

The Allelopathically Effect of Grain Legume and Winter Rye Intercrops Biomass Extracts on Radish Germinations and Shoots Growth

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INTRODUCTION

As a good strategy for competition between crops, allelopathy can clarify the compatibility of crop species and the appropriate sequence of different crops cultivation.

The study aims to understand the effects of extract concentration on radish seed germination and root growth and how they influence plant communities in intercropping.

METHODS

The effects of the grain legumes pea and chickpea as well as winter rye on radish was investigated seed germination and root growth. **Radish** (*Raphanus sativus*) was selected as the recipient plant, donor plants where the grain **legumes pea** (*Pisum sativa* L.), chickpea (*Cicer arietinum*) and **winter rye** (*Secale cereale*), which were grown as pure and intercrops (Fig. 1, 2).

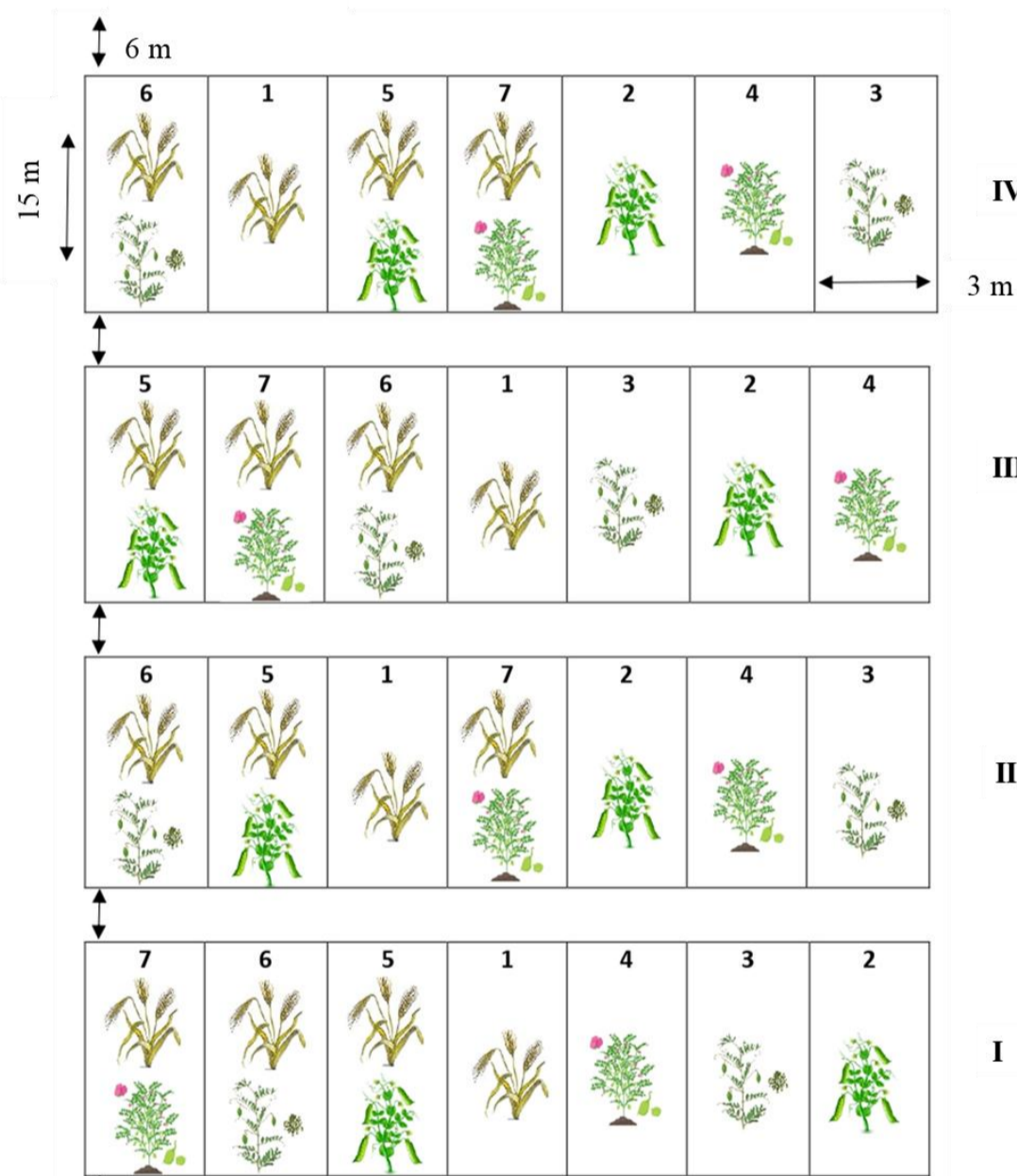


Fig. 1 Experiment scheme.



Fig. 2 Intercropped legume and winter rye.

Aqueous extracts were prepared from shoot samples of the donor plants of the grain legumes before flowering. The extracts were prepared, and the liquid was used as the starting aqueous extract. Each type of starting aqueous extract was diluted with distilled water to concentrations: 25, 50, 75 stored at 4 °C until and during use.



Fig. 3 Seeds germination in the incubator.



Fig. 4 Root length measurement

RESULTS

The highest impact was observed by 75 % of the aqueous extracts (except the pea extract). All concentrations of pure chickpea aqueous extracts had a positive effect on radish seed inhibition (Fig. 5, 6).

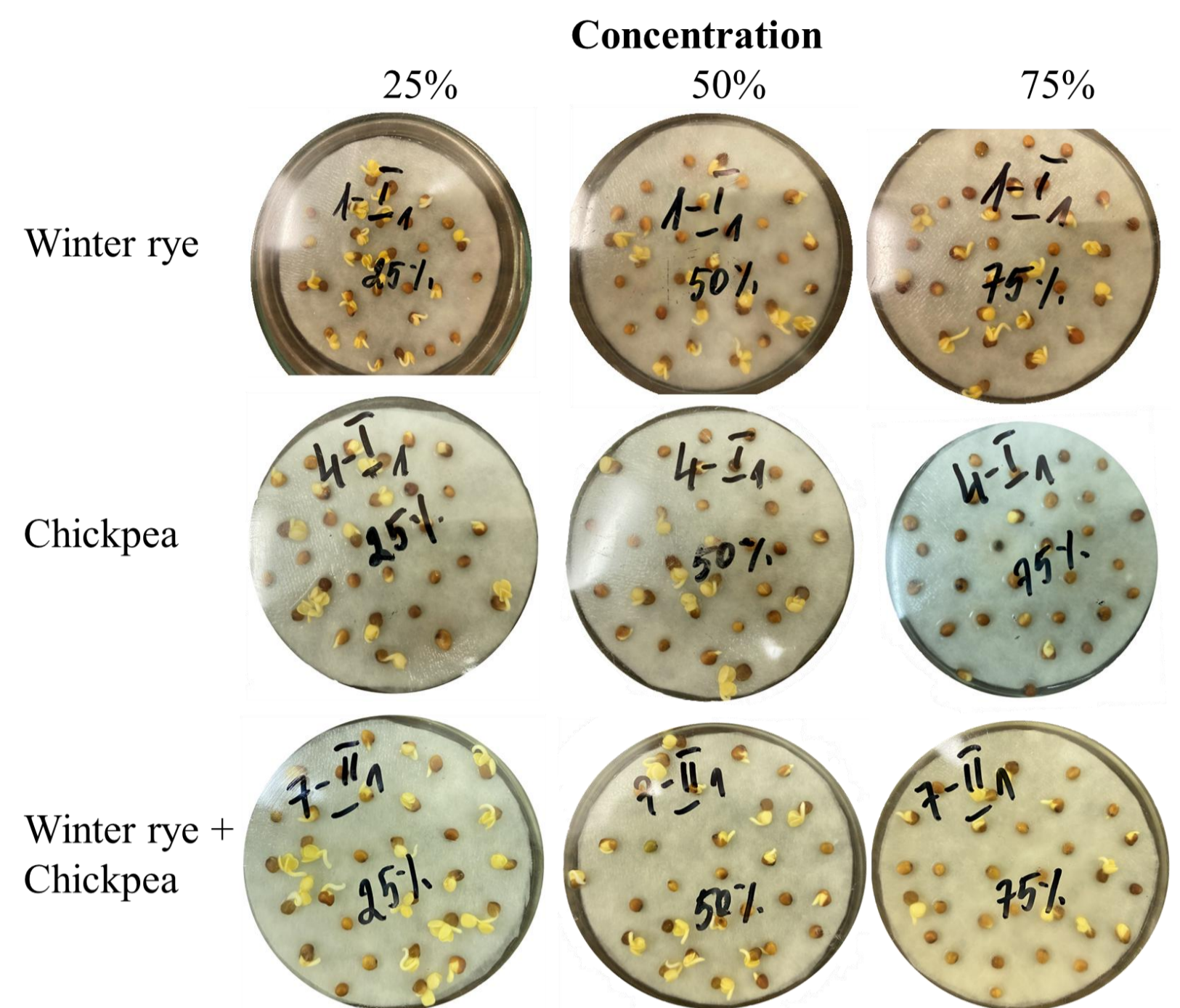


Fig. 5 Radish seeds germination affected by 3 concentrations of aqueous extract, after 24 h.

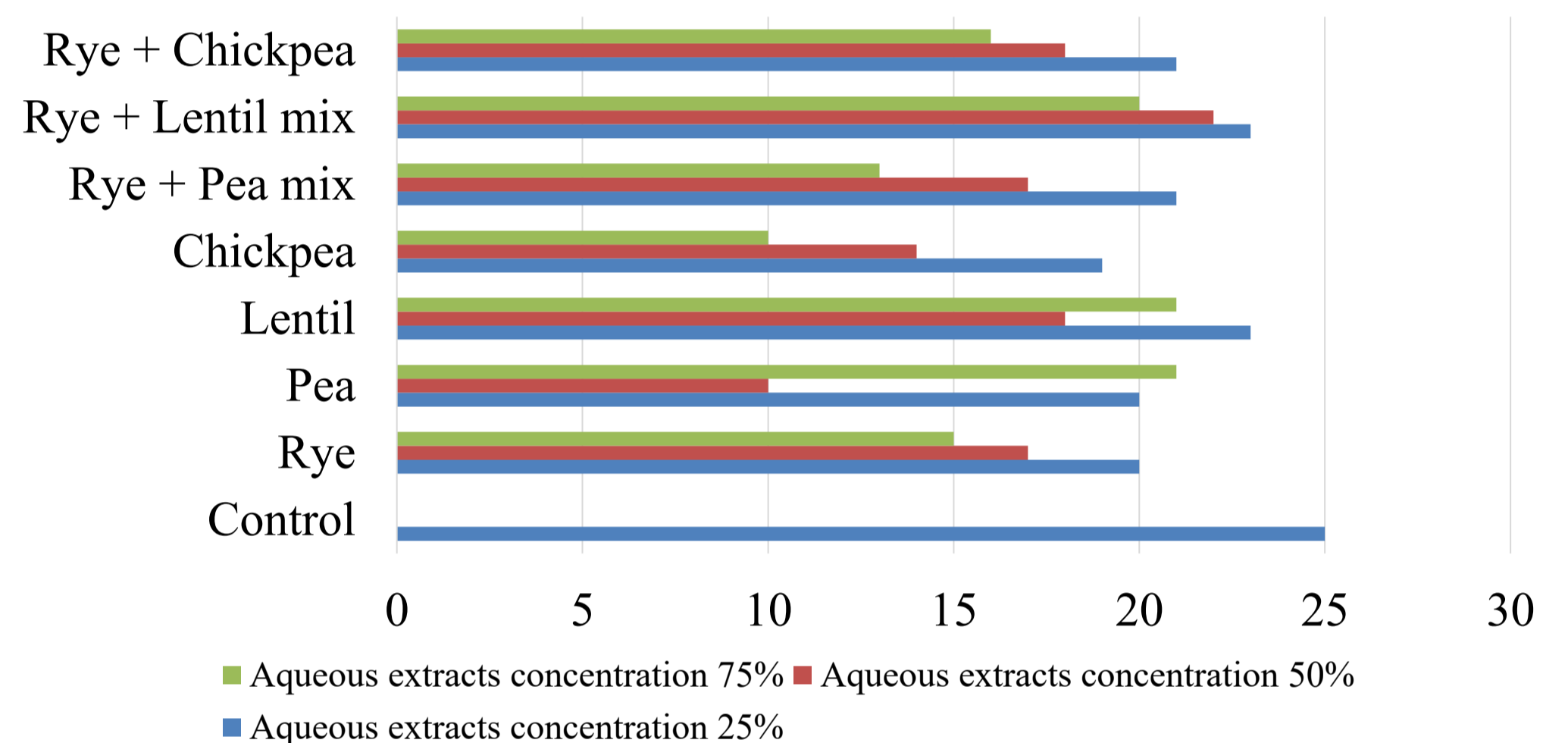


Fig. 6 Radish seed germination after 24 hours

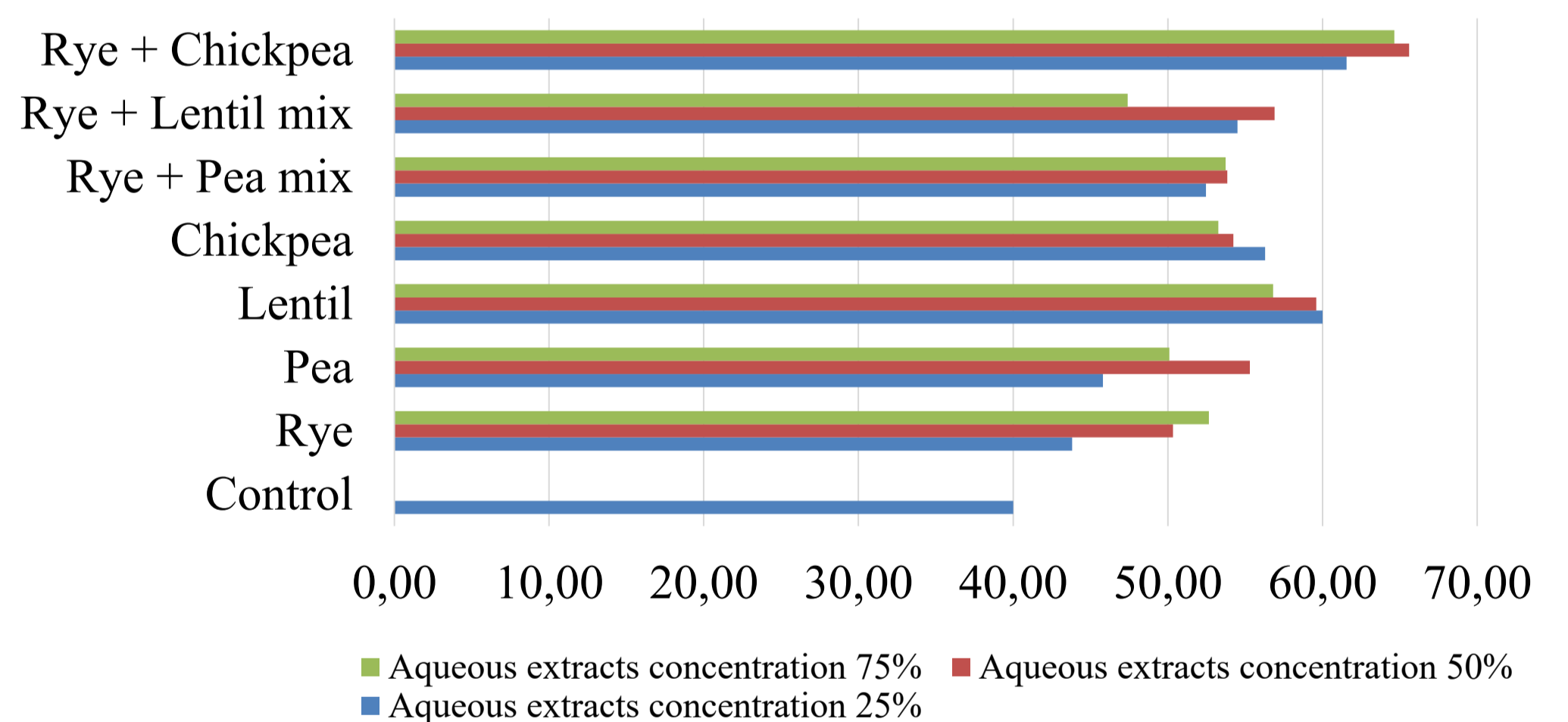


Fig. 7 Seedling root length, after 96 hours, mm

Compared to the control, rye and chickpea aqueous extract mix promoted seedling root length (Fig. 7).

CONCLUSIONS

The results show that the aqueous extracts of all donor plants grown as pure crop inhibited radish seed germination at both low and high concentrations. Extracts of grain legumes and winter rye intercrops (1:1) thus had a positive effect on root growth, while the pure extracts of pea and chickpea had an inhibitory effect, depending on the concentration.