tests** were carried out in **pots** in the **greenhouse** to assess the effectiveness of sawdust and bark as mulches, as well as their phytotoxicity when incorporated into the soil at three varying doses. For this experiment, *Amaranthus retroflexus* (AMARE) and *Glycine max* (GLXMA) were included in addition to the species used in the Petri test.



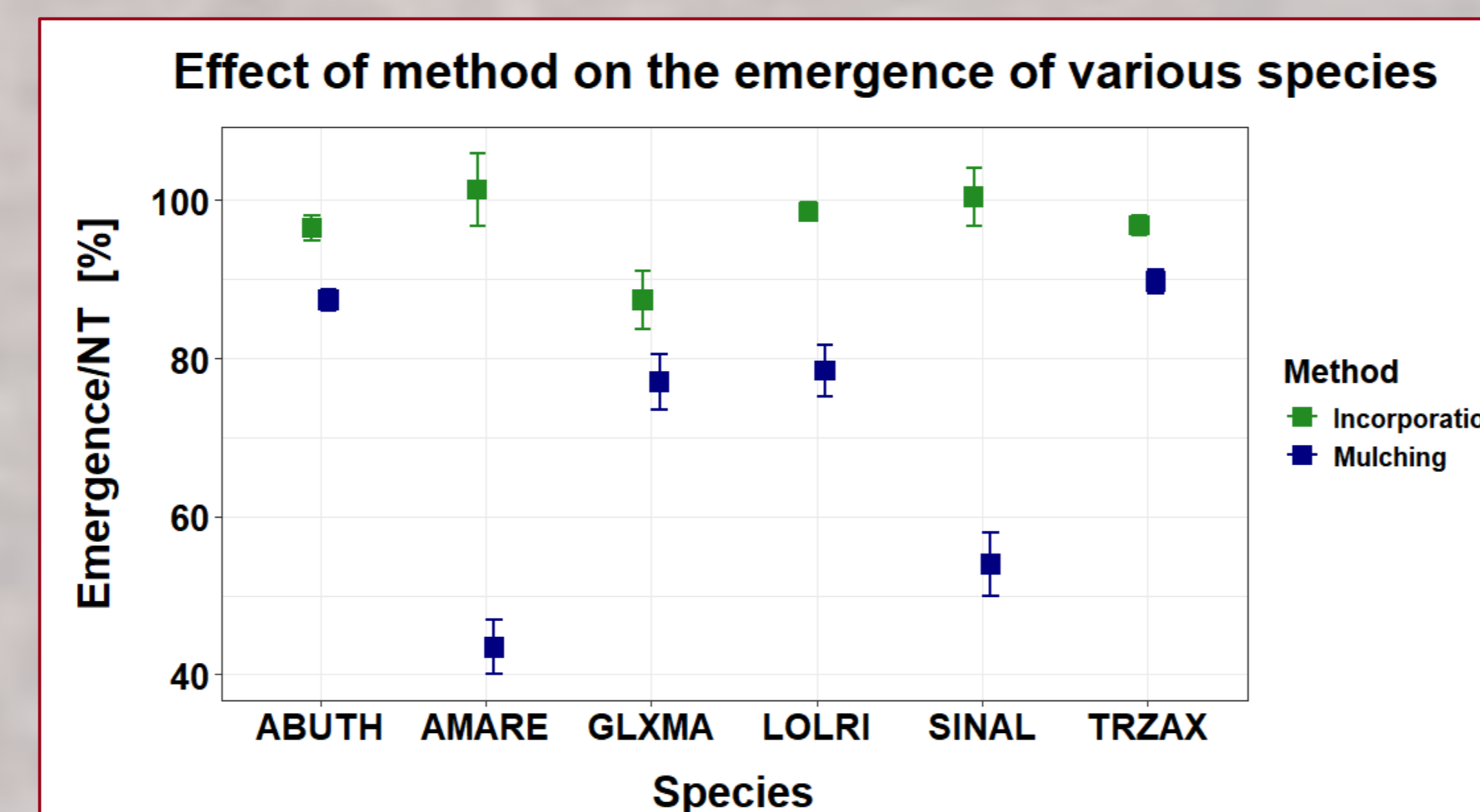
3. Results

In the Petri test no relevant effect on germination was observed. **Regarding root elongation, bark extract was more effective than the sawdust one**, particularly at the highest extract concentration (100 % v/v), reaching root length reduction from 41.8 to 69 % for all species.

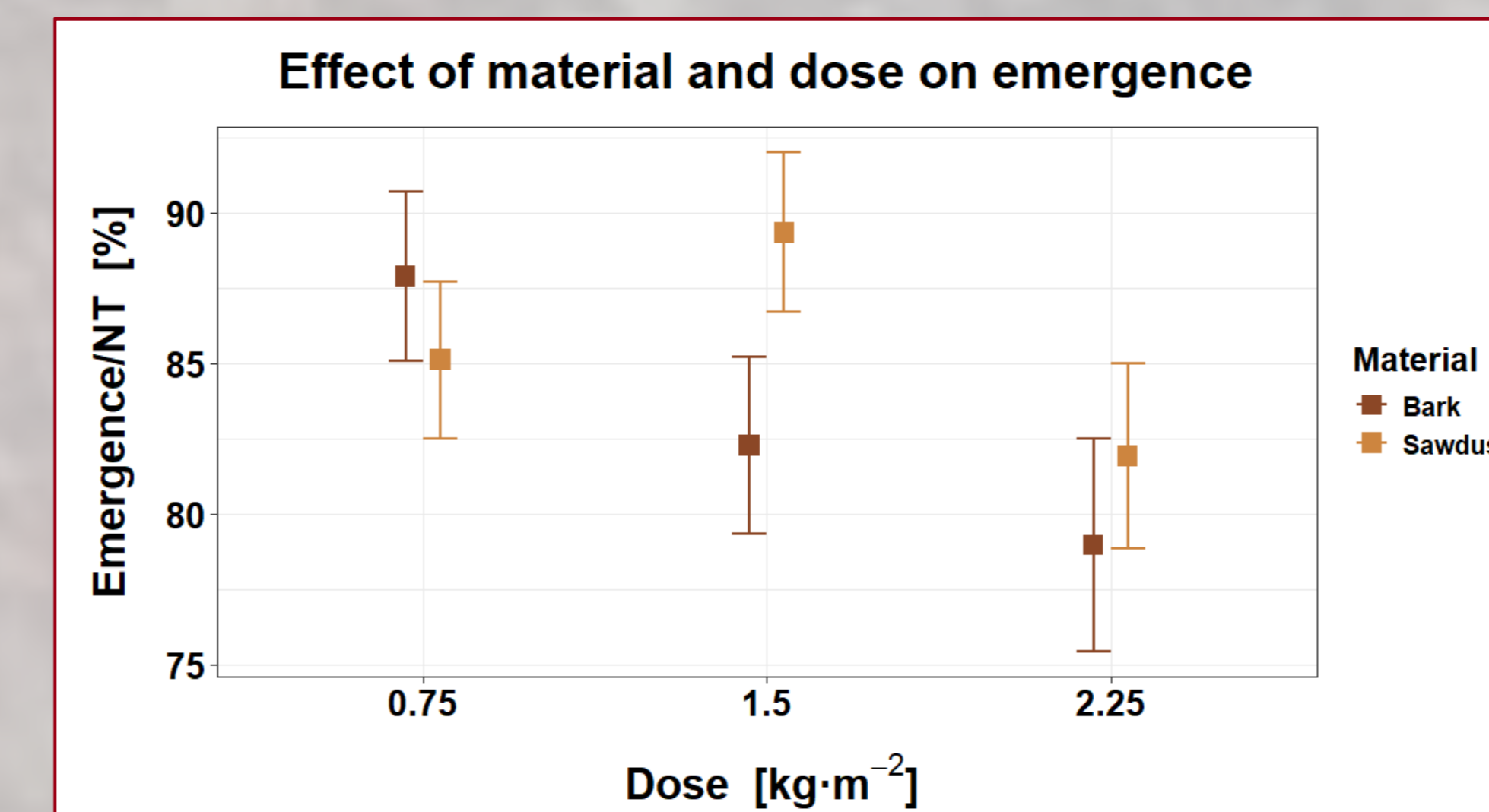


Root length (expressed as percentage on untreated) at different concentrations

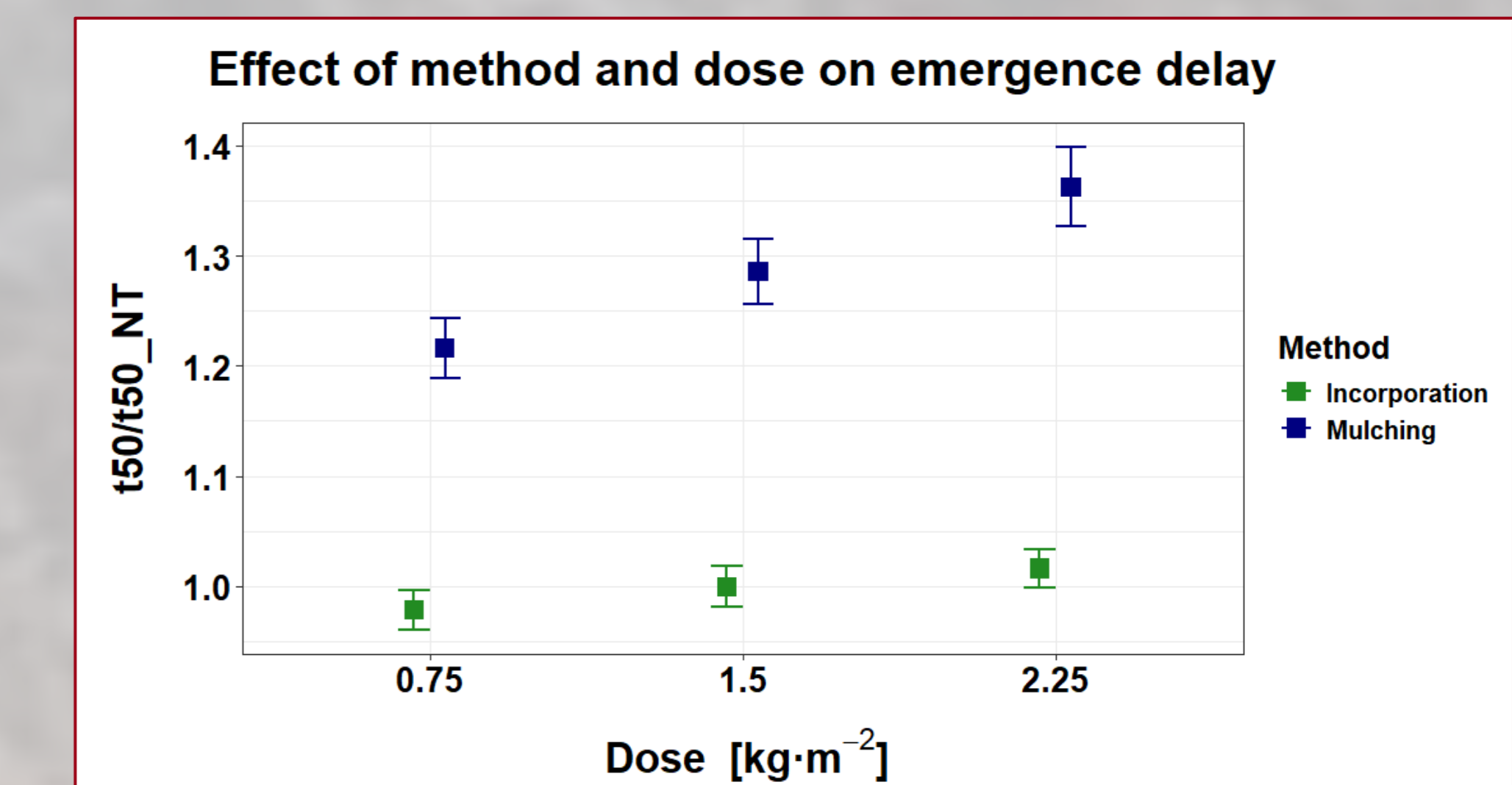
In the greenhouse trial **bark and sawdust mulching effectively reduced emergence in AMARE, SINAL and LOLRI**. A reduction in emergence was noted at the higher dose of bark (2.25 kg·m⁻²). In contrast to the sawmill by-products incorporation in the soil, mulching delayed emergence of all species in a dose-dependent way.



Final emergence (expressed as percentage on untreated) with incorporation or mulching



Final emergence (expressed as percentage on untreated) with different doses



Achievement of 50% emergence with mulching and incorporation

4. Conclusions

Aqueous extracts of bark and sawdust did not give satisfactory results, but the presence of phytotoxic compounds in the bark extract is suspected given the observed inhibitory effect on root elongation. Furthermore, results show that seedling emergence inhibition due to mulching appears to be mainly physical. As a regenerative solution, **the use of sawmill by-products as mulch seems to be the most viable tool for sustainable weed control**, and an increase in its use is desirable.