Exploring the fitness traits of cross-breading in *Tenebrio molitor* strains

Adamaki-Sotiraki Christina[1], Deruytter David[2], Rumbos I. Christos[3], Athanassiou G. Christos[1]

[1] Laboratory of Entomology and Agricultural Zoology, Department of Agriculture, Crop Production and Rural Environment, University of Thessaly, Phytokou Str., 38446, Volos, Greece

[2] Insect Research Centre, Inagro, Ieperseweg 87, Rumbeke-Beitem, Belgium

[3] Department of Agriculture, University of Patras, Messolonghi, Greece

Tenebrio molitor

Laboratory of Entomology and
Agricultural Zoology
Department of Agriculture,
Crop Production and
Rural Environment

University of Thessaly (UTH)

Hermetia illucens

Zophobas morio

Alphitobius diaperinus

Backround..

Strain matters!

Developmental and Waste Reduction Plasticity of Three Black Soldier Fly Strains (Diptera: Stratiomyidae) Raised on Different Livestock Manures

Fen Zhou, Jeffery K. Tomberlin, Longyu Zheng, Ziniu Yu, Jibin Zhang

Effect of moisture on growth rate and development of two strains of *Tenebrio molitor* L. (Coleoptera, Tenebrionidae)

K.C.D. Urs *, T.L. Hopkins

Strain matters: strain effect on the larval growth and performance of the yellow mealworm, *Tenebrio molitor* L.

C.I. Rumbos, C. Adamaki-Sotiraki, M. Gourgouta, I.T. Karapanagiotidis, A. Asimaki, E. Mente, C.G. Athanassiou

Strain effect on the adult performance of the yellow mealworm, *Tenebrio molitor* L.

C. Adamaki-Sotiraki, C.I. Rumbos, C.G. Athanassiou

Strain matters, so can we do more with them?

Objective

Evaluation of mating compatibility among different *Tenebrio molitor* strains in terms of fecundity and larval growth

Experimental design

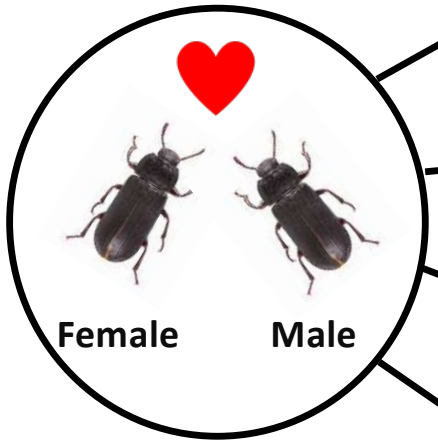
Lab trial

Experimental design – Lab trial

1 **Italian strain**

2 **Greek strain**

Experimental design – Lab trial



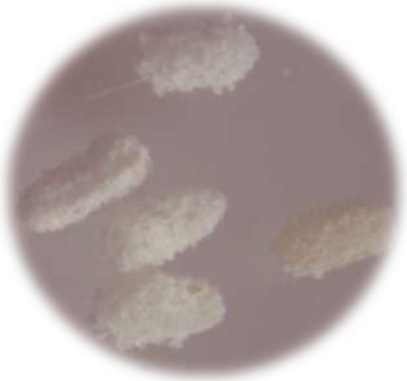
Adult reproduction
(10 adults 1:1)

Italian (♀) - Italian (♂)

Greek (♀) - Greek (♂)

Italian (♀) - Greek (♂)

Greek (♀) - Italian (♂)



1 Egg production

2 Hatchability

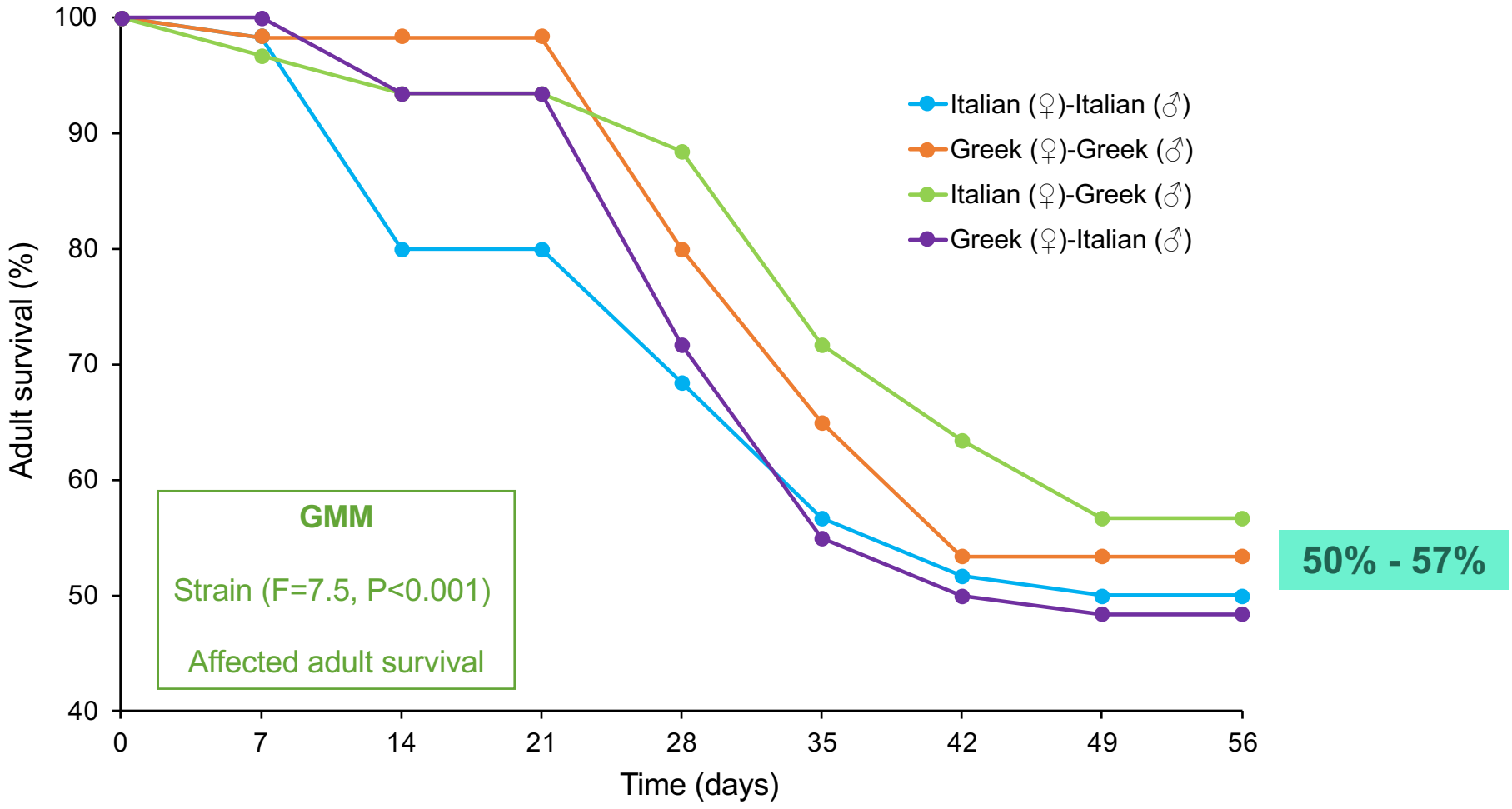
3 Larval growth

Results

Lab trial

Results – Lab trial

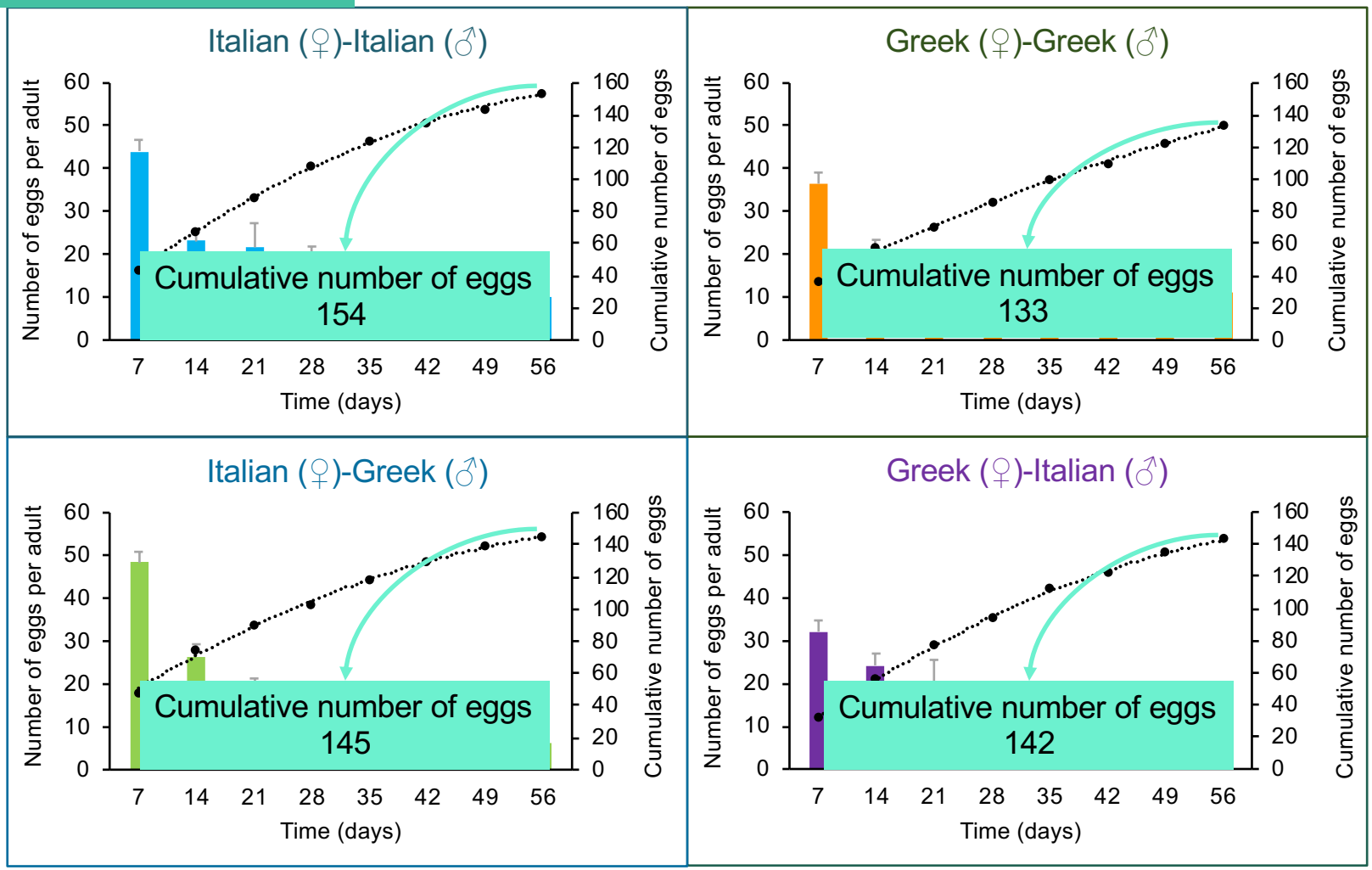
Adult survival



50% - 57%

Results – Lab trial

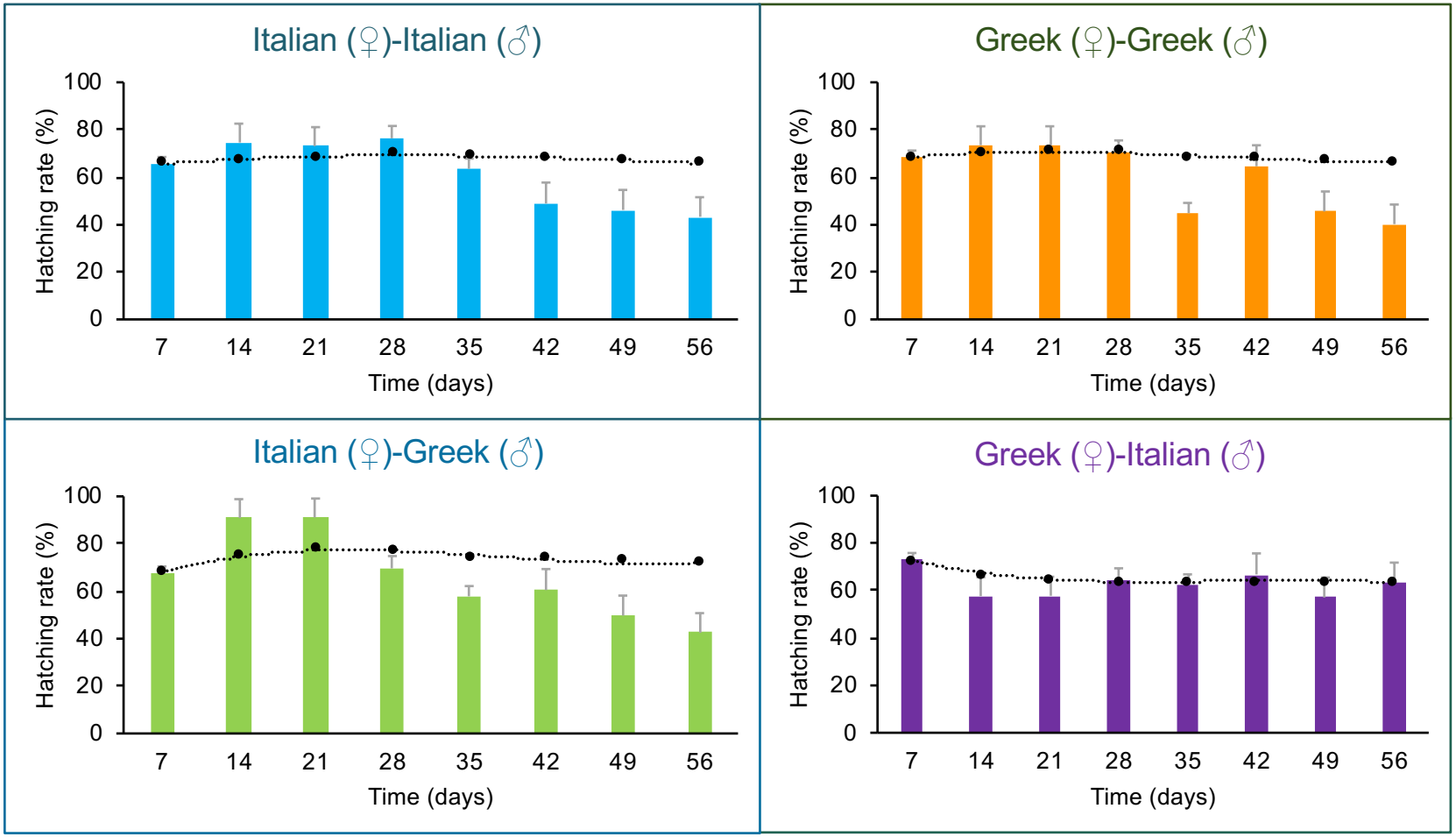
Number of eggs per adult



F=0.49; P=0.68

Results – Lab trial

Hatching rate



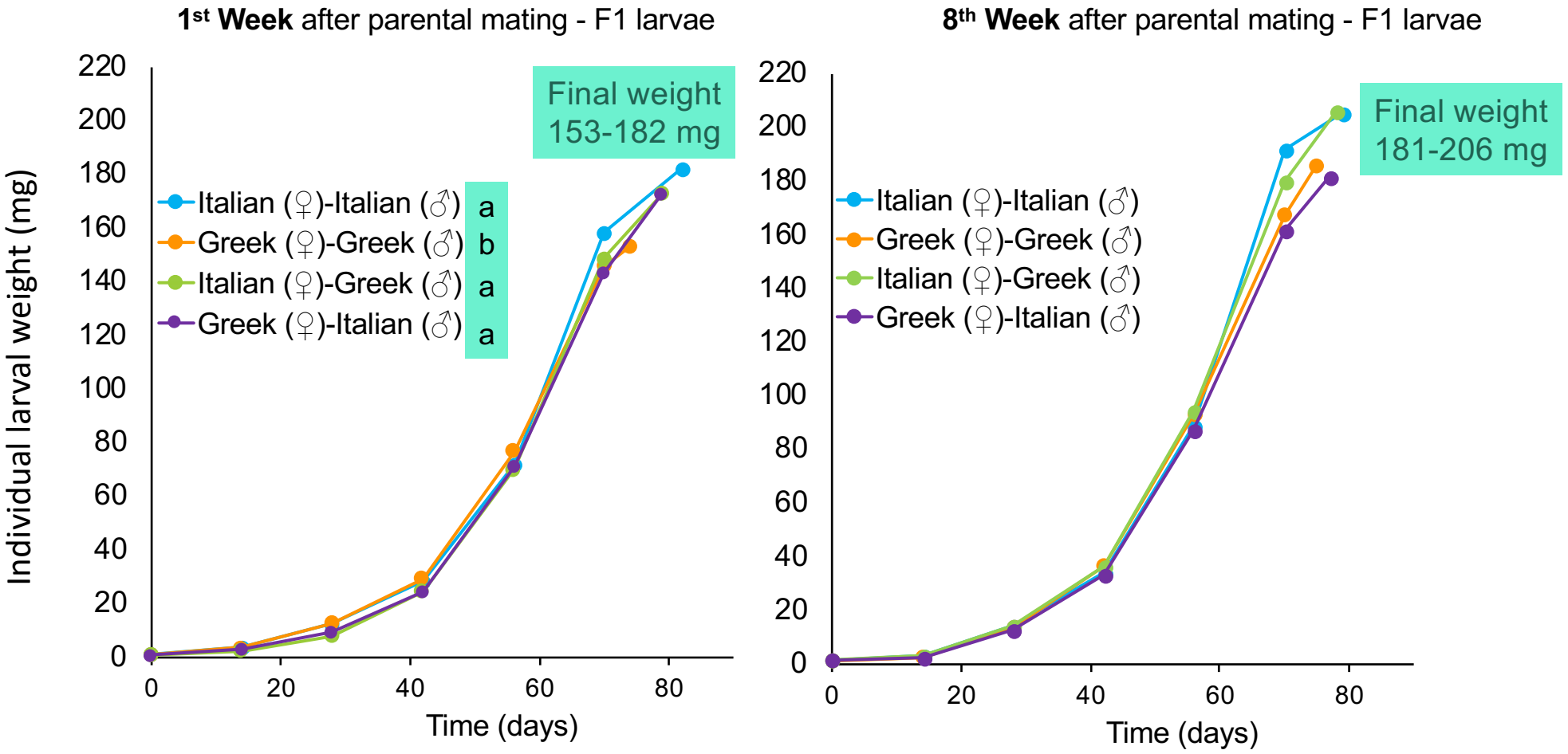
Cumulative hatching rate at the end of the bioassay

60-70% for all inbred and outbred strains

F=2.35; P=0.10

Results – Lab trial

Individual larval weight



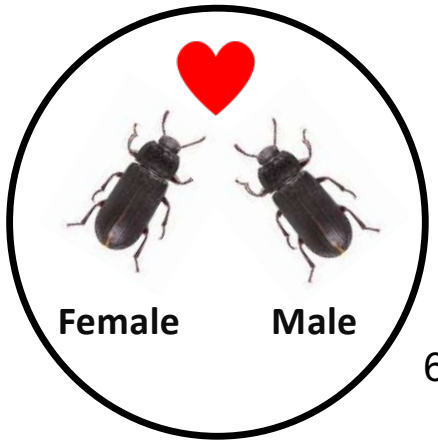
Experimental design

Tray trial

Experimental design – Tray trial

1. Italian strain
2. Greek strain
3. American strain
4. Inagro strain

Experimental design – Tray trial



Adult reproduction
(500 adults)

10 combinations

Time period:
6, 12, 18, 24 days

1 Egg production

2 Hatchability

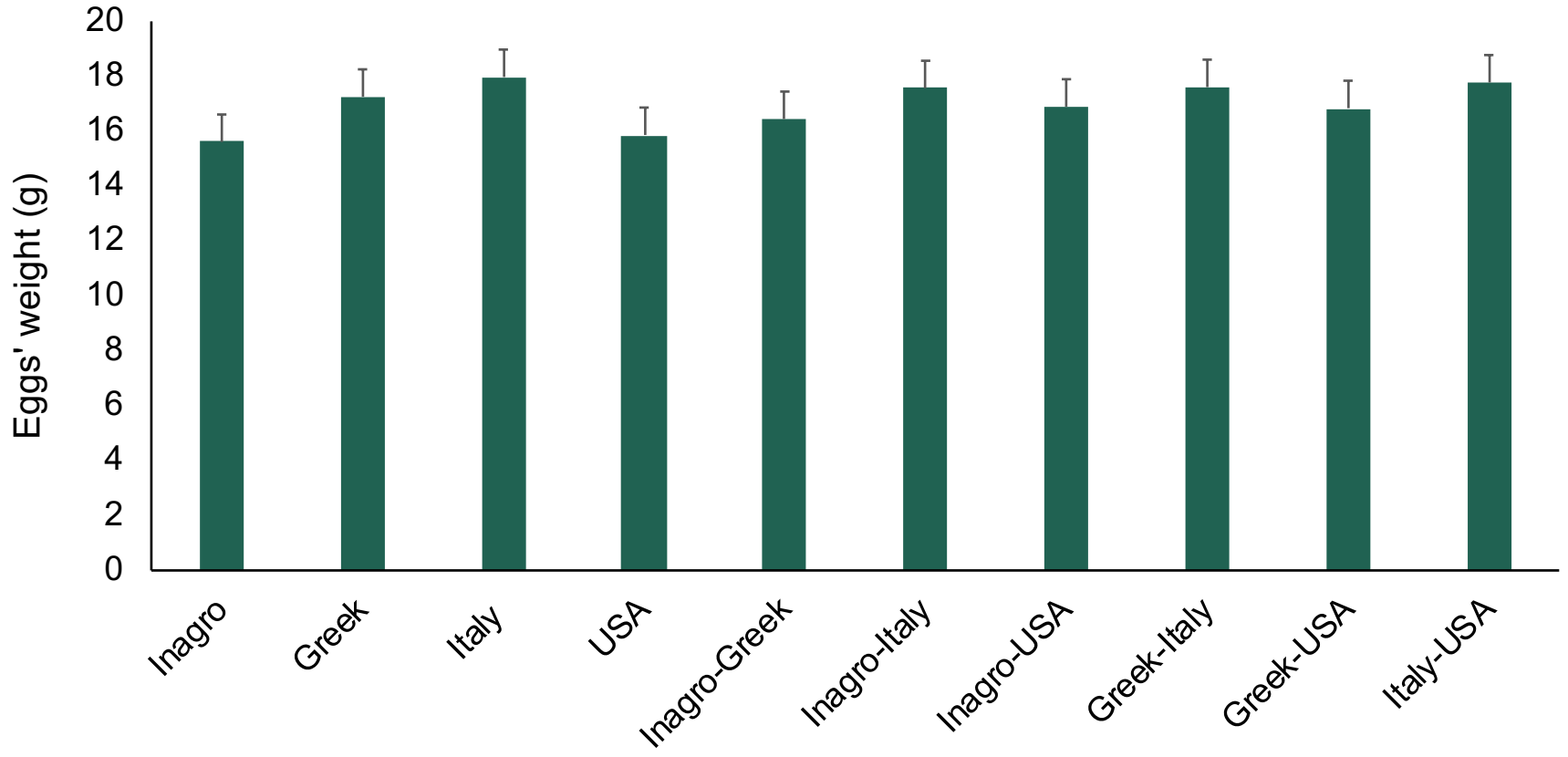
3 Larval growth

Results

Tray trial

Total weight of eggs

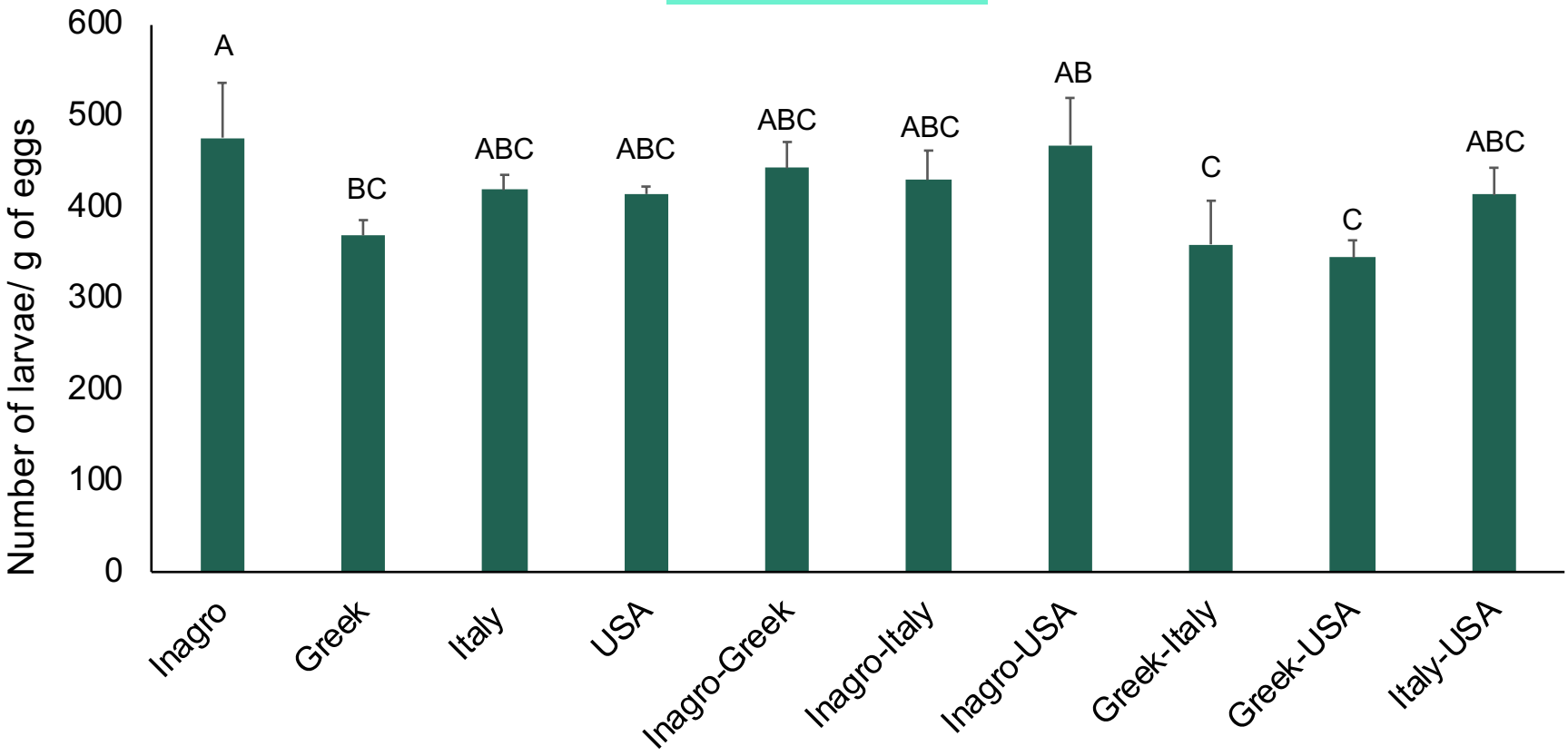
Range: 15-18 g *



*No statistical differences recorded

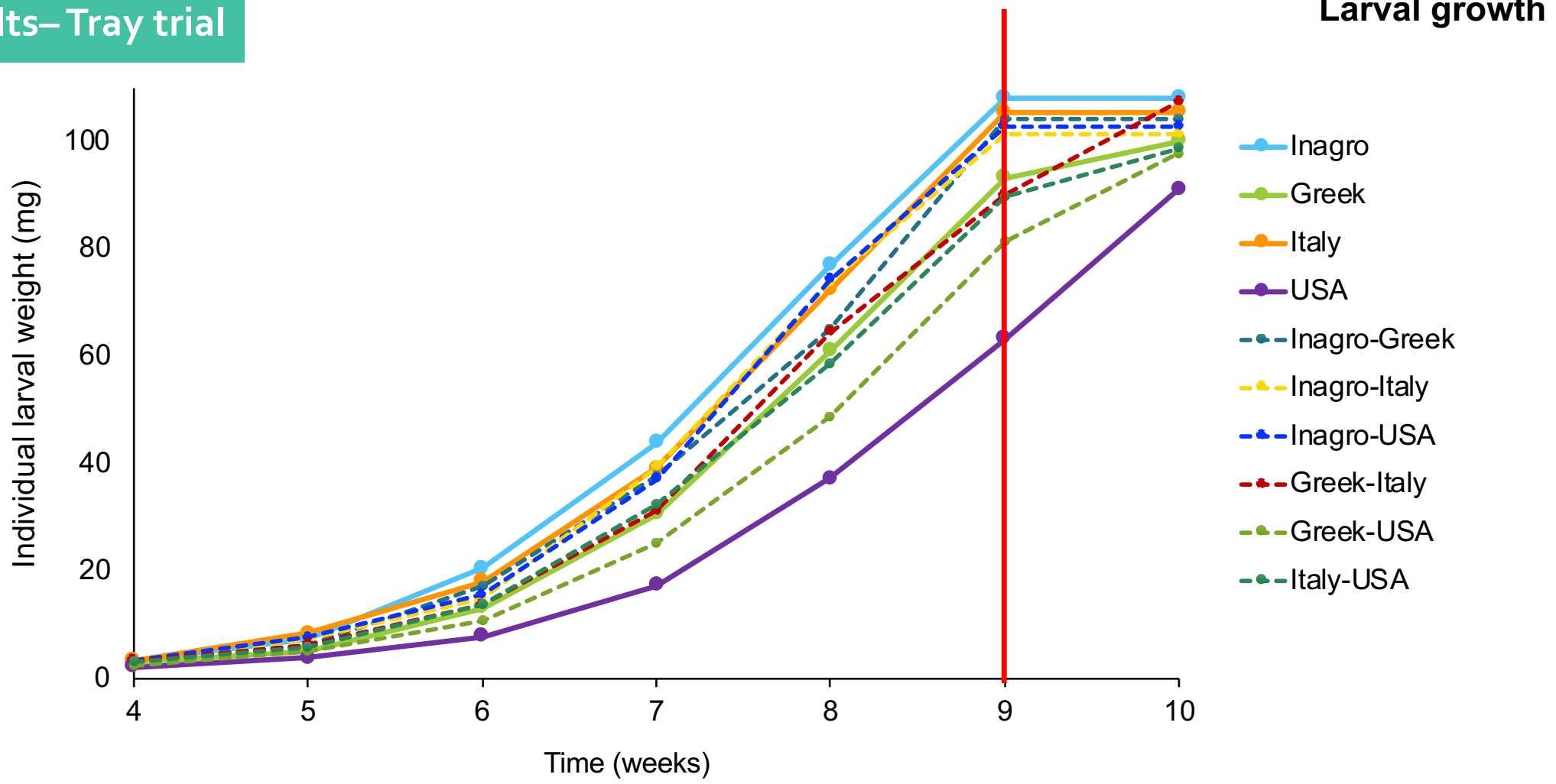
Hatched larvae

Range: 476-344 *



*Means followed by the same letter are not significantly different (P<0.05).

Results– Tray trial



Overall Conclusions

◎ Good **mating compatibility** (i.e. egg production, hatchability) among adults of the strains tested

◎ Strain-specific characteristics (i.e., larval weight) have the potential to be optimized by cross breeding with an additional strain.

◎ Further research on phenotype-genotype relationships could be utilized for targeted breeding approaches between different strains

Thank you!

Email: athanassiou@uth.gr

Thank you!


Georgia Baliota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