S19- Root and Tuber Crops: Value Added Crops for the Next Generation (2nd International Symposium)

SUBMITTED ABSTRACTS

INVITED PRESENTATION

Toward repositioning Allium vegetable crops as global commodities: Opportunities and challenges for future application of omics and phytomedomics plantforms to crop improvement

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Allium cepa (bulb onion, shallot) is a widely cultivated species that contains chemical compounds with culinary and therapeutic uses. A complete set of *A. fistulosum*—*A. cepa* monosomic addition lines has been used to obtain chromosomal-based genomic information of *A. cepa*. To go against a headwind without whole genome sequencing data, an F_2 mapping population was produced from a single F_1 plant between shallot and bulb onion doubled haploid (DH) lines, which could be used for constructing an *A. cepa* ultra-high density genetic linkage map via the use of numerous SNP markers generated by transcriptome-based genotyping. Furthermore, an advanced metabolomics technique was utilized as a tool for characterizing phytochemical variations in the genetic materials mentioned above. This will help to develop the capability and plant materials to support metabolomics-informed biomedical studies of whole plants or extracts, as well as enabling the detection of associations between phytochemical content, gene expression, and specific genome regions, along with a next generation functionality assessment method. While strengthening the position of Allium vegetables as global commodities, this academic approach will contribute greatly to solving the problem of nutrient deficiency throughout the world.

Keywords: Allium, Omics, phytomedomics, doubled haploid, alien monosomic addition line

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Benefits and limitations of the effective use of Allium genetic resources

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The genus *Allium* L. comprises a large number of horticultural plants that are used as vegetables (onion, garlic, leek, shallot, chives), ornamentals, and sources of natural therapeutic products. *Allium* domestication started millennia ago, and many of the direct ancestors of the cultivated crops have either been lost or changed beyond recognition. Genetic shifts and unbalanced selection pressure by breeders and growers resulted in the loss of many traits, important for modern horticulture, and therefore the genes of potentially useful characteristics are not freely accessible for crop improvement. In the 1970s, collection and conservation activities of wild relatives of the cultivated species and thei land races have been initiated by various gene-banks and researches. This genepool is of the greatest importance for the introduction of useful genes to the cultivated alliums, and for domestication of new cultivated crops. Numerous species and local landraces can serve as resources for quality traits, such as dry matter content, pungency, colors, yield, resistance to pests and/or to environmental stresses, as well as for sources for the pharmaceutical and neutraceutical industries. Underutilized species can be domesticated as condiment vegetables, spices, and ornamental crops.

However, the way from initial assessment to commercialization of the new crop is complex and consists of several main steps: (1) scientific and horticultural study of the species, including reproductive physiology, genetic regulation, biochemical traits and environmental effects; (2) breeding and development of propagation, growth, storage, and transportation technologies; (3) marketing and business aspects. In reality, however, these strategies interact, and more scientific or technological development is usually required at semi-commercial stage or when the crop is already released to the market. In such a case, the research aims are directed by the market analysis and sales program. The main pitfall of the process is usually an imbalance between technology and business teams. Therefore, for successful crop development, collaboration between public and private parties is beneficial.

A few examples of the introduction and development of new *Allium* crops (e.g., *A. ursinum, A. tricoccum, A. tuncelianum, A. aschersonianum*) from natural populations or genebank collections to the market will be discussed.

Keywords: new crops, vegetables, ornamental, introduction

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Edible Wild Alliums in Turkey

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Alliaceae family possesses 1300 species about 500 to 700 of which exist in Turkey. Some of these species are being collected from nature by local people and consumed for several purposes. We investigated 22 Allium species (*A. Akaka, A. ampeloprasum, A. armenum, A. atroviolaceum, A. aucheri, A. cardiostemon, A. flavum, A. fuscoviolaceum, A. kharputense, A. macrochaetum, A. orientale, A. peniculatum, A. pseudoflavun, A. schoenoprasum, A. scorodoprasum, A. scorodoprasum subsp. rotundum, A. shatakiense, A. sintenisii, A. subhirsitum, A. tuncelianum, A. vineale, A. zebdanense*) being collected from nature and consumed as human nutrition. The results revealed that some of these species are being consumed as vegetables and others for their remedies or aromatic properties. While some of these species are being commonly consumed as vegetables in the West Anatolia, Marmara, and Mediterranean regions, they are being preferred as aromatic plants in the Central Anatolia, East and South East Anatolia regions. These plants are usually collected in the spring and summer from nature, and either consumed as fresh, dehydrated or pickled to consume in the winter.

Keywords: Wild Alliums, remedies, aromatic plants

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Host status of some plant species to stem and bulb nematode (Ditylenchus dipsaci)

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Stem and bulb nematode (*D. dipsaci*) is a species complex with differentiating host spectrum in races. Onion race of *D. dipsaci* has a wide range of host spectrum. Records were variable due to the different nematode populations and different cultivars of plant species. Hosting ability of 25 plant species was tested against to Turkish onion isolate of *D. dipsaci* under greenhouse conditions. Experiment was set up according to randomized block design with 4 replications. A 200 nematodes were inoculated onto seedlings and going to be harvested and evaluated for plant growth and nematode multiplication. Plant growth is going to be compared with control group which is not inoculated with nematode. Plant species are going to be evaluated as good, poor and non host according to nematode multiplication.

Keywords: onion, nematode, host, Ditylenchus dipsaci

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Testing Promising Genes for Pre-selection for Drought Tolerance in Potato

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Potato (*Solanum tuberosum* L.) is sensitive to drought mainly due to its fibrous root system. With the global climate change, the yield loss in potato cultivation caused by drought is expected to reach 30% over the following years. A breeding approach to increase the tolerance of potato to drought stress requires a long time, quite laborious and expensive, mainly due to limitations in a controlled drought treatment in the field conditions, high heterozygosity nature of the plant and genotype X environment (G X E) interaction. A pre-selection in the laboratory for the promising drought tolerant lines is a requirement to disentangle these obstacles. However, the complexity and multigenic nature of the drought stress response mechanism restrains the identification of molecular markers to be used in pre-selection purposes. Here, we used a novel approach and investigated the possibility of using the gene expression under controlled conditions for pre-selection of drought tolerant potato cultivars. For this purpose, we analyzed next generation sequencing results of Unica (tolerant) and Russet Burbank (sensitive) potato cultivars to 23 days of drought treatment and selected genes with contrasting expression levels under stress/control conditions. Control expression levels of five promising genes [plastidial pyruvate kinase 4 (XM_006360110.1), cryptochrome-2 (XM_006354425.1), cytosolic L-ascorbate peroxidase 1 (XM_006366063.1), early responsive to dehydration 15 (HG975443.1) and GAST1 (XM_006338257.1)] were tested by RT-PCR approach in a different set of potato genotypes with defined drought tolerance index evaluated in an independent field drought experiment to test their efficiency in pre-selection of drought tolerance potential. Although the results indicated the potential of plastidial pyruvate kinase 4 for detecting tolerant potato genotypes, it appears that the differentiation of tolerance and sensitivity potential by a simple RT-PCR approach still requires investigation of a large set of genes together.

Acknowledgment: This project was supported by TUBITAK (Grant number 214-O-600).

Keywords: Potato, Drought, Pre-selection, RT-PCR

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Expression analysis of transgenic potato plants over-expressing stress responsive miRNAs

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Potato is a relatively sensitive plant to various unfavorable environmental conditions including drought and high temperatures. Plant miRNAs are known to regulate metabolism post-transcriptionally in response to environmental stress conditions. miRNA population in potato, on the other hand, have mostly been identified through *in silico* approaches and only a number of them were proven functionally to have a role in abiotic stress response. We previously identified drought-, heat- and drought + heat combined-stress responsive miRNA population in two potato varieties, Unica and Russet Burbank, with contrasting stress responses. Here, we focused on the selected miRNAs, 3 novel and 5 already known ones (stu-miR156d-3p, stu-miR160a-5p, stu-miR162a-3p, stu-miR172b-3p, and stu-miR398a-5p) to identify their function in potato under drought, high temperature and drought + high temperature conditions by using transgenic approach. Selected miRNAs were cloned and over-expressed via transferring with a constitutive promoter (35S promotor) to both Unica and Russet Burbank potato varieties. The expression levels of selected miRNAs and their target mRNAs in transgenic, wild type and mock-transformed plants was also investigated. Our main aim is to provide more information on metabolic regulation in potato under stress conditions and to generate novel data on the functions of miRNAs in combined stress response. Identification of target genes and miRNAs involved in regulation of abiotic stress response of potato may help to regulate the pathways leading to abiotic stress tolerance in the future. Therefore, the study may also contribute to develop new plant variations by using miRNA approach in potato.
Acknowledgment: This project was supported by TUBITAK (Grant number 115-O-405).

Keywords: miRNA, potato, overexpression, transgenic

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Molecular Studies Involved in Biotic Stress Responses in Potato

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Potato (*Solanum tuberosum* L.) is the fourth significant and the most consumed staple crop behind rice, wheat and corn in the world. It is known that several biotic stresses cause reduction in wordwide potato yields, which in turn, leads to a significant economic loss. In biotic stress response, potato plants have developed a wide range of defence and damage-delimiting mechanims. Morphological, biochemical, physiological and agronomical trait response screening studies on potato stress response are available to characterize the parameters from both pathojen and host sides. However, molecular studies to identify candidate biotic stress-associated genes are limited. For understanding and identification of biotic stress responsive plant genes, several approaches, such as RNA-seq-based gene expression profiling, gene expression microarray and transcriptome analyses give an insight to the molecular mechanisms of biotic stress tolerance in potato. Compherending of plant-herbivore and plant-pathogen mechanisms in plant defence responses will be effective to protect plants agaist biotic stresses, and to develop varieties with higher stress tolerance. Here, we present the current molecular studies of potato responses under biotic stresses.

Keywords: Biotic stress, Solanum tuberosum (potato), plant defence, molecular studies

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Microbial-induced mobilization of micronutrient from soil minerals from different soil environments for increased yield and improved nutritional quality of sweetpotato and purple yam

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This study was conducted to evaluate the performance of microbial inoculant (*Bacillus megaterium)* that was isolated from problem soils in terms of increasing the yield and nutritional quality of sweetpotato and purple yam in pot experiments. The inoculant is a fast-grower spore-forming bacteria capable of oxidation and dissolution of soil minerals specifically oxides of Zn, Fe and Cu. To evaluate its effectivity, pot experiments on sweetpotato (LSU 25 var.) and purple yam (VU2 var.) were established in screen house, each grown using five different problems soils collected in various locations within Leyte and Samar, Philippines. A total of seven different fertilizer treatments were used in the pot experiments, namely: T1 – control, T2 – 150-50-150 kg/ha (N-P2O5-K2O) recommended rate for yam or 60-60-60 kg/ha (N-P2O5-K2O) recommended rate for sweet potato, T3 – T2 + 8 kg/ha Biozome-200, T4 – T2 + Mycovam-1 (5 g/plant, manufacturer's recommended rate), T5 – T2 + 4 kg/ha microbial inoculants, T6 – T2 + 8 kg/ha microbial inoculants, and T7 – T2 + 12 kg/ha microbial inoculants. Results revealed that in both sweetpotato and yam pot experiments, treatments with microbial inoculants specifically T5, T6 and T7 obtained highly significant results on yield and some agronomic characteristics comparable to commercially available micronutrient fertilizers such as T2 (Biozome-200) and T4 (Mycovam). In general, addition of the microbial inoculant increased the capacity of the plant to take iron. The results implies, that organic-based developed microbial inoculant from *Bacillus megaterium* has good potential for increasing the yield and nutrient quality of sweetpotato and purple yam.

Keywords: microbial inoculant, problem soils, sweet potato, purple yam, yield

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Effects of Zn, Fe, Cu, Mn and B Biofortification of Purple Sweetpotato on the Growth, Yield and Anthocyanin Contents

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The fast- growing population today demands greater need for food, fuel, wood and fiber for human survival. This calls for the development of innovative researches that will improve the capacity of the soil to produce high yielding crops with improved quality and additional health benefits. A research was conducted to study the effects of the addition of micronutrients such as Zn, Fe, Cu, Mn and B on the growth, yield and tuber quality of purple sweetpotato under pot experiments. Two cropping cycles of purple sweet potato were established under pot experiments and fortified with 4kg/ha and 8 kg/ha of Zn, B, Mn, Fe and Cu added to 90-90-90 kg/ha N – P_2O_5 – K_2O. Results showed that during the 1st cropping, the addition of 4 kg/ha Cu to NPK fertilizers gave the highest tuber yield. However, during the 2nd cropping, the addition of 8 kg/ha Cu to NPK fertilizers gave the highest yield followed by 4 kg/ha Cu, 8 kg/ha Mn, 4 kg/ha Mn and 4 kg/ha Zn in descending order. In terms of anthocyanin contents, the highest amounts were obtained with the addition of 8 kg/ha Cu and Fe. These results signify the importance of micronutrient biofortification to macronutrient fertilizers in enhancing the growth, yield and anthocyanin contents of purple sweetpotato.

Keywords: Micronutrients addition, purple sweet potato, yield, anthocyanin contents

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Commercial sweet potato production in the highlands of Papua New Guinea

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The economy of the PNG Highlands, especially in those areas with relatively good transport infrastructure, is evolving rapidly, with smallholders continuing to turn from subsistence farming to market-oriented production. Sweet potato (kaukau) plays a key role in this evolution, becoming a cash crop in its own right and assuring food security in more diverse systems with coffee, vegetables and small livestock providing a cash income.

Research was conducted to support smallholders to turn from subsistence farming towards market-oriented production, producing specifically for the market and managing production to meet market/customer requirements.

A mobile acquired data system was used to survey major sweet potato production regions and map market-oriented sweet potato value chains. Characteristics of growers and other chain participants were assessed and compared to those of subsistence growers. Crop production capacity was improved by introducing a scheme to supply clean, high performing planting material. An increase in market oriented production created income generating opportunities for growers as well as enabling other groups to enter into sweet potato fresh product and sweet potato-based food product supply chains.

Keywords: value chain, innovation, pathogen tested, sweet potato

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Agronomic Efficacy of Fertilizer Types on Some Soil Chemical Properties and Sweetpotato Production in an Ultisol Environment

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Studies were conducted in 2014 and 2015 cropping seasons at the experimental farm of the Faculty of Agriculture, University of Benin, Benin City, Nigeria, to evaluate the effect of soil amendments in enhancing soil fertility status and relative agronomic efficacy of sweetpotato yield in humid ultisol environment. The effects of Cattle and Poultry manures were evaluated at application rate of 15 t ha^{-1} while NPK fertilizer effects was evaluated at 400 kg/ha and control (no fertilizer) with sweetpotato (0078-pp1) cultivar resulting in four treatments, and replicated three times. Data were collected on plant establishment, vine length, leaf area index (LAI), total dry matter and relative agronomic efficacy. The results obtained showed that the soil prior to the experiment was low in total N, available P and exchangeable cations but moderately acidic and high in organic matter. The manures were rich in N, P, Mg, K, organic carbon and Ca concentration. The application of Poultry manure, Cattle manure and NPK to the soil improved the soil fertility status. The longest Sweetpotato vines were observed in poultry manure (252.10 cm) and NPK (249.90 cm) treated plots. The highest LAI (5.15 cm) was observed from plots treated poultry manure while the plots treated with cattle and poultry manures had the greatest total dry matter (TDM) and relative agronomic efficacy (RAE). TDM was positively correlated with vine length (r = 0.360) and RAE (r = 0.569). Vine length positively correlated with LAI and RAE with a coefficient of 0.416 and 0.360, respectively. Poultry and cattle manures are therefore recommended for sweetpotato growers in the humid ultisols environment for better performance.

Keywords: Cattle manure, growth, poultry manure, NPK, soil fertility.

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Using a lysimetric station to determine the irrigation water requirements for chufa crop (Cyperus esculentus var. sativus)

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Chufa, also known as tigernut, is a typical irrigated crop in Valencia, Spain, where it is traditionally cultivated for its tubers. Its cultivation uses large amounts of water, in the order of 10,000 m^3 ha^{-1} $year^{-1}$. During the last years, the research team in which this study has been developed, has carried out several studies leading to improve the irrigation water use efficiency in chufa. Although these improvements are considerable, they are not definitive, as the water needs of the crop are still unknown. To know these needs, it is necessary to determine the crop evapotranspiration (ETc). The experiment was carried out on an experimental plot of the Universitat Politècnica de València, included in the traditional cultivation area. This plot includes a lysimetric station (Smart Field Lysimeter) which allows knowing the daily ETc. In addition, the plot is equipped with a meteorological station, which provides the necessary parameters for the determination of the daily reference crop evapotranspiration (ETo) through the FAO-Penman-Monteith method. Relating the values of ETc and ETo, the crop coefficient (Kc) values corresponding to the different growth stages, has been estimated from the data obtained during the crop cycle. The Kc values for the initial, mean and final growth stages were established, as 0.25, 1.43 and 0.75, respectively. Considering the crop development, the four growth stages were established as: initial stage (21 days), development stage (76 days), mid-season stage (43 days), and final stage (29 days). The use of these kc values, will allow adjusting irrigation water doses to water requirements, thus reducing the volume of water applied and improving the irrigation application efficiencies for chufa crop.

Keywords: Tigernut, tuber, smart field lysimeter, reference crop evapotranspiration, crop evapotranspiration, crop coefficient, growth stages

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Effect of the storage temperature and time on native potato quality

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The native potato varieties Michuñe roja (pink fleshed); Michuñe azul (purple fleshed); Cabra (pink fleshed) and the commercial variety Desiree (non colored fleshed) were stored at 4, 12 and 20°C and 85% RH. At harvest and after 2 and 4 months, dry matter contents, total polyphenol contents (TPC); total antioxidant capacity (TAC) by FRAP and glucose, fructose and sucrose contents were determined. Colored fleshed potatoes had between two and three times more TPC and TAC than the non colored with no differences among them. The dry matter content was higher than 20% without effect of genetic materials, temperature and time of storage. The values of TAC of colored fleshed potatoes were between 500-600 mg equivalent Trolox 100 g^{-1} FW at harvest decreasing both at 2 and 4 months (50% less than harvest value). Potatoes stored at 12 °C showed higher TAC compared to the stored at 4 and 20 °C that did not shown differences. The TPC measured on colored fleshed potatoes were not affected by the storage time and the values were between 300-400 mg galic acid 100 g^{-1} FW. The potatoes maintained at 20 °C presented the highest contents. Glucose levels showed no difference between genetic materials and were not affected by storage temperatures and time (1-1.69 mg g^{-1} FW). A similar behavior was observed in sucrose (0.94-1.2 mg g^{-1} FW). Fructose levels were higher in potatoes maintained at 4 ° C (1.4-1.5 mg g^{-1} FW) and lower in those kept at 20 °C (0.7-0.8 mg g^{-1} FW) without differences between genetics materials. The colored fleshed potatoes analyzed are rich in functional compounds and represent an interesting alternative for frying. To preserve the functional quality of the raw material it should be stored up to 2 months at a temperature of 12 °C.

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Keywords: dry matter, polyphenols, antioxidant capacity, carbohydrates

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Respiratory Activity and Compositional Changes during Storage of Sweetpotato Genotypes

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The respiration rate and chemical composition was characterized in the roots of multiple commercially important sweetpotato cultivars. Root respiration rate was highest at harvest and dependent on temperature and gradually decreased during storage. The white-fleshed cultivars 'Bonita' and 'Murasaki' had the lowest respiration rates, while 'Porto Rico' and 'Evangeline' had the highest. Root dry matter content decreased during storage and ranged from near 30% in high dry matter white-fleshed cultivars to 18% in moist orange-fleshed cultivars. Root sugar content increased significantly during the early months of storage. Sucrose was the dominant sugar in the raw roots, while maltose was the major sugar in baked roots. Glucose was the principal monosaccharide followed by fructose. Low temperature storage accentuated root sweetening. Large differences in the individual sugar profile existed between cultivars. Malic acid was the principal organic acid in all cultivars except the purple-flesh types, in which citric acid dominated.

Keywords: Respiratory Activity, Compositional Changes, Sweetpotato

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Physiochemical properties and shelf-life of orange fleshed sweetpotato puree bread

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Value addition of Orange-fleshed sweetpotato (OFSP) involves diversified utilization of the crop which is rich in pro-vitamin A. OFSP puree is being used as major ingredient with 30-50% wheat flour replacement during bread formulation. However, substitution of wheat during novel development of bread affects its physiochemical properties hence, its shelf-life. For this study, the physiochemical properties hence, shelf-life of OFSP puree-wheat flour composite bread (30% puree) was compared with wheat flour (100%) bread. The bread samples were stored at 7°C, 20°C, 25°C and 30°C, respectively. The moisture content and color of bread significantly ($p<0.05$) decreased with increase in storage temperature and time. High microbial load in white bread was possibly due to its high-water activity compared to OFSP bread ($p<0.05$). The was a significant decrease in the in β-carotene levels in OFSP puree bread with storage time and temperature. No β-carotene was detected in the white bread. Specific volume of white bread was significantly ($p<0.05$) higher than in OFSP puree bread. Refrigeration increased crumb firmness, chewiness and cohesiveness in both types of bread. OFSP puree had a longer shelf-life and showed spoilage on sixth day compared to fourth day for white bread.

Keywords: Biofortified Sweetpotato puree bread nutrition value Addition Africa

S19- Root and Tuber Crops: Value Added Crops for the Next Generation (2nd International Symposium)

SUBMITTED ABSTRACTS

ORAL PRESENTATION

Developing and deploying non- and low-sweet sweetpotato varieties for expanding markets

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A major objective of breeding at the Sweetpotato Support Platform for West Africa in Ghana, is the development of non-sweet varieties suitable for use as staple foods, or in fried and other processed products. This priority was set during stakeholder consultations when establishing the program, and is based on the opinion that sweetness constrains the potential for greater uptake and enhanced value-addition of sweetpotato in West Africa. Similar efforts are underway at the International Potato Center's headquarters in Lima Peru. Studies indicate that urban consumers in many countries are increasingly health conscious and are seeking out products with low sugar contents. Initial breeding efforts in Ghana focused on adaptation to the lowland tropical West African environments where sweetpotato virus disease pressure is high and rains can be uncertain. Populations include a range of flesh colors, including beta-carotene-rich orange-fleshed, anthocyanin-rich purple-fleshed, and yellow- and white-fleshed genotypes, with generally high dry matter content (>30%). Consumer sensory panels conducted at the village level consistently rate the majority of advanced selections highly with respect to texture, taste, aroma and appearance, though these contain varying levels of sugars and perceived sweetness. Recent and current efforts focus on better characterizing non- and low-sweet selections, and developing strategies for their dissemination, particularly through urban market segments. Sugar content in cooked or processed sweetpotato is influenced by various factors, including the sugar content prior to cooking, the method of cooking, and the levels of amylase activity during cooking, which can significantly increase maltose levels. Storage interval can significantly influence sugar content and amylase activity. Elite, non-sweet genotypes with low or null beta-amylase activity are present among released varieties and advanced selections in Ghana, and have excellent quality both in steamed and fried forms. Marketing research efforts build on previous successful experiences promoting and marketing the orange-fleshed sweetpotato, and include branding/naming these new quality types and products.

Keywords: Breeding, culinary quality, staple-type, sweetpotato

S19- Root and Tuber Crops: Value Added Crops for the Next Generation (2nd International Symposium)

SUBMITTED ABSTRACTS

ORAL PRESENTATION

Small Potato Production: A Value-Added Opportunity for the Canadian Prairies - Cultivar Choice, Agronomic Refinements, and Economic Performance

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More recently, the purported health benefit of 'Small' potato has resulted in higher demand for this market class. Suitable cultivars and appropriate agronomic practices are essential to maximize productivity and economic returns. Potato cultivars with diverse characteristics were studied at Outlook, Saskatchewan, Canada during 2016. Cultivars AC Peregrine Red (red skin/white flesh-table), AAC Hamer (light beige skin/cream flesh-table/chipping, low Glycemic Index), Milva (yellow skin/yellow flesh-table), and Operle (yellow skin/light yellow flesh-table) were evaluated. Two seed-piece spacings (15, 20 cm) and three top-kill timings (10, 11, 12 weeks from planting) were studied under dryland and irrigation. Tubers were graded into 5-mm diameter ranges. Tubers between 20-40 mm and >40 mm were considered 'small' and 'table' grades respectively. Favourable rainfall received during the 2016 growing season produced comparable yields of 'small' (9 t^{-ha}) and 'table' (18 t^{-ha}) grade tubers under both irrigated and dryland production. Crops top-killed at 10, 11, and 12 weeks produced similar 'small' grade yields under both irrigation and dryland production. However, delayed top-kill produced higher 'table' grade yield under both growing conditions; e.g. 12-week top-kill produced over double the yield than 10-week top-kill. Closer spacing produced higher 'small' and 'table' grade yields than wider spacing under irrigation. However, spacing had no effect on tuber yield under dryland. The different cultivars produced varying proportions of 'small' and 'table' grade yields. Operle produced the highest 'small' grade yield under irrigation (14 t^{-ha}) and dryland (11 t^{-ha}). AC Peregrine Red produced the lowest 'small' grade yield under irrigation (3 t^{-ha}) and dryland (4 t^{-ha}). By contrast, Operle produced the lowest (15 t^{-ha}) and AC Peregrine Red the highest (23 t^{-ha}) 'table' grade yields under both growing conditions. Economic performance and value-chain attributes in relation to cultivar suitability and agronomic options, for the different market grades will be discussed.

Keywords: potato, small potato, creamer potato, irrigation, spacing, yield, economics, value-chain

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Improvement of root vegetables for nutritional quality: case of carotenoids in carrot

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Synthesized by plants, carotenoids are key pigments as photoprotective compounds in chlorophyll organs and help attract pollinators and dispersers for non-chlorophyll organs such as flowers and fruits. However, in underground organs, such as roots or tubers, their role is not clearly determined. Carotenoids also represent an important class of human health metabolites as precursors of vitamin A. The carrot root, an important vegetable consumed worldwide, contains high concentrations of carotenoids, and therefore represents an interesting model to understand the accumulation in these pigments.

The objective of the work help controlling carotenoid content by understanding the genetic determinism of this trait but also by evaluating the role of environmental factors. Association genetics was performed on an unstructured population and a panel of inbred lines covering a wide diversity. Several genes of the carotenoid pathway are shown to be associated with the level of carotenoid content. However, environmental factors may impact the carotenoid accumulation. Contrasted growing period and specific biotic and abiotic stresses present a significant effect on carotenoid accumulation in carrot, partially explained by transcriptional regulation. The findings are useful for breeding for improved varieties but also for growing of quality products.

Keywords: Daucus carota L., genetic control, environment effect, quality, root, health compounds

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Evaluation of Ginger as a Greenhouse Crop

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Ginger (Zingiber officinale) has potential as a greenhouse crop with multiple uses, including food, beverage, medicinal, and ornamental. The rhizomes are internationally used as spices in cooking and are claimed to have medicinal anti-inflamatory properties. Under natural field conditions, ginger plants enter dormancy in early winter with short days and lower temperatures. Longer days (>12 hours) promote active shoot growth, but shorter days (~10 hours) promote rhizome production. Under greenhouse conditions, daylength and temperatures can possibly be manipulated to produce a locally-grown superfood year round that can be used industrially. Other potential market is to grow plants with good ornamental qualities that can be sold to home owners that want to harvest their own rhizomes. Currently we are evaluating germplasm from different sources, and identifying optimal environmental conditions for rhizome production with excellent yield and quality. We are comparing plants grown from rhizomes of several cultivars produced in Hawaii, and from tissue-cultured plants grown in a facility in Florida. Plants in 2.8 L pots were grown in growth chambers under either10, 12 or 14-hour photoperiods to evaluate the effect of daylength on shoot versus rhizome growth. All treatments were under a 10-h photoperiod provided by LED red-blue lamps, and daylength was extended with two 20-watt incandescent bulbs. In another experiment, plants were grown in 6.3 or 45.4 L pots in greenhouses either with natural days or long days provided by night interruption lighting. Additionally, plants were grown in the ground under full sun in two locations, and under 30% shade in one of these locations. Plant harvests are in progress and are being conducted monthly, evaluating the number of shoots per plant, and fresh and dry weights of the plants and rhizomes. We are also performing chemical analyses of rhizomes for gingerols, protein, fiber and fat contents.

Keywords: Ginger, Zingiber officinale, greenhouse plant

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Biodiversity and productivity of potato onions (Allium cepa var. agregatum G.Don)

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Potato onion is one of the specific species known as a part of biocultural heritage in many countries. The increasing interest of this germplasm causes the importance of biodiversity and productivity estimation and developing of stable cultivars suitable for the local climatic condition and growth regions. Nine landrases and three breeding lines of potato onions were investigated out at the Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry in 2013-2016. Bulbs of onions were planted in the first decade of May. The obtained results showed the differences in morphobiological features, productivity and multiplication ratio between landrases. The bulb shape was observed rhomboid, broad oval, globe and the colour of outer skin was an intensive yellow, brown and red. The productivity reached from 0.97 to 1.64 kg m^2. Bulbs formation distinguished with the highest diversity. The number of bulbs per cluster differed from 4 to 13 in a different landrases. It was determined that the most numerous cluster formed smaller sized bulbs.

Keywords: bulb, cluster, diversity, landrases, potato onions, productivity

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Pholyphenol Profile and Antioxidant Capacity of the Traditional Sicilian Landraces of the Egyptian Walking Onion (Allium cepa L. var. viviparum

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Nowadays, consumers pay increasing attention to the health-promoting characteristics of their meals. Vegetables are highly rich in valuable antioxidant compounds. Among them, onion (*Allium cepa* L.) is known and consumed for centuries all over the world. Onion is a valuable raw material largely used in food industry. Low production cost makes it an important crop in developing countries providing opportunities to meet food demand and supply. Several authors have shown that onions possess many biological activities, including antibacterial, anticancer, hypoglycemic, hypolipidemic, antiplatelet aggregation and antioxidant activity. The Egyptian Walking Onion (*Allium cepa* L. var. *viviparum*) is a traditional neglected crop grown in Sicily, which is characterized by specific aroma and sweet taste. For this reason, it could be exploited as a new ready-to-eat product. The goal of our work was to characterize the phytochemical content and antioxidant capacity of the Egyptian Walking Onion in comparison with five cultivars of onion (*Allium cepa* var. *cepa*) of different bulb color. To this aim, the quantitative and qualitative polyphenol content were detected by HPLC and the antioxidant capacity was measured as DPPH· and ROO· scavenging capacity. Additionally the analysis of ascorbic acid and carotenoids content were performed. The differences in the qualitative and quantitative traits between the var. *cepa* and var. *viviparum* of *A. cepa* were then highlighted and discussed.

Keywords: green onion, leafy vegetable, ready-to-eat, health-promoting, neglected crop

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Influence of Potting Media on the Growth and Bulb Yield of Onion (Allium cepa L.)

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A trial was conducted in the screen house at the Department of Crop Science, Faculty of Agriculture, University of Benin, Benin City, Nigeria to investigate the effect of different potting media on the growth and yield of *Allium cepa* L. Five sources of growing media: burnt rice husk (BRH), oil palm refuse bunch (OPRB), cattle dung (CD), poultry manure (PM) and river sand (RS) were used. River Sand and the other four sources were combined in ratios of 1:1, 1:2 and 2:1 to make 12 treatment [RS + PM (1:1); RS +PM (1:2); RS +PM (2:1); RS + OPRB (1:1); RS + OPRB (1:2); RS + OPRB (2:1); RS + BRH (1:1); RS + BRH (1:2); RS + BRH (2:1) RS + CD (1:1); RS + CD (1:2); and RS + CD (2:1)]. Together with the five main media sources, made up a total of seventeen (17) treatments. These treatments were laid out in polybags in a completely randomized design with three replications. Data were collected on leaf length, number of leaves, number of bulbs, weight of fresh bulb, bulb girth and bulb yield. Results obtained indicated that potting media influenced growth and yield of onion significantly. The best yield was obtained from OPRB potting media with 30.00 g fresh bulb per plant, bulb girth (11.83 cm) and bulb yield (19.80 t ha^{-1}). In the urban and sub-urban areas constrained with polluted and inadequate land space, potting medium with OPRB could be an innovative approach to good quality, enhanced and sustained onion production.

Keywords: Potting media, onion, growth, bulb yield.

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Morphological Characterization of Turkish Shallots (Allium cepa var. ascalonicum Backer)

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Shallot (*Allium cepa* var. *ascalonicum* Backer) is a variety classified by some researchers under edible onion (*Allium cepa* L.), but it is different from the common onion with small bulb structure, active tillering and formation of a cluster of small bulbs. Besides vegetatively propagated shallot cultivars, seed propagated shallot cultivars exist in Turkey. In vegetatively propagated shallot types, a shallot bulb with a size of large onion set is planted and 4 to 9 clustered lateral bulbs develop from a single plant.

Field survey was carried out from the years of 2010 to 2016. Shallot genotypes from different locations were collected and morphologically characterized. Size, diameter, height, ratio of height to diameter, width of neck, , shape, scale thickness and base color, number of centers per bulb and dry matter content properties of shallot bulbs were determined. The data were evaluated by Jaccard similarity coefficients, UPGMA cluster analysis. The cluster dendogram results showed that there are two main shallot groups in Turkey. One of them is vegetatively and the other is seed propagated. The vegetatively propagated group sets more than one bulblet around the main bulb; generally the bulb number varied from 2 to 12 and weighed 20.5 to 35.0 g per bulb. Seed propagated types usually formed single bulb with elliptic shape and the bulb weighed 35.00 to 87.90 g. Shallot cultivars were classified for their shape as long, mid-long, and short types. Scale color varied from yellow to reddish. Dry matter content varied from %10.07 to 16.08. Average number of growing points per bulb was 1.36-3.20. As a result, 14 morphologically different local shallot cultivars were determined that have been cultivated by farmer conditions in Turkey.

Keywords: Shallot, Allium cepa var. ascalonicum Backer

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Evaluation of onion breeding lines for hybrid production in Kazakhstan

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Over three years an assessment of 292 onion accession samples were studied. Of the studied breeding selections, 116 have shown to possess relatively high productive characteristics. Promising sterile lines of onion based on sterility of onion *Galanthum* and their derivatives - varietal-linear hybrids obtained by pollinating with domestic varieties had good biochemical indices of bulbs. The magnitude of losses during storage of 134 breeding accessions of onion varied depending on the genotype background of the selection material. The most virulent was the wet rot of bulbs, caused by bacteria and some genera of fungi, with the losses being reached up to 17,9%. There was no correlation between the parameters of the yield of onion and its storability (R = -0,10-0,24), the latter was determined by the natural decrease in weight (R = -0,59), wet rot (R = -0.59) and sprouting of bulbs (R = -0,69). Onion lines ON543, ON544, ON547 and ON548 were distinguished by the best economic and biological characteristics, which provided a gross yield of 29,7 t/ha and higher, a commercial yield of 26,6 t/ha and higher, marketability 89,5% and above, the average weight of commodity bulbs was 74,1 g and higher. Under the conditions of irrigated dark chestnut soils of the southeast of Kazakhstan at the application of mineral fertilizers N180P120K120, the largest productivity of onion was obtained by the breeding selection ON538 – 69,0 t/ha, against 61,1 t/ha in the variety 'Mereke'. At the same time, the gross profit made 1637,7 and 1396,2 thousand Tg/ha, the production cost was 23,63 and 25,07 Tg/kg, and the profitability of production was 111,6 and 99,4%, respectively. As a result of genomic analysis the genotypes studied had a genetic sterility factor in the cytoplasm. The accession sample ON447 was homozygous for the recessive allele (msms) and maintained sterility.

Keywords: onion, breeding, lines, hybrid, productivity, profitability, storability

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Interaction effect of calcium and jasmonic acid on some physiological traits and tuber yield of three potato cultivars

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Potato is cultivated as a spring plant in cold areas. Early autumn and late spring cold weather as well as hot summer is some problems to cultivate potato in these areas. Two factorial experiments based on randomized complete block design with three replications was carried out in Chaharmahal and Bakhtiari Province, Iran in 2014-15. The first factor includes three varieties (Jelli, Burren and Fontane). The second factor was application of calcium and jasmonic acid (µM) at six levels (calcium + jasmonic acid before tuber formation (T_1), calcium + jasmonic acid after tuber formation (T_2),jasmonic acid before tuber formation (T_3), jasmonic acid after tuber formation (T_4), calcium (T_5) and control (T_6)). It can be deduced that application of jasmonic acid and calcium before and after tuber formation can reduce temperature and nutrient stress. Furthermore, combination of jasmonic acid and calcium was more effective when they applied before tuber formation. Results showed that calcium and jasmonic acid had significant effects on the studied varieties. Jelli was more sensitive to the treatments than the other varieties. T_1 had the most effect on the studied traits, except for malondialdehyde (MDA). In general,According to the results, when jasmonic acid and calcium compounds, were applied before the stage of the rhizome production, Achieve the most yield with reduced the adverse effects of thermal stress and stimulation of the tuberization.
Keywords: Antioxidant enzymes, Chlorophyll content and Protein

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Onion Research and Development in Bangladesh- Present Status, Problem, Prospect and Future Strategies

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Onion is one of the most important crops of Bangladesh. It is used almost daily as year-round in cooking by all Bangladeshi families. Short day brown and red skinned onion varieties are widely cultivated in Bangladesh. Seven high yielding varieties were developed in Bangladesh by the Spices Research Centre (SRC) of Bangladesh Agricultural Research institute (BARI), Joydebour, Gazipur and private companies. Among them three varieties are grown in winter season and rest four varieties are grown in summer season and round the year. Mass selection is followed to improve local material/land races. In Bangladesh; Scientists are paying attention to develop variety(s) on good keeping quality, purple leaf blotch & thrips tolerant as well as CMS line from local improved varieties/cultivars. However, a remarkable progress was noticed in respect of thrips tolerant onion. Meanwhile noticeable research achievements were found in onion sector in Bangladesh. This article is highlighted on present status, problem, prospect and research & development of onion in Bangladesh regarding varietal improvement, breeding program, improve cultivations practices, disease and insect management, post harvest handling etc.

Keywords: Allium cepa/ present status/problem/prospect/research & development

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

Onion Seed as Potential Explant For Agrobacterium Mediated Transformation

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Obtaining stable onion transgenic plants has been challenge. The different factors like explant type, response of phytoharmones in medium and genotype dependency has been investigated earlier. The present research work was conducted to explore the possibility of obtaining transgenic plants of two onion varieties (Sampiyon and Kral) by subjecting onion seeds to *Agrobacterium* mediated transformation. *Agrobacterium* strain LBA4404 harboring pBIN19 binary plasmid was used to infect sterilized seed that contained *uidA* gene (interrupted by an intronic sequence to induce expression from eukaryotic cells) for earlier screening of primary transgenic shoots and *nptII* gene as plant selectable marker. Results exhibited the genotype and explant dependency. Three different regeneration MS media with different hormonal combination were used to evaluate regeneration response of explants. Based on regeneration response, GUS histochemical and PCR assays, cultivar "Kral" was found better compared to "Sampiyon". The transformation efficiency remained as 12% and 10% in Karal and Sampiyon cultivar respectively when combination of BAP and NAA was used as ratio of 10:1. Putative transgenic plants regenerated on media supplemented with 2,4D showed 8 and 7% of transformation efficiency in Kral and Sampiyon respectively. The less transformation efficiency was recorded when equal concentration of BAP and NAA were used. We report that onion seed can be used as explant for genetic transformation studies of onion to introduced gene of economic importance.

Keywords: Seed, explant, genetic transformation, onion

S19- Root and Tuber Crops: Value Added Crops for the Next Generation (2nd International Symposium)

SUBMITTED ABSTRACTS

ORAL PRESENTATION

A Large Scale Onion (Allium cepa L.) Breeding Project with Several Approaches

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Edible onion (*Allium cepa* L.) is largely produced and consumed in Turkey, which necessitates the development of hybrid lines/cultivars appropriate for marketing demand of the country. The first part of the project objectives is to characterize already collected onion gene pool originated from Turkey with respect to UPOV criteria to identify the characteristics that can be used in further breeding programs.

The second part of the project objectives is to analyze the advanced onion breeding lines from GAF-MTN onion gene pool developed with a private sector-university cooperation ongoing for more than 20 years, for their cytoplasmic and/or nuclear male sterility properties to be used in hybrid seed production, their yield capacities in different climate regimes (West Anatolia, Central Anatolia and South Anatolia), their long and short term storage capabilities including changes in bioactive properties during storage, generation of homozygous dihaploid lines, investigation of their tolerance to *Fusarium oxysporum* f. sp. *cepae*, salt, drought and salt&drought stresses, including transcriptomic analyses.

The project consists of researchers from two public universities, two Institutes of Ministry of Food, Agriculture and Livestock and a private sector company specialized in domestic and international onion seed production (MTN Seed, Bandırma, Turkey). With this multi-institutional project largely supported by the private sector, we aim to generate domestic onion hybrid lines/cultivars having capacity to compete both in national and international onion seed market.

Keywords: Onion, Allium cepa L., hybrid lines, pink rot root, abiotic stress, storage, bioactive

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SUBMITTED ABSTRACTS

ORAL PRESENTATION

The effects of drench and foliar application of a commercial seaweed extract on the leaf nutrient content of potato, Solanum tuberosum `BP1´

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A field experiment was conducted to quantify the effects of a commercial seaweed extract (Afrikelp® LG-1) on the leaf nutrient content of the potato plant, Solanum tuberosum 'BP1' under soil drench and foliar application over two growing seasons, namely 2010 and 2011. Field experiments were conducted at the Agricultural Research Council (ARC) Nietvoorbij site (33° 54' S, 18° 14' E) in Stellenbosch, South Africa during the late autumn for both years. The experimental design followed a randomized complete block design in a factorial arrangement of seven treatments (0, 2, 3, 4, 5, 6, 7 l/ha) and two application methods replicated four times. At 60 days after planting (DAP), Solanum tuberosum 'BP1' cultivar, leaves were sampled for nutrient analysis. The results for the 2010 and 2011 seasons showed that there was no difference in the leaf nutrient content due to the method of application. Leaf nutrient content of N, P, K, Ca, Mg, Na, Mn, Cu, Zn and B increased with treatment concentrations, with minor exceptions to Cu in 2010 and Fe in 2011.

Keywords: Commercial seaweed extracts, Leaf nutrient content, Potatoes, Solanum tuberosum 'BP1', Drench and foliar application.

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

The Performance and Profitability of Sweet potato (Ipomoea batatas L.) as influenced by propagule length and application rates of cattle dung in humid ultisols

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This study was conducted in 2013 and 2014 at the Teaching and Research Farm of the Faculty of Agriculture, University of Benin, Benin City, Nigeria. The aim of the study was to evaluate the effect of propagule and cattle dung application rates on the growth, yield and profitability of sweet potato (*Ipomea batatas* L.) in a humid ultisols. Treatments consisted of three different propagule lengths of vine cuttings (30, 40 and 50 cm) and three rates (0, 225 and 450 kg N ha^{-1}) of cattle dung in a 3 x 3 factorial arrangement fitted into randomized complete block design and replicated three times. The productivity of sweet potato was enhanced by the application of cattle dung and increasing propagule length positively. Growth and yield variables varied significantly with propagule length and cattle dung application. Number of vines, vine girth and number of leaves increased significantly with increase in propagule length. Cattle dung application rates of 225 and 450 kg N ha^{-1} had statistically at par number of vines, vine girth, vine length, number of nodes and leaves and leaf area index but significantly higher than unfertilized plants. The highest tuber yield of 26.10 t ha^{-1} and 22.00 t ha^{-1} was obtained from vine cutting of 40 cm and 20 t ha^{-1} cattle manure, respectively. The interaction of propagule length and cattle dung application rate on all growth and yield parameters were not significant. Tuber size significantly ($P \leq 0.05$) correlated positively with number of leaves ($r = 0.351$), number of nodes ($r = 0.288$), number of tubers ($r = 0.377$), tuber length ($r = 0.475$). Tuber yield significantly correlated positively with the number of leaves ($r = 0.335$), number of tubers ($r = 0.281$), tuber length ($r = 0.365$) and tuber size ($r = 0.652$). The appropriate propagule length and cattle dung application rates were 40 cm and 225 kg N ha^{-1}, respectively as they had the highest return per naira invested.

Keywords: Economic analysis, growth variables, organic fertilizer, tuber yield.

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Volatile profiling of African ginger (Siphonochilus aethiopicus) in response to irrigation regimes and nitrogen levels

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The concentrations of different compounds in African ginger (*Siphonochilus aethiopicus)* can be affected by water availability and N levels with significant consequences on the composition. The aim of the study was to profile the volatile composition of *S. aethiopicus* grown under water-stress regimes and N levels applied during the experiment. The study treatments included different tissues *S. aethiopicus* affected by irrigation regimes (30; 50 and 70 Allowable depletion level (ADL) and nitrogen rates (0, 50,100,150 and 200 kg/ha). Volatiles were extracted and identified by gas chromatography–mass spectrometry (GC–MS). Results indicated that the most abundant compounds in the root and rhizome were terpenes, as compared to the increased concentrations of aliphatic acids, benzenoids and aliphatic aldehydes in the leaf. The odorant sesquiterpene (1E)-5-Methyl-1-(2, 6, 6-trimethyl-2, 4-cyclohexadien-1-yl)-1, 4-hexadien-3-one was emitted in the rhizome (64.50%), leaf (21.35%), and root (13.73%). Low content of linalool was obtained from the rhizome (9.09%) and root (8.29%) grown under severely stressed (70% ADL; 267 mm per season). Severely stressed 70% ADL treatment with minimal application of N induced the terpenes concentration in all plant tissues. These results highlighted the validity of volatile profiling to study the effects of water stress and N levels for composition and physiology.

Keywords: Volatile compound, fertilizer, plant tissues, irrigation regimes, gas chromatograph

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

The seasonal variations in Inulin and reducing sugar in Jerusalem artichoke var. KKU 50-4

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The study of inulin and reducing sugar contents in Jerusalem artichoke planted in different seasons was aimed to comparison the effect of different planting seasons on contents and storage rates of inulin and reducing sugar in Jerusalem artichoke var. KKU 50-4. We planted it in each month of December 2013, January, February, March and April 2014. Leaves, stems, roots and tubers were harvested at 20, 40, 60 and 80 days after transplanting (DAT) and harvesting stage for determining contents and storage rate of inulin and reducing sugar. The results showed that the highest inulin content was found in the roots and tubers at 40 DAT planted in April. And then the trend of inulin content in tubers drastically declined at harvesting stage. Total inulin in all of months also exhibited high value at the beginning of growth stage and then drastically declined at harvesting stage. This resulted in high inulin storage rate in the beginning of growth stage and then reduction of inulin storage rate was found at harvesting stage. Reducing sugar content in tubers increased up at the beginning growth stage to harvesting stage. This result was found in all of month transplanting. The highest reducing sugar content was found in tubers at harvesting stage planted in December 2013. In contrast, reducing sugar content in leaves, stems and roots indicated high value at the beginning of growth stage and slightly decreased at harvesting stage and found in all of month transplanting. This result suggested that there was translocation of reducing sugar from leaves, stems and roots to tubers during harvesting stage, especially planted in December. Therefore, economic yield of Jerusalem artichoke var. KKU 50-4 such tubers, transplanted in April obtained high inulin at the beginning growth stage (at 40 DAT) and high reducing sugar at harvesting stage when transplanting in December.

Keywords: Helianthus tuberosus L., storage rate, inulin, reducing sugar

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Study on metabolomics between southern European garlic and common garlic based on GC-MS and LC-MS technology

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In this study, metabonomics methods based on GC-MS and LC-MS technology were employed to study the difference of metabolites between southern European garlic and common garlic (Cangshan garlic, Jinxiang garlic) in order to provide the basis for the selection of garlic varieties and the innovation of germplasm resources. 81 (class) compounds were identified through the detection and analysis of total metabolites of the three different garlic varieties, including the primary and secondary metabolites such as glycosides, alcohol, amino acids, polysaccharides and alkaloids. Combined with PCA and PLS-DA chemical analysis methods, it was found that the metabolites of three garlic varieties were significantly different, of which 57 metabolites were significant. 2, 3-Dihydroxybutanedioic acid, 2-methyl-Fumaric acid, Galactose, Glucose and Lecucine in southern Europe garlic were significantly higher than Cangshan garlic and Jinxiang garlic. Arabitol, Glucose-6-phosphate, Fructose-6-phosphate, Glycerol-3-phosphate, Heptanoic acid, Hexadecanoic acid, Lactic acid, Nicotinic acid, Proline and SThreitol in southern Europe garlic were significantly lower than Cangshan garlic and Jinxiang garlic.

Keywords: GC-M, LC-MS, Nanou garlic, metabolite differences

S19- Root and Tuber Crops: Value Added Crops for the Next Generation (2nd International Symposium)

SUBMITTED ABSTRACTS

POSTER PRESENTATION

Allium roseum L. as Antiproliferative and Differentiating Agents of Human Acute Myeloid Leukemia Cells Lines

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Epidemiologic studies support the premise that Allium vegetables may lower the risk of cancers. The beneficial effects appear related to the organosulfur products generated upon processing of Allium. Leukemia cells from patients with acute myeloid leukemia (AML) display high proliferative capacity and have a reduced capacity of undergoing apoptosis and maturation. The present study was an evaluation of proliferation, cytotoxicity, differentiation and secretion of AML cell lines (U937) in response to treatment with dehydrated, freshly and crushed aqueous extract of *A. roseum* L.

As assessed by flow cytometry, ELISA, and gelatin zymogaphy, we showed that these extract inhibited cell proliferation in dose-dependent manner. Dehydrated *A. roseum* aqueous extract was neither due to 1) apoptosis and necrosis nor cytotoxicity, 2) induced macrophage maturation, and 3) not inhibited the levels of secreted MMP-9. By establishing for the first time that *A. roseum* L. aqueous extract affect proliferation, and differentiation of leukemic cell lines, this study provides the opportunity to explore the potential efficiency of this endemic of North Africa species and their molecules in AML.

Keywords: acute myeloid leukemia, Allium roseum, proliferation, differentiation, matrix metalloproteinase-9

POSTER PRESENTATION

S19- Root and Tuber Crops: Value Added Crops for the Next Generation (2nd International Symposium)

SUBMITTED ABSTRACTS

Chemical composition and yield of onion under different fertilizer regimes

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Onion is a very important vegetable crop throughout the world, while in Greece it is the most important cultivated Allium species. Although fertilization requirements have been more or less evaluated regarding crop yield, little information is available regarding their effect on chemical composition of onion dry bulbs. In the present study, we examined the effect of fertilization and zeolite on yield and chemical composition of two onion genotypes ["Sturon" (commercial cultivar) and "Vatikiotiko" (local landrace). Five fertilizers treatments were applied, namely: 1) control (C), 2) farm yard manure (M), 3) standard fertilizer (F1),4) zeolite + standard fertilizer (Z) and 5) slow release nitrogen fertilizer (F2). Crop was established on 18-19/03/2017 by using sets of medium size for both genotypes (14/21 for "Sturon" and sets of similar size for "Vatikiotiko") in a plant density of 22 plants m^{-2}. Harvest took place on 14-15/07/2015. After harvest total yield and buld compactness, dry matter and total soluble solids (TSS) contents were recorded. Chemical composition analyses included proximate composition, sugars, organic acids, tocopherols, carotenoids, chlorophylls and fatty acids contents and antioxidant activity. The results of the study showed that fertilizer treatments (F1, Z and F2) had a beneficial effect for "Sturon" genotype, whereas for "Vatikiotiko" standard fertilizer (F1) resulted in higher yield. Compactness, dry matter and TSS contents were also affected by fertilizer regime. Control treatment was more beneficial for carbohydrates and energy content for both genotypes, as well as for sugars content in "Vatikiotiko" and organic acids content in "Sturon". Alpha-tocopherol andsugars content increased for F1 treatment in "Sturon", while the same treatment showed better results for antioxidant properties of "Vatikiotiko". In conclusion, chemical composition and quality was affected in a genotype and fertilizer treatment dependent manner, while yield increased for all fertilizer treatments only in the case of "Sturon".

Keywords: local landrace, commercial cultivar, zeolite, antioxidant activity

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

A Multiple-regression Model of Bulb Onion Yield Response to Weather Conditions in Gyeonsangnam Province, Republic of Korea

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Climate change is a challenge for onion growers because it has been causing many physiological disorders and pest problem, resulting in unstable onion bulb productivity. We evaluated climate change in the past 33 years in Gyeongsangnam province, Republic of Korea and analyzed the relationship between weather conditions and onion bulb yield from 1991/1992 to 2016/2017 growing seasons. Mean and maximum air temperature significantly increased in all the growth stages except for root establishment stage (early November to early December, phase II). During the plant vegetative stage (mid February to mid April, phase IV), mean temperature increased at 0.35 ^{o}C decade^{-1}. Precipitation widely fluctuated year to year. Bulb yield rapidly increased during 1980s with 2.51 t ha^{-1} year^{-1} (R^2= 0.683, P= 0.003) and was stabilized during 1990s and until 2002/2006 growing season with 0.51 t ha^{-1} year^{-1} (R^2= 0.441, P= 0.003). However, the yield was notably unstable and inclined to decrease from 2006/2007 to 2016/2017 with -0.68 Mg ha^{-1} year^{-1} (R^2= 0.101, P= 0.341). The bulb yield peaked in 2008/2009 growing season at 83.9 Mg ha^{-1}, but reduced at 60.8 Mg ha^{-1} in 2016/2017. In the linear regression analysis of onion bulb yield and temperature, precipitation in different growth stages from 1991/1992 to 2016/2017, onion bulb yield was positively related with mean and maximum temperature during seedling stage (early September to late October, phase I) at $P \leq 0.05$ and $P \leq 0.01$, respectively, and mean temperature during vegetable growth stage and bulb development stage (late April to mid June, phase V) at $P \leq 0.05$. Higher mean, maximum and minimum temperature during overwintering stage decreased onion bulb yield, with being non-significant. Precipitation was not significantly related with onion bulb yield. Among multi-linear regression models estimated from mean temperature, maximum temperature, minimum temperature, and / or precipitation from the phase I to the phase V. a model of the best accuracy and high applicability with a root mean squared error (RMSE) 5.012 % and precision (R^2) of 0.768 and adjusted R^2 of 0.613 can be written as follows: Yield = $5.419T_{max}$ (I) - $1.847T_{max}$ (II) - $5.138T_{max}$ (III) + $3.817T_{max}$ (IV) + $0.513T_{max}$ (V) + 0.003P (I) - 0.027P (II) + 0.004P (III) + 0.056P (IV) - 0.016P (V).

Keywords: Climate change, phyeilogical disorder, yield prediction, Allium cepa

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Melanogenesis Stimulation in Murine B16 Melanoma Cells by Tunsian Ziziphus lotus L. Extract

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Gray hair is caused by a genetic predisposition, aging, decrement of melanocytes by environmental stress, and decrement of the biosynthesis of melanin pigment or melanogenesis. Hair dye agents are used for the treatment of gray hair. However, some problems remain with these agents, such as side effects due to the dyes. Thus, there is a need for anti-gray hair agents that exhibit satisfactory melanogenesis activity and gray hair prevention. For the development of gray hair prevention agents, we have carried out a screening program to find a potential stimulant of melanogenesis from natural resources by using cultured murine B16 melanoma cells. In this study, *Z. lotus* ethanolic extract, was assessed with regard to its effects on melanogenesis in cultured murine B16 melanoma cells.

Z. lotus ethanolic extract showed a potent stimulatory effect on melanogenesis with significant enhancement of cell proliferation in a dose-dependent manner.

The *Z. lotus* ethanolic extract induced the expression of tyrosinase. In order to verify the effective components of the *Z. lotus*, its phenolic composition was assessed. It was found to be comprised mainly of vanillic acid, quercetine, 3,4-dihydroxyphenylacetic acid and p-coumaric acid. Among these components, coumaric acid reported by its potent melanogenesis stimulation activit, thereby indicating that it may play a role in the regulation of melanin content. Our results indicate that *Z. lotus* may prove useful in the development of gray hair prevention agents or tanning reagents.

Keywords: Ziziphus lotus, Melanin, melanogenesis, B16 melanoma cells**POSTER PRESENTATION**

S19- Root and Tuber Crops: Value Added Crops for the Next Generation (2nd International Symposium)

SUBMITTED ABSTRACTS

Morphological and agronomic characterization of four white onion (Allium cepa L.) Landraces

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Onion is one of the most significant vegetables in Niger because of its use as food and medicine. A nursery bed followed by transplanting is the most common method of cultivation used for onion production in Niger. But farmers cultivate several onion landraces that have a brown, red, violet, white and yellow color in separate production areas. However, the system is not organized in spite of the efforts of producers. In this study, we analyzed variation among Niger white onion landraces using agronomic and morphologic markers. The Hierarchical Ascendant Classification (HAC) and Factorial Discriminant Analysis (FDA) on qualitative and quantitative traits point out a structuration of this diversity in four groups based on leaves length and diameter, and on bulbs weight.

Keywords: Onion, Allium cepa L., White, Morphological variability, Landraces

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

The effects of storage temperature and packing method on seed yield and quality in Purple Carrot (Daucus carota L.)

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The research was carried out to determine the effects of storage conditions of seed roots on seed yield and quality in purple carrots. For this purpose, purple carrot roots were stored in cold (+ 4 ° C) and nonrefrigerated storage conditions with soil and soilless in sawdust and perforated PE bags for 16 weeks between 2015-2016. During storage, sprouting, rooting, roting and shriveling rate were determined. After planting the roots to the field, seed yield and quality characteristics were determined.

Results showed that the increasing the storage period caused to an increase the rate of rooting, sprouting and roting. Sprouting and rooting rate were higher in PE bags in cold storage and soilless and sawdust packaging in non refrigerated storage. Seed yields of roots taken from refrigerated and non-refrigerated storage were between 1.41-2.73 g and 1.17-1.84 g per plant

Keywords: refrigarated, nonrefrigarated, storage, soil, soilless, sawdust, PE bag

S19- Root and Tuber Crops: Value Added Crops for the Next Generation (2nd International Symposium)

SUBMITTED ABSTRACTS

POSTER PRESENTATION

Morphological Characterization of Edible Onion (Allium cepa L.) Genetic Resources collected around Turkey

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Edible onion (*Allium cepa* L.) production is about 2 million tons in Turkey. Open pollinated (OP) cultivars are more commonly used than hybrid ones, therefore most of the produced onions are from OP cultivars. Although one of the primary center of origin is not including Turkey considered as a secondary center of origin for onion, and yet maintains a large diversity in onion which can be used as genetic recourses. This study was carried out to characterize these populations morphologically using UPOV criteria for onion. Bulb shapes of collected materials were determined as elliptic, medium ovate, broad elliptic, circular, broad ovate, broad obovate, rhombic, transverse medium elliptic, and transverse narrow elliptic. Foliage cranking properties were observed as generally weak or intermediate. Leaf waxiness was medium and strong, bulb skin colors were white, brown, yellow and other colors. Size of determined bulbs was between 40 to300 g, and number of growing points was between1 to7. In addition, properties of collected onion materials were used in principal component analysis and a dendogram of similarity was presented.

Keywords: Onion, Allium cepa L., morphological characterization, UPOV, principal component analysis.

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Effect of low temperature conditioning on flavor precursors of garlic (Allium sativum L.) cv. 'Coreano seed cloves

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Garlic (*Allium sativum* L.) is widely cultivated around the world and it is well known due to its flavoring and medicinal properties. Both attributed to a number of volatile organosulfur compounds known as thiosulfinates where allicin constitutes the major one. Our working group reported that "seed" bulbs from "Coreano" variety conditioned at 5 °C for 5 weeks accelerated the crop cycle and increased the synthesis of phenolic compounds; however, there is little information on the variation in the levels of organosulfur compounds within garlic cloves low temperature conditioned. The aim of this work was to examine the effect of low temperature conditioning (5°C) on the levels of several organosulfur compounds in garlic "seed" cloves against not conditioning ones (25°C). Two sets of garlic cv. "Coreano" bulbs cultivated at Aguascalientes, Mexico during the crop cycle 2014-2015 were used, one set was stored at room temperature (25°C), and the other was conditioned at low temperature (5°C) for 5 weeks. Pungency was determined by the pyruvic acid method and allicin and total thiosulfinates by colorimetric assays. Qualitative determination of allicin and other thiosulfinates were obtained using an HPLC-DAD system comparing the chromatograms and UV-spectral data against the literature. The results showed that garlic "seed" cloves conditioned at 5°C and a room temperature showed no significant differences in production of allicin and total thiosulfinates; the same result was suggested by pungency measurement. Four peaks were identified in the chromatograms of both conditions. The relative areas of peaks suggest that allicin was accumulated in a larger amount on low temperature conditioning "seed" cloves compared with the other three thiosulfinates identified. This data suggest that low temperature conditioning promotes the accumulation of allicin, however decreases other thiosulfinates synthesis. Further research is needed to determine specific changes in flavor compounds in "seed" cloves conditioned at low temperature.

Keywords: thiosulfinates, low temperature conditioning, pungency.

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POSTER PRESENTATION

The Effect of Nitrogen and Sulphur Applications on Pyruvic Acid Content of Onion (Allium cepa L.)

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The aim of this study was to determine the effect of nitrogen and sulphur applications on pyruvic acid content of onion. The study was carried out in Atatürk Central Horticultural Research Institute in 2012 and 2013 years. The fertilizers were applied in combination of N and S. The ratios of the N-S combinations were 0, 50, 100 and 200 kgN ha^{-1} and 0, 25, 50 and 100 kg S ha^{-1}. The effects of applications on pyruvic acid content which an important quality criteria of onion were determined.

First year, the pyruvic acid contents were found between 10.88- 13.59 µmoles ml^{-1}. The smallest contents were determined on $N_{20}S_{2,5}$. On the other hand, the biggest content were determined N_0S_{25} combinations. The pyruvic acid contents of second year's bulbs were higher than first year. They were found 11.69- 14.60 µmoles ml^{-1} and $N_{200}S_0$, N_0S_0 combinations respectively. The effect of nitrogen and sulphur fertilizers on pyruvic acid content of onion was not found to be statistically significant both years.

Keywords: Onion (Allium cepa L.), nitrogen, sulphur, pyruvic acid

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Production of Chinese chive (Allium tuberosum) as potted herb

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Chinese chive is an important *Allium* herb native to east Asia. Chinese chive blossoms throughout summer and fall seasons. Aerial parts of this plant is consumed fresh or processed. It can also be used as an ornamental in house gardens and public parks. Chinese chieve is considered as a minor vegetable but its production is gaining popularity as a potted herb in many countries. We carried out an experiment to test whether this species is suited for production as a potted herb. The seeds of Chinese chive were germinated in the greenhouse by sowing them in plastic trays (104 cavities) filled with a mixture of turf and perlite (2:1). About three months after germination seedlings were transferred to 2 L pots filled with the same mixture. Plant development was slow in the first year and about three shoots were produced by each plant in the first growth season. In the second year, plants were transferred to 4 L pots in early February. All Chinese chive plants produced multiple shoots and flowers in the second season. Aerial parts of the plants were harvested in early Fall. In average, each pot contained about 45 shoots and ~80 flower stalks. About 250 g of pseudo-stem, leaf, and flower stalks was obtained from each pot. Potted Chinese chive plants can be maintained many years by transferring them to larger pots before the start of every growth season. Our results clearly show that Chinese chive is well suited for production as potted herb.

Keywords: Allium tuberosum, greenhouse, yield

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

New Onion (Allium cepa L.) Varieties for Long and Short Day Periods

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Turkey has suitable climatic conditions for short and long day onion (*Allium cepa* L.) cultivation that is why onion one of the main vegetable in Turkey with 1.904.846 ton production. In the past, while long day onion varieties generally propagated by sets, short day onions demand has been increasing for the last three decades. Onion production is done widely by open pollinated varieties. This research was carried out in Atatürk Central Horticultural Research Institute to determine the best long and short day onion varieties for Marmara Region. Short day onion varieties (K1, K2, K3 and K4) were seeded in autumn and long day onions varieties (U1, U2, U3 and U4) were seeded in spring. Each experiment was arranged in a randomized complete block design with 4 varieties and 4 replications. During growing period, number of leaves per pseudostem, leaves attitude, waxiness, intensity of green color, cranking, leaf length, leaf diameter, pseudostem length and after harvest bulb size, diameter, height, ratio of height to diameter, shape, width of neck, scale thickness and base color, number of centers per bulb and dry matter content properties of bulbs were determined. Data were subject to analysis of variance using the JUMP (version 7.0) pc program. Means were separated by Tukey's multiple range tests.

Among the short day onions, K-4 numbered variety produced the heaviest bulb with a weight of 240 g. In addition the highest yield (6,720 kg/da) was observed from this variety. The means of the other varieties similarly grouped in the second.

Observed different parameters, the long term onions were investigated for yield and yield components. The first group included U-1 variety with a bulb weight of 161.5 g and yield of 5438 kg/da, together with U-4 variety with a bulb weight of 155.9 g and yield of 5,247 kg/da, respectively.

Consequently, according to the yield and yield parameters K-1, U-1 and U-4 varieties distinguished the best for Marmara region among the other onion varieties.

Keywords: Onion, Allium cepa L., long day, short day

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Toxicity of salicylic acid and acetylsalicylic acid in Raphanus sativus submitted to water stress

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Drought can cause serious damage to horticultural farmers. Crops like *Raphanus sativus* (radish), which requires high amounts of water for its development are specially sensitive to drought. Currently few resources are available to recover plants or to avoid the damage caused by drought. There are substances found naturally in plants such as the hormone Salicylic Acid (SA) which is known as an inductor of the plant defense system against biotic and abiotic stressors like water stress. Therefore, the aim of this work was to evaluate the effects of SA and its analogue Acetyl Salicylic Acid (ASA) in the concentrations of 0, 0.01, 0.1, 1 and 10 mM exogenous application on seeds treated for 2 hours. We made another AS and ASA aplication 10 days after emergence via soil on plants of *R. sativus* water stressed. Analysis of fresh weight, carotenoids, antioxidant activity (DPPH) and total phenolics (Folin-ciocalteu) in both roots and shoots, chlorophyll a, b and total were performed to evaluate plant responses to the hormone. The highest concentration studied, 10 mM of AS and ASA was toxic to the seeds and there was no germination. In shoots and roots treated with AS and ASA for all analysis the highest values were in the control group, showing some level of toxicity to *Raphanus sativus*. Our results show that AS and ASA do not contribute to induce plant defense system against abiotic stressors like water stress in *R. sativus*.

Keywords: Plant hormones, abiotic stress, brassicaceae

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Peruvian Carrot yield under different planting systems and spacing

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The peruvian carrot (Arracacia xanthorrhiza), although considered a relatively rustic crop, is very demanding in basic care of crop management. These, when not carried out, can reduce yield, such as the use of poor quality seedlings, unfavorable climate conditions, inadequate soil preparation and systems, densities spacing. Therefore, the purpose of this study was to evaluate the best planting systems and space for the culture. The experiment was conducted in Ribeirão Preto and São Simão in São Paulo State, Brazil. The cultivar was 'Amarela de Senador Amaral' and the experimental design was a randomized block arranged in a 2 × 4 factorial adopted, with two planting systems (bed and ridge) and four spaces (two spacing between rows, 70cm and 80cm, and two spacing between plants, 30cm and 40cm). The individual statistical analysis for Ribeirão Preto showed that there wasn´t significant difference neither for the spacing factor nor for the interaction between spacing and planting systems. The planting systems factors were significant for number and yield of shoot; commercial and no commercial yield and number of roots; and for yield percentage of commercial roots. In all of them the bed system showed best condition for the crop development, allowing producers to remain with their bed system crop to introducing a new crop highly valued, without additional cost. In São Simão, there wasn´t significant difference between the factors. When the joint statistical analysis of the experiments was performed, the treatment factor didn´t showed a significant difference; the place factor showed significant difference for number and yield of shoot; for commercial yield and number of roots; and the yield percentage of commercial roots, being São Simão was superior. Finally, for interaction between treatments and places, there was a significant difference for yield and number of shoots, and for the yield percentage of commercial roots.

Keywords: Arracacia xanthorrhiza, bed, ridge, density, yield

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POSTER PRESENTATION

Physical and physiological characteristics during storage at cold and ambient temperature of carrot and cenourete cultivars

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The mechanical damage caused by the cut stimulates surface discoloration, dehydration and the accumulation of secondary metabolites in the carrot root, being proportional to the intensity of the cut. The objective was to characterize physical and physiological changes in three varieties of processed and whole carrots treated with ethylene and stored at two temperatures. The cultivars Alvorada, Brasília and Esplanada were harvested and the separation of whole carrots and baby carrots type cenourete®. In each of the groups, half received application of ethylene (10 ppm for 24 hours) and the other half control. Afterwards, carrots were conditioned in plastic bags and stored at 8 °C and 25 °C for 6 days. Samples were taken at every three days three days for analyses of the relative fresh weight loss, whitening index and total phenolic compounds. It was observed that the application of ethylene had no marked effect on all analyzes, regardless of the storage temperature. The roots stored at room temperature lost more weight, and the loss was higher in baby carrot. Regardless of the processing or not, all the carrots exceeded the maximum fresh weight loss (8%). The cenourete® has greatly increased the values of whitening index between 0 and 3 days, independent of treatment. There was an increase in total phenolic compounds during storage, in the three cultivars and for all treatments. Application of ethylene, the concentration used did not change the physical and physiological characteristics of carrots; there were differences between storage temperatures, cenouretes® and carrots; and there were differences between cultivars during storage.

Keywords: Daucus carota, minimally processed, relative fresh weight loss, whitening index and phenolic compounds

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Initial material of carrot as a valuable source in breeding for disease resistance and productivity

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The research was carried out at the experimental field of the Kazakh Research Institute of Potato and Vegetable Growing located 40 km west of the Almaty city, under irrigation conditions. A field visual assessment showed that from the studied 51 carrot samples of the nursery of the original forms, the carrot accession samples CR00535, CR00655 and CR01253 showed no signs of powdery mildew infection, and in the accession CR01715, the infection score was very weak (1-10% of the leaves) – 0,1; with a weak infection (11-25% of the leaves) were documented the samples CR00534, CR00533, CR00065, CR00004 and CR00102 – 1,3-1,9 points; the average leaf lesion score had 27 carrot accessions with a infection score of 3,1-3,8 (more than 51% of the leaves). Alternaria in the nursery of the original forms spread to a much lesser degree. From the studied 51 carrot accessions of the nursery of the initial forms, only 20 acession samples - Alau, CR00065, CR01472, CR00072, CR01630, CR00104, CR01226, CR01065, Nantes 4, CR00655, CR00230, CR00088, CR01625, CR00612, CR01470, CR01625, CR00612, CR01470, CR01443 CR01435 showed symptoms of infection by alternaria – 0,1-0,4 points (1-10% of leaves). Accounting showed that 28 varieties with yields from 37,2 to 89,9 t/ha were found with gross yields higher than the domestic standard variety 'Alau' (36,8 t/ha). Below the indices of 'Alau' there were 24 varieties, including the variety Nantskaya 4 – 32,8 t/ha. The minimum gross yields were shown in carrot accessions CR00004, CR00091 – 20,0 t/ha and CR00230 – 18,5 t/ha. The yield of carrot accessions CR00534, CR01710, CR00535, CR00102, CR01465, CR01443, CR00645, CR00533, CR00065, CR00009, CR00072, CR01312, CR01471, CR00655, CR00778, CR01065, CR01226, CR01686 and CR01715 was higher than that of the domestic variety 'Alau' (31,0 t/ ha) by 1,0-72,9%. The lowest commercial yields were shown in the accessions CR00552 – 9,6 t/ha and CR01472 – 6,2 t/ha.

Keywords: carrot, genotype, accession, evaluation, powdery mildew, alternaria, productivity.

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Morphophysiological and agronomic characteristics of potato cv. Markies treated with gibberellin inhibitors

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Potato is one of the main staple food on the planet, like corn, rice and wheat. However, under summer Brazilian climate conditions the cultivation suffer excessive growth of the stems and foliar mass causing auto shading, with consequent increase of the diseases, reducing productivity and dry matter content of tubers. The objective of this work was to evaluate the effect of growth regulators on plant height, number of stems and tubers, carbohydrates and production of 'Markies' French fry processing potato, grown under summer conditions at the state of Minas Gerais. Thirty-five days after planting, paclobutrazol (PBZ) at 0.125 and 0.250 L ha^{-1} and trinexapac-ethyl (TE) at 1.0 and 2.0 L ha^{-1} were sprayed up to leaf run off. PBZ at the highest dose was the most efficient treatment reducing the plant height by 20% compared to control plants. However, the same dose significantly reduced the number of tubers per plant and the final production. The number of stems per plant was not altered by any treatment. The use of growth regulators provided the anticipation of the tuberization process. Tubers from control treatment and plants treated with 1.0 L ha^{-1} TE showed higher starch content at harvest of mature tubers.

Keywords: Carbohydrates; growth regulators; plant height; paclobutrazol; trinexapac-ethyl

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Comparison of effective accumulation temperature and tuber productivity by different accessions and sowing period of yam bean (Pachyrhizus erosus (L) Urban)

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This study was performed to seek suitable sowing period of yam bean (*Pachyrhizus erosus* (L) Urban) in Korea. For that, we compared the effective accumulation temperature (EAT) on growth stages and tuber productivity by the different sowing times with the two accessions at Iksan of Korea. The EAT for emergence of two accessions was similar, but EAT on growth stage were a little different according to accessions. The average EAT required for flowering, tuber formation and tuber hypertrophy of EC-101 were 868°C, 939°C and 1,601°C. Also, the EAT required for flowering, tuber formation and hypertrophy of CGMM were 293°C, 280°C and 108°C higher than that of EC-101, respectively. Sowing time has marked influence on tuber formation and productivity. In Sowing at April 25, tuber formation was relatively slower than sowing after May 10, and it needed more cultivation days for tuber hypertrophy. In sowing after June 10, tuber was not sufficient to enlarge due to lack of growth days by frost in late October. Sowing on May 25 and May 10 led to the highest productivity of tuber in EC-101 and CGMM, respectively. And at this time, the EAT of EC-101 were about 1,900°C and that of CGMM were 2,050°C. As a result, sowing on May is best for maximum tuber productivity in the central-southern plain of Korea, and it is appropriate to sow on or before early June to obtain more than 80% of productivity.

Keywords: Sowing time, Hypertrophy, Productivity

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Determination of Hybrid Potential of Carrot Germplasm

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The use of the seed of hybrid cultivar for carrot production in Turkey has reached to 90% and this hybrid carrot cultivar seed has been imported from abroad. The reasons why hybrid cultivars has been preferred for carrot production are high yield and uniform root size, shape, color and tast. In Turkey, 2 tones of seeds from open-pollinated cultivars and 18 tones of seeds from hybrid cultivars were used for carrot production. While the seed of open-pollinated cultivars was sold for150-200 TL/kg, the price of one kg of seed of hybrid cultivars was750-1500 TL. Although the seeds of hybrid cultivars were 10 times more expensive than that of open pollinated cultivars, hybrid cultivars were preferred by producer due to the above mentioned reasons. All of the hybrid seeds used in carrot production in Turkey were imported and about 15 million TL were paid for these hybrid seeds every year.

This study has been researched in Eskisehir Transitional Zone Agricultural Research Institute since 2014.

Keywords: Hybrid, carrot

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Using sand storage technology: Can we store sweetpotato roots for food and vines, thus contributing to food and nutrition security in drought-prone areas?

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Orange-fleshed sweetpotato (OFSP) can significantly contribute to the fight against vitamin A deficiency in Sub-Saharan Africa. Erratic rainfall, poor soil fertility, virus diseases, weevil incidence, and animal destruction are often experienced by farmers, particularly in drought-prone areas, and can disrupt crop production. There is a need for seed systems that supply sweetpotato planting material in-time, so that farmers can plant and harvest this crop early. Farmers could also benefit from improved systems to sustain their food stocks, ideally up to the next harvest season. Between 2011 and 2017, studies were conducted in Northern Malawi and Ghana on a technique using sand to store sweetpotato storage roots. The sprouted roots can be planted for producing vines (planting material) and unsprouted roots used for household consumption or sales. Various types of sand, and some indigenous storage techniques were investigated. Using dry sand storage has proven to be highly effective for rural poor people living in drought-prone areas. The studies found that vines could be readily available for planting, particularly at the onset of the rainy season. As rains become more inconsistent, this technology may allow farmers to quickly respond to the early start of the rainy season, producing quality planting materials. Trained vine producers were able to generate income from vine sales. Furthermore, farmers had improved food security during the hunger period and could sell roots to buy other food items or household needs. Sand storage allowed farmers to realize good market prices, in contrast to the peak of the harvest season when prices are low due to glut. The overall findings showed the sweetpotato sand storage technology to be an effective approach to help reduce poverty, improve food and nutrition security, and mitigate the effects of climate change

Keywords: Food and nutrition security; climate smart agriculture; sweetpotato planting material; orange-fleshed sweetpotato; fresh root storage

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Analysis of metabolites and expression characteristics of sulfur metabolism related genes in Nanou garlic and common garlics based on LC-MS

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In this study, LC-MS was used to detect the differences in the whole metabolism group and the difference in the content of partial metabolites in garlic and common garlic. Meanwhile 6 genes related to the metabolism of sulphur metabolism in garlic were analyzed by fluorescence quantitative PCR. The results showed that the Nanou garlic were significantly different from the common garlic in the metabolic groups and the content of metabolites of thioselfic. The content of allicin and alliin in Nanou garlic was significantly lower than that of common garlic, and the difference in the expression of genes encoding related enzymes was in accordance with the content of metabolites.

Keywords: LC-MS,sulfur metabolism,expression characteristics,Nanou garlic

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SUBMITTED ABSTRACTS

POSTER PRESENTATION

Rizospheric microorganisms associated with coffee plants (Coffea arabica) and their effects on magnetic fields

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The agriculture is influenced by environmental, social, economic and tech factors, having an important role because it produces foods to reduce costs and increased performance. To do this, it needs to take innovations of other disciplines as physics. Different researchs have shown that magnetic fields can influence on plant growth, however they have not demonstrated its influence on coffee radicular system. The goal of the present work was to study the magnetic influence on microbial activity especially in fungi and bacteria rizospherical of coffee crop (Coffea arabica), and on their root system. The experiment was done with next evaluations: 0 (witness), 150, 300 and 400 militeslas (mT), at Horticulture Institute greenhouse and at soil microbiology lab in Soil Department, both in Chapingo University. Soil samples and coffee plants were brought from North Puebla's coffee region. The experimental design was completely random to root growth and microbial activity, while an factorial design was employed to number of colonies. The results indicated that root growth was greater at 300 mT, however it reduces when magnetic field intensity increase. About the fungi growth, the magnetic influence, their development, in contrast to the reduction of the bacterial colonies due to them were inhibited. Regarding microbial activity in soil, to 400 mT this is increased. Finally, samples of leaves with symptoms of rust (H. vastatrix) were collected. Subsequently, the fungal isolates obtained were characterized microscopically and compared with the morphological characteristics of the coffee rust fungus (H. vastatrix). The fungi obtained were subjected to the same intensities of magnetic fields observing that there is an effect on the development of fungi since over time, some characteristics of fungi such as color and shape vary according to the intensity of the magnetic field, difference of the witness, who only had fungi of the same color.

Keywords: microbial activity, bacteria and fungi colonies, magnetic intensity, rizospheric microorganisms