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The establishment potential of *Anoplophora glabripennis* in Europe

Das Ausbreitungspotenzial von *Anoplophora glabripennis* in Europa

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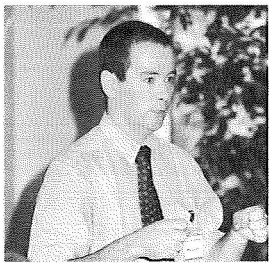

Abstract

Following an outbreak in Austria, the establishment potential of *Anoplophora glabripennis* in Europe was reassessed. Climatic matching studies using CLIMEX showed that almost 40 % of Europe has a climate suitable for *A. glabripennis* establishment, although biotic factors must also be taken into consideration.

Key words: CLIMEX, pest entry, pest introduction

1 Introduction

The geographic distribution and abundance of an organism that cannot control or regulate its body temperature is significantly influenced by climate. Details of its climatic preferences derived from the known distribution of an organism can help predict the potential distribution and abundance of the organism in new geographic regions. Climatic mapping infers a species response to climate and is a useful tool to estimate the potential distribution of a pest as long as the assumptions on which the predictions are made are given explicitly. Based on an organism's climatic response and climatic conditions within its natural distribution, the computer program CLIMEX estimates the organism's potential for establishment in another region (SUTHERST and MAYWALD, 1985).

Anoplophora glabripennis (Motschulsky), (*Coleoptera*: *Cerambycidae*), is native to China where it is most abundant and causes damage to *Populus* spp. and *Acer* spp. in the north, north-east and north-west of the country. Following the first outbreak of *A. glabripennis* in the USA, MACLEOD et al. (in press) assessed the risk that *A. glabripennis* presents to Europe based on its distribution in relation to climate in China. This paper evaluates the predicted establishment potential of *A. glabripennis* in Europe following an outbreak of *A. glabripennis* in Austria.

2 Materials and methods

YAN (1985) showed that the distribution of *A. glabripennis* within China lies between 110° to 125° East and 29° to 42° North. *A. glabripennis* is not present in Hong Kong. The wide area of distribution of *A. glabripennis* in China covers a number of climatic zones, from the arid temperate region in the north to border the tropical zone in the south. *A. glabripennis* does not occur at altitudes above 1,000 m and is most abundant below 200 m (LI and WU, 1993). This information was used by MACLEOD et al. (in press) to estimate biotic parameters for *A. glabripennis* required by CLIMEX and generate Ecoclimatic Indices (EIs) for meteorological stations across China. The EI is a measure of climatic suitability estimated by CLIMEX derived from an annual growth index combined with heat, cold, wet and dry stress indices, each related to parameters representing the climatic re-

Table 1. Ecoclimatic indices for *Anoplophora glabripennis* at meteorological stations in China, USA, Austria and Germany (potential Ecoclimatic Index range is 0 to 100)

Ecoclimatic Index	China	USA	Austria	Germany
55	Yantai			
54				
53	Bengbu/ Qingdao		Köln	
52				
51	Nanjing			
50				
49				Stuttgart
48			Wien	
47		Chicago		Dresden/ Münster
46			Linz	
45		New York		Bremen
44				
43	Kaifeng		Innsbruck	Berlin/ Hamburg
42				
41	Luda			
40	Jinan			Hannover
39				
38				
37	Wuhan			
36			Klagenfurt	
35				
34				München
33				
32				
31	Beijing			Hof
30	Tianjin		Braunau am Inn*	
29	Shanghai			
28				
27			Feldkirch	
26	Wuhu			

*location of an outbreak of *A. glabripennis*.

quirements of the species under investigation. The parameters were then applied to data from North American and European meteorological stations interpolated onto a 0.5° latitude by 0.5° longitude grid within CLIMEX to predict the EIs in these continents for each grid cell.

3 Results

Within CLIMEX, EI can range from 0 to 100. The EI for *A. glabripennis* at 12 meteorological stations in eastern and northern China where *A. glabripennis* does serious damage range from 26 to 55 (Table 1). EIs for 286 stations across Europe range from zero to 84, with the highest EIs around the Mediterranean coast. EIs for stations in Austria and Germany are shown in Table 1 with grid cell data for the outbreak site at Braunau am Inn. EIs for grid cells range from zero to 98.

4 Discussion

The EI from the grid cell for the outbreak site at Braunau am Inn is 30. 38 % of grid cells in Europe have an EI equal to or greater than 30 suggesting that *A. glabripennis* could establish across large areas of Europe assuming biotic factors are also appropriate. Given that many hosts are locally abundant in Europe, a lack of hosts is not likely to limit the establishment of *A. glabripennis* in Europe. This confirms predictions by MACLEOD et al. (in press) which highlighted the risk posed by *A. glabripennis* presents to European trees.

Acknowledgements

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