



XVI European Society
for Agronomy Congress

1 to 3 September, 2020 - **Sevilla - Spain**

**SMART AGRICULTURE
FOR GREAT
HUMAN CHALLENGES**

**BOOK OF
ABSTRACTS**

Organizes:



www.esa-congress-sevilla2020.es

Technical Secretariat:

VIAJES *El Corte Inglés*
CONGRESOS

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WELCOME

Dear participant in the ESA congress,

First, on behalf of the Organizing Committee, I would like to apologize for the alteration of the expected organization of the ESA congress due to the COVID pandemic situation. Our first idea was to maintain a face-to-face event. Even we thought in a 1-year delay, which was not possible due to the overlap with other scientific events. These circumstances and uncertainty led to a low number of abstracts received after the submission deadline. The change to a virtual congress encourages people to participate, and the final number of communications is finally similar to previous congresses. This is not the type of congress we thought and planned, however we considered that this was the best format to keep the event. The change, the extended deadline, and the preparation of the virtual platform for the congress explain the delay in reviewing and accepting abstracts and in the preparation of the final program. Again, I would like to apologize for this.

Around 280 abstracts were finally received, which will be organized as oral and poster presentations. You will access oral sessions organized in three virtual rooms through the webpage of the congress where you can also download the definitive program and the abstract book. You will access using your e-mail and password. An advantage of the virtual format is that you will not miss any oral presentation: this will be available for you for 30 days. In any case, we have tried to avoid the overlap between keynotes. After the presentation, queries to authors will be possible by chat under the supervision of the chairman of the session.

For posters, all will be available along the 3 days of congress and you can use the platform for sending questions to the corresponding author that will receive this by e-mail. As for oral presentations, we would try to maintain available for you during a time.

In all the ESA congress it is always very relevant the Field trips. In this edition, we expected to show you relevant and innovative Mediterranean agrosystems. We have not renounced to this, and you will have available three virtual field trips as videos. With these videos, you will get an idea of the use of the reclaimed marshland area of the Guadalquivir Valley (intensive irrigated land, with around 40000 ha of rice), the new intensive tree orchards systems, and new tools for precision agriculture.

Finally, we would like to express our gratitude for your confidence in the celebration of the conference in these difficult times.

Antonio Delgado

On behalf of the Organizing Committee

COMMITTEES

Local organizing committee (University of Sevilla)

- Antonio Delgado García. *ESA president 2018-2020*
- Manuel Pérez Ruíz.
- José María Urbano Fuentes-Guerra
- María Teresa Moreno Aguirre.
- Eusebio Carmona Chiara

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- Manuel Pérez Ruiz (*University of Sevilla*)
- José María Urbano (*University of Sevilla*)
- Francisco Villalobos (*University of Córdoba*)
- Roberto Confalonieri (*University of Milán*)
- Marisa Gallardo (*University of Almería*)
- Santiago Bonachela (*University of Almería*)

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- Davide Camarano, *Purdue University, USA*
- Christoph Carlen, *Agroscope, Switzerland*
- Natalie Colbach, *INRA-Dijon, France*
- David Connor, *University of Melbourne, Australia*
- Julián Cuevas, *University of Almería, Spain*
- Jose Paulo de Melo Abreu, *Instituto Superior de Agronomia, Portugal*
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- Antonio Rafael Sánchez-Rodríguez, *Universidad de Córdoba, Spain*
- Roxana Savin, *Universidad de Lleida, Spain*
- Urs Schmidhalter, *Technical University Munich, Germany*
- Gustavo Slafer, *Universidad de Lleida, Spain*
- Massimo Tagliavini, *Free University of Bolzano, Italy*
- Francesco Tei, *University of Perugia, Italy*
- Christine Watson, *Scotland's Rural College, UK*

KEYNOTE SPEAKERS

- Elías Fereres. *University of Córdoba, IAS CSIC.*
- Gustavo Slafer, *ICREA (Catalonian Institution for Research and Advanced Studies) at AGROTECNIO Center and the University of Lleida, Spain.*
- Nathalie Colbach, *Agroécologie, AgroSup Dijon, INRA, Univ. Bourgogne, Franche-Comté, Dijon, France.*
- Pytrik Riedsma, *Wageningen University, The Netherlands.*
- Marco Moriondo, *CNR, Italy.*
- Bruno Basso, *Michigan State University, USA.*
- Miguel Quemada, *Universidad Politécnica de Madrid, Spain.*
- Roberto Confalonieri, *University of Milan, Italy.*
- Urs Schmidhalter, *Technical University of Munich, Germany.*
- David Connor, *University of Melbourne.*
- Abdul M. Mouazen, *University of Ghent.*

PROGRAM

HOUR	AUTHOR	TITLE
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TUESDAY, SEPTEMBER 1 ROOM 1

09:00 -09:15	JULIÁN MARTÍNEZ, VICE-CHANCELLOR OF RESEARCH OF THE UNIVERSITY OF SEVILLA	WELCOME
09:20 -09:50	ELÍAS FERERES	KEYNOTE: FACING THE WATER LIMITATION IN EUROPEAN AGRICULTURE
10:15 -10:30	COFFEE BREAK	
10:30 -13:30	SESSION 1.1 CHAIRMAN: ROXANA SAVÍN	KEYNOTE: CROP PHYSIOLOGY
10:30 -11:15	GUSTAVO SLAFER	KEYNOTE PHYSIOLOGICAL BASES FOR IMPROVING RESILIENCE TO ENVIRONMENTAL STRESSES AND RESOURCE USE EFFICIENCY IN WHEAT
11:30 -11:45	KOCH HEINZ-JOSEF	ROW DISTANCE EFFECTS ON SUGAR BEET YIELD FORMATION
11:45 -12:00	IAN DODD	LOW TEMPERATURE PERTURBS HYDRAULIC AND HORMONAL REGULATION OF LEAF EXPANSION AND PHOTOSYNTHESIS OF SOYBEAN SEEDLINGS
12:00 -12:15	JINWOOK KIM	PLASTICITY OF GRAIN NUMBER AND AVERAGE GRAIN WEIGHT IN RESPONSE TO HEAT WAVES AND SOURCE- SINK RATIO IN FIELD GROWN WHEAT.
12:30 -12:45	IVÁN FRANCISCO GARCÍA- TEJERO	HYDROSOS ALMONDS: IMPROVING THE FRUIT QUALITY BY MEANS OF DEFICIT IRRIGATION STRATEGIES
12:45 -13:00	NICOLA HOLDEN	MANAGING FOOD SAFETY HAZARDS IN HORTICULTURAL PRODUCTION
13:00 -14:00		LUNCH

HOUR	AUTHOR	TITLE
SESSION 1.2		
14:00 -18:30	CHAIRMAN: FRANCESCO TEI	CROP INTERACTION WITH BIOTIC AND ABIOTIC FACTORS
14:00 -14:45	NATHALIE COLBACH	KEYNOTE: INVESTIGATING CROP-WEED INTERACTIONS AS A DRIVER FOR AGROECOLOGICAL CROP PRODUCTION
14:45 -15:00	CHARITY AMARA	EFFECT OF LOCATION AND GENOTYPE ON DEGENERATION OF ORANGE-FLESHED SWEETPOTATO IN NIGERIA
15:00 -15:15	TAUBE FRIEDHELM	ARE YIELD INCREASES IN MAIZE IN NW-EUROPE DUE TO BREEDING PROGRESS OR THE SELECTION OF MORE SUITABLE HYBRIDS DUE TO CLIMATE CHANGE?
15:30 -15:45	RAPETTI MANON	USING TRAIT-BASED APPROACH TO SELECT BANANA VARIETIES ADAPTED TO AGROECOLOGICAL CROP SYSTEM
15:45 -16:00		COFFEE BREAK
SESSION 1.2		
16:00 -18:30	CHAIRMAN: NATHALIE COLBACH	CROP INTERACTION WITH BIOTIC AND ABIOTIC FACTORS
16:00 -16:15	FEIKE TIL	MULTIPLE DISEASE SUSCEPTIBILITY, BREEDING PROGRESS AND YIELD LOSS OF WINTER WHEAT IN GERMAN VARIETY TRIALS DURING 1983-2019
16:15 -16:30	DIMA SABBOURA	A REVIEW OF HEAT STRESS IN CANOLA (BRASSICA NAPUS L.)
16:30 -16:45	KEYVAN ESMAEILZADEH SALESTANI	EXPRESSION OF AMMONIUM TRANSPORTER GENES IN BARLEY UNDER DIFFERENT FARMING SYSTEMS
16:45 -17:00	MARÍA LUISA GANDÍA TOLEDANO	UNRAVELLING THE RELATIONS BETWEEN THE SOIL WEED SEED BANK AND WEED EMERGENCE IN THE FIELD.
17:30 -17:45	JOHN BADDELEY	SOIL PH EFFECTS ON ROOT GROWTH AND ROOT:SHOOT RATIO IN SPRING BARLEY
17:45 -18:00	MOHAMED HUSSEIN	SALYSILIC ACID FOLIAR SPRAY EFFECTS ON MINERAL STATUS OF CANOLA SEEDS GROWN UNDER SALINITY
18:00 -19:00		VIRTUAL FIELD TRIP

HOUR	AUTHOR	TITLE
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TUESDAY, SEPTEMBER 1 **ROOM 2**

HOUR	AUTHOR	TITLE
SESSION 2.1		
11:15 -13:30	CHAIRMAN: MARIANA RUFINO	FARMING SYSTEMS
11:15 -12:00	PYTRIK REIDSMA	KEYNOTE: SUSTAINABILITY AND RESILIENCE OF FARMING SYSTEMS
12:00 -12:15	MARTIN HARRIES	CONTROLLING HERBICIDE RESISTANT WEEDS REDUCES DIVERSITY IN WESTERN AUSTRALIAN CROP AND PASTURE SYSTEMS
12:15 -12:30	CRYTELE LEAUTHAUD	WHY DO FARMERS ASSOCIATE CROPS? LOGICS AND STRUCTURE OF OLIVE GROVE-VEGETABLE ASSOCIATIONS IN A MEDITERRANEAN REGION
12:30 -12:45	DIANE RAKOTOMANGA - CIRAD	EFFECTS OF COVER CROPS AND SOIL TILLAGE ON THE SPONTANEOUS COMMUNITY IN FALLOW PRECEEDING BANANA CROP
12:45 -13:00	NATHALIE COLBACH	COMBINING EXPERT KNOWLEDGE AND MODELS IN PARTICIPATORY WORKSHOPS WITH FARMERS TO DESIGN SUSTAINABLE WEED MANAGEMENT STRATEGIES
13:00 -14:00		LUNCH
SESSION 2.1		
14:00 -16:30	CHAIRMAN: PYTRIK REIDSMA	FARMING SYSTEMS
14:00 -14:15	ASHRAF TUBEILEH	PLANT COMPOSTS REDUCE SOIL VERTICILLIUM DAHLIAE LOAD AND SUPPRESS WEEDS
14:15 -14:30	WIM PAAS	PARTICIPATORY ASSESSMENT OF FUTURE SUSTAINABILITY AND RESILIENCE OF EUROPEAN FARMING SYSTEMS
14:30 -14:45	GODINOT OLIVIER	CONCEPTION AND TEST OF AN INTERDISCIPLINARY SERIOUS GAME TO LEARN AGROECOLOGY
14:45 -15:00	LEONARDO VERDI	ENVIRONMENTAL ASSESSMENT OF ORGANIC AND CONVENTIONAL ANCIENT WHEAT CULTIVATION: ACIDIFICATION AND EUTROPHICATION PERFORMANCES THROUGH A LCA APPROACH
15:00 -15:15	CHRISTINE WATSON	REDESIGNING A LONG-TERM ORGANIC FARMING EXPERIMENT TO ADDRESS CONTEMPORARY ISSUES

HOUR	AUTHOR	TITLE
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15:15 -15:30	ROBIN WALKER	LONG TERM YIELD TRENDS IN FOUR PARALLEL ORGANICALLY MANAGED CROP ROTATIONS
15:45 -16:00		COFFEE BREAK

SESSION 2.2.
CHAIRMAN: CHRISTOS DORDAS
CROP DIVERSIFICATION

16:00 -16:15	MUHAMMAD ALI RAZA	EFFECT OF PLANTING PATTERNS ON YIELD, NUTRIENT ACCUMULATION, AND DISTRIBUTION IN MAIZE AND SOYBEAN RELAY INTERCROPPING SYSTEMS
16:15 -16:30	FEDERICO MARTINELLI	LEGUMES IN BIODIVERSITY-BASED FARMING SYSTEMS IN MEDITERRANEAN BASIN
16:30 -16:45	WERY JACQUES	THE ROLE OF IMPROVED AGRONOMIC PRACTICES IN DE-RISKING AND ENHANCING THE SUSTAINABILITY OF CEREAL-BASED SYSTEMS IN THE DRYLANDS
16:45 -17:00	RAUL ZORNOZA	GREENHOUSE GAS EMISSIONS FROM SOIL IN AN ALMOND ORCHARD DIVERSIFIED WITH CAPER AND THYME
17:00 -17:15	RAUL ZORNOZA	EFFECT OF FAVA BEAN AND VETCH/BARLEY CROPS INTERCROPPED WITH MANDARIN TREES ON SOIL GREENHOUSE GAS EMISSIONS
17:15 -17:30	STILMANT DIDIER	DOES COMPLEX MIXTURES INCREASE PERFORMANCES OF ORGANIC TEMPORARY GRASSLAND?
17:30 -17:45	ALI ELHAKEEM	DO COVER CROP SPECIES MIXTURES ENHANCE RESILIENCE AND RESOURCE CAPTURE?
17:45 -18:00	MARIANO MARCOS PEREZ	INTERCROPPING OF MELON AND COWPEA CAN IMPROVE MELON PRODUCTION IN ORGANIC SYSTEMS

TUESDAY, SEPTEMBER 1 **ROOM 3**

11:11 -13:30	SESSION 3.1 CHAIRMAN: THOMAS DÖRING	SUSTAINABLE INTENSIFICATION
11:11 -11:30	WERY JACQUES	EXCELLENCE IN AGRONOMY 2030: A CGIAR-WIDE INITIATIVE TO TAKE DATA-DRIVEN AGRONOMY TO SCALE IN THE GLOBAL SOUTH

HOUR	AUTHOR	TITLE
11:30 -11:45	FEIKE TIL	CONTRIBUTION OF IMPROVED IRRIGATION TO NARROWING FARMERS' WHEAT YIELD GAPS IN NORTH-EAST IRAN
11:45 -12:00	YAKUBU BALMA ISSAKA	TYPOLOGY OF LOWLAND RAINFED RICE PRODUCTION AND ITS IMPLICATION FOR SMALLHOLDER AGRICULTURAL INTENSIFICATION IN NORTHERN GHANA
12:15 -12:30	NA WANG	SYNERGIES AND TRADE-OFFS BETWEEN YIELD, QUALITY, RESOURCE USE EFFICIENCY AND ENVIRONMENTAL IMPACT OF POTATO PRODUCTION IN CHINA
12:30 -12:45	SARA BOSI	DEVELOPMENT OF AN ECONOMIC THRESHOLD FOR HERBICIDE APPLICATION IN COMMON WHEAT
13:00 -14:00		LUNCH
14:00 -16:30	SESSION 3.1 CHAIRMAN: GORAN BERGKVIST	SUSTAINABLE INTENSIFICATION
14:00 -14:15	DANIEL KINDRED	ACHIEVING PRECISION IN ON-FARM EXPERIMENTS
14:15 -14:30	FABIO MASCHER	STABILITY OF QUALITY AND YIELD IN WHEAT COMPOSITE CROSS POPULATIONS
14:30 -14:45	SARAH KENDALL	USING FARM INNOVATION GROUPS TO ACCELERATE PROGRESS IN AGRICULTURE.
14:45 -15:00	DOMENICO RONGA	STRUVITE AS A SUSTAINABLE BIO-FERTILIZER FOR THE REDUCTION OF PHOSPHATE ROCK DEPENDENCY AND BETTER DELOCALIZATION OF LIQUID DIGESTATE
15:00 -15:15	ANA AGUILAR	ECOSYSTEM FUNCTIONS OF MICROBIAL CONSORTIA IN SUSTAINABLE AGRICULTURE
15:15 -15:30	MARGARITA RUIZ-RAMOS	SUST-FARM: A MODEL TO ASSESS SUSTAINABLE INTENSIFICATION AND CLIMATE CHANGE ADAPTATION AT FARM SCALE
15:45 -16:00		COFFEE BREAK
16:00 -18:30	SESSION 3.2 CHAIRMAN: HELENA GÓMEZ-MACPHERSON	EFFICIENT RESOURCE MANAGEMENT: SOILS, WATER, NUTRIENTS, AND ENERGY
16:15 -16:30	VICTOR MAIGNAN	EVALUATION OF INNOVATIVE FERTILIZER ADDITIVES ON THE PHYSIOLOGICAL IMPACTS, AGRONOMIC PERFORMANCES AND PROTEIN QUALITY IN WINTER WHEAT

HOUR	AUTHOR	TITLE
16:30 -16:45	ANTONIO RAFAEL SÁNCHEZ-RODRÍGUEZ	BIOFORTIFICATION OF CEREALS WITH SOIL AND FOLIAR APPLICATIONS OF ZINC IN THE SOUTH OF SPAIN
16:45 -17:00	SILVIA BACHMANN-PFABE	ENHANCING DROUGHT TOLERANCE IN PERENNIAL RYEGRASS
17:00 -17:15	MELPOMENI SIAKOU	KORONEIKI OLIVE TREE PHYSIOLOGY RESPONSES UNDER TWO DEFICIT IRRIGATION TREATMENTS IN CYPRUS
17:15 -17:30	ELENA NAVARRO SORIANO	ANALYSIS OF THE FREQUENCY OF DISTRIBUTION OF THE RELATIVE IRRIGATION SUPPLY INDEX IN THE WATER USERS ASSOCIATION OF SECTOR BXII OF THE LOWER GUADALQUIVIR RIVER
17:45 -18:00	SAMUEL FRANCO-LUESMA	MAIZE MONOCULTURE UNDER MEDITERRANEAN CONDITIONS: ASSESSING THE EFFECT OF DIFFERENT IRRIGATION AND TILLAGE SYSTEMS

WEDNESDAY, SEPTEMBER 2

ROOM 1

SESSION 2.4		MITIGATING CLIMATE CHANGE: MODELLING, PREDICTION, AND STRATE
09:00 -11:30	CHAIRMAN: ANTONIO DELGADO	
09:00 -09:45	MARCO MORIONDO	KEYNOTE: EXPECTED IMPACT OF CLIMATE CHANGE ON FOOD PRODUCING SYSTEM IN THE MEDITERRANEAN REGION: HOW SMART AGRICULTURE CAN IMPROVE THE RESILIENCE
09:45 -10:00	QAISAR SADDIQUE	MULTIPLE CROP MODELS PROJECTION OF WHEAT PRODUCTION UNDER FUTURE CLIMATE CHANGE SCENARIOS IN THE GUANZHONG PLAIN, CHINA
10:00 -10:15	JAY RAM LAMICHHANE	HARNESSING CROP MODELS TO PINPOINT THE ESTABLISHMENT QUALITY OF FIELD CROPS UNDER THE 21ST CENTURY CLIMATE CHANGE: CASE STUDIES OF SOYBEAN AND SUGAR BEET IN NORTHERN FRANCE
10:15 -10:30	DANIEL MIRALLES	ADAPTATION STRATEGIES TO HIGH NIGHT TEMPERATURE IN WINTER CEREALS AND INTERACTION WITH MANAGEMENT PRACTICES

HOUR	AUTHOR	TITLE
10:30 -10:45	LUIS PARRAS-ALCÁNTARA	LAND MANAGEMENT CHANGE EFFECTS ON SOIL ORGANIC CARBON STOCK IN OLIVE GROVE HILLSIDES. IMPLICATIONS IN THE 40/00 NOTION
10:45 -11:00		COFFEE BREAK
SESSION 2.4		
11:00 -13:30	CHAIRMAN: MARCO MORIONDO	MITIGATING CLIMATE CHANGE: MODELLING, PREDICTION, AND STRATE
11:00 -11:15	LUIS PARRAS-ALCÁNTARA	EFFECT OF TILLAGE AND TOPOGRAPHIC POSITION ON SOIL QUALITY IN MEDITERRANEAN OLIVE GROVE HILLSIDES
11:15 -11:30	ROESCH ANDREAS	APPROXIMATION OF GREENHOUSE GAS EMISSIONS FOR A FARM NETWORK USING READILY AVAILABLE DATA
11:30 -11:45	SEYEDREZA AMIRI	MODELLING DORMANT SEEDING OF RAINFED CHICKPEA AS AN ADAPTATION STRATEGY TO SUSTAIN PRODUCTIVITY UNDER CLIMATE CHANGE
11:45 -12:00	NAULLEAU AUDREY	STRATEGIES FOR ADAPTING VITICULTURE TO CLIMATE CHANGE: A PARTICIPATORY MODELING APPROACH WITHIN A MEDITERRANEAN CATCHMENT
12:00 -12:15	ROBIN MARIE HELENE	IDENTIFICATION AND EVALUATION OF CROP ADAPTATION STRATEGIES TO CLIMATE CHANGE FOR WHEAT, POTATO, AND SUNFLOWER IN FRANCE.
12:15 -12:30	TOMMASO TADIELLO	SOIL ORGANIC CARBON SEQUESTRATION IN MEDITERRANEAN AND HUMID SUBTROPICAL CLIMATES UNDER CONSERVATION AGRICULTURE: FIRST STEPS OF A META-ANALYSIS
12:30 -12:45	ELISA M. SUÁREZ-REY	CARBON AND NITROGEN FOOTPRINT OF DRIP-FERTIGATED GREENHOUSE TOMATO CROPS
12:45 -13:00	FOLTZER LOUIS	GRASSLAND RESILIENCE TO CLIMATE VARIABILITY ON NITRATE LEACHING
13:00 -14:00		LUNCH
SESSION 2.5/CHAIRMAN: ENGRACIA MADEJÓN		
14:00 -16:30		PROTECTING NATURAL RESOURCES AND THE HUMAN ENVIRONMENT
14:00 -14:15	DONGMO ZANGUE YANNICK	PRESERVING ENVIRONMENT THROUGH FARMLAND MANAGEMENT PRACTICES (FMP)? A GENERIC REVIEW

HOUR	AUTHOR	TITLE
14:15 -14:30	NENDEL CLAAS	SIMULATING NITRATE LEACHING FROM AGRICULTURAL LAND USE IN GERMANY
14:30 -14:45	STEFAAN DE NEVE	SOIL PHOSPHORUS (P) MINING IN AGRICULTURE - IMPACTS ON P AVAILABILITY, CROP YIELDS AND SOIL ORGANIC CARBON STOCKS
15:00 -15:15	NICOLAS BEAUDOIN	LONG TERM RESPONSES OF CROP YIELD, SOILS AND NITRATE LOSSES TO BEST AGRICULTURAL PRACTICES AT THE CATCHMENT SCALE
15:15 -15:30	ANDREA AGUILAR	PARTICIPATORY CONSTRUCTION OF FERTILITY AND HEALTH INDICATORS IN AGRICULTURAL SYSTEMS WITH A MEDITERRANEAN CLIMATE IN CHILE
15:30 -15:45	AWAIS SHAKOOR	MODELLING OF SOIL NITROGEN DYNAMICS IN CROPPING SYSTEM WITH LEACHM IN RAINFED SEMIARID MEDITERRANEAN REGION
15:45 -16:00		COFFEE BREAK
16:00 -17:00		VIRTUAL FIELD TRIP

WEDNESDAY, SEPTEMBER 2

ROOM 2

HOUR	SESSION 2.2/CHAIRMAN: CHRISTINE WATSON	CROP DIVERSIFICATION
09:00 -09:15	MARIANO MARCOS PEREZ	INTERCROPPED BROCCOLI-FAVA BEAN SYSTEM CAN IMPROVE OVERALL PRODUCTION AND ECOSYSTEM SERVICES
09:15 -09:30	NADINE ENGBERSEN	THE CONTEXT DEPENDENCE OF RESOURCE PARTITIONING IN CROP MIXTURES
09:30 -09:45	MARÍA ALONSO-AYUSO	CHARACTERIZATION OF PERFORMANCE OF NINE SPECIES AS COVER CROPS INTERSEEDED INTO MAIZE
09:45 -10:00	GENÍS SIMON-MIQUEL	SOYBEAN INTRODUCTION IN MEDITERRANEAN CROPPING SYSTEMS CAN REDUCE THEIR CARBON FOOTPRINT
10:00 -10:15	DUCHENE OLIVIER	PERENNIAL GRAIN ROOTS DIFFER FROM ANNUAL ONES, AFFECTING SOIL FUNCTIONING AND MICROBIOLOGY
10:15 -10:30	FEDERICO LEONI	SELECTION OF SUITABLE LEGUMES FOR RELAY INTERCROPPING WITH DURUM WHEAT IN MEDITERRANEAN CEREAL-BASED CROPPING SYSTEMS

HOUR	AUTHOR	TITLE
10:30 -10:45	ROBERTA FARINA	A SET OF INDICATORS TO ASSESS THE AGRO-ENVIRONMENTAL PERFORMANCE OF TWO MEDITERRANEAN DIVERSIFIED CROPPING SYSTEMS
10:45 -11:00		COFFEE BREAK
11:00 -13:30	SESSION 2.2 CHAIRMAN: MARIE-HELENE JEUFFROY	CROP DIVERSIFICATION
11:00 -11:15	XAVIER BOUSSELIN	CHOOSING SERVICE PLANT FOR INTERCROPPING WITH RAPESEED BASED ON PLANT-PLANT AND PLANT-SOIL INTERACTIONS
11:15 -11:30	SAMUEL FRANCO-LUESMA	CROP YIELD AND WATER USE EFFICIENCY IN THREE IRRIGATED MAIZE CROPPING SYSTEMS UNDER DIFFERENT NITROGEN FERTILIZATION RATES
11:30 -11:45	ANJA SCHMUTZ	WATER USE AND WATER SOURCE OF SIX DIFFERENT CROP SPECIES IN MIXED CULTURES
11:45 -12:00	CHRISTIAN SCHÖB	INCREASING PLANT DIVERSITY REDUCES REPRODUCTIVE EFFORT IN ANNUAL CROPS
12:00 -12:15	BARKAOUI KARIM	DO CROPS GROW BETTER IN OLIVE AGROFORESTRY UNDER DROUGHT ? A TEST FROM NORTHERN MOROCCO
12:30 -12:45	FRANCISCO ALCON	FINANCIAL ANALYSIS OF INTERCROPPING PRACTICES. THE CASE OF MANDARIN ORCHARD IN THE SE OF SPAIN
12:45 -13:00	CHRISTOS DORDAS	USE OF APPROPRIATE CULTIVARS IN INTERCROPPING CAN IMPROVE RESOURCE USE EFFICIENCY UNDER MEDITERRANEAN CONDITIONS
13:00 -14:00		LUNCH
14:00 -16:00	SESSION 2.2 CHAIRMAN: ERIC JUSTES	CROP DIVERSIFICATION
14:00 -14:15	NATHALIE COLBACH	CONTRIBUTION OF CEREAL-LEGUME INTERCROPPING TO AGROECOLOGICAL WEED MANAGEMENT
14:15 -14:30	RECKLING MORITZ	IMPACT OF CLIMATE ON GRAIN LEGUME YIELD STABILITY IN LONG-TERM EXPERIMENTS
14:30 -14:45	TIMOTHÉE CHERIERE	INTERCROPPING: A TOOL FOR CROPPING SYSTEM DIVERSIFICATION
14:45 -15:00	MATTHIEU CAROF	A CONCEPTUAL MODEL TO LINK CROP DIVERSIFICATION WITH ECOSYSTEM SERVICES

HOUR	AUTHOR	TITLE
15:00 -15:15	ROBIN WALKER	PROSPECTS FOR GROWING ORGANIC OILSEED RAPE IN SCOTLAND: THE SCOTTISH ORGANIC CANOLA (SCOCAN) PROJECT
15:15 -15:30	KAIRSTY TOPP	NOVEL AND MINOR PROTEIN CROPS IN SCOTLAND
15:30 -15:45	ALICE BAUX	WHY SWISS FARMERS CHOOSE TO SOW WINTER OISLEED RAPE WITH COMPANION PLANTS?
15:45 -16:00		COFFEE BREAK
16:00 -17:00	SESSION 2.3 CHAIRMAN: ERIC JUSTES	CROP LIVESTOCK INTEGRATION
16:00 -16:15	ANNA WENDA-PIESIK	SOYBEAN NON-GM INNOVATIVE SOLUTIONS IN CULTIVATION AND FEEDING OF ANIMALS IN FARMS IN NORTH POLAND – EPI GROUP ‘MY SOYBEAN’ CONSORTIUM

WEDNESDAY, SEPTEMBER 2

ROOM 3

HOUR	AUTHOR	TITLE
09:00 -11:30	SESSION 1.3 CHAIRMAN: MARCELO DONATELLI	MODELLING CROP-ENVIRONMENT INTERACTIONS
09:00 -09:15	IRIS VOGELER	EFFECT OF WINTER CEREAL SOWING TIME ON YIELD AND NITRATE LEACHING BASED ON EXPERIMENTS AND MODELLING
09:15 -09:30	TOMÁS ROQUETTE TENREIRO	FROM POINT TO FIELD SCALE - UNCERTAINTIES ASSOCIATED TO THE UPSCALING OF MODELING FOR SPATIAL HETEROGENEITY ASSESSMENT
09:30 -09:45	EDMAR TEIXEIRA	EFFECTIVENESS OF LATE SOWN COVER CROPS TO REDUCE NITROGEN LEACHING UNDER CLIMATE CHANGE
09:45 -10:00	MOREAU DELPHINE	INTEGRATING PLANT-PLANT COMPETITION FOR NITROGEN IN A 3D INDIVIDUAL-BASED MODEL SIMULATING THE EFFECTS OF CROPPING SYSTEMS ON WEED DYNAMICS
10:00 -10:15	ASHIFUR RAHMAN SHAWON	A CROP MODEL FOR SIMULATING RYE GROWTH, DEVELOPMENT AND YIELD
10:45 -11:00		COFFEE BREAK

HOUR	AUTHOR	TITLE
11:00 -13:30	SESSION 3.2 CHAIRMAN: JOSE ENRIQUE FERNÁNDEZ	EFFICIENT RESOURCE MANAGEMENT: SOILS, WATER, NUTRIENTS, AND ENERGY
11:00 -11:30	MIGUEL QUEMADA	KEYNOTE: INTEGRATED MANAGEMENT TO ENHANCE COVER CROPS BENEFITS AND RESOURCE EFFICIENCY
11:45 -12:00	MINA DEVKOTA	OPTIONS TO ENHANCE WHEAT YIELD AND WATER PRODUCTIVITY IN A MEDITERRANEAN RAINFED ENVIRONMENT BY AGRONOMIC INNOVATIONS
12:15 -12:30	MARLOES VAN LOON	AGRONOMIC NUTRIENT USE EFFICIENCY AND GREENHOUSE GAS EMISSIONS FOR CEREAL SELF-SUFFICIENCY IN SUB-SAHARAN AFRICA TOWARDS 2050
12:30 -12:45	MARCO MANCINI	EFFECT OF SOIL AVAILABLE PHOSPHORUS AND NITROGEN ON WINTER WHEAT PRODUCTION
12:45 -13:00	BJÖRN REDDERSEN	DRONE BASED PHENOTYPING OF NUE RELATED PARAMETERS OF VARIOUS WINTER RAPSEED GENOTYPES
13:00 -14:00		LUNCH
14:00 -16:30	SESSION 3.2 CHAIRMAN: MIGUEL QUEMADA	EFFICIENT RESOURCE MANAGEMENT: SOILS, WATER, NUTRIENTS, AND ENERGY
14:00 -14:15	ERIC BÖNECKE	PRECISION LIME MANAGEMENT: A SENSOR-BASED SOIL MAPPING APPROACH
14:15 -14:30	BETTINA EICHLER-LÖBERMANN	(LITTLE) SHORT-TERM IMPACTS OF P FERTILIZER MANAGEMENT IN A LONG-TERM FIELD EXPERIMENT
14:30 -14:45	EVA HERRERO	FERTIGATION WITH SLURRY LIQUID FRACTION IS AGRONOMIC AND ENVIRONMENTALLY SUSTAINABLE
15:00 -15:15	JOSE LUIS PANCORBO DE OÑATE	HYPERSPECTRAL AND THERMAL IMAGERY TO ASSESS NITROGEN AND WATER STATUS IN WINTER WHEAT
15:15 -15:30	HELENA GOMEZ-MACPHERSON	POTENTIAL OF CONSERVATION TILLAGE COMBINED WITH REGULATED DEFICIT IRRIGATION FOR SAVING WATER
15:30 -15:45	MARÍA DOLORES RAYA-SERENO	GROUND LEVEL AND AERIAL SENSORS TO ASSESS WHEAT N STATUS AND TO ADJUST N FERTILIZATION
15:45 -16:00		COFFEE BREAK
16:00 -17:45	SESSION 3.3 CHAIRMAN: DAVIDE CAMARANO	INSTRUMENTS FOR RESOURCE MANAGEMENT: MODELS, MONITORING, AND DECISION-MAKING TOOLS

HOUR	AUTHOR	TITLE
16:00 -16:30	BRUNO BASSO	KEYNOTE: DIGITAL AGRONOMY TO DESIGN AND SCALE SUSTAINABLE AGRICULTURAL SYSTEMS
16:45 -17:00	DAVID DE LA FUENTE	SMART INTEGRATED DATA ANALYSIS FOR AGRICULTURE SUPPORT DECISION - MAKING AND MANAGEMENT – SENSING4FARMING
17:00 -17:15	MARTINA CORTI	A SOLUTION TO OVERCOME SATURATION OF VEGETATION INDICES FOR CROP BIOMASS ESTIMATION
17:15 -17:30	SÉBASTIEN DANDRIFOSSE	ASSESSMENT OF THE IMPACT ON WHEAT YIELD OF THE INTERACTION BETWEEN FERTILIZATION AND YELLOW RUST THROUGH MULTI-SENSOR MACHINE VISION

THURSDAY, SEPTEMBER 3

ROOM 1

SESSION 1.3:		
11:00 -13:30	CHAIRMAN: CLAS NENDEL	MODELLING CROP-ENVIRONMENT INTERACTIONS
11:00 -11:15	DUCHENE OLIVIER	MODELLING PHENOLOGICAL DEVELOPEMENT OF THINOPYRUM INTERMEDIUM REVEALS A PHOTOPERIODIC EFFECT, AFFECTING FLOWERING EARLINESS
11:15 -11:30	SÉBASTIAN MIRA	A SIMULATION STUDY FOR STRUCTURAL EQUATION MODELS SELECTION IN AGROECOLOGY
11:30 -11:45	DIMA SABBOURA	IMPACT OF PLANT PROTECTION STRATEGY AND SOIL TILLAGE ON THE CARBON FOOTPRINT OF WHEAT
11:45 -12:00	KERSEBAUM KURT CHRISTIAN	MODELLING IRRIGATION EFFECTS IN CROP ROTATIONS ACROSS BRANDENBURG UNDER CLIMATE CHANGE
12:00 -12:15	MARÍA LUISA GANDÍA TOLEDANO	WEED DENSITY AND WEED DIVERSITY INFLUENCED BY RAINFALL, DIFFERENT SOIL MANAGEMENT AND ROTATION SYSTEMS.
12:15 -12:30	CHRISTIAN JOFRE CEKALOVIC	ESTIMATING TRANSPIRATION IN GRAPEVINES UNDER TWO WATER REGIMES USING THE TWO-SOURCE ENERGY BALANCE MODEL
12:30 -12:45	DANIEL KINDRED	THE AGRONOME: ATTEMPTING TO UNDERSTAND GENETIC X ENVIRONMENT X MANAGEMENT EFFECTS ON CROP PERFORMANCE

HOUR	AUTHOR	TITLE
13:00 -14:00		LUNCH
14:00 -15:00		VIRTUAL FIELD TRIP
15:00 -15:45	ANTONIO DELGADO, ESA PRESIDENT 2018-2020. CLAAS NENDEL, ESA PRESIDENT 2020-2022.	CLOSING SESSION

HOUR	AUTHOR	TITLE
12:30 -12:45	MANUEL PÉREZ-RUIZ	AN AFFORDABLE SYSTEM FOR HIGH-THROUGHPUT PLANT PHENOTYPING FOR MAIZE
12:45 -13:00	MARTA RODRÍGUEZ FERNÁNDEZ	EVALUATION OF SPECTRAL VEGETATION INDEX OBTAINED THROUGH SATELLITE AND UAVS IMAGES FOR VINEYARD MANAGEMENT
13:00 -14:00		LUNCH
14:00 -14:45	WORKSHOP CHAIRMAN: MANUEL PÉREZ	TOWARDS EFFICIENT RESOURCE USE: SITE-SPECIFIC MANAGEMENT
14:00 -14:15	DIONISIO ANDUJAR	NEURAL-NETWORK-BASED CLASSIFIER FOR WEED IDENTIFICATION IN MAIZE FIELDS
14:15 -14:30	DOMENICO RONGA	PREDICTION OF THE BIOCHEMICAL METHANE POTENTIAL OF TRITICALE USING NEAR-INFRARED SPECTROSCOPY FOR DIGITAL AGRICULTURE PURPOSE
14:30 -14:45	JAIME NOLASCO RODRÍGUEZ	3D CROP MODELING FOR DETERMINATION OF WHEAT RUST SEVERITY AND ITS IMPACT ON CROP YIELD

THURSDAY, SEPTEMBER 3 ROOM 2

09:00 -11:00	WORKSHOP CHAIRMAN: SANTIAGO BONACHELA	SUSTAINABLE, INTENSIVE HORTICULTURE PRODUCTION SYSTEMS
09:00 -09:45	DAVID CONNOR	KEYNOTE: CANOPY DESIGN AND MANAGEMENT IN INTENSIVE FRUIT ORCHARDS
09:45 -10:00	MARISA GALLARDO PINO	MODELLING MACRONUTRIENT UPTAKE OF GREENHOUSE TOMATO WITH THE VEGSYST MODEL
10:00 -10:15	ORLY ENRIQUE APOLO APOLO	A DEEP LEARNING APPROACH TO THE AUTOMATED DETECTION IN-FIELD TOMATOES RIPENING USING A MOBILE PLATFORM
10:15 -10:30	MARÍA ROSA GRANADOS	USE OF A COOLING EVAPORATIVE SCREEN IN A SOIL-GROWN SWEET PEPPER CROP IN A MEDITERRANEAN GREENHOUSE
10:30 -10:45	MARÍA ROSA GRANADOS	INTEGRATION OF PASSIVE COOLING AND HEATING SYSTEMS FOR VEGETABLE PRODUCTION IN MEDITERRANEAN GREENHOUSE
10:45 -11:00		COFFEE BREAK
11:00 -13:00	WORKSHOP CHAIRMAN: MANUEL PÉREZ	TOWARDS EFFICIENT RESOURCE USE: SITE-SPECIFIC MANAGEMENT
11:00 -11:45	URS SCHMIDHALTER	KEYNOTE: PRECISION FARMING - CHALLENGES, ACHIEVEMENTS, AND NEEDS
11:45 -12:30	ABDUL M. MOUAZEN	KEYNOTE: POTENTIAL OF MULTI-SENSOR DATA-FUSION FOR SITE SPECIFIC SOIL AND CROP MANAGEMENT

THURSDAY, SEPTEMBER 3 ROOM 3

09:00 -10:30	SESSION 3.3/CHAIRMAN: URS SCHMIDHALTER	INSTRUMENTS FOR RESOURCE MANAGEMENT: MODELS, MONITORING, AND DECISION-MAKING TOOLS
09:00 -09:15	NEBOJŠA NIKOLIĆ	EX-ANTE ASSESSMENT OF HERBICIDE REDUCTION BY IMPLEMENTING EARLY PRECISION WEED CONTROL IN SPRING CROPS
09:15 -09:30	ALEXIS CARLIER	WHEAT NITROGEN AND SENESCENCE DYNAMICS IN FIELD ASSESSMENT THROUGH TWO PHENOTYPING APPROACHES LATE IN SEASON
09:30 -09:45	CHANDRASHEKHAR BIRADAR	DIGITAL AUGMENTATION FOR SUSTAINABLE INTENSIFICATION OF DRYLAND FARMING SYSTEMS
09:45 -10:00	ALVARO LOPEZ-BERNAL	CROPEBAL: A WINDOWS PROGRAM FOR CALCULATING THE INPUTS AND OUTPUTS OF ENERGY FROM CROP ROTATIONS
10:00 -10:15	FRANCISCO VILLALOBOS	A SIMPLE DECISION SUPPORT SYSTEM FOR FERTILIZER MANAGEMENT: FERTILICALC
10:15 -10:30	LUCIANO LUGLI	TOWARDS STATISTICAL PATTERN RECOGNITION GRAPH MORPHOMETRY APPLIED IN AGRICULTURAL ROBOTIC VINEYARD PRUNING

HOUR	AUTHOR	TITLE
10:30 -11:00	SESSION 3.4 CHAIRMAN: URS SCHMIDHALTER	NEW AVENUES FOR MANAGING BIOTIC AND ABIOTIC STRESSES
10:30 -10:45	MOREAU DELPHINE	WHICH NITROGEN FERTILIZATION TECHNIQUES AND CROP TRAITS PROMOTE WEED BIOLOGICAL REGULATION BY COMPETITION?
10:45 -11:00		COFFEE BREAK
11:00 -13:00	SESSION 3.2 CHAIRMAN: VINAY NANGIA	EFFICIENT RESOURCE MANAGEMENT: SOILS, WATER, NUTRIENTS, AND ENERGY
11:15 -11:30	LAURE HOSSARD	EFFECT OF PRECEDING CROP ON NITROGEN EFFICIENCY FOR SOFT WINTER WHEAT IN SAIS REGION, MOROCCO
11:30 -11:45	ALFONSO MORIANA	WHY AND WHY NOT MIDDAY STEM WATER POTENTIAL COULD BE A USEFULNESS DEFICIT IRRIGATION TOOL IN OLIVE TREES
11:45 -12:00	JAKOB SANTNER	A BORON RECYCLING FERTILIZER MADE FROM CELLULOSE INSULATION WASTE
12:00 -12:15	ROSE BOYKO	RESOURCE MANAGEMENT FOR NUTRITIONAL QUALITY AND SOIL ACIDITY IN GRAZED GRASSLAND
12:15 -12:30	ROGER SYLVESTER-BRADLEY	GRAIN ANALYSIS CAN PROVIDE A COMPREHENSIVE POST-MORTEM ON THE ADEQUACY OF A CROP'S NUTRITION
12:30 -12:45	MOHAMMED YAHBI	EFFECT OF NITROGEN RATE AND VARIETY ON YIELD, AND YIELD COMPONENTS IN MOROCCAN VARIETIES OF RAPESEED (BRASSICA NAPUS L)
12:45 -13:00	KELLY ULCUANGO	THE LEGACY OF DIFFERENT COVER CROPS ON MYCORRHIZATION AND PLANT NUTRITION

FGCC of olive trees was directly derived from summer imagery and inter-row FGCC (%CC) was calculated as the difference between 'real time' and summer FGCC (assumed as constant for mature plants in the absence of pruning or other canopy-reducing factors). A validation dataset (N=1600) was built from Deimos-2 satellite data (4x4m), assessed with an image processing package (Fiji Image-J) and based on a binary classification according to the structure of each pixel brightness histogram. Different machine learning (ML) methods taking into account all satellite bands were tested against standard vegetation indices (NDVI, EVI, BI). A higher robustness in predicting FGCC was achieved when using ML methods rather than vegetation indexes, especially for the case of PLS regression, Bayesian Ridge or Multiple Linear Regression Models (MLR). A model based on PLS was tested on Sentinel-2 data for more than 16.500 plots and evaluated with both the Deimos-2 validation dataset and field observations. The PLS model revealed a satisfactory potential to be used from crop field (10x10m) to landscape scale, with a temporal resolution of 5-10 days in cloud-free conditions. Pixel classification showed higher accuracy when distinguishing between higher CC densities (high from >60 to medium <50 %CC), than between lower ones (from low <20 to medium 20-50 %CC). We observed a negative response of potential %CC to field slope, which eventually suggests adjustments on policy targets established for steeper plots. An exploratory exercise was conducted, the annual cover management factor (C-factor) of the RUSLE equation was calibrated for three different levels of estimated %CC, and relative changes of annual soil loss were predicted. This exemplifies alternative uses for both policy making and landscape planning apart from the CC mapping for farm management. However, further measurements are needed as accuracy can be substantially improved mostly when shifting from discrete to continuous scales of prediction.

Keywords: Remote sensing, Monitoring tools, Farming systems

0140

CHANGES IN THE AVAILABLE PHOSPHORUS CONTENT OF THE AGRICULTURAL SOIL OF THE VOJVODINA PROVINCE, SERBIA

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The increasing phosphorus fertilizers use in agricultural production requires monitoring of the available phosphorus content in the soil. The AL available concentration of a soil is a key index that can be used to evaluate the P supply capacity of the soil and to estimate the optimal P fertilization rate. The aim of this paper was to examine the changes in the available phosphorus content in agricultural soil of Vojvodina Province, in the framework of soil quality monitoring. The examination included 1600 samples of agricultural soils from representative sites, properly distributed in a 4x4 km squares network. The available phosphorus content was determined by spectrophotometric method in AL extract (Egner and Riehm). The results of the research were compared with the results of the previous project in 1992, in order to detect the tendency of soil quality.

The results indicated that soil class with the optimal content (15-25 mg/100 g) covered the largest area (21.4%), while the smallest area (5.4%), included soil with a toxic content (< 100 mg/100 g). The area of soil with very high to harmful content (50-100 mg/100 g) amounted to 5.8%. Compared to results from 1992, the amount of available phosphorus increased in all types of soil by 4.67 mg/100 g, except in the humofluvisol. The area of poorly supplied and soils with phosphorus content over 50 mg/100g has been increased. Research indicated inadequate application of fertilizers compared to the previous period.

Keywords: available phosphorus, AL method, soil quality.

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0185

MODELLING WINTER WILD OAT IN THE SOUTH OF SPAIN, USING A NON PARAMETRIC REGRESSION

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Use of non-parametric regressions can improve our understanding of weed emergence patterns at the species-level, leading to improvements in weed management programs. Currently, parametric non-linear regressions are the predominant technique for modeling environmental indices, like thermal and hydrothermal time, to predict seedling emergence. However, this kind of regression has many statistical limitations. Our model used a Gaussian kernel distribution to describe the emergence of winter wild oat (*Avena sterilis* spp. *ludoviciana* (Durieu) Gillet & Magne), the most widely spread wild oat in Spain. The model was based on two different sites, Tomejil (37°24'08.4"N, 5°35'21.4"W) and Sevilla-ETSIA (37°21'07"N, 05°56'20"W), during two (2006/07 and 2007/08) and three (from 2005/06 to 2007/08) growing seasons, respectively. In both sites, 200 seeds of *A. sterilis* were sown each growing season under rain-fed conditions, simulating cereal field conditions. Each new sowing was placed next to the one made the previous year without disturbance. Seedling emergence was measured from each sowing during the two growing seasons. This, together with the accumulation of daily thermal or hydrothermal degrees starting at the first relevant rain, produced eight different growing conditions to train the model. Overall the mean emergence was 25.82% in the first-year sites and 11.25% in the second year. This model presented a high degree of accuracy describing the winter wild oat emergence at both sites. Weed emergence appeared to peak at approximately 200 hydrothermal degrees. Application of models like this that are based on growing conditions could optimize the timing of the control, resulting in reduced herbicide use, greater efficacy, and lower production costs.

Keywords: Hydrothermal model, *Avena sterilis* spp. *ludoviciana*, weed emergence model, kernel estimation.

0198

USING HAND-HELD X-RAY FLUORESCENCE SPECTROMETRY FOR QUICK ANALYSIS OF ORGANIC AMENDMENTS

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The determination of heavy metals in organic amendments, such as compost, manure, biofertilizer, and sludge, generally involves the digestion of samples with *aqua regia*, and the determination of those in the solution using various techniques. Hand-held X-ray fluorescence (pXRF) has many advantages in relation to traditional analytical techniques. However, pXRF determines the total elemental content and, until now, its use for the analysis of organic amendments has been limited. The objective of this work is the calibration of a pXRF instrument to determine the *aqua regia*-soluble elemental contents directly in solid samples of organic amendments. In this way, we will avoid the digestion step and the use of other more laborious and slower laboratory techniques. A training set of samples corresponding to the MARSEP-WEPAL (Wageningen evaluating programs for analytical laboratories) program was used for obtaining calibration functions that allow the prediction of the *aqua regia*-soluble contents from the pXRF readings of total contents. The calibration functions (obtained by multiple linear regression) allowed the quantitative determination of the *aqua regia*-soluble contents of Fe, K, P, S, Zn, Cu, Pb, Sr, Cr, and Mn, as well as the organic matter content and a semi-quantitative assessment of Al, Ca, V, Ba, Ni, and As contents. For each target element, additionally to their own pXRF readings, the readings of Si, Fe, Al, Ca, K, or S were used as correction factors and introduced in the multiple linear equations, indicating that the calibrations functions found are truly based on the chemical composition of the sample matrix. This study will allow a fast, cheap, and reliable field analysis of organic amendments and of other biomass-based materials. In this way, immediate analysis can be made in the field that would allow, for example, adapting the application to the characteristics of specific batches or discarding non-compliant batches. More complete information on this work can be obtained from López et al. (2019).