

SureVeg – Crop growth and nutrient dynamics in intercropping systems using different fertilization strategies

Problem

Organic vegetable production systems aim at maximizing soil quality and crop productivity while minimizing environmental impact by closing nutrient cycles. Which are proper fertilization strategies to achieve these combined goals?

Solution

Intercropping was tested over two growing seasons with different vegetable crop combinations in five different countries. The impact of alternative animal and plant based fertilizers, composts and other soil improvers, on nutrient availability and crops' performance was assessed.

Impact

In most cases, yield in intercropping systems was equally high compared to monocropping. Alternative fertilization strategies maintained or improved soil quality, while not compromising yield.

Practical recommendation

By intercropping - growing complementary crops on the same field - available nutrients can be absorbed at a different time and depth, thus increasing nutrient use efficiency and reducing losses.

The use of (pre-treated) waste streams (e.g. plant based composts, potato juice) or plant based fertilizers (e.g. clover silage) as alternative fertilization strategies can additionally sustain or improve soil fertility.

Both approaches combined increase the credibility and sustainability of organic vegetable production without affecting economic yield and thus farmers' income. Field experiments in five European countries showed that the marketable yield of vegetables either was maintained or increased (cabbage in Latvia) under intercropping (Figure 1). The results showed that the soil mineral N in the top soil layer at the time of harvest was less in intercropping compared to leek monocropping (celecriac-leek in Belgium-2018), beetroot monocropping (cabbage-beetroot in Denmark-2019) and faba bean monocropping (cabbage-faba bean in Latvia and Finland-2019).

Both plant based and animal based alternative fertilization yielded similar to the control treatment (Figure 2). The use of (pre-treated) waste streams and plant based fertilizers as an alternative fertilization strategy do not compromise yield.

It is important to think carefully about crop combinations, sowing/planting time and fertilization. The system's design should be based on crop traits.

Applicability box

Theme

Optimization of fertilization strategies in organic vegetable production by intercropping and adapted fertilization strategies

Keywords

Intercropping, nitrogen dynamics, compost, soil improvers, organic vegetables

Geographical coverage

BE, DK, FI, LV and IT

Application time

Before and during the growing season

Required time

Plant care and harvesting might be more complex and time consuming in intercropping systems. Alternative fertilizers might need more time or an adapted technique to apply in an established crop.

Period of impact

≥ 2 years

Equipment

Machinery development for intercropping systems is needed, in order to make them ready for practice.



Picture 1: Left: Preparation of compost as alternative fertilization product. Right: Celeriac and leek growing in an intercropping system in Belgium.

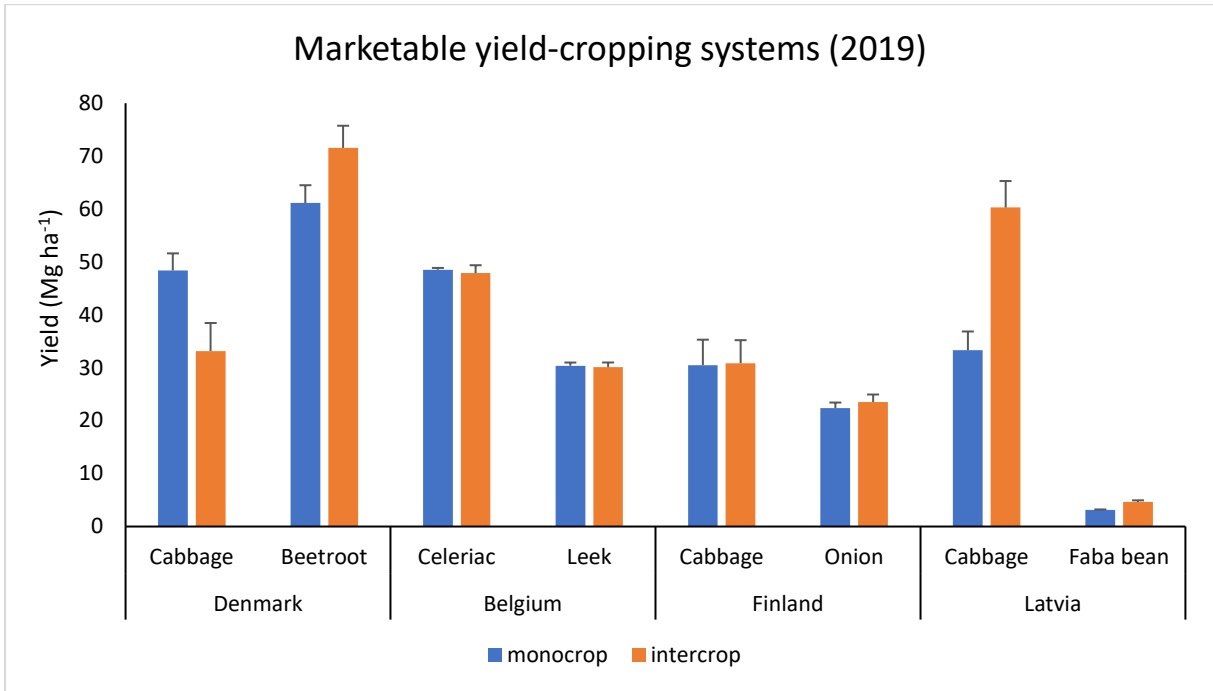


Figure 1: Marketable yield (average fresh weight + standard error) of vegetable crops grown in monocropping and intercropping systems in four European countries.

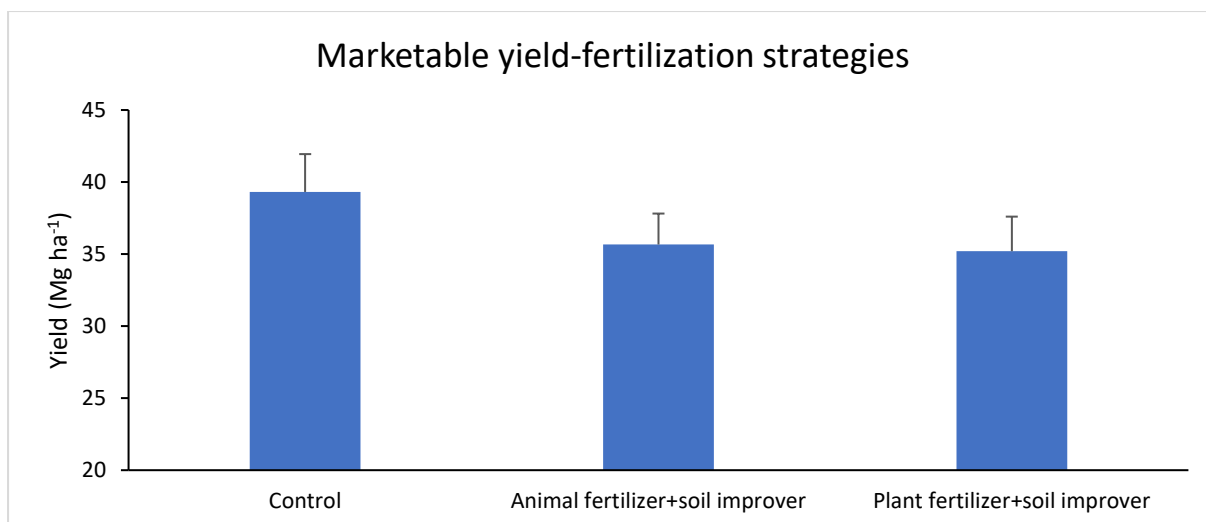


Figure 2: Marketable yield (average fresh weight + standard error) under different fertilization strategies averaged over four European countries and two years (2018 - 2019).

Further information

- Check the [Organic Farm Knowledge Platform](#) for more practical recommendations.

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Project website: <http://projects.au.dk/coreorganiccofund/research-projects/sureveg/>

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