## Biological control of weeds Updates for Big Island Natural Areas

2nd Annual Big Island Natural Area Weed Mgmt Forum

Ken Puliafico, Tracy Johnson, Nancy Chaney, & Lori Bufil

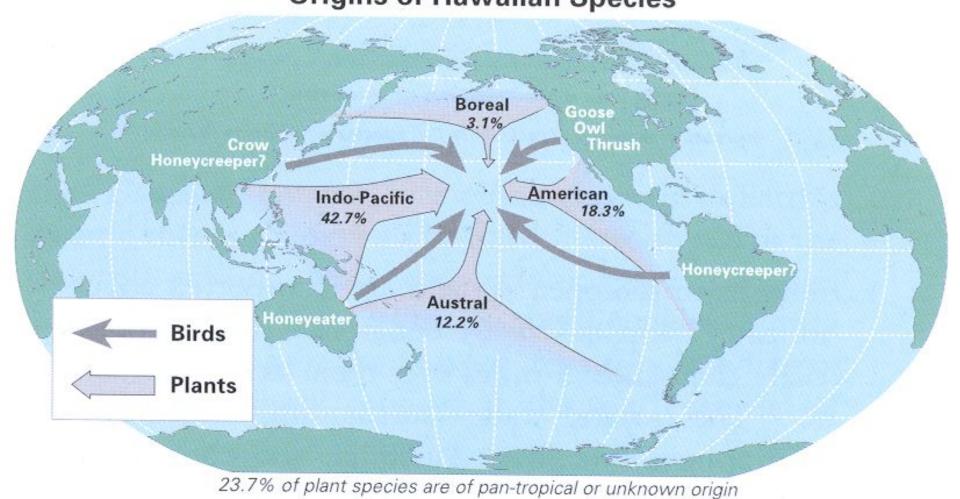
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Pacific Southwest Research Station

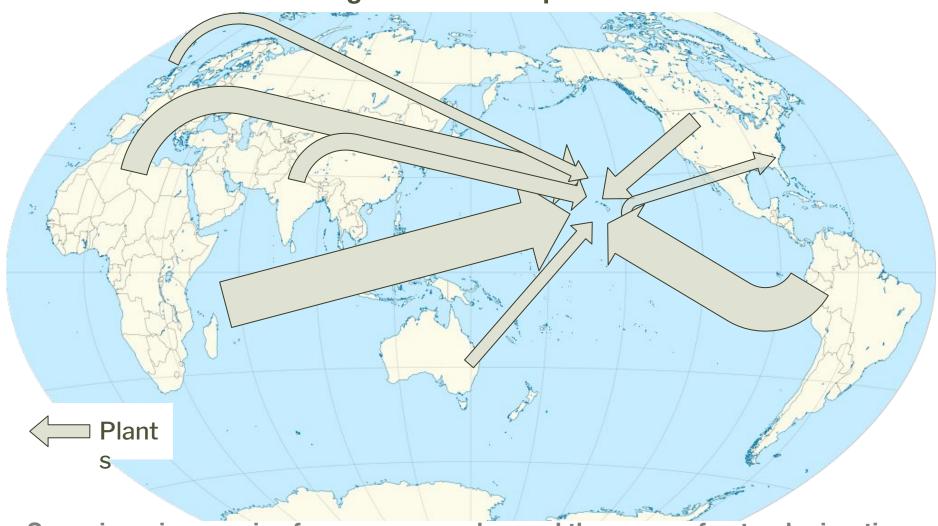


## Natural Introductions Origins of Hawaiian Species





## Human Caused Introductions Origins of Exotic Species



Some invasive species from new areas beyond the range of natural migration.



## Introduced species in Hawaii

- Over 50% of total flora is exotic (Wagner et al. 1999)
- Entirely new plant families
- Plants from around the world



### Land managers want biological control





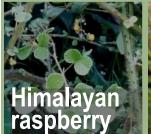
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Target Selection











Foreign Exploration in Native Range





Host-specificity

Tactin





Developing biological control for Hawai'i forest weeds

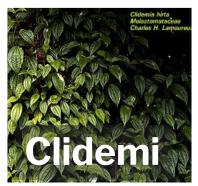


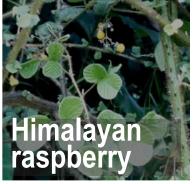


Biocontrol of strawberry guava



### Joint Projects









Christmas

berry



















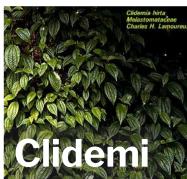




### **US Forest Service projects**



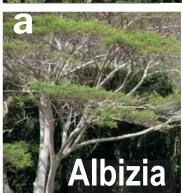
Biocontrol agent releases







Quarantine screening & permits





Foreign exploration



## Biocontrol agent releases





### Application of Tectococcus ovatus

- Live insect releases from reproductive females
- Eggs blow onto trees
- Crawlers move onto young leaves
- Potted plants
  - Heavy
  - Hard to attach
  - Other pests
- Bolos to the rescue!











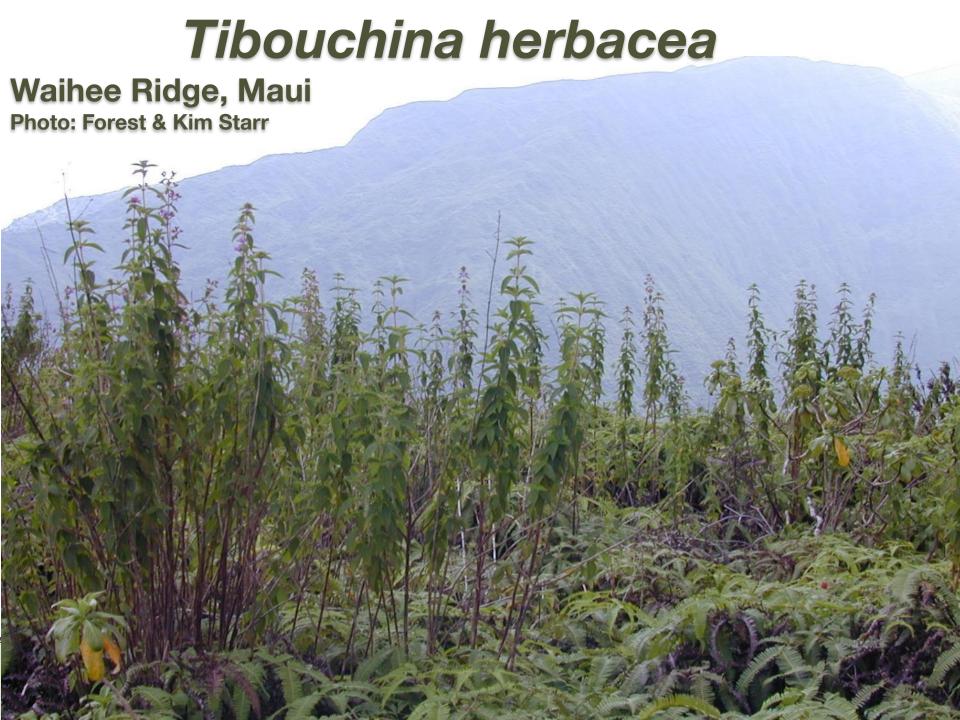


Application and Establishment of *Tectococcus ovatus* in Forest Areas 2013-2016





# Biological control agents under development







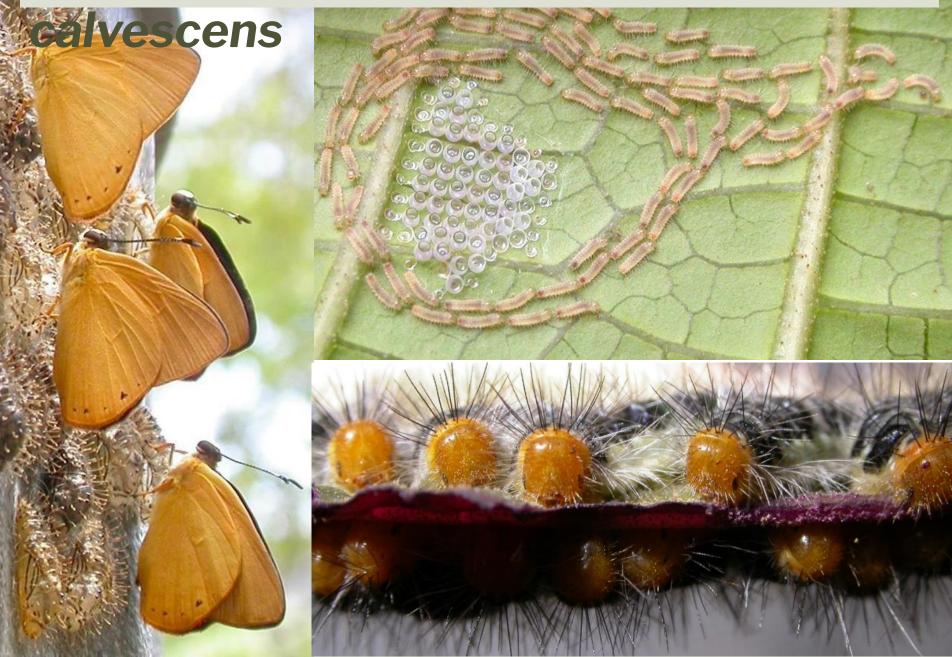


Syphraea uberabensis on





## Euselasia chrysippe on Miconia



Allorhogas gall wasp on Clidemia hirta in





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## Schinus terebinthifolius: Quarantine testing of thrips agent at USDA-ARS-IPRL in Florida with Hawaiian plant









Himalayan ginger biocontrol: CABI – UK coordinating exploration and testing of shoot fly from Sikkim, India

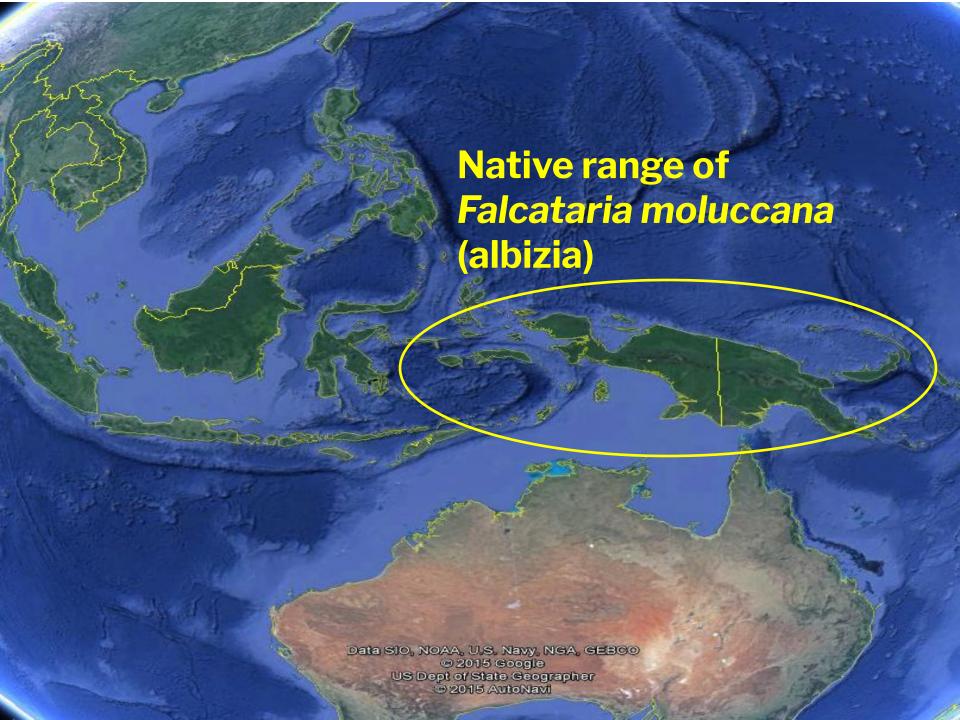








## Foreign Exploration for Albizia (Falcataria moluccana)



## Albizia Biocontrol Survey

Papua New Guinea & Indonesia partners help find future biocontrol agents





### Falcataria gall rust fungus Uromycladium falcatarium

- Attacks growing tissue on trees of all ages
- Many varieties in native range
- Closely related to biocontrol species used in South Africa





## Albizia top 5 Insect Candidates

- From families with host specific species
- Similar species used in other biocontrol projects
- Widespread in native range
- Preparing to screen these at Indonesian universities





### Mahalo!

To the many partners that share our vision for conservation in Pacific Islands!





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## Forest Weed Biocontrol Partners in Hawaii

- US Forest Service
- Hawaii Dept. of Agriculture
- National Park Service
- Hawaii Invasive Species Council
- University of Hawaii
- Hawaii Dept. Land & Natural Resources
- Watershed Partnerships
- The Nature Conservancy

- USDA ARS
- USGS -Ecosystems
- US Fish & Wildlife Service

