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11<sup>th</sup> World Congress on

# PLANT BIOTECHNOLOGY AND AGRICULTURE

March 05-07, 2018 | Paris, France

## Posters

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# PLANT BIOTECHNOLOGY AND AGRICULTURE

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## Impact of treated waste water on the biochemical quality of medicinal plant parsley *Petroselinum crispum* in the region of Annaba (East-Algerian)

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The reusability of treated wastewater in agriculture is a very common practice worldwide. Such action in this particular vegetable agriculture is not trivial. Indeed, the treated water can carry pollutants that cause chemical and biological contamination which the cultures, soil and consumers revelations. A test on parsley *Petroselinum crispum* was led in order to check the effects of worn water on some physiological and biochemical parameters. Two treatments were chosen, irrigation by worn water, compared to a check. A physicochemical analysis of the following parameters: pH, electrical conductivity, DBO5, DCO, nitrate, nitrite, and orthophosphate were conducted. The tests concerned the chlorophyll content, soluble sugar and proline. As far as the obtained results are concerned, the total chlorophyll content has been superior in the treated plants. This shows the ability of plants to react favorably under worn water irrigation. The soluble sugars were often taken as reference's tolerance to abiotic stress, were accumulated more than at leaves and roots level of the treated plants. The content of proline at the leaves and roots of the treated varieties were superior to check, leading to the probable explanation that there is an ability of the cultivars to sustain abiotic conditions. Even though the results that have been obtained are somewhat positive in the expression of the varieties, awareness has to be considered. Numerous studies and experiments have permitted these last decades, to establish standards more and more precise when it comes to deal with worn water in agriculture purpose.

### Biography

Fatiha Bekouche is currently a Professor in Plant Biology (Eco-Toxicology) at Badji Mokhtar Annaba University. Her scientific interest is in the area of physicochemical and microbiological analysis of treated wastewater and its impact on physiology and biochemistry and plants.

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# PLANT BIOTECHNOLOGY AND AGRICULTURE

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## Potential of peptone broth to inhibit *Striga hermonthica* germination in pot experiments

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*Sorghum bicolor* (L.) Moench, Poaceae is an important food crop in Africa, South Asia and Central America. It is the fifth major cereal crop in the world. Sudan produces 2.6 million tons. *Striga* sp. placed in the Orobanchaceae, are endemic obligate root parasitic weeds on the staple food of the poor in sub-Saharan Africa. The grain area in Africa, actually, infested by *Striga*, is estimated to be about 21 million hectares. In order to determine the ability of peptone broth to inhibit seeds germination of the parasitic weed *Striga hermonthica* in pot experiment. The first experiment performed to examine the suitability of peptone broth for irrigation of the planted sorghum grains, the second one performed to examine effect of peptone broth irrigation of *Striga* seed germination. In the bioassay of *Striga* seeds, the control treatment, which use water show *Striga* seed germination of 100%. Peptone which added to *Striga* caused 0% *Striga* seed germination compared with the result obtained with the control. Such flourishing of sorghum plant irrigated with peptone broth compared with the control that irrigated by water might be attributed to the chemical elements existing in the peptone broth. Opposite of this was the length of the root system where it was longer in water irrigated plants compare to which irrigated by peptone broth. Sterilization of the soil used for planting sorghum grain was a key factor for the success for the experiment. The inhibitory effect on *Striga* seed germination is coming from peptone broth media.

### Biography

Faris Albakri Ibrahim is trained in microbiology and molecular biology and is a Field Agent for plant collection, preservation and molecular analysis, with a strong background of quality control analysis. He is currently pursuing his MSc degree from the University of Khartoum, which involves the viroid detection in cultivated crops and vegetables in Sudan.

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# PLANT BIOTECHNOLOGY AND AGRICULTURE

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## Loss of function of SPFF, a novel receptor-like kinase, induces parthenocarpy in tomato

Hitomi Takei<sup>1</sup>, Yoshihito Shinozaki<sup>1</sup>, Ryoichi Yano<sup>1</sup>, Hiroshi Ezura<sup>1</sup>, Tohru Ariizumi<sup>1</sup>, Michel Hernould<sup>2</sup> and Christian Chevalier<sup>2</sup><sup>1</sup>University of Tsukuba, Japan<sup>2</sup>INRA, France

We are facing to the global warming. Fruit yield is decreased under high temperature because of a failure in pollination. To improve fruit yield under harsh environmental conditions, it is needed to understand the mechanism of fruit set. However, its genetic and molecular factors remain poorly understood. Analyzing the mechanism of parthenocarpy, fruit set without pollination, will help to identify the key regulators that control fruit set. A mutant named small parthenocarpic fruit and flower (SPFF) was obtained by  $\gamma$ -ray irradiation of Micro-Tom seeds. In this study, we aimed to identify and characterize the responsible gene for parthenocarpy in SPFF mutant. First, we characterized the visible phenotypes, size of cells and ploidy levels. The characterization of SPFF mutant was male sterility, floral organs dwarfism and parthenocarpic fruits with high ploidy levels. Second, in order to identify the responsible gene for these phenotypes, positional cloning by fine mapping and RNAi strategy were performed. They allowed us to identify that a loss of function of a gene coding a receptor like kinase (SPFF) triggers parthenocarpy. Third, to analyze the function and characterization of SPFF gene, RNA sequence and in situ hybridization were performed. SPFF expressed higher at receptacle than the other organs including reproductive organs in developing buds. The expression level of cell cycle genes (CDKB) and the gene maintaining stem cell (WUSCHEL) were affected at developing ovule. According to these results, our research brought a new point of view of the mechanism of fruit set, that they are supposed to be regulated by a receptor like kinase named SPFF. Furthermore, we also brought an idea that a responsible gene for parthenocarpy was expressed in receptacle and supposed to be in vascular bundle although the function of receptacle and vascular bundle during fruit set in tomato had not been noticed so far.

### Biography

Hitomi Takei has received Bachelor's degree of Bio-resource Science from the University of Tsukuba in 2016. Currently she is pursuing International Double degree Master's Program co-organized by the University of Tsukuba in Japan and University of Bordeaux in France. She has her passion in working toward a solution of food security problems in African countries and other developing regions of the world by improving yields of vegetables and crops.

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# PLANT BIOTECHNOLOGY AND AGRICULTURE

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## Assessment of candidate DNA Barcoding loci for phylogenetic relationships among *Triticum* species

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**Statement of the Problem:** DNA Barcoding is widely used for identification of species based on standard DNA regions. The Consortium for the Barcode of Life (CBOL) plant-working group recommended different nuclear and chloroplast loci as the standard plant barcode. Though many loci have been proposed as a DNA barcodes in plants, standardizing regions as a DNA barcode poses a challenge in many plant families. The evolutions of the chloroplast regions combine with nuclear genes are sufficiently rapid to allow discrimination between closely related species.

**Material & Methods:** In this study, we tested the phylogenetic utility of the DNA barcoding loci (ITS2, matK, psbA-trnH, rbcL and trnT) for efficient discrimination of *Triticum* species. For the assessment of the barcoding efficiency to resolve the species discrimination, a total of 113 accessions representing 18 species/sub-species within *Triticum* genus have been sampled. Consensus sequences of each region were manually edited with MEGA6 and the sequences were aligned and assessed for candidate DNA Barcode for phylogenetic relationships among *Triticum* species.

**Findings:** Topologies of the phylogenetic trees based on combination of DNA barcode analyses were similar but a few *Triticum* species were placed into distant phylogenetic groups. The 113 accessions analyzed in this study were placed into three groups supported by high bootstrap values. However, the barcoding analyses were not able to discriminate some closely related *Triticum* species.

**Conclusion & Significance:** We have proposed concatenated data approach to increase resolving power of candidate barcoding loci as an additional tool for phylogenetic analysis in *Triticum* species. However, molecular studies with more diverse markers and species will be required to clarify the ambiguities surrounding the phylogeny of these important genera.

### Biography

Lee Gi-An has his expertise in evaluation and characterization of plant genetic resources. He has worked in National Agro-Biodiversity Center (NAC, RDA, Republic of Korea) for more 12 years as a Researcher.

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# PLANT BIOTECHNOLOGY AND AGRICULTURE

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## Genetic diversity and population structure of potato (*Solanum tuberosum* L.) collection in Republic of Korea

Kyung-Ho Ma<sup>1</sup>, Kwang-Soo Cho<sup>2</sup>, Myoung-Jae Shin<sup>1</sup>, Gi-An Lee<sup>1</sup> and Kyung Jun Lee<sup>1</sup><sup>1</sup>National Agro-Biodiversity Center, Republic of Korea<sup>2</sup>Highland Agricultural Research Institute, Republic of Korea

**Statement of the Problem:** Potato (*Solanum tuberosum* L.) is an important staple food and economic crop around the world. The identification of potato is based on the morphological characteristics, such as tuber shape, leaf type, flower color, sprout appearance and so on. There are morphological similarities within the conserved potato collection, so the evaluation of genetic diversity and population structure among the diverse genetic resources could be useful for the potato improvement program.

**Material & Methods:** In this study, to understand the genetic diversity of conserved potato germplasm collected worldwide, we acquired leaf samples of 725 potato accessions from Highland Agricultural Research Institute, NICS, RDA, Republic of Korea. Using polymorphic 24 SSR markers, we analyzed the genetic diversity and population structure among the potato collection.

**Findings & Conclusion:** The tested 24 SSR loci revealed polymorphic alleles among the tested potato collection. A total of 273 alleles on 24 SSR loci were detected with an average of 11.4 alleles per SSR locus ranging from 4 to 23. The Simpson index, Nei's genetic diversity and Evenness were ranged from 0.16 to 0.83, from 0.16 to 0.83, and from 0.43 to 0.88, respectively. Model based population structure were tested using K values from 1 to 20, but there was no clear population structure, therefore Ln(PD) derived  $\Delta K$  was plotted against the K to determine the number of populations. Based on population structure analysis there were five or six sub-populations within the potato collection. The differentiated genetic lineages found in this study could be useful information for potato improvement and conservation programs.

### Biography

Kyung-Ho Ma is currently working as a Senior Scientist in National Agro-Biodiversity Center, Republic of Korea. He is now responsible for Deputy Director of Collection and Conservation in NAC. His main activity is managing the activity of conservation and distribution of plant genetic resources.

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## Integrated germplasm management system for sustainable use of the genetic resources

Lee Sun-Young, Young-Wang Na, Moon-Sup Yoon, Ho-Cheol Ko, Sok-Young Lee, Eun-Ae Yoo, Gi-An Lee, Young-ah Jeon, Jung-sook Sung and Seong-Han Sohn

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Genetic resources play an important role not only in the supply and demand of food, but also as a high-value-added material for biological industries such as in breeding new varieties and new drug development. National Agro-Biodiversity Center (NAC) under Rural Development Administration in South Korea currently preserves germplasm resources consists of 252,102 plant seeds, 23,387 microorganisms and 375 insects (Jan.2018). Since 2000, the 'Integrated germplasm management system (GMS)' which integrates information on plant, microbial, and insect germplasm, has been successfully implemented in the GeneBank to safely preserve and efficiently manage germplasm. Through the GMS, not only have the basic information's on scientific name, germplasm name, germplasm status, origin, collection place, date of collection, but also have additional information's such as physiological characteristics, morphological characteristics, functional components and disease resistance information which are provided to the user via website. In order to make it convenient for GeneBank staffs to handle germplasm, information's on the regeneration, input to the storage room for preservation, and output from the storage room for distribution, have been reflected in real time. In addition, for user's convenience, the GMS has been improved in the system, so that users can request for distribution of germplasm on-line conveniently. NAC distributed a total 18,308 accession for Research and Development in 2017. Recently, we have also developed a pc-GMS program that can be easily installed in laboratory computers. Moreover, the pc-GMS program was distributed to the Southeast Asian countries those who have rich source of genetic resources but have difficulties in GeneBank management. Additionally, this year, we are planning to upgrade the GMS to integrate plant viral germplasm.

### Biography

Lee Sun-Young has experience on evaluation and passion in improving the germplasm management system in RDA, Korea. Her research involves research and development for new DB construction program; the improvement of germplasm management system and constructing the plant genetic resources information system. She has also registered 6 programs under intellectual property rights.

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## Production of LAB bacteriocin in MRS medium and in a natural cereal medium with potential application in the food industry

Ariana Macieira, Claudia Maciel, Helena Albano, Alcina M M B Morais and Paula Teixeira  
Catholic University of Portugal, Portugal

**Introduction & Objective:** *Listeria monocytogenes* is a great concern in the food industry. Bacteriocins, produced by lactic acid bacteria (LAB) are of great importance to face this concern. The reason for that is because some bacteriocins have demonstrated antimicrobial activity against *Listeria monocytogenes* and do not alter the organoleptic characteristics of the products. Although MRS broth can fulfill fastidious growth requirements of most LAB, high costs for large-scale commercial applications and non-food grade constituents limit its use by the food industry. The objective of this study was to seek for a simple and food grade medium that could promote growth of an autochthonous strain of *Lactobacillus* and production of bacteriocin active against *Listeria monocytogenes*.

**Method:** From previous studies with different LAB, isolated from traditional meat products, an autochthonous *Lactobacillus* strain was selected since it demonstrated antimicrobial activity against *Listeria monocytogenes* and do not alter the organoleptic characteristics of the tested products. The LAB strain was grown in MRS broth and in the cereal based medium for 28 hours at 37 °C. Bacteriocins produced in those mediums were tested against five strains of *Listeria monocytogenes*.

**Results & Conclusion:** Bacteriocin activity and LAB growth were higher in MRS broth than in the cereal based medium. When LAB produced bacteriocins in MRS Broth, the maximum antimicrobial activity reached was about 12800 AU/ml. The bacteriocin produced in the natural medium was very low. The maximum antimicrobial activity was about 1600 AU/ml. So, although promising results were obtained, further investigation is still needed to improve the cereal based medium for bacteriocin production.

### Biography

Ariana Macieira is a researcher working in Paula Teixeira's group in Universidade Católica Portuguesa, in Porto, Portugal. She has been doing some work in the field of bacteriocins production by trying to find some techniques that will improve LAB bacteriocins with application in the food industry.

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## Content of exchangeable forms of heavy metals in agrable soils and common dandelion from urban allotment gardens of the cities of Kielce and Olsztyn (Poland)

Mgr Ewelina Zającka and Prof. dr hab. inż. Anna Świercz  
Jan Kochanowski University, Poland

**S**tatement of the Problem: Common dandelion *Taraxacum officinale* agg. is a well-known medicinal plant commonly used in unconventional medicine. Due to its valuable properties, it is obtained on a large scale from urban areas considered to be potentially clean, e.g. urban allotment gardens. Common dandelion is also a recognised bioindicator as it has the ability to accumulate in its tissues high levels of heavy metals and thus it is often used in environmental research. Therefore, it seems important to determine whether the concentration of heavy metals in the soil would translate into their content in common dandelion leaves, which are then used for consumption and treatment purposes. Moreover, the purpose of this research is to determine whether the heavy metal content in the dandelion leaves is dependent on the level of air pollution in cities. **Methodology & Theoretical Orientation:** The research was conducted on the basis of samples taken from two Polish cities with different degrees of pollution - Olsztyn, which is classified as a clean city of low air pollution with PM10, PM2.5, sulphur and nitrogen oxides, is a city with relatively small industrial infrastructure. The comparative city was Kielce, where the values of analysed indicators are significantly higher, and the city has a post-industrial character. The samples were collected from the area of urban allotment gardens, i.e. the areas recognised as potentially clean. In each city, 15 samples of common dandelion (leaves) and soil were taken for analysis. In the leaves and soil, the content of selected heavy metals, i.e. Cu, Cd, Pb and Zn was determined by inductively coupled plasma-optical emission spectrometry (ICP OES). **Findings:** The content of heavy metals in the soil is reflected by their level in the leaves. The conducted research indicated that there is a dependence for all the analysed heavy metals that higher concentrations of metals in soils determine their higher content in the dandelion leaves. There was no correlation that the quality of atmospheric air has a direct impact on the content of heavy metals in soils because for the samples taken from Olsztyn, which is considered as a clean city in terms of air quality, the average concentrations of copper and zinc were higher than those reported for Kielce. Analogical situation was noted for the concentrations of these metals in the dandelion leaves.

### Biography

Ewelina Zajecka - a doctoral student at the Jan Kochanowski University in Kielce. Authoress of numerous science articles on plant bio indicators, content of heavy metals in urban soils and bioavailable forms of heavy metals. Since 2016, she has been conducting the research on recognizing the properties of common dandelion as a bio indicator of pollution in urban areas.

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## Local and global implications of ecosystem restoration of degraded arid farmland

Stefan Leu<sup>1</sup>, Amir Mor-Mussery<sup>1</sup> and Michael Ben-Eli<sup>2</sup><sup>1</sup>Ben Gurion University of the Negev, Israel<sup>2</sup>The Sustainability Laboratory, USA

Stopping and reversing desertification and land degradation can contribute significantly to global food security and sustainable development while mitigating global warming. We have tested rehabilitation technologies aiming at maximizing environmental and economic benefits in four research plots along the arid-semi-arid interface (200 mm mean annual precipitation). The resulting insights were applied in 2012 to 15 hectares of heavily degraded farmland at Project Wadi Attir, an initiative to establish a model sustainable agricultural operation in the Northern Negev, Israel. The technologies applied included strict protection from grazing, erosion control by terracing and soil conservation and planting of about 3000 native and agroforestry trees (over 30 species), carefully selected for requested ecosystem services. All aspects of ecosystem rehabilitation including soil quality, biodiversity, biological productivity and carbon balance were monitored for five years. Soil organic matter increased by about 1% compared to untreated control plots. Key nutrient pools (NPK) showed gradual but significant increases in the conserved plots compared to the degraded control plots. Better water conservation by terraces, higher water infiltration and lower evaporation due to shade and litter accumulation lead to significantly increased soil moisture in the conserved plots. All three factors together contributed to 3-5-fold higher rainfed herbaceous biomass productivity in the restored areas compared to nearby control plots. Among the tree species planted, some showed annual rainfed timber production of over 10 kg per year and tree, adding to carbon sequestration and economic viability. Biodiversity recovery was facilitated by the protection of biodiversity hotspots resulting in rapid five-fold increase in the numbers of plant species and bird species. On a global scale such approaches would contribute to mitigation of global warming, climate resilience and protection of biodiversity in degraded agro-ecosystems, combat desertification and provide food, fodder and income to the inhabitants of marginal dryland areas worldwide.

### Biography

Stefan Leu is working as a Professor at Microalgal Biotechnology Laboratory, Jacob Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Sede-Boker Campus, Israel. His international experience includes various programs, contributions and participation in different countries for diverse fields of study. His research interests reflect in his wide range of publications in various national and international journals. He is the Editorial Board Member and serves as a Member of various associations, apart from being an author for many books.

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# PLANT BIOTECHNOLOGY AND AGRICULTURE

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## GC-MS method for determination of *Drosophila suzukii* pheromone's profile

Belenioti Maria and Chaniotakis Nikolaos  
University of Crete, Greece

*Drosophila suzukii*, (Matsumura), the fruit fly Spotted Wing Drosophila (SWD), is one of the most important polyphagous pest of many small fruits, specifically stone fruits, berries and grapes. Ovipositor of the female can cause physical damage to the host fruit upon insertion, rendering it soft and thus of no commercial value. *Drosophila suzukii* has already been recorded in America and Europe, causing significant economic damages. Nowadays, biological control methods play a crucial role in the control of insect pests with the ability to suppress pest population below economic thresholds rather than only providing a temporary control as chemical control does. The new techniques have been focused on semiochemicals, the organic compounds that transmit chemical signals. Insect pheromones are chemical messages produced and used by insects for communication. Isolated pheromones are presently used for surveying insect populations and in a number of cases as part of insect control programs. In order to study the *Drosophila suzukii* pheromone profile, pheromones were extracted from the fly cuticle. These extracts were analyzed on a gas chromatograph coupled with a mass spectrometer. Compounds were identified based on their mass spectrum, retention time and internal standard. The comparison of the CH profile of male and female showed only quantitative differences. Finally, some newly compounds were detected.

### Biography

Belenioti Maria is currently pursuing her PhD from the Department of Chemistry, University of Crete. She is a Scholar from State Scholarship Foundation. She has participated in several conferences and has implemented international program financed by the European Program Youth in Action.

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## Accepted Abstracts

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## Preliminary estimation of Arracacha's water requirement using lysimeter field data

Nesrine Chaali, Liliana Atencio, Jorge Villamil and Oscar Orjuela  
Colombian Corporation of Agricultural Research, Columbia

Arracacha (*Arracacia xanthorrhiza*) is not only a potential income-generating crops for medium and small farmers in Cajamarca, Tolima, Colombia with a total cultivated area of about 4000 ha, but also a high agro-alimentary and socioeconomic value in the region. Unfortunately, despite the importance of Arracacha there is not enough information available on Arracacha's water requirements and crop coefficients (Kc) in Colombia. Arracacha is a quite tolerant crop to the droughts, nevertheless, in cases of climatic adversity, the risk of loss of productivity is high. Therefore, the adequate administration of water and irrigation is fundamental to maintain high productivity. The aim of this research was to estimate the daily actual evapotranspiration (ETc) to present preliminary irrigation water requirement of Arracacha. Two volumetric lysimeters of 1 m<sup>3</sup> capacity were installed to establish the crop water consumption according to water balance. A common procedure for estimating ETc from a well-watered crop is to first estimate reference evapotranspiration (ET<sub>0</sub>) based on evaporation pan. The average weekly ETc varied from <1 mm.day<sup>-1</sup> to 5.73 mm.day<sup>-1</sup> for lysimeter 1, in the early growing period (week 1 to 37) and from <1 mm.day<sup>-1</sup> to 5.66 mm.day<sup>-1</sup> for lysimeter 2. The peaks ETc were 7.2 mm.day<sup>-1</sup> and 9.7 mm.day<sup>-1</sup> for lysimeter 1 and 2, respectively, both occurred in week 39 of the growing stage. The highest demand was due to the formation and filling of the turnip. The results indicated that future research shall address to more precise information about Kc and ETc using meteorological station data associated with the experiment. The generated ETc and Kc data will be used as input for FAO-AquaCrop model to estimate crop water requirements and crop yield. AquaCrop will be then calibrated for Arracacha crop parameters.

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## Molecular profiles of diploid and triploid cytotypes of *Acorus calamus* Linn

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*Acorus calamus* (Family: Acoraceae) commonly known as sweet flag is a plant widely used in Indian System of Traditional Medicine since times immemorial. Four cytotypes, viz., diploid ( $2n=2x=24$ ), triploid ( $2n=3x=36$ ), tetraploid ( $2n=4x=48$ ) and hexaploid ( $2n=6x=72$ ) are found world-wide, of which, only two cytotypes, viz., diploid and triploid cytotypes are found in Manipur, North-East India. Different cytotypes show great morphological variabilities and wide variations in chemical composition of essential oils. These cytotypes, as evident from literature survey, are extensively used for their anti-spasmodic, anti-diarrheic, carminative, anti-helminthic, anti-depressant and CNS anxiolytic properties, as tonic, stimulant and aphrodisiac, for treating rheumatism, toothache and respiratory ailments. The crude extract can prevent acrylamide-induced limb paralysis, decreased glutathione content and glutathione transferase activity, and increased dopamine receptor in corpus striatum. Bioactive compounds present in *Acorus calamus* are acorin,  $\alpha$ - and  $\beta$ -asarone, asaryldehyde, caryophyllene, isoasarone, methyl isoeugenol and safrol. The content of  $\beta$ -asarone (carcinogenic) is found to vary with ploidy level. Triploid accessions contain 7-7.8%  $\beta$ -asarone as against 73-88% in tetraploid accessions. Since the diploid cytotype is characterized by the absence of  $\beta$ -asarone, it has attracted considerable interest in pharmaceutical industry. We have studied diploid and triploid cytotypes, and developed clonal propagation protocols as well as microrhizome technology. *Acorus calamus* accessions across 19 different populations have been investigated. RAPD and ISSR molecular markers have been employed for revealing genetic variability of the species. Amplification of genomic DNAs using 32 primers yielded 238 bands of which 84 bands are polymorphic revealing 35.3% polymorphism. The average polymorphic information content obtained are 0.19 and 0.22 respectively. Marker index (RAPD 0.078; ISSR 0.106) and resolving powers (RAPD 0.22; ISSR 0.26) indicated that ISSR markers are more efficient than RAPD markers.

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## Response of potato (*Solanum tuberosum* L.) breeding populations under contrasting intercropping regimes

Ikram-ul-Haq<sup>1</sup>, Zunaira Ijaz<sup>1</sup> and Saeed Rauf<sup>2</sup><sup>1</sup>University of Sargodha, Pakistan<sup>2</sup>Muhammad Nawaz Sharif Agriculture University, Pakistan

Potato (*Solanum tuberosum*) is one of important crop grown all over the world due to its wider adaptability and staple food of many nations. It contains valuable quantity of protein and energy per unit area as compared with rice and wheat, thus it has more value than other crop as staple food. Plant breeders continue to evolve tuber varieties for high yielding environment which are heavily dependent on the high doses of the inputs. However, continues rise in the input especially fertilizer prices restrict their uses and farmers cannot support the crop with optimum doses of fertilizer. The symbiotic nitrogen fixing bacteria has been considered as another way to supply the atmospheric nitrogen for the host and subsequent crop. The leguminous species such as *Trifolium alexandrinum* are poor plant competitor and fix the nitrogen in the soils which may impart beneficial impact on the exhaustive crop like potato. The present study was carried out to check the impact of intercropping on tuber yield, its components and to screen out high yielding tuber lines under contrasting intercropping regimes. Data was analyzed in completely randomized design with three replications under factorial arrangement. Overall, there was positive effect of intercropping over the tuber yield of the breeding populations. Intercropping led to the 18% increase in tuber yield. Moreover, there was also subsequent increase in various yield components. Correlation analysis showed that tuber weight per plant had significant relationship with all traits except number of tubers per plant, chlorophyll contents, harvest index and leaf area under intercropping regime. Berseem weight had negative relationship with tuber weight per plant. The correlation analysis showed the importance of tuber diameter under both regimes.

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## Studies on the propagation of *Vangueria madagascariensis* Gmel

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University of Khartoum, Sudan

*Vangueria* is a tribe of flowering plant in the Rubiaceae family which contains about 600 species in 25 genera. Species of *Vangueria* are found in both extremely hot habitats, such as the very dry desert-like areas of the horn of Africa, the rain forests of tropical Africa and the southernmost part of Madagascar in the Sudan. Trees of *Vangueria* are grown near streams in water depressions in tall grass savanna in south Kassala, Blue Nile and Kordofan in Sudan. *Vangueria madagascariensis* has a medicinal value as well; an infusion of the roots and leaves has been used to treat malaria, chest ailments like pneumonia, as a purgative, to treat ringworms and for relief of toothache. Three approaches were followed to determine the best method of propagation: Propagation by seeds, vegetative propagation by stem cuttings and micro propagation using tissue culture techniques. Seed morphology, structure and viability were identified then germinated in vitro under aseptic conditions using Murashige and Skoog medium. The results showed that all the fruits are viable according to TTZ test, seeds were germinated very rapidly, normal seedlings were developed and the percentage of germination was 100%. The vegetative propagation showed that the stem cuttings of 1.0 cm diameter were better than larger ones. The tissue culture techniques showed that the high potentiality of the plant to produce callus was on MS medium supplemented with auxins 2,4-D (2 mg/L) combined with BAP (25 mg/L). The best method to propagate *Vangueria madagascariensis* is propagation by seeds.

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# PLANT BIOTECHNOLOGY AND AGRICULTURE

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## Effect of intra-irrigation meteorological variability on center-pivot water distribution and crop yield

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Water application depth from a center-pivot irrigation system is not uniformly distributed across a field due to emitter package design, tower dynamic and meteorological variability. The objective of this study was to incorporate in a center pivot irrigation model, the simulation of rotating spray plate sprinklers (RSPS) and the simulation of intra-irrigation meteorological variability. The final goal was to simulate the spatial and temporal variability of irrigation depth and yield of a center pivot. The irrigation season of the commercial center-pivot cropped with corn was analyzed. An automatic meteorological station was installed to monitor meteorological data with a 1 s frequency. Ten irrigation events were evaluated using radial catch-cans. The mechanical movement of the center-pivot towers for each irrigation event was characterized using GPS monitoring. The corn was harvested with a harvester equipped with GPS monitoring. The calibrated and validated ballistic model of the RSPS for different nozzle sizes, pressures and wind conditions was mounted on the pivot lateral, following the correspondent sprinkler package. The center-pivot lateral was moved following the measured and the simulated towers dynamic of all the irrigation events. Results indicated that no significant differences in total uniformity coefficient between experimental dynamic, simulated dynamic and complete aligned tower dynamic for the whole irrigation season. This could be explained by the perfect tower mechanical movement incorporating a very small switching on/off angle. However, the results showed significant effects in water distribution pattern between simulations considering average and time varying wind conditions. Center-pivot model including current tower dynamics and variable on time wind conditions improves the simulation results compared with a model simulating aligned tower movement and homogeneous wind conditions. The variability of the measured yield agreed with applied irrigation depth and the simulated corn yield. However, there are some unrelated areas between simulated irrigation depth and measured corn yield which could be due to other factors, not considered in this study, such as the soil characteristic, application of fertilizers, pest attack, etc.

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## Post-harvest mycoflora of some fruits from Ad Darb Market, Jizan, Saudi Arabia

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This is the first study of post-harvest mycoflora of fruits from Ad Darb region of Jizan province. A total number of 14 samples of fruits from the local markets of the place with post-harvest spoilage fungi were collected and screened for mycoflora during March 2015 to February 2017. The mycoflora was cultured on potato dextrose agar plates and Czapek Dox agar plates. A qualitative and quantitative assessment of mycoflora was carried out by the fungal cultures on the petri plates and the slides were identified by microscopic and macroscopic characteristics. A total of 64 fungal isolates represented by 9 fungal genera were isolated from the samples belonging to the three classes of fungi i.e. Oomycetes, Zygomycetes and Ascomycetes. The post-harvest mycoflora was represented by *Pythium*, *Rhizopus*, *Saccharomyces sp.*, *Aspergillus*, *Cladosporium*, *Dresclera*, *Fusarium*, *Penicillium* and *Sphaerotheca*. The most predominant genera were *Aspergillus* followed by *Fusarium* and *Penicillium*. Percentage Disease Incidence ranged from 20-30%. The information on the diverse groups of post-harvest mycoflora can help in effective management and minimization of post-harvest economic losses. Apart from the economic losses the post-harvest mycoflora are pathogenic. *Aspergillus*, *Fusarium* and *Penicillium* isolated are highly mycotoxigenic and are a potential risk to human health. They produce mycotoxins which are responsible for several diseases.

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