Poplars and Willows: Trees for Society and the Environment

J.G. Isebrands & J. Richardson

International Poplar Commission
Working Party 6, Environmental Applications
Gisborne, New Zealand, March 10, 2014
Background

- *Poplars in forestry and land use* - FAO 1958
- *Poplars and willows in wood production and land use* - FAO 1980
- Both now out of date & out of print
- A new global publication resource for a new age
Objective

• To produce a major update of the previous (1980) edition of the FAO publication on poplars and willows in an accessible format, providing a practical worldwide overview and guide to their basic characteristics, cultivation and use as well as issues, problems and trends relating to poplars and willows.
Mission accomplished!

Published Feb. 2014

ORDER THE BOOK NOW

http://bookshop.cabi.org
Audience

• Public and private sectors
• Decision makers & policy makers in forestry, agriculture & environment ministries
• Foresters, ecologists, botanists, agronomists, environmental engineers
• Developing and developed world
Scope

- World-wide
- More emphasis on willows
- New focus on environmental uses and sustainable rural development
- Sourcebook and information guide
  - comprehensive reference list with each chapter
    - more than 2600 references
  - taxonomic classification of *Populus* and *Salix*
  - index
  - glossary
Contents

1. Introduction
2. Poplars & willows in the world
3. Ecology & physiology
4. Domestication & conservation
5. Operational culture
6. Environmental applications
7. Abiotic stresses
8. Diseases
9. Insects and animal pests
10. Properties and utilization
11. Markets, trends and outlook
12. Sustainable rural development
13. Epilogue

Appendices
A. Glossary
B. Index
Format

• Hard-cover book
  • 660 pages

• Co-publication of FAO and CABI

• Fully illustrated
  • 48 colour plates, including 41 species range maps & 178 photos
  • 379 black and white illustrations

• English language
Process

- Overall project supervision - FAO
- Editing/coordination - Jud Isebrands, Jim Richardson
- Chapters written by teams of authors with chapter leads
  - 67 authors from 15 countries in 5 continents
  - >150 contributors
- Peer review of individual chapters
- Production by CABI
Chapter 1

- ‘Introduction’
- *J.G. Isebrands and J. Richardson*
  - Background, history
  - Scope and content of publication
Chapter 2

- ‘Poplars and Willows of the World, with emphasis on silviculturally important species’
  - *Don Dickmann* (poplars) and *Julia Kuzovkina* (willows)

- descriptions of all major species
- ‘proposed taxonomic classification of the genus Populus’
- ‘classification of the genus Salix by world region’
- used as taxonomic reference for other chapters
Table 2.2. Proposed taxonomic classification of the genus *Populus*.a

<table>
<thead>
<tr>
<th>Section</th>
<th>Taxon</th>
<th>English common nameb</th>
<th>Notes and synonyms</th>
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</thead>
<tbody>
<tr>
<td><strong>Abaso</strong></td>
<td><em>P. mexicana</em> Wesmael</td>
<td>Yaqui cottonwood</td>
<td>Monotypic section</td>
</tr>
<tr>
<td><strong>Turanga</strong></td>
<td><em>P. euphratica</em> Olivier</td>
<td>Euphrates poplar</td>
<td>Includes <em>P. diversifolia</em></td>
</tr>
<tr>
<td>(Afro-Asian poplars)</td>
<td><em>P. ilicifolia</em> (Engler) Rouleau</td>
<td>Kenyan poplar</td>
<td>Formerly synonymous with <em>P. euphratica</em></td>
</tr>
<tr>
<td></td>
<td><em>P. pruinosa</em> Schrenk</td>
<td>Desert poplar</td>
<td>Formerly synonymous with <em>P. euphratica</em></td>
</tr>
<tr>
<td><strong>Leucoides</strong></td>
<td><em>P. glauca</em> Haines</td>
<td>Asian swamp cottonwood</td>
<td>Formerly <em>P. wilsonii</em></td>
</tr>
<tr>
<td>(Swamp poplars)</td>
<td><em>P. heterophylla</em> Linnaeus</td>
<td>Swamp cottonwood</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>P. lasiocarpa</em> Oliver</td>
<td>Heart-leaf poplar</td>
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<tr>
<td><strong>Aigeiros</strong></td>
<td><em>P. deltoides</em> Marshall</td>
<td>Eastern cottonwood</td>
<td>Includes *P. sargentii, P. palmeri, and P. wislizenii</td>
</tr>
<tr>
<td>(Cottonwoods, black poplar)</td>
<td><em>P. fremontii</em> S. Watson</td>
<td>Fremont cottonwood</td>
<td>Includes <em>P. arizonica</em></td>
</tr>
</tbody>
</table>
Chapter 3

• ‘Ecology and Physiology of Poplars and Willows’
  • J. Richardson, J.G. Isebrands, J. Ball

• natural occurrence, life history and current status of ecologically important species
• 12 poplars, 6 willows
• complements Chapter 2
Chapter 4

• ‘The Domestication and Conservation of *Populus* and *Salix* Genetic Resources’
  - *Brian Stanton, Michelle Serapiglia, Lawrence Smart*

• ‘Overview of domestication and conservation approaches’
  - genetic systems; breeding strategies; controlled crossing technique and crossability; testing, selection and deployment; certification, regulation and international trade; molecular approaches; conservation.

• ‘Worldwide domestication and conservation programs’ – country by country – 26 countries
  - 55 contributors worldwide
Chapter 5

• ‘Operational Poplar and Willow Culture’
  • John Stanturf, Cees van Oosten

• 33 contributors worldwide
• current practices in different regions for stand establishment, stand tending and production of poplars and willows
• practical techniques and successful practices
Chapter 6

• ‘Environmental Applications of Poplars and Willows’
  • J.G. Isebrands + 26 co-authors worldwide
  • windbreaks and shelterbelts
  • soil erosion control and riparian buffers
  • land restoration
  • phytoremediation
  • ecosystem services
Chapter 7

• ‘Abiotic Stresses’
  • Nicolas Marron, Birgit Gielen, Franck Brignolas, Gao Jian, Jon Johnson, David Karnosky, Andrea Polle, Giuseppe Scarascia-Mugnozza, Bill Schroeder, Reinhart Ceulemans

  • edaphic stresses
    • water deficit, desertification, salinity, soil nutrient status
  • atmospheric stresses
    • $O_3$, $CO_2$, increased temperature, photo-inhibition
  • comprehensive annotated list of studies
<table>
<thead>
<tr>
<th>Species/Genotype</th>
<th>Number of Studies</th>
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<tbody>
<tr>
<td><strong>Populus species</strong></td>
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<tr>
<td>P. deltoides</td>
<td>30</td>
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<tr>
<td>P. trichocarpa</td>
<td>15</td>
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<td>P. nigra</td>
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<td>P. alba</td>
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<td>P. tremuloides</td>
<td>25</td>
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<td>P. tremula</td>
<td>20</td>
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<tr>
<td>P. fremontii</td>
<td>30</td>
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<td>P. balsamifera</td>
<td>25</td>
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<tr>
<td>P. angustifolia</td>
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<tr>
<td>P. euphratica</td>
<td>10</td>
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<tr>
<td>Other P. species</td>
<td>5</td>
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<tr>
<td><strong>Populus hybrids</strong></td>
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<tr>
<td>P. deltoides x P. nigra</td>
<td>5</td>
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<tr>
<td>P. trichocarpa x P. deltoides</td>
<td>10</td>
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<tr>
<td>P. tristis x P. balsamifera</td>
<td>15</td>
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<tr>
<td>P. koreana x P. trichocarpa</td>
<td>20</td>
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<tr>
<td>Other P. hybrids</td>
<td>25</td>
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<td><strong>Salix species and hybrids</strong></td>
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<tr>
<td>S. gooddingii</td>
<td>10</td>
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<tr>
<td>S. nigra</td>
<td>5</td>
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<tr>
<td>S. viminalis</td>
<td>5</td>
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<tr>
<td>Other S. species</td>
<td>5</td>
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<tr>
<td>S. hybrids</td>
<td>10</td>
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Number of studies: Controlled conditions vs. Natural conditions vs. Plantations.
Chapter 8

• ‘Diseases of Willows and Poplars’
  • Mike Ostry, Mauritz Ramstedt, George Newcombe, Marijke Steenackers

• disease prevention
  • disease resistance, clonal mixtures, biological control

• selected leaf, stem and root diseases
Chapter 9

• ‘Insects and other Pests of Willows and Poplars’
  • John Charles, Sylvie Augustin, Ludovic Nef +11 other co-authors

  • leaf feeders, leaf miners, sucking insects, gall formers, bud and young shoot feeders, wood borers, root feeders, disease vectors, other animal pests, integrated pest management, invasive species and international exchange of plant materials
  • selected examples (16) of insect pests of poplars and willows
    • global distribution, description, biology, impact, control, invasive risk
Chapter 10

• ‘Properties, Processing and Utilization’

  John Balatinecz, Patrick Mertens, Lieven De Boever, Hua Yukun, Juwan Jin, Joris Van Acker

• macroscopic and microscopic wood features
• physical, mechanical, chemical properties and natural durability
• processing
• utilization
  • lumber, wood-based composites & panels, glued structural products, pulp & paper, integrated poplar utilization, willow utilization, biomass energy)
• utilization trends
Chapter 11

• ‘Markets, Trends and Outlook’
  Qiang Ma, Arvydas Lebedys (FAO)

• overall global market trends in wood products
• poplar/willow resources, products production and trade
• evolution of poplar products market in China and Europe
• economic importance of poplar and willow plantations
  • poplar plantations in China
  • willow for energy in Sweden
  • basket willow cultivation in Chile
Production of poplar and willow wood products

Data source: IPC 2008
Main poplar based products in Europe

Data source: FAO 2008, IPC country reports; www.peupliersdefrance.org
Chapter 12

• ‘Poplars and Willows for Rural Livelihoods and Sustainable Development’
  • Walter Kollert, Jim Carle, Linda Rosengren (FAO)

• production systems
  • native forests
  • plantations (large-scale industrial, small-scale)
  • agroforestry, trees outside forests
  • bioenergy

• livelihood protection
  • protection of the environment
  • rural landscapes, urban amenity

• 22 case studies from 12 countries worldwide
Chapter 13

Epilogue

J. Richardson
J.G. Isebrands

- The scientist in the field is young, yet building on the solid groundwork laid by those who have gone before, like Dr. Victor Steenackers to whose memory this book is dedicated. A vast amount of information about poplars and willows is contained within the covers of this volume, but much remains to be learned. The future, as always, holds challenges. Poplars and willows, as trees for society and for the environment, can help us move forward sustainably and on a sound scientific base.’.
Vic Steenackers, 1928 - 2010
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