



26th EUCARPIA MAIZE AND SORGHUM CONFERENCE

Breeding in the era of genome
editing and artificial intelligence

BOLOGNA

JUNE 30 - JULY 2, 2025

PROGRAM



Bologna - Italy June 30 - July 2, 2025
Aula Magna - Facoltà di Agraria - University of Bologna

CHAIRS

Elisabetta Frascaroli - Silvio Salvi
(University of Bologna)

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Marco Maccaferri - Cristian Forestan - Roberto Tuberosa

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Alain Murigneux - Nicola Pecchioni - Jean-François Rami
Pedro Revilla - Chris-Carolin Schön - Domagoj Šimić
Silvio Salvi - Roberto Tuberosa - Serena Varotto

PRESENTATION

Plant breeding has been evolving dramatically in recent years, especially with the advent of genome editing tools and the integration of artificial intelligence, which are increasing selection precision, speed, and efficiency.

Progress is also being made in biodiversity analysis and use by reintroducing lost genetic traits and enhancing adaptability to changing and harsher environments.

This conference will bring together top experts from both academia and the private sector to address the major challenges of maize and sorghum breeding.



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MAIZE AND SORGHUM CONFERENCE**
**Breeding in the era of genome editing and
artificial intelligence**

Bologna - Italy June 30 - July 2, 2025
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PROGRAM

MONDAY, JUNE 30

13:00 - 14:00 Registration of participants

14:00 - 14:30 Opening session and welcome addresses

Chairs: Silvio Salvi, Elisabetta Frascaroli

14:30 - 18:00 SESSION 1

Genome editing for next generation breeding

Chairs: Alessandra Lanubile, Serena Varotto

14:30 **How to use CRISPR if you're a maize
quantitative geneticist**

Rex Bernardo - *University of Minnesota, Saint Paul, USA*

15:20 - 16:00 Oral Communications

15:20 **Overexpression of the maize 9-lipoxygenase
gene ZmLOX4 confers resistance to Fusarium
verticillioides via the oxylipin and jasmonic
acid-mediated pathways**

Letizia Ottaviani - *Catholic University of the
Sacred Heart, Piacenza, Italy*

15:40 **The maize B chromosome influences
transcriptome dynamics across plant
development**

Jan Bartoš - *Institute of Experimental Botany,
Olomouc, Czech Republic*

16:00 *Coffee break*

MONDAY, JUNE 30

16:30 **Genome editing: from potential to applications**
Hilde Nelissen - *University of Ghent, Belgium*

17:20 - 18:00 Oral Communications

17:20 **WOX2A-Enhanced Transformation and CRISPR-Cas9 Genome Editing in the maize model line Gaspé Flint 1.1.1 for Functional Analysis of the flowering time locus Vgt1**
Ruggero Gualtieri - *University of Bologna, Italy*

17:40 **BREEDIT: A multiplex genome editing strategy to improve complex quantitative traits in Zea mays**
Stijn Seynnaeve, Center for Plant Systems Biology, VIB and Gent University, Gent, Belgium

TUESDAY, JULY 1**09:00 - 12:00 SESSION 2**

Genetic and genomic approaches to address biotic and abiotic stresses

Chairs: Gabriella Consonni, Alain Charcosset

09:00 **Maize resistance to stem borers and to kernel contamination with fumonisins**
Ana Butrón - *Misión Biológica de Galicia, CSIC, Pontevedra, Spain*

09:50 - 10:50 Oral Communications

09:50 **Effect of chilling stress on the transcriptome of maize roots during the V3 growth stage**
Ana Nikolić - *Maize Research Institute Zemun Polje, Belgrade, Serbia*

TUESDAY, JULY 1

10:10 **Unravelling maize genetic diversity to study cuticle deposition and stomatal development to improve leaf transpiration**
Martina Sechi - *Sant'Anna School of Advanced Studies, Pisa, Italy*

10:30 **Plasticity of Digestibility and Cell Wall Assembly and in Maize Stems under Drought Stress**
Ana López-Malvar - *Université Paris Saclay, INRAE, AgroParisTech, Institute Jean-Pierre Bourgin for Plant Sciences (IJPB), Versailles, France*

10:50 *Coffee break*

10:50 - 11:20 Oral Communications

11:20 **Genetic architecture and functional consequences of lateral root length in maize**
Fabio Guffanti - *Technical University of Munich, Freising, Germany*

11:40 **Designing tomorrow's forage maize hybrids to maintain their digestible yield despite climate change**
Oscar Main - *Université Paris Saclay, INRAE, AgroParisTech, Institute Jean-Pierre Bourgin for Plant Sciences (IJPB), Versailles. France*

12:00 - 12:50 Poster Session

12:50 *Lunch*

TUESDAY, JULY 1

14:00 - 18:00 SESSION 3

Phenomics for breeding: old and novel challenges

Chairs: Nicola Pecchioni, Roberto Tuberosa

14:00

The biology emerging from root phenotyping: Advances in Maize, Sorghum and Co.

Alexander Bucksch - *University of Tucson, Arizona*

14:50 - 15:50 Oral Communication

14:50

Establishing UAV-Based Phenotyping in Maize: PHENO_MaizeE Project Overview and First-Year Progress

Nikola Grčić - *Breeding Department, Maize Research
Institute, Zemun Polje, Belgrade, Serbia*

15:10

Fine Mapping and Positional Cloning of a Major QTL Linking Maize Root Architecture, Yield Stability and Ion Homeostasis

Francesco Camerlengo - *University of Bologna, Italy*

15:30

A comparison of genotyping arrays with targeted Genotyping-By-Sequencing (tGBS) in maize

Martin Ganai - *TraitGenetics, SGS Institut Fresenius
GmbH, Gatersleben, Seeland, Germany*

15:50

Hiphen: A Leading Expert In Image Analytics For Plant Phenotyping of Maize & Sorghum Nicolas Cheviet - *Hiphen Agricultural Imaging Solutions*

16:10

Coffee Break

TUESDAY, JULY 1**16:40-18:00 Oral Communication**

- 16:40 **MineLandDiv: Enhancing cold tolerance in maize through allelic diversity of European landraces**
Lorena Álvarez-Iglesias - *Misión Biológica de Galicia, CSIC, Pontevedra, Spain*
- 17:00 **Phenotyping root system architecture of maize landraces under low nitrogen conditions**
Joséphine Guyot - *Catholic University of Louvain, Louvain, Belgium*
- 17:20 **DROMAMED: Phenotyping and GWAS of RILs under water stress in a MAGIC population of maize**
Carlotta Balconi - *CREA - Research Centre for Cereal and Industrial Crops, Bergamo, Italy*
- 17:40 **Discussion**
- 18:00 **Session close**
- 20:00 Social dinner
(*Victoria Restaurant - Via Righi 9c - Bologna*)
on reservation

WEDNESDAY, JULY 2**09:00 - 12:50 SESSION 4****Harnessing genetic diversity for maize and sorghum breeding**

Chairs: Violeta Anđelković; William F. Tracy

09:00 Harnessing global diversity and predictive biology to accelerate sorghum breedingDavid Pot - CIRAD - *Agricultural Research for Development, Montpellier, France***09:50 - 10:50 Oral Communication****09:50 Genomic prediction aided incorporation of genetic resources into elite breeding: lessons from a collaborative multiparental design in flint maize**Alain Charcosset - *INRAE UMR GQE-Le Moulon, France***10:10 Genomic Diversity, Population Structure and Climate Adaptation of Kenyan Sorghum Landraces Across Agroecological Gradients**Tobias Recha - *Sant'Anna School of Advanced Studies, Pisa and CIAT, Nairobi, Kenya***10:30 Evolution of population structure in a commercial European hybrid dent maize breeding program and consequences on genetic diversity**Romain Kadoumi - *Limagrain Field Seeds, and INRAE UMR GQE Le Moulon, France***10:50 Coffee Break**

WEDNESDAY, JULY 2**11:20 - 12:20 Oral Communication**

- 11:20 **Genomic predictions calibrated on sparse factorial instead of tester designs improves hybrid maize breeding cost efficiency over cycles.**
Laurence Moreau - *Université Paris-Saclay, INRAE, CNRS, AgroParisTech, GQE - Le Moulon, France*
- 11:40 **Integrated Transcriptomic, Genetic and Functional Studies to Investigate Grain Quality Traits in Sorghum**
Nancy Terrier - INRAE - UMR AGAP, Montpellier, France
- 12:00 **Polenta varieties and top crosses for the USA Northern Corn Belt**
William F. Tracy - University of Wisconsin, Madison, Wisconsin, U.S.A.
- 12:20 **Precision Breeding : from selecting the best to designing the best**
Manfred Mayer, Jean-Luc Pellet
Bayer
- 12:50 *Lunch*

WEDNESDAY, JULY 2

14:00 - 17:00 SESSION 4 (Continuation)

Harnessing genetic diversity for maize and sorghum breeding

Chairs: Carlotta Balconi, Pedro Revilla

14:00 **Characterization of maize landraces to identify sources of diversity**

Nicolas Stéphane - *Université Paris-Saclay, INRAE, CNRS, AgroParisTech, GQE - Le Moulon, France*

14:50 - 15:30 Oral Communication

14:50 **Harnessing Landrace Potential: Advancing Maize Biomass for Improved Sugar Yields and Chemical Processing**

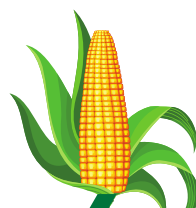
Konouta Medard Kafoutchoni - *Julius Kühn Institute (JKI), Quedlinburg, Germany*

15:10 **Leveraging knowledge of traditional maize landrace diversity to identify signals of local adaptation**

Alessandra Lezzi - *Catholic University of the Sacred Heart, Piacenza, Italy*

15:30 **Final Remarks and General Discussion**

16:00 **Meeting Close**



POSTERS' LIST

P.1 A loss-of-function of ZmWRKY125 induced by CRISPR/Cas9 improves resistance against Fusarium verticillioides in maize kernels

Letizia Ottaviani¹, Rozenn Lefeuvre², Emilie Montes²,
Thomas Widiez², Paola Giorni¹, Axel Mithöfer³,
Adriano Marocco¹, Alessandra Lanubile¹

1 Department of Sustainable Crop Production, Catholic University of the Sacred Heart, Piacenza, Italy

2 Laboratoire Reproduction et Développement des Plantes, Univ Lyon, Lyon, France

3 Research Group Plant Defense Physiology, Max Planck Institute for Chemical Ecology, Jena, Germany

P.2 Single versus recurrent heat stress in sorghum: physiological and transcriptomic insights into complex responses

Angelique Bergere^{1,2}, Caroline Calatayud^{1,2}, Roques Sandrine^{1,2},
Vial Raoul^{1,2}, Thomas Laisne^{1,2}, Aguilar Gregory^{1,2}, Nancy Terrier²,
Christine Granier²

1 CIRAD, UMR AGAP Institut, Montpellier, France

2 UMR AGAP Institut, Univ Montpellier, CIRAD, INRAE, Institut Agro, Montpellier, France

P.3 European Project MineLandDiv. Results of 2024 field trial evaluation of landrace panel at two nitrogen fertilization level

Carlotta Balconi¹, Alessio Torri¹, Benito Antonino D'Ambrosio¹,
Gianfranco Mazzinelli¹, Rita Redaelli¹

1 CREA – Centre for Cereal and Industrial Crops, Bergamo, Italy

P.4 Landraces as sources of genetic variation for resistance to stem borers

Rosa Ana Malvar¹

1 Misión Biológica de Galicia CSIC, Pontevedra, Spain

P.5 Identifying Double Use Maize Landraces in a Climate Change Scenario

Rogelio Santiago¹, Sonia Pereira-Crespo¹, Montserrat Gante¹, Ana Butrón¹, Leonardo Gómez²

1 CSIC (Consejo Superior de Investigaciones Científicas)

Misión Biológica de Galicia (CSIC), Pontevedra, Spain

2 CSIC - Facultad de Biología, Depto. Biología Vegetal Y Ciencias del Suelo, Agrobiología Ambiental, Calidad de Suelos y Plantas (UVIGO), Unidad Asociada a MBG (CSIC), Universidad de Vigo, Vigo, Spain

P.6 Innovative approaches towards more resilient maize production in Emilia-Romagna

Guglielmo Piazzi¹, Ruggero Gualtieri², Francesco Camerlengo², Giovanni Burgio², Serena Magagnoli², Paolo Trevisi², Antonio Prodi², Claudio Selmi³, Alvaro Crociani³, Francesca Passuello⁴, Greta Polidori⁴, Giovanni Giuntoli⁴, Silvio Salvi⁴

1 Alma Mater Studiorum - University of Bologna, Italy

2 DISTAL University of Bologna, Italy

3 RI.NOVA Soc. Coop, Cesena (FC), Italy

4 HORTA Srl, registered office in Piacenza (PC), Italy

P.7 European Exploring Root Architecture to Develop Maize Ideotypes for Drought and Flooding Tolerance

M. De Biasi¹, E. Frascaroli¹, F. Solimei¹, S. Beji³, A. Torri², C. Balconi², G. Mazzinelli², D. Madur³, V. Combes³, C. Bauland³, A. Charcosset³, S. Nicolas³,

1 Department of Agricultural and Food Sciences, University of Bologna, Bologna, Italy

2 Consiglio per la Ricerca e la Sperimentazione in Agricoltura / Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - CRA / CREA Bergamo, Italy

3 French National Research Institute for Agriculture, Food and Environment - INRAE France/ GQE-Le Moulon, France

P.8 Phenotypic characterization of cold tolerance in maize landraces at germination and early growth stages

F. Solimei¹, E. Frascaroli¹, M. De Biasi¹, L. Álvarez-Iglesias²,
N. Chibane², A. Torri³, B. A. D'Ambrosio³, A. Butrón², C. Balconi³

¹ Department of Agricultural and Food Sciences, University of Bologna, Bologna, Italy

² Misión Biológica de Galicia (CSIC), Pontevedra, Spain

³ Consiglio per la Ricerca e la Sperimentazione in Agricoltura
Consiglio per la ricerca in agricoltura e l'analisi dell'economia
agraria - CRA / CREA Bergamo, Italy

P.9 Differing expression patterns of important PSI and PSII genes after low-temperature exposure in two early developmental stages of maize

Manja Božić¹, Dragana Ignjatović Micić¹, Jelena Vančetović¹,
Nenad Delić¹, Ana Nikolić¹

¹ Maize Research Institute “Zemun Polje”, Belgrade, Serbia

P.10 Leveraging autofluorescence-based multispectral imaging to trace tissue origin in ground forage maize particle

Oscar Main¹, Marie-Françoise Devaux², Fabienne Guillon²,
Cécile Barron¹

¹ IATE, University of Montpellier, INRAE, Institut Agro, Montpellier,
France

² UR1268 BIA, INRAE, 44316 Nantes, France

P.11 From RGB Imagery to Yield Prediction: UAV-Assisted High-Throughput Phenotyping in Maize

Jovan Pavlov¹, Nikola Grčić¹, Jelena Vančetović¹,
Marko Mladenović¹, Aleksandar Kovačević¹, Milica Lučev²,
Vlatko Galic³, Sofija Božinović¹

¹ Breeding Department, Maize Research Institute Zemun Polje,
Belgrade, Serbia

² Research Department, Maize Research Institute Zemun Polje,
Belgrade, Serbia

³ Maize Genetics and Breeding Department, Agriculture Institute
Osijek, Osijek, Croatia

P.12 Optimization of SNP marker genotyping arrays for high-quality and cost-efficient analysis of Maize and Sorghum

Joerg Plieske¹, Thomas Groß¹, Naser Poursarebani¹, Dagmar Kulosa¹, Eva Grafahrend-Belau¹, Andreas Polley¹, Martin Ganal¹, Heike Gnad¹
1 Maize RSGS Institut Fresenius GmbH, TraitGenetics Section (SGS IF TG), Seeland OT Gatersleben, Germany

P.13 Identifying Limiting Climate Factors for Sorghum Yield Using XGBoost Models Explained by SHAP

Célestine Yvonnet¹, Christine Granier¹, Catherine Giauffret¹, Lauriane Rouan¹, 2 and Grégory Beurier^{1,2}
1 UMR AGAP Institut, Univ Montpellier, CIRAD, INRAE, Institut Agro, Montpellier, France
2 CIRAD, UMR AGAP Institut, Montpellier, France

P.14 Utilizing SNP markers to enhance hybrid performance and yield in maize breeding

Sanja Perić¹, Milan Stevanović¹, Slaven Prodanović², Nikola Grčić¹, Bojan Mitrović¹, Aleksandar Popović¹, Marko Mladenović¹
1 Maize Research Institute "Zemun Polje", Serbia
2 University of Belgrade, Faculty of Agriculture, Zemun, Serbia

P.15 Optimizing Genomic Predictions in Maize Using a Diversity Panel and a Multiparental Population

Noemi Gesteiro¹, Ana López-Malvar^{2,3}, Rogelio Santiago¹, Ana Maria Butrón¹, Rosa Ana Malvar¹
1 Misión Biológica de Galicia (CSIC), Pontevedra, Spain
2 Facultad de Biología, Depto de Biología Vegetal y Ciencias del Suelo, Agrobiología Ambiental, Calidad de Suelos y Plantas, Universidad de Vigo, Vigo, Spain, Unidad Asociada a la Misión Biológica de Galicia (CSIC)
3 Université Paris-Saclay, INRAE, AgroParisTech, Institut Jean-Pierre Bourgin for Plant Sciences (IJPB), Versailles, France

P.16 Potential of local Italian maize germplasm for enhancing adaptation via root system architecture

Matteo De Biasi¹, Francesco Solimei¹, Gianfranco Mazzinelli², Carlotta Balconi², Hans Hartwig², Chiara Lanzaova², Chiara Gagliardi¹, Alessio Torri², Silvio Salvi¹, Elisabetta Frascaroli¹

1 Department of Agricultural and Food Sciences, University of Bologna, Bologna, Italy

2 Consiglio per la Ricerca e la Sperimentazione in Agricoltura
Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - CRA / CREA Bergamo, Italy

P.17 Plant Genetic Resources for Food and Agriculture (RGV-FAO) program: valorization of Italian maize germplasm

Alessio Torri¹, Rita Redaelli¹, Carlotta Balconi¹

1 CREA – Centre for Cereal and Industrial Crops, Bergamo, Italy

P.18 Genetic diversity and breeding potential of Italian maize inbred lines core collection

Helga Cassol¹, Anna Maria Mastrangelo², Sabrina Locatelli¹, Carlotta Balconi¹, Nicola Pecchioni², Chiara Lanzaova¹

1 CREA – Centre for Cereal and Industrial Crops, Bergamo, Italy

2 CREA – Centre for Cereal and Industrial Crops, Foggia, Italy

P.19 Connecting Spanish scientists to organize genetic resources from four different domains

P. Revilla¹, R. Alia², L. de la Rosa³, J. Fernández⁴, L. Guasch³, A. Granell⁵, J.A Jiménez⁶, R.A. Malvar¹, M.Á. Moreno⁷, M. Pérez⁸, F.Y. Ramos⁹, D. Grivet²

1 MBG-Spanish National Research Council (CSIC)

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6 IAS-CSIC

7 EEAD-CSIC

8 IEO-CSIC

9 VAACT CSIC

P.20 Mining Allelic diversity of maize landraces for abiotic and biotic stresses

Stéphane D. Nicolas¹, Carlotta Balconi², Ana Butron Ana³, François Chaumont⁴, Brigitte Gouesnard⁵, Elisabetta Frascaroli⁶, Sekip Erdal⁷, Mesut Esmeray⁸, Antonio Lupini⁹, Carine Palaffre¹⁰, Patricia Faivre-Rampant¹¹, Cyril Bauland¹, Alain Charcosset¹, Agustin Oscar Galaretto¹, Delphine Madur¹, Romain Chapuis⁵, Morgane Vincent⁵, Alessio Torri², Gianfranco Mazinelli², Antonino Benito², Joséphine Guyot⁴, Mateo De Biasi⁶, Francesco Solimei⁶, Alper Adak⁷, Aurélie Canaguier¹¹, Damien Hinsinger¹¹, Rita Redaelli², Pedro Revilla³, Xavier Draye⁴, Rosa Ana Malvar³, Laurence Moreau¹

1 Université Paris-Saclay, INRAE, CNRS, AgroParisTech, GQE - Gif-sur-Yvette, France

2 CREA – Centre for Cereal and Industrial Crops, Bergamo, Italy

3 Misión Biológica de Galicia Consejo Superior de Investigaciones Científicas, Pontevedra, Spain

4 Louvain Institute of Biomolecular Science and Technology, UCLouvain, Louvain-la-Neuve, Belgium

5 UMR AGAP Institut, Univ Montpellier, CIRAD, INRAE, Institut Agro, Montpellier, France

6 Department of Agricultural and Food Sciences, DISTAL, University of Bologna, Bologna, Italy

7 Department of Field Crops, Batı Akdeniz Agricultural Research Institute, Antalya, Turkey

8 Breeding and Genetics Department, Maize Research Institute, Sakarya, Turkey

9 Department of Agraria, Mediterranean University of Reggio Calabria, Reggio Calabria, Italy

10 Unité Expérimentale du Maïs, INRAE, Univ. Bordeaux, Saint Martin de Hinx, France

11 Université Paris-Saclay, INRAE, Etude du Polymorphisme des Génomes Végétaux, Evry, France

P.21 Predicting adaptation of maize landraces from genebanks by combining DNA-pool genotyping, genomic prediction and genomic offset

Agustin Oscar Galaretto¹, Rosa Ana Malvar³, Brigitte Gouesnard⁵, Carlotta Balconi², Delphine Madur¹, Rita Redaelli², Violeta Andjelkovic⁴, Pedro Revilla³, Cyril Bauland¹, Ana Butron³, Torri, Alessio², Ana Maria Barata⁶, Natalija Kravic⁴, Pedro Mendes-Moreira⁷, Danela Murariu⁸, Hrvoje Šarčević⁹, Beate Schierscher-Viret¹⁰, Morgane Vincent⁵, Anne Zanetto⁵, Bettina Kessel¹¹, Tristan Mary-Huard¹, André Pereira¹², Domnica Daniela Placinta⁸, Alexandre Strigens¹³, Sandra Goritschnig¹⁴, Alain Charcosset¹, Laurence Moreau¹, Stéphane Nicolas¹

1 Université Paris-Saclay, INRAE, CNRS, AgroParisTech, GQE - Gif-sur-Yvette, France

2 CREA- Council for Agricultural Research and Economics, Research Centre for Cereal and Industrial Crops, Bergamo, Italy
3 Misión Biológica de Galicia Consejo Superior de Investigaciones Científicas, Pontevedra, Spain;

4 Maize Research Institute Zemun Polje, Belgrade, Serbia;

5 UMR AGAP Institut, Univ Montpellier, CIRAD, INRAE, Institut Agro, Montpellier, France

6 Banco Português de Germoplasma Vegetal, S.Pedro de Merelim, Braga, Portugal

7 Agriculture School of the Polytechnic University of Coimbra (IPC-ESAC)

and CERNAS – Research Centre for Natural Resources, Environment and Society Bencanta, Coimbra, Portugal

8 Suceava Genebank, Suceava, Romania

9 University of Zagreb Faculty of Agriculture, Svetošimunska Zagreb, Croatia

10 Agroscope, Nyon 1, Schweiz, Switzerland

11 KWS SAAT SE & Co. KGaA, Einbeck, Germany

12 CERNAS – Research Centre for Natural Resources, Environment and Society Bencanta, Coimbra, Portugal

13 DSP -Delley Semences et Plantes SA, Delley, Switzerland

14 ECPGR, Alliance of Bioversity International and CIAT Roma, Italy

- P.22 **Landraces: A Path to Recover Traditional Maize Bread Quality**
Rosa Ana Malvar¹, R. López-Toja², F. Almeida³, L. Campo⁴,
A. Butrón¹, P. Revilla¹
1 Misión Biológica de Galicia (MBG) CSIC, Pontevedra, Spain
2 Grupo Da Cunha, A Coruña, Spain
3 Sementares SL, A Coruña, Spain
4 CIAM-INGACAL, Abegondo, Spain
- P.23 **Enhancing understanding of white maize inbred lines genetic structure by leveraging SNP markers**
Snežana Mladenović Drinić¹, Nikola Grčić¹, Natalija Kravić¹,
Violeta Anđelković¹, Marko Mladenović¹, Jelena Srdić¹,
Ana Nikolić¹
1 Maize Research Institute „Zemun Polje“, Belgrade, Serbia
- P.24 **Exploring Trends in Maize Breeding: A Comprehensive Literature Analysis through Text Mining**
Bojan Mitrović¹, Milan Stevanović¹, Sanja Perić¹, Vesna Perić¹,
Marko Mladenović¹, Petar Čanak¹
1 Maize Research Institute „Zemun Polje“, Zemun, Serbia
- P.25 **Modifying Maize Arabinoxylan Cross-linkage Using Classical Breeding. New Advances**
Rogelio Santiago¹, Ana Butrón¹, Ana Carballeda¹,
Jose Carlos Souto², Rosa Ana Malvar¹
1 Misión Biológica de Galicia (CSIC), Pontevedra, Spain
2 Facultad de Biología, Depto. Biología Vegetal Y Ciencias del Suelo, Agrobiología Ambiental, Calidad de Suelos y Plantas (UVIGO), Unidad Asociada a MBG (CSIC), Universidad de Vigo, Vigo, Spain
- P.26 **Variability of vitamin E content in ZP popcorn hybrids**
Jelena Srdić¹, Jelena Vukadinović¹, Snežana Mladenović Drinić¹,
Ana Nikolić¹, Jasmina Milenković², Natalija Kravić¹,
Violeta Anđelković¹
1 Maize Research Institute Zemun Polje, Zemun, Serbia
2 Institute for forage crops Kruševac, Globoder, Serbia

P.27 Automated Plot-Level Phenotyping from UAV RGB Imagery for Maize Breeding Applications

Nikola Grcic¹, Vlatko Galic², Jovan Pavlov¹, Jelena Vančetović¹,
Marko Mladenović¹, Aleksandar Kovačević¹, Sofija Božinović¹

1 Breeding Department, Maize Research Institute Zemun Polje,
Belgrade, Serbia

2 Maize Genetics and Breeding Department, Agriculture Institute
Osijek, Osijek, Croatia



GENERAL INFORMATION

THE VENUE

Aula Magna – Facoltà di Agraria
Viale Giuseppe Fanin, 44-46
40127 Bologna

USEFUL CONTACTS

Taxi Cotabo +39 051 372727
Radio Taxi Cat Bologna +39 051 4590
Private Car +39 051 519090

Organizing Secretariat on site +39 348 2487176



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+39 051 6564300
Viale Aldini, 222/4 - 40136 Bologna - conference@avenue-media.eu
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