Invasive forest pests:
how important are urban areas
for their establishment?
A review study by PLURIFOR (GT2)

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Invasion process

Arrival

Establishment
(casual stage →
naturalization)

Spread
(population
growth, dispersal)

further invasions

Liebhold & Tobin (2008) Ann. Rev. Entomol.
Walther et al. (2009) Trends Ecol. Evol.
Wingfield et al. (2015) Science
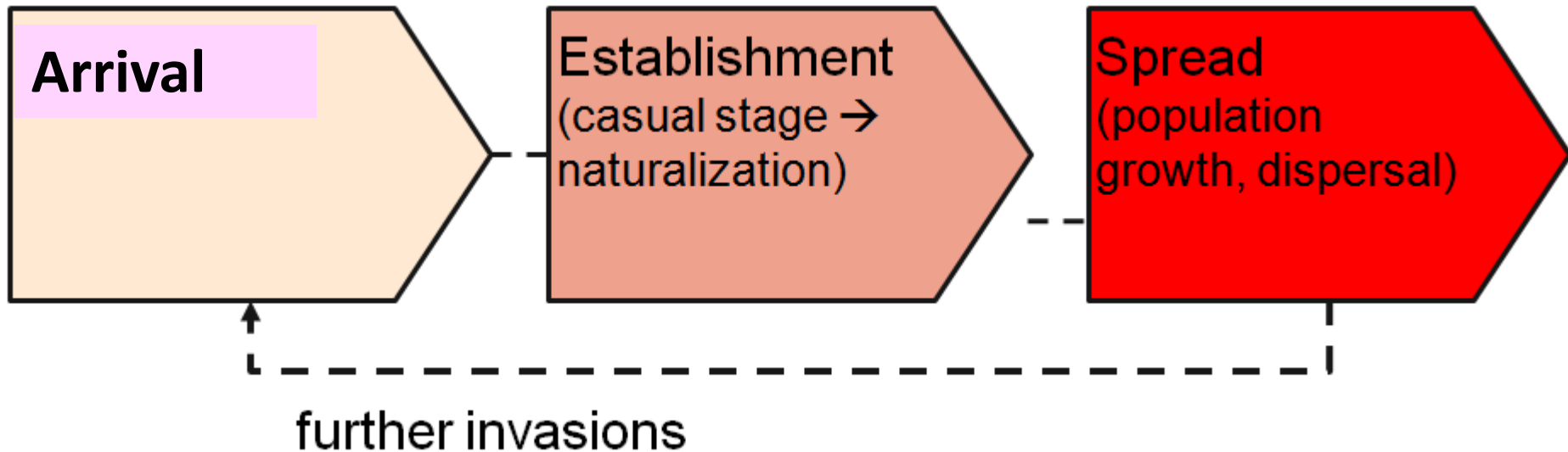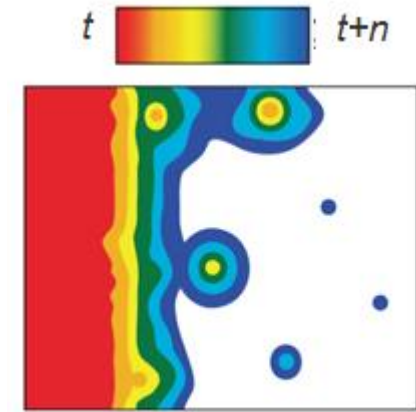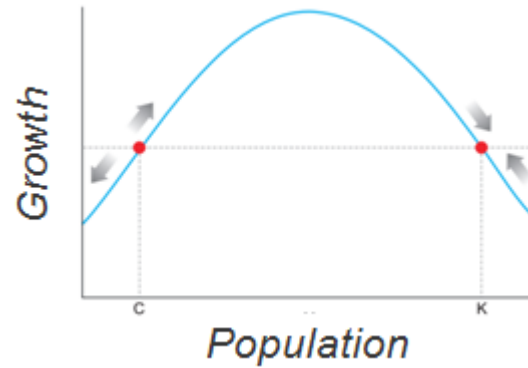
Why urban forests are important

- More **arrivals** : close to **ports of entry** (airports, harbors, railway stations…)

- More **arrivals**: higher human population, **more trade**, more imported wood products, packaging or plants for planting ("vehicles")

- Higher chance of **establishment**: higher tree species diversity (parks, botanical gardens, …) increase the chance of finding a **suitable host**

- Higher chance of **establishment**: better **climatic conditions** for the survival of insect species from warm countries ("urban heat island")

Rationale of the review study

If the probability of exotic forest pest establishment is higher in urban areas, then it is worth concentrating detection efforts in urban forests

Method

1. Bibliographic search: first detections in Europe

- Web of Science and Google scholar

TOPIC: (first OR new) *AND* **TOPIC:** (interception or detection or identification or discovery) *AND* **TOPIC:** (insect or pest or (isopter* or hemipter* or thysanopter* or coleopter* or neuropter* or hymenopter* or dipter* or lepidopter*)) *AND* **TOPIC:** (tree or forest*) *AND* **TOPIC:** (europe or albania or austria or belgium or bosnia or bulgaria or croatia or czech or denmark or estonia or finland or france or germany or greece or hungary or ireland or italy or latvia or lithuania or luxembourg or macedonia or moldova or montenegro or netherlands or norway or poland or portugal or romania or russia or serbia or slovakia or slovenia or spain or sweden or switzerland or (united kingdom))

- Literature database managed by A. Roques (DAISIE project)

- Cross References

Method

## 2. Retrieved variables from published papers:

- Insect pests : species (Order, Family)
- Date of first record
- Location of first record (x,y, municipality, district, country)
- Host tree species where it was detected
- Who detected (researcher, forest technician, municipality's employees, …)
- What lead to detection: accidental, systematic sampling, specific surveys
- Site -tree characteristics (urban tree, park, planted forest, natural forest…)

Method

3. Additional information

- **Insect feeding guild**

- **Using GIS and other databases (e.g. Corine Land Cover) :**
    distance to the nearest city,
    distance to the nearest forest,
    distance to the nearest port & airport,
    size of the city (population, area)
    tree species diversity in the city
    top 10 planted tree species in the city
    port/airport trade/ traffic volume
    climatic variables (WordClim)
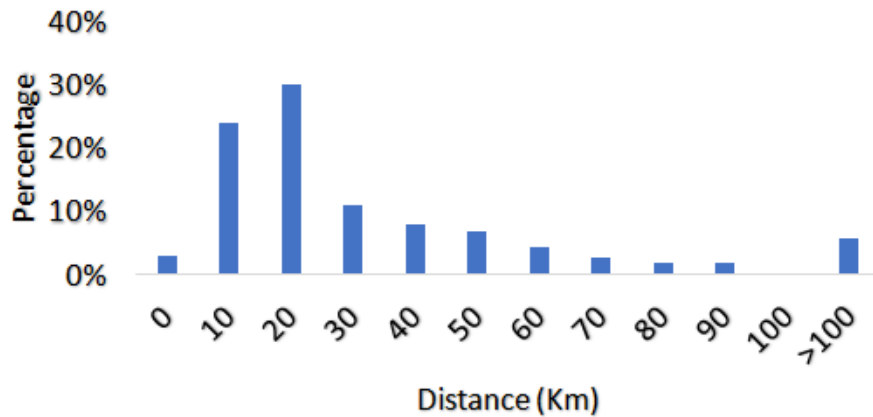
Preliminary results (based on 443 records)
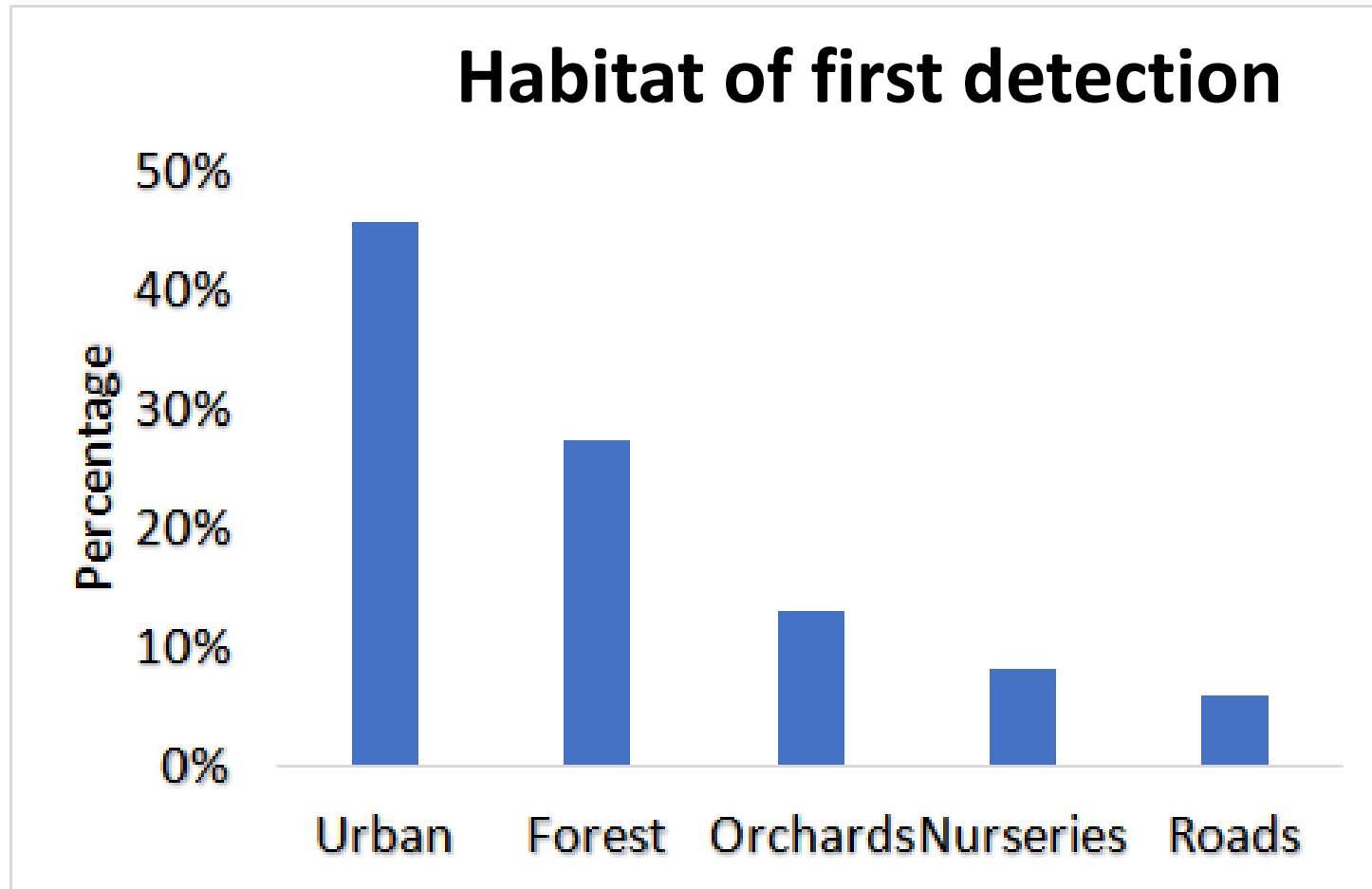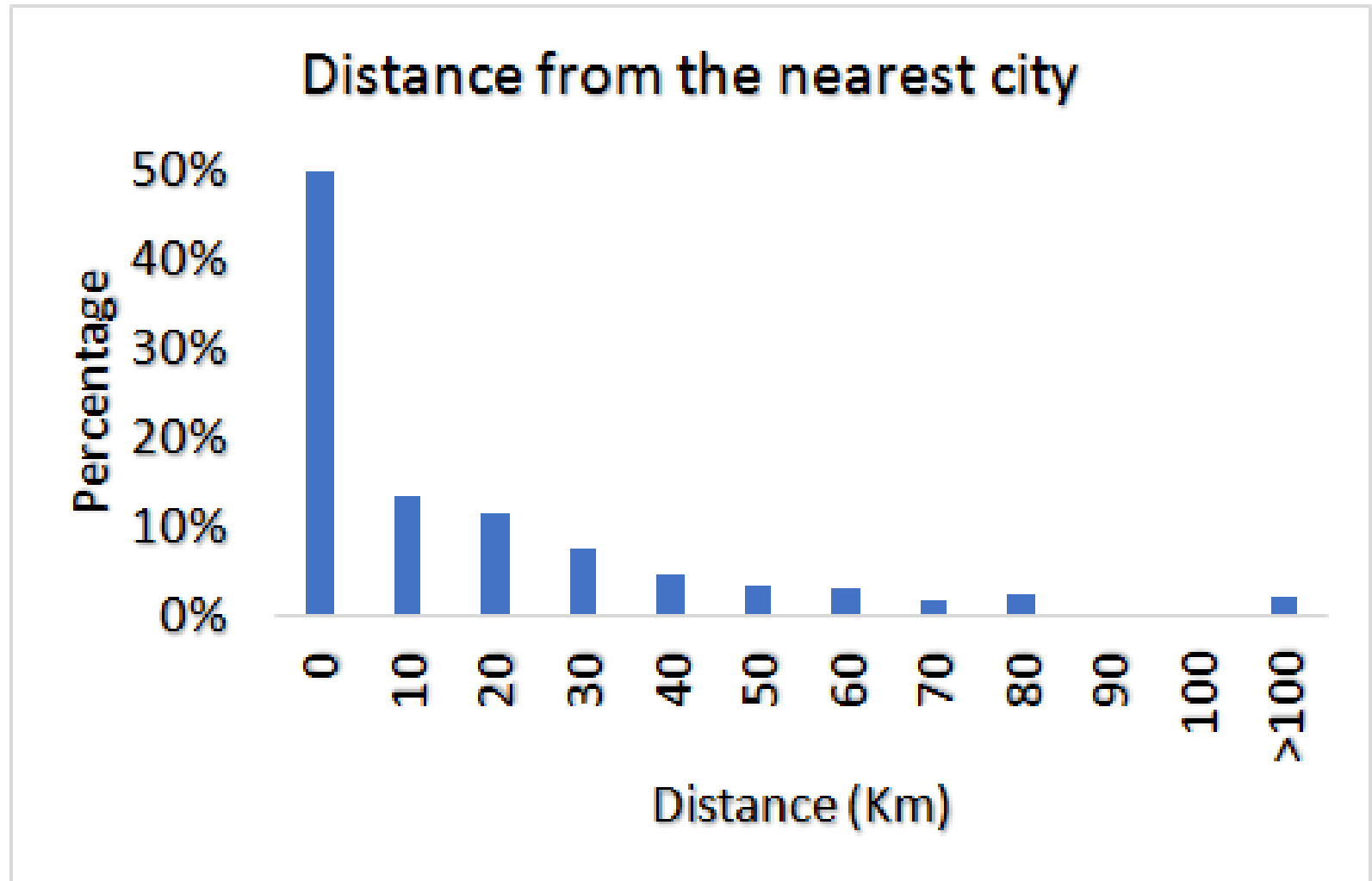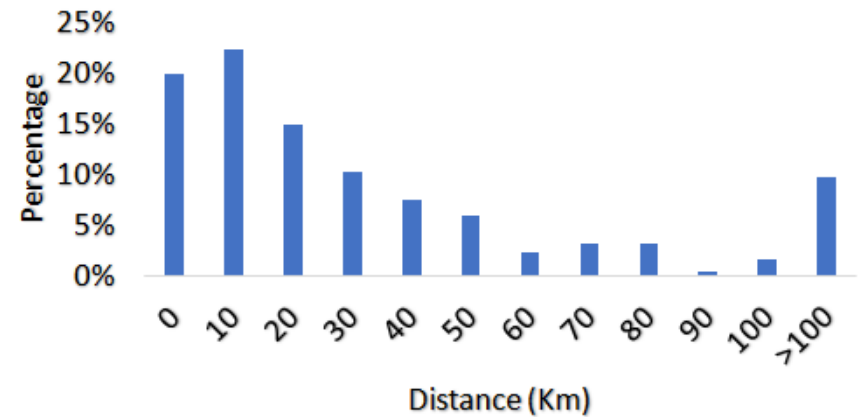
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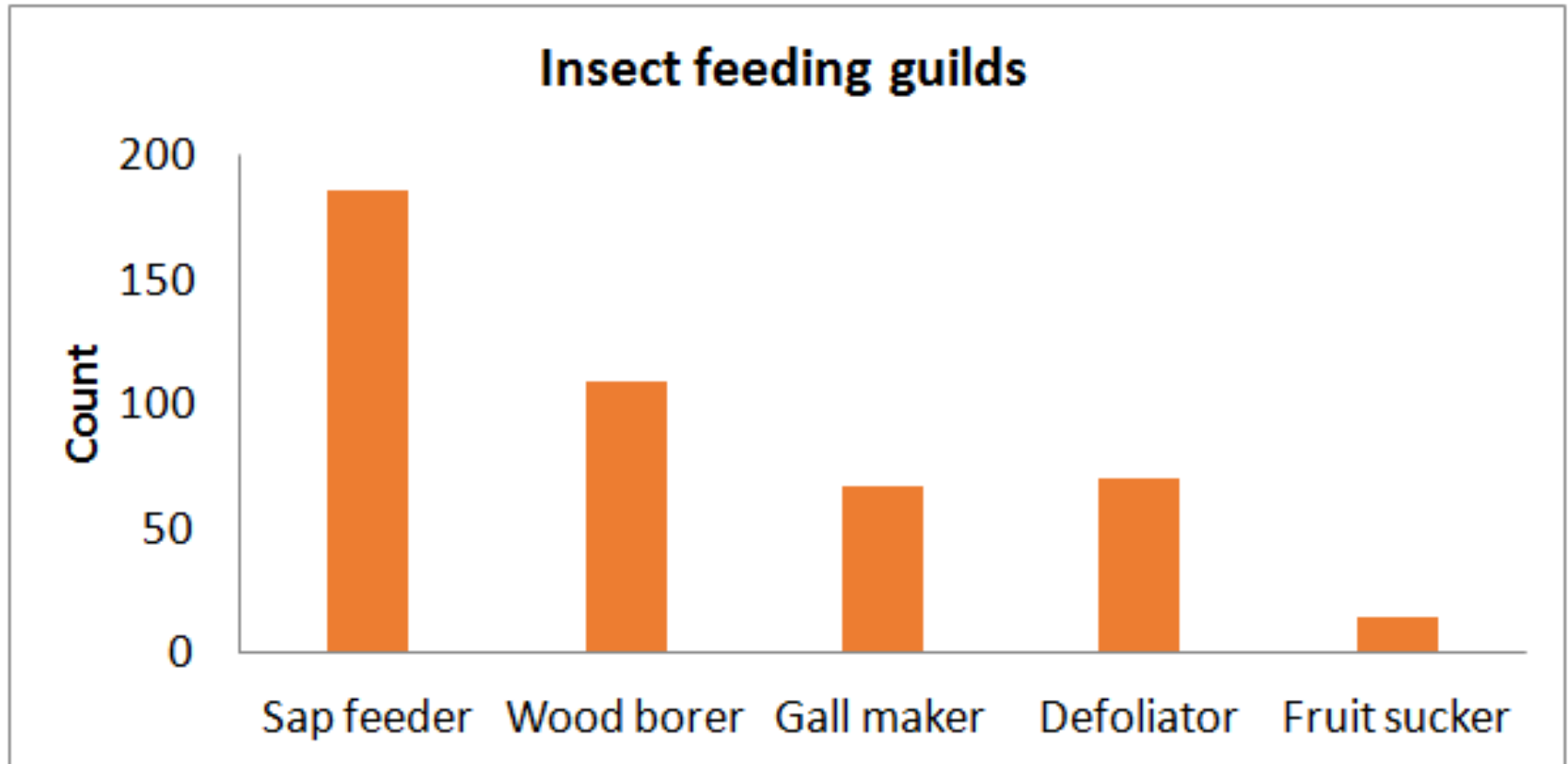
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Next steps

- **More records: ca. 10^3**

- **More variables: characterizing the urban areas and neighboring landscapes ….**

- **Statistical analyses, using « countries » as replicates**