



# Soilless cultivation of hardy nursery stock

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## Background

In regions with sandy soils in the Netherlands the EU water quality requirements are often not met due to emission. Therefore new cultivation systems need to be developed.

## Objective

Development of new innovative soilless cultivation systems with minimal emission of nutrients and crop protection chemicals.

New systems are developed and tested in close cooperation with growers .



Figure 1. The U system planted with liners.



Figure 2. Closed pot-in-pot system. Insert presents the below ground water supply and discharge system.



Figure 3. Street trees in different types of containers.

## Characteristics

U system	Liners, shrubs, conifers, young fruit trees
	<ul style="list-style-type: none"><li>+ Mechanization, fine root structure, high plant density, survival rate</li><li>- Investment costs</li></ul>
Pot-in-pot	Shrubs, conifers
	<ul style="list-style-type: none"><li>+ Stable plants, closed system, above ground less diseases</li><li>- Fixed plant density</li></ul>
Big containers	Street trees; conifers
	<ul style="list-style-type: none"><li>+ Harvesting throughout the year possible, fine root structure</li><li>- Transport</li></ul>
Further development	Winter hardiness, cost reduction

Table 1. Average nutrient budget (kg/ha) for three strong growing species grown in the U system.

	N	P
Input	243	54
Output - plant	175	26
drain	12	1
Difference	57	28

Nutrients were applied as CRF and partly as liquid fertilizers. Plants grown in the U system are harvested with a root ball. Consequently, nutrients are also exported in this way. Further optimization is possible.

## Results

Comparison with open field production shows that in the U system the nutrient recovery is substantially higher. Use of pesticides is also substantially lower. Cultivation period can be reduced by one year when liners are grown one season in the U system followed by a period of two years in big containers. Profitability for growers increases by these combined advantages despite the relatively high investments costs.

The first results of the pot-in-pot system are promising but research is on-going.

