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# Preliminary experiments on the foraging activity of *Messor* ants from Greece

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# Ants in Greece

- Some taxonomic research before the 2nd world war
- Since then… about 220 species
- Works on ecology by Harkness (80's) mainly with *Cataglyphis*
- Works on community ecology by Legakis

# The genus *Messor*

- Taxonomic problems when it comes to species level…
- Nevertheless…
  - Polydomous
  - Indications of territoriality (intraspecific competition)
  - ‘Trunk trail’ foraging
  - Major seed harvesters in Mediterranean-type ecosystems

# Foraging research so far

- FORMIS 2005 (‘foraging’ and ‘*Messor*’) → 196 results (since 1910):
  - about 70% of those for *Messor* ethology
  - 34 papers for Mediterranean region (17%)

- Work in North Africa (by the French), Spain, Italy, Israel
- Greece: 1 paper

# Present research

- Aspects of *Messor* foraging in Greek Mediterranean-type ecosystems
- Daily foraging activity
- Seed size & shape relationships with ants
- Seed selection (natural & experimental)
- Ecological aspects of foraging activity

# Areas of work

- 2 sites selected: **Kryoneri**, Attiki and **Athens University campus**, Kaisariani
- Med-type ecosystem, xerophytic vegetation (Kryoneri: *Festuca* sp., *Astragalus* sp.– Uni. campus: *Festuca* sp.)

# Work sites


Kryoneri
Alt: 380m
Aspect: S
More 'wet'

Uni. campus
Alt: 270m
Aspect: S
More 'arid'

# Experimental setting

- Assumptions:
  - Many entrances → one nest
  - Entrance cover → no influence
  - Each nest → one colony
  - Activity between measurements → linear model

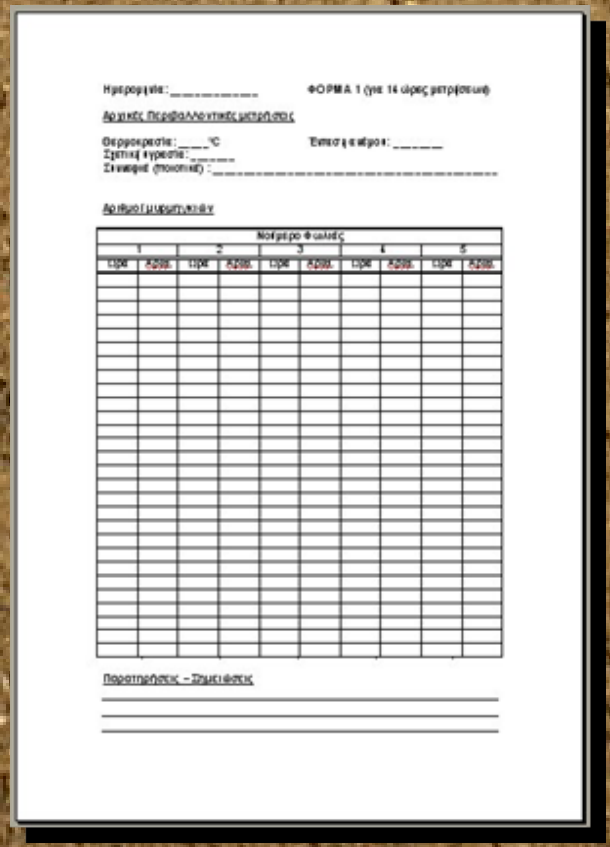
# Abiotic factors

- Wind speed
- Air temperature
- Air relative humidity
- Atmospheric pressure
- Dew point

- Soil moisture (standard method)

# Daily activity

- Number of ants leaving nest / 5 min
- Tally counter
- Every 30 min

Ημερομηνία: _____ ΦΟΡΜΑ 1 (για 16 ώρες μετρήσεις)

Αρχικές περιβαλλοντικές μετρήσεις

Θερμοκρασία: ____°C Ένταση ανέμου: _____
Σχετική υγρασία: _____
Σκιαφορά (ποσοστό) : _____

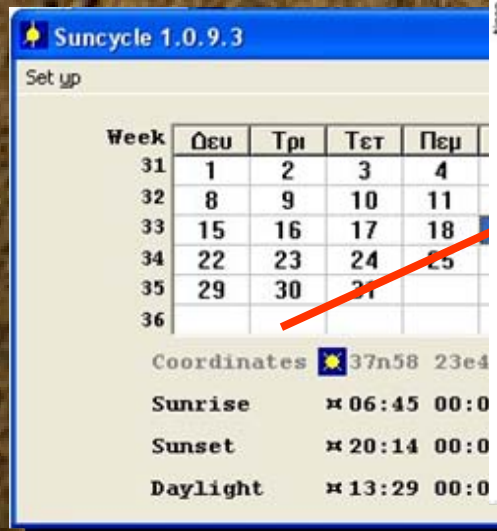
Αριθμός μυρμηγκιών

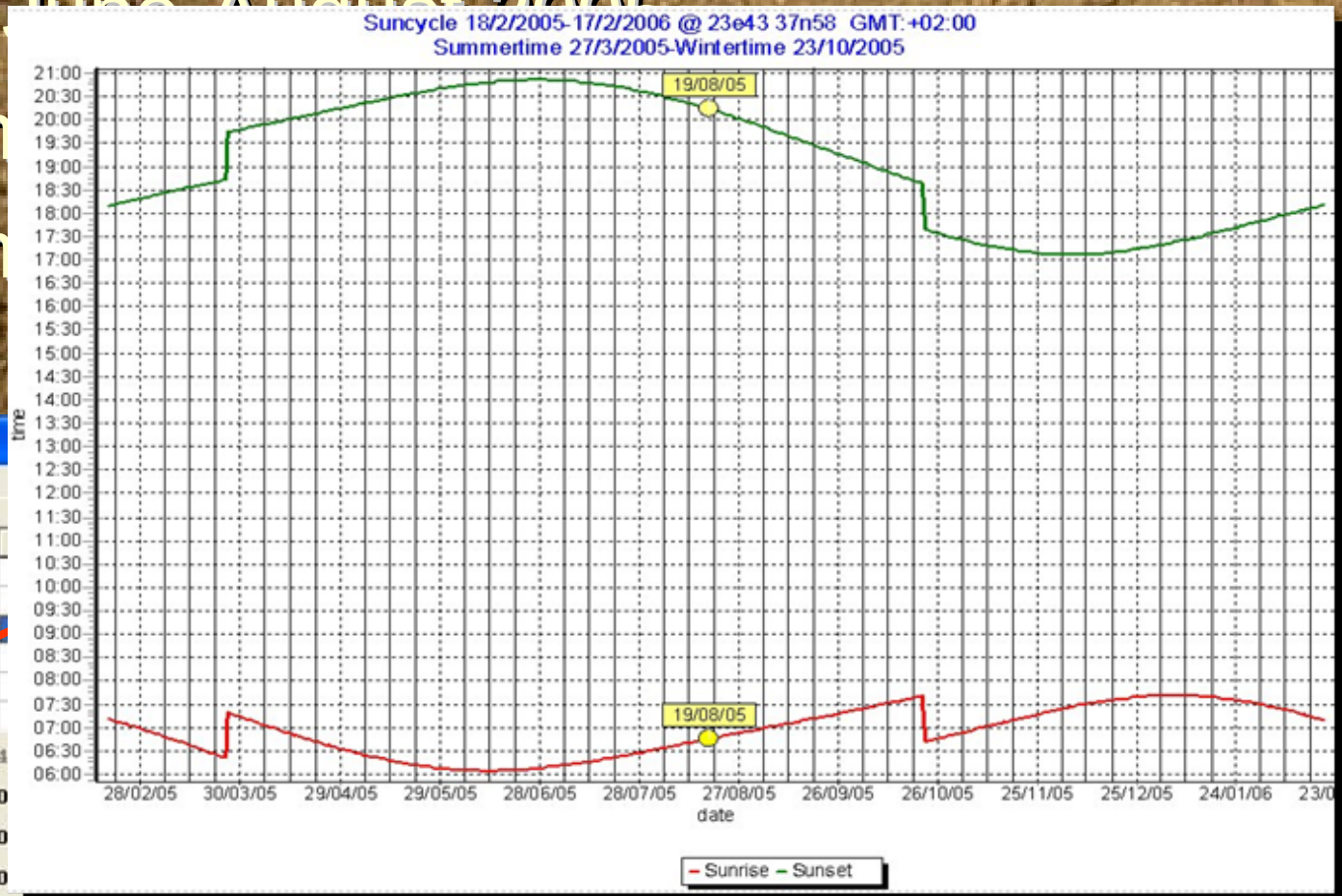
| Νοέμβριο Φωλιές | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 2 | | 3 | | 4 | | 5 | |
| ώρα | Αριθ. | ώρα | Αριθ. | ώρα | Αριθ. | ώρα | Αριθ. | ώρα | Αριθ. |
| | | | | | | | | | |

Παρατηρήσεις – Σχολιάστε

# Daily activity

- Period June-August 2005
- 7:00am
- 5:00pm



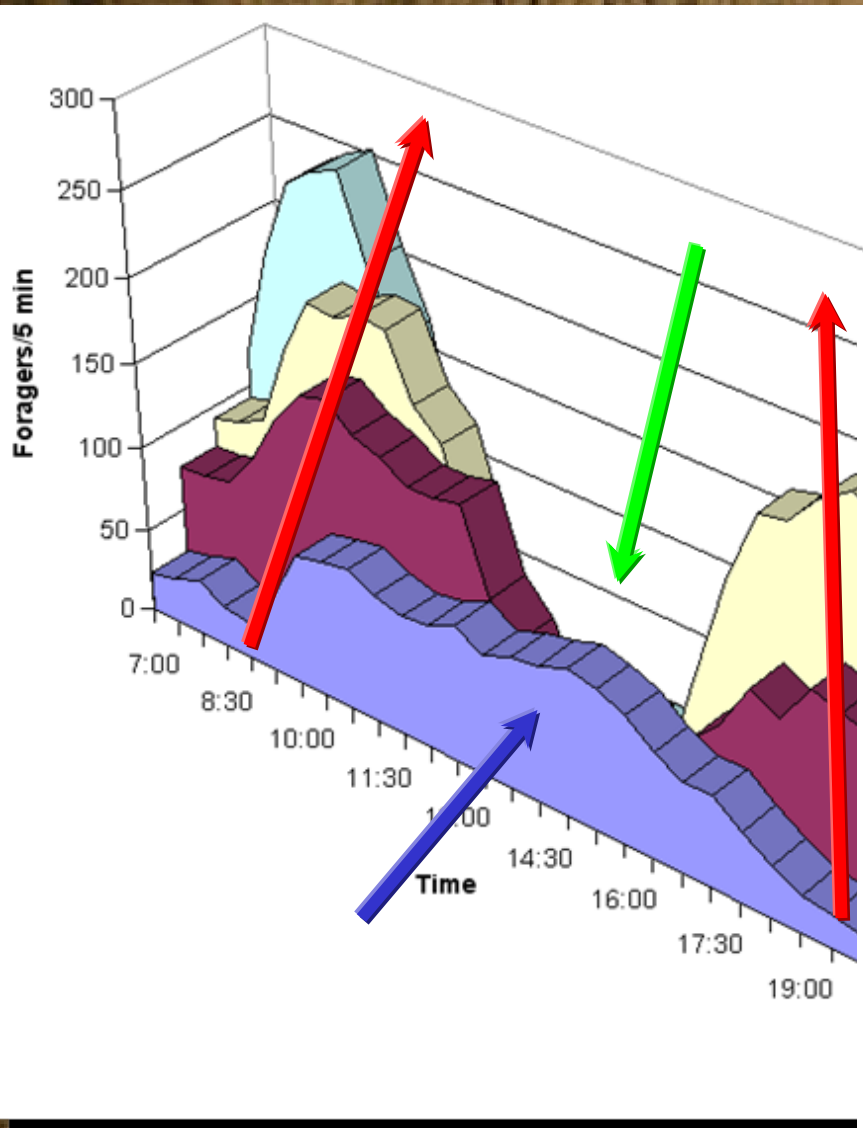
# Ant-seed weight correlation

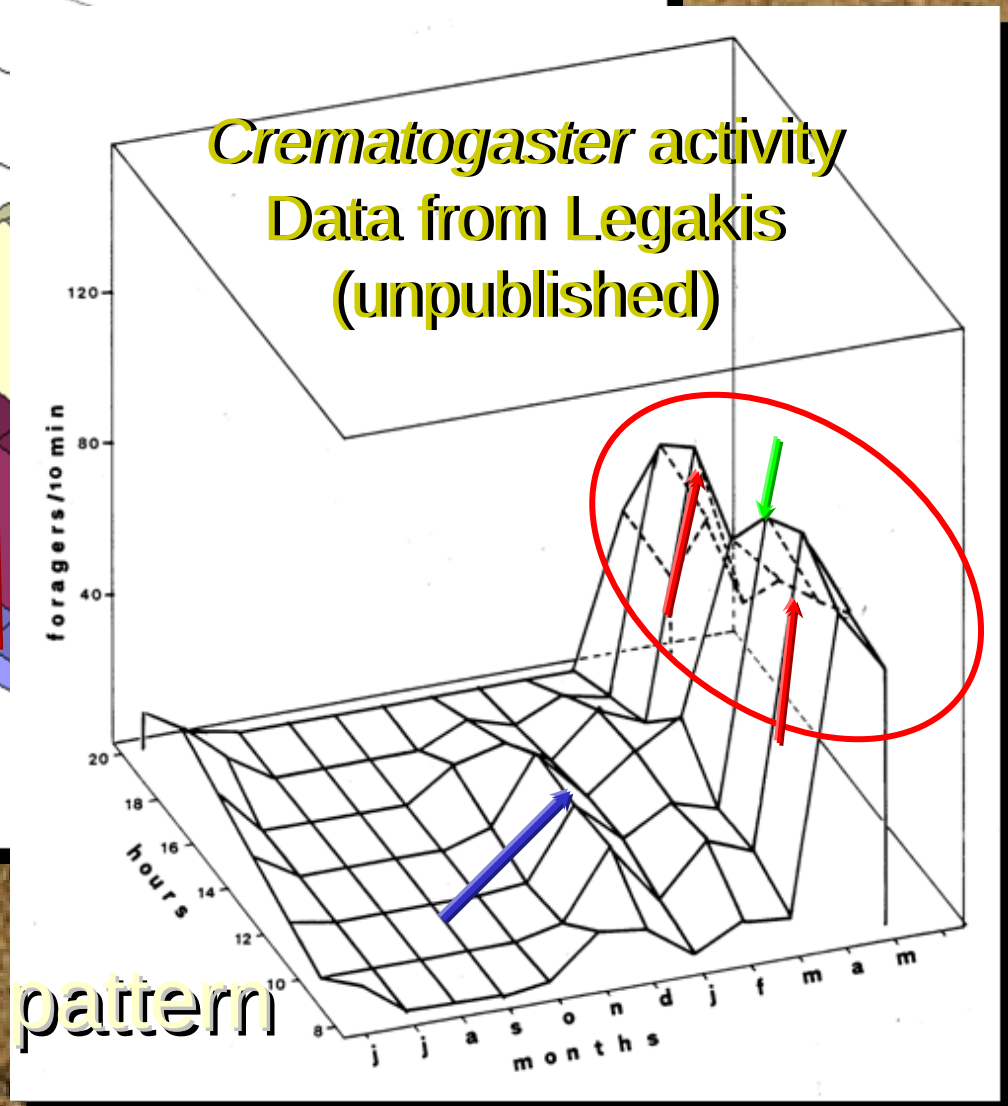
- 20 ants carrying seeds were collected/day (by hand)
- Ants + seed → eppendorf
- Weighed (in mg)


# Results 1

Activity vs. time of day and season

Daily activity changes with season?




*Crematogaster* activity
Data from Legakis
(unpublished)

"Saddle type" activity pattern

# Results 2

Relation of abiotic factors to activity

Which factors were most significant?

# Results 2

- Multiple regression of:
  - Wind speed
  - Air temperature
  - Air relative humidity
  - Atmospheric pressure

on ant activity

- Adjusted $R^2 = 0.856$
- $p = 0.015$

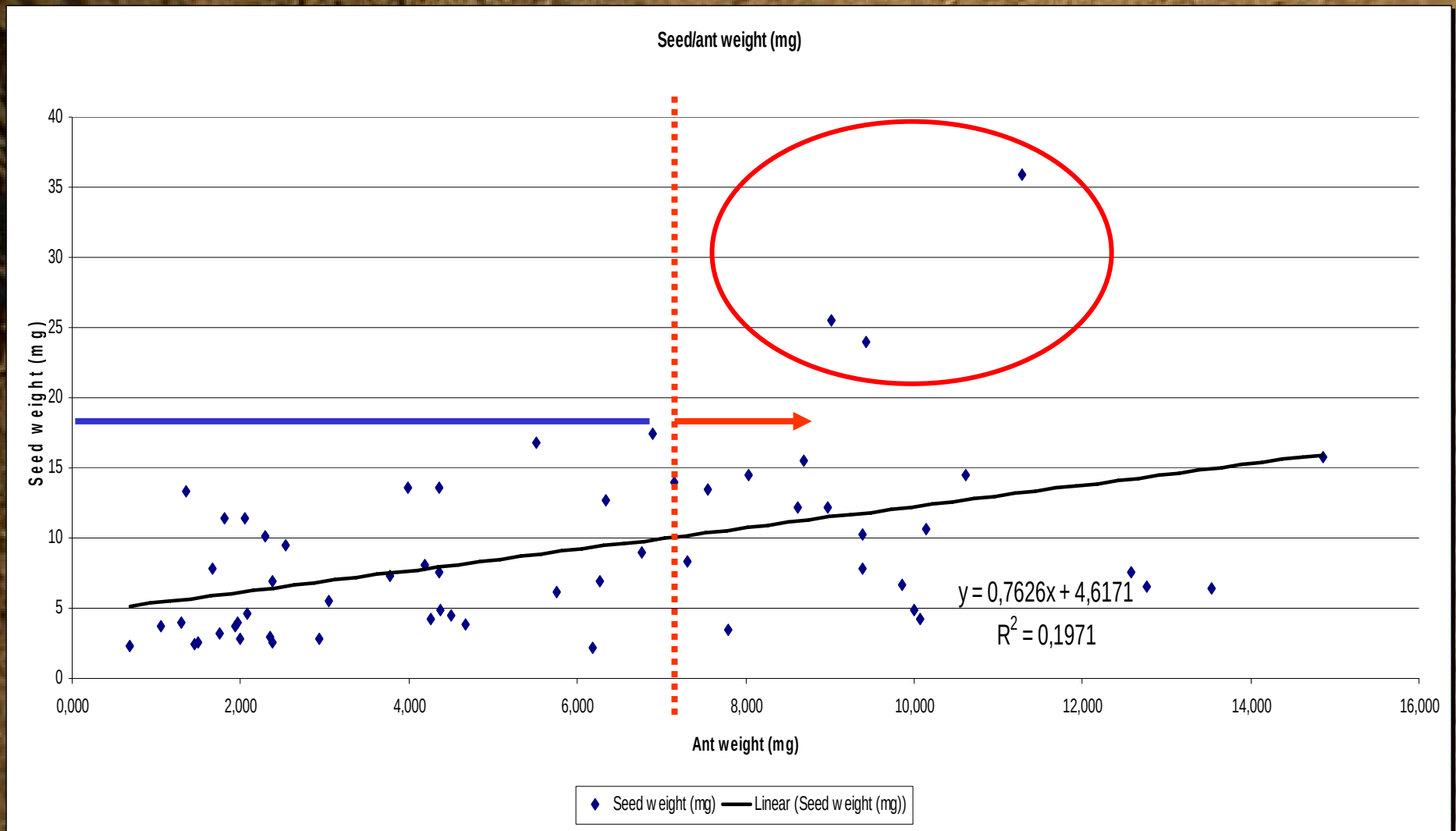
Forward stepwise regression

| | F to enter | p value |
|---|---|---|
| Atmospheric pressure | 5.81 | 0.07 |
| Air Temperature | 21.47 | 0.01 |
| Wind Speed | 1.41 | 0.30 |
| Air Relative Humidity | 1.16 | 0.34 |

# Results 3

Relation between ant weight and seed weight

Do heavier ants carry heavier seeds?




**Trend**: heavier ants → heavier seeds
Heaviest loads → Heaviest ants

# Conclusions…

- Change in pattern of activity / time and season
  - Avoidance of hot summer midday
- Activity does relate to abiotic factors
  - Somehow ants detect changes to their environment and modify their activity

# Conclusions…

- Seeds up to certain weight are carried by foragers of all sizes. Heavier seeds are carried only by larger foragers.

"Trophic energy strategy"

Small ants transport any seed that they can carry. Larger ants do not waste their time searching only for heavier seeds. This seems to be energy and time efficient

# Future research

- Shape & size of seeds vs. ant size
- Seed selection / season & abiotic factors (seed availability from local flora)
- Spatial foraging patterns (scouting, trunk trail change, transportation effectiveness)
- Investigation on potential myrmecochory of seeds

- Coding of foraging behavior
- Foraging simulation → random or not?

- Continue research…

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