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Invasion Biology 1

The Invasion Process

Invaders at Home
Can invasiveness be predicted from life-history traits?

- Baker - sexual and asexual reproduction together, rapid growth, phenotypic plasticity in plants
- Pysek - height, life form, competitive ability, taxonomy in plants
- Vegetative reproducers, unfussy germination, long duration of fruit on plants
- Colonists are r-selected
- Newsome and Noble - invasive birds and plants "gap grabbers", competitors, survivors (long life), swampers (mass reproduction)
- Freshwater fish are tolerant of broad range of environmental conditions, rapid dispersal and colonisation, aggression, useful to people
- Vertebrate invaders have close association with humans, high abundance in native range, large size, broad diet, short generation time, ability for females to colonise alone, tolerant to broad range of environmental conditions

Invasion Process
Transport

- Most long distance transportations by humans
    - Ballast, nursery stock, pet trade, illegal wildlife trade
- Propagule pressure - the more offspring had, the greater the chance they will be transported

Establishment

- May be little correlation between traits needed for colonisation than establishment
    - Dispersal vs competition
- Environmental tolerance greater in invasive species
- Colonisation may involve genetic bottlenecks

Lag

- Lag between colonisation and becoming invasive
- Build-up of genetic variation?

- Selection and adaptation to new environment?
- De novo adaptation - a new mutation allows invasiveness?

Spread

- Role of dispersal mode and reproductive biology?
    - Number of offspring, dispersal mode, birth and death rates
- Effect of landscape structure?
- Effects of genetics and rapid evolution?
    - Comparatively little studied

Ecological Impact

- How can effects be measured? What factors determine nature and effect of impact?

Human Impact

- What are economic impacts?
- How can we predict success of management/restoration efforts?
- Can we manipulate invasibility of communities?

Causes and Consequences of Ant Invasions

Invasive "tramp" ants

- Cosmopolitan invasive ants
- Unicolonial - one colony has multiple queens and subcolonies, but are not aggressive to each other
- Omnivorous
- Good at competing with other species
- Not good dispersers - rely on humans

Argentine Ants

- Known in Buenos Aires in 1868
- Southern USA 1891
- Europe 1905
- South Africa 1908
- Australia 1939
- Each time spread by humans
- Prefer areas of modified soil
    - E.g. cultivated fields
- In South Australia, Argentine ants restricted to those areas that are well-watered
    - Affect native ants, but not really other invertebrates

Halway 1998 Californian Argentine Ants

- Exclude native ants from their habitat
- Non-ant invertebrates not seemingly affected

Long-term Impacts

- Ant species do not recover over time

Invasion impact on seed dispersal mutualisms

- Argentine ants exclude ants that preferentially disperse large seeds
- Altering ant species balance - affects plants as well

Argentine Ant Supercolony

- Across Mediterranean coast Argentine ants are considered a supercolony
    - They don't fight, except some in Catalonia