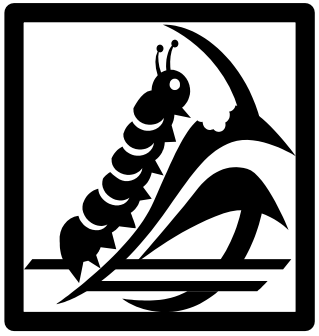
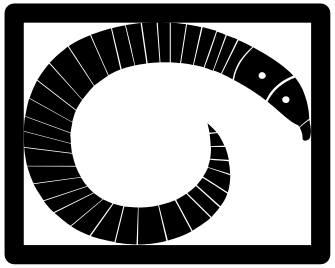
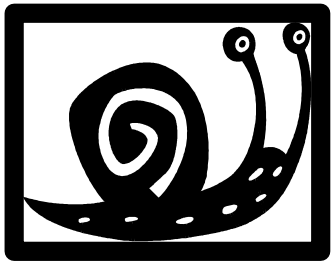
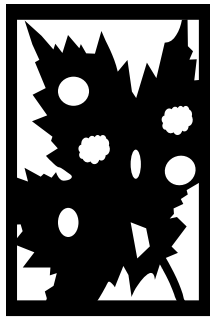
Host Status: What is it and why does it matter?

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A hypothetical example

- Multiple sources list “Yellow fruit fly” as attacking “*Prunus* spp.” as either occasional or rare host but no other info specified
- Attempting to trace each source to original research leads to “cyclical” citations
- The only original research that *associates* YFF with ANY *Prunus* is one paper from 1918
- Paper states that a single female emerged from a peach in 1917
- Paper is source of virtually all citations associating YFF with Prunus

- However:
  - No interceptions of YFF on ANY *Prunus* in 100 years
  - No other detections of YFF on ANY *Prunus* in 100 years
  - No other field data showing YFF on Prunus despite YFF being endemic in areas where several species of *Prunus* growing

- Should *Prunus* be regulated for YFF?

When does it come up

- Pest risk analysis
- Trade
- Surveillance programs
- Sampling and testing
- Inspection
- Quarantines (domestic and foreign)
- Area wide pest management

What is a host

IPPC Glossary “host range”

- Species capable, under natural conditions, of sustaining a specific pest or other organism

IPPC Glossary “host pest list”

- A list of pests that infest a plant species, globally or in an area

Some examples of hosts

- The larva of a species of fruit fly is found feeding inside a papaya
- Extensive literature indicates a type of virus is found to infect *Rosa* spp.

- Seems pretty straightforward, right?

Let's talk about where it gets vague

The ability of a plant to ***sustain*** a pest population ***under natural conditions*** can vary

- Ripeness
- Variety
- Seasonality
- Environment
- What constitutes "sustain"
- What constitutes "natural conditions"

Let's talk about where it gets vague

The information can vary:

- Pest is in, on, with, associated, feeding on, infesting
- Natural infestations versus experimental data
- Host terminology – dozens of terms attempting to describe "host-iness"
- How does pest-host relationship relate to pathways and risk?

Examples of host terms

- host
- field host
- natural host
- primary host
- preferred host
- commercial host
- regulated host
- conditional host
- conditional non-host
- experimental host
- laboratory host
- secondary host
- non-preferred host
- wild host
- occasional host
- reproductive host
- minor host
- poor host
- rare host
- unusual host
- natural non-host
- non-host

Things to consider

- How much, what kind and what is the quality of evidence being used to decide a plant is a host?
- How do we talk about evidence and uncertainty?
- What criteria do we use and do we use those criteria consistently?
- How defensible are our decisions?

What kind of guidance exists?

- NAPPO Regional standard on determining host status for fruit flies (adopted 2008)
  - Includes host, non-host, conditional host
- IPPC standard
  - Debate over “semi-natural host” or “conditional host”

What kind of guidance is needed?

- Guidance for researchers vs regulators
- Proposed/draft NAPPO standard on determining host status based on **existing evidence**
  - Was under development but currently on hold
  - Contingent on decisions in IPPC on “conditional host” terminology

Host status – how do we decide?

- In reality, host status is a continuum
  - Pests may survive better on some hosts than others
  - Pests may prefer some hosts more than others
  - Specific conditions may be identified that prevent or allow infestation
  - Lots of gray area

Host status – how do we decide?

- In the regulatory world, we need discrete lines to make decisions
  - Black and white
  - Operational concerns mean we need clear, defensible (and consistent) decisions
  - Trade concerns
  - Should it be regulated or not?

What are the options for decision-making?

- Base decisions on historical context
- Base decisions on any and all evidence without "weighting" the evidence (*and any evidence is enough to trigger regulation*)
- Make decisions case-by-case and on an ad hoc basis according to each individual's judgments ("gut feeling")
- Develop criteria for making judgments about evidence

What about the evidence?

- Examine available evidence
  - Scientific, technical, interception, NPPO records, etc.
- *Make judgments based on evidence*
  - Requires experience
  - Subject to interpretation
- Make a decision as to whether a pest should be regulated with respect to a host
- Incorporate uncertainty into judgments and decisions
- NAPPO RSPM 40 (Risk Management) is a good resource

What about the criteria?

- "Natural" vs field vs controlled field vs lab
- Interception type / frequency
- Type of literature or evidence
  - Multiple articles with independent information
  - Literature associating pest with host under wide range of conditions in field
  - Methods specified in article, including condition of host
  - Listing only
  - Host mentioned in same article as pest? (or…the dangers of bad abstracts!)
- Are there specific conditions that allow or prevent infestation

Host types

- Host
- Non-host
- Conditional Host (or Conditional non-host)
- Experimental / laboratory host
- *Fomite*

Host types

Host

- A plant species that may be infested or infected by a plant pest under a broad range of natural or field conditions (e.g., wild, cultivated or unmanaged plants) and the pest is sustained in a normal manner on that plant species

Host types

Non-host

- A plant species that does not become infested or infected by a plant pest under natural or field conditions (e.g., wild, cultivated or unmanaged plants) or the plant pest is not nutritionally sustained on that plant species

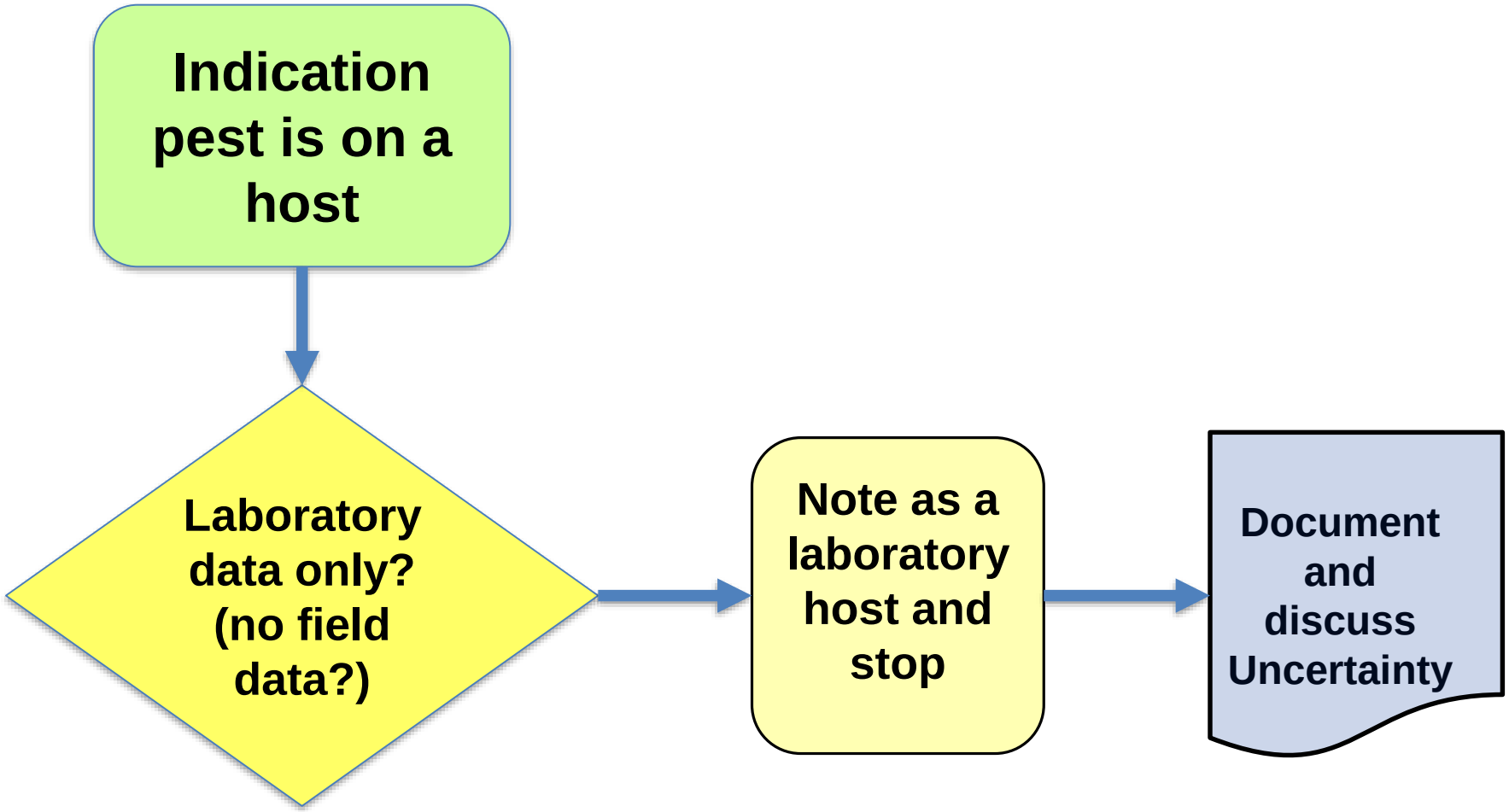
Host types

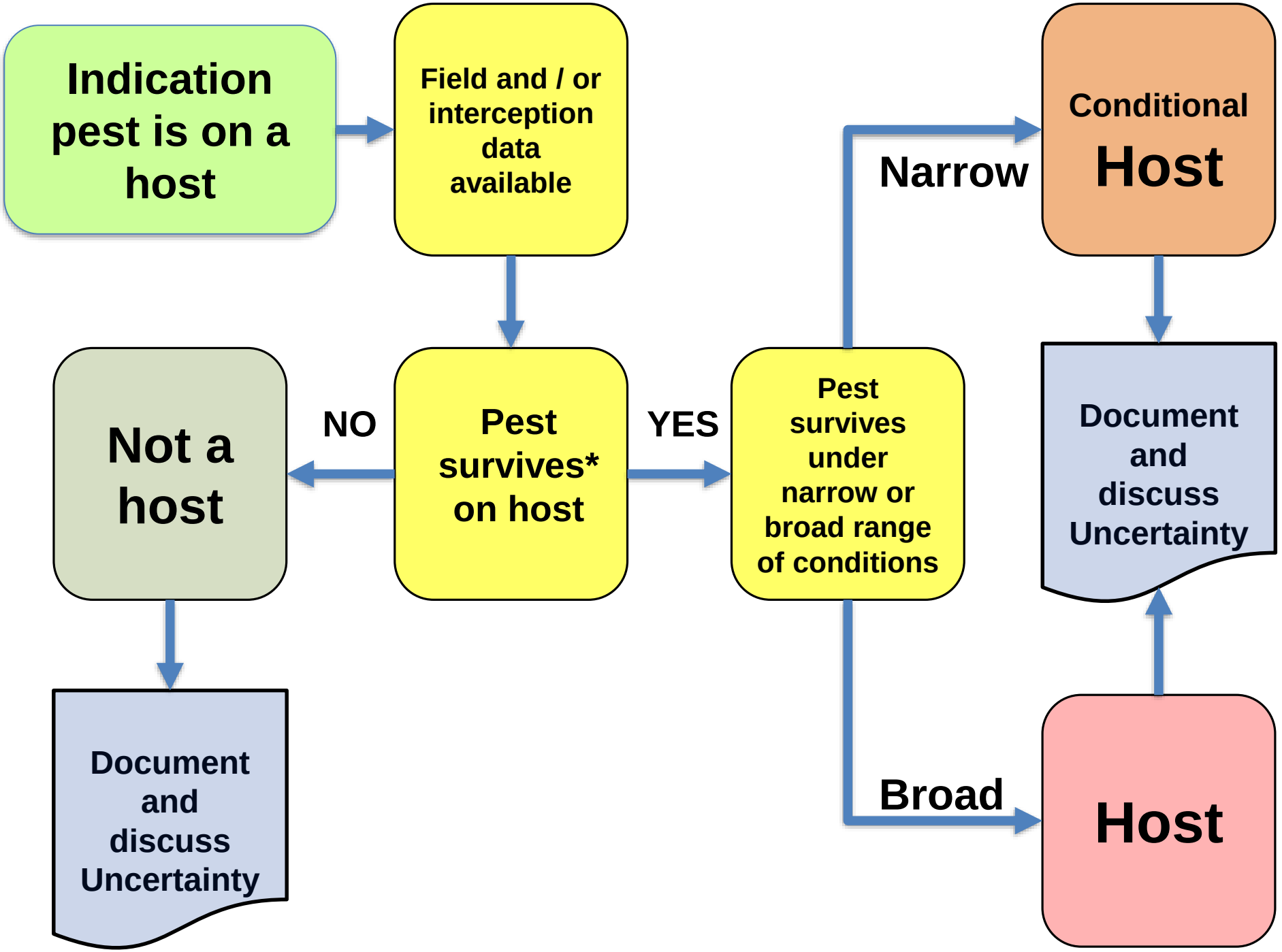
Conditional Host (or Conditional non-host)

- **Conditional Host.** A plant species that is only a host under a defined narrow range of conditions [for which specific evidence is available and those conditions can be described] [e.g., host variety, environmental or ecological conditions] – lemons may be medfly hosts under specific conditions

- **Conditional non-hosts.** A plant species that becomes a non-host under a defined narrow range of conditions (e.g., avocados are generally a fruit fly host, but 'Hass' avocados are a non-host for some species of fruit flies).

**note: definitions are different than IPPC


Indication pest is on a host
Laboratory data only? (no field data?)
Note as a laboratory host and stop
Document and discuss Uncertainty


Indication pest is on a host
Field and / or interception data available
Pest survives* on host
NO
Not a host
Document and discuss Uncertainty
YES
Pest survives under narrow or broad range of conditions
Narrow
Conditional Host
Document and discuss Uncertainty
Broad
Host

Radical thinking: The concept of "fomite"

- Definition: an object that may be contaminated with infectious organisms and serve in their transmission
- Concept widely applied in human and animal epidemiology

The case for “fomites” in plant health

- Pests may be associated with a commodity but not infesting that commodity
- Sometimes this can present a pathway of significance, sometimes not
- When this presents a pathway, should we assess the risk?
- What are some examples of fomites we are familiar with?

The case for “fomites”

- Snails on **tile**…
- Pathogens in soil adhering to **machinery**...
- Quarantine pests on **used cars**…
- Pests moving with **military equipment**…
- **Grafting tools** can transmit viruses

Host status
Recommendations to consider

- Have criteria – decide what works
- Use the criteria, talk about the criteria and make adjustments based on a learning curve
- Make it a practice to talk about the level of uncertainty associated with the evidence
  - Why is that important?
- Determine how conservative you need to be *based on the level of uncertainty*

You decide: Is it a host?

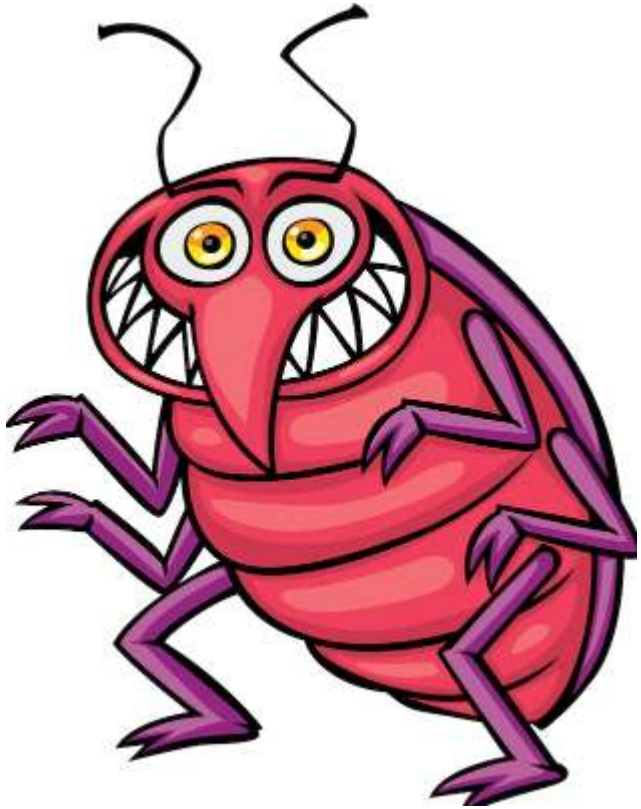
- *Tuta absoluta* infests tomato plants, feeding on leaves and occasionally fruit. In the literature, tomato is typically referred to as a primary host

You decide: Is it a host?

- Hass (variety) avocados do not appear to be infested by *Anastrepha* spp. fruit flies in avocado orchards even though other varieties of avocado are susceptible

You decide: Is it a host?

- A single report states “Lima bean is a rare host for *Bugus creepus* (Lepidoptera)” but without specific or original data. No other information is available despite a thorough literature search.



You decide: Is it a host?

- Asian Gypsy Moth egg masses are found frequently on ships arriving from the Far East during certain times of year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Tack
Asante
谢谢
Tak
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kiitos
Gracias
Salamat!
Terima kasih
Aliquam
Merci
Obrigado
Dankie
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