

Biocontrol in aquaponic systems: Toward a better characterization of microbiota properties

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1. Plant pathogens in aquaponic systems

Aquaponics

→ greenhouse conditions



Aquaponics

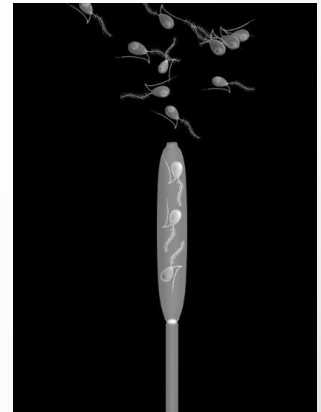
→ greenhouse conditions

- * Ideal conditions for plant growth
- * But also ideal for the development of many diseases
- * Compromises have to be made between
 - * Optimum conditions for economic productivity
 - * Conditions for diseases and pests prevention

Aquaponics

→ hydroponic diseases

- * Theoretically less susceptible to soil-borne pathogens
- * Zoosporic oomycetes are frequently detected
 - * *Pythium* spp. and *Phytophthora* spp.
- * *Fusarium* spp., *Rhizoctonia* spp., *Alternaria* spp., *Sclerotinia* spp., powdery mildews, *Botrytis* spp., etc.

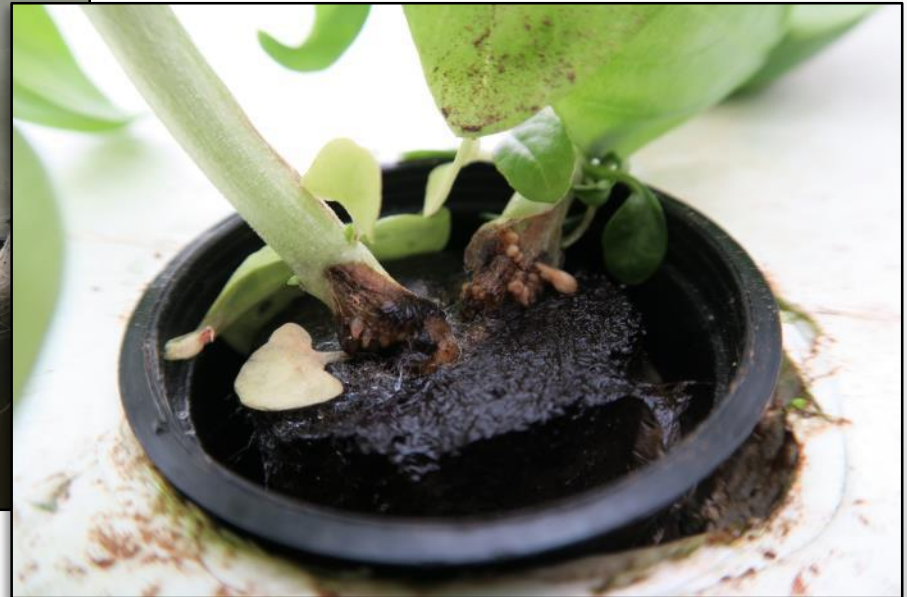


<http://cronodon.com>

Aquaponics

→ hydroponic diseases

* Crown and root rots on basil



Aquaponics

→ hydroponic diseases

* *Botrytis cinerea* on basil



2. How to manage plant pathogens
in aquaponic system?

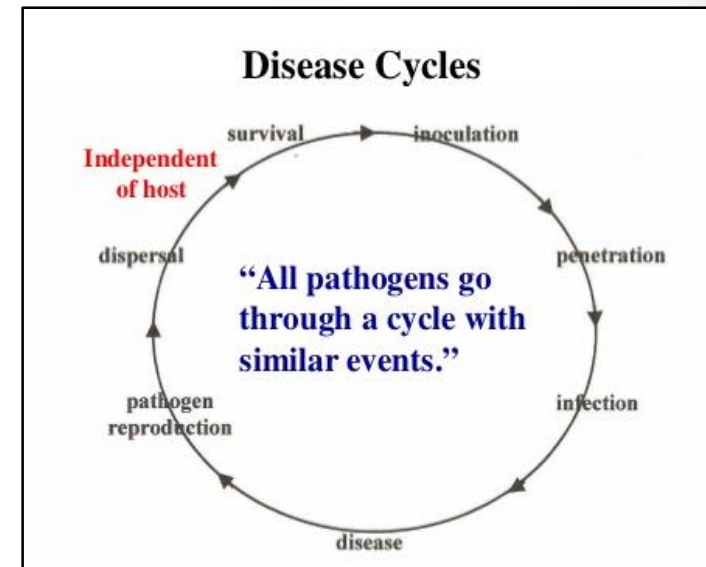
Pests control in aquaponics

- * Plant pathogens
 - Difficult to manage
- * No pesticides or biopesticides especially developed for aquaponics
 - * Fish health
 - * Antagonist agents not adapted to aquaponic conditions
- * Inadvisable use of disinfecting agents
 - * For fish health
 - * For beneficial bacteria



Diseases control in aquaponics

- * Resistant varieties
- * Preventive measures
- * Good agricultural practices
- * Greenhouse conditions management



3. What about biological control?

3 observations

1. Good plant yields with less nutrients compared to hydroponics
 - * Biostimulants ?
2. Aquaponic systems appears more resistant to diseases that affect standard hydroponics
 - * Antagonist agents?
 - * Plant elicitation?
 - * Sustaining plant growth under biotic and/or abiotic stress?

3 observations

3. Microbiota in recirculated aquaculture and hydroponic systems are already characterized

→ Not yet in aquaponics!

4. My PhD thesis

Thesis subject

Characterization and biocontrol
properties of the microbiota
associated with an aquaponic
system



2 big topics

1. Characterization of the rhizosphere microbiota
 - * Taxonomy
 - * Roles and properties
 - 16s rDNA sequencing and shotgun sequencing
2. Quantify the aquaponic plants resistance to diseases
 - * Underlying questions:
 - * Optimal conditions, microbiota evolution, isolation, characterization of an antagonist agent, etc.

Preliminary results

- * Rhizosphere microbiota collecting for DNA extraction
→ Protocol development

Microorganisms concentration in CFU/g of root

		Buffers	
		PO ₄ 0,01M - pH7	PO ₄ 0,01M - pH7 + tw80 0,005%
Washing 1	PDA	2,46E+08	9,13E+08
	LB	3,40E+08	5,62E+08
Washing 2	PDA	5,40E+07	2,55E+08
	LB	6,00E+07	2,81E+08
W2/(W1+W2)	PDA	17,98 %	21,84 %
	LB	15,00 %	33,30 %

Thank you for your attention

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