



Fluctuating asymmetry as a reliable biomarker of nutritive stress: The rice weevil (*Sitophilus oryzae* L) case



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INTRODUCTION

Developmental stability (DS) represents the ability of an organism to develop a genetically determined phenotype despite environmental stress. Feeding on an unsuitable host can act as a stressor for insects, leading to slower population development, reduced progeny production, and disrupted stability, ultimately decreasing population size.

Fluctuating asymmetry (FA), expressed as slight random deviations from bilateral symmetry is a widely used indicator of disturbed DS, since stress is expected to affect organismal symmetry.



RESULTS

Highly significant differences in PP (629-658 individuals) and %CK (88.7- 98.7%) were observed when feeding on wheat and maize compared to those feeding on sorghum (150–167 individuals, 7.9-14.4%).

Procrustes ANOVA revealed significant asymmetry among populations.

All populations showed significant FA, with the **highest** observed in individuals feeding on **sorghum** and the lowest in those feeding on wheat. Discriminant function analysis confirmed significant differences in asymmetric components between wheat and sorghum ($T^2 = 36.399$; $P < 0.05$) and maize and sorghum ($T^2 = 27.423$; $P < 0.05$), but not between favorable hosts ($T^2 = 20.4120$; $P > 0.05$).



Fig. 3. FA index of *S. oryzae* populations reared on maize, wheat and sorghum.



MATERIAL AND METHODS

The **rice weevil (*Sitophilus oryzae* L.)** was used as a model organism to test the reliability of FA as an indicator of disturbed DS in relation to progeny production (PP) and feeding intensity (% of consumed kernels - %CK). Weevils were reared on **wheat and maize** (favorable hosts) and **sorghum** (unfavorable host) in “no choice” tests over 4 months. FA was quantified on ventral body side using geometric morphometric analysis. Procrustes ANOVA was used to determine differences between body symmetry traits.

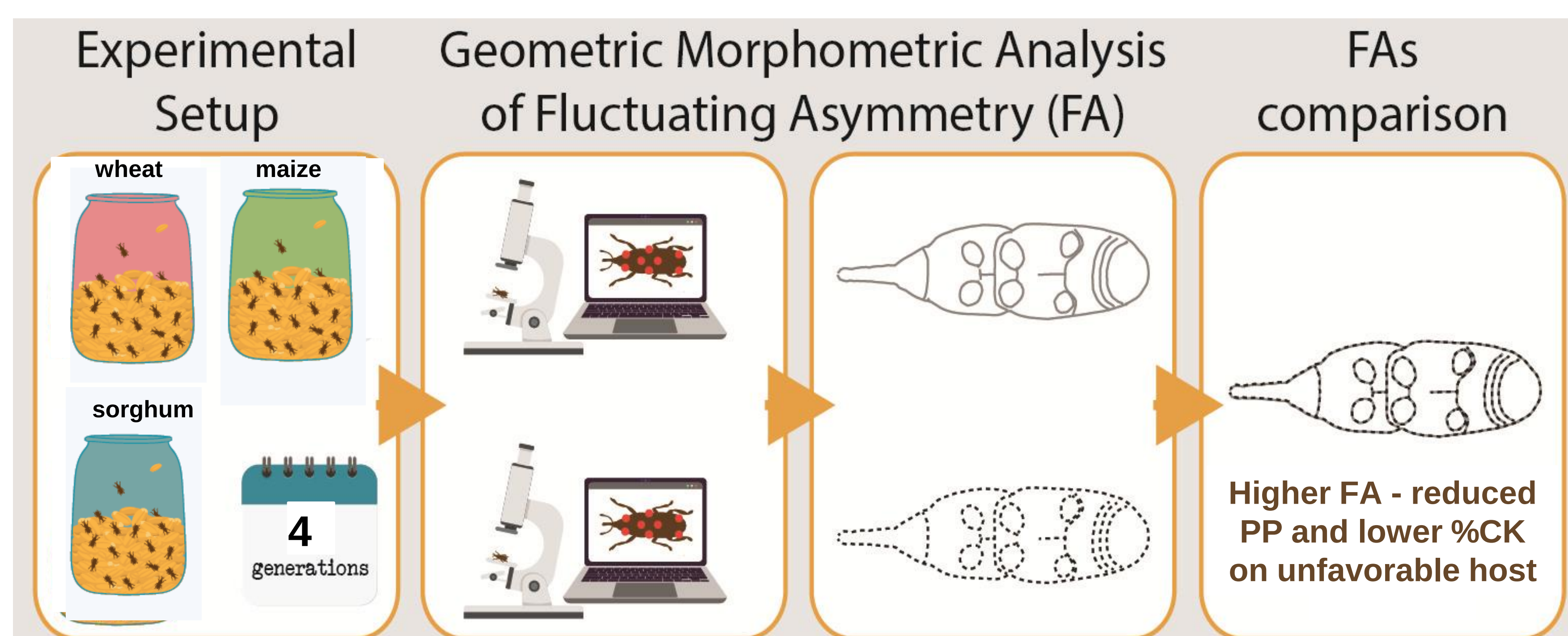


Fig. 1 Experimental set-up

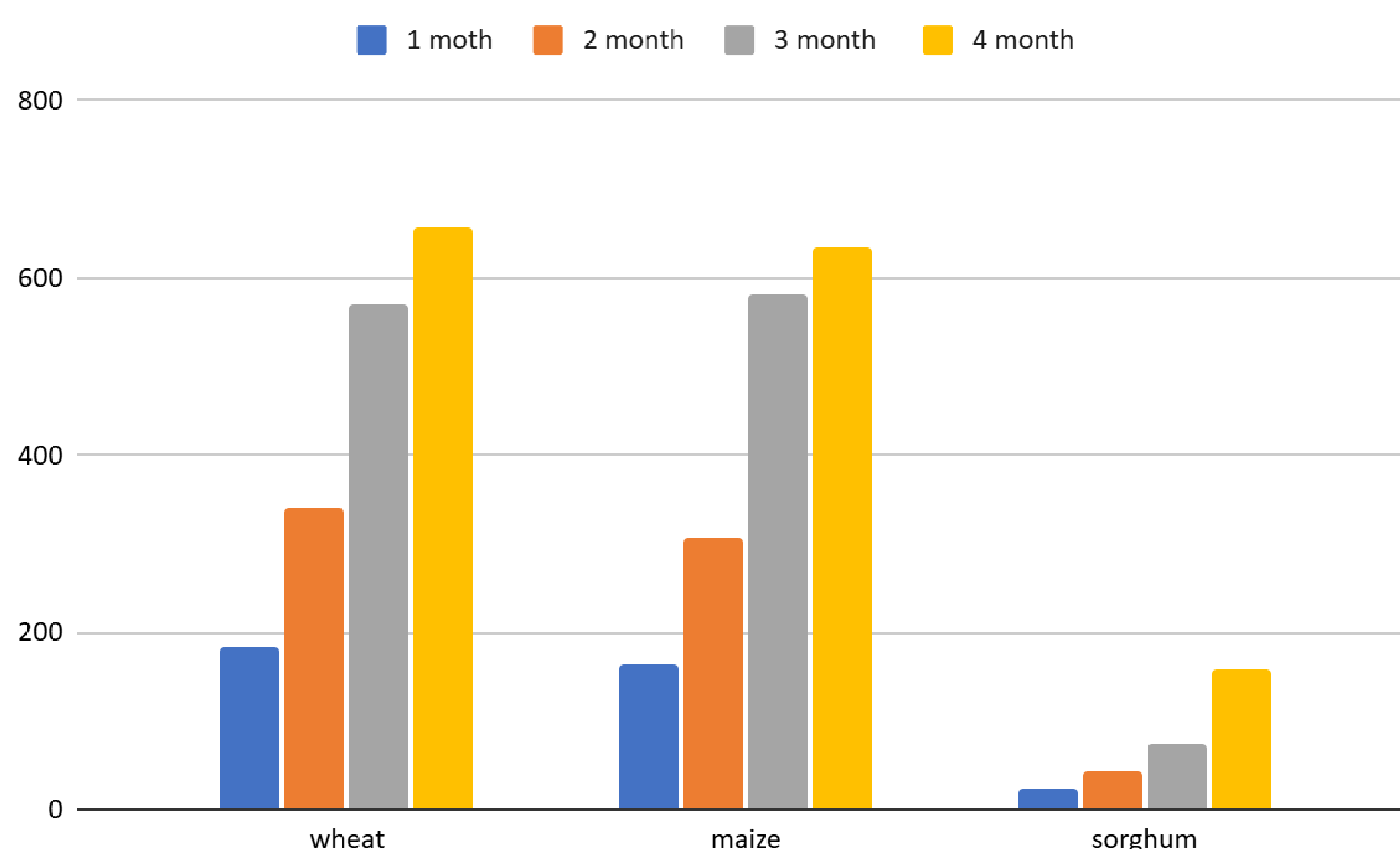


Fig. 2 Progeny production of *S. oryzae* on different hosts

CONCLUSION

- Higher FA corresponds to reduced PP and lower feeding intensity (%CK) on unfavorable host
- FA reliably reflects host-related nutritive stress and represents useful biomarker of disturbed DS in *S. oryzae*