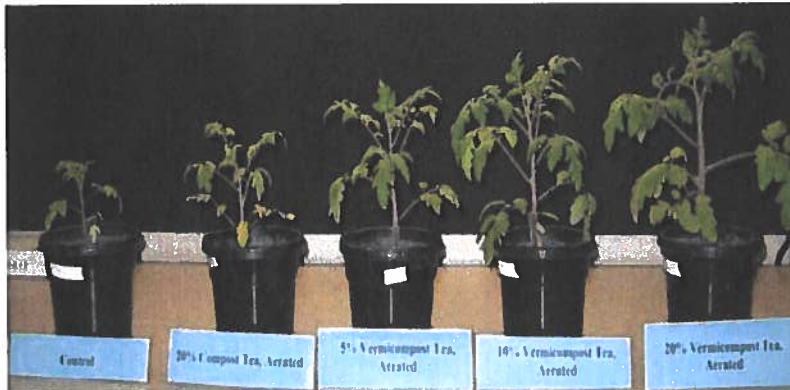


## IMPROVING PLANT HEALTH AND IMMUNE RESPONSE

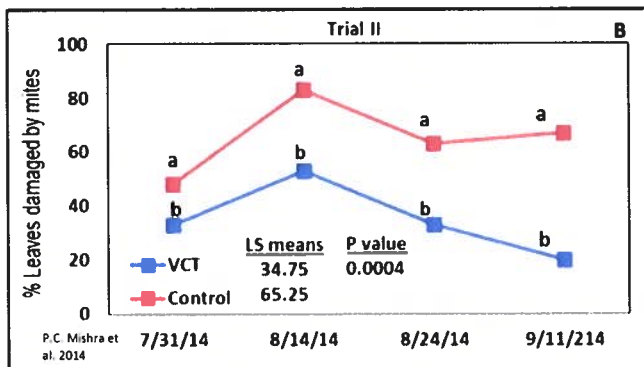
### Compost, Compost Tea Benefits: pest and disease suppression



Tomato plants infested with nematodes (*Meloidogyne hapla*) and treated with various compost teas.

Root Pathogen	Inoculum Density	Suppressive Tea Concentrations	
		Tomato	Cucumber
<i>Fusarium oxysporum</i>	10 <sup>8</sup> spores in 5 ml water drenched onto media	5%, 10%, 20%	--
<i>Phytophthora capsici</i>	10 <sup>8</sup> sporangia in 5 ml water drenched onto media	5%, 10%, 20%	5%, 10%, 20%
<i>Rhizoctonia solani</i>	0.1% (v:v) <i>Rhizoctonia</i> cultured ground rice inoculum	5%, 10%, 20%	10%, 20%
<i>Pythium ultimum</i>	0.1% (v:v) <i>Pythium</i> potato-soil inoculum	5%, 10%, 20%	5%, 10%, 20%

Suppressive effects of compost teas on various pathogens infecting tomato and cucumber plants.



Vermicompost tea application reduced mite damage on tea plants.

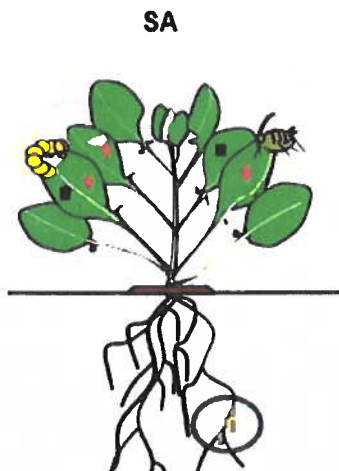
#### Potential Competitors in Composts

- *Trichoderma hamatum*
  - *Flavobacterium balustinum*
  - *Pseudomonas aeruginosa*, *fiuorecens*, *putida*, and *stutzeri*
  - *Xanthomonas maltophilia*
  - *Janthinobacterium lividum*
  - *Enterobacter cloacae* and *agglomerans*
  - *Bacillus cereus*, *mycoides*, and *subtilis*
- (Hoitink and Fahy 1986, Dowling et al 1996, O'Sullivan & O'Gara 1992, Shanahan et al 1992).

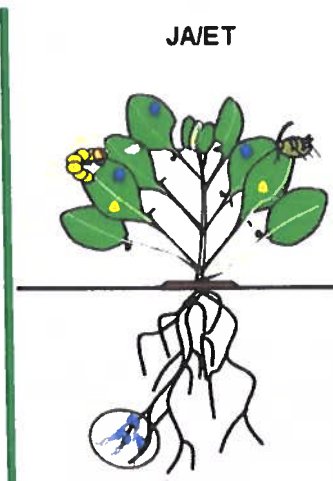


References: Mishra, S. et al. 2014. Suppression of mites by vermicompost tea on tea plant (*Camellia sinensis*). *Hanai' Ai* Vol 21  
Radovich & Arancon. 2011. *Tea Time in the Tropics* <https://western.sare.org/resources/tea-time-in-thetropics/>

### System-Acquired (SAR) & Induced-Systemic Resistance (ISR)



- SAR**
- Regulated by Salicylic Acid (SA)
  - Activated by pathogen infection of healthy tissues
  - Defends against sucking Insects



- ISR**
- Regulated by Jasmonic Acid (JA), Ethylene (ET)
  - Activated by beneficial microbes on plant roots
  - Defends against chewing Insects

References: Pangesti, N. et al. 2013. Two-way plant-mediated interactions between root-associated microbes and insects: from ecology to mechanisms. *Fr. Pl. Sci.* 4: 414.  
Blundell, R. et al. 2020. Organic management promotes natural pest control through altered plant resistance to insects. *Nature plants*, 6(5), 483-491.



## Chitin, Crustacean Meals

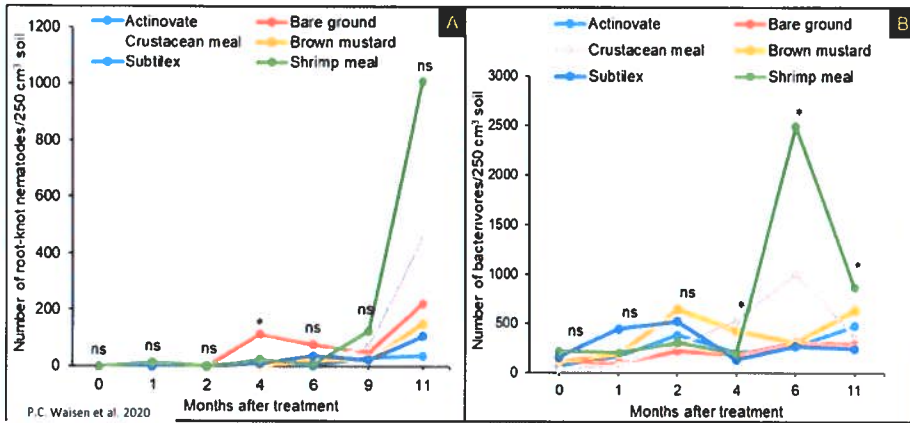
Chitin rich materials like crustacean meals stimulate chitonolytic microbes that consume chitin in nematode eggs, arthropod shells, and soilborne pathogens.



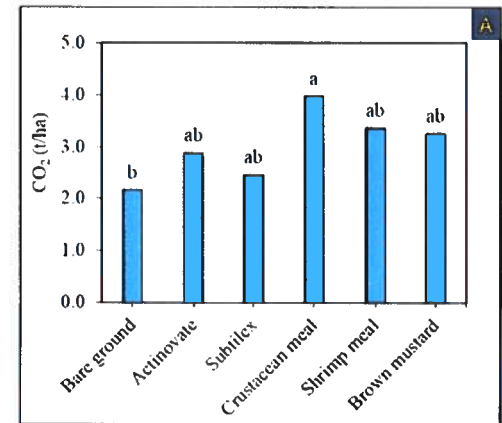
P.C. Down to Earth



Nematode Egg  
P.C. Creative Commons



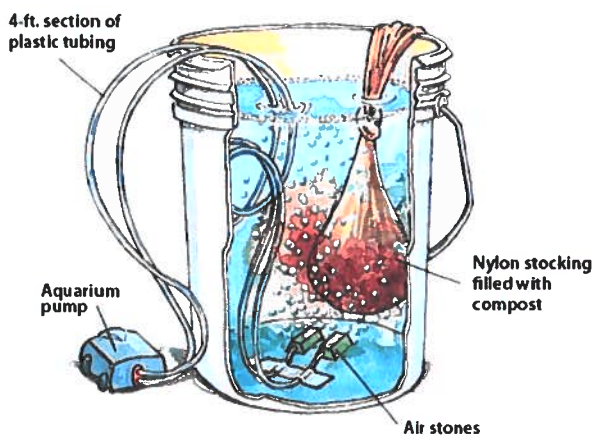
Crustacean meal, *Bacillus subtilis*, and biofumigation reduced root-knot nematode populations, increased bacterivores.



Crustacean meal increased soil respiration a.k.a. microbial activity.

References: W. Phillip et al. 2020. Pre-Plant and In-Season Soil Treatment with Chitin Rich Crustacean Meal Suppressed *Meloidogyne* spp. and Improved Soil Health in an Asparagus Agroecosystem. Poster.

## Make Compost Tea



- 1 part quality compost to 5-20 parts clean water by volume
- Recommended application rate: 7-14 gallons of tea per 1000ft<sup>2</sup> (Pant et al. 2011)
- Food safety recommendations
  - Make tea only from **properly treated** compost/vermicompost
  - Use **only clean water** to make compost tea or to dilute it and sanitize all equipment
  - **Avoid additives** when fermenting compost tea which can promote pathogen growth

(Image: Garden Gate Mag. 2010)



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