Update on CTAHR Research Investigating the Use of Vermicompost in Aquaponic Vegetable Production

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Introduction

• About me
  – CTAHR Aquaculture/Aquaponics Extension Program
• Talk
  – Background
  – CTAHR research
Commercial Aquaponic Micronutrient Supplements

• Traditional dogma
  – Nitrification (pH 7.0-9.0)
  – Micronutrient solubility (pH 5.5-6.5)

• Rakocy: pH (~7.4) and micronutrient
  – KOH
  – Ca(OH)$_2$
  – Fe-chelate (EDTA)
Locally Produced Micronutrients: Vermicompost

- Composting with earthworms
- Utilizes organic “waste”, renewable
- Nutrient rich, increases crop yield
- pH buffering
- Can be made into “tea”
Aqueous Vermicompost Extracts (Compost Tea)

• High levels of soluble mineral and biological nutrients
• Suppresses plant disease
• Experiment: investigate use of compost tea to supplement micronutrient and pH buffering requirements in aquaponic system
Experimental Design: CompostTea

- **Tea dose-response**
  - Hybrid systems (ebb/flow and raft)
  - $N=3$ treatments (doses), and $n=3$ systems per treatment

- **Pak choi and tilapia:**
  - 8 plants: 1 kg/m$^3$ fish

- **Tea added weekly**
  - 4 weeks
Results: Compost Tea

- Leaf number and area
- Fresh and dry weight
- Carotenoids
- Phenolics
- Antioxidant capacity
- pH
- Mineral nutrients (plant and water)

No Tea (control)

Static Hydroponic (+ control)
Vermicompost and Seedling Production

- Soil-less micronutrient supplement paradigm – Hydroponics/aquaponics
- Steady, constant supply of balanced nutrients – Luxury consumption

- Driessche 1974
- Seedlings uptake and store excess nutrients

Peat + Vermicompost 75%

25% 50% 100%

MiracleGro™ pH 6.5

pH 5.0
Application to Aquaponics

• Specific nutrient deficiencies in aquaponics.
• These were not adjusted with compost tea.
• SOP for hydroponic seedlings is to start in oasis with no ferts.
• Can yields be improved by inclusion of vermicompost in media?
• Three treatments:
  1 - Oasis
  2 - Oasis + 0.40g
  3 - Plug + 5.0g
    (1:1 peat:vermicompost)
Are we priming seedlings and avoiding deficiencies?

![Graph showing seedling shoot concentration (ppm) for Manganese, Zinc, and Copper in different conditions (Plug 1:1 (5.0g vermicompost), Oasis + 0.4g vermicompost, Oasis).]
Impact: ongoing observations on-farm
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