



Phenology and host-plant association of spittlebugs in Mediterranean olive groves

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RC/EFSA/ALPHA/2015/01:

“Collection of data and information on biology and control of vectors of *Xylella fastidiosa*”

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Introduction

Spittlebugs are the most common xylem-sap feeders in Europe
(Hemiptera: Cercopoidea)



Photo: Nicola Bodino

Cercopoidea

Aphrophoridae

Philaenus spumarius, the major vector

Philaenus italosignus competent vector

Neophilaenus campestris competent vector



Article

Transmission of *Xylella fastidiosa* Subspecies *Pauca* Sequence Type 53 by Different Insect Species



Photo: Nicola Bodino

Membracoidea

Cicadellidae Cicadellinae

Cicadella viridis

Competent, although unefficient, vector of *Xylella fastidiosa*

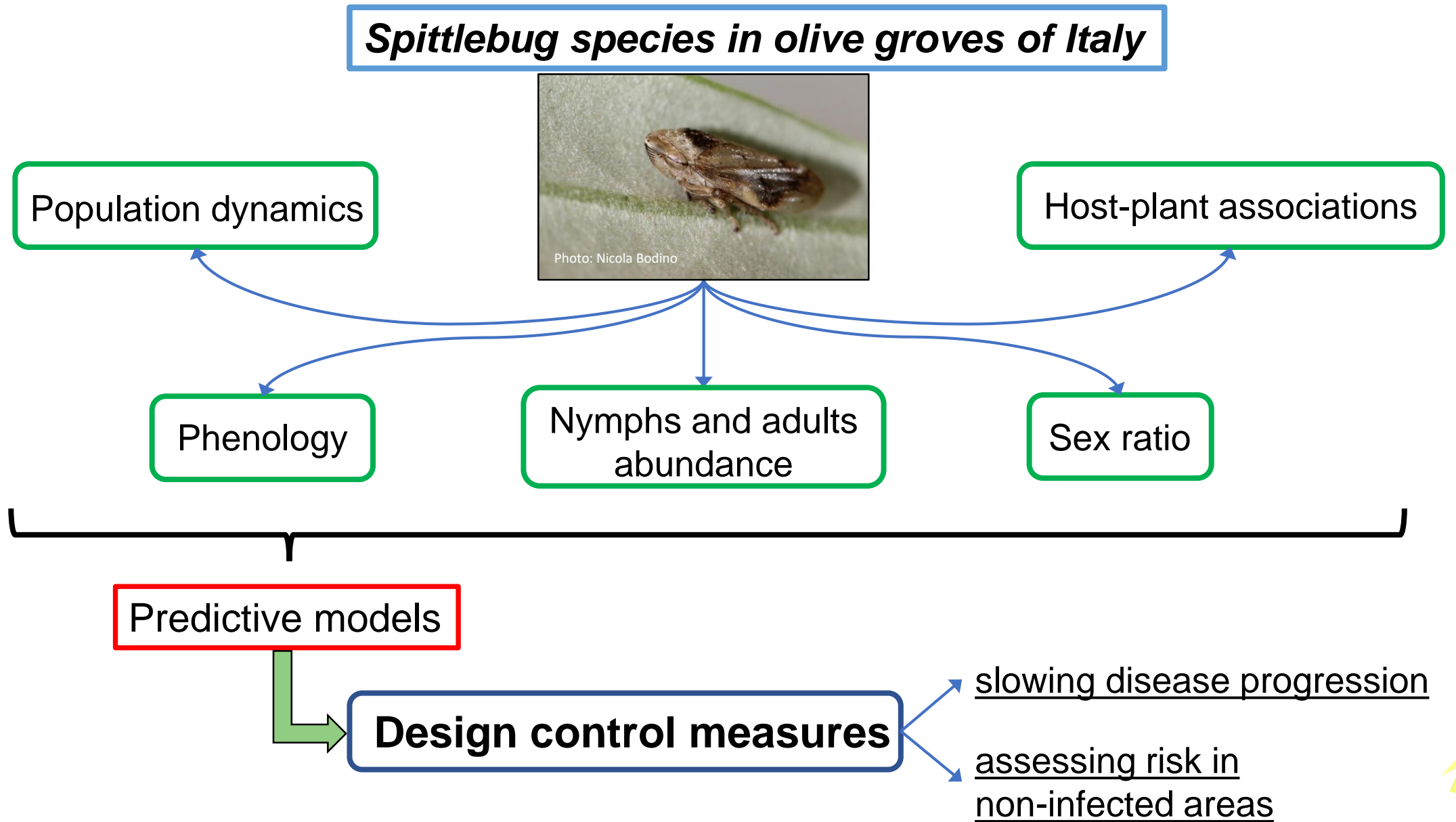
ST 53 to periwinkle (not to olive)

See presentation by Bodino et al.



Photo: Nicola Bodino

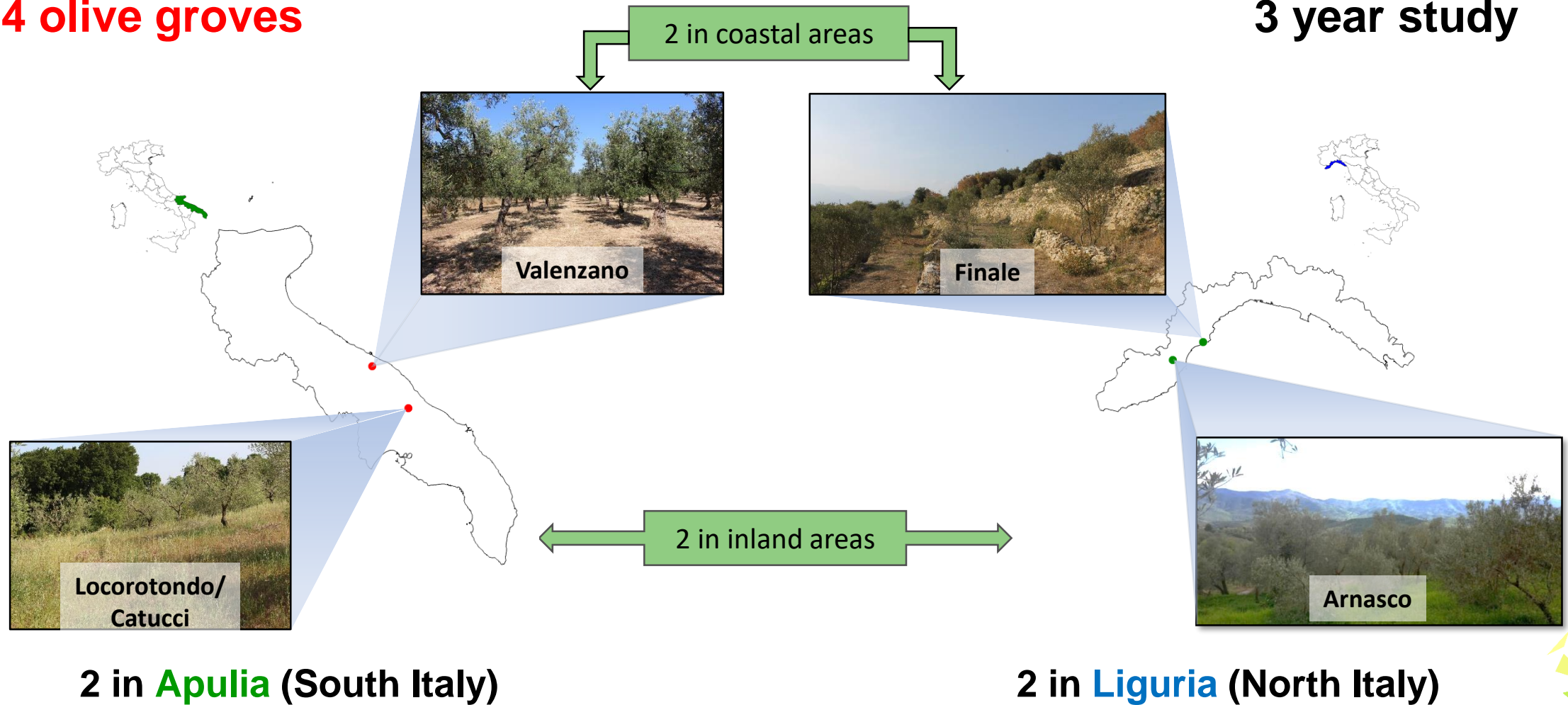




Experimental sites

4 olive groves

3 year study



Sampling methodology

Nymphs on herbaceous plants

- **30 samples** per olive grove (0.25 m² each) → simple random sampling
- Count of nymphs and spittles (instar ID) → conservative sampling
- ID of host-plants (species/genus level)
- Plant community sampling (inside the quadrat)
- **weekly field samplings**



Temperature and RH
registered hourly in
each olive grove



Sampling methodology

Adults

- Sweeping net → simple random sampling
- Count and sexing → conservative sampling
- every two weeks



Herbaceous cover → **30 samples** (4 sweeps each)

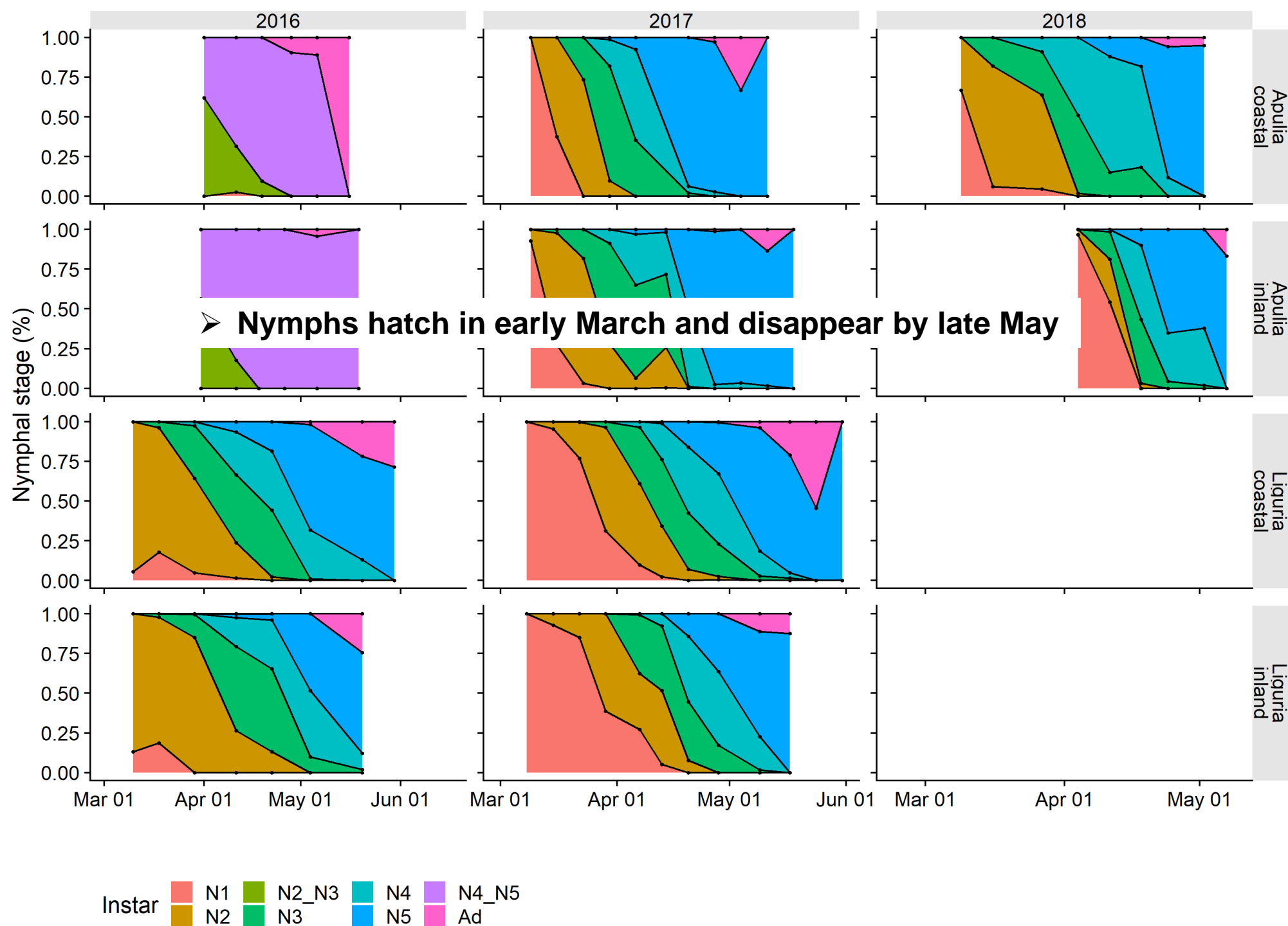
Vegetation ID

Olive trees → **20 samples** (10 sweeps each)

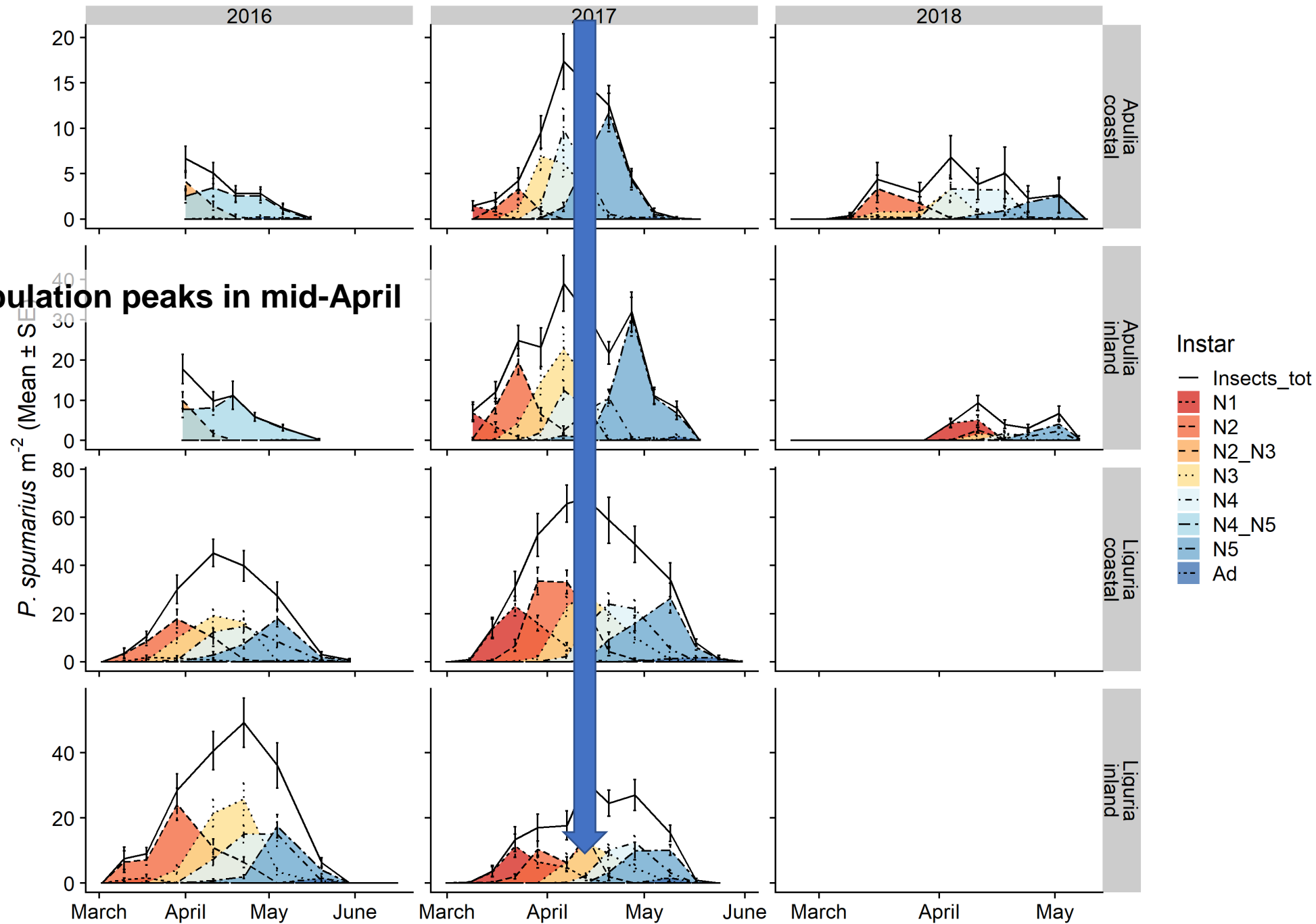
Phenology of olive trees (BBCH)

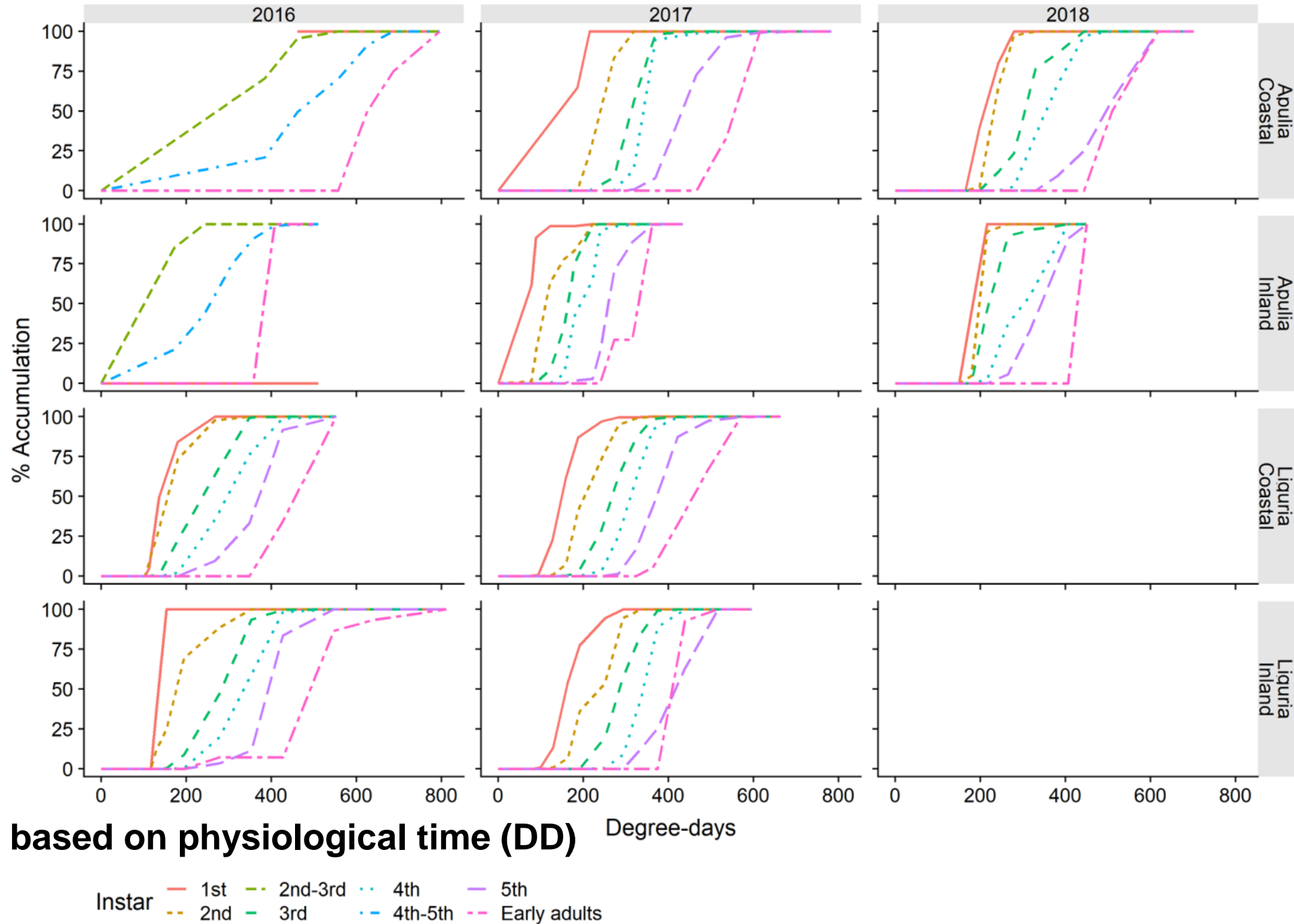
Shrubs/trees → **10/30 samples**
(10 sweeps each)



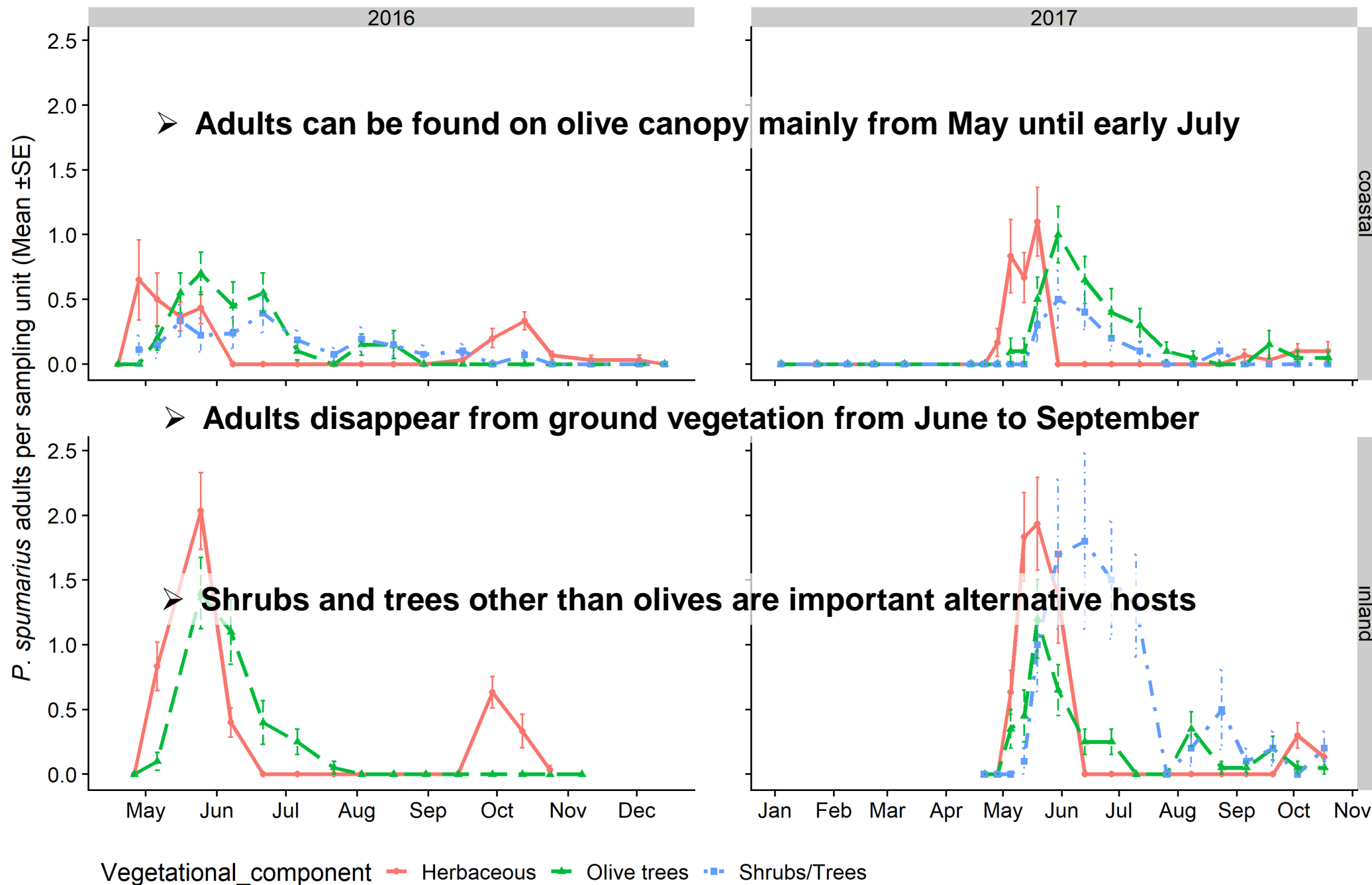


➤ Population peaks in mid-April

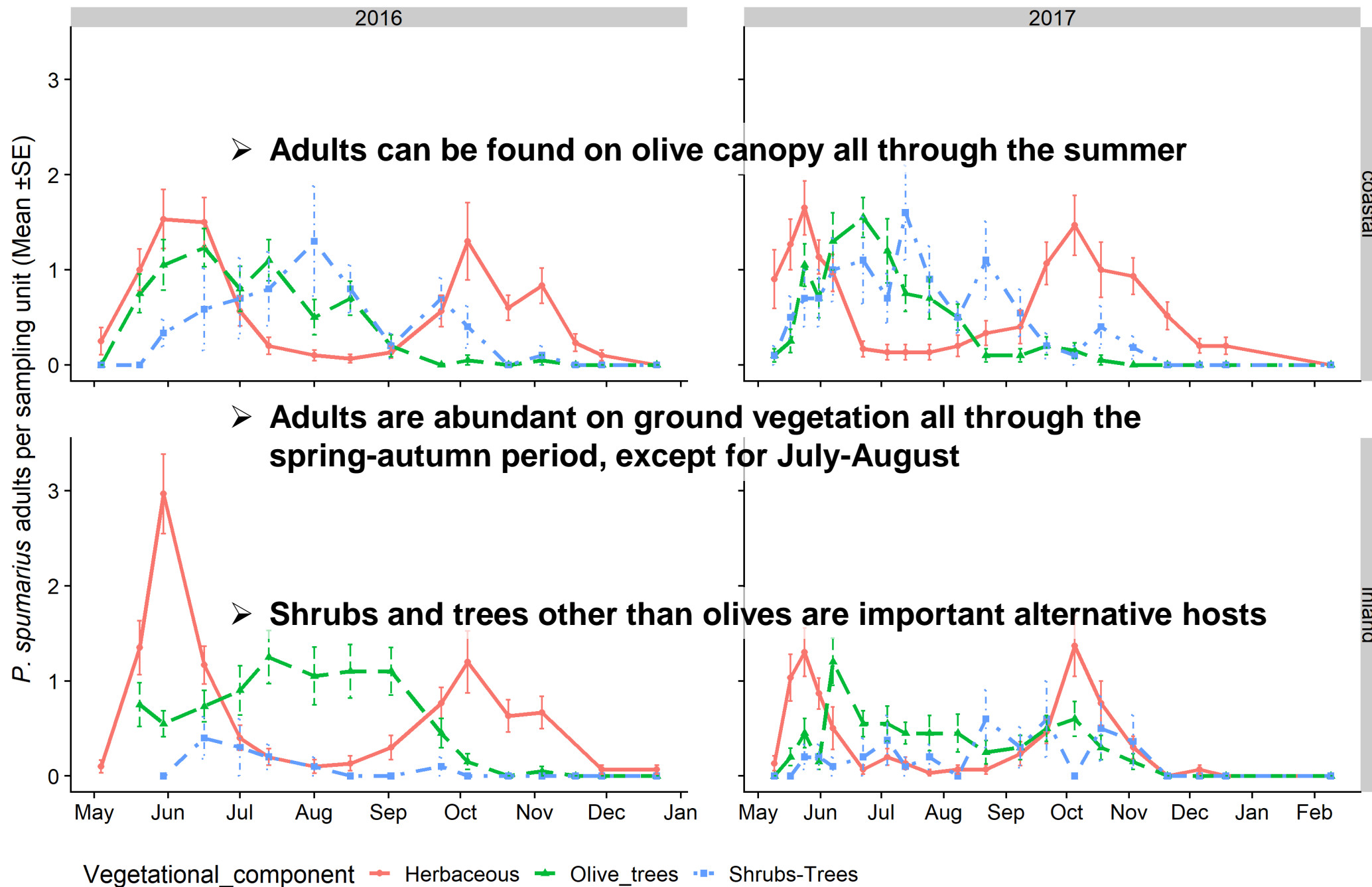


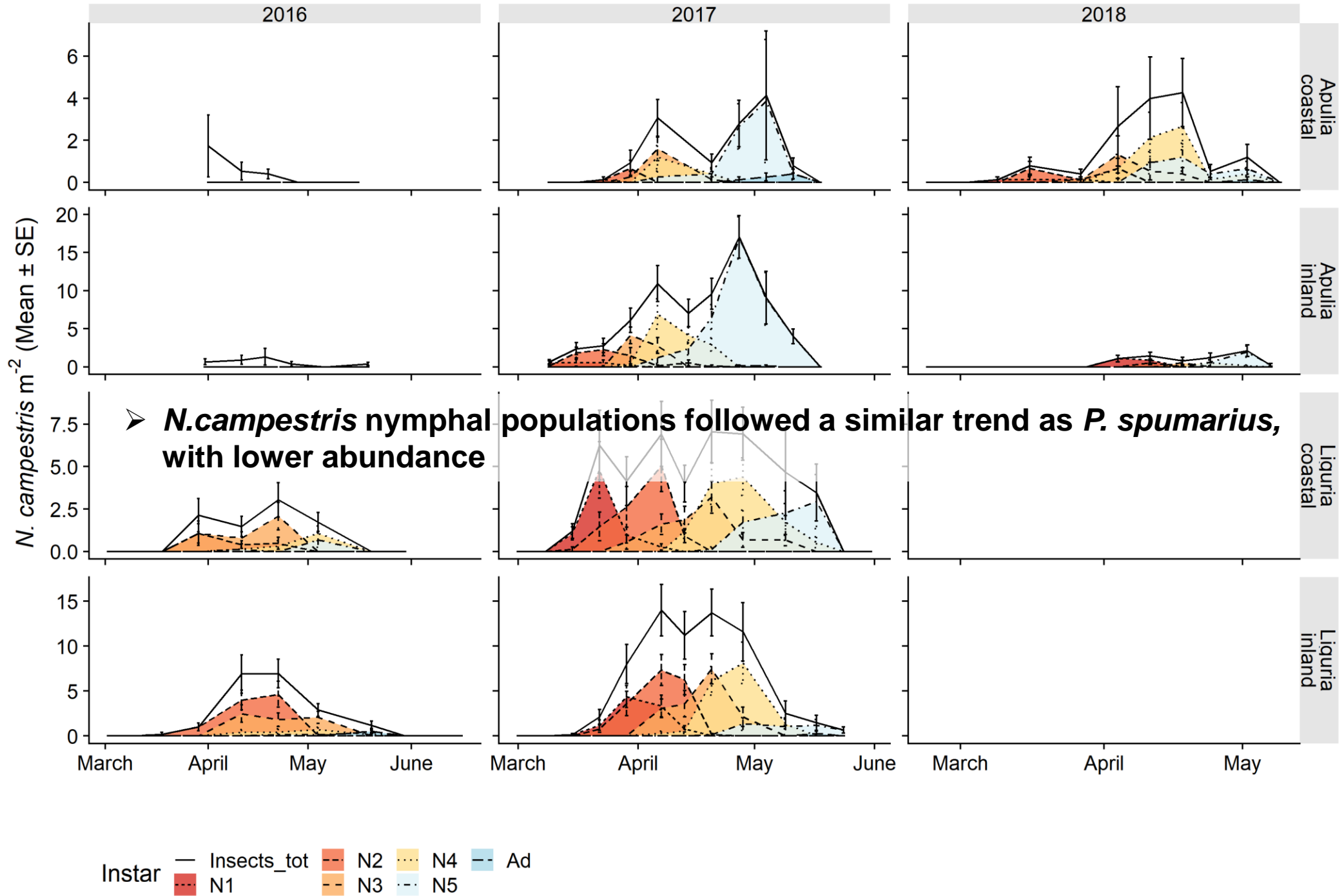


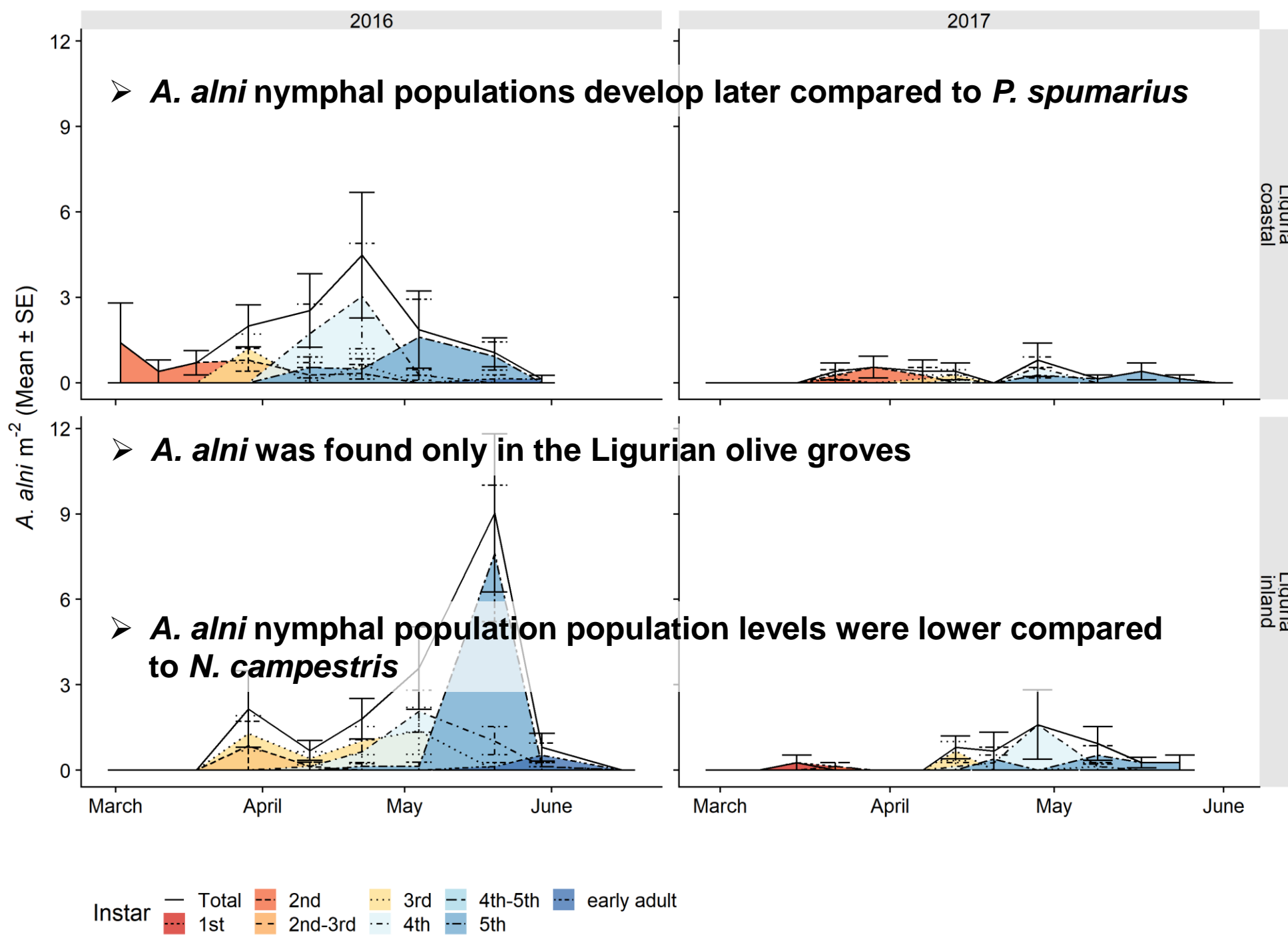
Adult populations of *P. spumarius* in Apulia



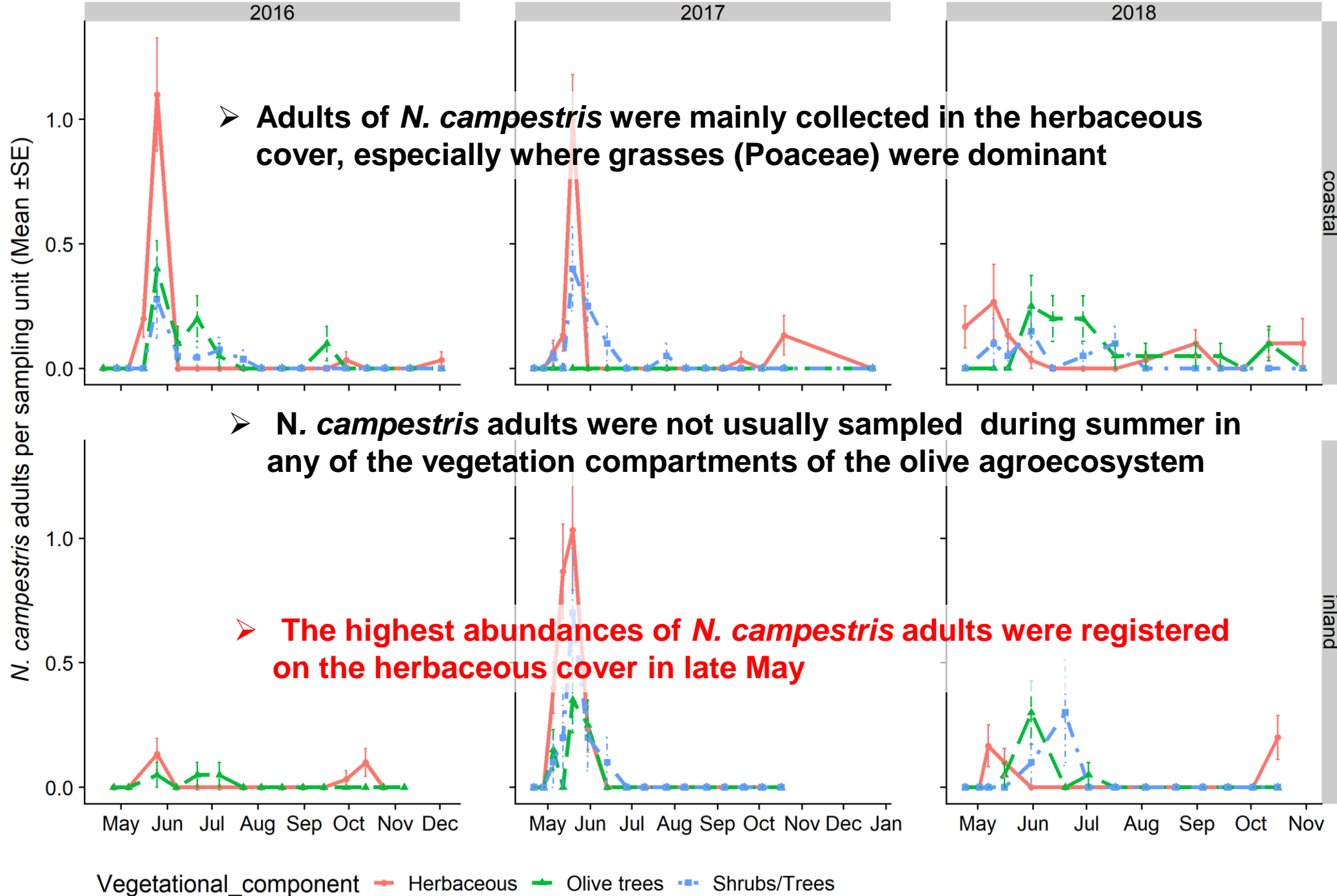
Adult populations of *P. spumarius* in Liguria



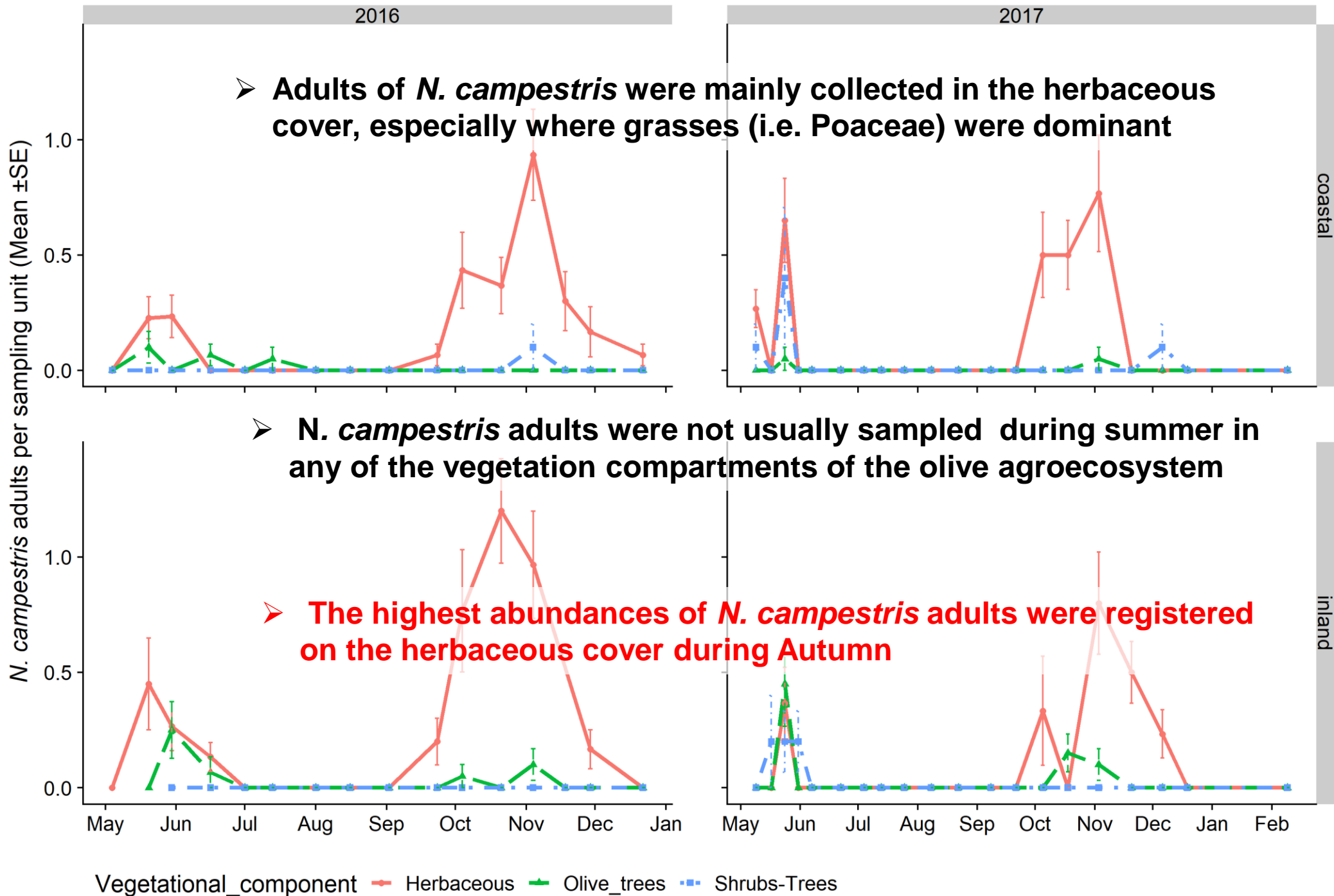




Apulia

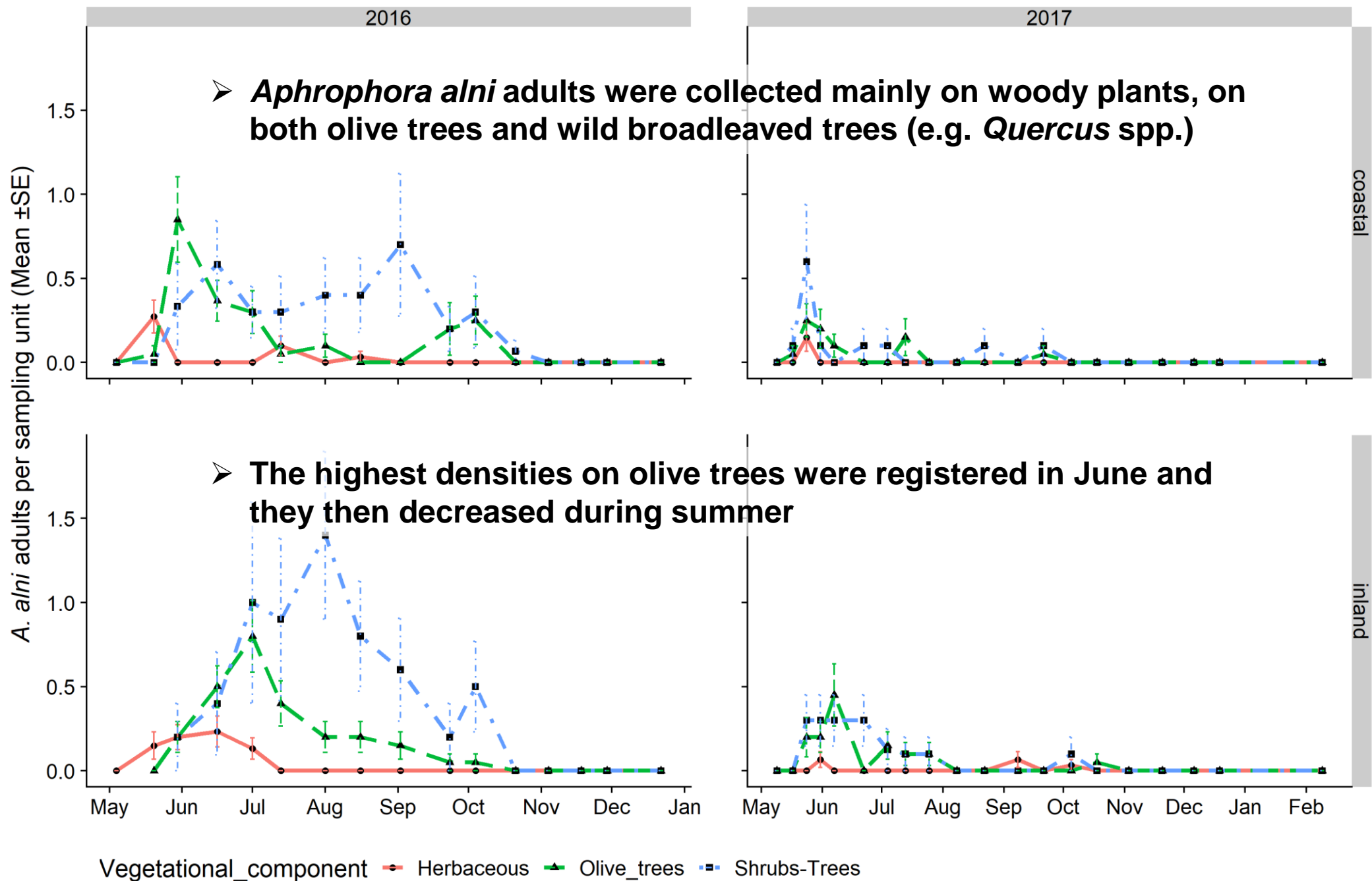


Liguria

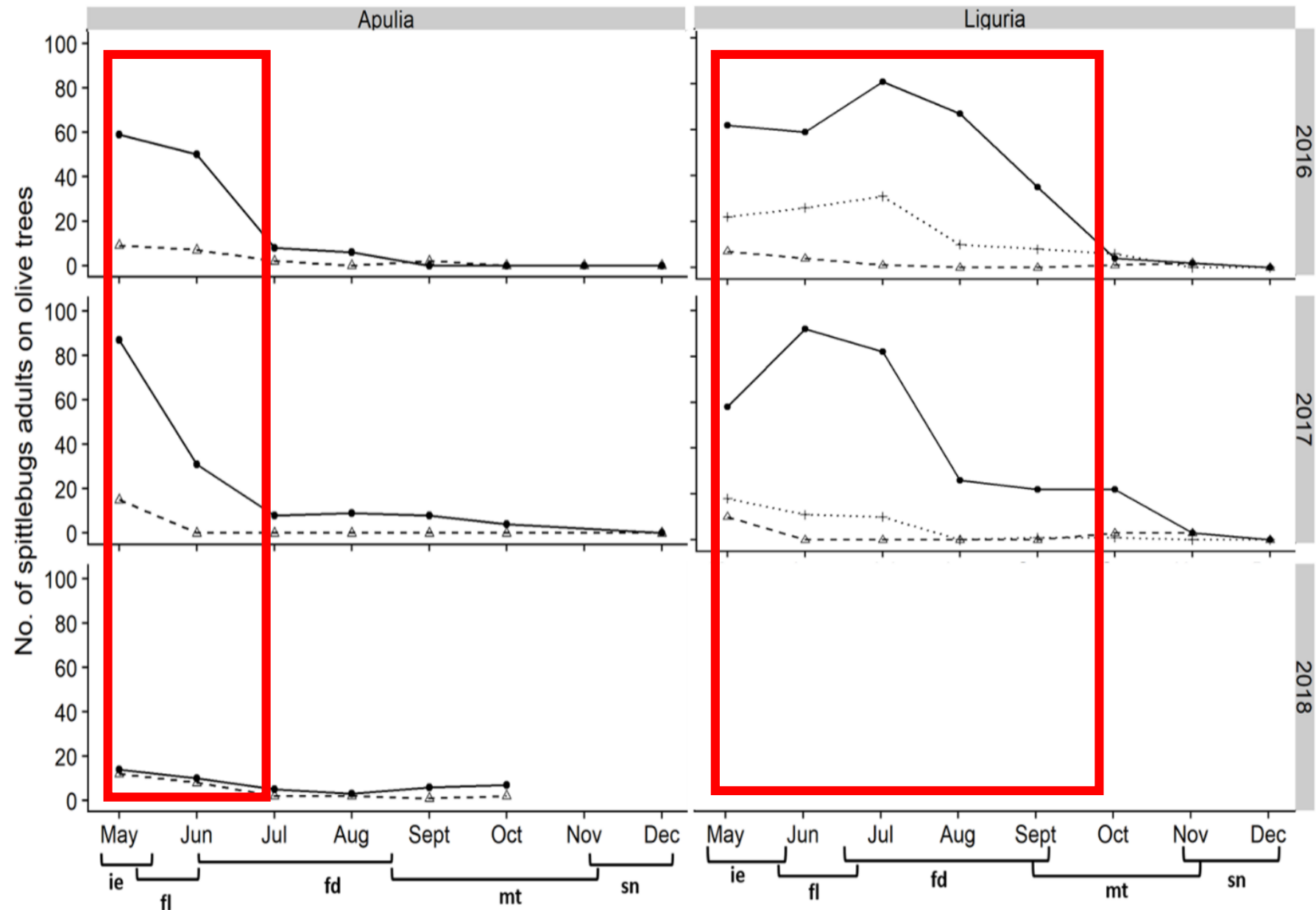


Liguria

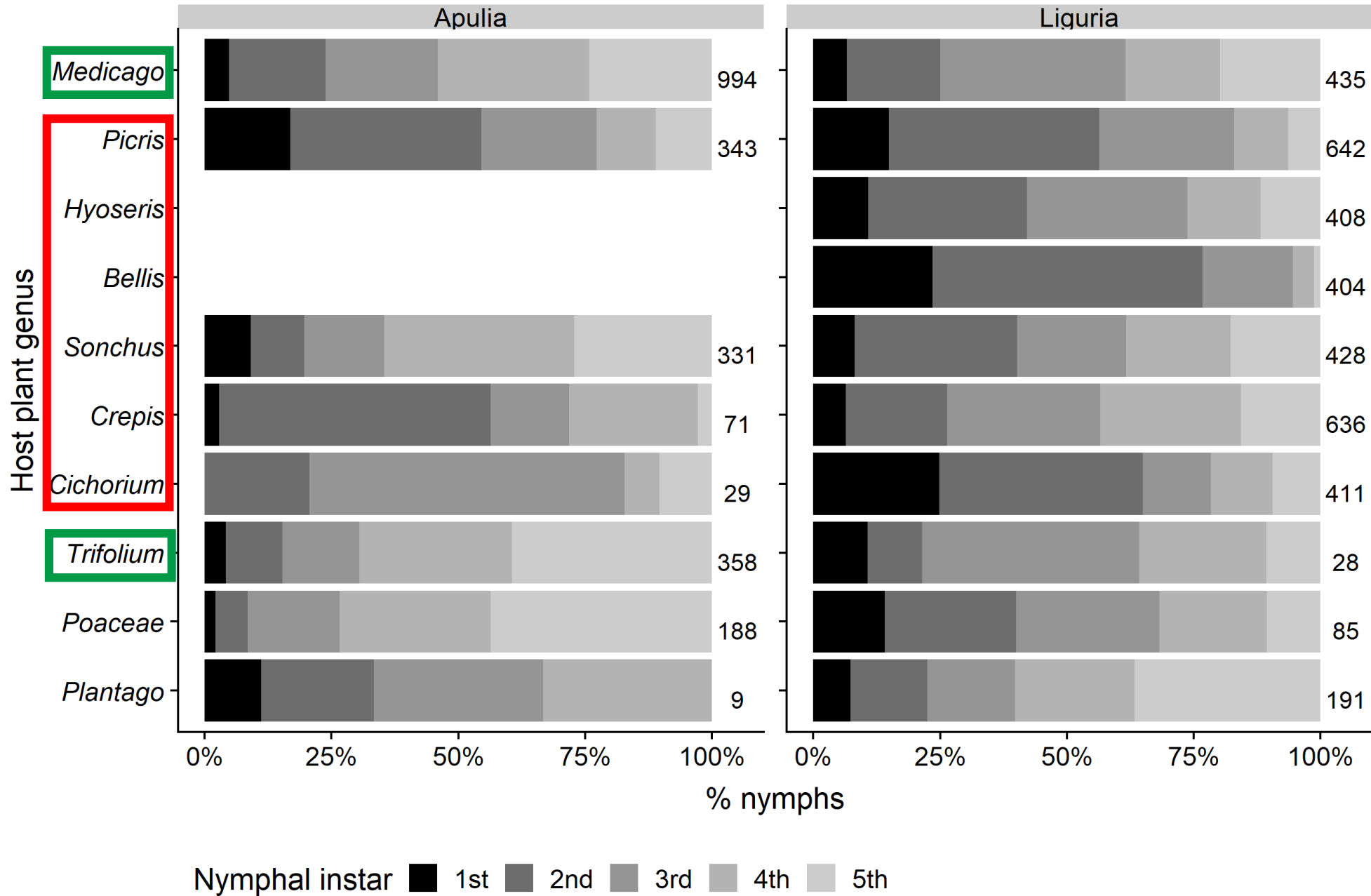
Adult populations of *A. alni* in Liguria

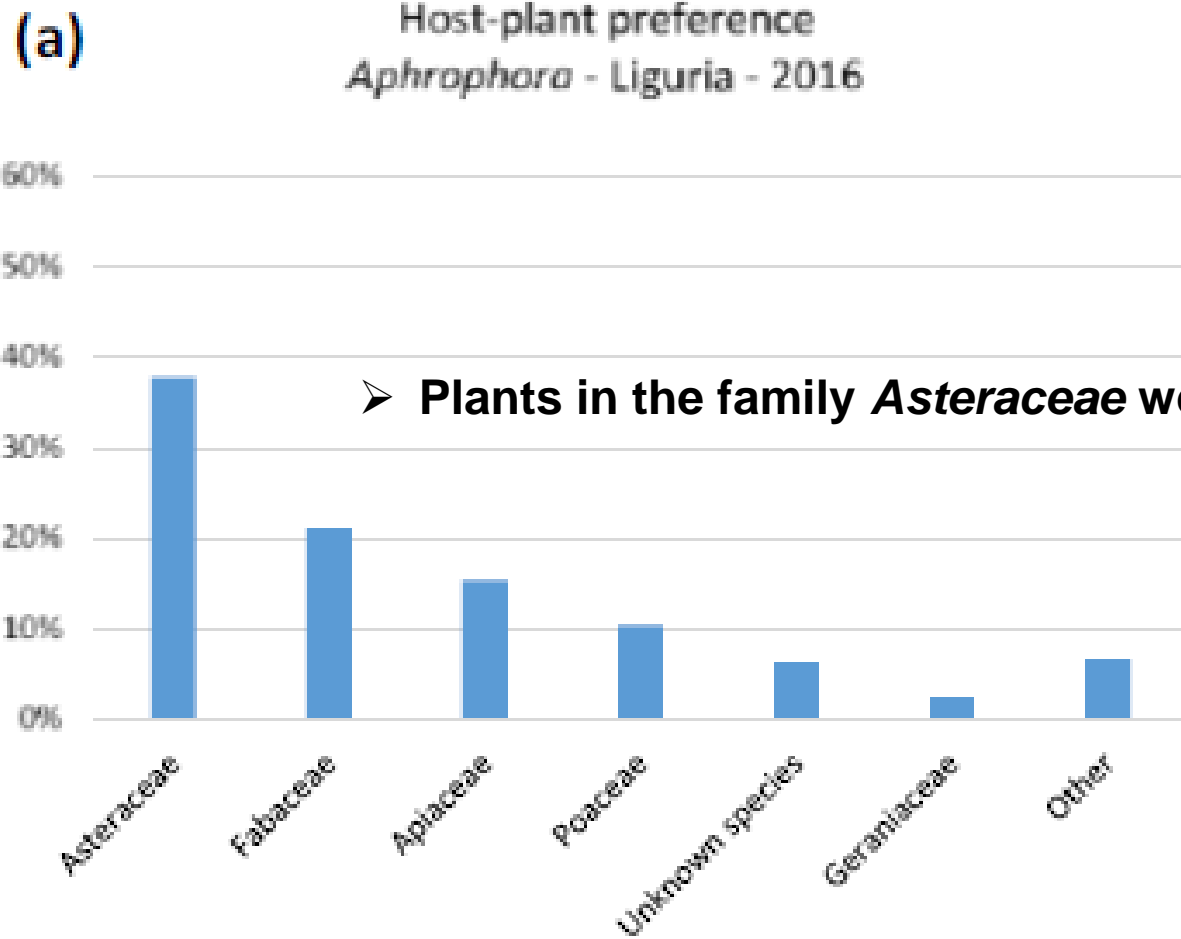


Abundance of spittlebug adults on olive trees over the season in Apulia and Liguria olive groves, compared with phenological stages of olive tree

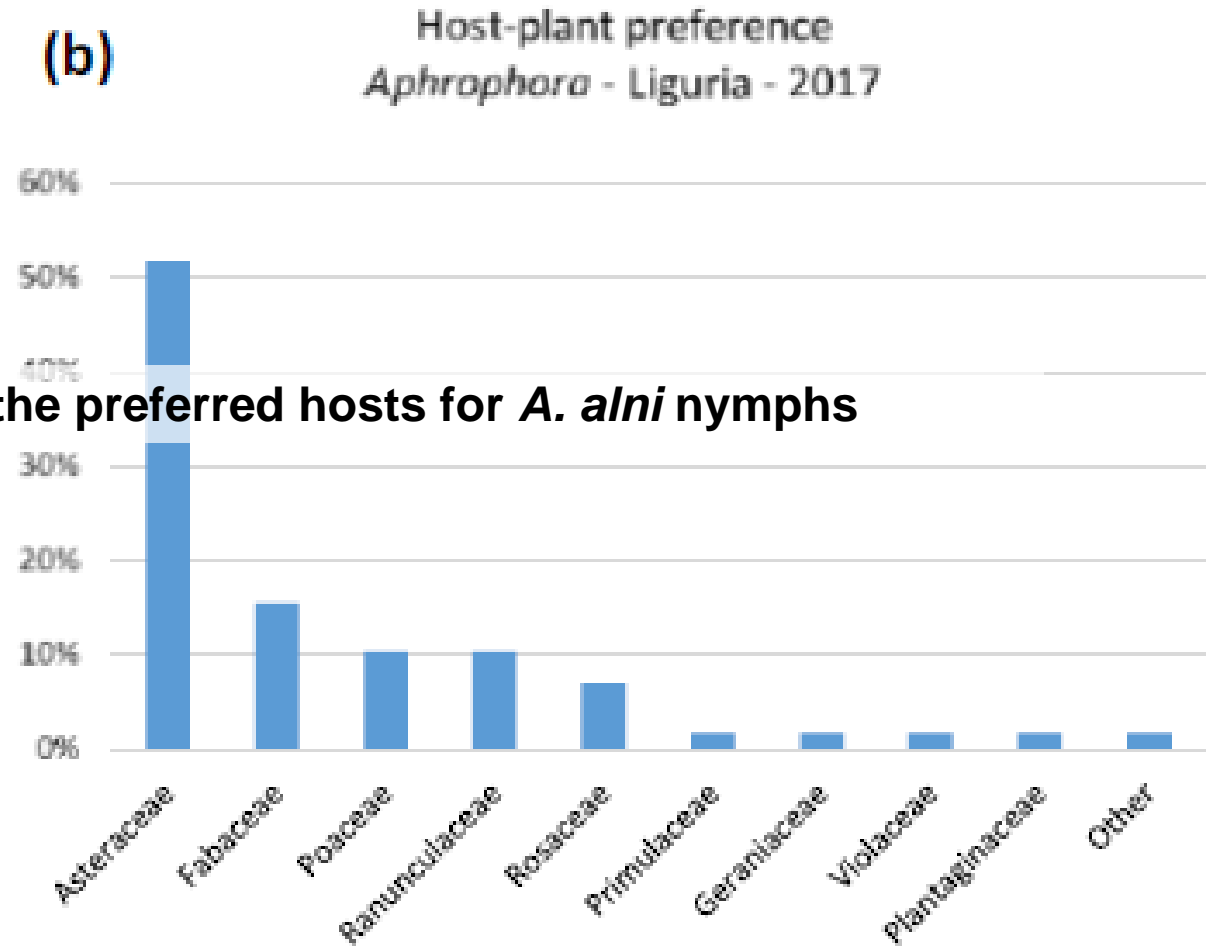


(ie = inflorescence emergence; fl = flowering; fd = fruit development; mt = maturity of fruits; sn = senescence)

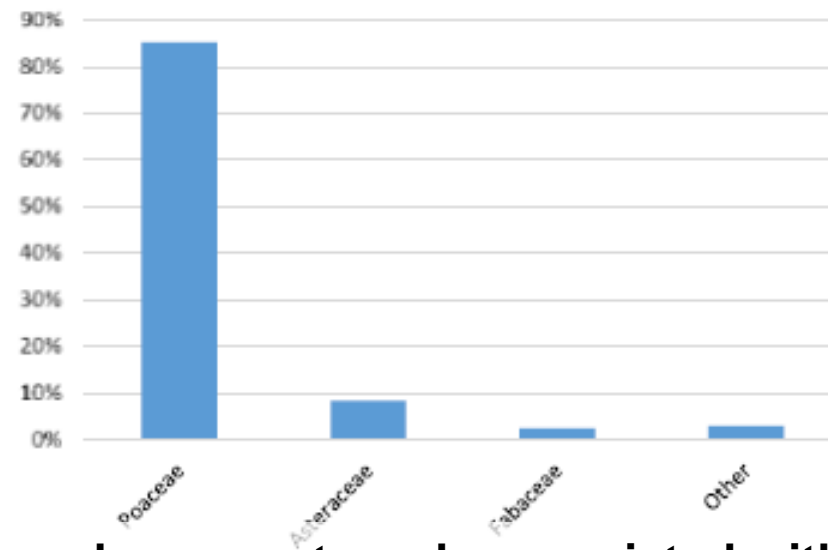




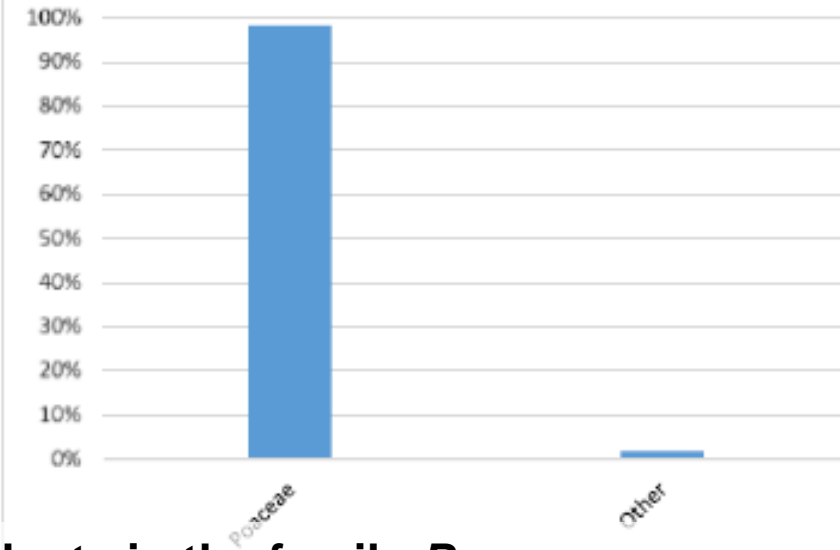
➤ Plants in the family *Asteraceae* were the preferred hosts for *A. alni* nymphs



(a) Host-plant preference
Neophilaenus - Liguria - 2016

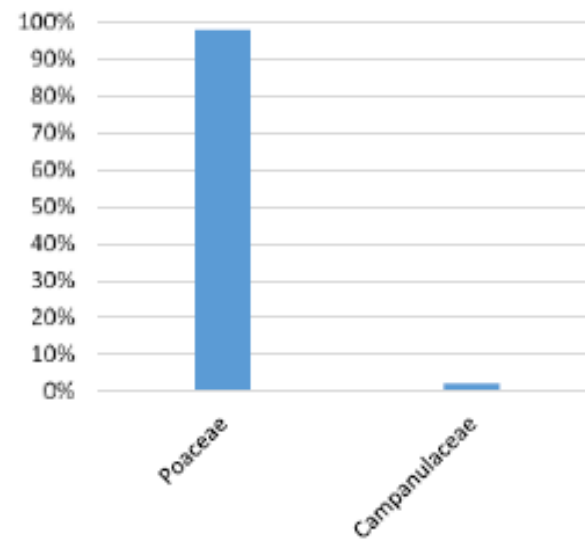


(b) Host-plant preference
Neophilaenus - Liguria - 2017

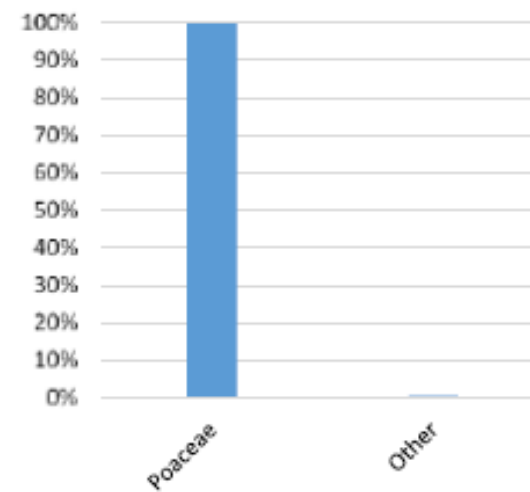


➤ *N. campestris* nymphs were strongly associated with plants in the family *Poaceae*

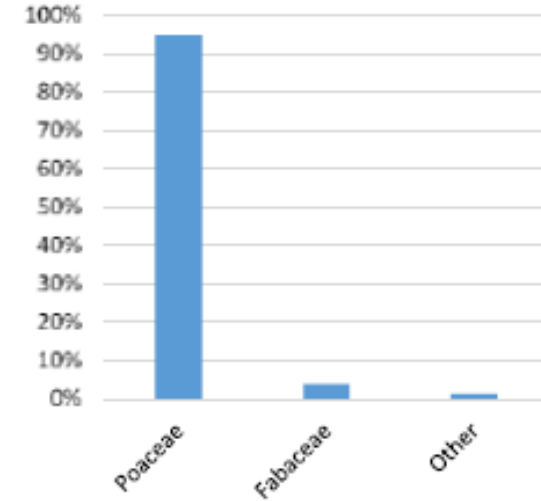
(a) Host-plant preference
Neophilaenus - Apulia - 2016



(b) Host-plant preference
Neophilaenus - Apulia - 2017



(c) Host-plant preference
Neophilaenus - Apulia - 2018



Journal of Economic Entomology, 112(1), 2019, 67–74

doi: 10.1093/jee/toy289

Advance Access Publication Date: 28 September 2018

Research

OXFORD

Arthropods in Relation to Plant Disease

Plant Selection and Population Trend of Spittlebug Immatures (Hemiptera: Aphrophoridae) in Olive Groves of the Apulia Region of Italy

Crescenza Dongiovanni,¹ Vincenzo Cavalieri,² Nicola Bodino,³ Daniele Tauro,¹ Michele Di Carolo,¹ Giulio Fumarola,¹ Giuseppe Altamura,² Cesare Lasorella,⁴ and Domenico Bosco^{3,5,6,○}

Nymphs of *P. spumarius* were sampled on 72 plant genera, and among the most common 25 genera, ***Sonchus*, *Knautia*, *Glebionis*, *Urospermum* (Asteraceae), *Medicago*, *Vicia*, *Melilotus* (Fabaceae), and *Daucus* (Apiaceae)** were the ones selected preferentially, according to Manly's index results

Phenology and abundance

- The phenological pattern in the two regions is similar if referred to chronological time. In fact, nymphs developed in Liguria between early March and end of May and in Apulia between the end of February and mid-May
- Phenological data based on physiological time (DD) are different in Liguria and Apulia. This difference among locations could be explained by a non-linear component in the temperature-dependent development rate function of *P. spumarius*
- The average nymph population density of *P. spumarius* varied from 13 to 30 individuals/m² in Liguria according to the olive grove and the year, and from 5 to 19 individuals/m² in Apulia

Host-plants of nymphs

- Nymphs of *P. spumarius* were polyphagous, they showed a strong host-preference for herbaceous plants of the Asteraceae and Fabaceae families both in Liguria and in Apulia regions of Italy: 72-88% of the total nymphs were indeed associated with these plant families
- Nymphs of *Aphrophora alni* showed a similar host-preference, while those of *Neophilaenus campestris* were strongly associated with Poaceae (85-100% of the nymphs were found on gramineous plants)

Vegetation compartments of the olive agroecosystem

- Depending on the region, the highest presence of *P. spumarius* adults on olive trees was recorded in May-June (Apulia) or for an extended period in May-August (Liguria)
- On the herbaceous cover two peaks of adults could be identified, in May and in September-October
- Alternative woody host-plants are important reservoir of the vector over the summer months

Thanks to EFSA for funding the research under the grant “Collection of data and information on biology and control of vectors of *Xylella fastidiosa*”.

EXTERNAL SCIENTIFIC REPORT



APPROVED: 23 April 2019

doi:10.2903/sp.efsa.2019.EN-1628

Collection of data and information on biology and control of vectors of *Xylella fastidiosa*

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Thanks for your attention