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Thomas Dubos, Lycée de Coulogne

Waste minimization in aquaponic systems

Boulogne sur mer, Monday 7th July 2025

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1 - Introduction to aquaponics

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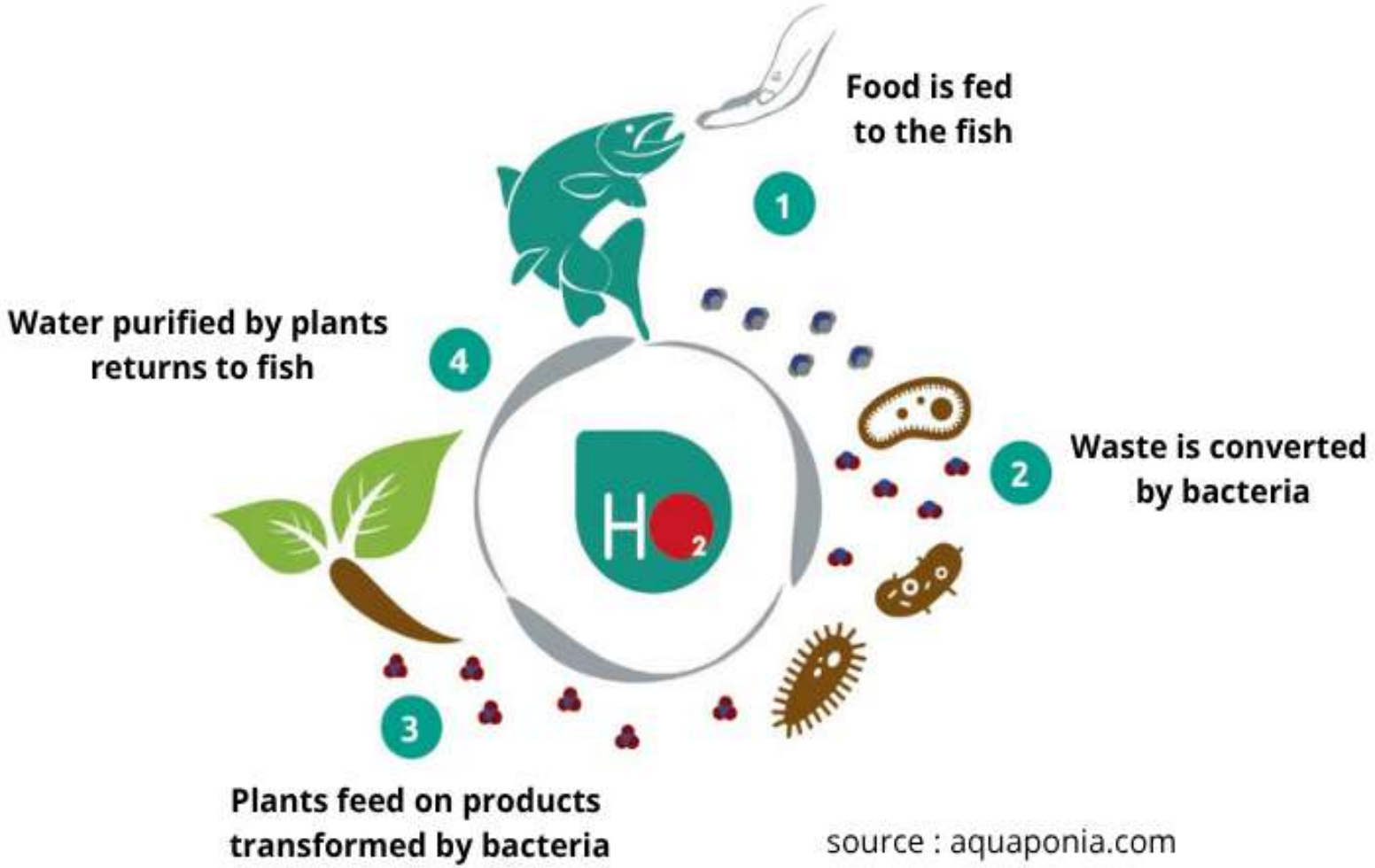
Aquaponic = Aquaculture + Hydroponic



source : aquaponia.com

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Origins

Aztecs : ~1000 – 1500 AD
Floatting islands : Chinampas

China : ~1000
Ducks and carps/tilapias
inside rice paddies

1970 : Aquaponic comeback !

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Some examples of aquaponic farms in France

Agriloops, Renne
50t of prawns + 70t plants

Richard's Farm, Yvelines
1t of fishes + 3t of plants

Saumon de France, Cherbourg
Demonstration farm

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Some examples of aquaponic farms in Netherlands

Urban Farmer, The Hague
19t of tilapias + 45t of vegetables, 2 300 m²

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Pros and Cons

- Food waste is re-used by plants → Waste minimization
- Faster growth
- Water purification
- Adaptable to urban environments

- Initial investment
- Knowlegde in both fish farming and traditionnal farming
- Surface area
- No use of pesticides
- No Labels for now

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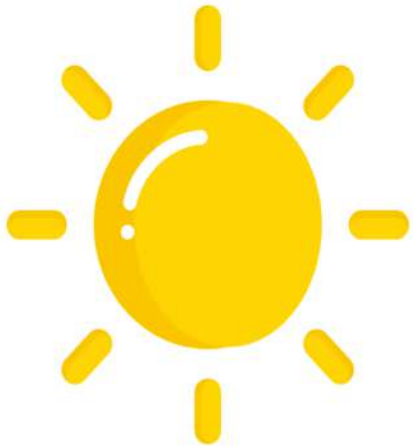
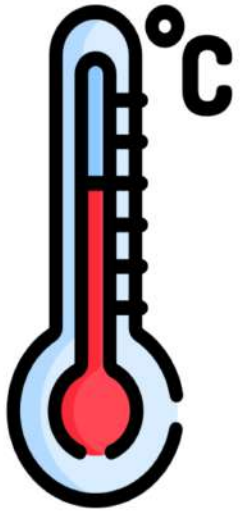
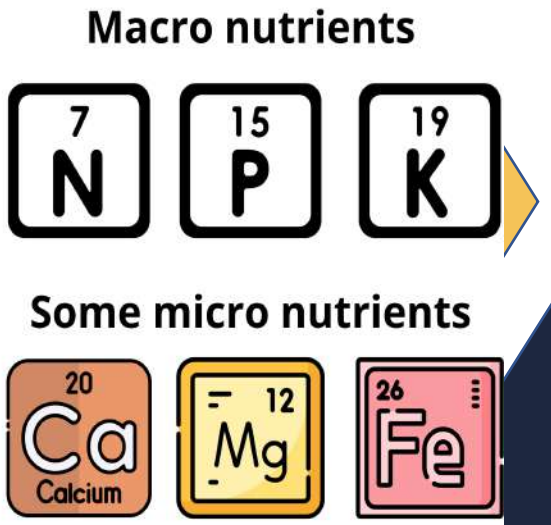
The plant needs







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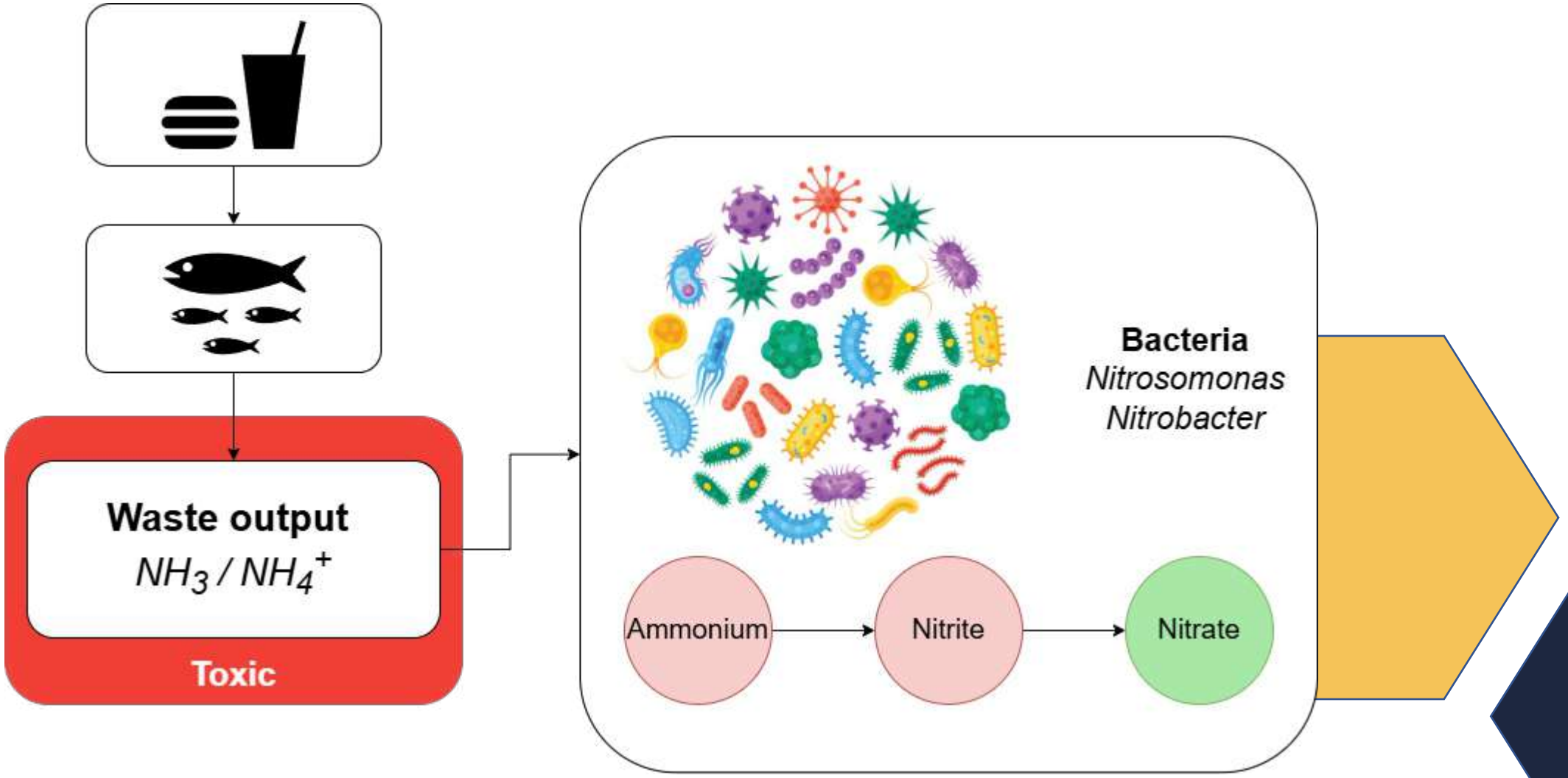
The Nitrogen cycle



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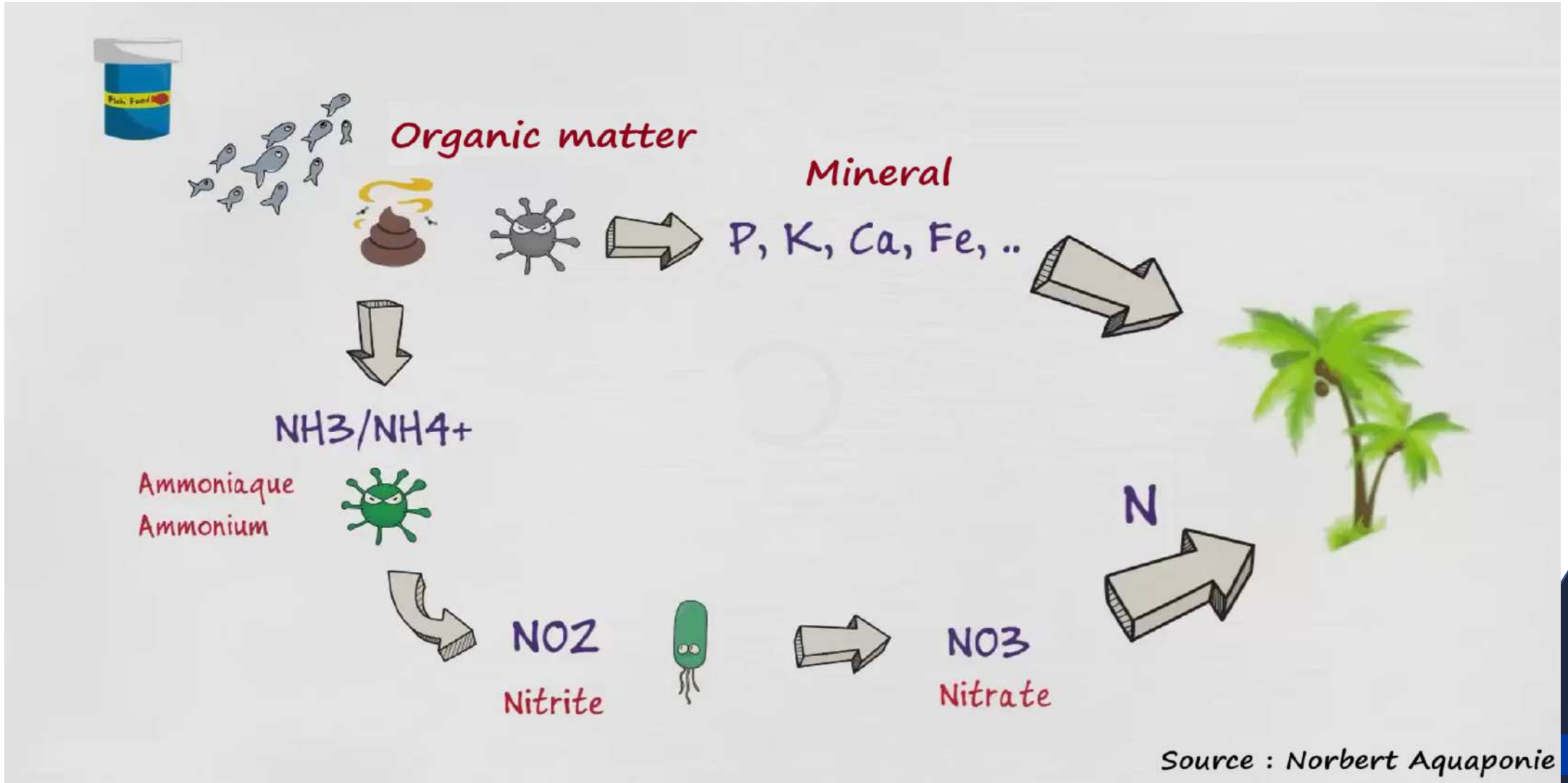
Linked and unlinked systems



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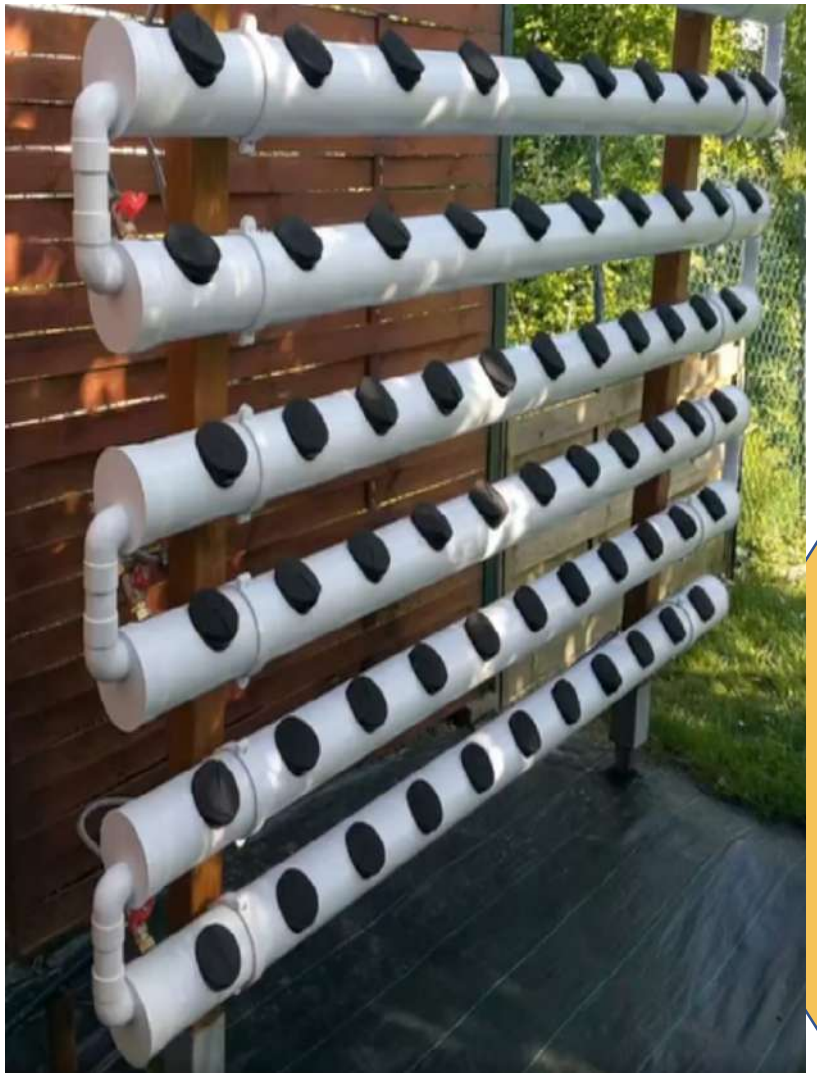
Vertical systems

Subtitle

- NFT Nutrient Film Technique
- Zip Grow

Main issue : The water has to go up
= Energy cost

NFT



Zip Grow

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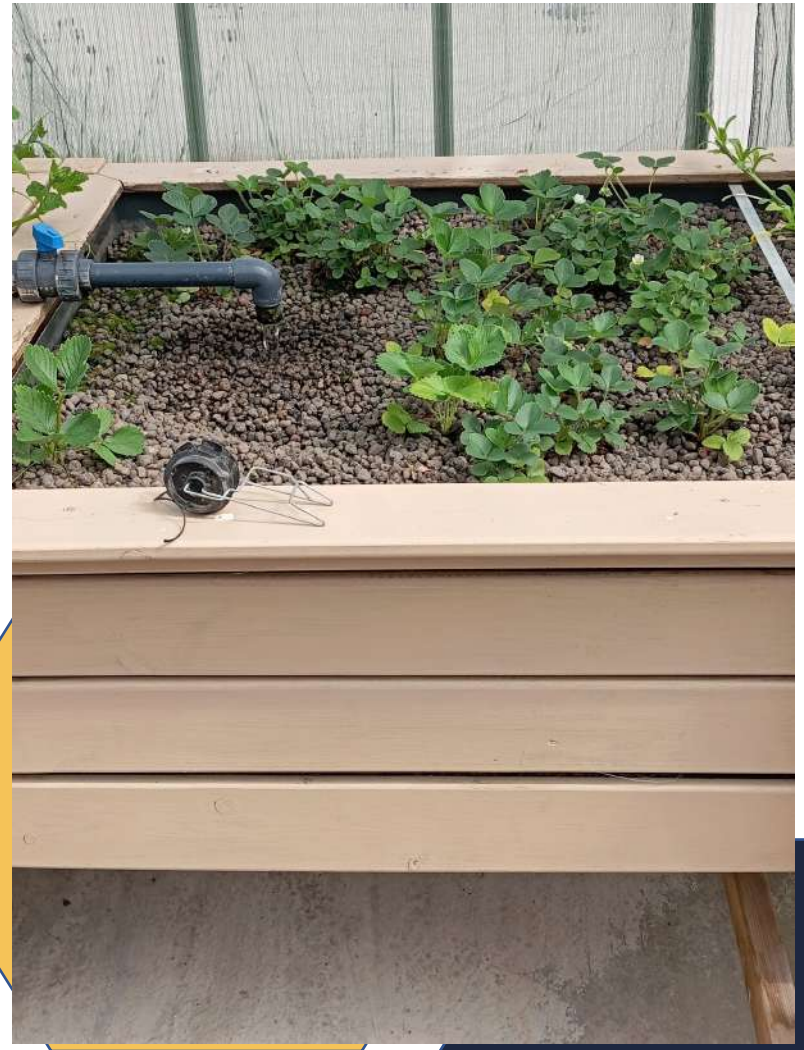
Horizontal systems

Géraldine

Raft

Table with pozolane



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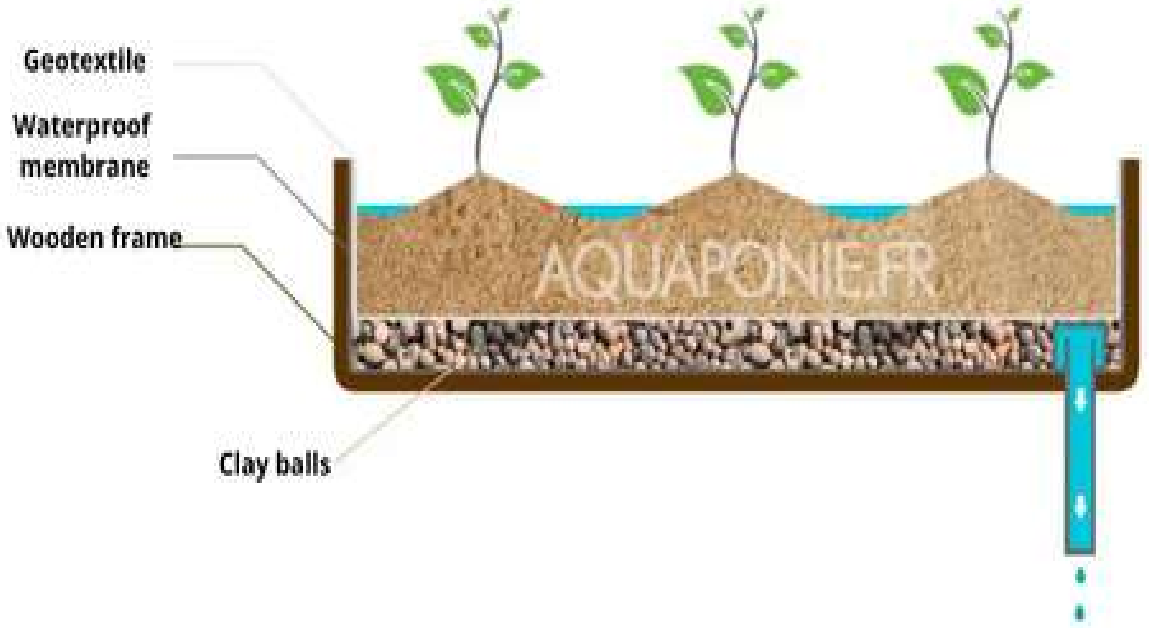
Horizontal systems

Sandponics



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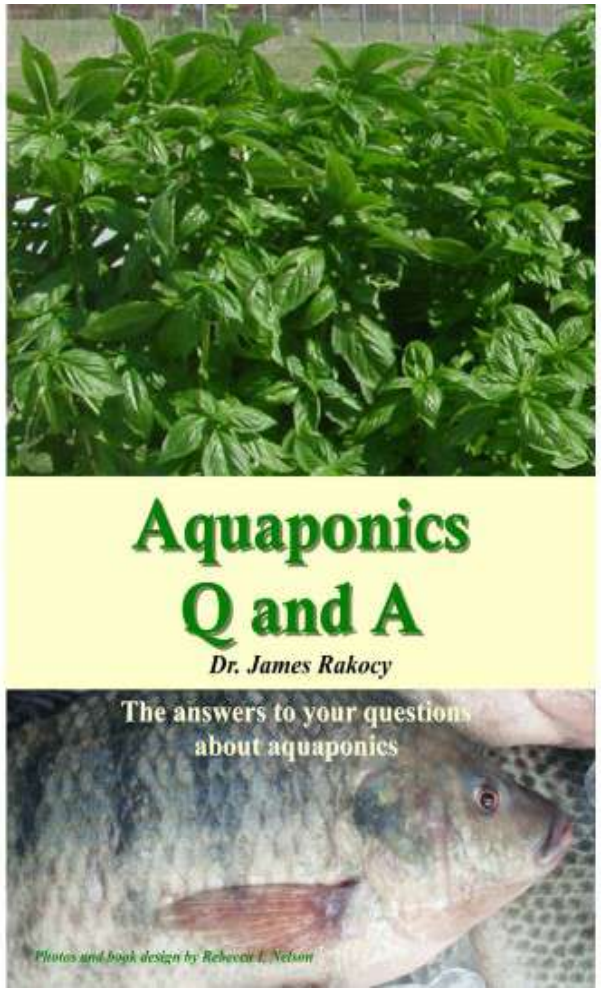
How much to produce ?

James Rakocy



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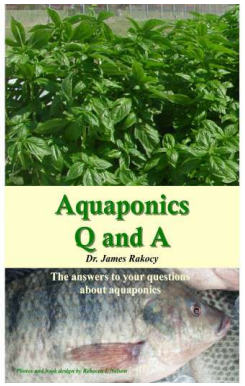

James Rakocy

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24 lettuces / m²

Horizontal culture :
60 – 100g of
food / day / m²

Vertical : 70% less

Quantity of food

Number of fishes

Volume of water

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3 – What to grow ?

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3 – What to grow ?

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Plants








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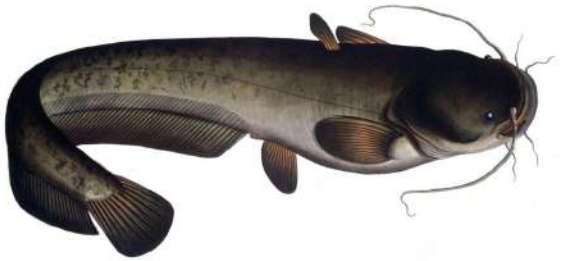
3 – What to grow ?

Fishes

And shrimps !



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4 – Points to look out for

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Plants and nutrient deficiencies

Make a diagnostic

Apply the traitment

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4 – Points to look out for

Plants and nutrient deficiencies

Nitrogen deficiency

Chlorosis

Phosphorus deficiency

Red or purple color
On the old leaves

Potassium deficiency

Peripherical chlorosis
On the old leaves
Growth is slowed down

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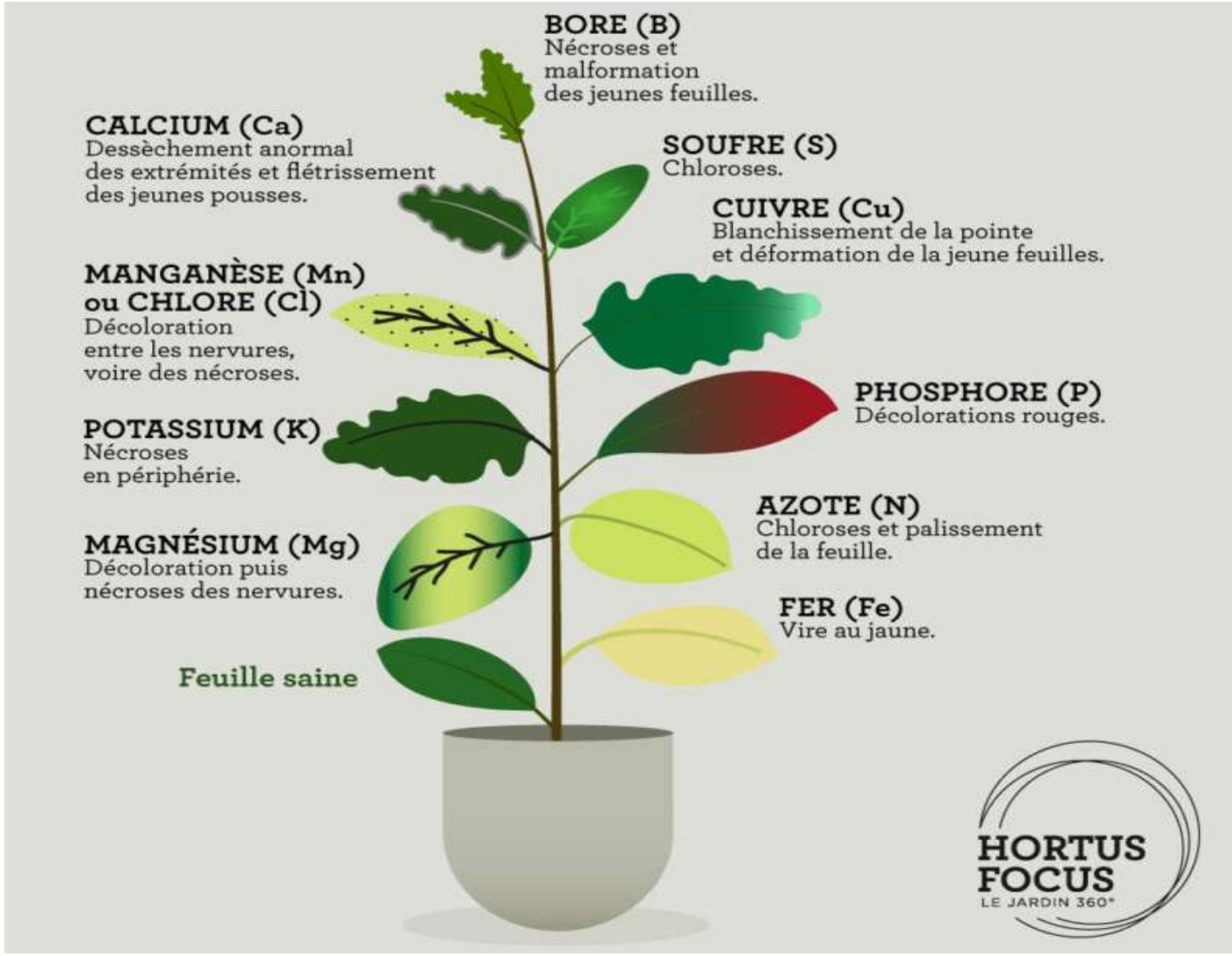
4 – Points to look out for

Plants and nutrient deficiencies



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4 – Points to look out for

Getting rid of insect pests

How to deal with them ?

Auxiliary insects : ladybug and chrisope against aphids
Coffee pond, ashes, black soap…
Plants association : Tomato and Basilisk

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