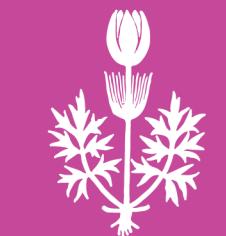


ANNALES REI BOTANICAE

# PHYTON

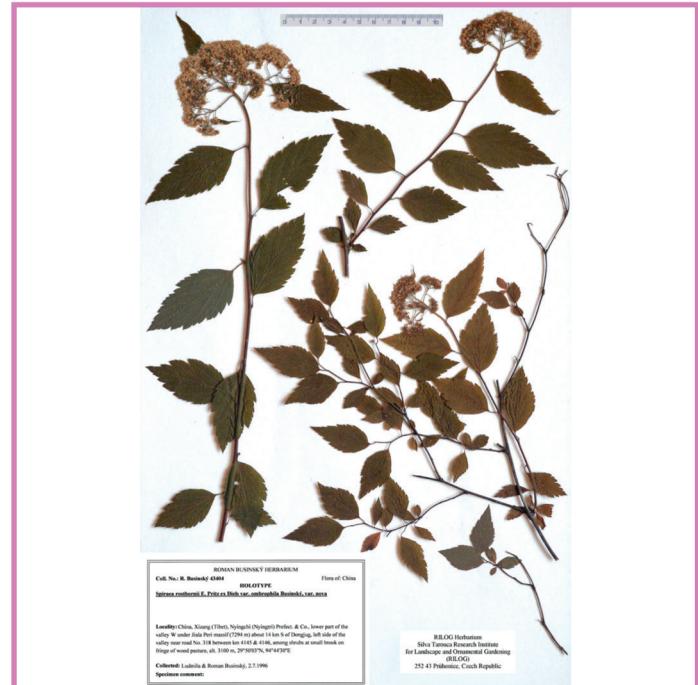


VOL. 61 | 2021

FOUNDED IN 1948 BY PROF. DR. F. WEBER AND PROF. DR. F.J. WIDDER, UNIVERSITY OF GRAZ, AUSTRIA

CONTENTS	
AMBROŽIĆ-DOLINŠEK J., ORNIK D., BRANDA R., MOLNÁR Z. & CIRINGER T. 2022. Does biostimulant Agrostemin® exhibit plant growth regulator activities? .....	109
BUSINSKÝ R. 2021. Taxonomic revision of the <i>Spiraea longigemmis</i> complex ( <i>Rosaceae</i> ) .....	51
HASSANEIN A. M., SALEM J. M. & SOLTAN D. M. 2022. Molecular characterization of four sorghum cultivars and their ability to germinate under heat, drought and salinity stress .....	117
JAMMER A., ALBACETE A., SCHULZ B., KOCH W., WELTMAYER F., VAN DER GRAAFF E. & ROITSCH T. 2021. Expression of genes encoding carbohydrate-metabolic enzymes during taproot development in sugar beet ( <i>Beta vulgaris</i> subsp. <i>vulgaris</i> ) .....	31
KATIVAT C., CHUEAKHUNTHOD W. & TANTASAWAT P. A. 2021. Enhancing the efficiency of somatic embryogenesis and plant regeneration system of sunflower ( <i>Helianthus annuus</i> ) .....	11
KOLANOWSKA M. & SZLACHETKO D. L. 2021. A new species of <i>Takulumena</i> ( <i>Orchidaceae</i> ) with glabrous petals from Colombia .....	21
ŠABANOVIĆ E., DJORDJEVIĆ V., MILANOVIĆ Đ., BOŠKAILO A., ŠARIĆ Š., HUSEINOVIĆ S. & RANDJELOVIĆ V. 2021. Checklist of the <i>Orchidaceae</i> of Bosnia and Herzegovina .....	83
SHAHZAD T., AKHTAR W. & MAHMOOD T. 2021. Molecular systematics of selected species of family <i>Boraginaceae</i> based on the <i>rps14</i> gene .....	97
ŞUTEU A., GAFTA D. & CRİŞAN F. 2021. Constraints to shoot growth and biomass allocation in <i>Astragalus peterfi</i> growing in two different stressful habitats .....	25
ZECHMANN B., MÖSTL S. & ZELLNIG G. 2021. Subcellular quantification of glutathione concentrations during ZYMV-infection based on high resolution 3D reconstructions .....	1

PHYTON, ANNALES REI BOTANICAE, VOL. 61, 2021



VERLAG  
BERGER

Printed and published by: Ferdinand Berger & Söhne GesmbH, 3580 Horn, Austria  
[www.verlag-berger.at](http://www.verlag-berger.at), mail: [verlag@berger.at](mailto:verlag@berger.at)

# PHYTON (Horn, Austria)

The journal PHYTON was established in 1948 by Prof. Dr. Friedl WEBER and Prof. Dr. Felix J. WIDDER, the heads of the former Institutes of Plant Physiology and of Botany at the University of Graz. Papers from all fields of plant sciences are still considered for publication in PHYTON.

From volume 57 onwards, all research contributions are published in English. Manuscripts should be submitted to the managing editor, who will confirm receipt and forward every manuscript to an editor of our editorial board (unless stated otherwise, the editors are affiliated with the Institute of Biology, University of Graz):

**Managing editor:**

Christian SCHEUER <[christian.scheuer@uni-graz.at](mailto:christian.scheuer@uni-graz.at)>

**Editors for plant physiology, anatomy, biochemistry, autecology and related fields:**

Alexandra JAMMER

Maria MÜLLER

**Editors for plant systematics, evolution, morphology, geobotany and related fields:**

Anton DRESCHER

Nejc JOGAN (Biotechnical Faculty, University of Ljubljana)

Michael PINTER (Universalmuseum Joanneum, Graz)

Wolfgang SCHÜHLY

Urban ŠILC (Jovan Hadži Institute of Biology, SAZU, Ljubljana)

The authors are requested to consult the 'Information and Instructions for Contributors' at  
<<https://biologie.uni-graz.at/de/phyton>>

Manuscripts, proofs and correspondence concerning editorial matter can also be directed to  
Managing Editor PHYTON, Holteigasse 6, 8010 Graz (Austria, Europe)

Cover illustration: Three *Orchidaceae* from Bosnia and Herzegovina (© Đorđije MILANOVIĆ):  
*Dactylorhiza sambucina* (top left), *Epipogium aphyllum* (bottom left), *Orchis purpurea* (bottom right). Holotype specimen of *Spiraea rosthornii* var. *ombrophila*, Rosaceae (top right, © Roman BUSINSKÝ).

**Beginning with PHYTON Volume 57, the articles are also published *instant online*.**

Subscription orders and other business communication should be directed to the publisher

**VERLAG FERDINAND BERGER & SÖHNE GES.M.B.H.**  
Wiener Straße 80, 3580 Horn (Austria, Europe) <[verlag@berger.at](mailto:verlag@berger.at)>

Beginning with PHYTON Volume 49, pdf files of single articles can be purchased at  
<<https://www.verlag-berger.at/?listview&link=0323000>>

PHYTON Volume 1–51 (1948–2011) are accessible at the literature database of the  
'Biologiezentrum' in Linz at  
<[http://www.zobodat.at/publikation\\_series.php?id=6793](http://www.zobodat.at/publikation_series.php?id=6793)>

Indexed/abstracted in Current Contents, Science Citation Index, Biological Abstracts and  
Current Advances in Plant Science

# **PHYTON**

## **ANNALES REI BOTANICAE**



VOL. 61, 2021

Alle Rechte vorbehalten  
© 2022 by Verlag Ferdinand Berger & Söhne GesmbH, 3580 Horn, Österreich  
[www.verlag-berger.at](http://www.verlag-berger.at)

[www.phyton.at](http://www.phyton.at)

VERLAG FERDINAND BERGER, HORN, AUSTRIA

## New taxa, new combinations, typifications

<i>Spiraea fornicate</i> BUSINSKÝ, spec. nova ( <i>Rosaceae</i> ) .....	56
<i>Spiraea hingshanensis</i> T. T. YU & L. T. LU, epitypification ( <i>Rosaceae</i> ) .....	73
<i>Spiraea mairei</i> H. LÉV., lectotypification ( <i>Rosaceae</i> ) .....	77
<i>Spiraea miyabei</i> KOIDZ., lectotypification and epitypification ( <i>Rosaceae</i> ) .....	69
<i>Spiraea miyabei</i> KOIDZ. var. <i>glabrata</i> REHDER, lectotypification ( <i>Rosaceae</i> ) .....	73
<i>Spiraea miyabei</i> KOIDZ. var. <i>pilosula</i> REHDER, lectotypification ( <i>Rosaceae</i> ) .....	73
<i>Spiraea miyabei</i> KOIDZ. var. <i>tenuifolia</i> REHDER, lectotypification ( <i>Rosaceae</i> ) .....	73
<i>Spiraea rosthornii</i> E. PRITZ. ex DIELS var. <i>ombrophila</i> BUSINSKÝ, var. nova ( <i>Rosaceae</i> ) .....	67
<i>Spiraea velutina</i> FRANCH., lectotypification ( <i>Rosaceae</i> ) .....	77
<i>Takulumena garayi</i> KOLAN. & SZLACH., spec. nova ( <i>Orchidaceae</i> ) .....	22

## New syntaxa

—

## CONTENTS

ZECHMANN B., MÖSTL S. & ZELLNIG G. 2021. Subcellular quantification of glutathione concentrations during ZYMV-infection based on high resolution 3D reconstructions .....	1
KATIVAT C., CHUEAKHUNTHOD W. & TANTASAWAT P. A. 2021. Enhancing the efficiency of somatic embryogenesis and plant regeneration system of sunflower ( <i>Helianthus annuus</i> ) .....	11
KOLANOWSKA M. & SZLACHETKO D. L. 2021. A new species of <i>Takulumena</i> ( <i>Orchidaceae</i> ) with glabrous petals from Colombia .....	21
ŞUTEU A., GAFTA D. & CRIŞAN F. 2021. Constraints to shoot growth and biomass allocation in <i>Astragalus peterii</i> growing in two different stressful habitats .....	25
JAMMER A., ALBACETE A., SCHULZ B., KOCH W., WELTMEIER F., VAN DER GRAAFF E. & RÖITSCH T. 2021. Expression of genes encoding carbohydrate-metabolic enzymes during taproot development in sugar beet ( <i>Beta vulgaris</i> subsp. <i>vulgaris</i> ) .....	31
BUSINSKÝ R. 2021. Taxonomic revision of the <i>Spiraea longigemmis</i> complex ( <i>Rosaceae</i> ) .....	51
ŠABANOVIĆ E., ĐORDJEVIĆ V., MILANOVIĆ Đ., BoŠKAJO A., ŠARIĆ Š., HUSENOVIĆ S. & RANDJELOVIĆ V. 2021. Checklist of the <i>Orchidaceae</i> of Bosnia and Herzegovina .....	83
SHAHZAD T., AKHTAR W. & MAHMOOD T. 2021. Molecular systematics of selected species of family <i>Boraginaceae</i> based on the <i>rps14</i> gene .....	97
AMBROŽIĆ-DOLINŠEK J., ORNIK D., BRANDA R., MOLNÁR Z. & CIRINGER T. 2022. Does biostimulant Agrostemin® exhibit plant growth regulator activities? .....	109
HASSANEIN A. M., SALEM J. M. & SOLTAN D. M. 2022. Molecular characterization of four sorghum cultivars and their ability to germinate under heat, drought and salinity stress .....	117

