

IHC2018-Symposium 24

S24- Horticultural Economics and Management (19th International Symposium), Improving the Performance of Supply Chains in the Transitional Economies(7th International Symposium) and Horticulture Economics, Marketing and Consumer Research (2nd International Symposium)

SESSION I

OS 1-1: COMPREHENDING AND CAPITALISING ON CONSUMER TRENDS

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From an extensive review of the material available on-line from management and marketing companies, food producers and food associations, the key drivers of consumer demand can be summarised as: (i) health and nutrition – and the increasing recognition of plant power in the diet, plant waters, nuts and seeds and the antioxidant properties of fresh produce; (ii) indulgence – the increasing demand for product to deliver the desired taste, flavour and texture without the application of preservatives or chemical additives and the rapid rise in the popularity of gourmet cooking shows and heirloom food; (iii) traceability – which not only implies that the product is safe, but identifies where and how the product was grown; (iv) sustainability – where greater attention is focused on the environment, equity and social responsibility and increasingly, on the need to minimise food waste; (v) convenience. Consumers today are eating more food at home, but more of the food that is consumed is semi-processed. Coupled with health and nutrition, more consumers are choosing to snack on fresh fruit and vegetables and with increasing urbanisation and the consumers desire to know where the food has come from, more fresh produce is finding its way into the home through alternative routes to market; and (vi) holistic beauty – where an increasing number of plant products are being utilised for skin care products and cosmetics.

Keywords: consumer demand, fresh produce

OS 1-2: CONSUMERS AWARENESS, BUYING BEHAVIOUR AND USE OF FRESH BERRIES IN DIFFERENT COUNTRIES

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In the recent past, there have been and still are several horticultural projects in order to stimulate the improvement of sustainability of berry production, quality and nutritional value in a changing environment. In terms of the whole supply chain, the consumer's perspective needs to be taken into consideration as well. In order to stimulate the demand of fresh berries among the consumers, it is crucial to know, what consumer's preferences are in matters pertaining fresh berries. With respect to production, there is statistical data available about fresh berries like e.g. strawberries, raspberries, blueberries, blackberries and currants. These data show a dynamic development of fresh berry production in different European countries. With respect to consumption, there are less data available and an information gap about consumer's preferences became obvious. This aim of this study is to contribute to the consumer's perspective. The objective of this research is consumer's awareness, their buying behavior and consumption habits of fresh berries in different countries. Assuming that consumer's preferences might show sex and age differences as well as regional distinctions, this study performed as a cross-national study. Countries involved are Finland, Germany, Italy, Poland and the United Kingdom. The sample size in each country is limited to 500 participants. In order not to distort the sample because of foreign language



competences, the questionnaire was designed in the native language of each country. The survey is carried out online. The data collection is in progress and will be finished in 2017. The paper will present the results of this cross-national study about consumer's preferences like associations towards fresh berries ("mind set"), awareness of fresh berries, buying behavior and use and consumption habits in different countries.

Keywords: consumers preferences, fresh berries, cross-national study, online survey

OS 1-3:

HAPPIER IN A HOME WITH PLANTS? A STUDY ON THE RELATIONSHIP BETWEEN HUMAN WELLBEING AND ORNAMENTAL PLANTS IN PRIVATE HOUSEHOLDS

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Ornamental plants are an integral part of people's life and consumption in developed countries. There are many benefits of amenity and ornamental horticulture in modern societies. However, in most cases the positive effects are documented for ornamental green in public areas (parks, greens) or at workspaces. Little is known regarding the relationship between ornamental plants and the human quality of life and wellbeing at the private level, while market figures point out the economic effect of hobby gardening. For instance, in Germany three out of four households buy a decorative plant at least once in the year. The trend of withdrawing into one's own home in times of uncertainty ("cocooning") encourages the need to explore if and how ornamental plants in households can improve mental wellbeing. In a representative online survey 1,200 German consumers have been interviewed on their living conditions, living style, relation with ornamental plants, economic and socio-demographic situation as well as their satisfaction with life in general and their satisfaction with housing conditions. A group comparison showed that persons with ornamental plants in their home are both significantly more satisfied with their life in general and with their housing situation. Multiple regression analysis revealed the impact of ornamental plants compared with other possible influencing factors and enlightened moderating variables of this construct. This study is embedded in the joint research project "ProKonZier" (German abbreviation of "Sustainable Production and Consumption of Ornamental Plants") targeting the whole value chain of ornamentals to enhance sustainable actions. It aims to develop new sustainable business models for the ornamental plant industry. The consumer survey showed that ornamental plants have the potential to support a satisfying and sustainable personal lifestyle.

Keywords: Mental wellbeing, ornamental plants, consumer study, sustainable horticulture, regression analysis

OS 1-4:

HOUSEHOLD EXPENDITURE ON FRUITS AND VEGETABLES: A CASE STUDY OF RURAL SOUTHWESTERN NIGERIA

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In spite of the growing body of evidence highlighting the protective effect of fruits and vegetables, their intake is still far below the dietary recommendation of the World Health Organization of 400g per capita per day in developing countries such as Nigeria. In view of this, factors associated with purchase likelihood and amounts spent on fruits and vegetables among households in rural southwestern Nigeria were investigated. Multi-stage sampling technique was used to select 152 households from rural southwestern Nigeria. A semi-structured questionnaire was used to obtain information on households' socio-economic and demographic characteristics, and expenditure on fruits and vegetables. Data were analyzed using descriptive statistics and the Probit model. Results revealed that majority of the respondents were male (82%), married (83%), educated (83%) with average household size of 6 members. Households' expenditure on vegetables (84%) was higher than that on fruits (17%). Expenditure share for the fruits and vegetables considered were 17%, 52%, 15%, 8% and 9% for leafy vegetables, fruit vegetables, root and bulb vegetables, herbaceous fruits and tree fruits, respectively. The Probit regression estimates revealed that respondents' age, main occupation and years of schooling, distance to market and perceived health benefits are closely associated with households' fruit and vegetable expenditure.

Keywords: fruits and vegetables, expenditure share, rural households, probit model, Southwestern Nigeria



OS 1-5:

THE COLOR PROFILE OF SPRING HARVEST GREEN ASPARAGUS SPEARS IN OPEN FIELD CULTIVATION, IN HOKKAIDO, JAPAN

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To investigate the varietal differences of the color in green asparagus spears, the 4 year-old plants of 6 varieties, UC-157, Grande, Gijnlim, Vegalim, Atticus and Cumulus, were used for this study, and spears were harvested in 14th May, 21st May, 4th June and 7th June, 2017. The spears were cut into 24cm long, and L value, a value and b value of scale leaves and some parts of stems (base green color) were measured by using colorimeter. The a value in scale leaves differs significantly among the varieties, especially in the scale leaves around 10 cm from the top. There were no significant differences in the stem base color among the varieties. Surveys were conducted for clarifying the relationship between consumer's preferences and quality including the color of spears. 55 spears with wide range of red color of different varieties including some European anthocyanin-free cultivars were used for these surveys. The fresh weight, maximum spear diameter, head tightness and number of scale leaves per spears (24cm in length) were measured as characteristics of size and shape of spears in advance. Besides, L value, a value and b value of different parts of spears; top (1cm from the top), scale leaves (5cm and 15 cm from the top) and stem base (5cm and 15cm from the top) were also analyzed by colorimeter in advance, too. The result of surveys indicated that the color difference does not have much influence on buying behavior of consumers than other characteristics such as fresh weight and number of scale leaves per spears. The information obtained from this study can help breeding programs of asparagus to reflect consumer demands of spear appearance and quality.

Keywords: asparagus, spear quality, colorimeter, consumer demand, Hokkaido

SESSION II:

OS 2-1:

TURKEY FOOD CHAIN PARTNERSHIP AN INNOVATIVE APPROACH: A BRIDGE TO THE WORLD FOR TURKISH HORTICULTURAL PRODUCE

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Turkey is a leading horticultural country producing a vast range of fruits and vegetable crops. Horticultural products are consumed fresh, dried or processed at both domestic and foreign market destinations. Bayer Food Chain Partnership (FCP) is a reference business model connecting partners along the value chain to improve sustainable production based on the fundamentals of good agricultural practices to deliver premium quality produce. The presentation will provide an overview of the FCP projects in Turkey and the key learnings in the period 2005–2017. Various independent FCP projects were implemented in cherry, citrus, gherkin, grape, lettuce, pepper, potato and tomato. Projects were built on the principles of good agricultural practices and designed to improve sustainable farming and production processes. The projects successfully delivered premium quality produce with both lower levels of residues and with a lower number of active ingredients in the final product. Overall food safety was improved and brought into compliance with international standards. Impacts of the crop management practices on the environment and off-target organisms were reduced through selection of IPM suitable crop protection products and minimizing the number of crop protection interventions. Economic improvements (ROI) were obtained through the combined effect of increased yield, improved quality and reduced input costs. The FCP initiatives included intense training programs to all participants to raise awareness



on topics related to protection of the environment, IPM, food safety, residue management, certification and traceability. Bayer specialists monitored periodically the status of the crops, the success of the pest management and offered technical support. In brief, FCP is an innovative approach: a bridge to the world for Turkish horticultural produce.

Keywords: food chain partnership, Turkey, gap, grape, potato

OS 2-2:

ECONOMIC PROCESS OF EXPORTATION OF MEXICAN PITAYA

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Mexican horticultural produce like Pitaya is one of the main economic crops in the low income region of Northern Oaxaca. Pitaya is produced in a very short period during six weeks of the year, from the end of April to early June. However, this product produces between 20 to 40% of the annual income of the population. Traditionally, pitaya is collected on the orchards, then it is transported to shaded buildings where they rest at least 24 hours. Then they are packed in wood boxes, transported to markets and sold at prices ranging from USD 1.24/kg to USD 2.50/kg. Traditionally pitaya is sold by native women outside the traditional market (since it is a seasonal fruit not many of established stands inside sell it). A system for exporting this produce, based on removing all the thorns from the fruit and passing it through a chlorine water bath has been developed. This procedure increases the price by USD 0.05/kg. However, the export price could be up to USD 3.00/kg. This is the lowest cost in the value chain. Air transportation could be up to USD 6.00/kg plus packaging material, which may add another USD 0.5/kg. In this paper we describe the transportation options of these fruits and the repercussions on the Pitaya market in Mexico and the USA.

Keywords: tropical Fruit, cacti, International Commerce

OS 2-3:

ASSESSING THE IMPACT OF EXCHANGE RATE UNCERTAINTY ON EGYPT'S HORTICULTURAL EXPORTS TO THE EU

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From a theoretical perspective, the evidence of the impact of exchange rate volatility (ERV) on exports is inconclusive. Likewise, the findings of empirical studies on the effect of ERV on exports are largely mixed. Furthermore, there are two apparent drawbacks of the ERV literature in relation to developing countries: First, although developing countries' real exchange rate is more volatile than that of the developed countries on account of high exposure to shocks, the literature on ERV and developing countries' exports has surprisingly been limited. Second, investigating the impacts of ERV on agrifood exports has received less attention in the literature compared to other export sectors, despite the significant role that this export category plays in economic growth and sustainable development in developing countries. The present article examines the influence of ERV on Egypt's fresh fruit and vegetable (FRV) exports to the European Union (EU) which absorbs nearly 40% of Egyptian FFV exports. Using quarterly data between 1994:Q1 and 2016:Q4 on Egypt's FFV exports to their major importing markets in the EU over three sub-periods: 1994-2003; 2003-2011 and 2011-2016, the empirical evidence analyzed in this paper suggests that ERV has a significant negative influence on Egyptian FFV exports to the EU. Especially in the third sub-period, ERV appears to be more important in the determination of Egypt's FFV exports to the EU. We conclude that increased volatility in exchange rates raises uncertainty about the future movements of the exchange rate. Egyptian exporters react to such uncertainty by



directing their FFV to the domestic market rather than to the EU, and thus, FFV exports would be adversely affected. A better management of Egypt's exchange rate system is therefore crucial in order to promote higher volumes of FFV exports to the EU.

Keywords: Exchange rate volatility, Horticultural exports, FMOLS Model, Panel estimation method, Egypt, the European Union,

OS 2-4:

TRANSPORTATION PLANNING MODEL FOR THE SUPPLY OF FRESH TOMATOES: AN APPLICATION TO SOUTH AFRICAN CONDITIONS WHILE CONSIDERING TOMATO FRUIT OF DIFFERENT MATURITY STAGES

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A transportation planning model was developed based on transportation, vehicle maintenance, and production costs against revenue from tomato fruit of different maturity stages supplied by different growers in a commercial farmers' sourcing network. Fruit quality kinetics of different maturities, transportation and storage conditions were integrated into the model, and quality constraints implemented to allow the selection of fruit that meet the requirements of different markets. The model's output is selected quantities of fruit to be supplied by different farms situated in different growing zones of the farmers' sourcing network, as well as the amount of fruit of each maturity stage. The objective function is to maximize profits from the quantity of fruit demanded while meeting the quality constraints of different markets. The kinetics of fruit firmness, hue angle and ascorbic acid content were selected as the quality attributes to be built into the model. The model was run under two configurations, with one configuration being strict on enforcing the quality constraints and the other configuration relaxing the quality constraints, while allowing the selection of fruit of each maturity stages. Different quantities of fruit were selected, based on each transportation and storage temperature regimes. In a typical scenario, the model was shown to improve the profits of the commercial growers by over 8000 ZAR per truckload of fruit, while ensuring that fruit quality requirements of consumers are met. The relaxed model configuration can be implemented in cases where fruit is sent to the open markets that are less strict on quality. Additional farms can be integrated into the model from a pool of farms in the grower's supply network. The model is potentially beneficial from a transportation planning perspective and its implementation will improve tomato fruit grower's profits, reduce food waste and allow competitive integration of emerging growers into the commercial growers' sourcing network.

Keywords: Supply strategy; transportation conditions; optimal supply parameters; multi-criteria optimization; fruit quality heterogeneity

OS 2-5:

PROGRESS AND CHALLENGES IN ESTABLISHING COMMERCIAL SUPPLY CHAIN FOR PAKISTANI MANGO EXPORT TO JAPAN

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Japan is high end competitive export market, and Pakistani mangoes have got access to Japanese market, with vapor heat treatment (VHT) protocol for quarantine purposes. Presently, Pakistan has two commercial VHT facilities working in private sector. During 2017, approximately 85 tons of mangoes have been exported (price \$4 -5/kg), while the rating score (out of 5) in Japan remained low (pricing 3 taste 4.5 and quality 2), as compared to the best rated mangoes from Taiwan (pricing 5, quality 5 and taste 4.5). Consumers prefer sweet mangoes, while buyer requires advance agreement in terms of weekly volumes, counts (prefer 12 and 14 in 5.2 kg gross weight), and a post arrival shelf life of 3-4 days. Pakistan export supply chain currently delivers mangoes to



Japan in 6-7 days (farm to import). Complexity of supply chain, inland logistic issues, varietal differences and transit route, make the mango export to Japan very challenging. However, significant progress has been made with industry-academic linkages. Specifically designed mango collection boxes were developed to avoid bruises. While, the VHT protocol remains same (47°C internal pulp temperatures for 25 minutes), variety specific processing protocols were refined: cultivar Sindhri (12 h, 100 ppm C₂H₄; pre-cooling 12°C, 10 -12 h; transport to airport 20-22°C); cultivar S. B. Chaunsa (10 h, 100 ppm C₂H₄; pre-cooling 16°C- 8-10 h; transport 18-20°C); cultivar Sufaid Chaunsa (12 h, 100 ppm C₂H₄, pre-cooling 14°C for 10-12 hours; transport at 20°C). Major issues on supply side remain high rejection ratio at farm level, upon arrival at pack house, and after VHT treatment, which increased the cost and limiting the supply volumes for export. Apart from supplies, colour development and shelf-life extension particularly in S. B. Chaunsa is needed. This paper describes detailed account of the process and challenges in establishing commercially mango export supply chains to Japan.

Keywords: mango, Pakistan, VHT, perishable, high value.

SESSION III:

OS 3-1:

IMPACT OF BEST PRACTICE HUBS (BPHS) AND VEGETABLE TECHNOLOGIES IMMERSION CLUSTER (VTICS) ON VEGETABLE PRODUCTIVITY AND WELFARE OF RURAL FARM HOUSEHOLDS IN MALI

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Consumption of calorie-based food such as rice, maize and millet are reportedly predominant among the rural poor households in Mali. These diets lack sufficient amount of essential nutrients such as protein, minerals and vitamins, thus leading to chronic undernourishment and resulting in poor health. It is widely believed that these deficiencies in food can be controlled in great measure by increasing production and consumption of nutrient-rich vegetables. Thus, the aims of this project were to increase vegetable productivity and consumption, with an expected resultant effect on welfare improvement. In order to reach a large number of farmers, this project adopted the “cascading approach” (training of trainers) through the use of best practice hubs (BPHs) and Vegetable technology immersion clusters (VTICs) training and demonstration vegetable gardens on Good Agricultural Practices (GAP) and Integrated Pest Management (IPM) in addition to field days. This paper examined the impact of BPH and VTIC in two regions of Mali (Sikasso and Mopti) using Propensity Score Matching (PSM) and Treatment Effect Model (TEM). The result shows that an average of 53% of the households consumes at least one type of vegetable daily. Positive gross margins was recorded for all the vegetable cultivated. The beneficiaries on average have a significantly higher expenditure on agriculture than the non-beneficiaries. The project has the probability of generating between 5%-12% increase in household income, 40%-53% increase in total per capita household asset value, and 32% increase in welfare. Our findings showed that the adoption of BPHs and VTICs significantly increased vegetable productivity, thereby leading to increase in income, assets, and improved welfare. The policy implication is that, the use of BPH and VTIC is an effective approach to achieve wide dissemination of new improved agricultural technologies for adoption and diffusion with a resultant positive effects on poverty reduction and welfare improvement.

Keywords: vegetable, impact, innovation, technology, productivity, welfare, Mali



OS 3-2:

GOOD AGRICULTURAL PRACTICES (GAP) IN ASIAN COUNTRIES: THE OUTCOME FOR IMPROVING INCOME OF FARMERS AND CAPACITY BUILDING

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In the globalization era, whereas there are no trade boundaries among Asian Countries anymore, it is necessary to enhance food safety and produce quality, environment friendly agriculture, worker's safe, health and welfare, as well as recording, traceability and reliability particularly for horticulture products. GAP is the answer of these challenges. How are the current status, implementation and outcome of the GAP implementation? This paper aimed to evaluate the implementation of GAP in Asian Countries as well as strengthening networks inter and among Asian Countries. Tabulation and descriptive analyses were employed. Results showed that among 11 Asian Countries, Korean, Thailand and Indonesia is the leaders of GAP implementation. However, the replication of GAP for more targeted commodities and more targeted areas should be done. The GAP implementation has been showed the outcome such as improving income of the farmers, quality of horticulture products, capacity building of the stakeholders and strengthening network of the stakeholders.

Keywords: GAP, Asia, horticulture

OS 3-3:

WIN-WIN SOLUTION FOR HEALTHY CHILI PRODUCTS OF RIGHT QUALITY

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India is the largest producer, consumer and exporter of red chilies. Chilies account for 20–30 % of India's total spice exports and are worth about €60–75 million. A big challenge to Indian chili production comes from large number of smallholder farmers. The right pungency, yield and color value as well as pesticide residues and aflatoxins are some of the other issues challenging the profitable growth of chili exports from India. To achieve the common mission of improving quality in order to safeguard Indian chili export opportunities, Bayer initiated a Food Chain Partnership project to collaborate with experts within the chili value chain for the mutual benefit of all stakeholders. Understanding the need to design a specific solution to meet the growing challenges affecting the global trade in chili based products, Bayer and partner companies agreed to work together to implement the innovative Food Chain Partnership model developed by Bayer with a clear focus on delivering economic, ecological and social benefits to all stakeholders by developing a customized agronomic solution. The tried-and-trusted 5P process was implemented for production as per specific consumer requirements with suitable chili varieties, nutrition management, Protection with a specific & scientific based plant protection schedule in line with principles of IPM & desired MRLs, Program monitoring from seed to harvest with coaching to farmers, Passport records for traceability and Post-Harvest by guiding growers on the best practices of managing post-harvest losses. In the end, collaboration proved to be good for all stakeholders, farmers earning 14% more in their income per hectare, partnering companies getting quality supply of raw chilies, consumers getting safe, right quality chili products & modern solutions from Bayer providing the basis for healthy nutrition.

Keywords: foodchain partnership, India, 5p process, chili



OS 3-4:

COST AND RETURN ANALYSIS AND SUPPLY CHAIN MANAGEMENT FOR HYGIENIC CHILI FARMING IN THAILAND

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Chili is the economic vegetable in Thailand. In 2015, harvesting area of chili was 239,026 Rai. Chili sauce is the highest exports value in terms of Chili products, totaled at 2,128 Million Baht in 2014, mostly exporting to European countries. This research was to analyze cost and return, and enlarge the management of Good Agricultural Practices (GAP) chili supply chain of farmers in Phrae, Nan and Chaiphum Province. Totally 210 participants were trained and collected. The results of technology transfer found that chili farmers' adoption rate of GAP increased. The adoption of GAP results in a decrease in plant diseases and insect pests. In Phrae province, cayenne pepper was the most popular type grown in the area. Planting area per household was 2.28 rai with the yield of 3,407.29 kg/rai. Cost of production was 35,678.80 baht/rai consisting of cash 47.25 per cent and non-cash 52.76 per cent. The variable cost was 89.48 per cent of the total cost which the highest cost was the labour cost (63.78 per cent). The average cost was 10.47 baht/kg while the farm gate chili price was 14.60 baht/kg. In Nan province, cayenne pepper in both hybrid and native pepper varieties were popular types grown in the area. For the hybrid pepper variety, planting area per household was 2.40 rai with the yield of 2,725.95 kg/rai. Cost of production was 30,407.48 baht/rai which the variable cost was 91.92 per cent of the total cost. The average cost was 11.15 baht/kg and the farm gate price was 14.10 baht/kg. In Chaiphum province, small native chili peppers named Yod Son and Jinda were popular types grown in the area. Planting area per household was 1.24 rai with the yield of 616.74 kg/rai. Cost of production was 18,779.64 baht per rai consisting of cash cost 17.75 per cent and non-cash cost 82.85 per cent. The variable cost was 95.34 per cent of the total cost. The average cost was 30.50 baht/kg while the farm gate chili price was 41.53 baht/kg. Farmers have the average income at 25,613 baht/rai.

Keywords: hygienic Chili Farming, Cost and Return analysis

OS 3-5:

SUSTAINABILITY AND ENVIRONMENTAL MANAGEMENT IN THE MEXICAN VEGETABLE SECTOR

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In terms of sustainability, the Mexican agricultural sector faces great challenges as well as opportunities because of its high environmental and social impact. The main environmental problems of agriculture in Mexico are related to inefficient water use and to deforestation. Also of growing importance are soil pollution because of inappropriate use of agrochemicals, greenhouse gas emissions and soil erosion. Environmental problems are severe in arid or semiarid regions such as in the state of Zacatecas where 87.7% of the cultivated area is rainfed, while the rest is irrigated with water extracted from 34 aquifers, of which 14 are overexploited. This study determines the relationship between the decision to adopt an integral program of care and protection of the environment in vegetable production units (UPs) and the characteristics of the UPs and growers, their views on sustainability, their agricultural practices and the drivers and barriers to adoption. Moreover, the likelihood of accepting the adoption of this program was determined. The information was obtained through a questionnaire applied to owners of UPs and was processed using two logistic regression models and a principal components analysis. The likelihood of adopting the program was 74.2%, determined by level of education, view on sustainability that profitability of the PU and internal aspects of the organization prevail, and sustainable agricultural practices. For the design of an integral program of care and protection of the environment in the agricultural sector, we suggest considering the possibility of conditioning direct support to the growers to



establishment of sustainable agricultural practices integrating standards of food safety, biodiversity and environmental management.

Keywords: environmental management systems, administration of natural resources, agricultural sustainability.

OS 3-6:

MULTI-CRITERIA EVALUATION OF SUSTAINABLE LAND USE IN RURAL AREA OF NORTHERN VIETNAM

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With the growth of the population in Vietnam, a significant growth of the food demand can be observed. A sustainable land use strategy is necessary, this strategy needs a multicriterial evaluation of the current situation. In northern Vietnam the province Phu Tho was studied in this regard and in particular two communities of this province, Trung Vuong with 119 and Tan Duc with 115 respondents. For evaluation of the sustainability of land use was used the analytic hierarchy process (AHP). In frame of the AHP 15 sub-criteria were investigated, based on three main-criteria related to economy, ecology and social aspects. This method was applied with the stakeholders in the province as well with the land users in the community. Regarding the evaluation of the main-criteria in both groups of respondents, the same ranking was observed: first economy, then ecology and sociology. As a result of the evaluation of the sub-criteria by the land users, in the first analytical complex (main-criteria) the highest priority had 'relation revenues/expenses', the lowest 'infrastructure', whereas in the second analytical complex 'overuse of pesticides and fertilisers' had the highest priority, but 'soil quality' was not valued as problematic, in the third analytical complex highest priority for the farmer had the 'social and medical care' and the 'motivation of the farmers', as the lowest problem were valued the job opportunity.

Keywords: analytic hierarchy process (AHP), development rural area, land use evaluation, multi-criterial analyses, agriculture, horticulture, sustainability

SESSION IV:

OS 4-1:

INVESTMENT OPPORTUNITIES OF HORTICULTURAL PRODUCTS IN AZERBAIJAN

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Biophysical conditions in Azerbaijan are generally favourable for fruit and vegetables sector, yet some regions also face more harsh natural conditions such as high temperatures in summer, water scarcity, erosion and salinity of land. What is more, factors like low levels of technology and related knowledge and limited access to resources, finance and markets are hindering improvements in the sector's competitive position. The main objective is to determine quantitatively the investment possibilities for the vegetable and fruit sector in 73 administrative regions in Azerbaijan. The outcome will be basis for stimulating technology innovation and knowledge transfer in horticultural products and regions with the best economic and market perspectives. The study consists of a literature search (statistics) and field survey, the application of the GIS & Knowledge-based Global-Detector tool (Hennen 2017) and compiling a cost-benefit analysis. The research covers data collection on biophysical conditions (e.g. climate, infrastructure, resources), on market and chain developments and on economic performances of production systems. Based on the biophysical conditions and sector expertise the Global-Detector tool was applied to estimate the opportunities of both sectors in the 73 regions. This was



completed with additional data from field trips. Moreover a cost-benefit analysis was conducted (profit, payback period and internal rate of return). Finally an overall ranking was carried out based on the results and impressions from stakeholder interviews. The study shows that the major vegetable and fruit producing regions have good opportunities, but unexpected regions have even better biophysical conditions and market opportunities for supporting technology innovation and knowledge transfer into the horticultural sector. This paper identifies obstacles for business development that need to be addressed to successfully use the identified opportunities.

Keywords: vegetables & fruit sector, statistical farm data, gis and knowledge-based tool, cost-benefit analysis, investment sheets, Azerbaijan regions

OS 4-2:

INDIAN HORTICULTURE-GROW, PROCESS AND EXPORT: AN OPPORTUNITY FOR INVESTMENT

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Horticulture development in India is remarkable in terms of production, productivity and economic returns. Current level of horticulture production has reached to 300 million tonnes from estimated area of 25.2 million hectares, of which 176.2 million tonnes are attributed to vegetables and 93.7 million tonnes to total fruit production. With its diverse agro-climatic region which varies from temperate to tropical, India produces almost all kinds of fruits and vegetables and the harvesting season varies from one region to another therefore these produce are available round the year in one or other part of the country. Therefore, these produce can be exported to other countries when they are not available in the importing country and this will fetch a better price. Currently, India does not have famous brand for crops/food products in outside market which also need to be done by identifying few specific products and export destination. Being the second largest producer of fruits and vegetables in the world the country is not able to harness the potential due to poor post-harvest management of these fresh produce. Appropriate investments in post-harvest management, processing technologies and marketing infrastructure or in complete value chain management are needed to reduce post-harvest losses. To address these issues policy is being framed to create enabling environment for private investment into integrating the backward linkages into the supply chain and thereby having an impact on farmer's income. Foreign Direct Investment (FDI) is one of the priority areas under 'Make in India' programme of government of India. 100 percent FDI under government approval route for trading, including through e-commerce, in respect of food products manufactured or produced in India are allowed. This study discusses the potential horticulture produce, advantages of investment in horticulture value chain and highlights few successful ventures in the sector.

Keywords: India, horticulture production, post harvest management, supply chain, value chain management, investment, FDI

OS 4-3:

FINANCIAL COMPARISON OF THREE GREENHOUSE DESIGNS

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Small scale farmers in Sub-Saharan Africa are becoming interested to engage in horticultural commodity production for business purposes. However, a hot and dry climate in most regions presents a challenge to small farmers with limited investment capacity. The efficiency of different locally developed greenhouse technologies in terms of agronomic parameters including yield and quality of different crops produced in such greenhouses are well studied and documented. However, a cost benefit analysis of selected greenhouse designs has not been investigated. The objective of this study was to investigate and document the cost benefit analysis of selected greenhouse designs. While different greenhouse design have a different influence on the climate conditions, a critical factor to consider is whether the capital expenditure for greenhouse infrastructure can be justified. In



South Africa, the benefits of investing in more advanced controlled environmental horticulture have not been sufficiently researched and documented. In this study, the capital costs as well as the operational costs for the three different greenhouses were captured and compared. The three designs included a naturally roof ventilated greenhouse (NVG), with the fixed vents fitted with insect netting; a naturally roof ventilated greenhouse fitted with high pressure fogging system (NVFG); and a simple shadenet tunnel (SNT). The yearly operating and maintenance cost for the equipment for NVG, NVFG and the SNT were calculated to be R 60,114, R 76, 157 and R 5,072, respectively. The capital costs associated with each greenhouse were R 380,000, R 1,571,520 and R 30,000, respectively. The equipment operating and maintenance costs of the SNT are approximately ten times lower than the costs associated with the NVG and NVFG and the capital cost approximately fifty times lower than that of the NVFG. The equipment operating and maintenance costs for the NVFG and the NVG are similar, while the capital investment required for the NVFG is approximately four times higher than the NVG. The equipment operating and capital costs associated with a bigger 1ha structure with specific design specifications were predicted and compared with the experimental greenhouses. It was found that, with the exception of the SNT, it was more cost-effective to construct larger greenhouses for crop production.

Keywords: Green house, vegetable, cost benefit analysis

OS 4-4:

PLASTICULTURE: THE ECONOMY OF RESOURCES

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Plasticulture is an ally for farmers, growers and agricultural production. Plasticulture contributes to the economy of resources, allowing farmers and growers to reduce the environmental impact of agricultural production, increasing yield, quantity and quality with limited input, pesticides, fertilizers, water... Plastics in agriculture protect root systems, soil structures, the water table, forage, harvest, and releasing lands for other crops. Without plastic, 60% of the vegetable and animal production could be endangered. Mainly made of PE and PP, once collected; used agri-plastics are recyclable and contribute to the circular economy. Nevertheless, the end-of-life management of used plastic in agriculture is still to be implemented and developed in many countries in the world: not collected, used plastic can damage the environment. With plastic, water and sun, it is possible to produce almost anywhere. Continuous research and development projects on barrier products, biodegradability, climate control, multi-layers, UV-Protection, etc., along with reliable agri-waste management, provide a good future for plastic in agriculture.

Keywords: plasticulture- plastics for agriculture- agro-ecology- intensive ecological agriculture - circular economy – recycling

OS 4-5:

STRATEGIC DECISIONS AND ECONOMIC SUCCESS OF HORTICULTURE FARMS IN FINLAND

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Horticulture is a small but productive part of Finnish crop production. Horticulture production covers only a small percent of the farmland, but produces 45% of the total crop yield. However, the economic success of horticulture farms varies a lot. Both the farms with the weakest and the best profitability can be found among horticulture producers. Farm success is affected not only by the farm and farmer characteristics and the surrounding environment but most of all by the strategic decisions made by the farmer. The aim of this study was to evaluate management choices of horticulture producers leading to economic success. In the study, a self-reported farm profitability assessment on a 6-point Likert scale was used to indicate economic success of farms. The data was based on the farm questionnaire conducted in 2014 and supplemented by information from the farm structure survey 2013 and Horticultural statistics collected by the Natural Resources Institute Finland. Modeling farm profitability was performed using proportional odds ordered logistic regression. Both interpretability and predictability were taken into consideration in the modeling process, using cross-validation methods. Farm profitability is symmetrically distributed with large frequencies for the middle classes and small frequencies for the extreme classes. The predictor variables include both quantitative and qualitative variables,



with different distribution shapes. The preliminary analyses with regard to the proportional odds ordered logistic regression seem to give statistically significant models. Finding the most adequate model is however a combination of several aspects, including predictability and model adequacy.

Keywords: crop production, horticulture, open field, profitability, strategy, success

OS 4-6:

OPTIMAL FARMLAND SIZE OF MAJOR HORTICULTURAL CROPS FOR DECISION MAKING SUPPORT OF CROP SECTION

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In Korea, there are many farmers who are converting into other crops in order to make income more since the agricultural markets are fully open to world and many imported agricultural products in the domestic market. Within the agriculture, aging of the agriculture population and continuous decrease of agricultural workers have made the labor force of rural areas insufficient. The government is promoting urban-to-rural returning policies for (retired) urban workers for raising the competitiveness of agriculture and maintaining rural villages. A study was conducted to investigate the optimal farmland size of horticultural crops such as garlic and onion (field vegetable), apples and peach (field fruit), tomatoes and green peppers (facility vegetable fruit), rose and chrysanthemum (facility flower). The data mainly come from the Agricultural Production Cost data (Korean Statistical Information System) and the Agricultural Income Survey (Rural Development Administration) in 2016. In the empirical analysis, the cost-minimum farmland size of crops is as follows; 1.0 ha of garlic, 2.6 ha of onion, 2.8 ha of apple, 1.4 ha of peach, 0.6 ha of tomato, 0.7 ha of green pepper, 1.1 ha of rose, and 0.9 ha of chrysanthemum. The farmland size is as follows; 1.5 ha of garlic, 3.0 ha of onion, 1.9 ha of apple, 1.9 ha of peach, 0.7 ha of tomato, 0.7 ha of green pepper, 0.6 ha of rose, and 0.8 ha of chrysanthemum. Lastly, the farmland scale of crops capable of being managed by couples is as follows; 0.6 ha of garlic, 0.6 ha of onion, 0.9 ha of apple, 1.1 ha of peach, 0.4 ha of tomato, 0.4 ha of green pepper, 0.3 ha of rose, and 0.2 ha of chrysanthemum.

Keywords: optimal farmland size, decision making

OS 4-7:

INVESTIGATION OF THE CYBERLOAFING AND JOB SATISFACTION LEVEL OF THE TECHNICAL PERSONNEL WHO WORK IN THE HORTICULTURAL SERVICES

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Cyberloafing is the use of information technologies like email and internet by employees during work hours for personal purposes and nonbusiness. Job satisfaction is the whole of positive or negative attitudes, feelings and thoughts of employees for work. Both concepts have a direct effect on production and productivity in working life. High cyberloafing and low job satisfaction cause some problems such as slowdown strike, goofing off, unprofitableness. The aim of this study was to determine the level of cyberloafing and job satisfaction of technical personnel who work in horticultural services. It was also tested whether there is a relationship between cyberloafing and job satisfaction level of technical personnel who work in horticulture. The study was carried out on 175 technical personnel who work on horticulture subjects in 3 public institutions in Salihli, Alaşehir and Sarıgöl. Scale of Personnel Web Usage Behaviors (Cyberloafing) and Minnesota Job Satisfaction were used for obtaining the data. Statistical Package for the Social Science was used for analyses of data. After the validity, reliability and factor analysis was performed; hypotheses were tested by using t test, analysis of variance and correlation analysis. The level of cyberloafing of technical personnel who work in the horticultural services is low, the level of job satisfaction is high, there are significant differences in the level of cyberloafing and job



satisfaction according to demographic characteristics (age, gender, marital status, level of education, place of employment) and as long as level of job satisfaction increases, level of cyberloafing decreases. According to the findings obtained, suggestions were offered to institute management and to employees to increase productivity of technical personnel who work about horticultural services.

Keywords: Horticultural services, technical personnel, cyberloafing, job satisfaction, labor productivity.

SESSION V:

OS 5-1:

AN INTEGRATED ANALYSIS OF TOMATO SUPPLY NETWORKS IN NIGERIA TO IMPROVE EFFICIENCY, SAFETY AND QUALITY

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The urban centres of Nigeria are supplied with fresh vegetables by an intricate supply network, linking 70 million smallholder farmers to 60 million urban residents. The fragmented nature of production, transport and distribution, marketing and sales, causes large inefficiencies, high costs and low quality in the system. Interventions to improve perishable supply networks do not always fit with the nature and rationality of supply network actors. This study aims to understand the functioning of the fresh produce supply network, the rationality of actors, its efficiency, safety, health and quality, the existing gaps in the knowledge base and how effective strategies for intervention can be designed. Improving the price/quality ratio may positively affect the nutrition status by making nutrition more affordable and contribute to the realisation of Sustainable Development Goal 2. The supply network for tomatoes and onions is highly fragmented. From the field, the supply suffers from limited productivity due to a low level of investment and technology, inadequate skill level, high commercial and climatic risks, agricultural lending constraints and high risks of chemical and microbiological contamination. The trade and transport function suffers from a lack of organisation, lack of investment in affordable conditioned transport, lack of effective payment and information exchange systems. A lack of investment in public services (roads, railways, waterways, electricity) increases the transport costs and food loss. Supermarkets are reluctant to offer local produce due to the high price, risk of contamination, lack of uniformity, lower overall quality and inconsistent supply. Urban markets add to the contamination problem due to insalubrious vending conditions. Potential solutions were tested including crates for protecting the fruit, the use of adapted technology refrigerated stores, and the use of the railway and waterways in Nigeria for refrigerated, shock free transport.

Keywords: value chain, SDGs, living lab, white elephant, learning, innovation, food security, logistics

OS 5-2:

ANALYSIS OF MARKET FLOW AMONG SMALLHOLDER FARMERS IN OYO STATE, NIGERIA

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This study was carried out to analyze the market flow and volumes as well as problems faced by farmers in marketing tomatoes in Oyo state, Nigeria. Data were collected from 146 tomato producers at selected major tomato markets in Ogbomoso South and Ogo Oluwa Local Government areas using pretested and well structured questionnaire. Descriptive statistics was used to analyze the data collected. Results indicated that 67.6% of the producers are male with average age of 45 years (45.25 ± 12.68); married (93.0%) while 45.20% have non-formal education. The farmers have an average of 24 years farming experience (23.66 ± 13.16 years) and are mostly full-time farmers (64.80%). Most of them trade their produce through the rural market (65.10%); 38.40% through the



urban market while only 2.10% and 4.10% sell at the farm gate and to farm collectors respectively. Most of the farmers (65.10%) sell 100% of their tomato at the rural market because of proximity while 20.50% sell at the urban market due to the availability of higher sales price and large population. The most severe problems faced by farmers in the locations are perishability of tomatoes (58.20%) and price fluctuation (53.5%). The study recommends the provision of storage and processing facilities for farmers for optimum revenue generation and reduction of price fluctuation.

Keywords: tomatoes, urban markets, rural markets, volume, Oyo State

OS 5-3:

EFFECT OF TRANSPORTATION CONDITIONS AND PRE-STORAGE TREATMENTS ON THE QUALITY AND SHELF-LIFE OF FRESH TOMATOES IN SELECTED SOUTH AFRICAN SUPPLY CHAINS

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This study investigates the effect of various pre-storage treatments and transportation conditions on the quality of fresh tomatoes along three supply chains in South Africa. The experimental design consisted of tomatoes of three maturity stages (red, pink and green), two harvesting seasons (summer and winter), three transportation routes with varying road quality conditions, seven disinfection treatments and two storage environments (ambient or cold storage 11oC). Samples were drawn at suitable intervals over a 30-day storage period and fruit colour, firmness, mass loss, pH and marketability assessed. The Esmefour-Pietermaritzburg route (ZZ) was longer than the Point drift-Pietermaritzburg (PD) and Steve Mohale's farm-Pietermaritzburg route (EM) by 263.44 and 223.81 km, respectively. 70% of the EM road length had International roughness index (IRI) values less than 2.5 m km⁻¹, while the ZZ and PD routes had 63 and 58% of their road length recording IRI values of less than 2.5 m km⁻¹, respectively. The mean hue angle and firmness of fruit stored under cold storage environment was 16.31 and 19.2 % higher than that of fruit stored under ambient conditions, respectively. Samples transported through EM had the highest mean firmness (19.41 N) and marketability (74.52%), least cumulative mean weight-loss across the two seasons (4.866%), while samples transported through PD had the best colour retention with an average hue angle of 52.56. Hot water treatment in combination with biocontrol was effective in retarding colour changes in the fruit, while biocontrol treatment in combination with chlorinated water or anolyte water was effective in minimizing fruit weight-loss. Anolyte water and Chlorinated water in combination with biocontrol gave tomatoes with better visual appearance and marketability compared to fruit treated with hot water, hot water in combination with biocontrol or tap water (control). This study recommends the timely maintenance of roads in and around farms that fruit is transported through to the markets, transportation planning that minimizes the overall time fruit takes to reach the markets as well as the maintenance of the cold chain during distribution and storage of fresh tomatoes. Anolyte water in combination with biocontrol is recommended to the tomato industry as an integrated pre-storage treatment that gives fruit with the highest quality and shelf-life.

Keywords: road quality, IRI, surface disinfection, post-harvest fruit losses, anolyte water

OS 5-4:

VEGETABLE RETAILING IN URBAN SETTING - AN EXAMPLE OF KALIMATI FRUIT AND VEGETABLE MARKET, KATHMANDU, NEPAL

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In the context of population concentration in cities, demand for food by the agriculturally unproductive population is stimulating the sub-urban farmers on one hand to produce more food. However, condition of transportation infrastructure like roads, bridges, tunnels etc. that facilitate food delivery directly impacts the price of food. In this paper, we conducted a survey at Kalimati Fruit and Vegetable Market located in Kathmandu, Nepal. The local vendors who retail perishable vegetables face numerous hurdles due to lack of cooling



facilities. Through this survey we have uncovered some strategies they use to profit from vegetable retailing and provided suggestions that can be implemented to benefit the retailers in future.

Keywords: vegetable retailing, Kathmandu, Nepal, women and income generation

OS 5-5:

FOOD CHAIN PARTNERSHIP ' CASE STUDY GRAPES OF TURKEY

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Turkey is one of the major grape producers of the world with 460 kha of grapes, an average annual production of 300 thousand tons of raisin, covering 25% of the world's raisin production. More than 80% of the production is exported to countries with high quality demands such as the EU. Bayer and Özgür Tarım initiated a Food Chain Partnership (FCP) initiative in 2017 to produce raisin at international standards. Bayer FCP is a reference business model connecting partners along the value chain to improve sustainable production. Özgür Tarım is the biggest raisin exporter of Turkey with operations in Saruhanlı / Manisa. The FCP initiative covered an area of 2000 ha and involved 400 contracted grape growers. Prior to the project, Bayer and Özgür Tarım defined action plans to fulfill the quality demands of the international markets. Crop protection management programs were designed to reduce environmental impact, to improve efficiency to control citrus mealybug, to improve MRL compliance and to increase food safety. On weekly intervals, vineyards were monitored by experts and actions taken. Grape growers were intensively trained combining small-scale meetings, demonstrations, field days and communication tools including the use of social media. Together with the growers, the initiative succeeded to complete the agreed action plans from the beginning till the end of the production. An integrated crop protection management program was successfully adopted to control citrus mealybug, a new pest for the regions. Economic pest control was achieved combining minimum amounts of crop protection products with a limited number of interventions minimizing the impact on the environment. Raisins proved to have a reduced number of residues and an improved residue profile along to the standards set for the international markets. As an outcome, around 10 000 tons of high quality raisins were produced in accordance with international trade and quality requirements.

Keywords: food chain partnership, grape, Turkey

OS 5-6:

PRODUCER ORGANISATIONS THAT ADD VALUE: A CASE STUDY IN PAPUA NEW GUINEA

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This research was motivated by renewed support for cooperatives in Papua New Guinea, and the government's intention to introduce new cooperative policy and legislation. Of concern is that the proposed policy changes do not address weak institutional and governance arrangements that constrain value-adding in traditional marketing cooperatives. This study highlights problems that warrant attention by contrasting two producer-owned organisations established to process and market commodities produced by smallholders in Papua New Guinea. These organisations, a cocoa cooperative and a rubber company, differed markedly in their value-adding performance despite similarities in their patron-shareholders and markets. Propositions relating performance to institutional and governance arrangements were tested by analysing and comparing data gathered in case studies of the two organisations. The low-performing cocoa cooperative took on all of the investor-unfriendly institutional arrangements that characterise a traditional cooperative, denying its patron-shareholders the opportunity to realise capital gains and to benefit in proportion to their investment. By contrast, smallholders were able to realise capital gains on their investments in the high-performing rubber company, and also benefited from dividends proportional to their investment. Most importantly, these investor-friendly institutional arrangements were extended to a strategic partner that contributed capital, marketing contracts, and expertise to the company. Key policy recommendations were to legalise and promote investor-share cooperatives, establish a



code of good conduct for strategic partners, allow smallholders to nominate and elect experienced directors from outside of their own ranks, and to provide the same level of initial support to producer organisations regardless of their juristic status.

Keywords: smallholders, marketing cooperatives, joint ventures, governance and institutional arrangements

OS 5-7:

USING AGRICULTURE CALL CENTERS TO IMPROVE INFORMATION ACCESS AMONG SMALL-SCALE HORTICULTURE FARMERS IN TRANSITIONAL ECONOMIES

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Studies have shown that small-scale farmers suffer from large information gaps in the field. This limited access to information results in lower production, higher input costs, misuse of dangerous chemicals, and lower profitability. In an environment with ever-decreasing government budgets and limited resources, agriculture extension services have looked toward Information and Communications Technologies (ICT) to help disseminate good agricultural information. One of the latest developments in ICT for development is the agriculture call center – intended to extend resources over a larger number of farmers as well as in some cases, become financially self-sustainable through payment for its services. Research objectives included identifying best practices, current challenges, and future opportunities within agriculture call centers. A survey to assess small-scale farmer needs and technological capacity was conducted in northern and southern Ghana in 2014. A similar but more limited survey was conducted in southern Bangladesh in 2015. The survey was designed to better understand farmers' current agriculture information needs, what information they would like in the future, and the means in which they would like to receive that information. Research included a six-month audit of Esoko – a call center based in Ghana – with input from call centers in other parts of Western and Eastern Africa and Asia. Major findings included; (i) when offered a variety of potential information services, farmers want to know more about weather and market prices; (ii) building trust with farmer clients is critical. The capacity of the call center operators to speak the languages of different farmer groups, as well as demonstrate topic expertise were found to be key in building trust with the farmers; (iii) farmers prefer information sent through voice mechanisms rather than SMS – this preference seemed due to illiteracy and a lack of basic phone skills; and (iv) due to limited access and large information gaps women need to be more engaged.

Keywords: Information Communication Technology, information dissemination, information access

OS 5-8:

STRATEGIC INFORMATION FLOWS WITHIN AN AUSTRALIAN VEGETABLE VALUE CHAIN

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Value chains operate within a system. A distinguishing feature of a value chain is the entire chain is aligned to deliver what the end user (consumer) values. Understanding the system is critical to identify system interventions to improve effectiveness and efficiencies within a value chain. For horticultural value chains, the flow of information along the chain is critical to ensure food safety with the right quality and quantity delivered while minimising waste. Knowledge about what the consumer values is regarded as strategic resource. Willingness to share this strategic resource between firms of the entire supply chain is influenced by individual firms' strategy, culture, chain governance and the external environment in which the chain operates (contingent resource based view). When evaluating inter-firm information sharing applying a relational view (trust and commitment) together with a contingent resource base view considers the system in which the value chain operates. A case study was undertaken, interviewing firms involved in a vegetable value chain in Australia from seed supplier through to a food service provider which confirmed trust and commitment between firms was built over time however only with firms that shared similar strategy and company culture.

Keywords: Inter-firm information sharing, contingent resource based view, value chain



OTHERS ORAL PRESENTATIONS NOT IN SESSIONS

OS 1:

CHERRY PRODUCTION DESPITE DROSOPHILA SUZUKII: IMPLEMENTED CONTROL METHODS AND COST IMPACT

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The invasive vinegar fly *Drosophila suzukii*, spotted wing drosophila, causes recurring yield loss and additional management costs. In 2015 and 2016, we conducted a survey among Swiss sweet cherry growers to gauge the economic impact of the infestation on an exemplary production sector and identify the implemented control methods against *D. suzukii* (Mazzi et. al., 2017). 111 and 296 growers responded to the online survey in 2015 and 2016, respectively. Results show that the use of insecticides (78% and 79% of respondents in 2015 and 2016, respectively) and the harvest of all fruits (93% and 59% of respondents in 2015 and 2016, respectively) were the most widespread methods used to reduce damage. Enclosure nets, which require high investment costs, were set up by nearly one-third of the respondents. However, the implemented management measures did not prevent infestation. While in 2015 44% of cherry growers did not report any damage, in 2016 only 12% were free from infestation. Using a calculation model, we defined different costs level. With no infestation but costs for control methods, the extra production costs to be attributed to *D. suzukii* amount to about 3%. With infestation of less than 20%, production costs rise by about 35% and with infestation exceeding 20% by about 65%, and revenues decrease dramatically.

Keywords: economic evaluation, cost impact, pest control, *drosophila suzukii*, sweet cherry production

OS 2:

ANALYSIS OF RISKS IN THE AUSTRALIAN BANANA SUPPLY CHAIN

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The aim of this paper is to provide an overview of the Australian banana supply chain by reviewing the relevant policies, organisational structure, production, processing and distribution. The central contribution of this paper is to assess the vulnerability of the banana industry by highlighting existing and potential risks as well as to propose certain policy implications which would predispose state intervention. Based on data drawn from policy issuances, industry reports, international literature and available statistics, the study results confirms the predominant role of labour, freight, fertilisers, packaging and marketing along the Australian banana supply chain. Major risks identified for banana supply chain actors include those related to natural disasters, pests and diseases and input supply. It is therefore suggested that banana growers put in place biosecurity best practice actions and adhere to business management hygiene requirements. An investment in improving packing materials, cool chain facilities and personnel training will reduce the amount of waste. Opportunities exist for using the damaged and unsalable bananas for producing value-added banana products as well as investment in organic banana production.

Keywords: banana supply / value chain, productivity, risk analysis



OS 3:

ECONOMIC BENEFITS EVALUATION ON CITRUS FRUIT'S NEW MODE OF GREEN ECOLOGICAL CULTIVATION IN THE POST HLB DISASTER ^BASED ON THE EXPERIMENT AND DEMONSTRATION OF LO TANGERINES' COMPREHENSIVE EXPERIMENTAL STATION IN YONGCHUN COUNTY

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This paper aims to analyze and evaluate the economic benefits of the new cultivation mode of the orchard destroyed by HLB. According to the field survey data from 2014 to 2016, taking the demonstration orchard of Lo Tangerines' comprehensive experimental station in Yongchun County as research object, basing on the brief introduction to the Lo Tangerines' new mode of green ecological cultivation and using the method of agricultural techno economic analysis, it carries out comprehensive economic benefits analysis from the perspective of production cost, fruit quality, maturity (listing) change and the changes in economic benefits under the new mode of green ecological cultivation. The results show that, compared with the traditional planting mode, the cost of the orchard with new mode is saved by nearly 34.15% per mu, and the most obvious one is the saving of direct material input and labor cost. Compared with the traditional mode, the profit of the orchard with new mode increases by about 1,900 yuan per mu, of which the input-output ratio increases by 59.01% on average, and the cost-profit ratio increases by 77.5% on average. The basic conclusion is that establishing ecological orchard and realizing green development is the only way for the sustainable development of citrus fruit industry in China.

Keywords: citrus fruit; green ecological cultivation; new mode; economic benefits; Yongchun county, Fujian province

OS 4:

CAUSES OF THE DECLINE OF THE JAPANESE TULIP BULB INDUSTRY

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In Japan the peak year of the cultivation area and the production of tulip bulbs was 1993. Since then they have continued to decrease. One of the reasons of the decline is the increasing imports of the low-priced bulbs from the Netherlands after the relaxation of the bulb quarantine in 1988. Recently, however, the imports declined. In this paper we point out and analyze the other causes of the decline. We divide two periods (from 1993 to 2001 and from 2001 to 2015) due to the difference in movement of the demand and supply curve. And we analyze causes that affect demand and supply of tulip bulbs. We consider demand factors of large influence such as prices of substitutes and complements for bulbs, prices of consumer goods, national income and demand shocks (change in preference of flowers such as a gardening boom, expected income and population), as well as supply (both home production and import) factors such as price of complementary crops in production, substitute crops, production factors (material inputs, labour, and land), capital equipment for the total farmers who decide their investment considering future expected profits and interest cost, supply shocks (technical progress, weather, market organization, and innovation). and import conditions(exchange rate and the world price). From the economic point of view we clarify the causes of the decline, consider whether it is a consequence of a free trade policy of 1988 or not and show some conditions for recovery and sustainability of the tulip bulb industry in Japan.

Keywords: supply, demand, bulb price, export, import, consumption, production, tulip bulb, free trade



OS 5:

GLOBALISM AND FLOWER ECONOMY IN ASIA

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In this paper we firstly discuss a concept of flower economy as an analytical tool of flower consumer and industry as a total system. We define flower economy as a system which composes of all economic activities in a stream of the breeding of flower, production, wholesale, retail and consumption. It compromises all relationships among plyers in the stream and the related sectors of flowers including public and academic sector. It has multi points of view. It emphasizes the view point of consumers as well as producers because the previous researches have sometimes been done from the view point of producers and industry. It has the wide space view. It compromises local and global produces and interactions of producers and consumers. It has the dynamic view of movements in time. Since 1990 the economic situation and flower trade have greatly changed in Asia. Late 1990 Asian under-developing countries had currency and financial crises. Japan had lost decades and a long-run depression. China performed liberalization and rapid economic growth in 2000s. And recently IT revolution has deeply spreaded in Asian countries. These economic situations have also changed flower market and distribution among Asian countries. We apply the concept of flower economy for an analysis of Asian countries and find some important facts and implications in globalism.

Keywords: China, Japan, flower market, consumer, producer, supply chain, inter-industrial relation

OS 6:

LOW-RESIDUE: AN INNOVATIVE AND CONSUMER FRIENDLY FRUIT PRODUCTION

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Pesticides in fruit production are necessary to reduce yield and quality losses and to ensure a long-term profitable fruit production. However, in Switzerland and several other European countries, consumers and retailers are demanding a large reduction of pesticide residues on fruit to minimize the risk to human health and the environmental impact. Fruit growers need research results and advice to establish sustainable production systems that reduce the use and the residues of pesticides. Agroscope tested and evaluated a low-residue (LR) plant protection strategy that allows the production of residue-free apples. With regard to the incidence of apple scab and powdery mildew, the LR strategy was comparable to the integrated production (IP) strategy and superior to the organic production (OP) strategy. Losses of fruit during storage due to bull's eye rot (*Neofabraea* sp.) were a weakness of the LR and OP strategies. With regard to economical sustainability, the new LR strategy was linked to higher production risk and lower profit than the IP and OP strategies. A price premium for LR production, which is justified by environmental advantages, could have a positive effect on the economical sustainability of the LR strategy. Future long-term experiments in model orchards should evaluate how to combine and optimize the effects of robust or resistant varieties, different cultivation systems, weather influences (hail net, rain shelter, etc.) and a LR pest management system.

Keywords: apple crop protection, low pesticide residue, innovative integrated pest management, fruit production, economic evaluation



OS 7:

SUSTAINABLE SMALLHOLDER FARMING CLUSTERS IN THE PHILIPPINES

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The context for this paper is the problem of smallholder farmers in the Philippines who face a range of livelihood challenges. Smallholders are family units that exist in a family-labour intensive system with low capital input. These farmers generally have limited opportunities for livelihood improvement because of limited farm size, poor knowledge in production and marketing, and difficulties accessing finance. In the Philippines, a common practice of development agencies in maximising the reach and impact of a farmer focus assistance program is to organise smallholder farmers for collective action into agricultural clusters. These clusters are geographic concentrations of interconnected smallholder farmers who collaborate in production and/or marketing of the same produce in the same supply chains. A cluster can benefit smallholders through increased profits by encouraging innovation, reducing costs, sharing risks and increasing production; however, the management, decision making, and cohesion of smallholder farming clusters is complex, and many of these clusters have failed. The success or failure of clusters can be related to how the cluster farming members respond, adapt and draw on their existing resources and supporting network to become a competitive supplier in their unique and dynamic environments. Analysing interviews from 22 facilitators and 16 Focus Group Discussions of agricultural clusters in the southern Philippines, this paper explores the influences on the sustainability and adaptation capacity of smallholder agricultural clusters in their dynamic environments.

Keywords: development, rural, agricultural cluster, smallholder farmer

OS 8:

COMPARISON OF TACTICAL AND SYSTEMIC INTERVENTIONS IN PHILIPPINE SMALLHOLDER AGRICULTURE CLUSTERS

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Agricultural clusters are geographic concentrations of interconnected smallholder farmers who collaborate in production and/or marketing of the same produce in the same supply chains. A cluster can benefit smallholders through increased profits by encouraging innovation, reducing costs, sharing risks and increasing production. In the Philippine context, agricultural clusters are utilised by Government and Non-Government development agencies as a mechanism to disseminate tangible and intangible benefits to a group of smallholder farmers. Two of the methods of intervention are compared in this paper; tactical and systemic. Tactical interventions refer to benefits that are specific and incremental to the farm enterprise with large enough benefits to offset the minimal costs of implementation. Systemic intervention refers to the packaging of multiple incremental changes that can influence social and financial capitals across the farm enterprise and the wider community. This paper compares these two interventions which were used in different geographic areas of the southern Philippines (Leyte, Bohol, Mindanao) as part of an Australian Government funded Vegetable production project. A targeted intervention was provided by a commercial organisation training growers on specific vegetable production that was focussed mainly on improving human capital. A systemic intervention was implemented by a local Non-Government Organisation which embedded themselves into the community and packaged changes across social, human and financial capitals.

Keywords: development, rural, agricultural cluster, smallholder farmer



OS 9:

LOCAL GOVERNMENT BORROWING TO ENABLE DEVELOPMENT OF HORTICULTURE

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Horticulture, as the key sub-sector of the Albanian agricultural sector requires investments in terms of agricultural infrastructure, namely irrigation and drainage systems and reservoirs, rural roads for better access, green markets, etc. The responsibility for such investments is on the local government authorities. The scope of the territorial reform in 2015 in Albania aimed to avoid the inefficiency of delivering public services at the local level due to the high fragmentation of the territory and the large number of local government units. Despite the raised incomes from own sources and the use of new sources, the local fiscal authorities remain weak and lack the resources for investments, particularly in agriculture. While the municipalities are aware that there is still potential to extend the taxable basis due to the high informality, local governments are looking for more alternatives for expansion. The objective of this study was to review the level of control of local government borrowing and its role on agricultural development and that of horticulture in particular. Interaction of factors like the limit of borrowing, grant size, local taxes, will be a complex negotiation between the government and municipalities. The analysis showed that banks consider borrowing of local government authorities as a release of extra capital and municipalities as welcomed clients because of the low risk of borrowing. We found also the need for reviewing the legal restrictions on long term borrowing by the local government authorities same as the freedom of the national government. The same restrictions should be lessened in the banking legislation, specifically by reviewing the risk coefficient. These measures should improve the horticultural business environment in Albania.

Keywords: agricultural infrastructure, local government authorities, risk coefficient

OS 10:

ANALYSIS OF POTENTIAL EXPORT MARKETS FOR TABLE GRAPES PRODUCED IN ALBANIA

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This paper examines the performance of the table grape sector in Albanian in relation to quantities, destination markets and quality standards. A recent increase in production has been followed by an increase of export volume and geography, with interesting developments. Quantities remain small, not using the economies of scale, because wholesalers are not regular exporters. Better harvesting techniques, better logistics, improved marketing skills and more financial capital is required. A number of businesses are developing value chains focussed on the export market. The analysis covers factors that influence the further expansion of table grapes exports from Albania. Primary and secondary data was used for the analysis in order to identify constraints in the calculation of average prices as simple arithmetic averages, not weighed by quantitative flows. We attempted to calculate national average prices based on a spatial weighted average and at farm level in order to avoid biased estimations which lead to inaccurate estimations of the value of table grapes. We also estimated the Export Performance Ratio (EPR) and Revealed Comparative Advantage (RCA) to examine the comparative advantage of Albania in table grape export.

Keywords: trade, price, competition, export performance ratio, revealed comparative advantage



OS 11:

VALUING THE ENVIRONMENTAL COSTS OF HORTICULTURE IN ALBANIA

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Horticulture is by far the most important sub-sector of Albanian agriculture. To exploit market opportunities, horticulture production is being expanded even in remote areas with a high biodiversity and landscape value, threatening the diversity and stability of natural ecosystems. On the other hand, rural people in these regions have to make their living principally from horticulture in the future, too. The research presented here is based on an analysis of the horticultural development around environmentally sensitive areas. The study has assessed the trend in the use of mechanization, fertilizer, pesticides as well as changes in the structure of horticultural crops. The analysis has enabled us to properly evaluate the environmental performance of horticulture in these particular regions and has attempted to value these environmental costs. The study offers many recommendations on the right policies and appropriate economic incentives to improve horticultural output while making the sub-sector economically efficient, socially acceptable and environmental friendly. The main strategic directions for increasing horticultural business revenues in environmentally sensitive areas takes into account the tradition and the development trends, adapting horticultural production to the development of agro-tourism, in order to exploit the opportunities offered by the nature of the region to this kind of business.

Keywords: nature conservation, agricultural policy, agri-environment indicators

OS 12:

MANAGING CO-CREATION OF VALUE IN VEGETABLES SUPPLY CHAIN

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Co-creation is a form of development economic strategy in order to produce mutually valued outcome. Moreover, managing co-creation in vegetables supply chain has many challenges this day, e.g. price fluctuation, inefficient supply chain system, and high logistics costs, involve multiple actors without integration and coordination, etc. Those challenges are affecting to the value of products. Vegetables supply chain conducted multiple actors who have interaction between each actor so that it needs solicit ideas from multiple actors to achieve competitiveness and robust supply chain system, and enhancing logistics services for vegetables products. However, managing multiple actors has several conflicts that hamper the implementation of collaboration and impact to the value of products. Co-creation strategy needs collaboration and synergy to achieve applicable vegetables supply chain. This is a case study conducted in Bandung District, West Java Province, Indonesia which is needs an integration supply chain activities to develop co-creation of value in vegetables supply chain. Value stream mapping is used as a method to build value in vegetables supply chain consider to develop logistics process by reducing waste and improve value of logistics system for vegetables supply chain. This study aim is to develop robust, effective, and efficient co-creation in vegetables supply chain with notice value in co-creation. This paper described that co-creation in vegetables supply chain need a synergy, collaboration, minimize lead time and maximize value to enhance robust supply chain. Moreover, implement co-creation in vegetables supply chain should involve facilitation and assistance in order to enhance the capacity of production and develop collaboration by involving multiple actors.

Keywords: co-creation, vegetables, supply chain management, value stream mapping



OS 13:

SOCIAL EFFECTS OF CLIMATE CHANGE ON SMALLHOLDER FARMERS IN AKINYELE LOCAL GOVERNMENT AREA OF OYO STATE, NIGERIA

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The population involved in farming is 60-70% of which smallholder farmers constitute 80% of all farm holdings. Their production system is inefficient, which leads to a regular shortfall in national domestic production (FAO, 2005). Generally, inadequate extension service in terms of personnel for farmers to get information is a serious problem to agricultural development in Nigeria, not only in crop production but in accessibility to information about climate change as well. Without adequate knowledge and information about climate change, farmers are unable to adapt. The general objective of the study is to determine the social effects of climate change among smallholder farmers in south western Nigeria. Sixty respondents were randomly selected; from three communities (Ajibode, Ajeja and Alabata) in the local government. Both qualitative (in-depth interview) and quantitative tools (structured interview schedule) were used for data collection. Majority 72.2%, 94.4%, 83.3%, 77.8%, of respondents are males, Yoruba, married and have a modal family size of 5-8 respectively. Adaptation strategies are gained through experience and very few of them 5.6% stated they had been taught adaptation through extension personnel. Fifty six percent have suffered displacement as a result of climate change. The in-depth interview further elaborates that moving to upland as a result of flood eventually leads to low yield, low income, health issues, cancelling of meetings and social network failure. We conclude that more extension personnel should be made available to farmers for enlightenment.

Keywords: adaptation strategies, climate change awareness, smallholder, akinyele displacement

OS 14:

ARE SMALLHOLDER VEGETABLE FARMERS OPTIMIZE PRODUCTIVITY? TECHNICAL, ALLOCATIVE AND ECONOMIC EFFICIENCIES OF VEGETABLE PRODUCERS IN SOUTHWEST CAMEROON

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The paper measures and examines the technical, allocative and economic efficiencies of smallholder vegetable farmers in the Southwest region of Cameroon. Biophysical and socio-economic data have been collected from 100 household vegetable farms. The estimation efficiency that hinges on stochastic frontier analysis yields average technical, allocative and economic efficiency scores of 99.58%, 78%, and 77.67%, respectively. Model simulation results indicate that technical efficiency is very high with a minimal dispersion among vegetable producers. The high productive performance of the vegetable producers observed is attributable to the accumulated knowledge by the vegetable farmers who have over past years benefited enormously from a concentration of technical support and extension services by agricultural institutions. Unlike the technical efficiency levels of the vegetable producers, the allocative efficiency scores reveal huge cost-saving avenues that can be exploited simply by using the right input mix, given the input prices. While avenues for catch-up are almost non-existent in the technical efficiency, marked disparities are observed in the allocative efficiency scores, thus indicating possibilities for significant gains in terms of improving the allocative efficiency of the less efficient vegetable producers. The economic efficiency scores reveal enormous cost reduction opportunity that can be interpreted as potential to increase productivity. This underscores the need for intervention in the vegetable sector in Cameroon in order to optimize productivity: i.e. to reduce existing information asymmetry relating to input prices and farm management techniques. The drivers of efficiency identified are the farmer's marital status, education, specialised farm training, and mode of access to land. The extension services and membership in a farmer organisation are among the key aspects identified that need to be strengthened.



Keywords: technical efficiency, economic efficiency, real profit, counterfactual profit, Southwest Cameroon

OS 15:

FLUCTUATIONS OF APPLE VARIETY PRICES ON SELECTED WHOLESALE MARKETS IN POLAND BEFORE AND AFTER THE IMPOSITION OF RUSSIAN EMBARGO

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Apple crop increased from 2.07 million tons in 2005 to 3.2 million tons in Poland in 2014 lifting the country past France and Italy into the position of the EU leading apple producer. Production volume fully meets the domestic demand for fresh apples and apple processing sector. A large volume of fresh apples has been exported to traditional markets in Ukraine, Belarus, and Russia. In 2013, Russia imported about 600 thousand tons of apples from Poland and Russian buyers favored the variety 'Idared'. Among the EU countries, Germany was the main destination and EU importers preferred the 'Gala' variety. The relative importance of the EU and Russian market was dramatically altered following the imposition of food import embargo by the Russian federation in August 2014. The paper examines price patterns of selected varieties prior and after August 2014 at Sandomierz wholesale market, Lublin, which services apple growers in east-central Poland, and Warsaw Bronisze wholesale market that serves the concentration of horticultural farms near the capital city. The data are weekly price records 'class 1' apples. Five price-series models were estimated, two for 'Idared' (Sandomierz and Lublin), and three for 'Gala' (Warsaw-Bronisze added) after taking first-differences as indicated by the stationarity tests. The specified models include own lagged price, and binary variables to indicate the embargo and months of the year. Results show that the embargo led to 'Gala' price increase at Sandomierz market, which sold large volume of 'Idared', possibly due to a shift in destination of Polish apple exports and preferences for 'Gala' in the EU. Lagged own price was positively associated with current 'Gala' prices. Monthly dummies indicated an increase in 'Idared' prices in May-June in both markets suggesting their decreasing inventory, while 'Gala' prices increased already in January in Sandomierz and from February to June at Warsaw-Bronisze.

Keywords: Apple price, time-series, wholesale market, var. 'Gala', var. 'Idared'

OS 16:

IMPROVING SMALLHOLDER HORTICULTURE SUPPLY CHAINS IN EMERGING ECONOMIES

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Fruits and vegetables are critical components to healthy diets, providing important nutrients. Horticulture crops are traditionally considered women's crops and thus provide important income and business opportunities that often result in more income spent on family well-being. The Horticulture Innovation Lab conducts research and development projects to improve horticulture supply chains in Sub-Saharan Africa, Southeast Asia and Central America. Highlights of successful projects and lessons learned will be presented. Pests and diseases present challenges during production of fruits and vegetables, resulting in over-use and misuse of pesticides. Use of protected culture and grafted seedlings can reduce reliance on chemical controls. In humid tropical regions, traditional seed production and storage methods without temperature and moisture control result in rapid deterioration of seed quality. Zeolite Drying Beads enable companies to dry, store, and package seeds of improved varieties to provide farmers with high-quality seeds. The Drying Beads can also be used to dry and dry-store horticultural products. Horticultural crops are generally available only during short periods due to inadequate storage facilities. Cooling is the most efficient way of delaying the spoilage of fresh fruits and vegetables. CoolBot regulated cold rooms, which operate with household-type air conditioners, can be installed in rural areas to provide moderate cost cold storage. Drying fruits and vegetables can stabilize and allow for storage of products that have not been sold or consumed due to gluts in supply. An improved solar dryer with a



chimney attached on one end of the drying table, facilitates airflow and reduces drying times. The DryCard is an important tool to measure the dryness of products before they are stored. This simple, inexpensive tool identifies products that are insufficiently dried, helping to reduce harmful molds and toxins. A review of successful projects and lessons learned, including cost-benefit analysis, will be presented.

Keywords: drying, emerging economies, food security, cold storage, postharvest, seeds, solar drying

OS 17:

PERCEPTION OF ECONOMICALLY IMPORTANT ATTRIBUTES OF BIODEGRADABLE CONTAINERS

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The burden of disposing plastic containers to landfills by the environmental horticulture industry has raised environmental concerns. Biodegradable containers offer an environmentally friendly substitute of plastic containers. In recent years research on their performance focused on the use of water, fertilizer, root growth, and plant appearance as compared to plastic containers. However, little research has addressed the primary cause of plastic container popularity, which is convenience. This study examines perceptions of two economically relevant attributes namely, convenience of using biodegradable containers and potential to save worker time by not having to handle a used container, among the licensed environmental horticulture firms in Georgia, USA. The study uses responses from 241 firms collected in 2017 through a survey of licensed environmental firms in Georgia. The content of the questionnaire was discussed with two industry associations and a small pilot test was conducted, but did not reveal problems in understanding the questions. The survey applied an online portal and firms received an electronic letter inviting them to participate in the study. The empirical relationship between the perceptions of two attributes of biodegradable containers is modeled using an order logit specification because a respondent could indicate his agreement with the statement about a specific attribute by choosing one of five response options. The steps ranged from 1=strongly disagree to 5=strongly agree, where the middle step represented a neutral step (3=neither agree, nor disagree). Results show a key role of the company manager as influencing the positively the perception of convenience of biodegradable containers and recognizing their effect on saving worker time. Also, important is the location in the metro Atlanta, a densely populated area of more than 4 million residents. However, respondents generally do not recognize improved appearance of plants grown in biodegradable containers.

Keywords: Plastic container, environmental horticulture, container disposal, labor savings, convenience

OS 18:

FACTORS AFFECTING DECIDUOUS FRUIT RESEARCHERS' PRODUCTIVITY IN SOUTH AFRICA

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The Infruitec research institution is Africa's oldest fruit research station. Established in 1937 as the Western Province's Research Station and later amalgamated into the national autonomous research body, the Agricultural Research Council in 1992, the station serves the country by providing research services along all the five categorises of the research continuum and having its prime services in cultivar development. This paper provides evidence of the different factors that affect the productivity of the researchers in the institution. The evidence reported was gathered from primary data gathered from the researchers, industry stakeholders during interviews as well as secondary data collected from the organisation's annual financial and research reports, the national list of research workers, the annual reports of producers organisations and scientific journals. Financial investment and human capital retainment emerged as significant drivers of researchers' productivity. The rate of research output production was also highly influenced by organisational changes, national and international policies.

Keywords: R&D, productivity, Horticultural economics



Posters

P-1:

POTENTIAL OF WALNUT (JUGLANS REGIA L.) NURSERY PRODUCTION AND ITS ECONOMIC IMPORTANCE IN TURKEY

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In this study, data such as the total amount of nursery production in Turkey, walnut rootstock production (seedling rootstock) amount, walnut nursery production amount per variety, number of certificated nursery producers and distribution per province, number of producers with breeding parcels, walnut nursery export-import amount and the amount of state funding per year have been statistically analysed and the results have been provided. Data for the study have been acquired from the Ministry of Food, Agriculture and Livestock, General Directorate of Plant Production. According to the study, during the 2014-2016 period in Turkey, the total certificated and non-certificated nursery production was 105.418.395 piece/sapling, and 30.24% of this was apple nursery production (31.882.092 piece/sapling), and this was followed by 15.91% by walnut plant production (16.767.854 piece/sapling). Looking at the distribution of walnut nursery enterprises per province, Balıkesir province (63 piece/sapling enterprises) is ranked first, Bursa province (32 piece/sapling enterprise) is ranked second, while Izmir province (27 piece/sapling enterprise) is ranked third. 11.43% (12.044.597 piece/sapling) of the total nursery production was grape. According to General Directorate of Plant Production data, a total of 3.487.710 piece/bud eyes have been used as vaccine material in walnut nursery production in Turkey during the 2014-2016 period, and these consisted of Altınova-1, Bilecik, Şebin, Chandler, Fernette, Ferron, Franquette, Gültekin-1, Kaman 1, Kaplan-86, Maraş 18, Oğuzlar 77, Pedro, Sütyemez 1, Şen-1, Şen-2, Tokat-1, Yalova-1, Yalova-2, Yalova-3, Yalova-4, Yavuz-1 varieties. During the last 12 years, a total of 348.239.912 Turkish liras assistance has been provided by the Ministry of Food, Agriculture and Livestock for certificated and non-certificated nursery production for all types of fruits. During the 2005-2016 period, the amount of provided supporting for certificated and non-certificated walnut nursery production was 100.785.483 Turkish liras.

Keywords: walnut, walnut nursery, quantity of nursery production, export, import

P-2:

PRESENT CONDITIONS AND PROBLEMS OF FRUIT NURSERY PRODUCING ENTERPRISES IN TURKEY

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Present conditions and problems of fruit nursery producing enterprises in Turkey have been examined and solutions proposed. In the production of saplings, the ratio of the land kept to the rent and the partner is found to be 53% of the operation land because the land is used alternately. In relation to this, the enterprises stated that the most important/priority problems related to the infrastructure and the land shortage. The difficulty of procuring basic materials has been identified as the most important problem faced by enterprises in the certification system and in the provision of inputs. Businesses have stated that they are experiencing problems in quality standards due to price instability in the market and irregular market structure, high prices in



transportation, inability to institutionalize due to inadequacy of capital, bureaucratic problems due to inadequate capital procedures and lack of quality of labor.

Keywords: Fruit tree propagation, sapling, certified nursery plant, basic propagating material

P-3:

WHAT DO INTERN HORTICULTURAL ENGINEERS EXPECT FROM THE INTERNSHIP PROCESS?

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Internship process is the forty-five workday period to gain knowledge and vocational skills. An efficient internship process will ensure a smooth transition to professional life. Not only should intern engineers be evaluated by her/his teacher in the internship process but the internship process should also be evaluated by the intern engineer. The aim of this study was to determine whether intern horticultural engineers had a qualified internship and to determine what they expect from the internship process. Scale used in the research was prepared benefit from the student internship evaluation form of University of Kocaeli Faculty of Engineering. There are 10 questions (5 point Likert scale) in this study questionnaire and 74 intern engineers who have completed their internship at the Public Research Institutes (54 person) and Private Sector Organizations (20 person) were asked questions about their internships. Statistical Package for the Social Science was used for analyses of data. After the validity, reliability analysis were performed, scale items were assessed. The proportion distribution of the survey participants is as follows: 50%: female, 81%:21-25 age, 91%: single, 51%: 500-1000 TL monthly expense amount and 73%: Internship at the Public Research Institutes. It has been determined that within the scope of the research, the intern horticultural engineers are generally satisfied with the internship process with an average of 4.11 out of 5 points. According to findings obtained; intern horticultural engineers expressed that forty-five workday period is not enough for internship and internship time should be increased. They also clarified that they can't observe as planting, plant nutrition activities, and harvest etc. different terms of crop production during forty-five workdays. The other important topic is that intern engineers don't want to work trivial routine tasks but want to work in the technical tasks.

Keywords: Intern, internship, intern horticultural engineer, intern' expectations, public research institutes, private sector organizations.

P-4:

ECONOMIC EVALUATION OF AMINOETHOXYVINYLGLYCINE (AVG) APPLICATIONS IN WILLIAMS PEAR CULTIVAR

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In modern fruit growing, the amount of fruits that are located in the first class quality rather than the total amount of products is foreground. For this reason, producers have focused on cultural practices in order to produce quality fruit in the direction of consumers' demands in order to compete in world markets. In order to obtain superior quality products, it is necessary to make some technological applications besides cultural processes. However, these implementations need to be effected economically by producers positively and profitability. With this study, it was aimed to profitable production by improving the yield and quality of 'Williams' army which has high market value both nationally and internationally by application of aminoethoxyvinylglycine (AVG) applied before estimated harvest. For this purpose, The 100, 125 and 150 ppm dosages of AVG were applied to fruits and leaves of the Williams pear at 3 different times (30 days, 21 days and 7 days before) on the estimated harvest time in Fruit Research Institute (Egirdir-Isparta in Turkey) between 2012 and 2014. It has been found that AVG applications considerably reduce the pre-harvest fruit drop, delay the harvest time and enhance the fruit quality characteristics. As a result, 30 days before the harvest time AVG application at 100 ppm was determined gross profit as the highest application for Williams pear cultivar.



Keywords: Pear, Williams, AVG (Aminoethoxy-Vinylglycine), Gross Margin, Pre-harvest Fruit Drop

P-5:

ECONOMIC EVALUATION OF TRANSITION FROM FLOOD IRRIGATION METHOD TO DRIP IRRIGATION METHOD OF APPLE TREES IN YIELD AGE

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While the use of drip irrigation is becoming more widespread, flood irrigation continues to be practiced in many areas. Not having the most suitable irrigation schedule leads to economic and environmental problems. In this study, the transition from flood irrigation to drip irrigation was investigated economically. It aimed to determine the most suitable irrigation schedules to recommend to farmers in the transition period. Two different irrigation intervals and four different pan coefficient for each irrigation interval were compared with the flood irrigation treatment. Income and production costs for each treatment were determined. Gross profit, net profit and unit product costs were also calculated. It was determined that 4 day irrigation intervals (I1) and 1.0 pan coefficient (Kcp3) led to the most economic and environmental profits in apple orchards which had been irrigated with flood irrigation for many years in transition from flood irrigation to drip irrigation method. By taken into consideration grant support, it was determined that economic profit was better than extra cost for new irrigation method (in transition from flood irrigation to drip irrigation method). There was no yield increasing in Kcp3 treatment but the main reason for profit was increasing fruit quality.

Keywords: irrigation interval, fruit quality, Malus x domestica, gross profit, net profit

P-6:

COMPARISON OF PROFITABILITY AND SUSTAINABILITY ON CHINESE CABBAGE OF KOREA, CHINA AND TAIWAN

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In Korea, kimchi is popular as a fermented health food made from Chinese cabbage. As a consequence, Chinese cabbage is one of the most consumed vegetables in Korea and, when processed with various vegetables, has become a global health food. Therefore Chinese cabbage is one of major horticultural products traded with neighboring countries. The objective of this study was to compare the competitiveness of Chinese cabbage produced in Korea, China and Taiwan, in terms of price, yield, production cost, etc. in 2012 and 2015. The data were collected from official agricultural statistics of central governments. In 2015 the yield of these countries was 7,021kg in Korea, 5,711kg in China, 4,657kg in Taiwan, respectively, which 14.9% in Korea, -5.5% in China, and -1.7% in Taiwan were the rate of yield growth compared with year 2012. As a result, the yield ratio of Korea to China was widened to 1.23 times in 2015 (1.01 in 2012). That of Korea to Taiwan also was widened to 1.51 times in 2015 (1.29 in 2012), which means the productivity of the crop in Korea has increased more. The price received by farmers per kg in 2015 was 315 KRW in Korea, 159 in China, and 276 in Taiwan, which the growth rate of the price was -36.4% in Korea, 17.6% in China and 21.1% in Taiwan compared with year 2012. It means that, with the domestic consumption held constant, the price in Korea dropped more due to yield increase. In 2015 the cost per kg is 221 KRW in Korea, 122 in China and 139 in Taiwan. Compared with 2012, Korea decreased 9.1%, while China and Taiwan increased 9.9% and 3.7%, respectively, which primarily resulted from increasing the yield in Korea and decreasing in the others. As a result, in terms of unit cost, the ratio of Korea to China narrowed down to 1.81 times in 2015 (1.01 in 2012). That of Korea to Taiwan also was gradually reduced to 1.51 times (1.29 in 2012). From the empirical result, it is concluded that Chinese cabbage cultivation in Korea is a high-input, high-efficiency farming structure. In terms of profitability, the farmers' income per ha in Korea and Taiwan decreased, but the reverse was in China. Also, the cost gap per kg decreased due to the decrease of production cost (9.1%) in Korea and the increase in production cost (9.9%, 3.7%) in Taiwan and China, respectively. All things considered, since quality and safety of the crop cultivated in Korea have been relatively high and the gap has narrowed, it is possible to improve profitability and sustainability of cultivating Chinese cabbage in Korea through trade, even when the Korea agricultural market is open to world.



Keywords: Chinese Cabbage, Production Cost, Price received by farmers, Yield

P-7:

THE APPLE'S COMMODITY CHAIN IN LEBANON: DESCRIPTION, CHALLENGES AND OPPORTUNITIES

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Fresh apple is considered one of the most productive fruit in Lebanon. This poster focuses on the description of the structure of apple value chain in Lebanon. The total area cultivated with apples in Lebanon is 13604 ha in 2016. The red varieties, especially "Starking Delicious" constitute the most popular. However, Scarlet, Golden, Fuji, Gala and Granny are widely used as an alternative for the old varieties. The total number of apple farmers in Lebanon is 21640 and total cost per crate (22 kg) is USD 5.1. The poster discusses the factors that may hinder the performance of the apple industry in Lebanon in technical, organizational and financial terms, and, refers to the problems faced by stakeholders along the chain and reveals the challenges associated with entering new markets especially in the Arab Gulf.

Keywords: Apple, Middle East, Production, Value chain, Varieties

P-8:

ALMOND MARKETING IN AFGHANISTAN: AN OVERVIEW OF EXPORT POTENTIAL

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The objective of the study is to estimate the trends in the area, production, marketing, export potential and channels adapted to almond in Afghanistan. The data of study collected from various secondary sources, (FAO reports, government publications, USAID reports, NGOs reports, journals, and websites) for the period of 2010 – 2016. The methodology adopted in sampling, data collection, analytical tools used and methods of evaluation are explained. Almonds are native horticulture products to Afghanistan and have been commercially exported for decades. It is sold in-shell as well as kernels. Almonds production has increased continuously during the decade. The almond subsector represents a strong subsector with present levels of national production at 27400 MT per annum (2014-15). The main producer locations are Samangan, Balkh, Kunduz, Zabul, Baghlan, Urozgan, Ghazni, Takhar and Ghorband district in Parwan province. There are over 40 varieties of almonds grown in Afghanistan. Satyarbahi variety is the most popular and profitable. Afghanistan is one of the 10 main producing countries in the world, which contributes 1.38 % (kernel basis) to the overall world production. This study focuses on the almond production and consumption, trade flows and prices at a national and international level, the domestic industry is potential enough to rank the country among the top ten almond producing countries in the world, almonds are an important export item among dried fruits, accounting for 25% of dried fruits and nuts exports in 2016.

Keywords: Afghanistan, Almond, Export, Marketing, Potential



P-9:

IMPACT OF PRE-HARVEST FRUIT BAGGING AND IMPROVED POSTHARVEST PRACTICES IN REDUCING LOSSES AND MANAGING QUALITY OF MANGO IN THE VALUE CHAIN SYSTEM

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Pre-harvest fruit bagging and improved postharvest practices were integrated in the mango value chain of Bangladesh to reduce losses and to manage fruit quality along the marketing channel. The experiment was conducted at Chapainawabganj and Gazipur district with a popular commercial mango cultivar cv. 'Khirsapat' alongside traditional management practices (TMP) in order to evaluate the impact of fruit bagging together with improved postharvest management practices (IMP). Pre-harvest fruit bagging and postharvest practices including the use of improved mango harvester, stackable plastic crates as field and transport containers, delatexing and hot water treatment (HWT) were integrated in the "improved value chain". On the other hand, traditional mango harvesting method and use of bamboo baskets as field containers were followed in the TMP. Usually, delatexing and HWT were not practiced in the TMP. Both in the TMP and IMP, mangoes were packed in plastic crates, were loaded on to a truck and transported to the wholesale market in Gazipur district, some about 500 km away, and a 12-hour drive. Harvested bagged mangoes handled using the IMP particularly keeping 8-10 mm stalk attached to the fruit along with delatexing followed by HWT for five minutes at 55°C showed the best performance in respect of disease control, attractive skin colour, good keeping quality and marketability for 7 days at retail outlets. The incidence of decay due to stem end rot, anthracnose and bruising was 24% in non-bagged mangoes with TMP on day 4 at retail, while it was only 3.2 and 4% in bagged mangoes handled with IMP and TMP, respectively. Non-bagged mangoes handled with IMP exhibited moderate effect showing 7% decay incidence during the retail display. The total unmarketable mangoes in the whole value chain system, which considered as postharvest loss accounted for 37.1% of the traditionally handled non-bagged mangoes, while 10.6 and 11.3% losses resulted in the bagged mangoes handled with IMP and TMP, respectively. With pre-harvest fruit bagging followed by improved postharvest management practices, the average reduction in loss was about 70% with acceptable fruit quality on day 4 at retail outlets. Thus, the interventions of fruit bagging and IMP in the value chain proved highly beneficial for the mango industry in Bangladesh and would help to promote mango exports.

Keywords: Pre-harvest mango bagging; Delatexing; Hot water treatment; Value chain; Fruit quality; Loss reduction; Bangladesh

P-10:

HORTICULTURE RESEARCH AND CAPACITY BUILDING IN DEVELOPING COUNTRIES ' A CASE STUDY FROM PAKISTAN

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Australian R&D institutions have provided significant and resilient horticulture research and capacity development skills which have had a positive impact in developing countries. There is definite comparative advantage to Australia in the field of horticulture and that advantage has helped developing countries. This paper presents a case study of a horticultural project in Pakistan funded by the Australian Centre for International Agricultural Research (ACIAR). The horticulture sector in Pakistan is significant, both domestically and for



export production. Crop management practices are often suboptimal and losses along the value chain are high. Australian intervention led to the adoption of a value chain approach by Pakistani smallholders to increase the productivity and competitiveness of their produce along with building the capacity of researchers and extension workers in using the value chain approach. In examining the impact of the this paper 1) demonstrates the small investment in research and capacity building which brought major change in an industry; 2) identifies some of the major issues associated with the implementation of these activities; and 3) highlights progress to date, major successes and major lessons learnt. The success achieved has been the result of ACIAR's particular way of working. The ACIAR approach, which is based on brokering relations between Australian expertise and developing country institutes, is unique and has been very effective in Pakistan. There are significant opportunities for future involvement of Australia's horticultural research capacity and expertise in overseas development assistance programs (ODA).

Keywords: Australian development program. ACIAR. Horticulture research. Post-Harvest capacity building, developing country, Pakistan

P-11:

ECONOMICS OF CUT FLOWER INDUSTRY IN PAKISTAN

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Pakistan is an agricultural country and horticulture plays a major role in supporting its economy. Cut flower industry has recently gained momentum in Pakistan. With the change in life style of urban societies, demand of cut flower is gradually increasing in various ceremonial events, for example marriage or birthday, and farming community is encouraged to grow cut flowers. The cut flower business has expanded more in big cities like Islamabad, Lahore and Karachi as compared to other cities of Pakistan. There is a great need to address issues being faced by the cut flower industry which demands the attention of the researchers, growers and processor as well the policy makers. Moreover, effective extension services are required to motivate the farmers and consumers toward this industry. In addition to the recent interventions employed to improve the cut flower industry, findings of case studies conducted on economic returns associated with cut flower production and marketing in the Karachi city of Pakistan will also be discussed.

Keywords: Cut flowers, Industry, Business, Pakistan, Karachi.

P-12:

CITRICULTURE INDUSTRY IN PAKISTAN: PRESENT STATUS AND FUTURE PROSPECTS

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Citrus is one of the major fruit crops in the world with annual production exceeding 110 million tons. Pakistan has a diverse climatic and edaphic conditions for the production of a range of citrus species including sweet oranges, mandarins, grapefruit, lime and lemons. Pakistan stands at 11th and 13th position with regard to citrus area (192,832 ha) and production (2.4 million tons) in the world. The average yield (11 tonnes/ha) in Pakistan is far less than real potential when compared to other countries (average 30 tonnes/ha). There is a significant yield gap among local citrus growers, with progressive farmers getting almost double the yield (20 tonnes/ha) than average growers. The major difference remains the management practices. Presently, the industry mainly



comprises of Kinnow mandarin (> 80% of production). Now growers from south Punjab, Sindh have started to diversify with the cultivation of lime and lemons. There is tremendous potential for enhancement of yield and quality with the adoption of latest production technology, GAP and HACCP certification, introduction/adoption of new varieties and species, and widening the harvest window. Research and development institutions need to strengthen their collaboration especially in the wake of climate change and increased challenges which degrading fruit cosmetic quality, attributed to various biotic and abiotic factors. There is also dire need to regulate citrus nurseries for true to type production of plants. In order to establish globally competitive value chains, the local citrus industry needs to implement quality standards and certification system in the supply chain.

Keywords: citrus, supply chains, Pakistan, quality, certification

P-13:

RAPID NEED ASSESSMENT OF VEGETABLE VALUE CHAINS FOR SUSTAINABLE LIVELIHOOD OF MARGINALIZED COMMUNITIES IN SINDH AND SOUTHERN PUNJAB IN PAKISTAN

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Around 60% of Pakistan's population of ~208 million live in rural areas where multidimensional poverty is much higher (54.6%) than it is in urban centres (9.4%). The vast majority of the rural poor depend on agriculture for their subsistence either directly as farmers, or indirectly as farm labourers and service providers. The vast majority of farmers operate family smallholdings - comprising less than 5 acres of land - and, for many of these, vegetables are a major, but highly variable, source of household income. To identify the opportunities for value chain interventions in order to improve the livelihood of small farmers, particularly women and youth, four major vegetables (onion, potato, tomato, chillies) were selected. A rapid need assessment survey was conducted in major production areas of these vegetables in Sindh and Southern Punjab. Structured interviews conducted with 156 respondents; and the data were validated by focus group discussions. The findings confirmed the potential of significant financial returns for small-scale vegetable producers and other value chain participants, including women and youth. However, consistent supply of vegetables to the market remains a big challenge. Structural constraints to profitable marketing further exacerbate the situation. Supply of consistent quality is also a big issue. The causes of poor quality could be poor storage, handling, transportation, and processing. Finally, the supply of both the quantity and quality of vegetables required by the consumers are subject to inputs and production constraints (such as seed quality, price of inputs, and pests and diseases) and economic constraints (such as mechanism of access to capital, credit, tenancy/land). Overarching socio-cultural factors include the lack of knowledge to address these constraints (including inadequate extension services), restricted agency for women and youth, and barriers to working collaboratively within some communities. A 'whole of the value chain' focused approach addressing the production, processing, marketing, and socio-cultural constraints identified in the needs analysis is suggested for improving livelihood of the target communities. Partnerships of both the public and the commercial institutions throughout the testing and application of selected value chain interventions are vital to sustain ongoing impacts.

Keywords: gender, pro-poor, quality, safety, women, youth,

P-14:

SOCIO-ECONOMIC AND FARM CHARACTERISTICS OF VEGETABLE GROWERS IN SAMSUN PROVINCE, TURKEY

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The aim of this study is to determine socio-economic and farm characteristics of vegetable growers in Bafra district of Samsun province which is the leading vegetable production area in Turkey. The primary data of the study was obtained through survey with 120 vegetable growers selected with simple random sampling method. The data were analyzed with descriptive statistics and cluster analysis using SPSS program. Farms were grouped into small, medium and large by clustering analysis using income, land size and personal indices (education status, registration status of farmer organization, experience, farm record keeping, vocational education participation and the number of the products produced) of the vegetable growers surveyed. It is determined that 49.2% of vegetable growers in Bafra province are small, 45.9% of them are medium and 5% are large farms. One Way ANOVA analysis showed that growers with large farms are younger and more educated than those with medium and small farms. When examined in terms of agricultural experience, it can be argued that the experiences of medium-sized farms are higher than those of other farm groups. It has been shown that the farm groups have significant differences in terms of land size, income from plant and animal production and product variety. While 63.3% of small farms do not keep records about agricultural activities, 55.4% of medium sized farms and all of big farms keep records.

Keywords: Growers, Farm and Socio-Economic Characteristics, Samsun, Bafra, Turkey





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