PENYAKIT PADA PUCUK, BATANG, CABANG DAN AKAR

Complexity of forest diseases

- At the individual tree level: 3 dimensional
- At the landscape level" host diversity, microclimates, etc.
- At the temporal level

Complexity of forest diseases

- Primary vs. secondary
- Introduced vs. native
- Air-dispersed vs. splash-dispersed, vs. animal vectored
- Root disease vs. stem. vs. wilt, foliar
- Systemic or localized

Categories of wild plant diseases

- Seed decay
- Seedling diseases
- Foliage diseases
- Systemic infections
- Parasitic plants
- Cankers, wilts , and diebacks
- Root and butt rots
- Floral diseases

Seed diseases

- Up to 88% mortality in tropical Uganda
- More significant when seed production is episodic

Seedling diseases

- Specific diseases, but also diseases of adult trees can affect seedlings
- *Pythium*, *Phytophthora*, *Rhizoctonia*, *Fusarium* are the three most important ones
- Pre- vs. post-emergence
- Impact: up to 65% mortality in black cherry. These diseases build up in litter
- Shady and moist environment is very conducive to these diseases

Foliar diseases

- In general they reduce photosynthetic ability by reducing leaf area. At times this reduction is actually beneficial
- Problem is accentuated in the case of small plants and in the case other health issues are superimposed
- Often, e.g. with anthracnose,needle cast and rust diseases leaves are point of entry for twig and branch infection with permanent damage inflicted

Cankers, wilts, and die-backs

- Includes extremely aggressive, often easy to import tree diseases: pine pitch canker, Dutch elm disease, Chestnut blight, White pine blister rust
- Lethal in most cases, generally narrow host range with the exception of Sudden Oak Death

Root diseases

- Extremely common, probably represent the most economically damaging type of diseases
- Effects: tree mortality (direct and indirect), cull, effect on forest structure, effect on composition, stand density, growth rate
- *Heterobasidion, Armillaria, Phellinus weirii, Phytophthora cinnamomi*

POPULATION DYNAMICS

Species interactions and diversity

Disease and competition

- Competition normally is conducive to increased rates of disease: limited resources weaken hosts, contagion is easier
- Pathogens can actually cryptically drive competition, by disproportionally affecting one species and favoring another

Diseases and succession

- Soil feedbacks; normally it's negative. Plants growing in their own soil repeatedly have higher mortality rate. This is the main reason for agricultural rotations and in natural systems ensures a trajectory towards maintaining diversity
- *Phellinus weirii* takes out Douglas fir and hemlock leaving room for alder

Diseases as strong forces in plant evolution

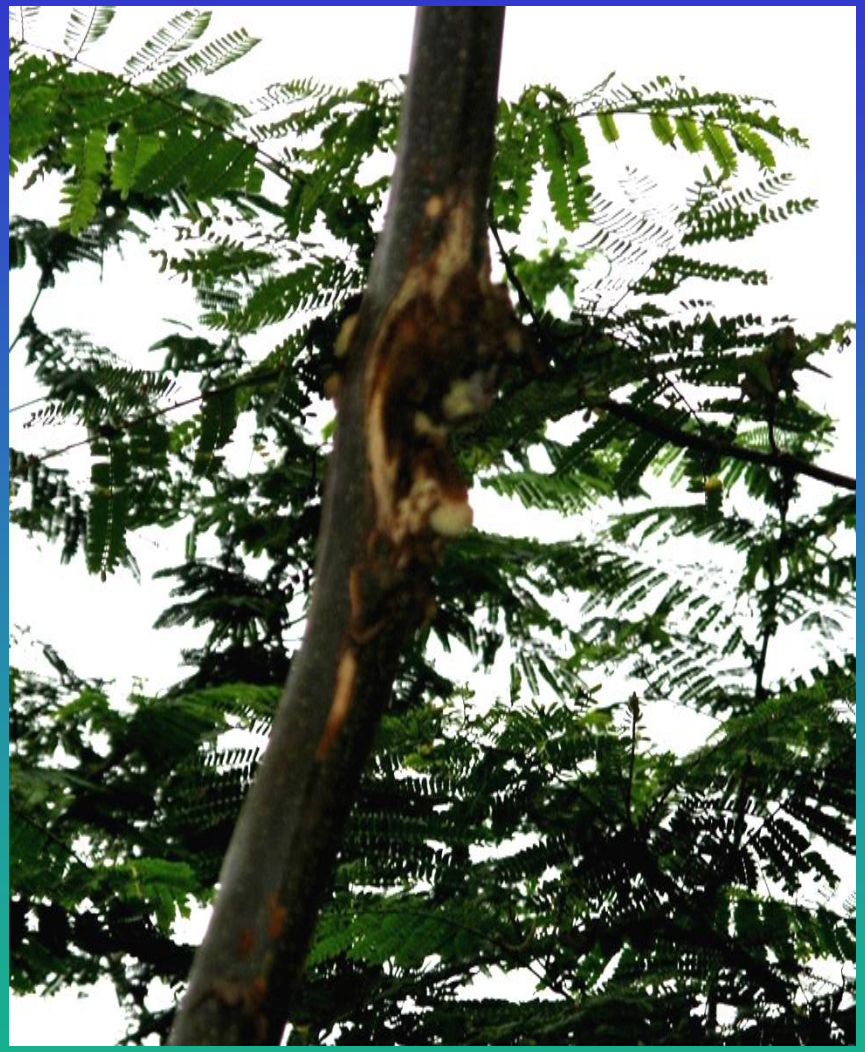
- Selection pressure
- Co-evolutionary processes
  - *Conceptual*: processes potentially leading to a balance between different ecosystem components
  - *How to measure it*: parallel evolution of host and pathogen

HOST-SPECIFICITY

- Biological species
- Reproductively isolated
- Measurable differential: size of structures
- Gene-for-gene defense model
- Sympatric speciation: *Heterobasidion, Armillaria, Sphaeropsis, Phellinus, Fusarium forma speciales*

The "scale" of disease

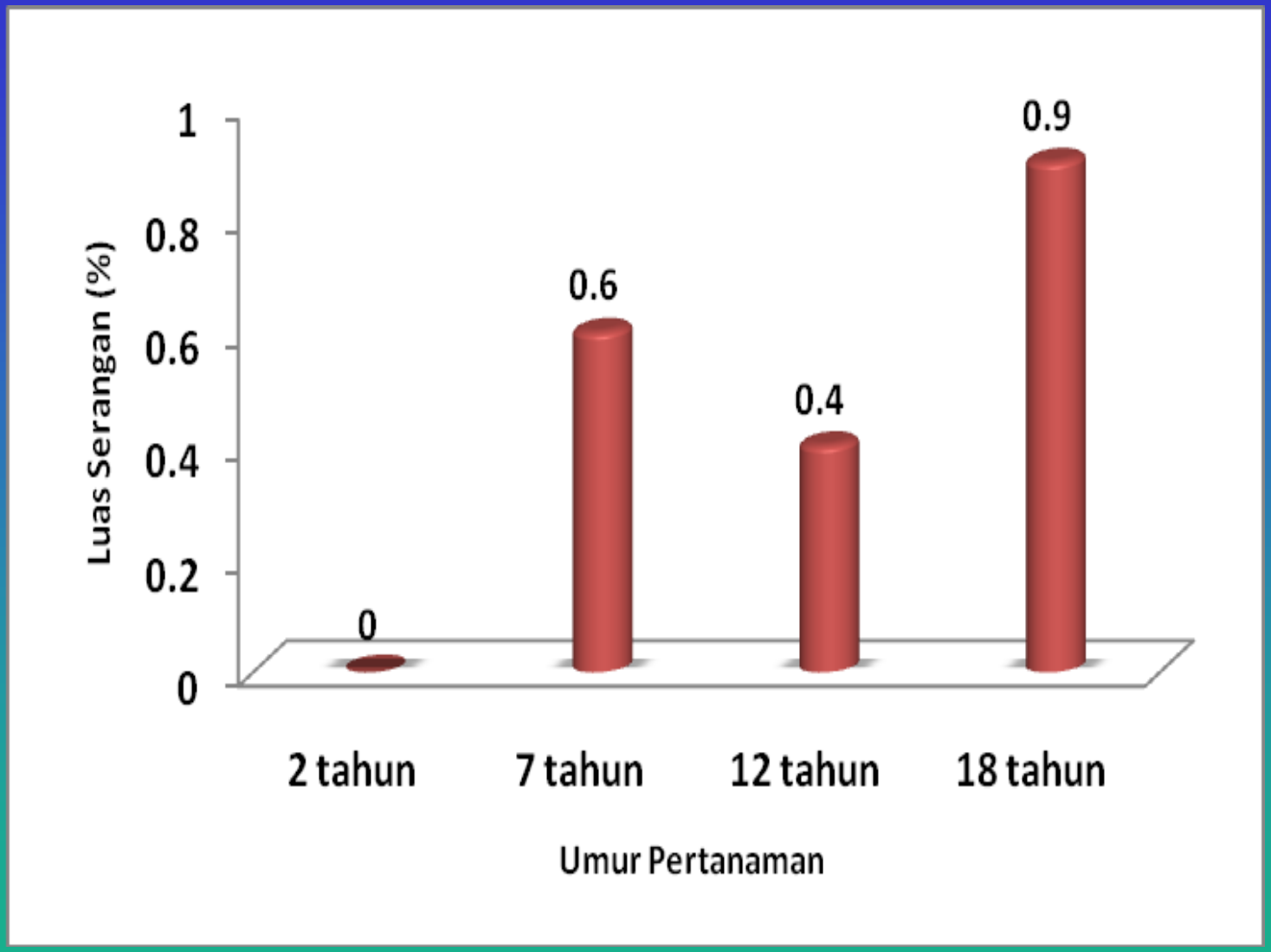
- Dispersal gradients dependent on propagule size, resilience, ability to dessicate, NOTE: not linear
- Important interaction with environment, habitat, and niche availability. Examples: *Heterobasidion* in Western Alps, Matsutake mushrooms that offer example of habitat tracking
- Scale of dispersal (implicitely correlated to metapopulation structure)---two examples: *Heterobasidion* in California, and *Coriolopsis* in Panama



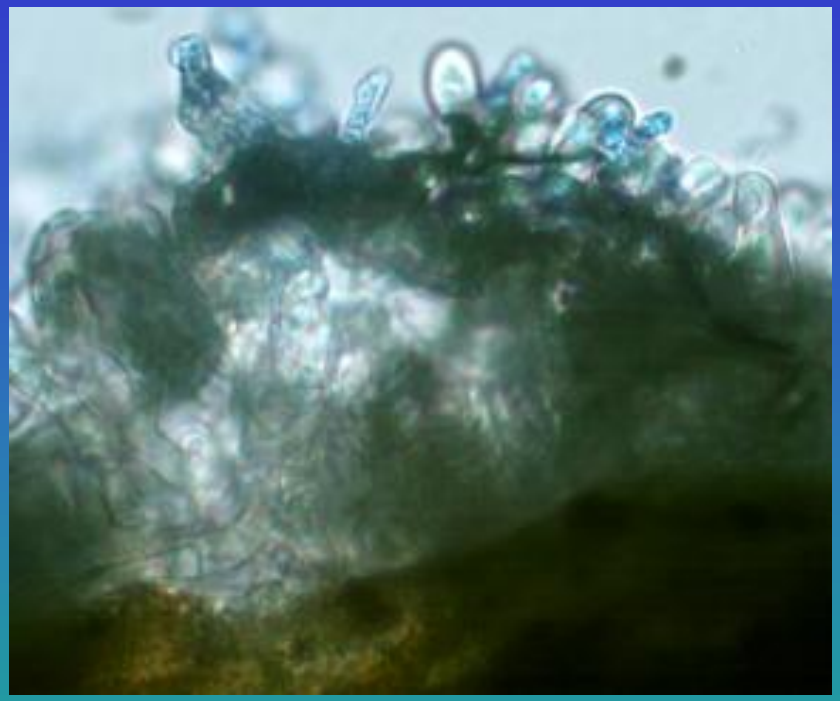
Aplikasi Fungisida pada trubusan

Jamur Upas

Gejala penyakit jamur upas pada : a. tajuk yang mengalami mati kering, b. Kumpulan miselia warna putih yang menebal pada batang, c. kerak warna merah jambu pada cabang dan batang, d. Kerak warna merah jamubu diikuti dengan munculnya tunas muda pada cabang yang terinfeksi, e. Pustul stadium necator pada cabang dan f. lubang-lubang gerekan serangga pada batang yang telah rapuh



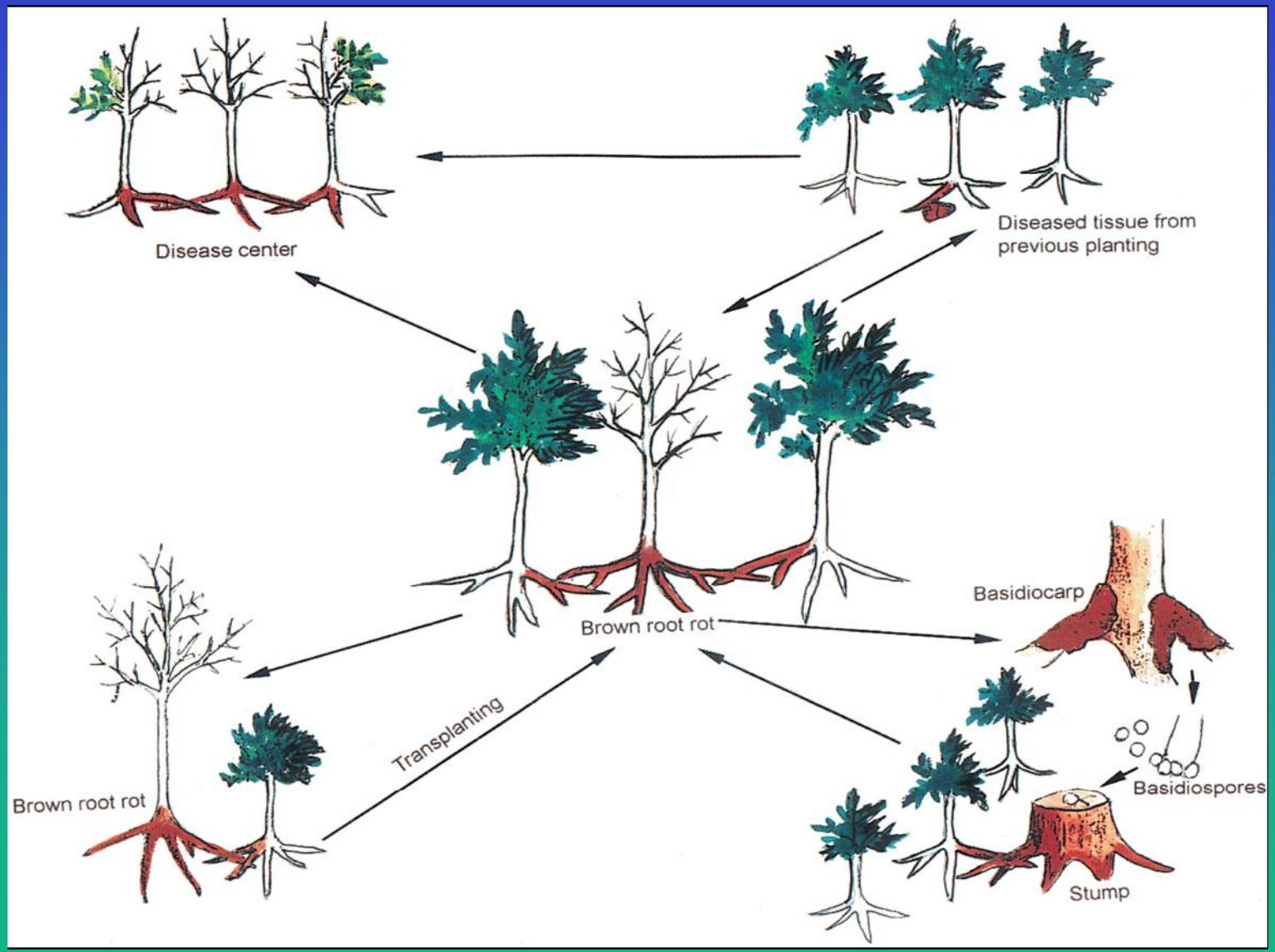
Luas serangan jamur upas pada pertanaman cemara udang umur 2,7,12 dan 18 tahun di lahan pantai Samas



basidiospora jamur upas pada pertanaman cemara udang umur 2,7,12 dan 18 tahun di lahan pantai Samas, Bantul, Yogyakarta

Root rot Disease in Sabah, Malaysia

Brown root by *Phellinus* Spp. in Taiwan


Disease center
Diseased tissue from previous planting
Brown root rot
Basidiocarp
Transplanting
Brown root rot
Basidiospores
Stump

Girdling Roots on Shorea in Pulau Laut

Sometimes roots develop in an unfortunate position, choking off other roots or the base of the stem as they develop. This is especially common on planted seedlings. It is made more likely by growing of seedlings in containers or close cultivation of the soil.

Prolepsis on Shorea in Oby island, Moluccas