SETTING THE TABLE FOR A HOTTER, FLATTER, MORE CROWDED EARTH: INSECTS ON THE MENU?

SONNY RAMASWAMY
Societal Challenges aka Wicked Problems

- Population
- Food
- Water
- Environment
- Climate Change
- Energy
- Health
- Poverty
Food, Feed, Shelter, Clothe, Fuel, Bio-Feedstock > 9 billion

- Climate change
- Land and water constraints
- Increasing urbanization
- Environmental degradation
- Minimal ecological footprint
- Changing income and diets
- Positive health outcomes
The Nexus
Food Security: Paths Forward

- Transformative discoveries
- Farming systems
- Education
- Policies, regulation, marketing
- Human dimensions
- Insects as food
Path Forward: Knowledge Gaps

- Biology and ecology of insects as food/feed
  - Biotic and abiotic constraints
  - Ecological footprint – LCAs
- Nutritional quality
- Healthy/therapeutic foods
- Scale of production
- Food safety and allergens
- Regulations and policies
Path Forward: Transformative Discoveries

- "Wildcrafted"
- Insect farming
- Biology
- Human and animal nutrition
- Biodiversity
- Ecological issues
  - LCAs
- Supplements
- Bioprospecting
- Waste management
  - Animal feed
  - Bioproduct feedstocks
- Food safety
- Allergens
- Facilities
- Production scale
Path Forward: Human Dimensions

- Market hubs
  - “Market Maker”
  - Lessons from Organics?
- Quality and availability
- Regulations, policies, rule-making, governance
- Extension
  - Knowledge gaps
- Glocalization

- Jobs
- Acceptance
  - “Yuck” factor
  - Behavior, choices, attitudes,
  - Education
  - Chefs
- Nexus of bio-physical and social sciences
Path Forward: Funding

- Public
  - Stealth approach
  - Food security programs
  - SBIR
- Private
- NGOs
- Foundations
- Crowd sourcing – e.g., Kickstarter
- Commodity groups
Path Forward: Opportunities

• Marketing
  – Insect farming, specialty crop, land shrimp
• Healthy and therapeutic foods
• Locavores
  – Chefs as culinary trendsetters
• Insects as animal feed source
• Bioprocessing, bioproducts, bioprospecting
• Condiments, supplements, additives
• Waste management
• Diversified farming systems
Path Forward: Challenges
Policies, Regulations, Rule-Making
Food, Drug, and Cosmetic Act (FD&C)

• “Under the Act as amended, bugs/insects are considered food if that is the intended use (Sec. 201(f)). Food must be clean and wholesome (i.e. free from filth, pathogens, toxins), must have been produced, packaged, stored and transported under sanitary conditions, and must be properly labeled (Sec.403). The label should include the scientific name of the insect.
• Insects must be raised specifically for human food following current good manufacturing practices (cGMP).
• Insects raised for animal or pet food cannot be diverted to human food. They cannot be "wildcrafted" (collected in the wild) and sold as food due to the potential of carrying diseases or pesticides.
• The manufacturer also needs to demonstrate the "wholesomeness" of the product. There is a growing body of scientific literature that people who are allergic to shrimp, clams, etc. may also be allergic to insects either as food or as adulterants in foods.
Insect Protein Supplements

- Subject to regulation like any other food ingredient, which means that the protein is a food additive unless the use of the substance is GRAS.
  - Fish protein isolate is regulated as a food additive in 21 CFR 172.340.
  - To be considered GRAS, the substance would have to meet the GRAS criteria in 21 CFR 170.30.
  - A company can make a GRAS determination independent of FDA. However, self-GRAS determination can be challenged by FDA if it disagrees.
  - Company can voluntarily submit a GRAS notice of their claim to FDA for review. If the substance is a food additive, it would be considered unsafe under section 409 of the FD&C Act since there is no food additive regulation authorizing insect-derived protein in food.
  - Company interested in seeking a food additive regulation for the substance, they should submit a food additive petition that follows the format in 21 CFR 171.1.

http://www.fda.gov/Food/IngredientsPackagingLabeling/GRAS/default.htm
http://www.fda.gov/Food/IngredientsPackagingLabeling/FoodAdditivesIngredients/default.htm#
Animal Feed

- Need rule-making
  - FDA purview
Imagine: The Possibilities

SUNDAY, FEBRUARY 9, 2014

KNIGHT LIFE

I'm reading an article about people who eat bugs!! Isn't that disgusting?!!

Whatchu talkin' 'bout, Phyllis? You eat shrimp, correct?

I never miss "Red Tide Night" at Red Lobster!!

What are shrimp, if not insects of the sea?

Ya know--your sensible reasoning really bugs me!!

By Keith Knight
Choose MyPlate.gov

Setting the Table for a Hotter, Flatter, More Crowded Earth: Insects on the Menu?
Coming: To A Grocery Store Near You?

Images: Courtesy of Rakesh Soman; Caren Wilcox
Healthy/Therapeutic Foods

Image: Courtesy of Gabi Lewis, Exo
From Wastes to Value Added (NIFA SBIR Funding)

Food Wastes → BioPod → Black Soldier Fly → Hilo Mill → Animal Feed

Offal → BioPod → Black Soldier Fly → Press → Transesterification → Biodiesel

Images: Courtesy of Robert Olivier, ProtaCulture, LLC
USA Based Companies/Non-profits

- Insects as food
  - Chapul
  - Exo
  - SixFoods
  - World Entomophagy
  - Little Herds
  - All Things Bugs
- Insects as feed
  - ProtaCulture
  - Enviroflight
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YES!