prime Meetings

GMAST2023 ABSTRACT BOOK

Global Meet on
Agricultural Science and Technology

May 25, 2023 | Webinar

PRIME MEETINGS

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FOREWORD

The Prime Meetings takes the pleasure to formally invite you to the Global Meet on Agriculture Science and Technology (GMAST2023) which will be held on May 25, 2023 as a Webinar.

GMAST2023, is an annual meeting organized with the intend of being a platform for researchers, engineers, academicians as well as industrial experts from all over the world to present their research results and development activities in Agriculture Science and Technology.

The meeting brings together World Class participants and young researchers looking for opportunities for exchanges that cross the traditional discipline boundaries and allows them to resolve multidisciplinary challenging problems that only a venue of this nature can offer. Through this event you will be able to share the state-of-the-art developments and cutting-edge technologies in the broad areas of Agriculture Science and Technology.

We would like to strongly encourage you to submit your abstracts and register to attend in order to share your achievements in the fields of Agriculture Science and Technology.

We cordially invite the scientific community to participate in what promises to be a memorable webinar in May 2023

Plenary

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Microarray Meta-analysis Focused on Differentially-expressed Genes Involved in Response to Diverse Biotic and Abiotic Stresses in Arabidopsis

Synan F. AbuQamar*, Khaled A. El-Tarabily
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Abstract
Plants are exposed to different environmental stresses which affect its growth and development. Here, we aimed on identifying common responses to environmental and hormonal stresses in *Arabidopsis. Transcriptomic datasets in Arabidopsis related to* biotic, abiotic and hormonal stress groups were analyzed. In response to *B. cinerea and abiotic, abiotic or hormonal treatments, nearly 24%, 1.4% and 14% of the genes* were induced, respectively. About 18%, 2.5% and 22% were repressed by *B. cinerea and* the abovementioned stress groups. Our analysis revealed that *B. cinerea and* biotic stresses or hormones specifically enhanced genes involved in electron transport or energy pathways. On the other hand, strongly repressed genes by *B. cinerea and* abiotic stresses were involved in receptor and transcription factor activities. The transcriptomic analysis indicates that plant responses to all examined stresses can be mediated by commonly regulated genes. These results suggest that the accumulation of signaling molecules plays major roles in the activation of downstream defense responses upon single/multiple stress(es). The T-DNA insertion lines of *pr1 showed* increased susceptibility to *B. cinerea,* but *rap2.4 mutant* showed enhanced resistance to the same pathogen. This study has provided a basis for breeding programs to increase tolerance and yield performance in crops.

Biography
Prof. Synan AbuQamar completed his Ph.D. from Purdue University/Department of Botany & Plant Pathology in 2007; did his postdoctoral in the same university. In 2008, he joined UAEU and currently he is a Full Professor there. Synan's current research interest is Plant Molecular Genetics. His research focuses on understanding the molecular and cellular factors that control plant defense response mechanisms against necrotrophic pathogens using the "model" plant *Arabidopsis thaliana as a host plant.* He co-authored >85 publications in peer-reviewed journals. Synan won the prestigious Khalifa Award for Education in 2020, and Khalifa International Award for Date Palm and Agricultural Technology 2023. He serves as an Editorial Board member for many prestigious journals, and a member in Scientific Boards of Plant Biotechnology Centers.

Keynote

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Green Vaccination: Future Applications for Plant Health and Food Security

Prashant Singh*
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Abstract
In the absence of genetic resistance in crops, food production heavily depends on use of chemical to control pathogens. Despite their effectiveness, chemicals-based plant defence have detrimental environmental consequences and creating risks to the wider environment. Modern synthetic chemicals usually have reduced environmental toxicity; however, they are expensive and only available to advanced agricultural production systems. Moreover, as with antibiotics, discovery of new chemical to control plant disease is difficult and extensive use of current agents may result in selection of pathogen strains tolerant to pesticides.

Plants have evolved a sophisticated immune system to resist pests and diseases. Apart from their innate immune system controlling pre-programmed defence reactions, plants can also increase the responsiveness of their immune system in response to selected environmental signals. This phenomenon is known as “defence priming”. Priming is one of the most economical and effective modes of resistance because it prevents wasteful metabolic consumption in plants. The fitness costs of priming are lower than those of constitutively activated defences, suggesting that priming functions as an ecological adaptation of the plant to respond faster to a hostile environment. Although defence priming rarely provides full protection, its broad-spectrum effectiveness, long-lasting durability and inherited to future generations make it attractive for integrated disease management. Plant defence priming and Transgenerational Immune Priming (TGIP) will be discussed in relation to wheat crop improvement and sustainability.

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Marine Compounds For A Sustainable Disease Management In Tomato

Hillary Righini[1*], Ornella Francioso[1], Antera Martel Quintana[2], Stefania Galletti[3], Silvia Cetrullo[4], Flavio Flamigni[4], Veronica Zuffi[1], Federica Bergonzoni[1], Roberta Roberti[1]

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Abstract
In agriculture, the use of natural alternative products in place of synthetic ones is encouraged by European rules for plant disease management. Cyanobacteria and seaweeds are a rich source of bioactive compounds such as polysaccharides and phycobiliproteins that can be exploited for their activity against fungal plant pathogens.
Our recent findings showed that tomato seed biopriming with water-soluble polysaccharides (WSPs) extracted from the brown seaweed *Ecklonia maxima* caused a long-lasting resistance of plant to Fusarium wilt under greenhouse conditions. Moreover, WSPs-seed priming caused an enhancement of flavonoid and phenols contents and chitinase and β-1,3-D-glucanase activities and expression of defence genes correlated to the induced resistance.
Phycobiliproteins (PBPs) from the cyanobacterium *Anabaena minutissima* applied as seed treatment on tomato promoted seedling emergence and growth and reduced root rot disease caused by *Rhizoctonia solani* under greenhouse conditions. Seed priming with PBPs increased the content of phenolic compounds as well as chitinase and β-1,3-D-glucanase in both hypocotyls and epicotyls of seedlings. Additionally, a deeper investigation by Micro FT-IR spectroscopic technique showed changes in functional groups in root exudates in *in vitro* experiments.

Keywords
algae; cyanobacteria; antifungal activity; Micro FT-IR.

Biography
I'm a Post-Doc at Department of Agricultural and Food Sciences (DISTAL), Alma Mater Studiorum, University of Bologna, Bologna, Italy. During my studies, I gained the proper knowledge about plant protection and came out with an interest in alternative solutions to synthetic products for plant protection against fungal plant pathogens. My research is focused on the use of aqueous extract from algae and cyanobacteria against fungal plant pathogens. At the moment, I'm wprkin on water-soluble polysaccharides and phycobiliproteins from algae

and cyanobacteria applied as seed treatment for their plant biostimulant activity and their protective role in triggering plant defense responses. During my Master's thesis, I started research on extracts from algae and cyanobacteria as new plant bio-protectants and deepened my knowledge during the Ph.D. at the Banco Español de Algas (Spain) where I spent one year and with which we are still collaborating.

Invited

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Seasonal Climate Forecast-An Important Tool in Managing the Risk of Extreme Climate Events in Australian Wheat Industry

Qunying Luo*, Dale Schilling

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Abstract
Heat stress, frost risk and terminal drought at reproductive stages are limiting factors of crop production worldwide. Their impact on crop production can be managed through contingent decision-making around sowing time with the aid of seasonal climate forecast (SCF) information and decision-making tools. This study aims to investigate the benefits of state-of-the-art SCF tool in Australian wheat industry. Six locations in eastern Australia, three cultivars with varying maturities, and 17 times of sowings (TOS) were considered. The hindcast data from the Australian Community Climate and Earth-System Simulator (ACCESS)-S2 initialized on the 1st May with three ensembles and nine hindcast dates for the period 1981-2018 were linked with the Agricultural Production System sIMulator (APSIM)-Wheat model (v7.10) to (1) characterize the occurrence of the three aforementioned extreme climate events at wheat flowering and grain filling stages, (2) identify optimal management strategies (the optimal combination of TOS and cultivar maturities in terms of the highest wheat yield) in mitigating the impact of extreme weather events, (3) quantify the benefit of using ACCESS-S2 at the key decision-making point of sowing against baseline management situation (without the use of SCF). Research results showed that (1) there is 70% of cases (24 years and six locations) which had benefit in using SCF information, (2) the benefit ranged up to 1959 kg/ha with an average of 262 kg/ha, (3) benefits to using SCF were seen across both wet years and dry years (69% and 71% respectively). Generally speaking, there is a demonstrated benefit in applying ACCESS-S2 in the Australian wheat industry through improved farm management decision-making. The benefit is substantial and can occur in both wet years and dry years.

Keywords
seasonal climate forecast; wheat yield; time of sowing; cultivar maturities.

Biography
Dr Qunying Luo has a PhD in Agroclimatology. She has a background in climate impact and adaptation research in economically important cropping industries such as wheat, cotton, and rice. She secured a series of national competitive research projects from various funding sources such as Australian Research Council, Australian Cotton Research and Development Corporation, and Australian Grains Research and Development Corporation. She authored 48 research papers in prestigious international journals such as *Global C hange Biology* as a lead author in 63% of her publications. Dr Luo has a high level of skills and capacity in agricultural production system modelling (crop model validation, calibration, modification and application);

use and application of general circulation model (GCM)-based climate information at seasonal and multi-decadal lead times and statistical-based seasonal climate forecast information in agricultural risk analysis and management; the coupling techniques between climate models and crop models (e.g. spatial and temporal downscaling, bias correction and construction of robust climate scenarios); spatial and statistical modelling/analysis; programming; and use of a range of computing software. She is applying her expertise to crop insurance through developing blockchain-based parametric insurance products including weather-based single peril and crop yield-based multiperil crop insurance products to protect global farmers against extreme weather events at Hillridge Technology Pty Ltd.

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Effect Of Planting Patterns And Pre-Em Herbicides On Critical Time For Weed Removal In Corn

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Abstract

Corn is one of the leading crops in Serbia, grown on more than 1 million ha. One of the most important goals in corn production is to protect yield, however, this is not always easy due to many factors. Yield losses in corn can be highly impacted by competition from weeds to as much as 90%. Determining the critical time of weed removal (CTWR) could be a very helpful tool in integrated weed management tool-box. By definition, the CTWR is a period in the crop growth cycle during which weeds must be controlled to prevent yield losses. The field experiments were conducted during 2015-2017 year in the Southern Banat area (north eastern Serbia) where evaluated the effects of two planting pattern (standard and twin-row) with and without pre-em applied herbicides on CTWR in corn. Experiments were laid out in a split-split-plot arrangement with two main plots: (i) standard rows planting (SRP, 80 000 plants/ha) 70 cm wide and (ii) twin row planting (TRP, 93 900 plants/ha) 50 cm distance between each set of double rows. Each main plot was divided into two sub-plots, therefore with and without pre-em herbicides. The sub-sub plots consisted of seven weed removal timing for pre-em herbicides tank-mixes were utilized [S-metolachlor (1.44 kg a.i./ha) + terbutylazine (0.75 kg a.i./ha)]. The final corn harvest was conducted soon after physiological maturity by hand-harvesting the middle two rows (third and fourth rows), each of 6 m long in every plot, shelled and seed moisture adjusted to 14% moisture. All statistical analyses were performed in R program utilizing the "drc" statistical add on package. The CTWR without pre-em herbicides were similar in both the SRP and TRP systems, it was around the BBCH 11 to 12 [16 to 19 days after emergence (DAE)] growth stage. The use of pre-applied herbicides delayed CTWR in SRS BBCH 14 to 20 (25 to 58 DAE) stage and up to the BBCH 21 (60 DAE) stage in TRS. These results are clearly indicating that pre-em herbicides are important for protecting corn yield regardless of the planting pattern.

Utilizing the concept of CTWR is one of the keys for proactive measures in the sustainable concept of integrated weed control in corn. Knowing when to initiate weed control can save time and expenses. The results of this study also re-enforced the benefit of pre-em herbicides for controlling early emerging weeds, which are the most competitive against the crop. Furthermore, pre-em herbicides could also delay the need for post-em application of foliar herbicides or the use non-chemical weed control. In those fields where weed resistance exist, pre-em herbicides containing multiple (or alternative) modes of action can aid in managing herbicide resistant weeds.

Keywords
corn, CTWR, planting pattern, crop density, grain yield, pre-em herbicides.
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Research interests & achievements
Sava Vrbničanin has more than 30 years of experience in weed science, with more than 190 scientific papers, several books and chapters in monographs. Her research focus on weed flora and vegetation and alien invasive weeds, crop-weed interactions and population dynamics of weeds, weeds resistant and crop tolerance to herbicides, critical time for weed control, physical and chemical weed control, integrated weed management, etc. She has supervised 11 PhD theses which related to invasive weeds, plant interactions, physical weed control, crop rotation and soil seed bank, critical time for weed control, weed resistance to herbicides etc. She was a leader of several national and three bilateral projects which are related to alien invasive and resistance weeds to herbicides; as well as a leader of WPs or participant in several international projects (EU FP7 REGPOT, COST-Action, TEMPUS, ERASMUS+). She is the editor-in-chief of the journal Acta herbologica, publisher Weed Science Society of Serbia.
Professional memberships: European Weed Science Society, International Weed Science Society, Weed Science Society of Serbia, and Plant Protection Society of Serbia.

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Non-Thermal Plasma Technology For Sustainable Agriculture

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Abstract
Lecture is devoted to review the research carried out by Lublin University of Technology Poland with Kumamoto University, Japan for 20 years now on agricultural applications of non-thermal plasma technology, especially for soil fumigation and plant treatment. Non-thermal plasma technologies, which are generated by electrical discharges in air and oxygen, have been used in environmental protection processes for almost 100 years. The first applications concerned the treatment of drinking water. Currently, the technologies of water and wastewater treatment are very advanced and used on an industrial scale around the world. This has significantly reduced the use of chemicals such as chlorine, fluorine and other chemical oxidants that have a negative impact on the natural environment. Since the beginning of this century, a dynamic development of agricultural and biomedical applications of non-thermal plasma technology has been observed.
Sustainable agriculture requires new non-chemical methods of soil treatment, support plants growths, and prevent their diseases caused by bacteria, viruses and fungi and other pests.
Lecture reviews selected results of common research of both partners labs in the area of non-thermal plasma technologies for sustainable agriculture.

Keywords
Agriculture engineering; No-thermal plasma technology; Sustainable development; Non-chemical agriculture

Biography
Henryka Danuta Stryczewska, PhD DSc Eng. full professor at Lublin University of Technology, Lublin, Poland; senior member of IEEE; member of the Presidium of the Electrotechnical Committee of Polish Academy of Science KE PAN - Head of the Section of Electrotechnical Materials and Technologies; major research area includes supply systems for ozone generators and non-thermal plasma reactors, in particular with gliding arc discharge, electromagnetic processes and devices used in environmental protection technologies, application of non-thermal plasma in biotechnologies and agriculture; solar energy in the power systems of plasma reactors. She is the editor, author and co- author of 14 books, book chapters and academic scripts, 90 journal paper and 130 conference papers, 9 patents, she was a coordinator and contractor in 12 research projects – 5 national and 7 international.

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Effect Long-Term Management System on Soil Weed Seed Bank

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Abstract
Long-term monoculture has a de-stroying impact on plant production, while crop rotation is known as a more eco-friendly approach as provides diversification in crop management systems, modifies intensive pressure on the agricultural ecosystem, utilizes various soil horizons, and prevents the establishment of specific pests and weeds. The aim of his research was to answer: How management system over 50 years of specific continuous crop management programs (crop rotation and fertilization) effect on weed populations? This study was conducted in the experimental site of the Institute of Field and Vegetable Crops of "Plodoredi", Rimski Šančevi, Novi Sad, Serbia. It has been estimated three monocultures of maize, wheat and soybean, 2-year crop rotation (winter wheat-maize) with and without chemical fertilizer and 3–year crop rotation (winter wheat-soybean-maize) with and without chemical fertilizer and manure. Soil samples were taken six times from 2014 to 2017 prior to sowing and after harvesting each year. Weed seeds were extracted from soils and identified and counted by species. Mixed model analysis was used to determine the effect of the crop sequence and fertilizers on weed seed bank. To compare the strength of the treatment, it calculated the log-worth with their P-values. Upon the data of a long term experiment of crop rotation, could approve that crop rotations with more crops in the sequence are significantly effective in maintaining weed population. Therefore, will be a more sustainable crop production, chemical fertilizers would imbalance the plant population diversity and manures with high number of weed seeds have potentials to totally vanish crop rotation effects. Mixed model analysis suggests that on over 50 years of the management practices crop sequence × fertilizer interaction had the highest effect (log-worth = 64.7), followed by the triple interactions between crop sequence × fertilizer × soil depth (log-worth = 30.5). The number of seeds in soil significantly decreased from surface layer to deep soil. The crop sequence efficiency in decreasing weed seed bank was highly dependent on the fertilizer management, as with chemical fertilizer, the three years crop rotations had significantly lower seed bank, while with manure, the effect of crop rotations was eliminated.
Keywords: crop rotations; fertilizer; soil weed seed bank; weed population

Biography
Dr. Markola Saulić Academy of Applied Technical Studies Belgrade, College of Applied Engineering Sciences, Požarevac, Serbia.
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Research interests & achievements:
Markola Saulić worked several years in the "Golden Garden" company, Serbia on the position

of deputy manager in the agricultural sector and she was team leader for the implementation ISO 9001, Global GAP and HACCP. Also, she has experience in corn selection in the Al Dahra Company. She was participant in project EU FP7 REGPOT.
Professional memberships: European Weed Science Society, Weed Science Society of Serbia, and Plant Protection Society of Serbia.

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Soil Moisture Annual Variations Under Different Ground Covers After Deep Dried Soil Layers Formed In Semi-Arid Region

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Abstract
The artificial vegetation construction has caused large-scale deep soil drying in the Loess Plateau of China. To solve the problems of rebuilding plants and soil moisture restoration under deep soil drying conditions, large field soil columns were applied to simulate dried soil layers in the range of 0-1000 cm and monitor soil moisture dynamic changes by planting different local species and covering different materials. After five years continuous observations, we found that replanting plants survival mainly relied on local precipitation which can make the renewal plants grow normally under serious soil drying condition. Based on the different water consumption ability of renewal plants, the original dried soil moisture showed a new balance: soil layers under deep-rooted perennials plants such as black Locust, Alfalfa, Caragana were much more drying and aggravated soil desiccation. The soil layers under the plants with less water consumption (like shallow-rooted plants, Buegrass) was lighten. The columns surface with physical mulching treatments and bareland had strong soil moisture remediation effects with dried soil layers remediation speed of 128 cm / year for white film, 120 cm / year for cloth; 60 cm / year for twigs; 56 cm / year for gravels and 48 cm / year for bareland (control). This research can provide technical references for local soil moisture remediation selection and the sustainable development for local soil water management.

Keywords
soil moisture, artificial vegetation, dried soil layer, Loess hilly area.

Biography
In 2015, I got my Ph.D. degree at Northwest A&F university, majoring in Agricultural water and soil Engineering. Then I started my Post doctoral research from 2015 to 2018 at Chinese Academy of Sciences and studied on dry cultivation techniques by determining the distribution of root, soil water consumption and soil nutrients in semi-arid mountain areas. And focused on agricultural water highly efficient use by monitoring soil water consumption, deep dried soil layers, plant growth and soil water dynamic for different aged plantations. The relationship between soil moisture and root distribution, pruning intension and Transpiration water consumption was also analysed to improve water use efficiency in the Loess Plateau. Since 2019, I have been working for Ningxia University at school of Agriculture as an associate professor to continue my research on local vegetations adaptation under drought conditions and the selection and evaluation of suitable tree species in dry areas of Northwest China.

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Distribution Characteristics Of Soil Moisture, Root System In Belted Caragana Korshinskii Forest In Loess Hilly Region

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Abstract
In order to explore the deep water status and root distribution of artificial rainfed planting Caragana korshinskii forest in southern Ningxia, the 20 years rain-fed strip planting C. korshinskii forest as the research object, selecting similar farmland for control, analyzing 0~1000 cm depth of soil moisture soil moisture, vertical distribution of root and correlation. Soil moisture and root systems were investigated in the center of C. korshinskii and farmland. Soil moisture content was determined by soil drying method, the root system was investigated by root-drill sampling method. The results showed that: (1) Deep soil desiccation was determined in 0~1000 cm soil layers for 20 years C. korshinskii forest. Soil water content for intra-zone and inter-zone of C. korshinskii forest was lower than farmland; Compared with inter-zone soil water, Intra-zone soil moiture content reduced to 1.46% in 0~1000 cm soil layer. (2) In the range of 300~1000 cm soil layer, 20 years artificial C. korshinskii appeared different water deficiency states and soil desiccation. Soil moisture availability for intra-band and inter-band were 0.21 and 0.02 and soil water supply coefficient were 0.49 and 0.33. (3) C. korshinskii roots mainly distributed in 0~80 cm soil layer, accounted for 46.33% and 45.56% of the total roots weight for intra-band and inter-band dried roots, respectively. The root surface area density accounted for 66.58% (intra-zone) and 63.51% (inter-zone) of the total root surface area density and root length density accounted for 59.54% (intra-zone) and 58.45% (inter-zone) of the total root length density. This study has positive significance for in-depth understanding of root system, water content and sustainable management of artificial vegetations in semi-arid Loess area.

Keywords
Caragana korshinskii forest; soil moisture availability; soil drying degree; root distribution

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Study on Spatial and Temporal Distribution Characteristics of Soil Moisture in Artificial Caragana Korshinskii Forest In Loess Hilly Region of Southern Ningxia

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Abstract
In order to explore the variation in vertical distribution characteristics of soil moisture in Caragana korshinskii forests, and its response and balance characteristics to precipitation, this study aimed to provide data and theoretical support for the sustainable and high-quality development of artificial Caragana korshkinsii forests in the southern loess hilly region of Ningxia. The vertical distribution of soil moisture was analyzed in the 0-1760 cm soil layer of a 22-year-old Caragana korshinskii plantation, using field investigation, dynamic monitoring of positioning plots, and indoor analysis. The soil moisture in the 0-500 cm soil layer was dynamically monitored for six months (from May to October) and analyzed in combination with precipitation. The study concluded that: (1) The 0-1760 cm soil layer of artificial Caragana korshinskii forest was in a dry state due to its annual water consumption being 44.58 mm more than that of dry farmland; (2) Deep infiltration recharge rainfall (24-hour precipitation greater than 28.2 mm) under natural conditions is the key to realizing the water recovery of the deep soil dry layer in the loess hilly region, yet the cumulative infiltration depth of precipitation during the observation period failed to reach 500 cm; (3) June to August is the main recovery period for soil moisture. During the observation period, the soil water compensation degree was negative, and the average ET/P (evapotranspiration to rainfall ratio) was 1.17. As a result, the soil water storage was finally reduced by 108.52 mm, the soil moisture exhibited a ‘negative balance’ state, and the drying phenomenon occurred.

Keywords
Loess Hilly Area; Artificial Caragana Forest; Soil Dry Layer; Soil Moisture.

Biography
Yuankang Gao, male, from Urumqi, Xinjiang, graduated from Shihezi University with a bachelor’s degree and is studying for a master’s degree in Ningxia University, mainly engaged in research on soil and water conservation and desertification control.

Global Meet on
Agricultural Science and Technology
May 25, 2023 | Webinar
GMAST2023

Agriculture and Food Security Stable Isotope Analysis Solutions from Elementar: EnvirovisION and BiovisION

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Abstract

Stable isotope ratio analysis (SIRA) can be deployed as a powerful tool in a broad range of agricultural analyses, including geographical provenance of produce, detection of adulteration of food products, and interrogation of nutrient cycling in soils and crops.

Stable isotopes of dissolved nitrate and nitrite (δ15N, δ18O and δ17O) have proven to been useful in distinguishing between diverse nitrogen sources and sinks, which contribute to furthering the understanding of local as well as global nutrient cycling processes, including interrogation and interpretation of the impact of major changes in agricultural land use and urbanization on the global nitrogen cycle. Despite the demonstrated usefulness of dissolved nitrate and nitrate stable isotope analysis however, there has hitherto existed a significant barrier for uptake of the methodology, largely due to the caveats associated with sample preparation, rather than the analysis itself: the favored contemporary methods (bacterial denitrifier and Cd-azide reaction) involve laborious multi-step and/or challenging chemical or biological preparation methods: maintenance of anaerobic bacterial cultures, or use of highly toxic chemicals, has limited the analysis to highly specialized laboratories. We present results using the new Ti (III) reduction method (Altabet et al., 2019) for a one-step conversion of dissolved nitrate into gaseous N2O for stable isotope analysis using the Elementar EnvirovisION stable isotope analyser,, a more simple and straightforward preparation and analysis method, aiming to enable the possibility for a broader range of analytical laboratories to undertake the isotope analysis of dissolved nitrate.

Similarly, the stable isotope analysis of food produce has been utilised as a powerful tool for geographical provenance (e.g. Camin et al., 2017), adulteration detection (e.g. Dordevic et al., 2013), and even farming practices (e.g. organic vs non-organic, grass-fed vs corn-fed, etc., e.g. O'Sullivan et al., 2021). However stable isotope mass spectrometry has traditionally been considered an academic endeavour undertaken in specialized laboratories. We present here the BiovisION, a stable isotope analyzer package for the bulk analysis of agricultural and food product materials, offering many automation features designed to reduce the operator burden and enable less specialised labs access to stable isotope analysis. The user friendly and high capacity design of the instrumentation minimizes the sample preparation and maintenance times, further reducing the cost of ownership and labour time usually associated with stable isotope analysis. Moreover, ArDB software provides a software platform for managing databases of analyses, a critical component in the application of food provenance.

Lastly, we also present the range of elemental analysers offered by Elementar for high-throughput, low maintenance analysis, particularly the Rapid N exceed and Rapid N max Dumas combustion-based nitrogen protein analysers for fast nitrogen analysis, and the range of CHNS organic elemental analysers for flexible and large sample analysis.

Keywords
Nitrogen, Isotopes, SIRMS, Authenticity

References
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Biography
Kyle Taylor is the Elementar Americas business development manager for the stable isotope ratio mass spectrometry product line. He gained his Ph.D from the University of Bristol in 2012 in organic geochemisty, and undertook a postdoctoral research position in the same group before joining Elementar UK Ltd in 2013 as technical sales specialist. He recently moved to Toronto, Canada to take up his current position with Elementar Americas, Inc.

Elementar is the world leader in high-performance analysis of organic and inorganic elements. We incorporate more than 120 years of experience in the development and manufacturing of high-class analytical instrumentation. Today, our product portfolio includes instruments for CHNOS elemental analysis, stable isotope analysis (IRMS), TOC analysis, protein analysis according to Dumas, and optical emission spectrometry (OES).

Continuous innovation, creative solutions and comprehensive support form the foundation of the Elementar brand, ensuring our products continue to advance science across agriculture, chemical, environmental, energy, materials, and forensics markets in more than 80 countries.