

ISSN 1644-0722

ACTA SCIENTIARUM POLONORUM

Scientific journal (quarterly), issued since 2002,
whose founder and advocate is the Conference of the Rectors of Universities
of Life Sciences

Silvarum Colendarum Ratio et Industria Lignaria

Forestry and Wood Technology

16(4) 2017

October – December



Bydgoszcz Kraków Lublin Olsztyn
Poznań Siedlce Szczecin Warszawa Wrocław

ACTA Scientiarum Polonorum Silvarum Colendarum Ratio et Industria Lignaria was founded by all Polish Agricultural Universities in 2001 and it is published by Poznań University of Life Sciences Press.

Executive Board of Acta Scientiarum Polonorum

Józef Bieniek (University of Agriculture in Krakow), Barbara Gąsiorowska (Siedlce University of Natural Sciences and Humanities), Wojciech Gilewski (Warsaw University of Life Sciences – SGGW), Janusz Prusiński (UTP University of Science and Technology in Bydgoszcz), Julita Reguła (Poznań University of Life Sciences), Wiesław Skrzypczak (West Pomeranian University of Technology, Szczecin), Krzysztof Szkucik (University of Life Sciences in Lublin), Jerzy Sobota (Wrocław University of Environmental and Life Sciences), Ryszard Żróbek (University of Warmia and Mazury in Olsztyn)

Affiliation

Faculty of Forestry

Poznań University of Life Sciences, Poland



This journal is the open access and non-profit enterprise. The published papers may be collected, read and downloaded free of charge – with Author's rights reserved. We have adopted a Creative Commons licence CC BY-NC (Attribution-NonCommercial).

The papers are published in four issues yearly.

Covered by: AGRO, Arianta, CABI, Index Copernicus, Google Scholar, PBN Polska Bibliografia Naukowa

ISSN 1644-0722 (print) ISSN 2450-7997 (online)

Cover design	Daniel Morzyński
Text editor	Lucyna Borowczyk, phone: +48 61 848 7807
Computer typesetting	Stanisław Tuchołka • panbook.pl

© Copyright by Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu
Witosa 45, 61-693 Poznań, Poland
e-mail: wydawnictwo@up.poznan.pl <http://www.wydawnictwo.up-poznan.net>

Edition 60 copies. 9.4 publisher's sheets.

Print: Zakład Graficzny Uniwersytetu Przyrodniczego w Poznaniu
Wojska Polskiego 67, 60-625 Poznań, Poland

Scientific Board of Acta Scientiarum Polonorum Silvarum Colendarum Ratio et Industria Lignaria

Editorial Chief

Andrzej Mazur

Biodiversity, Ecosystems Valorization
Faculty of Forestry
Poznań University of Life Sciences
forestry.acta@gmail.com
andrzejm@up.poznan.pl
phone: +48 61 848 7676

Associate Editors

Dorota Dziurka

Wood Sciences, Wood Technology
Faculty of Wood Technology
Poznań University of Life Sciences
Poland
forestry.acta@gmail.com
ddziurka@up.poznan.pl
phone: +48 61 848 7419

Robert Kuźmiński

*Plant and Forest Protection,
Forest Entomology*
Faculty of Forestry
Poznań University of Life Sciences
Poland
forestry.acta@gmail.com
phone: +48 61 848 7885

Krzysztof Adamowicz

*Economics, History of Forestry,
Zoology, Hunting*
Faculty of Forestry
Poznań University of Life Sciences
Poland
e-mail: forestry.acta@gmail.com
phone: +48 61 848 7688

Janusz Szmyt

*Silviculture, Forest Botany,
Forest Management*
Faculty of Forestry
Poznań University of Life Sciences
Poland
forestry.acta@gmail.com
jszmyt@up.poznan.pl
phone: +48 61 848 7735

Jakub Glura

*Coordinator of website, Statistical
Analysis, Forest Management*
Faculty of Forestry
Poznań University of Life Sciences
Poland
forestry.acta@gmail.com
jglura@tlen.pl
phone: +48 61 848 7687

Catherine Burbridge-Labędzka

Language Editor

Members

Tatiana Flisikowska

Technische Universität München, Munich
Germany

Jerzy M. Gutowski

Forest Research Institute, Białowieża
Poland

Dariusz J. Gwiazdowicz

Poznań University of Life Sciences
Poland

Jaroslav Holuša

Czech University of Life Sciences, Prague
Czech Republic

Roman Jaszczak

Poznań University of Life Sciences
Poland

Nenad Djuro Keca

University of Belgrade
Serbia

Nikolas G. Kerallieratos

Agricultural University of Athens
Greece

Jan Klimaszewski

Natural Resources Canada, Canadian
Forest Service, Laurentian Forestry Centre
Quebec, **Canada**

Piotr Łakomy

Poznań University of Life Sciences
Poland

Wiesław Olek

Poznań University of Life Sciences
Poland

Piotr Robakowski

Poznań University of Life Sciences
Poland

Kerry Sendall

University of Minnesota
USA

Jerzy R. Starzyk

University of Agriculture
Kraków, **Poland**

Koike Takayoshi

Hokkaido University
Japan

Dear Readers,

We are very glad to be able to let you have the consecutive issue of ACTA SCIENTIARUM POLONORUM Silvarum Colendarum Ratio et Industria Lignaria, a scientific journal published by all the agricultural universities in Poland. Our journal publishes original scientific papers reviewed by the best specialists in a given field of science. Its high scientific ranking is confirmed by the fact that its name can be found in databases of prestigious indexing institutions. Initially, in years 2002–2006, the journal was published twice a year and since 2007, it has been published as a quarterly. Since 2006 the journal has been published in the English language with summaries and table and figure headings in Polish (for details, please, check Internet web site: www.acta.media.pl). Abstracts, key words and summaries of papers can be found on our internet site: www.forestry.actapol.net. We would like to encourage all our Readers to cooperate with our journal and to disseminate it in your professional environment.

*With our best regards
The Editorial Staff*

Szanowni Państwo

Przekazujemy Państwu kolejny zeszyt ACTA SCIENTIARUM POLONORUM Silvarum Colendarum Ratio et Industria Lignaria, czasopisma naukowego wydawanego przez wszystkie uczelnie rolnicze. Czasopismo nasze zamieszcza oryginalne prace naukowe, recenzowane przez najlepszych specjalistów w danej dziedzinie. O jego randze naukowej może świadczyć umieszczenie w bazie danych prestiżowych instytucji indeksujących. Początkowo, w latach 2002–2006 czasopismo ukazywało się dwa razy do roku, a od 2007 roku jest publikowane jako kwartalnik. Od 2006 roku jest wydawane w języku angielskim, ze streszczeniami oraz opisami tabel i rycin w języku polskim (szczegóły podano na stronie internetowej www.acta.media.pl). Abstrakty, słowa kluczowe i streszczenia prac są umieszczone na stronie internetowej www.forestry.actapol.net. Zachęcamy Państwa do współpracy z naszym czasopismem oraz do jego upowszechniania w swoim środowisku zawodowym.

*Z poważaniem
Zespół Redakcyjny*