IHC 2018 S23

Organic Horticulture for Wellbeing of the Environment and Population (2nd International Symposium)

ORAL PRESENTATIONS

KEYNOTE 1

MAKING ORGANIC HORTICULTURE GROW IN THE GLOBAL SOUTH

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Most of the organic producers (84%) are located in Asia, Africa and Latin America, while 90% of the retail sales happen in North America and Europe. Horticultural crops (fruits, vegetables, nuts, ornamentals, aromatic and medicinal plants and nurseries) are grown in over 3.2 million hectares, representing 5.6% of the organic agricultural land worldwide (excluding wild products)[1]. Organic exports can provide important revenues for countries in the global South, but the growth of local markets in these countries is happening at unprecedented rates as middle classes demand superior food and health concerns drive consumer choices, but also because many countries develop national regulations and promotion schemes, including innovative guarantee systems and efforts to combat fraud in the organic marketplace. It has been noted that "while there is sound development and wide prosperity in the organic sector, many stakeholders also see a need … to make production and consumption truly sustainable … certified organic agriculture has not even reached 1% of agricultural land … and there are many organic operations that need to improve their practices to become truly sustainable for their environment, their society, their tradition, and their business"[2]. This presentation will present key features of organic horticulture in the global South in an attempt to identify key features and innovations that suggest pathways for improvement of the sector, as well as main research needs. These will include considerations dealing with ecological, economic and social sustainability, with emphasis on biodiversity, agronomic practices, development of local markets and institutions. In the end, a discussion on the potential of organic agriculture for smallholder production will make use of key concepts in agroecology and rural development as experienced by the Latin American movement.

Keywords: organic horticulture, global South, agroecology

SESSION 1: ORGANIC HORTICULTURE STATE

OS 1-1:

ADOPTION OF ORGANIC TEA PRODUCTION IN TURKEY

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This research was aimed to reveal the adoption of organic tea production in Rize province of Turkey. The primary data were collected with surveys from organic and conventional tea growers in the research area. The tea growers were determined using simple random sampling method (115 organic and 50 conventional). The conventional tea growers were asked the reasons for rejecting organic production and the conditions for adopting organic production. According to the results of the study, 50% of conventional tea growers thought that organic production was not economically profitable. On the other hand, 20% of them were not invited by ÇAYKUR. For these reasons, most of the conventional tea growers could not adopt organic production. On the other hand, 21%

of conventional tea growers wanted to convert organic production. According to them, organic production is more profitable due to better price for organic tea products and more suitable for the health of people. It has been also determined that the organic tea growers adopt organic production due to support ÇAYKUR and protection of the environment. They learned to the principles of organic production by ÇAYKUR and their agricultural engineers in the tea factory. Factors affecting the adoption of organic tea production were determined as innovativeness, economic factors, social factors, environmental protection factors and health factors, respectively. This study conducted in the province of Rize the highest tea production area Turkey and the results are believed to be useful for planning, implementing and developing organic production projects in Turkey and the places with similar conditions.

Keywords: Adoption, Organic, Tea, Convention, Turkey

OS 1-2:

FARMERS' PERCEPTION ON ORGANIC FRUIT PRODUCTION IN EASTERN THAILAND

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Thailand is the major producer and exporter of various quality tropical fruits in Southeast Asia. Fruit trees cultivation is usually intensive and conventional practices to promote premium quality. Organic fruits supply is still small in the market, while consumer demand is increasing. Thus, organic produce and its processing are valuable in the niche market. Currently, the success of organic farmers may play a role both aspects on production and marketing in order to conserve their means. This study aimed to determine farmers' perceptions including knowledge, practices, and attitude towards organic fruit production and constraints and recommendations on organic fruit production. The research methodology was done through in-depth interview schedule with organic fruit growers in 3 provinces of eastern Thailand, Crop Year 2016. Testing the reliability of knowledge and practices on organic fruit production used the Kurder-Richardson reliability coefficient 21 with a reliability of 0.95. The synthetic differential scaling method of attitude was determined by reliability of Cronbach's alpha value of 0.79. The findings revealed that most farmers had good perception of the principle of organic agriculture in terms of conserve soil and water resources. The most ordinary production constraint was lack of labor force in harvesting period.

Keywords: organic produce, conventional, knowledge, practice, attitude

OS 1-3:

TURKEY'S PERSPECTIVES AND POLICIES ON ORGANIC HORTICULTURE

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Organic agriculture is one of the eco-friendly production techniques and it is essential in terms of sustainable development, environmental protection, contribution to employment, prevention of migration from the countryside, feeding the consumers with healthy products and created added-value. On the other hand, the concentration of the organic agriculture activities in mainly plant production in Turkey is considered as an important opportunity area. Indeed, starting with 8 goods as the export-oriented organic agriculture in 1984-1985, has reached 225 goods in 2016. In addition, the organic agricultural production area of 89.827 hectares in 2002 has increased to 523.778 hectares levels in 2016. However, despite these positive developments, the current increase in the share of total agricultural area of organic agriculture in Turkey is still needed. Therefore, the evaluation in detail of the limiting factors in the development of these aspects are important. The main aim of this paper is to evaluate the limiting factors in the sustainable production of organic horticulture in a wide perspective. Within this framework, developed policies, regulations and their effects on the scale of the EU and Turkey were examined for organic horticulture. In light of the findings, it is observed that organic agriculture regulations in Turkey carried out on the axis of EU progresses. Besides, it is thought that usage, production and

market share of organic products will increase in the coming period. Therefore, in order to enhance the sustainable global competitiveness of agriculture sector it is important that generalized the organic farming practices of high potential for foreign trade. As a conclusion, it is need to increase the capacity of R&D activities of organic inputs.

Keywords: organic horticulture, sustainability, policy, regulation

OS 1-4:

EVALUATION OF THE IMPACT OF ORGANIC AGRICULTURE TRAINING IN AN URBAN CONTEXT

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Portugal is following the global trend of an urban population more attentive to health and environmental sustainability. In this context, a high demand of organic agriculture training was detected in Oporto, the second major city in Portugal. In response, the Intermunicipal Waste Management of Great Oporto (Lipor), developed several training courses, since 2002. The objective of this work was to analyse the impact of this great effort and inquire about its effects in the community, through evaluation of the training course in Organic Agriculture 1 (OA1), with 14 hours, 40€ payment, running twice a year, in "Horta da Formiga/Academia Lipor", between 2006 and 2016. It was performed a quantitative analysis based on an online survey sent to the 840 trainees with an electronic address (from a total of 1120) and it was obtained 31.5% responses. The survey included a sociodemographic characterization and 11 questions covering food, health, professional and social/community potential impacts. From the 265 responses, 66% attended the OA1 course between 2012-16, 56% were female; 78% aged between 35-64 years; 76% had higher education and 20% secondary school; 59% were specialists in intellectual and scientific jobs; 60% were employed and 23% retired. The course attendance contributed to healthier food behaviours (75%) and 77% started to eat organic food. This was significantly related to the positive health effects (76%), revealed by increased physical activity (74%), wellbeing (66%) and reduction of stress and tiredness (42%). Therefore, trainees improved quality of life and, at the same time, they assumed a greater environmental awareness (80%) and increased healthy social practices (47%). The course attendance led trainees to better decisions in organic production techniques, for those with home garden or urban allotment (69%), but was not an opportunity to change their professional activity.

Keywords: organic agriculture, health, food, professional, social, benefits, trainees

SESSION 2: ORCHARDS

OS 2-1:

ENERGY FLUX ANALYSIS IN FRUIT AGROECOSYSTEMS

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Industrial production systems use subsides that accelerate energy flux and nutrient cycles increasing entropy. This is visualized in the contamination and loose of diversity. Energy flux analysis assess agricultural practices, Identify processes to be improved and give tools to develop agroecosystems with a degree of entropy compatible with life. The objective of this work was to determine how different energy sources affect a fruit crop and propose strategies to improve the sustainability of agroecosystems. Energy flux was done for a crop obtained from an organic-biodynamic apple plantation of Red Delicious cv. Top Red, 30 years old. It was considered that the production responded to a “Superior” quality for fresh consumption. Cultural Biological energy was determined with labor costs data used in the orchard and industrial energy through the consumption of oil and electricity. The production system studied, had industrial direct energy values of 24,106.57 MJ/ha and cultural biological energy values of 449.56, equivalent to 98 % and 2 % of the total energy input to the orchard respectively. Dependence on energy subsidies that increased industrial energy can be reduced with the application of different strategies that will be discussed. In the fruit-growing system, total energy revenues are largely retained in the agricultural ecosystem for the structure and maintenance of the "Fruit deciduous forest" that sequesters carbon and this could determine lower efficiencies compared to other crops. So, not only harvested fruit should be counted in the analysis. Agricultural sustainability is reached by adequate knowledge of ecological processes at farm and regional level and through socio- economic changes that promote sustainability in all sectors of the food system. The Agriculture system should allows appropriate levels of production with the conservation of natural resources taking into account social, spatial and temporal asymmetries and inequalities in the human use of resources.

Keywords: Cultural biological energy, industrial energy, energy subsidies, sustainability

OS 2-2:

TOWARDS ORGANIC CITRUS 3.0

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During the last twenty years, the organic food and farming sector has grown considerably worldwide and citrus is one of the most highly demanded products on the market. Organic farming is an agricultural regime based on agroecology principles, and the increase or maintenance of the soil organic matter over time is a key issue of organic agroecosystems. Results of case studies carried out in Southern Italy already demonstrated that organic citrus management is a technically feasible option for citrus growers. Transition challenges and recent results of a field trial on organic orange set up in 1995 are shortly presented. By means of in-farm composting of residues is possible to recycle a relevant part of organic outputs in fruit tree systems in arid environments. The combined action of cover-cropping and conservative soil management techniques can act to increase the economic and environmental sustainability of organic citriculture.

Keywords: Orange, agroecology, ecological service crops

OS 2-3:

IMPACT OF THE USE OF PHOTOSELECTIVE NETS ON TWO APPLE CULTIVARS IN A MEDITERANNEAN ORCHARD

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Organic management for tree fruit production is a challenge as these perenial crops are grown in open field conditions for several years with major biotic and abiotic stresses for their production. Protected cultivation is less explored for tree fruit production as it is for vegetables and small fruits. But the use of netting system is becoming more and more popular in orchards globally in order to protect against environmental damages such as hail, frost and wind, flying pests and excessive solar radiations. The aim of this project was to measure and compare the effects of photoselective red netting systems on fruit quality indicators, tree vigor, micro climate and major apple pests in an experimental orchard in the Bekaa region in Lebanon. Fuji and Jonagold trees were either covered with net after full bloom or left under field conditions. The nets significantly protected the apple trees against codling moth. Photosynthetically active radiation (400-700 nm) transmission was reduced whereas the efficiency of the photosystem of the leaves was higher under nets compared to the control trees. Microclimate conditions comprising temperature, humidity and light intensity were monitored throughout the season whereas fruit quality indicators such as size, weight, skin colour, sugar content, firmness, starch index and grading were monitored at harvest .The use of photoselective nets seemed a promising tool for a better quality fruit and an overall tree health with the opportunity of reducing the use of pesticides.

Keywords: Photoselective nets, apple, sustainable production system, tree fruit, fruit quality, photosynthesis, codling moth, postharvest quality.

OS 2-4:

EFFECTS OF DIFFERENT FLOOR MANAGEMENT METHODS APPLIED FOR FIVE YEARS IN AN ORGANIC OLIVE ORCHARD

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Orchard floor management is an important cultural practice for successful and sustainable cultivation of fruit crops including olives. Orchard floor management methods have an effect on soil organic matter, soil mineral content and soil moisture which then effects the growth of the plants, yield and quality of the fruits. A field experiment was designed in organic olive orchard at Atatürk Horticultural Central Research Institute (Yalova, TURKEY) in which 4 different floor management methods were implemented. The methods tested were traditional tillage, no-till management, organic mulch (straw) and cover crops (vetch + oats). The trial aimed to find a sustainable olive orchard floor management system that could be recommended to the producers. Tested floor management methods did not show any statistically significant effects on yield or on olive fruit quality. Even though some positive effects of cover crops on the soil properties have started to appear as confirmed by the significant differences obtained from some of the samplings, the effects of tested floor management methods on soil properties did not differentiate clearly for most parameters. Based on these results, it is possible to propose using cover crops – under conditions where there is no strong competition – instead of traditional tillage which has additional costs and possible negative effects on environment. It is expected that maintaining the same research plan for longer terms will further differentiate the effects of floor management methods over the years, and significant impacts of applications will also be seen.

Keywords: No-till, mulch, cover crop, tillage

OS 2-5:

EFFECT OF ORGANIC MANURES ON GROWTH, YIELD AND ECONOMICS OF POMEGRANATE (*PUNICA GRANATUM* L.) CV. SUPER BHAGWA UNDER NORTHERN DRY ZONE OF KARNATAKA

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An experiment was conducted to study the growth behaviour, fruit yield and the B:C of pomegranate (*Punica granatum* L.) cv. 'Super Bhagwa' as influenced by different organic sources of nutrients under northern dry zone of Karnataka during hasta bahar season of 2016-17 at Department of Fruit Science, University of Horticultural Sciences, Bagalkot, Karnataka, India. The experiment was laid out in a complete randomized block design with seven different sources of nutrients viz., 100% Recommended dose of nitrogen (RDN) through FYM, 100% RDN through vermicompost, 100% RDN through poultry manure, 100% RDN through green manure with sun hemp, 100% RDN through sheep manure, 100% RDN through neem cake and recommended dose of fertilizer (control; 400:200:200 g N:P2O5:K2O per plant). Results revealed that 100% RDN through vermicompost recorded significantly higher number of shoots (45.73/plant), highest shoot length (95.30 cm), plant height (3.97 m) and plant canopy spread in both North-South (2.82 m) and East-West (2.98 m) directions followed by 100% RDN through poultry manure. 100% RDN through poultry manure recorded significantly more number of productive flowers (85.15/plant), highest fruit set (67.16 %) and yield (13.43 kg/plant) which was followed by 100% RDN through neem cake and control (T7). Highest gross income (Rs.932512/ha), net income (Rs.620695 /ha) and B:C (2.99) were recorded by 100% RDN through poultry manure. Thus, the present investigation revealed that the vermicompost was superior over other organic sources in improving vegetative growth and closely followed by poultry manure and poultry manure was superior over other organic sources in improving flowering, fruit set, yield and B:C of the pomegranate cv. Super Bhagwa.

Keywords: Growth and yield, organic manures, pomegranate, Super Bhagwa

OS 2-6:

ECONOMIC ANALYSIS OF ORGANIC APRICOT FARMS IN MALATYA REGION OF TURKEY

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Turkey is one of the important apricot producers of the whole world as well as a lot of fruit types. Apricot production is most intensive farmed in Malatya region of Turkey. In this study was aimed to make the economic analysis of organic apricot producer farms, which produce one of the major agricultural products of Turkey. The research data were collected from 56 organic farms by survey method using stratified randomly sampling method in 2012 production year. Sample farms were stratified in three groups regarding apricot production area (0-30 decare, 31-60 decare and 60+ decare). Average gross production values were calculated 35.705,34 TL and average gross revenues as 37.785,77 TL for the organic farms. Besides average farm cost was calculated as 34.368,37 TL and the variable cost and fixed cost percentages were determined as 66,41% and 33,59% respectively for the organic farms. Average economic and fiscal rantability rates were calculated 0,87% and -3,32% for the organic farms respectively. Late spring frost damage and late labour cost were determined as most important problem for apricot farming. To overcome these problems the farms should head towards production of other fruit species and vegetables as well as apricot production. In this way, family workforce will be used more efficiently and late spring frost damages on farms reduced.

Keywords: Apricot, Malatya, organic, economic analysis

SESSION 3- CROP MANAGEMENT

OS 3-1:

MASS TRAPPING WITH DECIS TRAP TO MANAGE FLY CONTROL OF *RAGOLETHIS CERASI* AND *DROSOPHILA SUZUKII* IN IPM CHERRY ORCHARDS

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Decis™ Trap has been developed jointly by Bayer and its partner Sociedad Española de Desarrollos Químicos (SEDQ) to control Ceratitis capitata. Expansion to *Rhagoletis cerasi* and *Drosophila suzukii* has been made by the development of target specific lures which cover the whole flight period in typical multi-variety mixed cherry orchards. Mass trapping with Decis Trap aims to attract and kill adult flies in order to reduce the number of their progeny larvae below the economic threshold during the period in which the crop is susceptible. Mass trapping with Decis Trap installs a reliable base line protection and enables to reduce the number of spray applications whilst maintaining season-long protection against fruit fly damage. It has been developed as environmental and end-user safe device. The novel ready-to-use mass-trapping and fully closed system is a three part device with a yellow colored plastic trap for *R. cerasi* and a red colored for *D. suzukii*, a dispenser releasing a target specific and persistent blend of attractants and a surface coated with the synthetic Pyrethroid Deltamethrin. *R. cerasi* is a major pest having zero tolerance by the food chain. The introduction of Decis Trap against *R. cerasi* at a density of 100 traps/ha and positioned at the earliest cherry variety color change, reduces the damage level of R.cerasi in large scale trials even in conditions of high pest pressure. The by-catch and impact on the beneficial arthropod population can be neglected. *D. suzukii* is considered as a major pest with a broad host range of cultivated fruits, but generally with first seasonal appearance on cherries and possible disastrous damage. Although the practical implementation of mass trapping for *D. suzukii* control should be optimized related to perimeter and immigration patterns, large scale density trials so far indicate significant pest reduction and valuable efficacy levels on fruits.

Keywords: *Rhagoletis cerasi*, *Drosophila suzukii*, cherry, mass trapping, sustainability

OS 3-2:

ORGANIC MANGO: AN ANALYSIS IN CONTRAST OF ORGANIC FARMING IN BANGLADESH

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Organic farming in Bangladesh still occurs largely on an experimental basis representing only 2% of the country's total cultivable land. This article presents an analysis of the current situation of the organic mango sector in Bangladesh with the aim of providing recommendations for the organic mango sector and designs a model for Bangladesh's organic farming that can link organic farmers with their organic markets. However, it will not be easy to achieve, but possible with the cooperation of both farmers and consumers. There have been studies on the three levels of the mango sector: production, processing, and marketing. Conventional farmers need to be willing to convert to organic farming and consumers need to be convinced to buy more organic products. To convince the farmers, technical information about organic farming has to be provided, which can be achieved by running workshops and providing examples of successful organic farms. The government could play an important role by motivating through research and extension personnel, promoting the establishment of farmers' cooperatives, helping with organic certification, and providing subsidies to encourage conversion. An appropriate policy is required to play a significant role and make the organic system more attractive in terms of economic sustainability.

Keywords: Mango, organic farming, organic market, Bangladesh

OS 3-3:

FACTORS AFFECTING CONVERSION TO ORGANIC TEA PRODUCTION IN TURKEY

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This research was aimed to reveal the factors affecting the adoption of organic tea production in Rize province of Turkey. The primary data were collected with surveys from organic and conventional tea growers in the research area. The tea growers were determined using simple random sampling method (115 organic and 50 conventional). The conventional tea growers were asked the reasons for rejecting organic production and the conditions for adopting organic production. According to the results of the study, 50% of conventional tea growers thought that organic production was not economically profitable. On the other hand, 20% of them were not invited by General Directorate of Tea Enterprises (ÇAYKUR). For these reasons, most of the conventional tea growers could not adopt organic production. On the other hand, 21% of conventional tea growers wanted to convert organic production. According to them, organic production was more profitable due to better premium price for organic tea products and more suitable for the health of people. It was also determined that the organic tea growers adopt organic production due to support of ÇAYKUR and protection of the environment. They learned to the principles of organic production by ÇAYKUR and their agricultural advisors in the tea factory. Factors affecting the adoption of organic tea production were determined as innovativeness, economic factors, social factors, environmental protection factors and health factors, respectively. This study was conducted in the province of Rize, the highest tea production area in Turkey and the results could be useful for planning, implementing and developing organic production projects in Turkey and other countries with similar conditions and products.

Keywords: Adoption, convertion, organic tea, ÇAYKUR, Turkey

OS 3-4:

EFFECT OF PARTIAL SUPPLEMENTATION OF N AND P USING OIL CAKES AND BIO-INOCULANTS ON POMEGRANATE YIELD AND QUALITY

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A field experiment was conducted during 2016-17 in hasta bahar season at semi-arid region of northen Karnataka, India to evaluate the effect of partial supplementation of N and P using oil cakes and bio-inoculants on nutrient content and productivity of pomegranate. The treatments involved supplementation of 25 and 50 per cent of recommended dose of N and P nutrients using organics (neem and pongamia cake in 1:1) with or without bio-inoculants (Trichoderma harzianum and Pseudomonas fluorescence) that were compared with 100 per cent RDF with or without bio-inoculants. Supplementation of 50 per cent N & P using organics along with bio-inoculants was found to be promising with respect to fruit yield (41.43 kg plant-1 and 21.56 t ha-1), number of fruits (103.01), hermaphrodite flowers (156), pomegranate juice phenolic and antioxidant activity, mineral content (P -4.1 g L-1, Fe-228.1 mg L-1, Zn -73.2 mg L-1 and Cu - 51.7 mg L-1), leaf nutrient concentration and nutrient availability in soil. Lowest fruit yield (23.06 kg plant-1 and 14.62 t ha-1) and soil nutrient availability was observed in 100 per cent RDF without bio-inoculants.

Keywords: Pomegranate, oilcakes, bio-inoculants, fruit yield, hermaphrodite flowers…

OS 3-5:

BALANCE BETWEEN SUPPLIED NUTRIENTS THROUGH SOIL ORGANIC AMENDMENTS AND NUTRİENT UPTAKE BY ORGANIC HORTICULTURAL CROPS

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Organic agriculture is more sustainable than conventional agriculture to maintain ecosystem services and biodiversity. A main challenge in organic agriculture is to improve nutrient management in order to increase yields and reduce the risk of N losses. With this aim a three-year field organic crop rotation with rye and vetch as green manure over the autumn/winter, followed by potato and lettuce (2012), Swiss chard and turnip (2013), and Portuguese cabbage and carrot (2014), was arranged as a randomized block design, to assess crop growth, crop nutrient uptake, and N mineralization determined by field incubation, in response to soil amendment with green manure (GM), GM with 20 and 40 t ha-1 farmyard manure compost (C20 and C40) and GM with 1 and 2 t ha-1 of immature commercial organic fertilizer (CF1 and CF2). The difference between supplied nutrients (P, K, Ca and Mg) through soil organic amendments and nutrient uptake by organic horticultural crops was positive for C20 and C40, whereas the K, Ca and Mg balance was negative for GM, CF1 and CF2. The N balance was positive for all treatments except for GM. However, daily N mineralization for CF1 and CF2 occurred mostly during the first seven days after soil organic amendment with this fertilizer, increasing the risk of N losses. In contrast, the highest value of daily N mineralization for C20 and C40 occurred during the period of higher crop N demand, contributing to improve the synchronization between N mineralization and crop N demand. Therefore, the application of farmyard manure compost with green manure contributes to build-up soil fertility, reducing environmental impact.

Keywords: Compost, field incubation, nitrogen mineralization, nutrient balance, organic agriculture

OS 3-6:

EFFECT OF BIOSTIMULANT/BG55 ON SEED GERMINATION AND SEEDLING GROWTH OF *MORINGA OLEIFERA*

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Moringa (*Moringa oleifera* Lam.) is a highly esteemed plant and has a remarkable range of medicinal and industrial uses with high nutritional value. The aim of this study was to determine the effect of biostimulant/BioGreen55 (BG55) on seed germination and seedling growth in M. oleifera. The laboratory experiments were carried out at the premises of Biology Department, College of Science and Humanities, Prince Sattam bin Abdulaziz University, Alkharj (24°15'N; 47°30'E), KSA. The seed material of moringa was obtained from Sara bint Rached bin Ghonaim Research Chair for Cultivating non-Traditional Medicinal and Aromatic plants, PSAU, Alkharj, KSA. Six treatments were established as follows: T1: negative control, sowing of the seeds without pre-soaking; T2: positive control, soaking of the seeds in water only; T3: soaking of the seeds in BG55 as of 0.5 g L-1; T4: soaking of the seeds in BG55 as of 1.0 g L-1; T5: soaking of the seeds in BG55 as of 2.0 g L-1; T6: soaking of the seeds in BG55 as of 4.0 g L-1, soaking last for one hour. The results showed significant effects on most of the germination parameters; final germination percentage (FGP), mean

germination time (MGT), coefficient velocity (CV), seedling vigour index (SVI), energy of germination (EG), emergence rate (ER), speed of germination (SG), and seedling growth.

Keywords: Moringa oleifera, biostimulant, seed germination, seedlings, moringa

OS 3-7:

GRAFTING GREEN BEANS FOR IMPROVED YIELD AND FRUIT QUALITY

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Grafting of protected green beans (*Phaseolus vulgaris* L.), used to prevent biotic and abiotic stresses, is a safe technique, easy to manage and suitable for organic production, that has scope to be improved. With this aim, we evaluated the effect of root/shoot genotype on yield and pod quality of two commercial cultivars, 'Oriente' and the standard Portuguese traditional cultivar 'Vagem rajada'. The trials were carried out in the same season in two different sites in the NW Portugal, with the P. coccineus L. rootstocks cultivars Aintree (P1) and White Emergo (P2) (TozerSeeds) and also with the rootstock '7 years bean' landrace 'Ponte de Lima' (P3). Self-grafted and non-grafted plants were also included. In the first experimental site, with low soil fertility and 3.3 stems m-2, the crop showed symptoms of Fusarium oxysporum f. sp. phaseoli (Fop) and the highest yield was achieved with the cv. 'Oriente' grafted onto P3, followed by the scion/rootstock combinations cv. 'Oriente'/P2 and cv. 'Vagem rajada'/P2 or P3. In the second site, with increased mineral nutrient availability and lower crop density (2.1 stems m-2), and where the disease symptoms were not detected, similar yields were found for all treatments, except for both cultivars grafted onto rootstock P2 which showed lower yields compared to non-grafted plants. Grafting with P2 and P3 rootstocks resulted in an increased P content of the pods for both cultivars in both experimental sites, and increased Mg and Ca contents in the first and second site, respectively, compared to self-grafted and non-grafted plants. Both cultivars grafted onto rootstocks P3 in the first site, showed a 15% increase in the mean length per pod, compared to control plants. Therefore, further research with P3 rootstocks to produce healthy grafted seedlings may be a key point for wider use of grafted green beans.

Keywords: *Fusarium oxysporum*, *Phaseolus coccineus*, *P. vulgaris*, pod nutrient content

OS 3-8:

EFFECTS OF CROP ROTATION ON YIELD AND QUALITY PARAMETERS OF GRAFTED WATERMELON (*CITRULLUS LANATUS* L.) UNDER ORGANIC AGRICULTURE CONDITIONS

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The usage of grafted watermelon seedlings has recently been demanded by farmers due to early and high yield and resistance against soil-borne diseases. Same problems effect watermelon production under organic conditions and organic farmers desire watermelon production with early and high yield. Therefore, the aim of this study is to determine the effects of crop rotation and certified organic fertilizers on yield and several quality properties of watermelon grafted onto lagenaria under organic agriculture conditions. The study was carried out according to split plots design with 32 plots as 4 rotated crops*4 repetitions*2 fertilizer applications. Rotation plants are broccoli (*Brassica oleraceae var. italica*), fava bean (*Vicia faba*), vetch (*Vicia sativa*) and natural vegetation. Rotated plants which were cultivated in compliance with organic agriculture regulations were

incorporated into soil at 15- 20 cm depth 15 days before transplanting of grafted watermelon seedlings. The seedlings were transplanted into plots with 2,5*1,5 m spacings. Harvesting was done twice depend on maturation level of fruits and recorded that yield for hectare and plant. Some quality parameters (total soluble solids (TSS), fruit flesh color, fruit sizes and etc.) were analyzed on fruits obtained from first harvest. Statistical analyzes showed that the effects of crop rotation and fertilizer application on yield (kg/ha) have been statistically important ($p \leq 0,05$) and the highest yield are obtained from fertilizer treatment (74 311 kg/ha) and vetch plots as a rotated crops (87 660 kg/ha). While the highest fruit weight (8,35 kg) is similarly found in fertilizer treatment, effects of crop rotation and fertilizers on fruit size are statistically significant ($p \leq 0,05$). The effect of fertilizers on TSS is found statistically significant and the highest value is obtained from fertilizers application (% 10.73). The highest fruit firmness value (1.28-1.30 kg) is found in broccoli and vetch plots.

Keywords: Watermelon, grafted seedlings, crop rotation, natural vegetation, yield, quality

SESSION 4- FERTILIZATION MANAGEMENT

OS 4-1:

IMPROVEMENTS OF SOIL BIOLOGICAL PROPERTIES WITH HAIRY VETCH (*VICIA VILLOSA* ROTH) AND RYE (*SECALE CEREALE* L.) AND THE CONTRIBUTIONS ON LETTUCE (*LACTUCA SATIVA* L.) PRODUCTION

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Hairy vetch (*Vicia villosa* Roth) and rye (*Secale cereale* L.) are known to improve abundance of soil microorganism and their activities. However, the contribution on subsequent crop production is unreported well. We conducted a pot experiment in greenhouse. Three cover crop treatments were set; hairy vetch (HV), rye and control (without cover crops), in triplicates. The applied amount of these cover crops was 40 g dry weight pot-1. At five days after the incorporation, five lettuce (Lactuca sativa L.) seedlings were transplanted on each pot. The HV decomposed significantly faster than rye, supplying larger amount of inorganic nitrogen (38.5 mg N kg-1 soil) than rye (12.5 mg N kg-1 soil). Soil DNA at the harvest time of lettuce was extracted and analyzed using quantitative-polymerase chain reaction (q-PCR) approach. The 16S and ITS primers were used to target bacteria and fungi, respectively. The result shows that microbial quantity (sum quantity of bacteria and fungi) tended to be higher in soils with rye (338.3 ng DNA g-1 soil) compared with HV (288.6 ng DNA g-1 soil) and control (147.1 ng DNA g-1 soil). It is suggested that high carbon content of rye supply plentiful energy source for microbes. Due to high nitrogen content of HV, microbial biomass nitrogen (MBN) in HV treatment (6.9 mg N kg-1 soil) was significantly higher than rye and control (ave. 3.8 mg N kg-1 soil). The lettuce yield was increased significantly up to 313 g plant-1 in HV. Conversely, the yield in rye (258 g plant-1) and control (251 g plant-1) tended to be smaller. We confirmed that application of cover crops increased the quantity of microorganism. Further, the MBN shows a positive correlation to lettuce yield ($r = 0.84$), suggesting that microbes may indirectly contributes to lettuce production through decomposition activity to improve soil nutrient status.

Keywords: Leguminous, graminous, microbial biomass, microbial quantity, decomposition, lettuce

OS 4-2:

A TWO YEAR YIELD OF TOMATO UNDER DIFFERENT FERTILIZER TREATMENTS

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Tomato is an important vegetable for human nutrition. It is grown intensively in Mediterranean basin under temperate climate in Turkey. Production is mostly undertaken in greenhouse conditions. One of the problems of tomato production is continuous production in same area causing exhausting of plant nutrition minerals. Avoid this problem soil fertilizing is used prevalently. Organic liquid fertilizing and worm fertilizer are good alternative to synthetic fertilizers with being natural and rich mineral content. Beside humic acid and mycorrhizae is useful soil regulating agents supporting plant growth. The effect of different combinations of organic and worm fertilizer with humic acid and mycorrhizae were investigated for tomato plant and fruit yield for two years under greenhouse conditions. Syntetic fertilizer was positive check and also a negative check without fertilizer application was included in completely randomised block designed experiment. Tomato fruit length, diameter and weight was determined as fruit yield and fresh and dry weight as plant yield. The highest plant and fruit yield were obtained in organic fertilizer and mycorrhizae combination treatment followed by worm fertilizer and mycorrhizae combination treatment. Organic based fertilizers and mycorrhizae were shown to be good fertilizer combinations for high yielding tomato growing.

Keywords: Tomato, fertilizer, organic production, yield, worm fertilizer, humic acid, mycorrhizae, organic fertilizer

OS 4-3:

THE EFFECT OF PRE-PLANTS APPLICATIONS ON SOME SOIL CHEMICAL PROPERTIES IN ORGANIC ONION (*ALLIUM CEPA* L.) AND CUCUMBER (*CUCUMIS SATIVUM* L.) SEED PRODUCTION

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This study was carried out between 2014-2017 in Yalova Atatürk Horticultural Central Institute Organic field. Organic onion (Allium cepa L.) and cucumber (Cucumis sativum L.) seeds were produced using broccoli (Brassica oleracea var. italica) and lettuce (Lactuca sativa L.) as a pre-plant. The effect of the pre-plants on some chemical soil properties was investigated. According to the results of the experiment, soil pH, total N (%), available P (mg kg-1) and exchangeable K (mg kg-1) were not changed but, EC (dS m-1) and organic matter (%) content of soil were changed. EC content of soil was determined between 0.09 dS m-1 (trial beginning) and 0.26 dS m-1 (onion seed production-preplant lettuce). On the other hand, organic matter of soil was evaluated between 2.28% (trial beginning) and 2.49% (onion seed production-preplant lettuce).

Keywords: Onion (Allium cepa L.), cucumber (Cucumis sativum L.), broccoli (Brassica oleracea var. italica), lettuce (Lactuca sativa L.), pre-plant, organic seed.

OS 4-4:

ASSESSING THE POSSIBILITY TO USE LEGUME PLANTS AS COVER CROPS OR INTERCROPS IN ORGANIC TOMATO PRODUCTION TO OPTIMIZE NUE

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Organic farming systems rely on environment-friendly practices, such as intercropping, crop rotations, enhancement of soil fertility through biological processes, composting, and biological pest control, while excluding the use of synthetic chemicals. However, in organic agriculture the availability of N to plants depends on mineralization rates of soil organic matter, which are hardly predictable under field conditions. Therefore,

timely supply of sufficient amounts of plant-available N is a challenge for organic agriculture. If N is not available to the plants at critical plant developmental stages, the growth and yield may be restricted. Legume crops are capable of providing N to the soil through symbiosis with N2-fixing rhizobacteria. Nevertheless, also in legume crops the timely delivery of plant available N forms may pose a problem, since at the initial cropping stages the proliferation of N2-fixing rhizobacteria results in immobilization rather than in release of plant available inorganic N forms. The use of legumes as cover crops or intercrops in organic cultivations of non-legumes, aiming solely to increase soil fertility, might strongly contribute to achievement of these goals. In view of this background, a greenhouse experiment with organic tomato aiming at assessing the contribution of the legume crop on the nitrogen needs of the tomato crop. In the experiment, cowpea plants were used as cover crops while faba beans as intercrops with beds of tomato spatially separated plants. Using appropriate spacing on beds and pruning tomato plants to two stems contribute to maintaining an appropriate plant density (but lower than in conventional crops), despite the utilization of part of the ground area for cultivation of legumes. The focus of this work was on measures to facilitate the rapid transfer of biologically-fixed N from the legume crop to the following non-legume vegetable crop by testing the efficiency of the system in terms of biological N2-fixation (BNF). The results indicated that the use of legumes as cover crops or intercrops needs further investigation.

Keywords: Organic, tomato, cowpea, faba bean, rhizobia, intercrops, nitrogen

OS 4-5:

EFFECT OF HAIRY VETCH (*VICIA VILLOSA* ROTH) AND LIVESTOCK COMPOST ON SOIL PROPERTIES, FRESH-MARKET TOMATO YIELD AND FRUIT QUALITY

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A shift from conventional tomato production systems to alternative production systems based on cover crops and compost is required in order to minimize environmental problems associated with the massive use of N chemical fertilizers, and to improve soil quality. In this sense, the effects of hairy vetch and livestock compost on soil physical, chemical and biological properties, tomato yield, and fruit quality were evaluated in tomatoes grown in a greenhouse in 2016 and 2017 in Sapporo, Japan. The treatments were hairy vetch (HV; sown at a seeding rate of 20 kg ha-1), compost (Comp), a mixture of HV and compost (HV+Comp; HV sowed at a rate of 10 kg ha-1), and bare (Control). Additional 100 kg N ha-1 were applied in all plots as controlled-release fertilizer (LPS100). The total organic N applied as HV, HV+Comp, and Comp was similar in both years, 198 kg ha-1 in 2016, and 187 kg ha-1 in 2017. Soil organic carbon didn't improve with the application of HV and compost in 2016, though total and organic N (g kg-1) was slightly greater in HV (2.34 and 2.30) and HV+Comp (2.37 and 2.34), than in Comp (2.14 and 2.11) and Control (2.11 and 2.08). Microbial biomass N (mg N kg-1 soil) at 4 weeks after transplanting in 2017 was greater in HV+Comp (46.4 a), compost (34.5 b), and HV (27.1 c) than in Control (14.8 d). HV and compost also improved soil K, P, and EC, and slightly decreased bulk density. The average marketable yield of the two years (t ha-1) was greater and similar in HV (106 a), HV+Comp (101 a), and Comp (101 a), compared with Control (92 b). HV and compost slightly improved the tomato brix, while the vitamin C was only improved by compost.

Keywords: Organic fertilizers, soil carbon, microbial biomass N, soil nutrition

OS 4-6:

THE EFFECT OF DIFFERENT COMPOST APPLICATIONS UNDER ORGANIC MANAGEMENT OF TOMATO (LYCOPERSICON ESCULENTUM L.) PRODUCTION IN TURKEY

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In order to increase organic tomato production under open field conditions, a rotation program was designed and carried out between 2011 and 2016 for 5 years on an organically managed experimental open-field of the Aegean Agricultural Research Institute (AARI), Izmir, Turkey under Mediterranean climatic conditions. Lettuce (Lactuca sativa L.) was produced as preceding crop of tomato (Lycopersicon esculentum L.) parcels on the same plots for 5 years under organic management. The research was also designed to study the effects of composted plant residues (C), farmyard manure (FYM), and two different certified commercial organic composts (CCC1, CCC2) on tomato (Lycopersicon esculentum L.) to determine total yield and some agro-morphological measurements of tomato and soil characteristics where trial was conducted. Tomato (Lycopersicon esculentum L.)is one of the most important species for testing effects of compost applications because of its sensitivity related with phyto-toxic effects of compost and very important to find out productivity and sustainable production levels in crop production in related to its consumption as unprocessed / raw material. It is obtained from the results at the end of the five-year trials, respectively of the five year-planned research under organic management with a framework of regulations of EU and Turkey that (1) the artificial organic materials sourced from farms can be composted and compost could be produced as on-farm and applied to tomato production to generate farmers' profit in terms of economic aspects of organic tomato production significantly, (2) promising soil physical parameters improvement of parcels of the trials found significantly, (3) Organic tomato can be consumed as microbiologically safe, (4) high quality tomato production can be attained by using compost, (5) tomato yields in all applications reached to 0.9 ton/ha which is the declared mean yield in 'description certificate' of the tomato variety (Lycopersicon esculentum L. cv SC2121).

Keywords: Organic farming, tomato, *Lycopersicon esculentum*, quality, yield.

SESSION 5-ORGANIC AGRICULTURE INPUTS

OS 5-1:

PHASING OUT CONTENTIOUS INPUTS IN ORGANIC AND NON-ORGANIC HORTICULTURE - ORGANIC PLUS

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Across Europe, there has been an ongoing discussion regarding inputs into organic agriculture and horticulture, which are considered more or less contentious. These discussions have contributed to the decision by the European Horizon-2020 research programme to invest 8 million Euros into two 4-year projects, starting in 2018. This paper provides first results from one of those projects: Organic-PLUS. The focus is on research relevant to organic horticulture(and non-organic horticulture). This will include alternatives to the use of copper and mineral oils used for plant protection, with a special focus on potatoes, perennial Mediterranean crops like olives and citrus and greenhouse crops like tomatoes and aubergines. Further research is on better organic fertilisers like non-animal derived fertilisers which are compatible with 'Vegan Organic Standards' but also other 'bio-economy fertilisers' which make use of existing resources like fish pond sediments and marine-derived fertilisers. Alternatives to peat as a growing media, an area where peat replacement is most challenging i.e. in specialised nursery crops will also be researched and discussed, and equally the increasing use of plastic mulch materials and potential impact of plastic and alternative mulch materials on soil pollutants. Finally, we will

discuss how organic horticulture can contribute to contentious issues in organic livestock production, mainly by researching and growing natural plant products with immunostimulatory properties, which have the potential to contribute to the phase-out of antibiotics. The oral presentation of the paper will invite discussion on further contentious inputs and modelling possible phase-out scenarios to strengthen the contribution organic horticulture (and horticulture in general) can make to a true Bio-economy and to Wellbeing of the Environment and Population. Therefore, the Organic-PLUS project is also committed to research broader public concerns about contentious inputs and to further develop science-society dialogue around contentious inputs.

Keywords: Contentious inputs, organic and conventional horticulture, copper, mineral oils, vegan fertilisers, marine-derived fertilisers, peat, plastic, immunostimulatory plant products, phase-out scenario modelling.

OS 5-2:

BIO2BIO ' FROM ORGANIC WASTE STREAMS TO BIOSTIMULANTS

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The increasing population growth and demand for better quality food, coupled with the need for replacing conventional agrochemical use drives the development of biostimulant and biopesticide. Biostimulants are defined as substances originated from organic matters which are applied to the above ground parts of a plant or the rhizosphere, enhancing plant growth and improve resistance to abiotic stresses, whereas biopesticide refers to those which combats biotic stress. The Bio2Bio project aims at generating biostimulant and biopesticide from waste of agricultural and food industry, offering eco-friendly alternatives to fertilizers and pesticides. We will establish a library of formulated extracts derived from 10 organic waste streams within the Flemish Region, followed by a combinatory screening platform from in vitro, greenhouse and field test. The screening platform will collect expertise from a variety of research partners, providing valuable knowledge for the agrochemical industry in the Flemish Region. The core concept of Bio2Bio project is to construct a database which provides an overview from various bioactivity results. Moreover, we will investigate the mode of action for the selected biostimulants and assess the possibility to valorize one waste stream and its putative biostimulant or biopesticide. Overall, the Bio2Bio project will result in the development of the biostimulant market, bringing financial returns to stimulate the market of biostimulant across the European Community. The biostimulants discovered in this project will provide insights into the further development of soilless farming industry by achieving better plant growth in hydroponic conditions.

Keywords: Biostimulant, biopesticide, waste streams, agroeconomy, bioactivity screening, bioactivity database, valorization

OS 5-3:

DEVELOPING OF INPUT PRODUCTION METHODS FOR UTILIZATİON IN ORGANIC PLANT PRODUCTION

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In Turkey, organic plant production has reached to an important place after organic agriculture movements started in 1985. However, the inputs used in organic agriculture are mostly dependent to abroad. Sustainability of production is dependent on the development of production techniques and methods of organic inputs using domestic resources efficiently and put into the service of sector. This could be possible with the continuity of cooperation among universities, public and private sector and with the investments to R&D. From this point of view, this project entitled “Developing Of Input Production Methods For Utilization In Organic Plant Production” has been composed by the cooperation of public, private sector and universities. The project

involves three main work packages composed of Development of Compost Production Techniques and Utilization in Organic Agriculture, Development of Biological Control Techniques with Domestic Resources and Development of Propagation Material Production Techniques for Utilization in Organic Agriculture. In the first work package of the project, natural, renewable and recycled organic raw material, which is also beneficial in terms of soil and environment, is obtained from rose and olive oil processing wastes that were not evaluated well and causing environmental pollution. Principal scientific data is obtained for the establishment of new large-scale compost production systems. The produced composts rich in terms of organic material and was enriched with plant nutrient elements in a certain rate and which had no phytotoxicicity were used in olive and apple nursery fields and their effects on yield and quality over them were investigated. The infrastructure established with the use of olive oil and rose-processing wastes is planned as a model to the related sector. Two prototype composting units established within the project will be able to be used actively in "composting" trainings. In the second work package of the project, proper techniques for formulation and production of promising bio control microorganisms (T. harzianum) against soil born plant pathogens, which is a problem of vegetable production particularly in protected cultivation is developed. A formulation was developed for three isolates (T1, T2 and T4). Another activity realized in this work package was to develop the techniques of mass production of local natural predators of red spider (T. cinnabarinus Boisd.), whitefly (B. tabaci Genn.), aphids (A. gossypii Glov.), leafminers (L. trifolii (Burgess) and thrips (F. occidentalis Pergande) which are the most important pests of vegetable production under protected cultivation and pesticides used against those pests in conventional production are harmful in terms of food safety, environment and human health. In the third work package, organic vegetable seeds (onion, cucumber, broccoli and lettuce) production techniques; organic vegetable (tomato, watermelon and lettuce) and strawberry seedlings production techniques; organic sapling (olive, apple, apricot, fig and grapevine) production techniques was developed. Also, the cost analysis of production technologies obtained from application of developed techniques and technologies within this project was determined.

Keywords: Organic agriculture, composting, rose processing wastes, olive oil processing wastes, Trichoderma spp., Biological control, Bioformulation, Phytoseiulus persimilis, Eretmocerus mundus, Macrolophus caliginosus, Orius niger, Aphidus colemani, Diglyphus iseae, organic propagation material, organic vegetable seed, organic seedling growing medium, organic grafted seedling, bacteria, organic strawberry seedling, organic fruit sapling, organic apricot sapling, organic fig sapling, organic apple sapling, organic grape sapling

OS 5-4:

SCANDINAVIAN HEIRLOOMS FOR WELLBEING

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Seed availability in general has narrowed tenfold down, comparing seed catalogues in a century perspective. Not only the supply due to catalogues has minimized; the seed supply chain has been monopolized to four mega giant companies. Organic horticulture rely on this supply too, but could more frequently rely on local seed exchange of open pollinated varieties. Open pollinated varieties, often heirlooms, offer the gardener an opportunity to be self-sufficient in viable, locally adapted seeds. Heirlooms are, if not susceptible to pathogens, often quite suitable and adaptive to organic small scale cultivation. They will yield reasonable even though fertilizing is not abundant and they will yield for a longer season. The recent adjustment of European Organic Legislation opens up for use of non-labelled organic seed, which as well can be heirlooms. The objective of this work is to examine if seed-savers-organization could provide site-specific, sound and viable, trustful seeds for organic horticulture. The scope is limited to a Scandinavian case study where both an formal and informal seed market exists side by side. The main results are shortly as follows. Seed saving and seed exchange has long tradition in Sweden, Denmark and Norway where it is organized in networks. The Nordic Gene bank plays a prominent role providing and conserving Nordic heirlooms. Some heirlooms have even been reintroduced to national variety lists. Norway and Sweden respectively hosts each one small seed company providing only

organic seeds but they are very dedicated to heirlooms. Denmark counts for at least three established organic seed providers. In all three Scandinavian countries mentioned one will see a profound interest in these varieties. This might as well lead to an increased interest for organic gardening with well-being of the environment and population.

Keywords: Seed exchange, seed biodiversity, heirlooms, access, Scandinavian case study

OS 5-5:

AMERICA FLIRTS WITH TRUE TOMATO FLAVOR: HEIRLOOM TOMATOES REBOUND IN THE MARKET

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Heirloom Tomatoes (*Solanum lycopersicum*) (HLTs) had drifted into popular obscurity among U.S. consumers during the second half of the 20th century. By the turn of the 21st century HLTs had reemerged as an ascendant commercial produce item in the U.S. market. Driven by an expanding organic market and growing sophistication in food preferences the HLTs' ascent offered production challenges for contemporary growers in both Mexico and the United States. Exceptional "true tomato" flavor is credited with the HLTs' market penetration. Issues of pest and disease control are discussed. Effective organic management methods are identified and routinely applied. Crop improvement is considered within acceptable organic parameters, and post-harvest management of shelf-life and packaging are considered. Contemporary innovations in organic soil and fertility management, tailored to this crop, are introduced. Their propensity to create soil health and sustainability define them as best practices. Varietal selection plays a key role in identifying cultivars suitable for shipping and merchandising. Industry and consumer education relating to this product and to organic produce in general are addressed. In both cases HLTs have successfully disrupted market norms and impacted public perceptions regarding eccentric cultivars and the increasing importance and value of organic produce.

Keywords: Organic; heirloom tomatoes, net house production, vermicompost, humic acid, organic soil management

OS 5-6:

ORGANIC AGRICULTURE IN UZBEKISTAN

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The idea of organic farming is not new for the Republic of Uzbekistan as the country has its historical trends of traditional low-input agricultural practices. Consequently, the ages-old culture of the traditional vegetable farming and horticulture in Uzbekistan were originally based on the principles of biological farming with the use of organic fertilizers and without the use of genetically modifying technology. Uzbekistan has great potential to introduce and widespread organic agriculture. In 2016, Uzbekistan had a total area of organic certified 563 hectares arable land while 6000 ha of wild land was certified according to organic farming rules, up from zero ha in 2013. During the last two years, the organic area in Uzbekistan increased by about 250 hectares each year. According to the latest data from Uzbek Statistical Agency, rangeland and hayfield area amounted more than 21 million hectares, rain-fed land is 0.75 million hectares. According to the Figures, organic products are already marketed. Uzbekistan produced 1000 tons of organic raisins, 500 tons of organic dried plum and 3000 tons of organic dried apricots in 2016 and exported to Germany and the United States of America. The future for organic

agriculture in Uzbekistan is very positive. The growth rate, experienced over the last few years, suggests a fast and considerable development of the sector. Uzbekistan may become a central area for producing high value organic products, such as dried apricot, walnut, honey and other bee products, raisin, nuts and dried fruit and medicinal and aromatic plants. As seen in the above given example, private sector may play an important role to develop the organic movement in Uzbekistan to develop both the domestic and export markets, mainly because a majority of people still cannot define what organic means, and how the production differs from non-organic products.

Keywords: Dried fruit, nuts, medicinal aromatic plants, bee products

SESSION 6-GREENHOUSE HORTICULTURE

OS 6-1:

SUSTAINABILITY AND RESILIENCE IN ORGANIC GREENHOUSE HORTICULTURE. EXAMPLES FROM ITALY AND THE UK

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It is estimated that at least 5,000 ha of greenhouses are managed organically within the EU. One current development is the “conventionalisation” of organic practices, another is the increase of community supported agriculture and short food supply chains. In this study, we capture both ends of the organic spectrum. Sustainably and resilience have been given theoretical definitions, however the perspectives of organic growers have not been studied. The aim of the research was to connect theory and practise across Europe with the two case-study countries, Italy and the UK (United Kingdom). We used an online survey emailed to organic growers in both countries. The survey was open from June 2016 to June 2017, containing 18 questions on general information and 12 researching details on sustainable and resilient practices, and major influencing factors on growers’ decisions. These questions were presented as five-point Likert-scaled, so growers were asked to attribute a weight from low (1) to high (5) to issues and practices in relation to their relevance to the sustainability and resilience of their farms’ management. From Italy 42 responses were received and 10 from the UK. Results show that ‘soil fertility management’ was rated highest in both Italy and the UK. ‘Biodiversity’ and ‘landscape protection’ were rated higher in Italy, while ‘energy efficiency’ and ‘weed management’ were rated higher in the UK. ‘Short food supply chains’, ‘product traceability’ and ‘traditional knowledge’ were equally rated. These interesting differences and similarities were further studied in detail with 20 on-farm interviews (10 in Italy and in the UK) and growers’ voices on their specific perspectives are given in the presentation.

Keywords: Greenhouses, resilience, sustainability, organic, soil fertility management, short food supply chains

OS 6-2:

EFFECT OF ORGANIC AMENDMENTS ON SOIL FERTILITY AND QUALITY OF ORGANIC ZUCCHINI UNDER GREENHOUSE CONDITION

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The aim of this experiment is to evaluate the effect of organic amendments on the soil physic-chemical parameters and the agronomic performance of organic zucchini according to five different treatments. Two commercial composts (A and B) were applied as a regular organic amendment and two other treatments with the same composts but enriched with Trichoderma harzianum (stain T22) along with a control (no amendment). Various soil parameters were monitored: pH, electrical conductivity (EC), active carbon (AC), organic matter (OM), phosphorus, total nitrogen and exchangeable bases. Results revealed significant differences in soil fertility parameters after organic amendments and between treatments. Soil amended with compost A contains significantly higher values of AC, OM and phosphorus than other treatments. The analysis of AC and OM present in cultivated soils has shown the same evolution during the development cycle with an increase after amendment followed by a decrease towards the end of the cycle. Moreover, the content of OM and AC of the amended soils are significantly higher than values of the control plots. Exchangeable calcium is more abundant in the soil than potassium and sodium due to the nature of the soil and for its vital role in the stability of the Clay Humic Complex (CHC). Treatment with enriched compost A presented significantly higher available nitrogen in the soil than the other treatments especially at the end of the cropping cycle. Compost B resulted in the highest yield with 68.58 T.ha-1 followed by compost A with 55.02 T.ha-1. Compost enrichment has no effect on organic zucchini yield, thus compost A has been revealed the best treatment for soil fertility improvement and compost B for better yield production of organic zucchini in sandy soil under greenhouse conditions

Keywords: Organic amendment, microbial enrichment, compost, soil fertility, organic zucchini.

OS 6-3:

EFFECTS OF NITROGEN FORM ON SOIL MICROBIAL PROPERTIES AND FRUIT QUALITY OF ORGANIC GREENHOUSE TOMATO

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The consequences of intensive use of agro-chemicals are now well known in terms of erosion, soil acidification, greenhouse gas emissions, water contamination and loss of biodiversity. Furthermore, consumer's demand for organic food has increased by 4.56-fold from 2000 to 2015, reaching global retails sales of 81.6 billion US dollars (90% in North Amercia and Europe). It has been reported that the form of nitrogen supply may influence plants-soil-microbes interactions as well as fruits and vegetables quality. In order to better understand the influence of the organic form of N on soil microbial communities, diversity and activity as well as its impact on tomato fruit quality, six N treatments (2 N forms x 3 N rates: 50%, 100% and 150% of the N crop requirement) were compared within a randomized complete block design with 6 replicates. A mix of feather and blood meals was used for the organic N form, while ammonium nitrate was used as the inorganic N form. All other nutrients were supplied as organic certificated fertilizers. Solid nutrient amendments were weekly applied. Each experimental unit had six plants (Solanum lycopersicum L., cv. Trust) cultivated in 0.62 m³ container filled with a certificated organic soil (mix of compost, perlite, blond peat moss, brown peat, coir and clay). Our results showed that the organic N form increased (p2 efflux, microbial activity expressed by the FDA hydrolysis, earthworm biomass and the quantity of total bacteria and fungi (AU g-1) compared to the inorganically N treatments. The microbial soil diversity and composition also differed according to nitrogen form. Fruit quality (e.g. vitamin C, carotenoids, phenols, Brix, titratable acidity, dry matter, firmness, EC), plant growth and yield were not significantly affected by the studied treatments, although the soil N content increased with the N rate.

No significant effect of the N form on leaf and fruit N content was observed. Correlations between studied parameters will be presented and discussed as well as the impact of the N form on the relative proportion of the main microbial phyla.

Keywords: Microbial diversity; microbial communities; plants-soil-microbes interactions ; organic nitrogen

OS 6-4:

ORGANIC FERTILIZER FORMULATIONS AND APPLICATION METHODS INFLUENCE GROWTH, PRODUCTIVITY, PRODUCT QUALITY AND PROFITABILITY OF GREENHOUSE VEGETABLES IN SOILLESS PRODUCTION SYSTEM

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Because organic products are perceived to be healthier and environmentally friendlier than the conventional products, demands for organically produced agricultural commodities are steadily increasing globally. In Kuwait, these produces allow local farmers to compete better with imported vegetables. Therefore, a series of investigations were conducted between 2009 and 2017 to evaluate the effects of different formulations and application methods of organic fertilizers on vegetative growth, yield, product quality and profitability of selected greenhouse vegetables using soilless production system. A number of vegetables were grown in a substrate comprising vermicompost, sphagnum peat moss, cocopeat and perlite supplemented with an organic slow release fertilizer, DOrS @ 15 kg/m3. In the first set of experiments, commercial organic fertilizer formulations listed by Organic Materials Research Institute, USA (Earth Juice, fish hydrosylate, seaweed powder, and desert bat guano) were applied in different combinations to soil or through foliar applications. Overall, soil drench application of Earth Juice products and foliar application of fish hydrosylates produced higher yields and better quality produce. Considering the extremely high cost of imported organic fertilizers, follow-up studies with natural liquid fertilizers derived from local seaweeds, Enteromorpha intestinalis (Linnaeus) Nees,and Sargassum angustifolium C. Agardh were carried out in Tomato and cucumber.The natural fertilizer from local seaweeds was as effective as the commercial formulation (Earth Juice ®) in enhancing growth, productivity and quality of tomato. Plants receiving the local seaweed fertilizer were 24.5% taller, contained 19.8% more leaves with 89.8% higher chlorophyll contents, produced 18.78% more biomass and 55% more fruits than those receiving Earth Juice® applications. The results of several studies will be summarized to demonstrate the technical and economic feasibility of organic greenhouse vegetable production in Kuwait.

Keywords: Organic farming, biostimulant, seaweed fertilizer, nutrient management, protected environment agriculture, containerized vegetable production

OS 6-5:

VALORIZATION OF DIGESTATE IN GREENHOUSE TOMATO CROPS

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The digestate is a byproduct rejected during the transformation of waste into biogas. The elimination of this product can be problematic. In Switzerland, biogas industries pay farmers to spread it on their fields. The lack of knowledge on this product may lead to a suboptimal use by farmers. In vegetable crops, the use of digestate is uncommon, even nonexistent for protected crops. The main reasons are the difficulties for application and the risk to contaminate crops. But its low cost and its fertiliser value make it interesting, particularly for organic production where a nitrogen-rich fertilizer readily available and cheap is always sought. In order to assess its potential in greenhouses, a trial was conducted by Agroscope in an organic tomato crop in soil under greenhouse.

The digestate was compared to an organic reference fertilizer. The application was realized via the drip system. The trial was carried out in a compartment of a Venlo greenhouse. During the season 2016 several improvements like the quantity of nitrogen brought were set up. The main objectives of this trial were to confirm and clarify previously trials and to observe the effect on the plants under greenhouse conditions. Plant growth, yield, and fruit quality were monitored during the season. The results obtained show that the digestate allowed a plant growth (speed of blooming and growth) and a yield identical to reference. However, filtration of digestate before application must be improved to avoid risk of clogging the irrigation system. These difficulties are the object of specific research. Due to these results a 3 years project with the Research Institute of Organic Agriculture (FiBL) began in 2017.

Keywords: filtration, nitrogen, yield, contamination

OS 6-6

A PRIVATE SECTOR EXPERIENCE ON ORGANIC VEGETABLE SEED PRODUCTION IN TURKEY

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Ziya organic is a private seed producer company that is founded in Kırklareli province. The company has research center on agronomy and breeding. The researcher team were developed vegetable varietyies for organic agriculture from Marmara Region domastic vegetable population. These are cucumber (Lule cv.) and watermelon (Burgas cv.). The company is also produce organic certificated vegetable seed on tomatoes, pepper, eggplant, leek, garlic, cabbage, cucumber and watermelon specieses for organic farmers. The vegetable seed production was started in 2014. The certificated planting stock materials got from Atatürk Horticulture Central Research Institute that was produce the first organic certificated vegetable stock in Turkey.

Keywords: Organic agriculture, private sector, organic certificated vegetable seed

SESSION 7- PRODUCTION TECHNIQUES AND QUALITY

OS 7-1

EFFECT OF ARBUSCULAR MYCORRHIZAL INTERACTIONS ON PHYSIOLOGICAL ASPECTS AND PRODUCTIVITY OF CAPSICUM ANNUUM

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Fungi represent a significant portion of soil rhizosphere microflora and influence plant growth. The symbiotic association generated by fungi with plant roots (mycorrhizae) increases the root surface area, and therefore enables the plant to absorb water and nutrients more efficiently from large soil volume. Arbuscular mycorrhizal fungi have the potential of building beneficial relation between feeder roots of plants and fungi. The term 'Mycorrhiza' was created by Frank in 1885 while he discover of symbiotic association of plant roots and fungi. Several research results reports shows evidence that association with AM fungi facilitates better nutrient uptake enhancing plant growth. Some stresses cause a particular direct or indirect negative impact on plant growth and development. Physiological processes involved in osmoregulation like enhanced carbon dioxide exchange rate, water use efficiency, and stomatal conductance are also influenced by the activities of AM fungi. Hence to exploit these biological tools, pot experiments were carried out and response on growth and yield of Capsicum

annuum was studied. In this study mycorrhizal inoculums obtained from Cukurova University containing the mixture of Glomus species was directly used as an inoculums to study the effect of AM on Capsicum annuum. The experimental unit was carried out in pot experiments which conducted in mixture of sterilized garden soil and sterilized sand in the ratio 3:1. The experiment was designed with AM (treated) and non AM (control) plants of Capsicum annuum. Physiological parameters such as; transpiration rate, photosynthetic rate, stomatal conductance, intercellular CO2 concentration, chlorophyll, ion leakage, shoot and root dry weight, leaf area, leaf water content and osmotic potential of treated and control plants of Capsicum annuum were estimated at an interval of 20 and 40 after transplanting day(ATD). The significantly high growth rate and yield was observed in treated plants than control plants. The Karaisali plant showed the highest chlorophyll content and leaves area rate in associated with mycorrhizal fungi during 150mM NaCl concentration in compare to Demre with and without mycorrhizal colonization. Mycorrhizal fungi impose successful tolerance to high level salinity concentrations (150mM) in plants through plants growth.

Keywords: Arbuscular mycorrhizae (AM), physiological parameters, Capsicum annuum, symbiotic association, gas exchange

OS 7-2:

THE EFFECTS OF DIFFERENT COMPOST APPLICATION ON ORGANIC STRAWBERRY PLUG PLANT PRODUCTION

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This study was conducted to determine the possibility of growing organic strawberry plug plants in growing media containing various proportions of composts in the research and application field at the Department of Horticulture in Cukurova University. Composts as growing medium previously obtained from the mixture containing rose oil processing wastes, separated dairy manure, poultry manure, and straw were composted in (1) aerated static pile (ASPC, compost produced by aerated static pile method) and (2) turned windrow (TWC, compost produced by turned windrow method) methods. ASPC was enriched with microelements (Fe and Zn) and Azotobacter (EASPC). Three different types of composts (ASPC, TWC, and EASPC) were used in varying ratios (12.5%, 25%, and 50%) in organic growing media and conventional growing media was considered as control. Randomized block design with three replications, each of which had 28 plants, was used for trial. The data including plant height, root length and number, leaf width and number, stem diameter, dry substance amount in roots and stem, analysis of macro and micro elements, and chlorophyll content on the leaves were determined and analysis of variance and Duncan Test were applied to the results. In the light of analysis, the best results in terms of plant height and root length were obtained from ASPC (12.5%). The highest of amount of dry substance in plant roots was found in ASPC (25%) and the highest dry substance in stem was found in EASPC (12.5%). All the results in growing medium containing composts were better than control application.

Keywords: Organic agriculture, strawberry plug plant, compost

OS 7-3:

ORGANIC FERTILIZERS IN CAULIFLOWER: EFFECTS ON GROWTH AND ASCORBIC ACID

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This study was carried out so as to compare the effect of different forms of organic fertilizer applications on the plant height, crown diameter, leaf number, ascorbic acid of cauliflower under the field conditions in 2012-2014 years at experiment plots of the Directorate of Middle Black Sea Transition Zone Agricultural Research Institute, Tokat, Turkey. The experiment was established as a randomized block design with three replications and was conducted under the open field conditions. Barcelona F1 and Grafiti F1 types was cultivated organically during in three year. Treatment included: O1 (50 kg/ha Biofarm), O2 (37.5 kg/ha Biofarm+15 kg/ha NOF), O3 (25 kg/ha Biofarm+30 kg/ha NOF), O4 (12.5 kg/ha Biofarm + 45 kg/ha NOF), O5 (60 kg/ha NOF), K (control). Results indicated that, plant height values were ranged from 32.6 to 34.1 cm. The highest plant height was found in the Barcelona F1 variety compared to the Grafiti F1 variety. The highest number of leaves was found in O5 application (37.7 piece/plant) while the lowest number of leaves was found in control application. In the experiment, the crown diameter values were ranged from 13.9 to 18 cm. The highest crown diameter was obtained in the Barcelona F1 variety compared to the Grafiti F1 variety. The highest ascorbic acid content in the Barcelona F1 and Grafiti F1 varieties were found 88.03 mg/100 g, 96.84 mg/100 g in the O1 application and O3 application, respectively.

Keywords: Organic agriculture, cauliflower, organic fertilizer, ascorbic acid

OS 7-4:

THE EFFECTS OF DIFFERENT SOWING TIME ON ORGANIC BROCCOLI (BRASSICA OLERACEA VAR. ITALICA) SEED YIELD AND QUALITY

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Broccoli is affected by ecological conditions once seed production periods in Crucifers such a cauliflower. Seed yield and quality parameters of open pollination broccoli cv. Turaç 77 were researched in different sowing dates in this study. Total four sowing dates were used (two dates in spring and two dates in autumn) in the trial, which was established in complete randomized block design with four replications. Some seed parameters were determined such yield (kg ha-1), 1000 seed weight (g), seed number per gram (number) and germination rate (%) in the study. The best broccoli seed yield was taken from second autumn sowing date (September) as 999.38 kg ha-1 and second spring sowing date (February) followed with 470.18 kg ha-1 seed yield. Autumn first (June) and spring first (January) sowing dates were not determined suitable for broccoli seed production. While sowing dates were not found important with regard to 1000 seeds weight, number of seed per gram was important. Seeds numbers per gram were determined as 306.6 numbers in September, 289.7 numbers in January and 257.3 numbers in February sowing dates. Germination rates were occurred as 100% all of sowing dates.

Keywords: Organic agriculture, broccoli, *Brassica oleracea var. italica*, organic seed, sowing date

OS 7-5:

EFFECT OF BIO-FERTILIZER AND ORGANIC MANURES ON PERFORMANCE OF BROCCOLI (*BRASSICA OLERACEA L. VAR. ITALICA* PLENCK) CV. PALAM SAMRIDHI

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An experiment was carried out at Horticulture Research Farm of Department of Applied Plant Science, Babasaheb Bhimrao Ambedkar University, Lucknow, India, with a view to study the effect of bio-fertiliser (Rhizobium radiobactor) in association with various organic manures on vegetative, yield and biochemical traits

of broccoli. The experiment comprised eight treatments viz. T1- Control, T2 Bio- fertilizer, T3 – RDF, T4 FYM (100%), T5 Vermicompost (100%), T6 –50% Bio- fertilizer + 50% FYM, T7 - 50% Bio-fertilizer + 50% Vermicompost and T8 - 50% Bio- fertilizer + 50% NPK and three replications laid out in randomized block design. It was observed from the recorded data that maximum plant height (64.07 cm), number of leaves (20.16), leaf length (47.73 cm), leaf width (23.46 cm), stem diameter (15.59 mm), plant spread (59.91 cm), curd diameter (13.46 cm), net weight of curd (355.00 g), yield per hectare (175.49 q/ha), fresh weight of plant (1132.66 g), dry weight of plant (0.20 g), fresh weight of root (82.00 g), dry weight of root (0.02 g), root length (17.80 cm), root spread (24.70 cm), total soluble solids (10.90 oBrix), chlorophyll content in leaf (108.27 mg/l), proline content in leaves (33.99 %), nitrate content in leaves (156.75 mg/kg), carbohydrate content in leaves (108.27 mg/l), protein content in leaves (0.38 mg/l), carbohydrate in curd (107.49 mg/l), chlorophyll in curd (108.62 mg/l), antioxidant in curd (61.90 %), flavonoids in curd (34.49%), nitrate in curd (172.96 mg/kg) and protein in curd (0.40 mg/l) was found in T7 - Bio- fertilizer (50%) + Vermicompost (50%) followed by T6 – Bio- fertilizer (50%) + FYM (50%). The results concluded that increased efficiency in bio-fertiliser was observed in association with vermicompost and farmyard manure as compared to other treatments resulting in increased availability of macro and micro nutrients which in turn efficiently enhance other metabolic activities of broccoli.

Keywords: Brassica oleracea, broccoli, bio- fertilizer, vermicompost, FYM, NPK

OS 7-6:

THE EFFECTS OF DIFFERENT PRE CROPS ON ORGANIC CUCUMBER (*CUCUMIS SATIVUM* L.) SEED YIELD AND QUALITY IN CROP ROTATION

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Choice of pre-plant is an important factor which affected to yield in crop rotation program. Effects of lettuce and broccoli, were selected as pre-plants, were researched on cucumber seed yield in this gram (number) and germination rate (%). In conclusion, seed yields were determined in lettuce and broccoli pre-plants 154.10 and 141.10 kg ha-1 respectively. Seed numbers per gram were occurred averagely 57.07 numbers in lettuce pre-plant parcels and 54.23 numbers in broccoli pre-plant parcels. 1000 seed study. Trial was set in crop rotation program area where certificated organically in Yalova Turkey. The study was carried out in complete randomized block design with four replications in the open field. Effects of pre-plant application were determined on cucumber seed yield (kg ha-1) and some seed quality parameters such as; 1000 seed weight (g), seed number per weights were determined respectively 18.09 g and 20.59 g. Germination rates of both of pre-plants application were 100%.

Keywords: Organic agriculture, organic cucumber seed, lettuce, broccoli, crop rotation

IHC 2018 S23

Organic Horticulture for Wellbeing of the Environment and Population (2nd International Symposium)

POSTER PRESENTATIONS

PS 1:

STUDY OF THE BEHAVIOR OF TWO ROMANIAN AUTOCHTHONOUS VARIETIES FOR WINE GRAPES, COLUMNA AND FETEASCA NEAGRA, CULTIVATED IN ORGANIC SYSTEM

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Organic viticulture represents one of the developmental opportunities of the Romanian vine-growing sector, which, mainly at the level of small farms, is opportun and facile to implement due to the habit to minimizing human interventions in the vineyard ecosystem by using a reduced number of treatments and utilising especially copper and sulfur based products. Demand for organic wine is on the rise, both globally and locally. At the Research Centre for Viticulture and Enology Murfatlar, over a period of 10 years, several varieties of wine grape have been tested to choose the most suitables to organic cultivation. The accent was on the autochtonous varieties, among which are noted the grape varieties for white wine Columna and for the red wine, Feteasca neagra. The paper presents studies carried out between 2014 and 2016 on the adaptability of the two varieties to the main stressful climatic factors characteristic of the Murfatlar vineyard (near Romania's Black Sea coast) - extreme temperatures, the lack of precipitation especially during the vegetation season, and their tolerance to diseases and pests specific to the vineyard, by applying three schemes of phytosanitary treatments - a conventional one (witness) and two with substances admitted in the ecological system. The resistance of the Feteasca neagra variety to the periods of drought during the vegetation season and of both varieties at the downny mildew attack (*Plasmopara viticola*) and the eudemis (*Lobesia botrana*) are remarqued. For powdery mildew attack (Uncinula necator), it has been found that treatments in the vegetative rest periode and at the buds breaking with sulfur-based substances have induced a better control of the infections. Grapes and wine production was analyzed both qualitatively and quantitatively, observing that the application of the organic system does not influence the quality of grapes and wines.

Keywords: local varieties, adaptability, ecological products, harvest quality

PS 2:

OPTIMIZATION OF PHENOLIC COMPOUNDS EXTRACTION FROM CABERNET SAUVIGNON VARIETY THROUGH APPLYING DIFFERENT TECHNOLOGICAL OPTIONS OF MACERATION AND FERMENTATION

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Obtaining quality red wines depends both on the composition of the raw material and on the extraction of his components by the different techniques applied to the processing of grapes and musts. In the case of red wines, maceration is an important step, which involves the extraction of phenolic compounds, especially color pigments, without which the red wines can not be individualized. The purpose of this work was to optimize the extraction of phenolic compounds from the grapes skins, experimenting two variants of the times of maceration

and fermentation on the marc for 8 and 16 days using the classical maceration-fermentation method. The studies was done on Cabernet Sauvignon variety cultivated in two Romanian vineyards, Murfatlar and Copou Iasi, being determined too the phenolic profile of wines obtained by HPLC-DAD liquid chromatography. During the maceration-fermentation process, daily determinations of color intensity, tint, anthocyanins, total polyphenols, and alcoholic content were performed, observing an ascending curve of phenol compounds accumulation in wine that peaked after the alcoholic content exceeded 10.0% vol. The results obtained for phenolic acids (gallic acid, pyrocatechinic acid, p-benzoic acid, chlorogenic acid, p-coumaric acid and ferulic acid), flavanols (catechin and epicatechin), flavonols (naringin, quercitin) trans-resveratrol and monoglucoside anthocyanins , delfinidine, peoniodine and cyanidine), acylates and coumarilates, revealed significant differences for the this variety (Cabernet Sauvignon), especially for phenolic acids, flavonols and trans-resveratrol. Analyzing the statistical data on the wiew of influence of the two factors (the vineyard and the duration of the fermentation-maceration process), we observe significantly higher values recorded in the Murfatlar vineyard, and in the case of technological variants with a longer period of maceration.

Keywords: Red wine, HPLC-DAD, phenol profile

PS 3:

WINTER COVER CROPS TO ECOLOGICAL MANAGEMENT OF WEEDS IN BROCCOLIS CULTIVATION IN TROPICAL CONDITIONS

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The aim of this research was evaluated the performance of winter cover crops to ecological management of weeds in the broccolis cultivation in tropical conditions in no tillage. For this, a experiment was carried out in the city of Ribeirão Preto, Brazil. The treatments were composed by four species of cover crops: black oat; triticale, white lupine and forage turnip. The experimental design was a completely randomized block with four replications. It was evaluated the growth of cover crops by the leaf area index (LAI) at the 42 and 53 days after sowing (DAS) and yield of dry mass of aerial part at 62 DAS. Later, the cover crops were killed by the aid of 'roller crimper' to straw formation on soil surface to broccolis cultivation in no tillage. During the broccolis growth it was evaluated the weed establishment at the 35 and 50 days after transplanting (DAT). For agronomic performance of broccolis it was evaluated the dry mass of aerial part at 35 and 50 DAT. The forage turnip had the great LAI than the others cover crops at the 42 DAS, however at the 53 DAS did not have significant difference among cover crops for LAI. The dry mass of aerial part of cover crops did not significant difference, which produced in average 3.5 Mg ha-1. Regarding to establishment of weeds in the broccolis grown there isn't significant difference among cover crops. The large value of dry mass of aerial part of broccolis, evaluated at the 35 DAT, was recorded when grown on the straw of with lupine, followed by triticale; and at the 50 DAT was reduced when grown on the straw of forage turnip. There isn't difference significant among cover crops to broccolis yield. So, the winter cover crops are a great alternative for weed control.

Keywords: No tillage, roller crimper, conservationist horticulture

PS 3:

ASSESSING SOIL CHEMICAL PROPERTIES AND SOIL RESPIRATION AMENDED WITH SESBANIA GRANDIFLORA

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The objective of this two-year study was to assess the influence of using a leguminous crop, Sesbania grandiflora, on soil nutrient levels (NO3, P, K, Ca+2, Mg+2, Na and S), pH, EC, soil organic matter (OM) and respiration. Sesbania seeds were planted in a certified organic field in March at a planting density of 50 kg/ha in 2015 and 90 kg/ha in 2016. In order to determine soil chemical analysis, soil cores were collected from the topsoil layer (0-20 cm) prior to the experimental period in February, 2015, and from 3 soil depths (0-20, 20-40 and 40-60 cm) at the end of 2015 and 2016 growing seasons. Except for soil OM %, soil nutrients (NO3, P, K, Ca+2, Mg+2, and S) and pH was higher in 2015 than 2016. In both years, soil P, K, Mg+2, OM% and respiration in the topsoil layer (0-20 cm) was higher than at deeper soil depths (20-40 and 40-60 cm). Conversely, soil Ca+2, S, and Na in the 40-60 cm soil layer were higher than in the topsoil (0-20 cm). No significant differences were found in soil pH, EC and NO3 across soil layers during the study. Additionally, shoot NO3 and total N concentration during the flowering period was similar across both years. Shoot NO3 was 415 and 425 ppm, and total N was 2.98 and 3.06%, in 2015 and 2016, respectively. Interestingly, soil respiration in the topsoil (0-20 cm) increased slightly in 2015, but by 9-fold in 2016 as compared to the baseline level measured in February, 2015. In addition, soil respiration in the 20-40 cm and 40-60 soil depth was 39% and 50% lower than the topsoil (0-20 cm) at the end of the experiment in July 2016. Overall, this study revealed that organic soil amendment using Sesbania grandiflora significantly improved soil respiration and reduced pH especially in the topsoil layer, but did not potentially enhanced nutrient levels compared to the baseline soil.

Keywords: Organic amendment, soil respiration, soil health, legumes

PS 4

EFFECT OF *TRICHODERMA ASPERELLUM* ON PEPPER AND MELON SEEDLING GROWTH AND FRUIT QUALITY

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Trichoderma spp. are from soil and root inhabitants that have been globally known as biocontrol agent and plant growth promoting fungi. Trichoderma asperellum, being a member of Trichoderma family, also have been concerned. Hence we investigated the effect of Trichoderma asperellum on the growth and fruit qualities of pepper and the nitrogen use efficiency. Under the same conditions, T. asperellum treatments (2×108spores/ml) , including inoculating Trichoderma on soil, inoculating Trichoderma on seeds and spraying of fungal suspension, improved the root activity of pepper and melon seedlings, the fresh weight and dry weight and the plant height. T. asperellum treatments increased the fruit yield of pepper or melon under low dose of nitrogen, and promoted the utilization efficiency of nitrogen. Furthermore, T. asperellum treatment enhanced the contents of Vc, total flavonoid, soluble sugar and β-carotene in pepper and the content of sucrose, glucose, fructose and soluble sugar in melon fruit, then depressed the nitrate accumulations of pepper and melon fruits in low dose of nitrogen treatment. Nevertheless, T. asperellum treatment reduced the the content of sucrose, glucose, fructose and soluble sugar in melon fruit in high nitrogen dosage treatment. Moreover, T. asperellum treatment boosted the increases of soil enzyme activities related with nitrogen uptake, namely urease, catalase, dehydrogenase and invertase, which might regulate the absorption and utilization to nitrogen in plants. Overall, T. asperellum could regulate plant growth and fruit yield and improve fruit quality by regulating the root activity and the activity of nitrogen uptake related enzymes. There are many ways of interaction between Trichoderma and host plant, while more works further need to carry on the molecular mechanisms how T. asperellum regulate the absorption and utilization of pepper and melon on nitrogen.

Keywords: Trichoderma asperellum, Nitrogen, melon and pepper, quality, soil enzyme activity

PS 4:

INFLUENCE OF NEEM LEAF FORTIFIED FERTILIZERS ON TEA YIELD AND SOIL CHEMICAL PROPERTIES

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Tea production is not at optimal without fertilizer because of the great demand for N, P and K of about 150, 30 and 30 kg/ha respectively.A field study was conducted to assess the influence of inorganic and organic nutrient sources applied with or without neem leaf on tea leaf yield, nutrient uptake and soil chemical properties in Kusuku area of Mambilla Plateau, Nigeria. The fertilizers - NPK (15:15:15), Urea + SSP, Cocoa pod husk (CPH), NPK + Neem, Urea + SSP + Neem and CPH + Neem, were applied to supply 150 kg N ha-1 while the neem leaf was applied at 10 kg ha-1. The treatments were in 3 replications in a RCBD. Tea leaves harvested were weighed, milled after drying and analyzed for nutrient contents. The soil from each treatment was collected, processed and analyzed for the pH, organic C, total N, P, K, Ca, Mg and Zn contents and compared with the corresponding initial values. The results showed that tea leaf yields were significantly higher when fertilizers were applied compared with the control without fertilizer. The organic and straight fertilizers compared favourably with NPK 15:15:15 (the reference fertilizer). Fortification of the fertilizers with neem leaf resulted to 2.22–46.9 % higher tea leaf yield. The organic fertilizer and neem fortification led to improved soil pH, organic C and high nutrient build up compared with NPK (15:15:15). The Urea + SSP + neem treatment was absolute best and was followed by CPH + neem.

Keywords: Economic enhancement, fertilizer scarcity, food security, soil productivity, tea production.

PS 5:

CONSUMER PREFERENCE MODELING FOR ORGANIC ROUND TOMATOES IN SWITZERLAND ACCORDING TO FRUIT QUALITY AND TEXTURE

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Most studies show that the production system has few effect on tomato quality. For now, the main factor dictating the quality differences of tomatoes is the genetic heritage, in other words the variety. Today, the production of quality tomatoes is a key issue for Switzerland as consumers expect the product to be in line with their expectations and preferences. A trial taking into account the diversification of the round-type tomato was carried out in the greenhouses of Agroscope Conthey. A range of twelve varieties of round tomatoes of various breeders were chosen. These so-called old, current and future varieties were cultivated in soil under greenhouse according to the guidelines of organic farming. The 12 tomato varieties were submitted to a panel of more than 500 consumers attending the "Tomato and Terroir Festival" (Geneva, CH, 2016). Consumers were asked to express their preferences after tasting the tomatoes. The 12 varieties could thus be classified according to their degree of appreciation. Among the most appreciated: Paronset, Estiva, Cindel and Pilu, among the least appreciated: Fiorentino and especially Natyssa. The tomatoes were analyzed to determine the SSC, TA, background color but also the texture of the skin and flesh. The preferred varieties had the highest SSC and TA values and at the same time the lowest skin and flesh texture values. The low color index of Natyssa, Admiro and Octydia appears to have been detrimental to consumer judgments.

Keywords: Tomato varieties, skin texture, flesh texture, chemometric modelling

PS 6:

IMPACT OF VARIOUS COMBINATIONS OF ORGANIC AND INORGANIC FERTILIZER ON FRUIT PRODUCTION AND QUALITY OF KINNOW MANDARİN (*CİTRUS RETICULATA* BLANCO)

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Current study was conducted to compare the impact of different doses of organic and in organic fertilizers on quality and yield of ten years old Kinnow mandarin grafted on rough lemon rootstock in silt clay loam soil, for three successive seasons; 2012-13, 2013-14 and 2014-15. Study involved six different combinations of organic and inorganic fertilizers i.e. FYM + Recommended dose of NPK -FYM 60kg + 75% recommended dose of NPK FYM 70kg + 50 % recommended dose of NPK, 150 g/plant humic acid + Basic dose of NPK, 200 g/plant humic acid + 75% Basic dose of NPK and 250 g/plant humic acid + 50% Basic dose of NPK. Distinct parameters of plant growth (height, spread, and canopy volume) and yield besides important quality characteristics of the fruit (size, weight, peel thickness, peel weight, TSS and acidity) were measured. Fertilizer combination (FYM 60Kg + 75% Recommended dose of NPK significantly produced better vigor 3.27 m height, 3.15 m spread and 17.39 m3 plant canopy for (2012-13), 3.54 m height, 3.77 m spread and 23.02 m3 canopy for (2013-14) and 3.60 m height, 3.68 m spread and 25.90 m3 canopy for (2014-15). Similarly, in case of fruit yield, it remained significantly high i.e. 47.16 kg/plant as compared to its contestant treatments. Better fruit size 69.30 mm and juice percentage remained substantially higher and increased up to 45.81% in the same treatment. The research findings favorably exhibited the combination of increased FYM with the decreased level of inorganic fertilizer such as NPK as major nutrients. The results are worth exploitable by the citrus growers thereby reducing reliance on the chemical based fertilizer for major nutrients.

Keywords: Mandarins, NPK, FYM and humic acid, vigor, fruit quality, yield.

PS 7:

SOIL FERTILITY AND YIELD IMPROVEMENT OF ORGANIC POTATOES AMENDED WITH DIFFERENT DOSES OF COMPOST IN SANDY SOIL UNDER MEDITERRANEAN CONDITIONS

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The objective of this study is to highlight the positive effect of compost amendment and to select the most promising doses for soil fertility with the best yield. Five treatments including 4 doses of compost 10, 20, 30, 40 T / Ha and a control (0 T / ha) were tested to study the evolution of physic-chemical and biological parameters of the soil fertility during the production cycle and to evaluate the yield and quality of organic potato. Different soil fertility parameters were analyzed: Organic matter, Phosphorus, potassium, sodium and calcium. The results

revealed improvement in soil fertility parameters during the cropping cycle of the amended plots (Organic Matter, Phosphorus and Potassium) compared to the control. Electrical Conductivity has been increased compared to the initial state. Concerning potato yield, the comparison between the doses showed that the dose of 40 T.ha-1 gave promising result with 29.46 T.ha-1, whereas the other treatments gave 28.06; 28.84; 26.96 and 25.63 T.ha-1 respectively for the treatments 10; 20; 30 T.ha-1 and the control. The organic amendment with the compost significantly improves the yield of the organic potato and results in a positive balance of sandy soil fertility under Mediterranean conditions.

Keywords: Organic amendments; soil fertility; compost; yield; organic potato, sandy soil

PS 8:

INFLUENCE OF ORGANIC FERTILIZATION RATE ON SWEET ONION (*ALLIUM CEPA* L.) BULB YIELD AND QUALITY

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In the U.S., there are few reports on how organic fertilization rates affect sweet onion yield. The objective of this study was to evaluate the effects of organic fertilizer rates on sweet onion bulb yield and quality. Experiments were carried out at the Tifton Campus, University of Georgia, in the winters of 2012-2013 and 2013-2014. There were five treatments (organic fertilizer 3-2-3 equivalent to 0, 60, 120, 180 and 240 kg·ha-1 N). Total and marketable yields and individual bulb weight increased quadratically with increasing fertilization rate. The percentage of bulb dry weight was highest in the unfertilized control and decreased with increasing fertilization rate. Fertilization rate had little impact on bulb soluble solids content and pungency (measured as pyruvate concentration) in the two seasons. In conclusion, onion bulb yields increased with increasing organic fertilization rate, while incidences of bulb diseases responded differently to N rate. Botrytis rot was the main cause of postharvest bulb decay in all N rates.

Keywords: Organic agriculture, chicken manure, sustainable agriculture, vegetable production

PS 9:

PRODUCTION OF ORGANIC POTTED HERBS WITH LED SUPPLEMENTARY LIGHTING: EFFECT ON PLANT BIOMASS AND PHENOLS

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LED lighting technology for greenhouse horticulture offers the possibility of using a blend of monochromatic wavelengths that can stimulate or inhibit specific morphological and physiological responses and thus act as growth regulators. This is particularly interesting for organic herbs and ornamentals as few products are available to control plant growth. Our study hypothesis was that LED supplemental lighting (SL) is a good tool for organic greenhouse ornamental growers to increase plant biomass and product quality such as leaf phenolics concentration. By using randomized complete block designs with three replicates, two light treatments (with and without LED SL) were compared for 20 herb species and cultivars grown in seven sets of three species (called trios A to G; Trio A: Salvia officinalis- Origanum vulgare- Rosmarinus officinalis; Trio B: Persicaria hydropiper- Persicaria odorata- Mentha piperita; Trio C: Majorana syriaca- Thymus vulgaris- Rungia klossii;

Trio D: Tagetes lucida- Artemisia arbotanum- Thymus citriodorus; Trio E: Mentha spicata-Ocimum herbalea-Majorana syriaca; Trio F: Mentha piperita f. citrata- Mentha suaveolens- Mentha 'Hilary's Sweet Lemon'; Trio G: Artemisia arborescens- Lippia dulcis- Micromeria fruticosa). Trials were carried out in 2017 at Laval University (Quebec City, QC, Canada). The LED SL (15% blue and 85% red) PPFD at the plant level was 193 µmol m-2 s-1 for a 12-h photoperiod (6h00 to 18h00). Our results showed that the total dry shoot biomass (DM) over all species increased on average by 1.4 times (up to 2-fold for T. citriodorus and S. officinalis) under LED SL while the increase in leaf dry biomass (harvested >12cm) averaged 1.7 times (up to 3.2 times for M. suaveolens). The leaf phenolics concentration increased on average by 1.2 times (up to 1.5 times for A. arbotanum) under LED SL. Therefore, on average 2.2 times more phenols have accumulated in plant (up to 6.4 times for R. officinalis) under LED SL. In conclusion, LED SL increased plant biomass, phenol concentration per leaf unit and consequently, the total phenol accumulation per organically grown herb plant.

Keywords: Aromatic plants, artificial lighting, organic farming, phenolic compounds

PS 10:

ECOLIVE: TRAINING FOR THE PRODUCTION OF ORGANIC OLIVE OIL

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Olive is the leading permanent crop managed organically worldwide. The total area of organic olive groves is reported as 672 033 hectares in 2015, 79 % being in Europe and 19 % in Africa. Major reasons for converting large areas of olive to organic are the low-input use especially under rain-fed conditions and the high demand for olive oil due to its health benefits. This paper gives brief information on ECOLIVE project 'Training for Organic Olive Oil Production', explains the methodology implemented and outlines the e-learning material developed by 6 partners from, Turkey, Greece, Cyprus and Italy. ECOLIVE project is funded by the EU Erasmus+ program between 2016 and 2018. The main objective is to prepare an ICT based learning program in English, Greek, Italian and Turkish to train farmers, cooperative or SME managers and consultants. The learning material is prepared based on a transnational needs analysis. Farmers make up one of the social groups where ICT penetration is relatively low however, there is a growing need parallel to the interest for ICT based trainings. The use of ICT will allow reaching remote areas where olive oil is produced but access to information is rather limited. The focus being exclusively on organic olive oil production allows finding answers to questions specific to organic olive oil production. It supports the sector in all steps from production, preparation and management of the soil and identification of local varieties, to labelling and exporting of the organic olive oil. ECOLIVE project creates a platform for organic olive oil sector through the learning material that valorize the know-how of producing countries and through the establishment of communication channels between farmers, members of agricultural associations and companies through the use of web based communication tools.

Keywords: Olive fly, olive moth, harvest, labeling, exportation

PS 11:

CONTRIBUTION FOR WELLBEING OF PEOPLE WORKING IN URBAN ORGANIC ALLOTMENTS GARDENS

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Urban allotments gardens in Portugal have increased in recent years, as in many other European countries and worldwide. The contribution of these gardens to the quality of life and wellbeing of urban populations has been recognized, but their evaluation is still very scarce. The objective of the present work is to evaluate this contribution, based on the organic urban allotments garden of the Devesa Park, V. N. de Famalicão, Portugal. The sample included 65 Portuguese participants that completed a self-administered questionnaires Life Satisfaction (Pais-Ribeiro, & Cummins, 2008) and Subjective Happiness (Pais-Ribeiro, 2012), with socio-demographic items. Results showed that 74.5% of the sample consider themselves happy with their life. The results also indicated that the increased frequency of visits to work at the allotments garden was positively related to a greater perception of subjective happiness. There was a positive happiness perceived by most gardeners who evaluated themselves happier, since they initiate this activity. These individuals also revealed an optimistic and positive attitude with life, regardless of their economic or social difficulties. The organic urban allotments garden of the Devesa Park has proved to be a model of valorisation and enhancement of the quality of life of its gardeners, contributing significantly to make people feel happier and more satisfied with life, changing and improving their habits.

Keywords: Life satisfaction, subjective happiness, urban agriculture

PS 12:

EFFECT OF ORGANIC FERTILIZER WITH MINERAL FERTILIZER ON PISTACHIO PRODUCTIVITY

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Turkey is third in the production of pistachio after USA and Iran. The amount of pistachios taken from the unit area is not at the desired level. The first reason for the low productivity is to be grown on dry conditions. But other reasons besides this cause stem from the fact that the plant can not feed enough. Most of the soils grown in pistachio are clayey, lime and alkaline. Besides, the organic material content of pistachio gardens is low. It is known that the phosphorus fixation capacities of such soils are particularly high. In these conditions, it is obligatory to use mineral and organic fertilizers together in the pistachio. On dry conditions in Gaziantep, the experiment was carried out for four years at the 25-year-old Uzun variety pistachio garden. According to soil analysis, mineral fertilizer was applied to control plot. On the other hand, two doses of organic fertilizer (25 kg / tree and 50 kg / tree) with mineral fertilizer were used. For four years, pistachio yield was followed; 25kg / tree organic fertilizer combined with mineral fertilizer has been shown to increase the yield by about 40%. It is thought that this increase not only organic fertilizer improves the physical, chemical and biological properties of soil, but also increases the efficiency of mineral fertilizer.

Keywords: Pistachio, organic fertilizer, organo-mineral fertilizer, soil

PS 13:

CALCULATING CARBON EMISSIONS IN TURKISH ORGANIC AND CONVENTIONAL DRIED FIG PRODUCTION

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In Turkey, fig fruit are commercially sun-dried in the Meander basins as destined to the export markets. Fig orchards are mostly located on mountains in the region and production on slopes is mainly rain-fed except few irrigated locations with low levels of input use. Parallel to the increased demand for dried fruit and nuts among consumers of organic food, organic dried fig demand escalated during the last decades. Reasons to buy organic varies among consumers however health concern is still the motivation followed by environmental awareness especially for plant products. The objective of the study was to compare carbon emissions in organic and conventional fig production and to identify the main practices leading to significant emissions. All activities carried out at the orchard and in processing plant during the production season were recorded and each step was evaluated in respect to carbon emissions. In order to make the assessment representative for the region, farmers, processors and experts were surveyed. In case of carbon emission rates, relevant literature and data sources were used to obtain reference data. The carbon emissions were calculated taking into consideration cultural practices as fertilization, tillage, pest and disease management, pruning, pollination by male figs, and irrigation and harvest, and post-harvest handling which included storage, drying, selection-sorting, aflatoxin control, fumigation (pest control), and packaging operations. The emissions in conventional management was 570 kg CE/ha compared to 242 kg CE/ha in organic systems. The emissions per kg of dried fig are calculated as 0.315 kg and 0.192 kg CE, respectively. In conventional orchard management, major carbon emissions were due to fertilizer use followed by irrigation and tillage. Regarding control of storage pests, chemical and non-chemical methods showed significant differences in respect to carbon emissions. Carbon dioxide treatment under atmospheric pressure is recommended to organic dried fig processors due to lower carbon emission compared to deep freezing.

Keywords: Chemical fumigation, non-chemical fumigation, *Ficus carica*, irrigation, fertilizers

PS 14:

DRY SEASON CLIMATIC CHANGE ADAPTATION STRATEGY IN TROPICS' CROPPING SYSTEMS: A CASE STUDY FROM WATERMELON (*CITRULLUS LANATUS*) AS LIVE MULCH

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Live mulch crops like watermelon (Citrullus lanatus) can reduce soil temperature and improve soil moisture, resulting in reduced irrigation and additional income from produce harvested in mixed cropping systems in the no rain dry season of sub Saharan Africa rainfall agriculture. This study therefore seek to quantify the impact of watermelon live mulch densities on the irrigation water requirement, climatic change adaptation capability and yield potential in dry season of amaranth production system. Treatments comprised three sowing densities of watermelon: 1.5 x 0.45m; 1.5 x 0.90m; 1.5 x 1.50m. Grain amaranth as an intercrop was transplanted at 0.75 x 0.75 m spacing. There was a control plot with only grain amaranth, forming four treatments in each of five replicates in an RCB design. Averaged over two consecutive croppings, irrigation water requirement was optimally (P= 0.05) reduced, while amaranth grain and watermelon fruit yields were highest at 1.5 x 0.90 m watermelon plant spacing. All mulch densities transmitted less photosynthetic photon flux density (PPFD) relative to the control. Maximum soil temperature was reduced 2.20C by amaranth, 3.50C by melon relative to the control. Soil moisture content was significantly (P = 0.05) greater in the live mulch treatments 18.8% compared to the control 12.4%. Our research demonstrated that live mulch have lower diurnal soil temperature amplitude that account for reduced irrigation water requirement in the dry season; and we believe offer opportunities in adaptation of agricultural production systems under climate change scenarios.

Keywords: Dry season, climate change, tropics, temperature, moisture, watermelon

PS 15:

EFFECT OF NITROGEN AND PLANT DENSITY ON YIELD AND POSTHARVEST STORAGE OF SWEET ROCKET

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Fresh sweet rocket (Hesperis matronalis) is a constituent of ready to consume salads, used for many purposes ranging from food to cosmetic and medicinal uses. Factors that contribute to quality of leafy salad herbs are post-harvest techniques in relation to time, storage temperature, plant density and nitrogen (N) application. The objective of the study was to investigate the influence of N application and plant density on yield, and postharvest quality of sweet rocket stored for different periods. The experiment was laid out as a 6 x 3 factorial with six N levels of 0, 60, 90, 120, 150 and 180 kg ha-1, and three plant density at 133 333, 80 000 and 40 000 plants ha-1. Treatment combinations were replicated three times in a randomised complete block design. Harvested sweet rocket leaves were stored at 5 °C for 0, 5, 10, or 15 days. Thereafter, the leaves were freeze-dried in order to determine total phenols content (TPC) and total flavonoids (TFC). An increase in plant density resulted in an increase in leaf fresh and dry mass, which was at 133 333 plants ha-1. Leaf fresh and dry mass was significantly high at N application ranging from 90 to 180 kgha-1. Plant density did not exibit significant effect on TPC and TFC. Most of the TPC occurred from 0 to 90 kg.ha-1N and when stored from 0 to 10 days. The TFC increased with an increase in N application reaching maximum at 120 kg ha-1N from 0 to 10 days of storage. Results indicate that N application ranging from 90 to 120 kg ha-1 improved yield, and TPC and TFC of freshly harvested leaves and up to duration of 10 days of storage at 5°C. Therefore, the application of 90 kg ha-1 N for improved yield ad chemical compositions of sweet rocket is recommended.

Keywords: Hesperis matronalis, yield, total phenols, total flavonoids, quality

PS 16:

EFFECT OF BENEFICIAL MICROORGANISMS ON ORGANIC LETTUCE GROWING

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This study was conducted in order to determine the effects of beneficial microorganisms on two lettuce cultivars (cvs. Maritima and Patagonia) in organic production. Two beneficial microorganisms, namely mycorrhiza (Glomus species) and Trichoderma harzianum and their combination (mycorrhiza + T. harzianum) were tested comparing with control (no treatment). Lettuce plants were grown between 14.11.2016 and 02.03.2017 in an unheated greenhouse with a plant density of 5.7 plant per m2. At the end of growing period, yield and head quality parameters such lettuce size, colour, vitamin C and nitrate contents were determined. The results showed that cv. Patagonia gave the highest yield (2.18 kg m-2) and highest head size (366.16 g m-2), however among the tested microorganisms, mycorrhiza had higher performance as plant growth promoting microorganisms compared with the others.

Keywords: Mychorriza, Trichoderma harzianum, yield, quality.

PS 17:

EFFECT OF DESTROYED COVER CROPS ON SOIL ARTHROPOD ABUNDANCE

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Cover crops used as agro-ecological service crops (ASC) have been recognized as a beneficial component of many farming systems. These plants are significantly important in keeping no-till system healthy. In organic systems, ASC can provide more sustainable ecosystem; they reduce soil erosion, increase amount of organic matter and improve soil fertility and nutrient cycling. ASC provides weed control and better environment for beneficial's insects (pollinators, predators, parasite species and weed seed predators). This research was conducted to determine the effectiveness of using a mechanical roller crimper technology (RC) as an alternative method for destroying cover crops in innovative project SoilVeg, that was carried out as part of the Core Organic Plus, involved nine European countries. In case of Slovenia field experiments were conducted in Maribor using a split-split plot design during the 2015-18. Used were two different ASC (crimson clover and barley) that were terminated with two different techniques (i) no/reduced tillage, as flattering with RC the and (ii) traditional technique used to incorporate the ASC as green manure (GM) into the soil compared to conventional tillage and soil mulching (black foil). The aim of this study was to evaluate the effects of cover crops on pest/beneficial soil arthropods dynamics in cabbage. Insects were sampled five times in each treatment with pitfall traps. Total insects (each beneficial, pests and neutral) activity-density was higher in treatments with crimson clover compared to barley. Population densities varied during growing season. The number of Coleoptera (Carabidae) was greater on treatment where ASC was incorporated compared to flattened. Our results showed that long-term experiments are essential for evaluation of tillage system on arthropod fauna.

Keywords: Agro-ecological service crops, reduced-tillage, roller crimper, organic farming, arthropod fauna, natural enemies