The role of bird dispersal in plant invasion pattern

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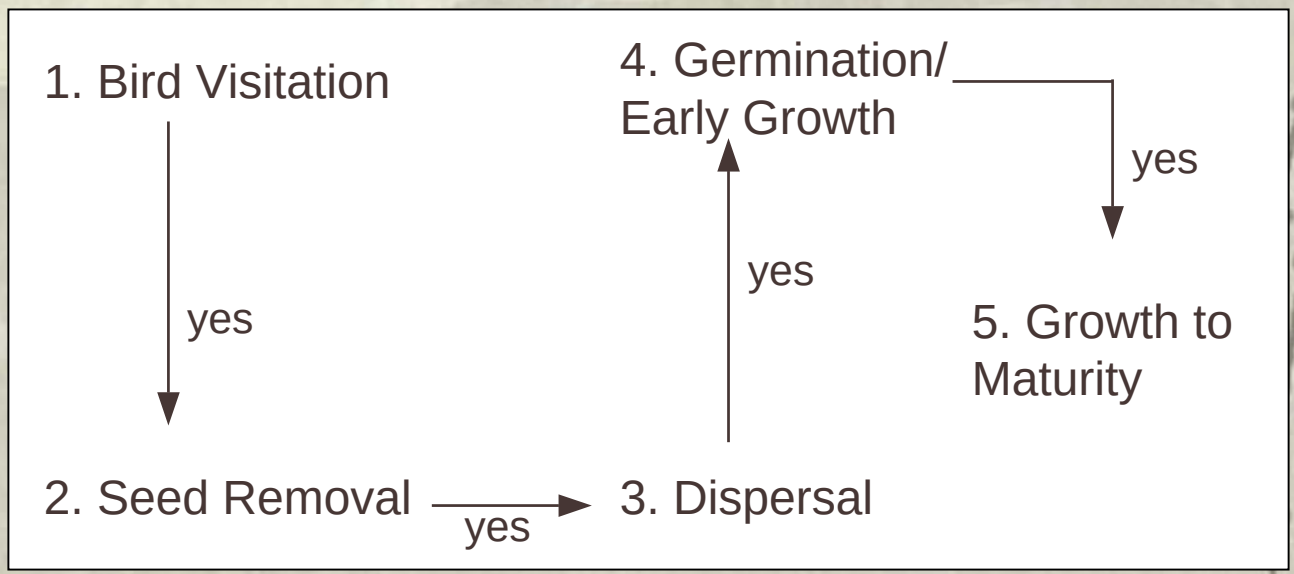
Presentation Outline

- Literature review: known patterns of bird-mediated plant invasion
- Knowledge gaps and conservation implications
- Conceptual framework and broad question
- My approach: CA avifauna and woody plant introductions

Conceptual Framework

- Necessary factors: successful bird-dispersed plant invasions



  - Loose coevolution and generalized dispersal complexes

Literature Review

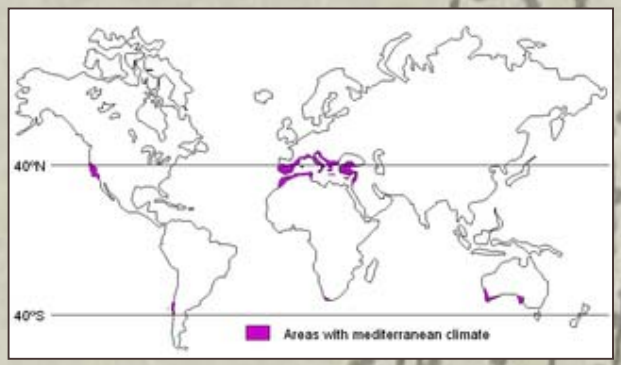
- Known patterns: successful bird-mediated plant invasion
  - Plant perspective: benefits of bird dispersal
    - Population growth rate (Sekercioglu 2006)
    - Seed size and dispersal (Willson et al. 1990)
    - Germination promotion (Meisenburg and Fox 2002)
    - Vertebrate-dispersed species: 60% (temperate) to 90% (tropical)
  - Bird perspective: fruit attractiveness - abundance, size, pulpiness, color (Sallabanks 1993)

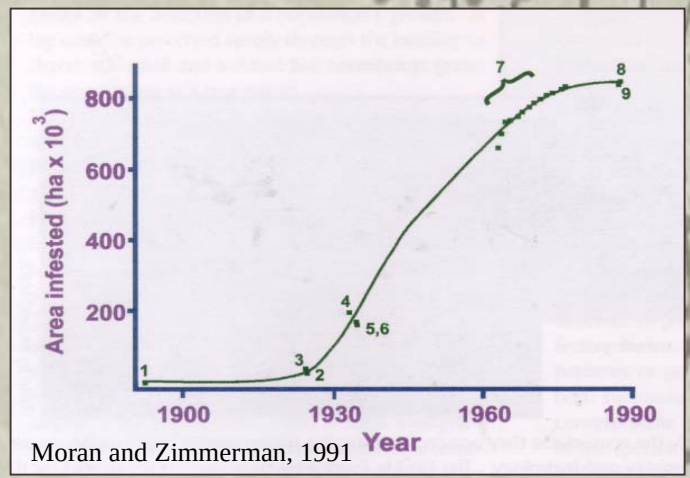
Literature Review

- Additional patterns: successful bird-mediated plant invasion
  - Influence of frugivore behavior and traits
  - Fragmented landscapes and riparian corridors (Gosper et al. 2005)
  - Invasion of undisturbed habitats: triggering attributes (Gurvitch et al. 2005)

Literature Review

- Relevance to California (Central Valley)
  - Mediterranean climates
  - Conservation implications: reserve design: frugivorous birds and oldfield colonizers (Neilan et al. 2006); corridor attraction of bluebirds (Levey et al. 2005)
  - Lag phases (gap!)





Moran and Zimmerman, 1991

Literature Review

- Conservation implications: potential impacts of bird-mediated invasions (gap!)
  - On native plants
    - Less attractive natives: dispersal-limited? (Knight 1986)
    - Attraction to disturbed or edge habitats: inadequate native dispersal? (Traveset and Richardson 2006)
  - On native birds
    - Plant community structural changes (Traveset and Richardson 2006)
    - Fruiting season, urban areas, and migration (Debussche and Isenmann 1990, 1992)

Risk Assessment: "Red Flag" Nonnatives

- A few prime suspects:
  - Fleshy-fruited, woody trees/shrubs
  - Widely-introduced
  - Known invasives of similar climates, but…

…Californian establishment/spread nonexistent or rare

E.g.: *Olea europaea*, *Ligustrum lucidum*, *Schinus terebinthifolius*

Noninvasiveness: Temporary or Lasting?

- Overarching research question:

  What is the role of bird dispersal in the invasion success of fleshy-fruited, woody plant species introduced to California?

Spectrum Approach: Case Studies

Olea europaea[2]

- ***Olea europaea:*** Australian invasion (starlings), monospecific stands, reduction in drupe size (Spennemann and Allen 2000) (Lord 2004)
- ***Triadica sebiferum:*** Southeastern US invasion (riparian/saline soils), generalized avian dispersal syndrome (Renne et al. 2002)
- ***Ligustrum lucidum:*** Invasion in Chile/Australia, urban spread
- ***Rubus armeniacus:*** California invasive

Triadica sebiferum[3]

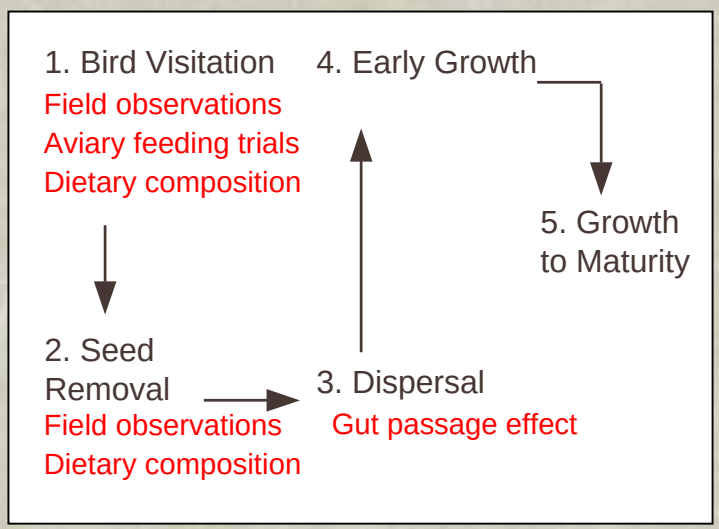
Ligustrum lucidum

Rubus armeniacus[1]

[1]Photo source: kaweahoaks.com/html/ grpvn-trl-03hberry.jpg; [2]Photo source: http://www.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/weeds_shrubs_olive; [3]Photo source: http://tncweeds.ucdavis.edu/esadocs/sapisebi.html

Proposed Studies

- Field observations: bird use of nonnatives vs. natives
- Aviary feeding preference trials
- Gut passage effect on germination
- Year-round dietary composition



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