Modelling spatiotemporal patterns of dubas bug infestations on date palms in northern Oman: A geographical information system case study

- Khalifa M. Al-Kindi
- Paul Kwan
- Nigel R. Andrew
- Mitchell Welch

Show more
http://dx.doi.org/10.1016/j.cropro.2016.11.033
Get rights and content

Highlights

- Geographical Information System (GIS) is used to study Dubas bug infestation in northern Oman during 2006–2015.

- Spatiotemporal risk of Dubas bug infestation is modelled by hotspot analysis using the Getis-Ord statistic, Gi*

- Annual hotspots over study period are concentrated in mountain plains where farms are located between gradient elevations.

- Average seasonal infestation levels and distribution of hotspots help monitor Dubas bug and plan resources for its treatment.
Abstract

The aim of this paper is to demonstrate how Geographical Information System (GIS) can be used effectively to study infestations of Dubas bug (DB), Ommatissus lybicus Bergevin, in date palm (Phoenix dactylifera L.) that occurred in northern Oman during 2006–2015. The ability to produce geographical and spatiotemporal layers using GIS is expected to serve an important role in both monitoring and surveillance of DB infestation and its impact in the study area. By using of spatial analytic and geostatistical functions in ArcGIS 10.3™, data that quantified the infestation levels of DB over a 10-year period from 2006 to 2015 were used to map and model the risk of infestation spatiotemporally. We modelled the spatiotemporal risk of DB infestation by performing hotspot analysis using the Getis-Ord statistic, Gi*. Our results show that annual hotspots over the study period were mainly concentrated in the mountain plains, particularly where farms are located between gradient elevations. Furthermore, the distribution pattern varied considerably with time and space. These results demonstrated the usefulness in following annual DB infestation patterns by studying the average seasonal infestation levels and distribution of hotspots as they can facilitate the allocation of resources for the treatment of infestations and allow for more effective monitoring of its influence on date palm trees.

Keywords

- Dates;
- Dubas bug;
- Geographical information system;
- Spatiotemporal;
- Oman;
- Temporal hotspot;
- Phoenix dactylifera L.