

Provinces with plant distributions listed in this book are shown above. (Map produced by Ann Steketee, USDA Forest Service.)

## Introduction

There are approximately 50,000 non-native invasive species (plants and animals) in the United States. The cost of these invasive species could exceed an estimated \$138 billion per year (Pimental et al. 2000). Human population growth, development, and global trade and transportation are some of the major pressures that are exacerbating the growing problem of invasive species. They are unlikely to decrease in the near future since effective market and environmental compromises are difficult and long-term to develop (Radoscevis, Holt and Ghera, 1997).

There are an estimated 250,000 species of plants in the world including about 1,100 species that are considered to be invasive (Radoscevis, Holt and Ghera, 1997). The term “invasive” has

many definitions but refers to species that establish in a new ecosystem in which they proliferate, spread and persist to cause or likely to cause detrimental impact to the economy, environment or human health. Invasive non-native plants comprise from 8 to 47 percent of the total flora of most states (i.e., well over 100 million acres) in the United States and continue to increase by 8 to 20 percent annually. These percentages are likely to increase dramatically as they were comprised mostly of invasive plants associated with agriculture but more resources are being committed to identification and documentation of invasive plants found in nature and natural ecosystems.

Once an invasive plant becomes established it is not easily suppressed or eliminated, as these species often

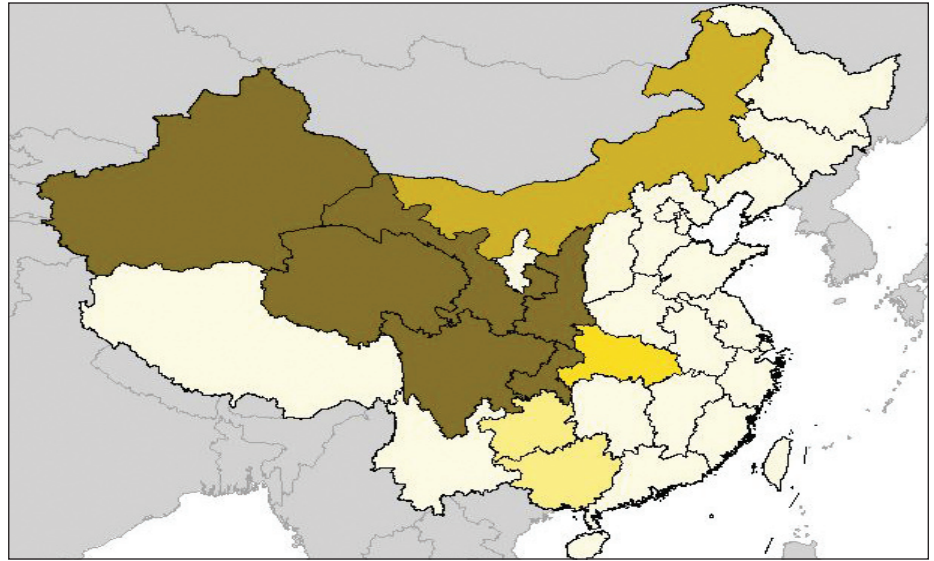
possess characteristics that favor their population increase. In addition, many invasive plants are free of attack in their invaded range by a complex of specialized arthropod herbivores or plant pathogens that are associated with a particular plant species.

Classical biological control is a widely used tactic for suppression of invasive plant species. This approach requires the acquisition of information on the natural enemies as well as the invasive plant in its native range. These data are often difficult to acquire for plants native to Asian countries where they are typically non invasive and therefore, have not been studied except for medicinal, nutritional or other uses.

The book Invasive Plants of Asian Origin Established in the United

States and Their Natural Enemies Volume 1 contains summaries of existing information on more than 40 species of plants found in Asia that were introduced either purposefully or accidentally into the United States. All of these species have established populations in the United States and many are designated as invasive. It also includes lists of natural enemies in their native range. All of the information in Volume 1 was obtained by searching and reviewing the Chinese literature as well as discussions with Chinese scientists. Prior to this current volume, information was scattered, inaccessible and available only in Chinese. The scientific names that appear in the lists of natural enemies were obtained from the Chinese literature and the authors and technical reviewers did not review all of the names, but updated those in obvious error. The book also contains background information on the biology of each plant species, an image to help with identification, a map of its distribution in China, indices of scientific names for each plant species and a bibliography of over 200 references. References are cited in the text as bracketed superscript numbers that are indexed in the reference section (pages 142 - 147). Also included are maps of US distribution for all plant species. This book is intended to serve as a resource for regulatory and plant protection agencies worldwide.

The invasive plant species included in this book (Volume 1) as well as Volume 2 were selected according to their origin, distribution and economic and ecological importance in the United States based on information from the following sources: Invasive Plants: Weeds of the Global Garden (Randall and Marinelli 1996); Selection of Appropriate Future Target Weeds for Biological Control (Pemberton 2002); In: Biological Control of Invasive Plants in the Eastern United States (VanDriesche et al 2002), websites (<http://plants.usda.gov>, <http://tncweeds.ucdavis.edu>, <http://www.aphis.usda.gov/ppq/weeds>) and discussions with Dr. Bernd Blossey








at Cornell University, Ithaca, NY and Dr. Ted Center at the USDA-ARS Invasive Plant Research Laboratory, Ft. Lauderdale, FL.

Knowledge of host range (H.R.) specificity is essential for biological control. Tables containing lists of fungal and arthropod natural enemies are provided for each plant species. The lists of fungal natural enemies were revised based on the Index Fungorum (<http://www.indexfungorum.org/names/names.asp>). Where appropriate, the old names are noted below the table. The host range of natural enemies is based on the organism's feeding preference. Each natural enemy table contains a letter code representing the host range of a given organism. The code, using *Ailanthus altissima* as an example, is as follows:

- m = recorded on *Ailanthus altissima*
- mo = recorded on one species of the genus *Ailanthus* other than *Ailanthus altissima*
- o = recorded on more than one species of *Ailanthus* including *Ailanthus altissima*
- oo = recorded on more than one species of *Ailanthus* other than *Ailanthus altissima*
- p = recorded on *Ailanthus* and other genera
- po = recorded on more than one genus including *Ailanthus*, but excluding *Ailanthus altissima*

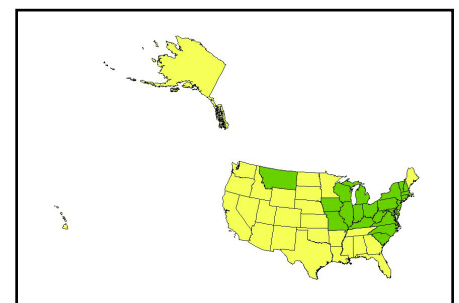
COLOR CODED KEY TO DISTRIBUTION MAPS :

-  Does not occur
-  Probably does not occur
-  Cultivated
-  Probably occurs
-  Occurs

**Distribution Maps**

The China distribution maps were created in China, with ESRI ArcView 3.1. using data provided by the National Fundamental Geographic Information system of China (NFGIS). (See sample map and color key above.)

The United States distribution maps indicate whether the plant is present (green) or absent (yellow) in a given state. U S Distribution map information was compiled from a variety of sources, including the USDA Plants database and the Flora of North America.



## References

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