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Short Rotation *Populus*: A Bibliography of North American Literature, 1989-2011

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Abstract

There have been three comprehensive poplar bibliographies dating back to 1854 and the most recent contained literature published through 1988. Given that these bibliographies are outdated, the number of forestry/bioenergy related journals has increased dramatically (along with subsequent publications), and there have been profound advances in science (particularly in the areas of genetics and molecular biology) within the past two decades, development of the current bibliography was necessary. In addition to compiling the information, our objectives were to encourage publication in peer-reviewed journals and to enhance collaborations with partners outside the poplar community. The current bibliography contains 864 unique citations that are cross-listed among as many as three topic areas, resulting in 1,395 total entries. The topic areas are cell and tissue culture, conservation, diseases, economics and social science, general, genetics, global change, growth and productivity, insects and mites, physiology, phytotechnologies, silviculture, and wood science and wood products.

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Cover Photo

Poplars at a phytoremediation site in northern Wisconsin. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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Introduction

Poplar at a phytoremediation site in northern Wisconsin. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

The world's population is expected to exceed 10 billion people by 2100, and this population increase will require many additional natural resources. Natural forests are being harvested at greater rates than they are being replaced, and alternate sources for structural and housing materials will need to be identified. Gasoline and other fuel prices continue to rise, and locally available methods of green power and energy are necessary, both to decrease costs and to diversify our power sources. Environmentally friendly means of removing soil and water contaminants (i.e., phytotechnologies) will also be necessary, as the costs associated with chemical waste removal continue to escalate.

Poplars (*Populus* spp.) and their hybrids have a plethora of uses for modern society, such as structural lumber, building materials, biofuels and bioenergy, and as phytoremediative agents on polluted sites. Poplars have several characteristics that make them desirable for production in short-rotation woody crop production systems. Poplars are easily propagated, have fast growth rates, respond well to agricultural management techniques, and can be grown across North America. Poplars are known to be effective in phytoremediation and associated phytotechnologies, and are capable of high rates of water and pollutant uptake and assimilation. Overall, poplars have a wide variety of beneficial uses that have warranted their research and production.

The first comprehensive poplar bibliography reported literature published from 1854 to 1963 (Farmer and McNight 1967), the second from 1964 to 1974 (Hart 1976), and the last from 1975 to 1988 (Ostry and Henderson 1990). Given that these bibliographies are outdated, the number of forestry/bioenergy related journals has increased dramatically (along with subsequent publications), and there have been profound advances in science (particularly in the areas of genetics and molecular biology) within the past two decades, development of the current bibliography was necessary. In addition to compiling the information into one interactive location, our objectives were to encourage publication in peer-reviewed journals and to enhance collaborations with partners outside the poplar community (i.e., to provide them with easily accessible poplar information).

THE BIBLIOGRAPHY

Four primary parameters were considered when including literature in our updated bibliography. The papers had to be peer-reviewed (1) and they had to contain information about poplars, cottonwoods, aspens, and their hybrids grown as short rotation woody crops (2) in North America (3), and be pertinent to at least one topic area (4). The topic areas are cell and tissue culture, conservation, diseases, economics and social science, general, genetics, global change, growth and productivity, insects and mites, physiology, phytotechnologies, silviculture, and wood science and wood products. The bibliography contains 864 unique citations that are cross-listed among as many as three topic areas, resulting in 1,395 total entries. The number of citations within each topic area is shown in Figure 1.

TOPIC AREAS AND DESCRIPTIONS

- 1) **Cell and Tissue Culture:** Proliferation of tissues from callus, ovules, nodules, buds, etc.
- 2) **Conservation:** Sustainability of water, soil, and wildlife resources.
- 3) **Diseases:** Major stem and leaf diseases impacting health and productivity.
- 4) **Economics and Social Science:** Financial feasibility of growing and harvesting poplars; public perception.
- 5) **General:** Advantages and disadvantages of short rotation poplar crops; technological innovations.
- 6) **Genetics:** Quantitative, molecular, and population genetics of pure species and hybrids.
- 7) **Global Change:** Climate change effects on tree establishment and growth.

Topic Area	Citations
Physiology	272
Genetics	253
Growth and Productivity	199
Silviculture	130
Phytotechnologies	123
Insects and Mites	77
Diseases	76
Conservation	65
General	50
Wood Science and Wood Products	49
Global Change	38
Economics and Social Science	36
Cell and Tissue Culture	27

Figure 1.—Number of citations within each of the topic areas.

- 8) **Growth and Productivity:** Belowground and aboveground growth of individual trees and plantations, including yield predictions.
- 9) **Insects and Mites:** Major insects and mites impacting health and productivity.
- 10) **Physiology:** Internal processes regulating plant growth and development.
- 11) **Phytotechnologies:** Use of the trees for remediation of contaminated soil, water, and sediment.
- 12) **Silviculture:** Production management systems, including irrigation, and fertilization.
- 13) **Wood Science and Wood Products:** Wood properties and conversion technologies; consumer products.

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Callus development on hardwood poplar cutting. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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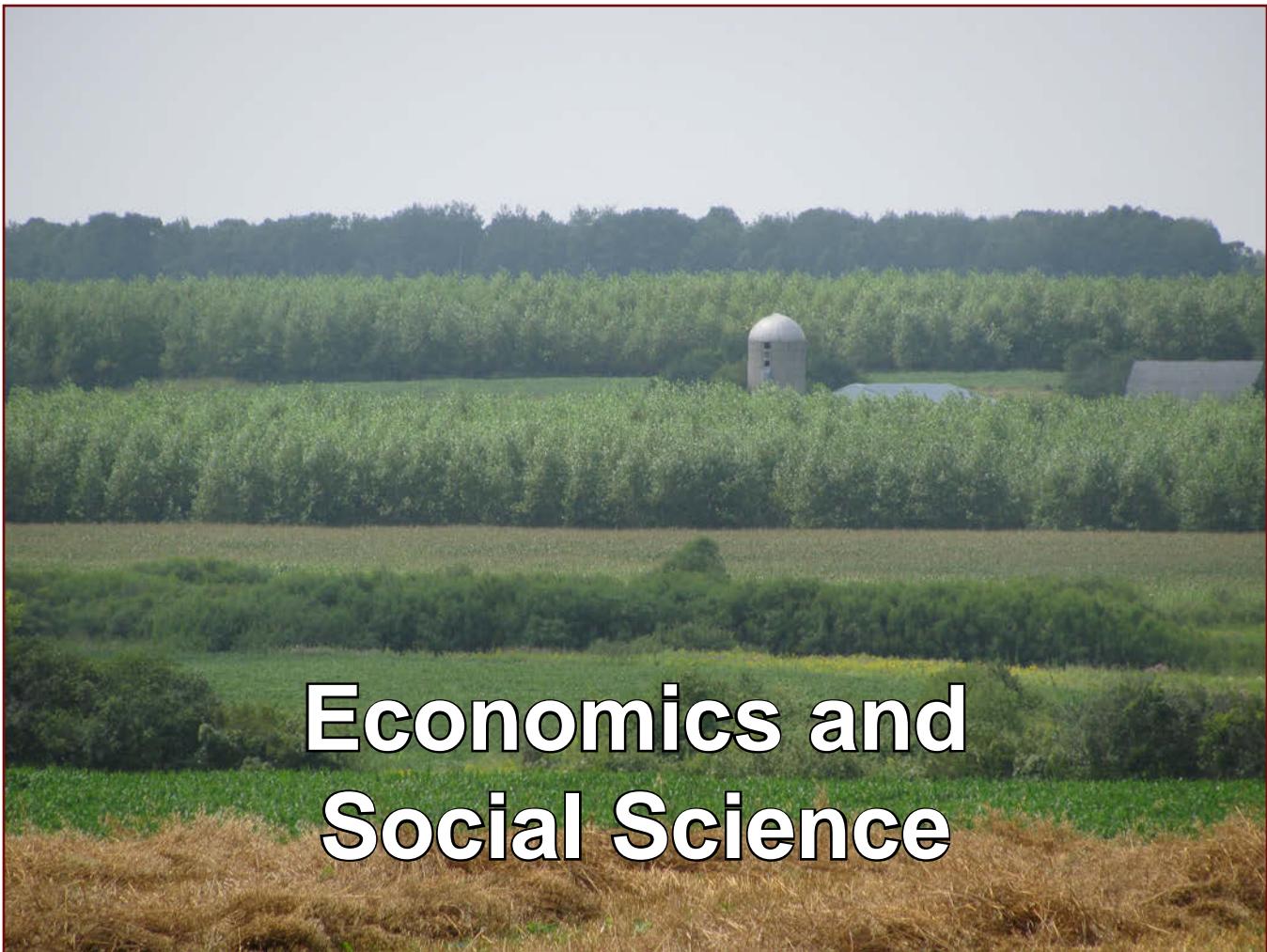
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Male catkin during poplar breeding. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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Stem cross section being evaluated for effects of changing climate on tree growth. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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Industrial poplar plantation in the Pacific Northwest. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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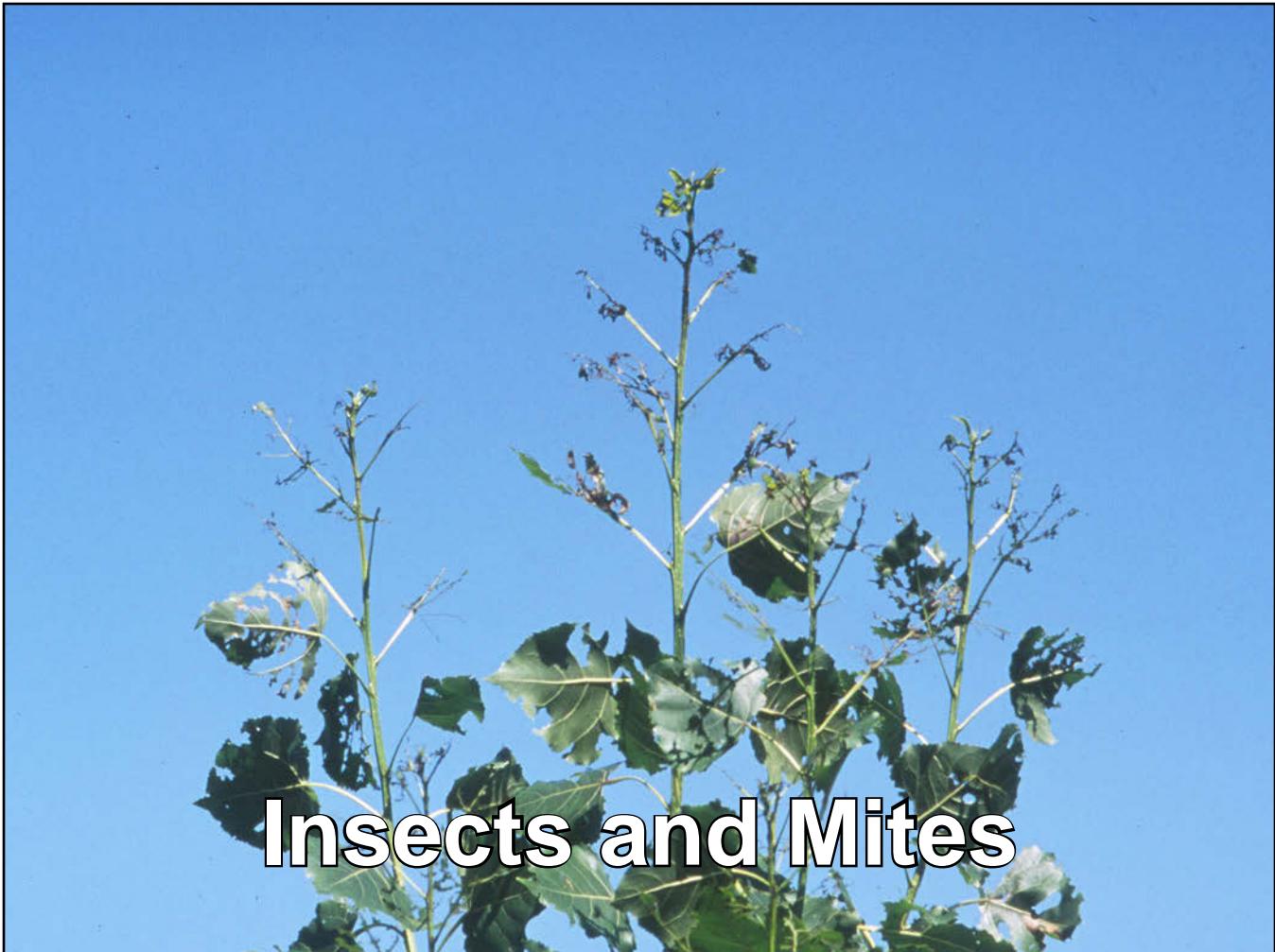
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Cottonwood leaf beetle defoliation. Photo by David R. Coyle, University of Georgia, used with permission.

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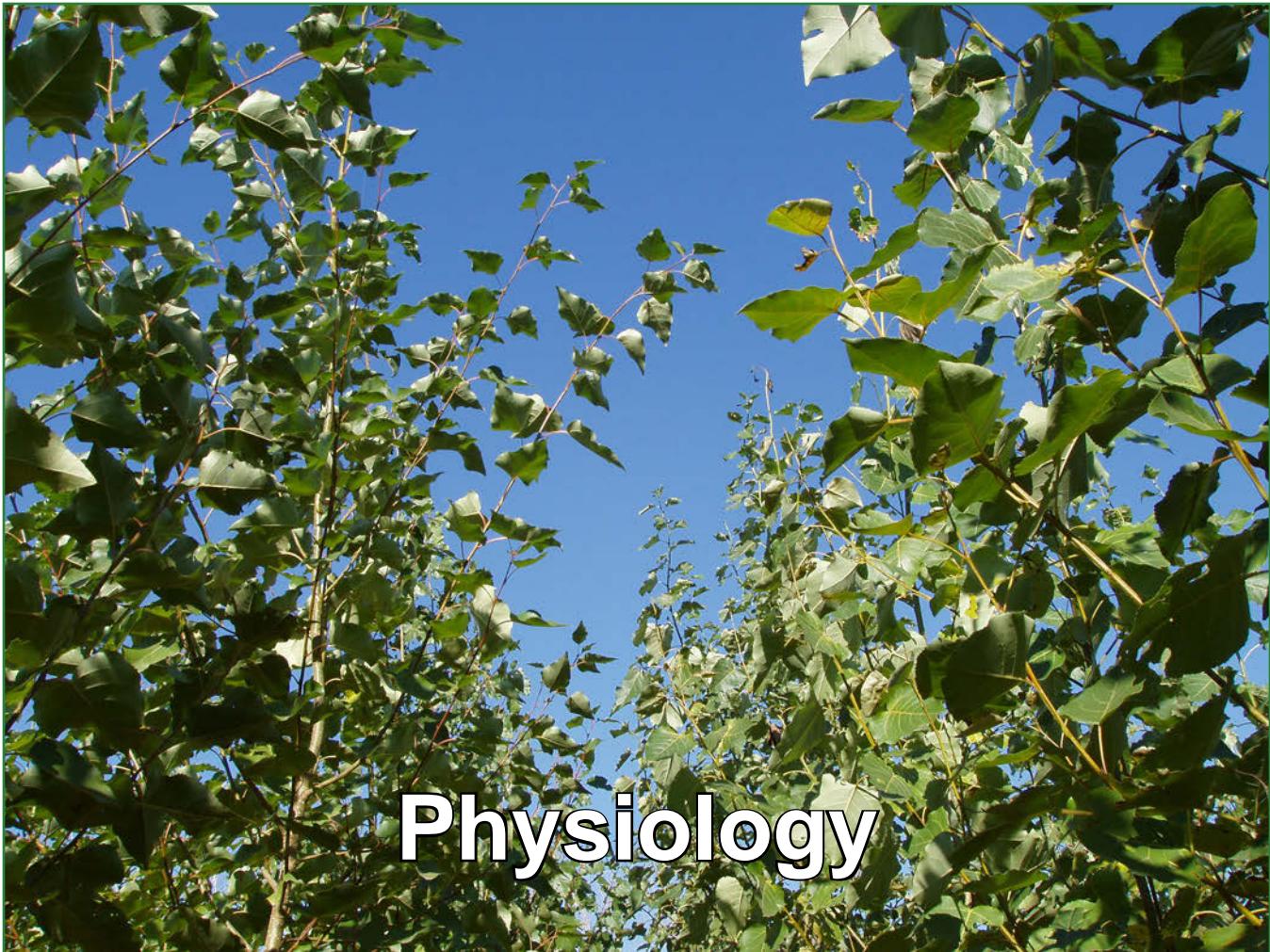
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Physiology

Poplars at a phytoremediation site in northern Wisconsin. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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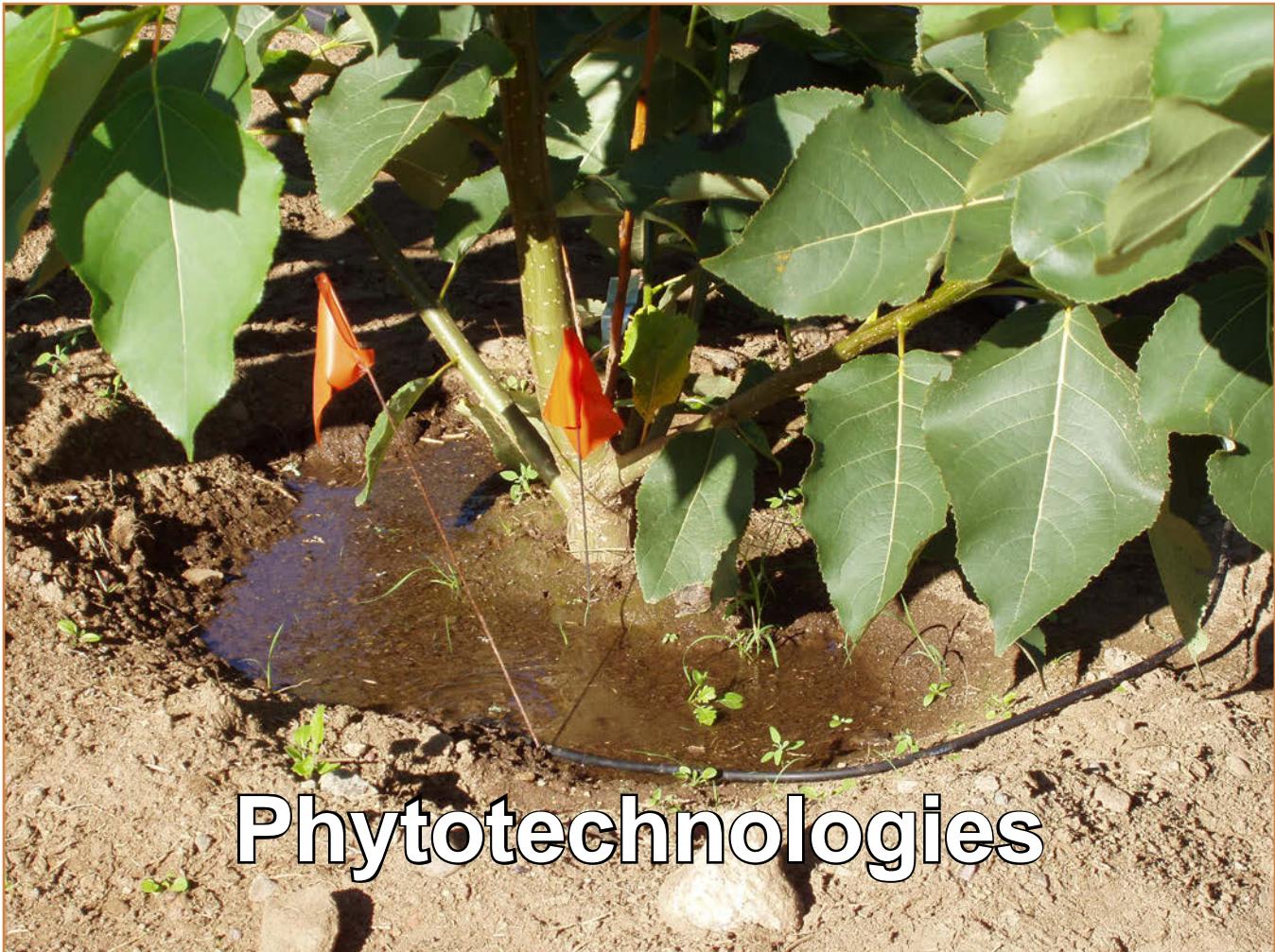
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Poplar tree irrigated with landfill leachate. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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Young poplar stool bed. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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Harvested poplar trees in Minnesota. Photo by Ronald S. Zalesny, Jr., U.S. Forest Service.

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There have been three comprehensive poplar bibliographies dating back to 1854 and the most recent contained literature published through 1988. Given that these bibliographies are outdated, the number of forestry/bioenergy related journals has increased dramatically (along with subsequent publications), and there have been profound advances in science (particularly in the areas of genetics and molecular biology) within the past two decades, development of the current bibliography was necessary. In addition to compiling the information, our objectives were to encourage publication in peer-reviewed journals and to enhance collaborations with partners outside the poplar community. The current bibliography contains 864 unique citations that are cross-listed among as many as three topic areas, resulting in 1,395 total entries. The topic areas are cell and tissue culture, conservation, diseases, economics and social science, general, genetics, global change, growth and productivity, insects and mites, physiology, phytotechnologies, silviculture, and wood science and wood products.

KEY WORDS: hybrid poplar, short rotation woody crops, *Populus*, intensive forestry

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