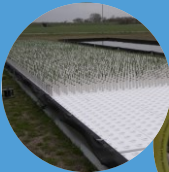


## Hydroponically Grown Leek: Slowly Growing to Maturity

July 2015

Erik van Os, [erik.vanos@wur.nl](mailto:erik.vanos@wur.nl)



## Introduction

- Less nitrogen emission in outdoor cultivation
  - Leek:
    - Vulnerable sandy soils
    - Inefficient with fertilizers
  - 2009 -2013: programme, cultivation out of the soil
    - More yield, better quality
    - Floating system: DFT
      - ~ 80 pl/m<sup>2</sup>, 200 g each
  - 2014 – 2017: 2<sup>nd</sup> programme
    - Commercialisation
    - Robustness
    - Mechanisation



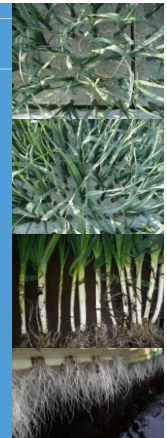
## System description

- Floating panels
  - device – tube+tray
  - 15-25 cm solution
- 4 crop cycles per year 60-80 pl/m<sup>2</sup>
  - Yield: 300 ton/ha/yr
    - (against 65 in soil)
  - Shaft length: >14 cm
- Upscaling
  - Semi commercial scale
  - 2x 200 m<sup>2</sup> at Kamperland



## System requirements

- Plant density: 40, 50, 70, 100 pl/m<sup>2</sup>
  - soil 25 pl/m<sup>2</sup>
  - > 70 pl/m<sup>2</sup>: smaller plants
    - < 200 g/pl, > 2.5 cm thick
- Tube:
  - 28 or 34 mm inner diameter:
    - 34 mm for thicker leek
  - 10 or 20 cm long:
    - 20 cm for more white shaft
  - Grading plants before planting
    - More uniform yield



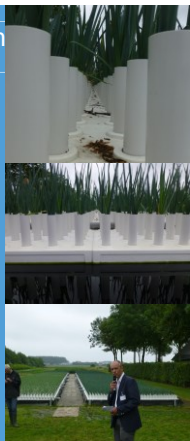
## Cultivation requirements

- Planting – issue with long roots
  - 8 cm roots are folded and may rot
  - ~4 cm: partly in solution
  - 1 cm too short, no growth recovery
- Age of young plants: 10, 12 or 14 weeks
  - Age from sowing to final planting
  - No difference between age
- Fast growing varieties (summer cultivars)
- Long shaft length varieties
- Grading: 10% smallest plants eliminated
- Other symptoms: yellow stripe virus



## Towards a commercial system

- Terms of reference was made
- Dry Hydroponics designed a system:
  - 64 pl/m<sup>2</sup>
  - 20 cm tube with special tray
  - 36 inner diameter
  - Floating panels with air room
- Grower: 2 x 4m x 50 m ponds
  - No stock nutrient solution
  - EC: 2-3
  - Continuous planting/harvesting



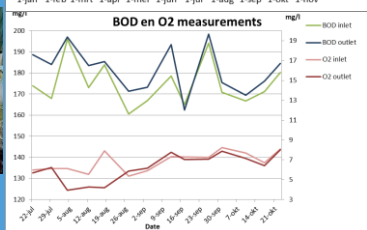
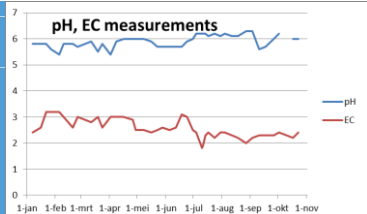
## Nitrogen efficiency

- Goal of the programme: higher N-efficiency
- Average: supply 2.9 kg N per ton harvested leek
  - Efficiency in soil: 45%
  - Efficiency in hydroponics: 81-100 %
    - Possible discharge after harvesting
- Precipitation entering the system (800 mm/yr)
  - Transpiration leek: 300 -500 mm/yr
  - Other system design to avoid spill over
  - Storage in pond, surplus to surface water
  - Direct storage in tank



## Measurements

- In small pond



## Economy

- Cost price per kg leek
  - Hydroponical: € 0.43- 0.50
  - Soil: € 0.59
- Space for investment
  - Investment hydroponics: €455,000.-
  - Paybacktime: 8 years
- Same market price
  - Niche market important
  - Taste is same



## Present bottlenecks

- Rainwater surplus
  - System adaptation
- Frost in winter
  - Continuous cropping or stopping
  - Regrowth after planting in spring
- Disinfection of solution?
  - Virus?
  - Erwinia bacteria
- Cover it with a greenhouse?



## Conclusions

- Commercial system developed
  - 64 pl/m<sup>2</sup>, 20 cm tube, 36mm inner diameter
  - Mechanization to be started
  - Marketing as new product
- Start of cultivation to be improved
  - Graded plants
  - Plant raising for hydroponic goals
  - Better varieties
  - Better uniformity
- N efficiency much better as in soil
- Economically viable



Thank you for  
your attention !



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