



A global overview of potato intercropping – a meta-analysis

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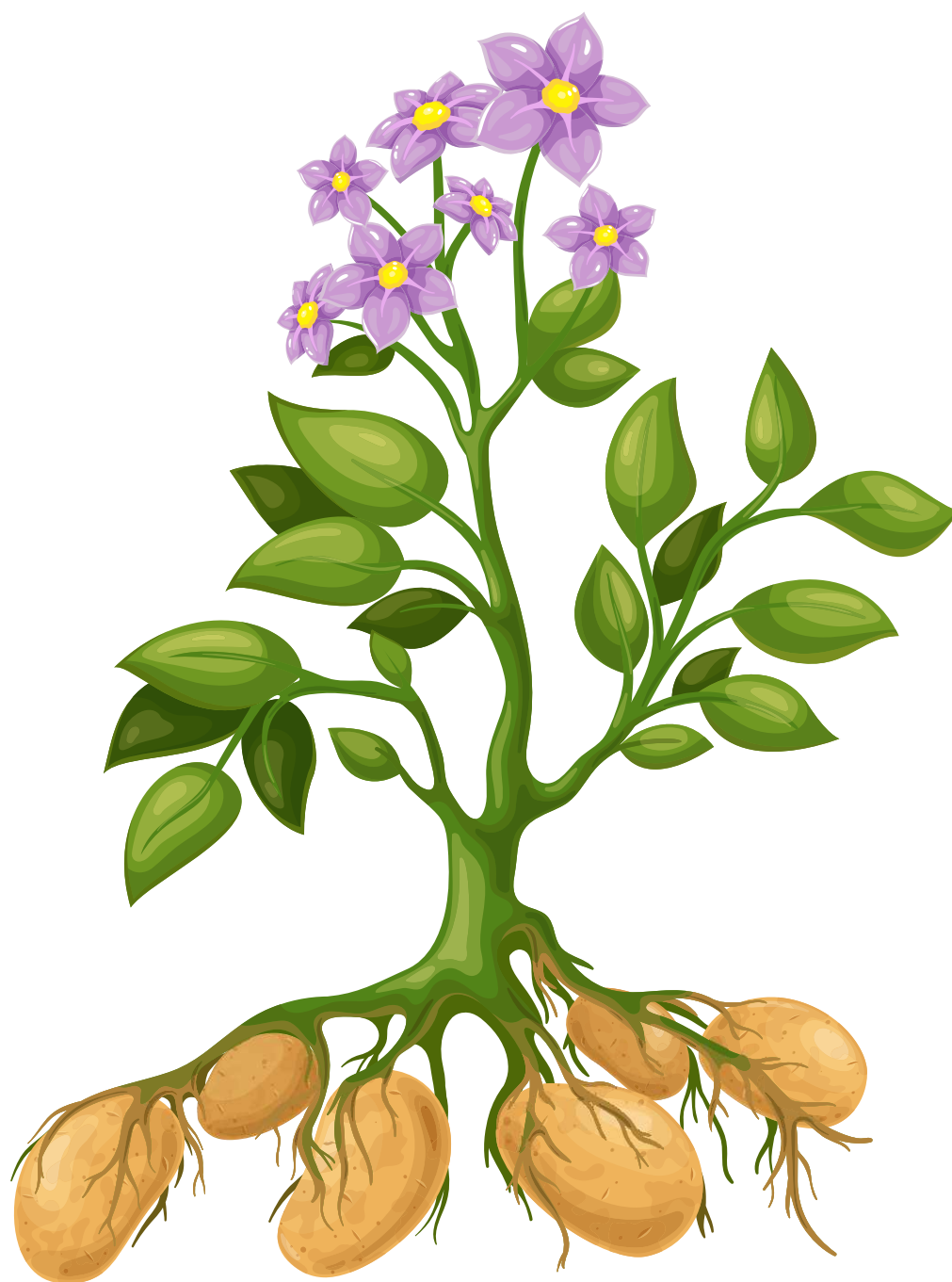
Background

Intercropping can be a way of 'sustainable intensification' for low input and resource-limited farming systems. Besides that, multiple studies show the advantages of diversifying the cropping system through space, time, and genes; it can potentially increase productivity, make the system more resilient to pests and disease, improve ecosystem services, and increase economic profitability compared with intensive agricultural monocropping systems. Potatoes are the third biggest food crop globally for human consumption. Due to population growth, soil degradation and increasing bans on plant protection products it is becoming more and more relevant to enhance production and look at alternative production systems.

Organic potato yield in the Netherlands is up to 30 t/ha, but an intercropping study from the Netherlands shows potato yield up to 40 t/ha (Weller, 2015). This difference will be investigated to see if it is a general tendency. There is currently no global overview looking at potato yield difference between intercrop and monocrop.

Research Question

- How are intercropping affecting **productivity**, product quality, pest injury and yield stability in potato production?
- How is this effect caused by genetic and **spatial diversity**, time and field management?
- How are productivity, product quality, pest injury and yield stability **related** to each other?



Methods

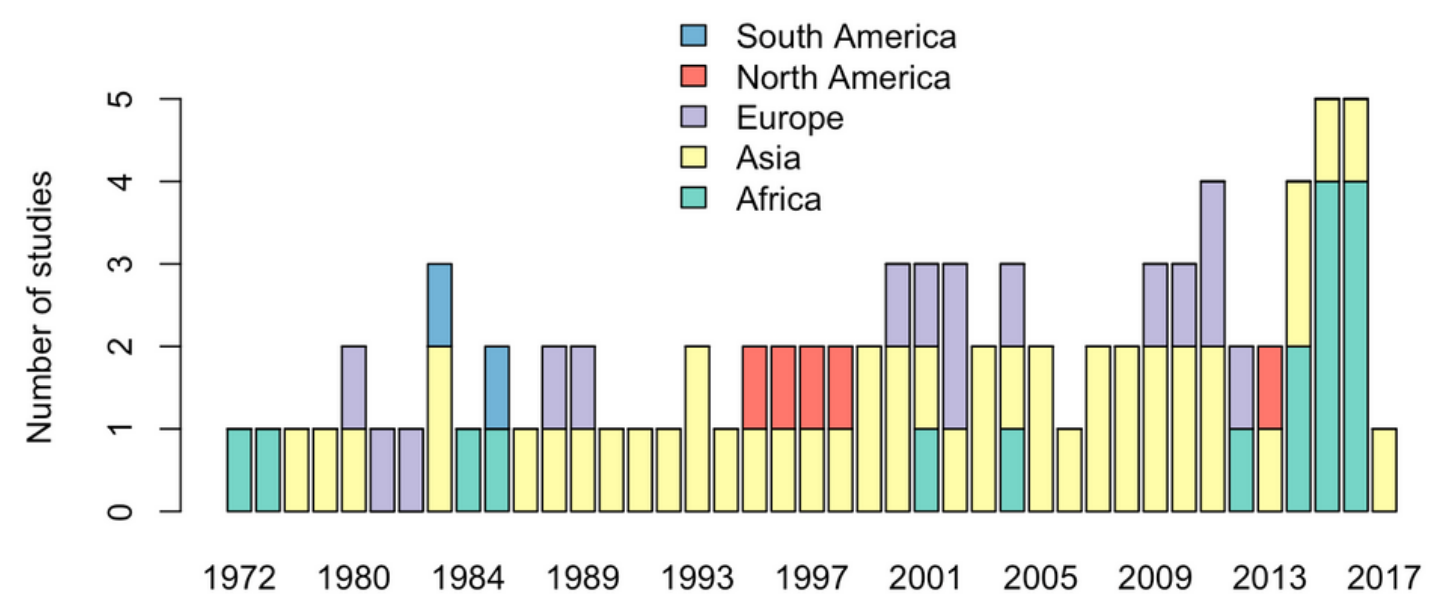
The data analysis will be conducted via a meta-analysis followed by a mixed-effects model to see the difference between intercropped potatoes and a control crop of mono-cropped potatoes with **the same growing conditions** and **management** as the intercrop.

- Excluded papers
 - Greenhouse studies, reviews, or model simulations
 - Laboratory- or pot experiments
- Included papers
 - Potato-based intercropping with companion species
 - Relay intercropping



The market for organic potatoes is growing but is limited by challenges with both pests and diseases. Especially the late blight disease *Phytophthora infestans* and Colorado Potato Beetle influence potato production. Diversifying the system to reduce the disease pressure by arranging different non-host crops next to potatoes is an advantage of intercropping. Furthermore, Ditzler (2021) found that by combining genetic and spatial diversity, late blight disease incidence was significantly lower than in monoculture.

Intercropped potatoes at Droevendaal 2022



Graph of intercrop experiments per continent through time.

