



Invasive weed *Parthenium hysterophorus* could hamper malaria control in East Africa

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INTRODUCTION



The current climatic changes have led to a host of negative impacts on human health, including the emergence and resurgence of infectious diseases and the spread of invasive weeds. *Parthenium hysterophorus*, which is native to the tropics of North and South America, is one such invasive weed that has invaded many regions in East Africa, including malaria endemic areas. Allelopathic properties and high biotic potential favour the spread of this weed. The plant exhibits toxic effects on livestock and humans, and reduces crop yield and pastoral land. However, the plant's indirect impact on human health, and interactions with disease-transmitting vectors, remains explored. We present the first evidence of the potential involvement of invasive plant species in the spread of arthropod-borne infectious diseases.

METHODS

Target nectar sources



Parthenium hysterophorus
(Asteraceae)
{Photo: www.daf.qld.gov.au}



Ricinus communis
(Eupobiaceae)
{Photo: Dan L. Perlman/EcoLibrary.org}



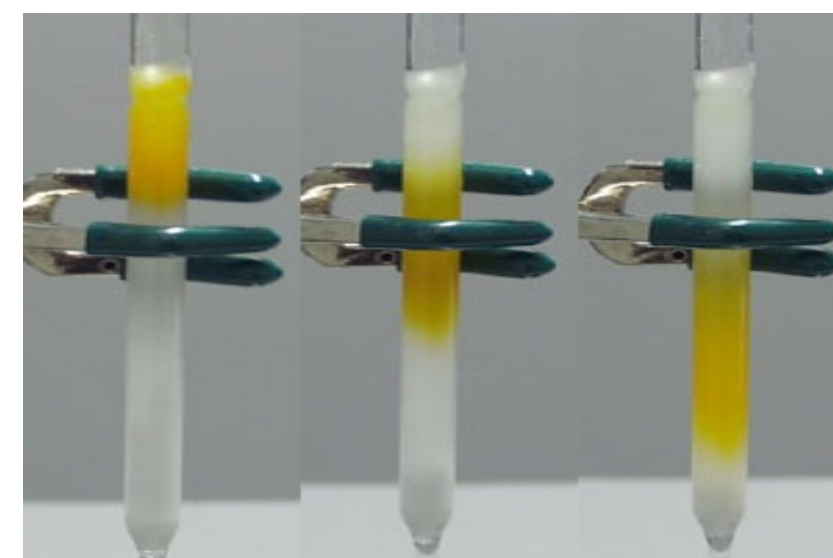
Bidens pilosa
(Asteraceae)
{Photo: www.prota4u.org}



Feeding assay



An. gambiae
imbibing nectar



Isolation of plant
metabolites

Approach

- Survival on intact plants monitored for 14 days.
- Surviving mosquitoes sampled on day 5 for energy and plant toxin analysis.
- Survival on glucose solution laced with plant toxins monitored for 7 days.

CONCLUSION

- P. hysterophorus* has the potential to extend malaria vector survival especially in areas where it has displaced local flora that are poor nectar sources (such as *B. pilosa*).
- This could hamper control efforts geared towards breaking the transmission circuit of the malaria-causing parasite.

IMPACT

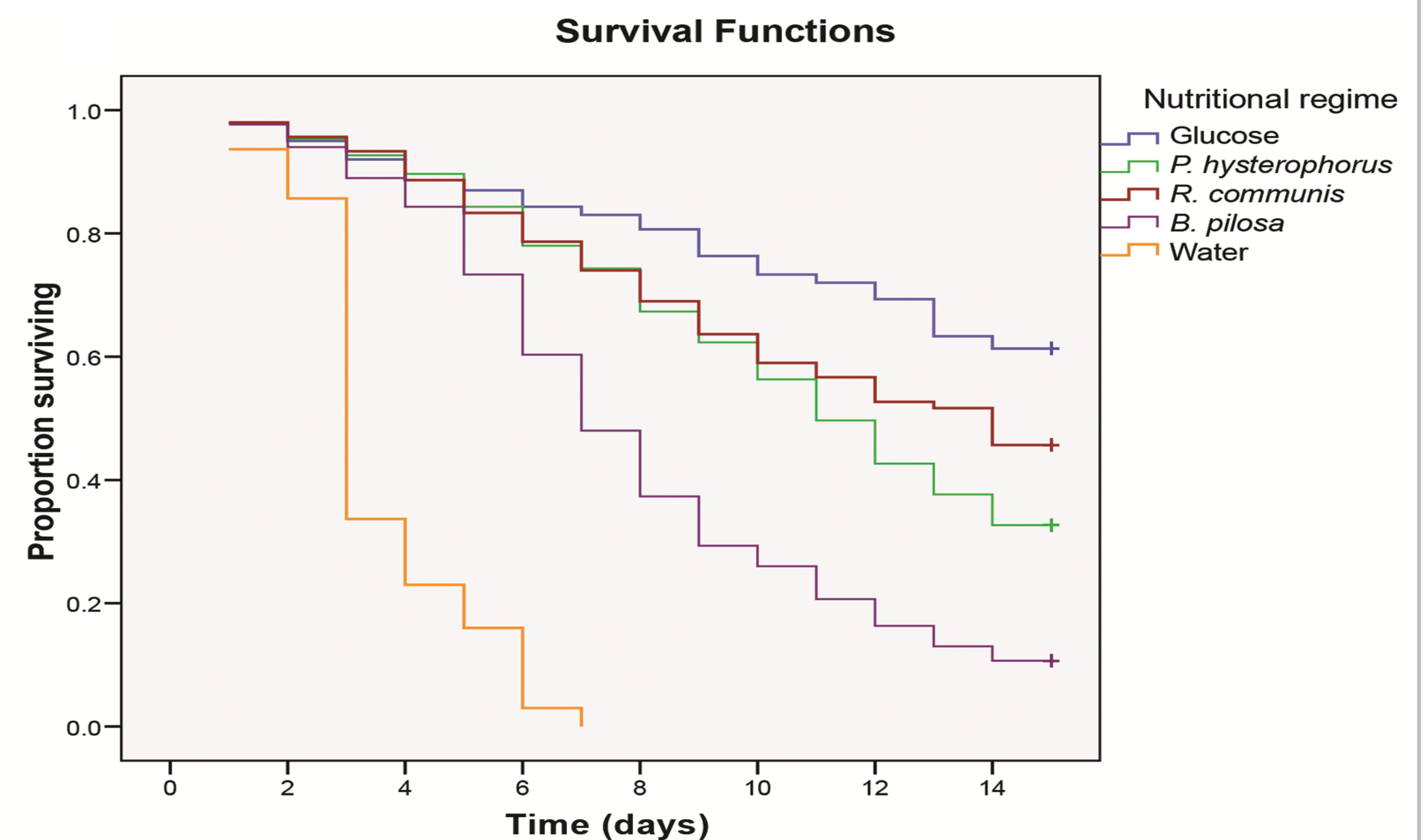
This study serves as a prerequisite to understanding the interactions of invasive plants and disease vectors, and to finding mitigating strategies against such plants.

OBJECTIVE

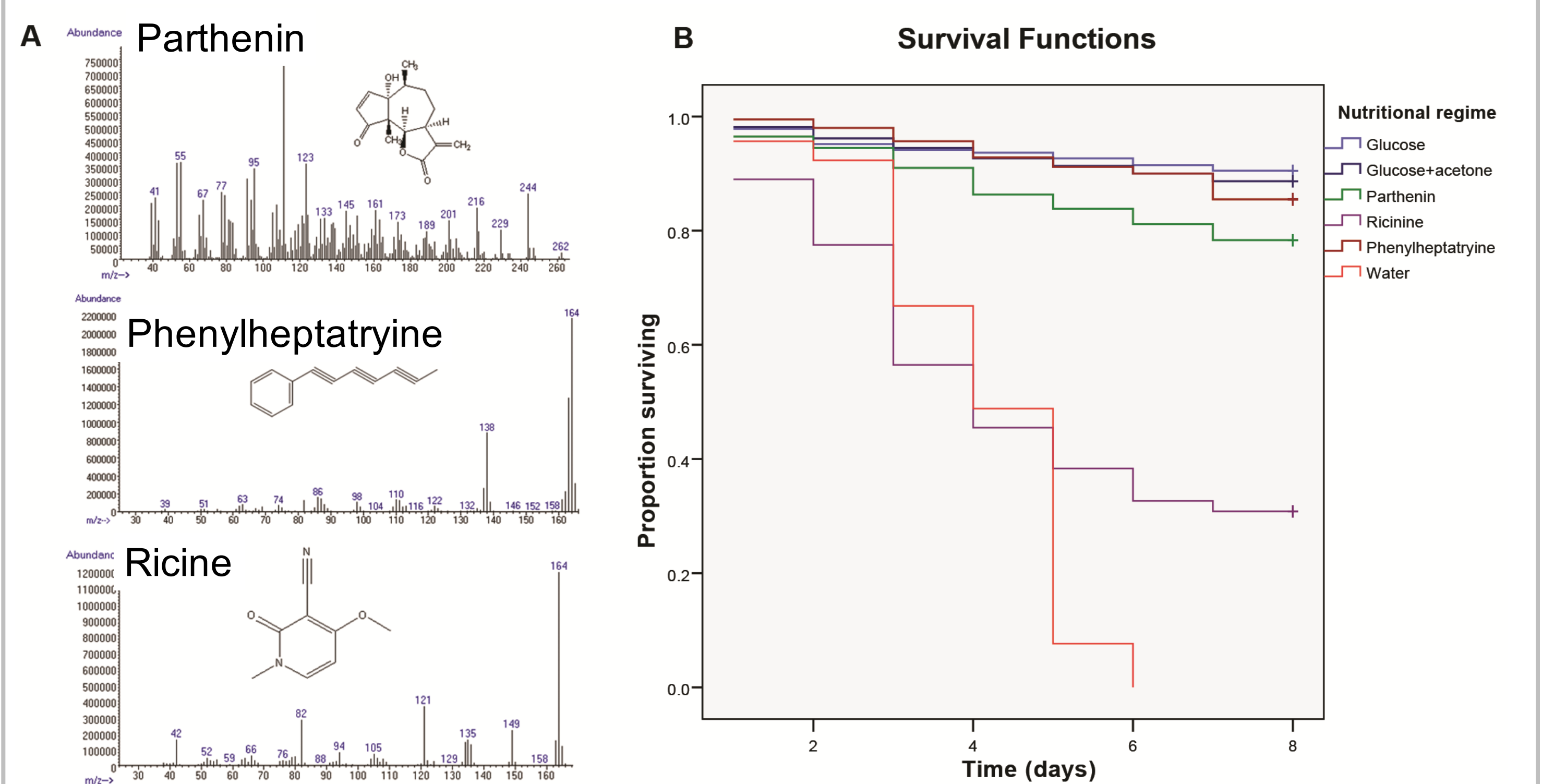
To investigate the impact of the invasive Neotropical weed *Parthenium hysterophorus*, and its toxins, on the survival and energy reserves of the malaria vector *Anopheles gambiae*

RESULTS

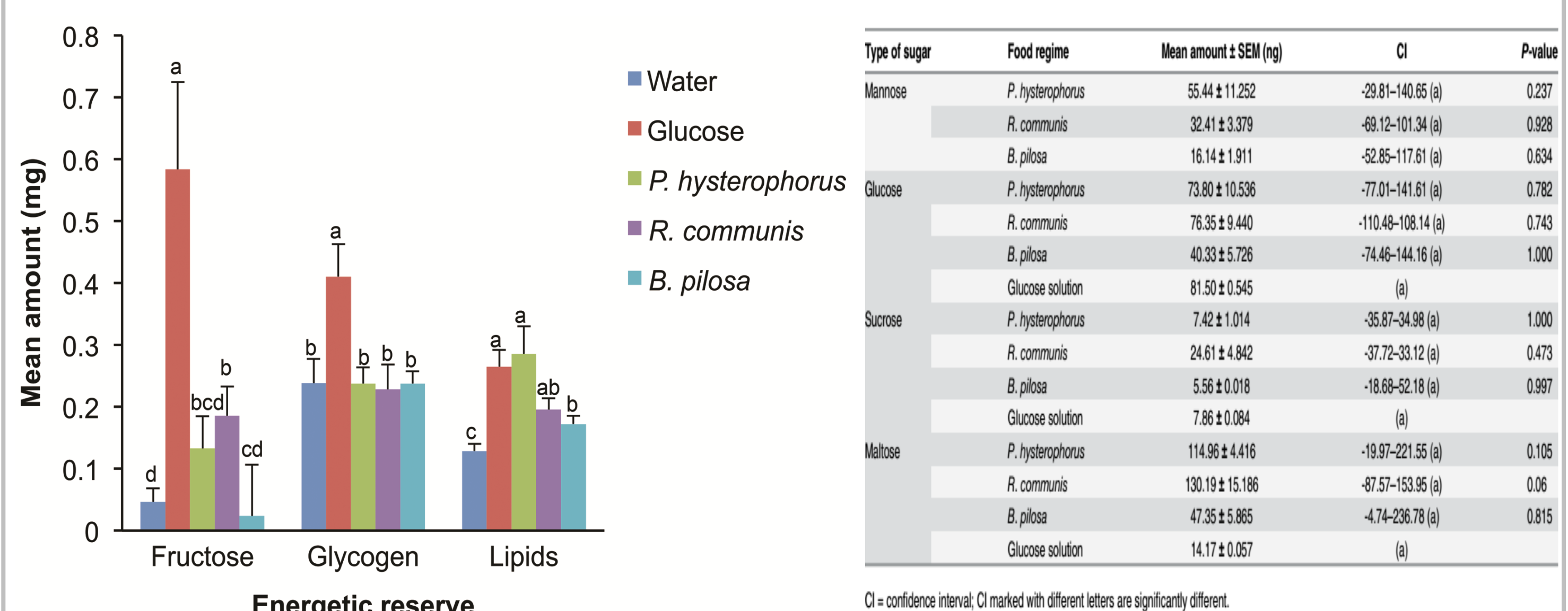
An. gambiae thrives on intact *P. hysterophorus*



An. gambiae tolerates *P. hysterophorus* toxins



An. gambiae obtains energy reserves from *P. hysterophorus*



REFERENCES

Manda H., Gouagna L.C., Foster W.A., Jackson R.R., Beier J.C., Githure J.I. and Hassanali A. (2007) Effect of discriminative plant-sugar feeding on the survival and fecundity of *Anopheles gambiae*. *Malaria Journal* 6, 113.

Nyasembe V.O., Cheseto X., Kaplan F., Foster W.A., Teal P.E., Tumlinson J.H., Borgemeister C. and Torto B. (2015) The invasive American weed *Parthenium hysterophorus* can negatively impact malaria control in Africa. *PLOS One* 10(9), e0137836.