

Study of fruit bat diets: what we can learn, how we can learn it and why it matters...

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Bat diet tell us many things including

- What is the major food item for this particular bat species. Do season influence on food items.
- Where this bat forage.
- Do bats in different species, sex, age class differ in their diet (also habitat use/nutrition requirement).

- when food availability is monitored, the keystone food plants in a critical period can be proposed. On the other hands, we can tell that bat prefer specific diet (habitat) when several food items is available.
- The diet study lead to further investigation on
 - role of bats in pollination or seed dispersal of particular plants/habitat.
 - how much damage of bats as fruit pest.

Foraging behaviour of fruit bats.

Fruit bats generally have several foraging areas in a night. In each feeding area, they either consume fruit at fruiting trees (large bats or large fruit) or transfer fruit to consume at feeding roosts (within ca.200m from fruiting trees). It defecate/eject fruit parts (&leaves) at feeding roost. It also use day roost as feeding roost, take fruits and consume at day roost. Bats keep using these feeding areas until fruits are finished.

How we study bat diet?

Two ways - day roost/feeding roost observation
- netted bats.

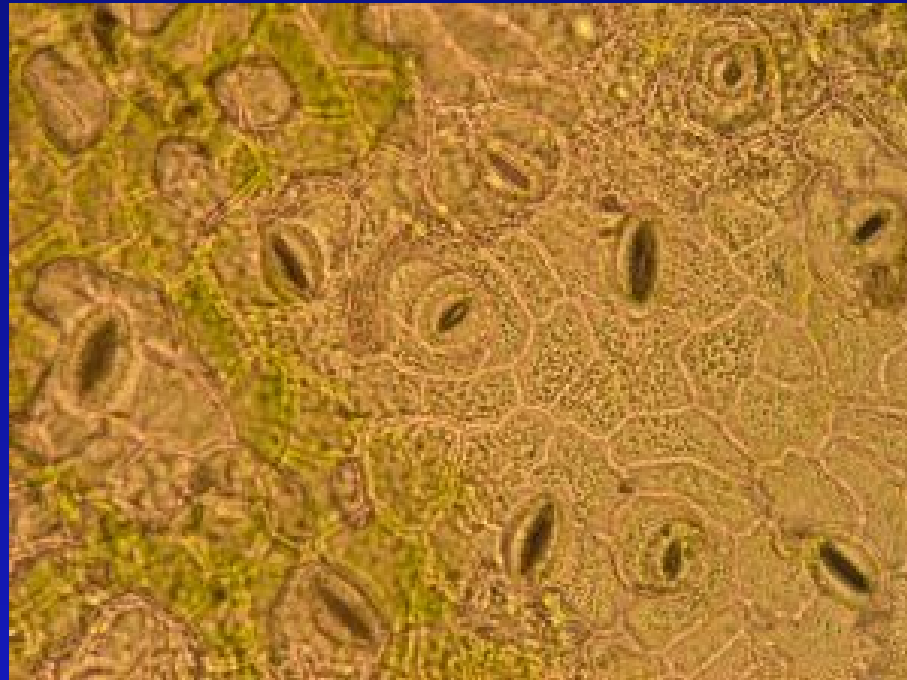
At day roost/ feeding roost



Identifying diet items from day roost.

- Seeds >> compare with seed collected in the area (reference collection) (feeding roost is less than 200m from fruiting trees)
 - >> germinate seed
- Fruit pulp (much of faeces)>>keep with alcohol> see under microscope, smell or test with chemical.
- Pollen >>prepare slides and compare to reference collection.

Ejecta :mostly leaves, fruit fiber-hard to digest >> prepare slide and identify leaf stomata or trichrome.



Identifying diet items from netted bats





Pollen was collected from bat face, head and abdomen with scotch tape or fuchin gel, place over slide.

Captured bats were Feed with syrup kept in cloth bags for 2 hr, and their faeces were collected in tubes with alcohol.



Advantage/disadvantage of these ways

Day roost- bias toward last meals

- can be cheap, if accessible
- bias toward small seed fruit
- no detail of individual variation
- some bats do migrate-data missing

Netted bats

- high cost and effort
- can be bias toward to diet species found in captured sites
- can detect variation related to sex, age

4. The diet of *E. spelaea*



a cave with about 20,000 *E. spelaea* at Thailand-Malaysia border.

Example of diet study and its further implication

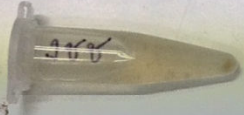






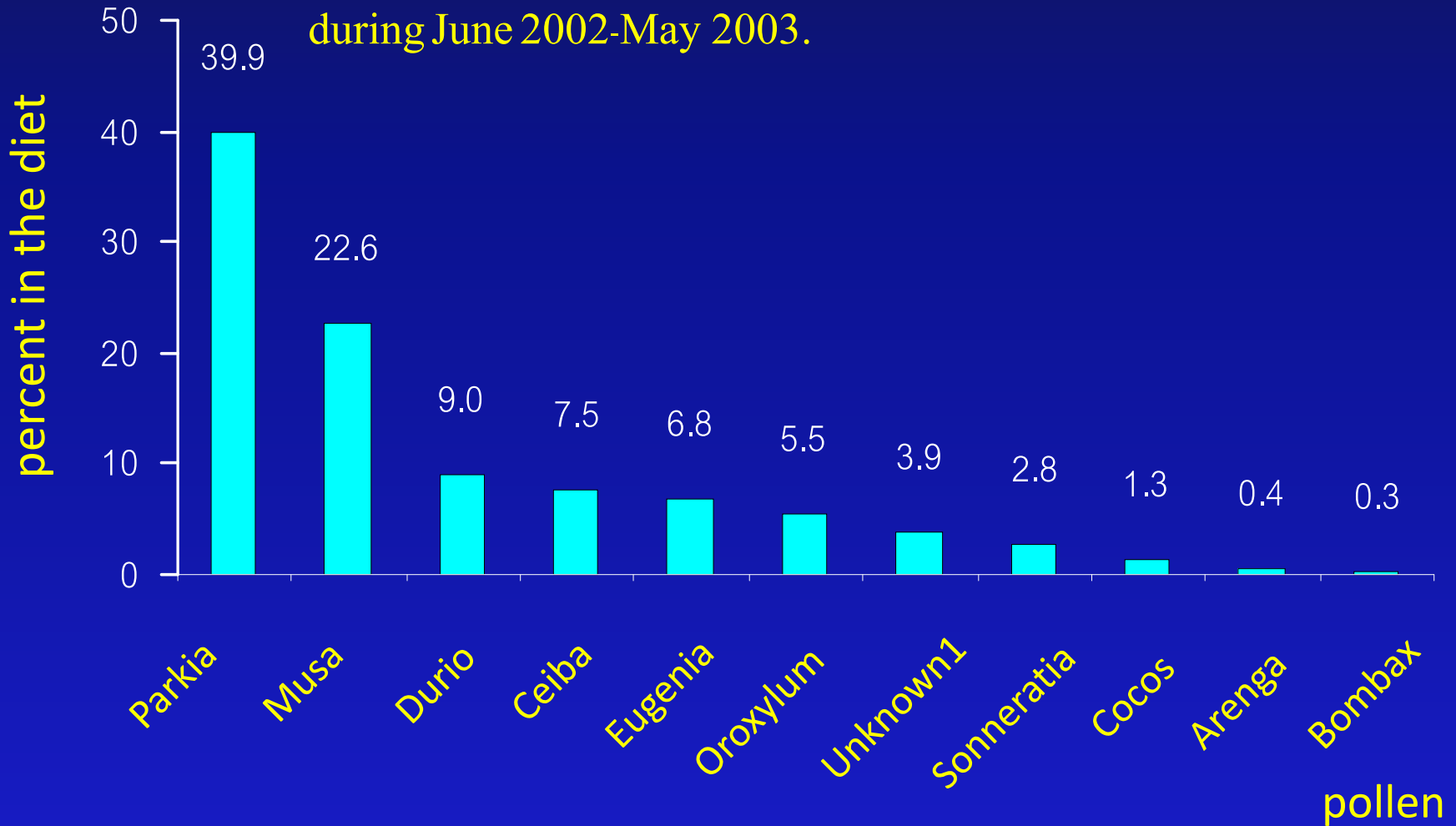
Captured bats were kept in cloth bags for 2 hr, and their faeces were collected.





Diet of *Eonycteris spelaea*

Frequency percentage of each pollen sources from faeces of 557 captured cave nectarivorous bats, *Eonycteris spelaea* during June 2002-May 2003.



POLLINATION EXPERIMENTS

Open
pollination

Spontaneous
self
pollination

Insect
pollination

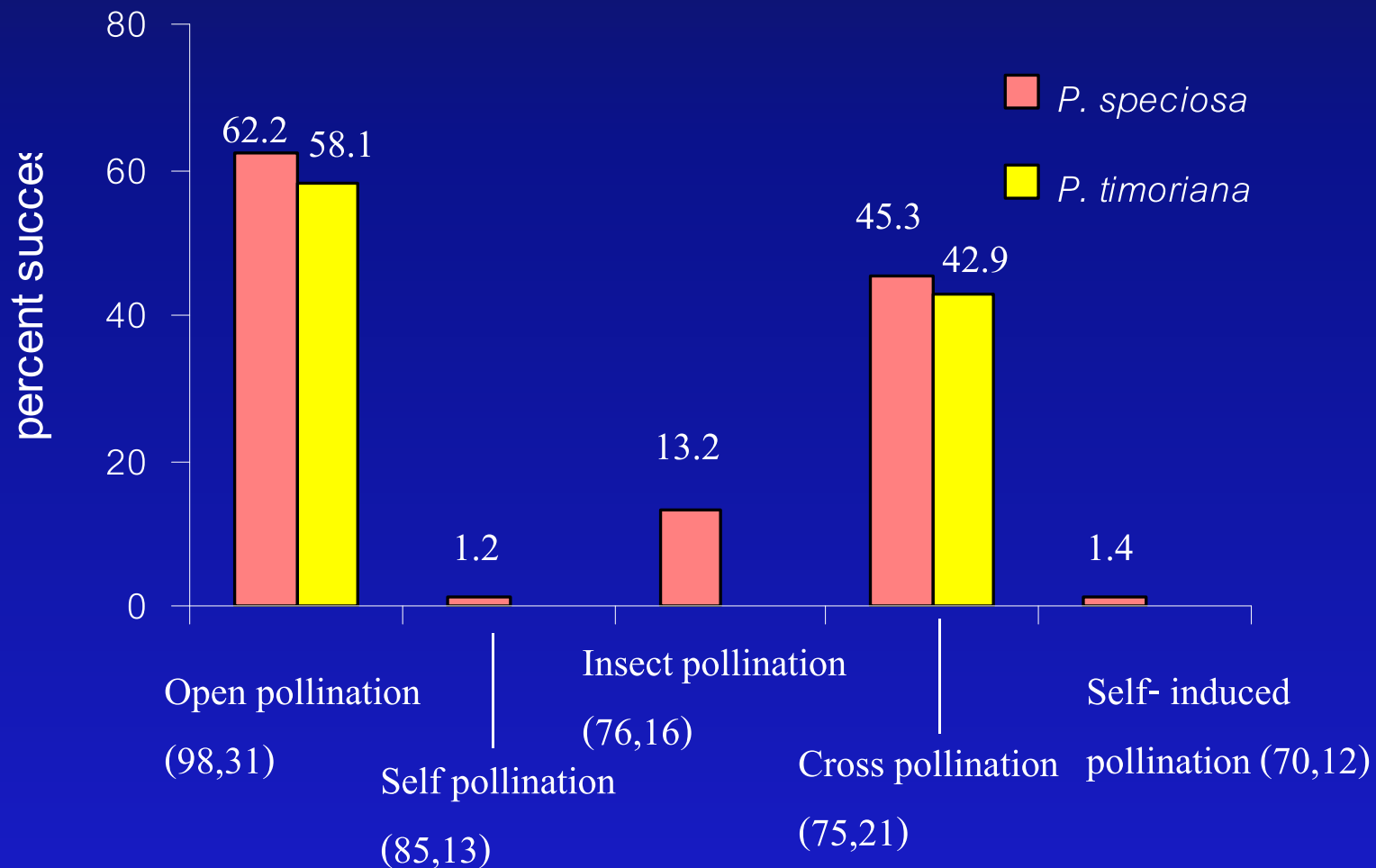
Self-Induced
pollination

artificial
cross
pollination



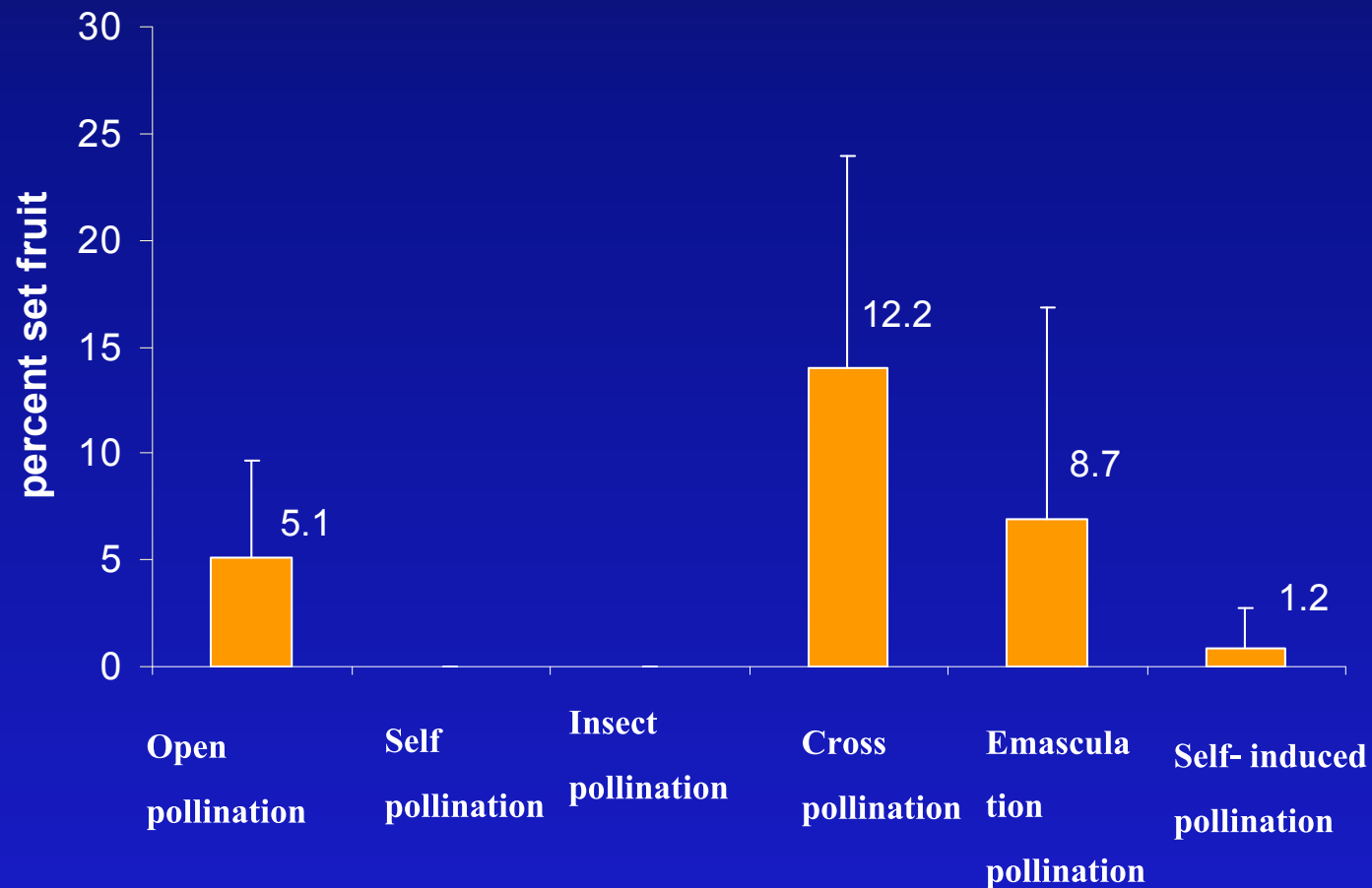
Pollination Experiments

Average pollination success from pollination experiments carried out in 28 *P. speciosa* and 4 *P. timoriana* trees during September 2002-January 2004 (no. of capitulum in parenthesis).



Similar results have also been observed in pollination experiments on durian.

Average pollination success at 2 months from pollination experiments carried out in 8 semi-wild cultivated Durian trees (145-415 flowers per treatment)



From camera traps, durian flowers were visited mainly by giant honey bees (80-92%), bats (5.7-11.4%) and moths (1-8.5%)





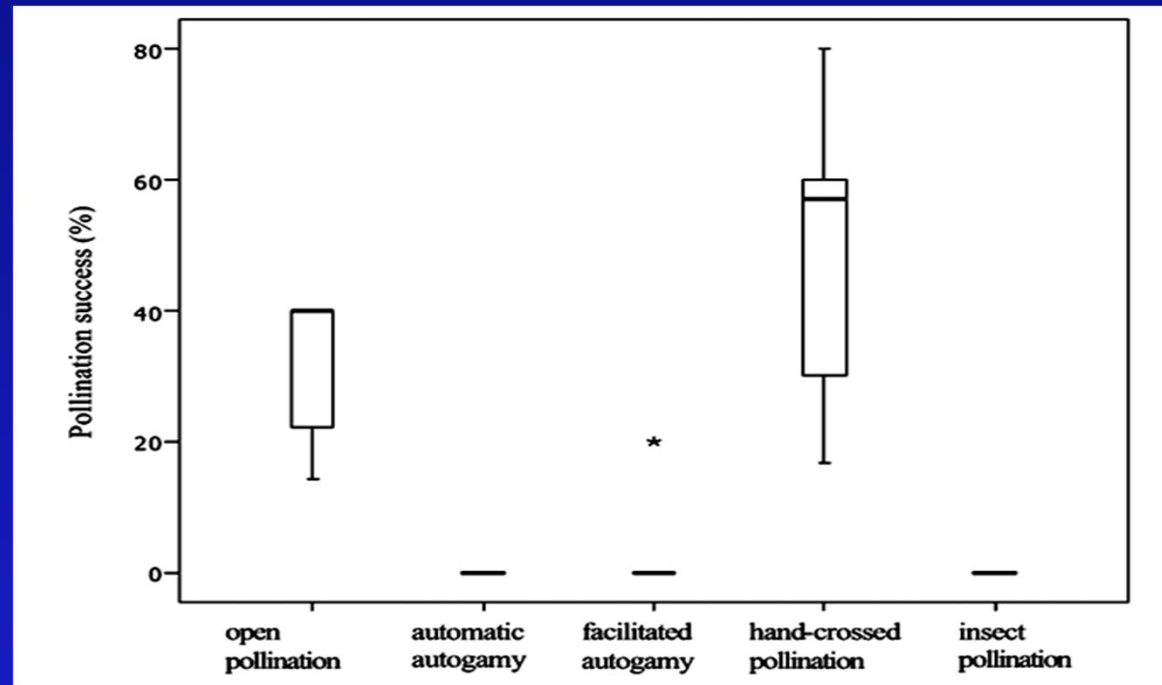
Oroxylum indicum



Similar result in
Oroxylum indicum



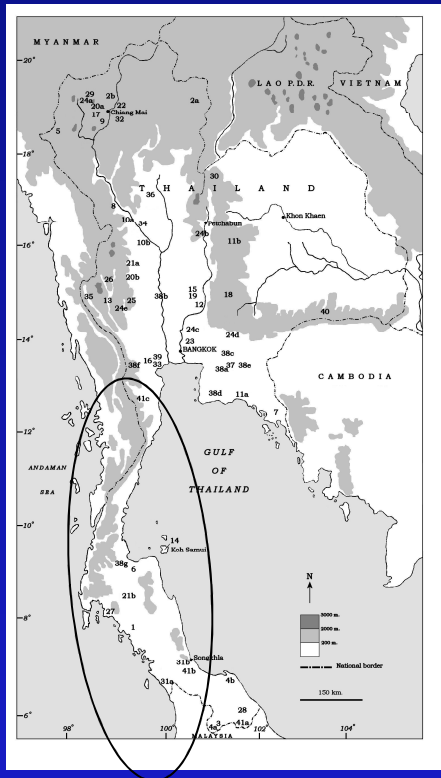
Eonycteris spelaea



(Sritongchuay et al., 2008)

Economic valuation

The information on no. of tree, fruit production of durian and *Parkia* in each village were retrieved from Agriculture Extension Offices. Fruit production was timed to a market price and minus production cost. Economic assessment was also undertaken for the whole southern Thailand.



100 % of durian are from bat pollination
80% of *Parkia speciosa* from bat
pollination

For southern Thailand, it is
estimated to be 100 million Euro a
year (2010).



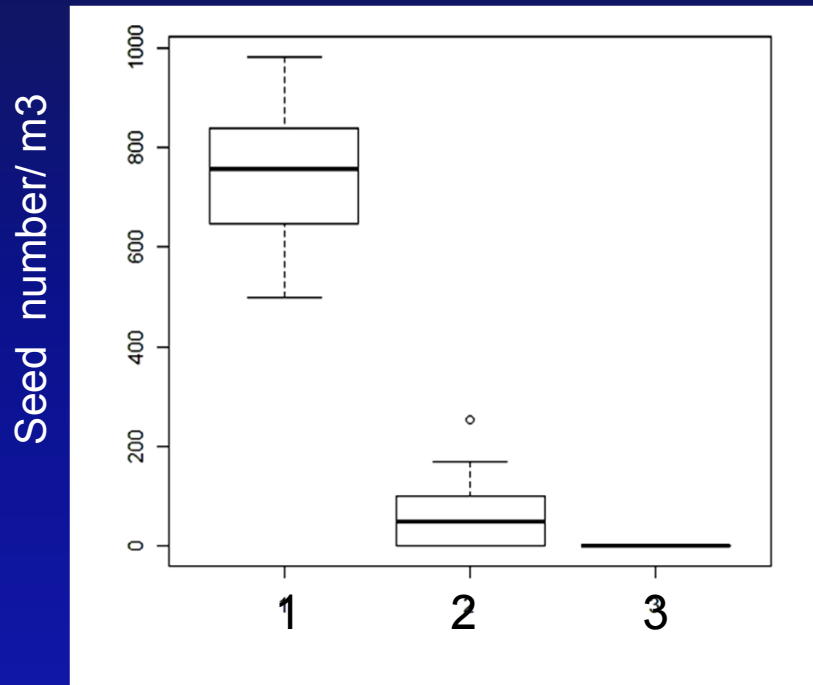
Abandoned 60 ha farmland in a protected area, Krabi is replaced with grassland, scattered trees and shrubs.



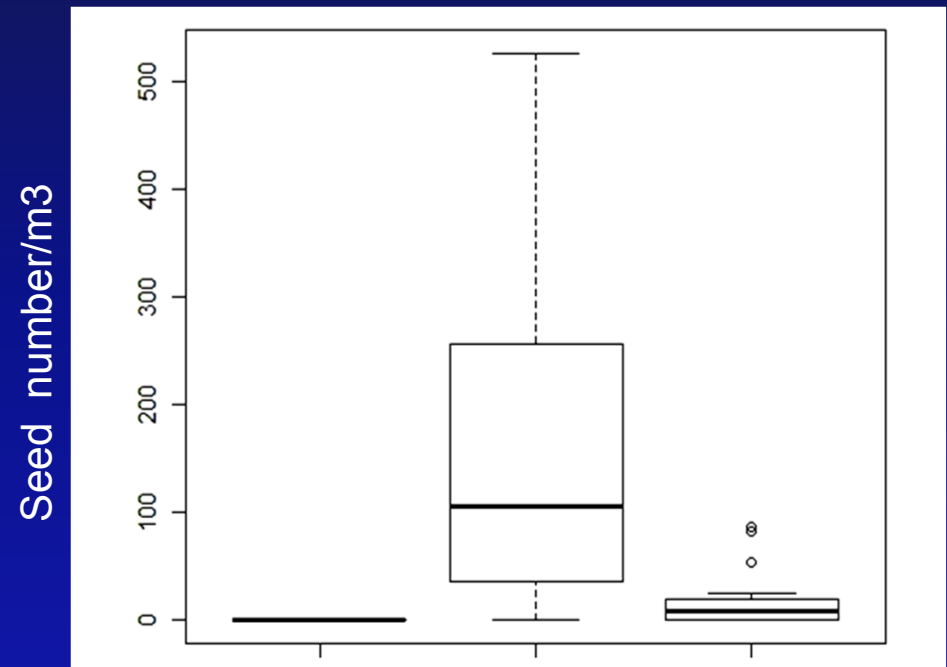
30 paired seed traps each were set under isolated trees, shrubs, and in open grassland. Seed rain was observed for 15 day a month, for one year. It was classified to bird, bat and wind dispersed.

Seed rain in three micro-habitats within a grassland in lowland forest

1= bird, 2= bat, 3 = wind

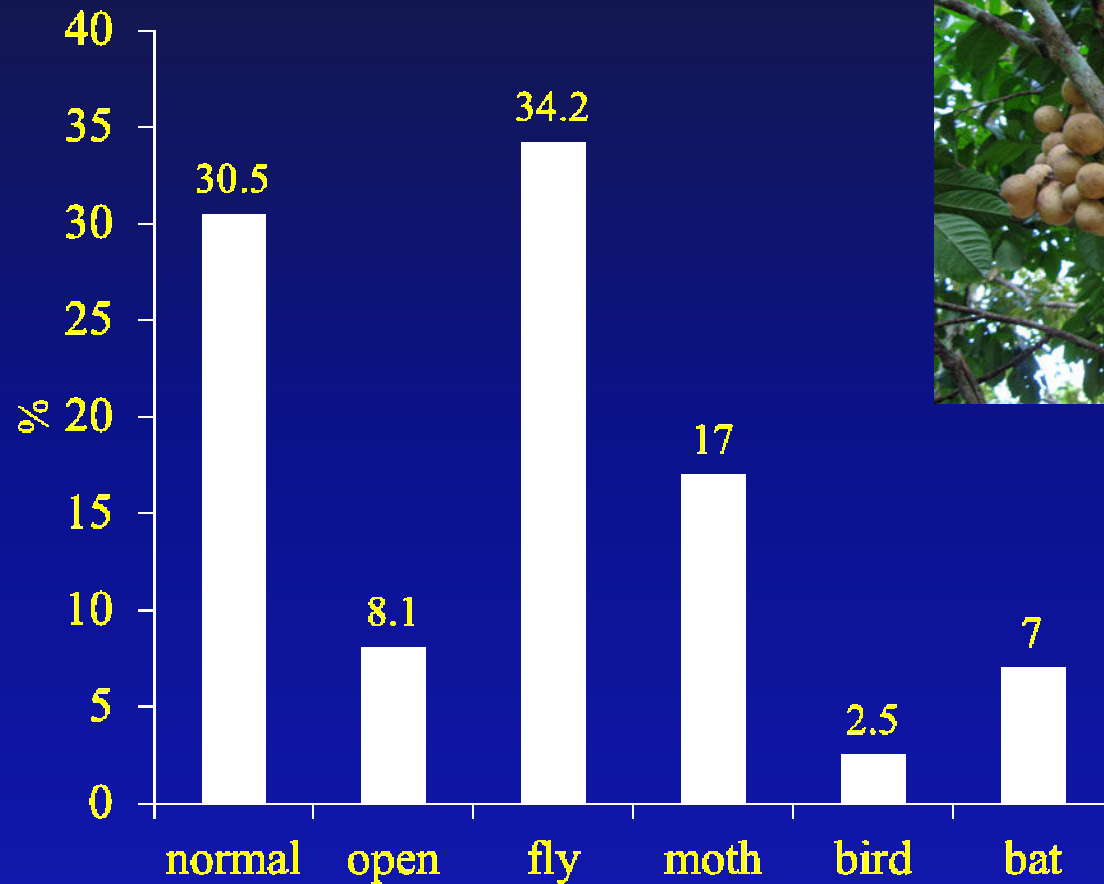


Under Trees



Open Grassland

66,000 seeds, 40 sp. were found in a year, Birds disperse seeds in areas that have already started to recover (e.g. shrubs and trees present), while bats disperse seeds in open areas.



From 85 trees, in 8 sites, The majority of fruit crop fallen in Longong is from insect (50%), bat (7%) and birds. Note that in some sites, fruit bats damage is higher than others (27% vs 0.7%).