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ORAL PRESENTATIONS

KEYNOTE 1
THE MAIN CHALLENGES OF THE WORLD VINE AND WINE SECTOR

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The goal of this Symposium is to provide means and ways for scientists, engineers, researchers, students, growers, consultants, government employees, and policy makers to exchange ideas and provide an opportunity for networking in the fields related to viticulture. Another goal is to provide cutting edge information on the global technology that is being developed or studied. It is expected that the meeting foster cooperation between research institutions and universities.
This Symposium aims to bring together once more the experience of scientists from different disciplines of vine & wine (physiology, breeding, producing, production, processing, pathology, etc..) whose research focuses on grapevine and product quality and safety and collate a more comprehensive, updated and detailed knowledge in this important sector. Topics will include rootstocks, varieties, breeding, biotic and abiotic stress interactions with natural factors and agronomic practices, management systems, quality, and safety.
The symposium will be hosted in Istanbul, a city located in Europe and Asia continents and links them through the Bosphorus. It is close to Bursa one of the most important late table grape growing regions, and Tekirdağ, one of the most important viti-viniculture regions of Turkey, famous for the cultivation of traditional autochthonous varieties, like Merlot, Yapıncak and new varieties Trakya İlkeren, Tekirdağ Sultani as well as internationally known varieties.
Two tours will be organized to Cappadocia (Central Anatolia) for wine-grape production and to İzmir-Manisa (Western Turkey) for sun-drying of grapes to provide an opportunity for delegates to learn more about the Turkish grape production and processing. We welcome researchers, students, viticulturists and professionals in the grapevine/wine industry to attend the symposium and exchange their studies and experiences.

OP 001:
ASSESSING THE GRAPEVINE AND ENVIRONMENTAL INTERACTIONS: INTEGRATING WEATHER AND SATELLITE DATA IN THE CONTEXT OF CLIMATE CHANGE, SOUTH AFRICA

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In the context of climate change and the complex terrain of the Western Cape, increased resolution of climate data is crucial for effective terroir zoning and adaptive strategies. Reliable climate data can be costly, and currently requires intensive data validation; hence the study aimed to find an alternative resource to quantify the climate over the spatial extent of the Western Cape, for possible semi-real time applications. This study focused on integrating climate and thermal satellite remote sensing data to assess the reaction of the grapevine to a changing environment. Sites were selected over a geographical climatic band; multiple factor analysis was used to evaluate the interaction of weather, specifically temperature, relative humidity and wind speed with grapevine phenology. The aims of the study were to quantify climate change and seasonal variability in the Western Cape with the best station network possible within the limits of the spatial and temporal resolution availability. The satellite land surface temperature and weather station data exhibited a significant linear relationship with a good prediction accuracy. Simple statistical models where employed, with robust resampling techniques achieving a high accuracy in the complex terrain of the Western Cape. Land surface temperature maps are intrinsically spatialised, providing daily temperature values that in the past would have only been possible by spatial interpolation of sparse weather station networks, which could only be as accurate as the input data. This study has provided insights into grapevine and environmental interactions being driven by seasonal variabilities within the climate shifts in the Western Cape. Grapevine responses such as flowering date, driven most prominently by climate, specifically the summer months of the previous harvest. Emphasising the need and the potential use of thermal satellite products to supplement weather station networks.

Key words: weather, climate, remote sensing, *Vitis vinifera*, phenology

OP 002:

MECHANICAL PRUNING IN NON-IRRIGATED VINEYARDS: EFFECTS ON YIELD AND GRAPE COMPOSITION OF CV. `SYRAH´ (*Vitis vinifera* L.)

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The effect of mechanical pruning on vine performance and wine quality was evaluated from 2012 until 2015. Two trial fields, with a randomized complete block design, were established on already existing Syrah vineyards in Quinta do Côro (QC) and Quinta do Gradil (QG), located in Tejo and Lisboa wine regions respectively. Mechanical pruning (MEC) was simulated by trimming all shoots to a 15 cm square around the cordon. Manual pruning (MAN) treatment was subjected to a traditional spur pruning. MEC tended to increase water consumption due to the higher proportion of exposed leaf area, since the total leaf area per vine was not different from MAN. The transpiration and photosynthetic rates were tendentially lower in MEC, indicating an adaptation to more stressful conditions. Yield was higher in MEC, while the individual shoot vigour and the total amount of pruning wood were lower in MEC. These results led to higher values of the Ravaz Index in this treatment, reflecting changes in the partitioning of carbohydrates that were redirected from vegetative to reproductive growth. Total dry matter production (DMP) was mainly not affected by the pruning system, even in years with lower water availability. In 2014, when water was not a limitative factor, the total dry matter production was higher in MEC. The DMP in MEC was

not reduced along the trial, suggesting that reserves accumulation have not been restricted. The grape composition, analysed in 2013 and 2014, has not been significantly affected, with the exception of the total soluble solids content (TSS) and the pH, in 2014, which were lower in MEC. The results indicate that mechanical pruning is a reliable instrument to improve vine performance in non-irrigated vineyards, increasing yield without quality loss, even in dry years.

Key words: mechanical pruning, water scarcity, dry matter partitioning, yield and quality

OP 003:

INTEGRATION OF IOT (INTERNET of THINGS) AND STANDARD SENSING TECHNOLOGIES ON ORGANIC TABLE GRAPE CHAIN IN MEDITERRANEAN REGIONS IN THE FRAME OF IOF2020 PROJECT

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The integration of heterogeneous IoT (Internet of Things) and standard sensing technologies can improve the organic table grape from a discontinue into a coherent system, generating a sustainable fruit sector, potentially traceable from "*farm to fork*".
The Use-Case "fresh table grapes" innovation, implemented in IoF2020 project, made up of a combination of soil and crop parameters which are needed to obtain an accurate irrigation schedule, canopy management and crop performance, as well as to improve yield and grower incomes. In 2017, a test was carried out at Castellaneta Marina, Apulia region, Southern Italy, on *Vitis vinifera* cv. Sugranineteen (Scarlotta seedless®), in a 3-year organic vineyard.
IoT devices such as microclimate stations, sap-flow and dendrometers sensors were installed in two different parcels (farm parcel and IoT parcel). The IoT sensory data collected were used to identify an appropriate irrigation scheduling for table grape vineyard. The information sets acquired by both wireless and in-situ measurements were analyzed by using a commercial DSS (BluLeaf™) to decide irrigation and fertilization management. At commercial harvest, cluster and berry weight, berry diameters, berry firmness, total soluble solids, titratable acidity and juice pH were determined.
Finally, another rate of harvested clusters were transported to the SAFE laboratory, immediately precooled and driven to cold storage in association with MAP (Modified Atmosphere Packaging), using BLOW® device, a patented device able to control gaseous exchanges of the packaging.
First year results are very promising in terms of water saving, yield performances, reduction of agrochemicals inputs at field level, shelf-life prolongation and fruit quality and are strictly connected to the implementation of IoT at farm level, allowing the farmer to a better managing of technical means and to a better individuation of the critical points of the fruit chain.

Key words: grapevine, crop performance, irrigation schedule, leaf gas exchange, cold storage

OP 004:

SURVEY STUDY ON THE STATE OF VITICULTURE AND WINE PRODUCTION IN LEBANON. EVALUATION OF THE STATUS OF VITICULTURE AND WINE PRODUCTION AS A FIRST STEP IN THE ORGANIZATION OF THIS SECTOR

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Lebanon was traditionally known for its wine grape production and last decades marked an unprecedented growth of this sector. However, there is a lack of data that could describe the main features of viticulture and winemaking in Lebanon, therefore a survey was conducted in 2015 using questionnaires that were addressed to wine grape growers and wineries' owners and/or managers through face to face interviews. Data collected indicated a total number of 216 vineyards covering a cultivated area of 26368.49 Do with 54 active wineries. Winegrape vineyards were mainly concentrated in West Bekaa (56%) followed by North Bekaa (26%), Central Bekaa (11%), Mount Lebanon (3%), North Lebanon (3%), South Lebanon (1%) and East Bekaa (1%). Winegrapes production has been expanding towards new regions like North Lebanon and South Lebanon. Cultivated winegrape varieties were mainly noble ones like Syrah, Merlot and Sauvignon Blanc with Cabernet Sauvignon and Chardonnay being the most abundant. The strategy of producing high quality wines was adopted from field to winery including agricultural and industrial management techniques. The annual production capacity differed largely between wineries with 45% producing less than 20000 bottles, 23% between producing 20000-120000 bottles and 30% producing 120 000-1000000 bottles. Only 2% of wineries produced over 1000000 bottles. Although wine industry was found struggling with problems of monopolization by early established wineries, however this sector benefited from a great potential with the presence of un-exploitable terroirs that are suitable for viticulture. Findings of this survey could be used as a base to draw a national strategy for the sector of viniculture in Lebanon.

Key words: Lebanon, Viticulture, Vineyards, Wine grape varieties, Winemaking

OP 005:

OVERVIEW OF GRAPES INDUSTRY IN SOUTH PUNJAB, PAKISTAN

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Grapes are highly nutritious fruit crop having carbohydrates, vitamins and polyphenols with antioxidant properties. Grapes are considered among the major fruits grown in world and are produced under different climates. European varieties of grapes require hot dry summer and moderate winter. Introduction of these varieties to the plainland subtropical regions of Pakistan have added new areas of grapes production including south Punjab. Presently various cultivars are being grown like Sultania C, Red Globe, Vitro Black, NARC Black, Flame Seedless and Kings Ruby. Due to better productivity and profitability, the trend of grapes cultivation is increasingly expanding in this region. A survey was conducted to evaluate the challenges being faced by the newly establishing grapes industry in South Punjab. As regards the findings, the grapes industry lacks with local R&D based production technology

(especially planting geometry, balanced nutrition, pruning and training system), varietal characterization and selection, availability of certified plants, availability of salt and drought resistant rootstocks, postharvest management system, value addition options and marketing facilities. This paper provides detailed account of the current issues and advances in grapes industry, which will be useful for establishing the grapes industry in other parts of the world having similar agro-ecological conditions to those of South Punjab.

Key words: Viticulture, Subtropical regions, Quality, Productivity, Marketability, Preharvest, Postharvest

OP 006:

SOMATIC EMBRYOGENESIS AND PLANT REGENERATION FROM ANTHER CULTURE OF GRAPE CV. EKŞİ KARA (*Vitis vinifera* L.)

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Grape cv. 'Ekşi Kara' (*Vitis vinifera* L.) is prosperous grape variety in middle Anatolia utilise for table grape, dried and concentrated fruit juice. Anther culture is one of the sustainable grape breeding methods used to obtain haploid plants. The anthers isolated from a plant are based on the development of callus and plant transformation into a suitable culture media. The desired mutant types can be selected from the haploid plants derived by this method and new varieties can be improved. Anther culture has been studied in the cv. 'Ekşi Kara', which are cultivate in Turkey without any alternative in their locations. Explants (0.3-1.0 mm long, pale green colour) were used in the approximately single-nucleus microspore stage, which was considered optimal for the start to culture. Embryogenic culture induction occurs by placing anthers on induction medium with a dark/light photoperiod cycle for 12–16 weeks. The derived callus was transferred to N&N (macro-micro) + MS (vitamin) embryo differentiation medium. Following the embryogenic cell aggregates that was transferred to the embryo germination and plant regeneration medium. For plant regeneration, germinated embryos with hypocotyls and cotyledons and apical root axes were transferred to Semi-MS Medium. It was determined that the anthers found in the flower buds' corolla-covered, which have turned from the dark greenish to slightly yellow colour immature flowers, were more suitable. The embryonic callus development rate was 22.86% and the embryonic calli plant conversion rate was 66.89%. Since the level of development of embryonic induction was influenced by the culture medium, it has been determined in this study that the content of the nutrient medium has an important role in embryo development and plant regeneration. Results showed that 'Ekşi Kara' was suitable for embryogenic calli formation and plant regeneration that can accelerate the polyploid grape breeding.

Key words: Grapevine, embryonic callus, haploid plant regeneration, grape improvment.

OP 007:

IN VIVO POLYPLOIDY INDUCTION BY COLCHICINE IN GRAPE CV. EKŞİ KARA (*Vitis vinifera* L.)

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Polyploidization has been demonstrated as a very effective approach in grape improvement. It is known that grapes with increased ploidy level by mutation breeding have better qualities compared to their original diploids in some properties such as berry size, leaf size, and resistance to pests and diseases. For this purpose, studies on the folding of chromosome numbers have been made by applying chemical mutagen to diploid grape varieties. In this study, colchicine was applied in vivo in order to raise the level of ploidy to *Vitis vinifera* L. var. 'Ekşi Kara' autochthonous grape variety seedlings. 8 colchicine dosages (mg L^{-1}) (0.0, 1000, 2000, 3000, 4000, 5000, 7500, 10000) were applied to meristematic part of seedling twice a day (in 8.30 and 18:00) during 3 days when first true leaves emerge. The effects of colchicine treatments have been investigated with changes in shoot and stoma size. Ploidy levels of the samples were tested using flow cytometry (FC). Blind seedling formation was determined in all of the 10 g L^{-1} colchicine applications. In low-dose colchicine applications, shoot growth continued at various rates. Stomata sizes (density, length, width, and area) were recorded. The stoma properties were significantly affected the applications. FC analysis showed that the treated plants were not different from the original diploids of ploidy levels. It is known that as the level of ploidy increases in plants, the size of stoma increases and the density decreases. In this study, it was determined that the size of the stoma increases and the density of stoma decreases in the colchicine applied seedlings. Some colchicine applications are thought to alter the ploidy level. Chromosome analysis is required for precise detection. 10000 mg L^{-1} colchicine applications cause blind seedling formation entirely. It has been understood that doses lower than 10000 mg L^{-1} are more successful in promoting ploidy in 'Ekşi Kara' grape variety seedlings.

Key words: Table grape, mutation, flow cytometry, improvement

OP 008:
INDUCTION OF PLOIDY IN SOME GRAPE ROOTSTOCK AND CULTIVARS BY N2O TREATMENT

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Polyploidy has been used in horticulture as a breeding tool to enhance characteristics such as flower size, flower number, plant size, increased width–to–length ratio of leaves and leaf thickness. Nitrous oxide gas (N_2O) was applied to seedlings and zygotes of many plants as a polyploidizing agent instead of colchicine treatments. N_2O application for polyploid grape breeding has not been tested before and has been used as a new approach in polyploidizing studies. In this study, N_2O was applied in order to induction mitotic ploidy of 41 B grape rootstock and 'Trakya İlkeren', 'Gök Üzüm' and 'Ekşi Kara' grape cultivars (*Vitis vinifera* L.) single node cuttings. The application of N_2O was performed for 24 hours at 12000 kPa at 25 °C when the cuttings were sprouted as 2-3 leaf development period at different stages of mitosis. The effects were evaluated by stomata sizes (density, length, width, and area) and flow cytometry (FC) analysing by PartecCyflow space brand. The results showed that stomas were morphological significantly changed by N_2O applications. The stomata density was significantly decreased from 525.81 stomata mm^{-2} to 378.75 stomata mm^{-2} at 41B grape rootstock, and grape cultivars stomata density also significantly affected same way that were from 306.45 stomata mm^{-2} to 265.13 stomata mm^{-2} grape var. 'Gök Üzüm'. On the other hand, the FC analysis were not detected any induced plants. The present study reveals that polyploid yield frequency by using N_2O were low in tested rootstock and grape varieties, this

most likely is due to the diploid×N_2O-treated rootstock and grape cultivars genotypes and also N_2O-treatment method.

Key words: Grape Breeding, *Vitis vinifera* L., Mitotic Ploidy, Nitrous Oxide Gas, Flow Cytometry

OP 009:

VINE DESCRIPTION, BERRY CHEMICAL CHARACTERISTICS AND PHENOLIC COMPOUNDS OF FIRST REGISTERED FOXY GRAPE CULTIVARS IN TURKEY

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This study was conducted between 2014 and 2016 in order to determine the phenological, morphological and berry characteristics of five Turkish foxy grape (*Vitis labrusca* L.) cultivars (‘Rizessi’, ‘Rizpem’, ‘Rizellim’, ‘Ulkemiz’, and ‘Celiksu’) newly registered by Dr. CELIK. Ampelographical description observed by OIV norms. Bunch weight, berry weight, TSS, acidity, pH, total phenolic compaunds and L* values of berry samples collected from ten years old grapevines at large unripe, veraison, 50% coloring, harvest time, and over-ripe period, also determined. ‘Ulkemiz’ shoot tip is wide open and other has fully open. While ‘Ulkemiz’ young leaf has green with anthocyanin color and ‘Rizpem’ light copper-red, other cultivars have yellow green. All cultivars have fully developed sexual organs, small bunch size and medium bunch shape. It was observed that the weight of a berry at harvest time ranged between 3.20 (‘Rizpem’) and 3.93 g (‘Celiksu’). Berry weight, pH and TSS continue to increase to the over ripe period. Berry skin color of ‘Rizpem’ is dark red-violet and others are blue-black. The berry flesh of each variety were colorless and contained seeds. Total phenolic compounds decreased during the maturation. ‘Rizpem’ gave the highest total phenolic (4116.53 mg kg^{-1}) at harvest time while it has the 7666.33 mg kg^{-1} total phenolic at large unripe period.

Key words: Foxy grape, *Vitis labrusca*, ampelography, TSS, acidity, pH, phenolic

OP 010:

DETERMINATION OF HYBRIDIZATION PERFORMANCE BETWEEN *Vitis vinifera* L. AND AMERICAN ROOTSTOCKS

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In the study, Boğazkere and Karadimrit grape cultivars were used as the maternal lines and 1103 P, 140 Ru American rootstocks as the paternal lines. As a result of the realized hybridization; parameters such as cluster and fruit set ratios, F1 seed yields and plant seed conversion rates were examined.
In the Bogazkere x 1103 P combination, 40 clusters were emasculated and fruit occurred in 29 clusters in the first year. Cluster set ratio was 72.50% and fruit set ratio was realized as

47.50%. A total of 55 clusters were emasculated in year 2 of the same combination, fruit occurred in 44 clusters of fruit. In the second year of the related combination, Cluster set ratio was 80.00% and fruit set ratio was obtained as 53.20%. In the Karadimrit x 140 Ru combination, 75 clusters were emasculated and fruit occurred in 61 clusters in the first year. Cluster set ratio of 81.30% and fruits set ratio of 63.90% were obtained. A total of 78 clusters were castrated in year 2 of the same combination, fruit occurred in 59 clusters of fruit. In the second year of the related combination, Cluster set ratio was 76.40% and fruits set ratio was obtained as 54.80%.
Hybridization results obtained in conversion rates of F1 seeds to plants in combination of Boğazkere x 1103 P was higher than the control group (85.83%). In the combination of Karadimrit x 140 Ru, lower value than the control group (11.66%) was obtained. A total of 4,588 F1 genotypes were obtained from the combination of Bogazkere x 1103 P and a total of 1,908 F1 genotypes from the combination of Karadimrit x 140 Ru, in two vegetation periods.

Key words: Hybridization, *V.Vinifera* L., Boğazkere cv.,Rootstock, 1103P.

KEYNOTE 2
CURRENT AND FUTURE OUTLOOK OF THE TURKİSH GRAPE İNDUSTRY

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Grapes are one of the world's most commonly produced fruit crops, with approximately 75 million tonnes produced each year and creating the highest total value of production among fruit in the world. Almost 50% of grapes are used to make wine, 37% are consumed as fresh table grapes and 9% as dried grapes. Drying is one of the oldest traditional methods of preserving fruits and world dried grape production was reported as 1.5 million tonnes in 2017. The rate of internationalization of trade for dried grape is very high due to its suitability to international trade because of its multiple uses, nutritive value, low transportation cost and long shelf life at ambient storage conditions. Today, the population growth, along with rising incomes in developing countries, are driving up the global food demand which will shape agricultural markets and dried grape industry. While Turkey and USA dominate global dried grape production, Turkey is the leading dried grape exporter in the world. Turkey's annual dried grape production is approximately 300.000 MT and its export reaches 270.000 MT. In this paper, current and future trends, challenges and Turkey's role in dried grape sector will be discussed. A brief information will be given on the work and efforts of the Turkish dried grape sector aiming at bringing solutions to these challenges at national and international level.

OP 011:
EFFECTS OF CALIBRATED DELAYED WINTER PRUNING ON *Vitis vinifera* L. CV. PINOT NOIR GRAPEVINES IN RELATION TO DIFFERENT TRAINING SYSTEMS

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Warming trends are challenging viticulture worldwide. The rise of temperatures recorded in most of traditional and new viticultural regions can be particularly detrimental for the production of sparkling wines, requiring moderate alcohol level and sustained acidity. The postponement of spur-pruning after bud-break has recently been proposed as a simple and inexpensive technique to delay ripening, exploiting the natural acrotony of the grapevine. A three-year trial was conducted in central Italy to assess if late pruning can successfully delay ripening in grapevines according to different training systems. Mature field-grown *Vitis vinifera* L. cv. Pinot Noir vines were subjected to the following treatments: winter spur pruning (WSP), delayed spur pruning (DSP), winter cane pruning (WCP), and delayed cane pruning (DCP). Delayed pruning was performed when, on node 10 of the unpruned canes, growing shoots reached an average stage of 3 unfolded leaves. During the season, phenological stages were monitored twice a week for both spurs and fruiting cane. Ripening kinetics were characterized from veraison until the end of the season. DSP and DCP significantly delayed bud-break and early phenological stages. Similarly, sugar accumulation was postponed and the drop of titratable acidity was successfully shifted by 12 and 7 days, respectively. At technological maturity of WSP and WCP vines, corresponding to the achievement of ~20° Brix, DSP and DCP significantly reduced total soluble solids (-4.6°Brix and -1.6°Brix, respectively) and maintained higher acidity (+5.2 g/L and +2.9 g/L). Accordingly, a 46% and 32% yield loss was recorded. In both training systems, delayed winter pruning can be a simple technique suitable for preserving must compositional characters required for sparkling wines.

Key words: Climate change, fruit composition, delayed pruning, phenology, yield

OP 012:

EFFECT OF SEVERE SUMMER PRUNING, LEAF AND BUNCH REMOVAL ON NITROGENOUS COMPOUNDS IN SHIRAZ MUST IN AUSTRALIA

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Viticultural practices are important to optimise berry ripening and enhance grape composition; varying the fruit to leaf area ratio is the fundamental principle of grape production. Fruiting capacity and berry composition of grapevines are dependent on canopy area, with grapevine reserves affected by crop load. During grape maturation nitrogen (N) uptake is limited, therefore grapes obtain N mobilised from vegetative annual and perennial organs. Removing leaves or bunches could influence N accumulation in the fruit and consequentially nitrogenous compounds that are important for the fermentation process.
Early leaf removal was implemented prior to flowering, while severe summer pruning and bunch removal were applied shortly before veraison to Shiraz vines during three growing seasons in three vineyards located in Langhorne Creek (South Australia), Murray Valley (Victoria) and Hilltops (New South Wales). The implemented difference in leaf area/fruit ratio changed grape maturation rates, but harvest was conducted at similar berry ripeness. Berry samples were taken to assess basic juice parameters, including nitrogenous compounds prior to fermentation. In Hilltops, free amino N (FAN), ammonia (NH3) and consequentially the yeast assimilable N (YAN) levels were lowered by leaf removal and this was more pronounced by severe summer pruning. In Langhorne Creek, only the NH3 fraction was

lowered by early leaf removal, while Murray Valley had the lowest levels of nitrogenous compounds assessed with no treatment influence observed.
The lower YAN levels in grapes coming from vines that had leaves or a combination of shoot/leaf sections removed could be due to the reduced availability of N. During maturation, the berry demand for N is commonly mobilised from the other annual or perennial tissues as N uptake is often insufficient. A diversion of N to other nitrogenous compounds such as proline in the berry could be another reason for the YAN reduction, often being elevated under abiotic stress. The variation of treatment responses between sites is likely due to the difference in irrigation and nutrition management.

Key words: Leaf/bunch removal, berry maturation, nitrogenous compounds, nitrogen mobilisation

OP 013:

EFFECTS OF EXTREME BUD LOAD AND LEAF REMOVAL TREATMENTS ON LEAF WATER POTENTIAL, STOMATAL CONDUCTANCE AND RIPENING OF CV. SULTANA (*Vitis vinifera* L.)

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A study was conducted to determine the effects of three different bud load levels (15 buds, 25 buds and 30 buds/m2) and two different leaf removal (25 % and 50 % on each vine shoot) treatments on bud burst (%), fruitfulness (%), midday leaf water potential (ΨMD), stomatal conductance (gs), total soluble solids (brix), pH, titratable acidity (g/L) and maturity indice (brix/g-L) of own-rooted *Vitis vinifera* L. cv. Sultana in 2016 and 2017 vegetation season in Alasehir, Turkey. Vine spacing was 3.0 to 2.0 m and the vines were cane pruned on Y type trellis system. Leaf removal treatments were performed only once approximately one month before verasion. In this research, healthy berries were sampled separately from the top and from the bottom part of the bunch. Then values were analyzed separately ($P \leq 0.05$). Midday measurements of leaf water potential (ΨMD) showed difference between -1.55 MPa to -1.98 MPa. Leaf stomatal conductance (gs) values were determined between 400.00 mmol/m-2s-1 and 109.15 mmol/m-2s-1 as well. The results indicate that extreme bud load on vines generally reduced leaf water potential (ΨMD), stomatal conductance (gs), bud burst (%), fruitfulness (%) values according to the all data of two consecutive vegetation periods.

Key words: grape, bud, stomatal conductance, water potential, berry.

OP 014:

DETERMINATION OF THREE DIFFERENT TRAINISYSTEMS EFFECTS ON THE QUALITY YIELD AND BERRY COLORATION OF RED GLOBE GRAPE VARIETY IN LAKES REGION OF TURKEY

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This study was done in a farmland of Fruit Research Institute in located in Eğirdir town of Isparta city of Turkey. Vineyard was designed according to randomized block design with Red Globe grape variety grafted on 41 B rootstock in 2012 year. Trial was done with 3

replicates, each replicate contained 10 grapevines with 3 m. X 2 m. row distances. Training systems were double armed pergola, rational pergola, U system with 4 wires. It was aimed to evaluate effect of the training systems for Red Globe variety in Lakes Region of Turkey. Data was collected in 2015, 2016, 2017. Phenological observations (bud burst time, bloom time, verasion time, harvest time) average cluster number/per vine, average bunch weight (g), 100 berry weight (g), soluble sugar content (%), titratable acidity (g/l) and pruning weight (g) data had been evaluated. Quality analyses, maturation index, vegetative development, pruning weight, berry skin colour, degustation values, density of pests and diseases, fruit sunburn ratios and meteorological data had been determined. Bud burst time varied in systems 11-25 April. Harvest time was varied in systems between 29 September-07 October.
Excellent berry coloration for Red Globe grape variety in systems was determined in three years period. It was evaluated with dark red violet color with average L 36.55, a 2.05, b -3.31, c 4.21, h 293.57 values. Three years average quality parameters yield per vine vary according to systems with values of (7.0-11.6 kg), soluble sugar content % 16.4-17.6) titratable acidity (3.8-4.4 g/lt), single berry weight (9.4-10.2 g), bunch weight (780-1380) gr. These results are average results according to 3 years data, there are some significant and insignificant results variable to training systems for getting the precious result trial will be continued in three years period.

Key words: Grape, Red Globe, Yield, Quality, Training System, Colour

OP 015:

THE EFFECTS OF WINTER PRUNING TIME ON BUD BREAK TIME, FLOWERING TIME AND SHOOT LENGTH ON SOME TABLE GRAPES

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Late spring frosts have been occurred in most grape growing areas such as Aegean region in Turkey. One of the indirect measures to protect vineyards against to spring late frost is late winter pruning. The aim of this research is to determine the effects on bud break time, flowering time and shoot length of early and late winter pruning times on Red Globe Alphonse Lavallee, Gelin Öldüren, Bornova Misketi and Gelin Üzümü table grapes (*vitis vinifera* L). Vines were pruned 18 November 2016 and 13 February 2017. When compared control vines, late pruning resulted in 4, 2.7 and 1-day late bud break for Gelin üzümü, Bornova Misketi and Alphonse Lavalle table grapes respectively. In addition, that full flowering time was become later 2, 1 and 1 day for Alphonse Lavelle, Bornova Misketi and Gelin üzümü cvs. respectively. Bud break and flowering times of Gelin Öldüren and Red Globe cvs, were not affected by pruning times. Shoot length was significantly decreased by using late winter pruning in Bornova Misketi and Red Globe cvs. As a result, Bud break and flowering times of Gelin üzümü, Bornova Misketi and Alphonse Lavalle table grapes were delayed by late winter pruning in spring. It is suggested that if late spring winter pruning time can be delayed until bud break time.

Key words: spring frost, late pruning, bud break time, flowering time shoot length

OP 016:

IS PHENOLOGICAL BEHAVIOR OF TANNAT (*Vitis vinifera* L.) AFFECTED BY TEMPERATURE VARIABILITY IN THE COASTAL WINE REGION OF SOUTHERN URUGUAY?

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To improve measurements for vinegrape adaptability to climate change and variability, we need to know how local climatic factors influences its behavior. The aim of this work is to assess temperature spatial and temporal variability at meso-scale and its relation with Tannat phenology. Ten temperature sensors were installed in Tannat commercial vineyards (Plot 1 to Plot 10) in southern Uruguay wine region at different distances from the La Plata River and topographic situations (Plot 1 the nearest of the estuary at 0.9 km and Plot 10 the furthest at 28.6 km). A phenological monitoring was done in 100 bunches per plot in four phenological phases: flowering, fruit set, bunch closure and veraison. Temperature database over three growing seasons (2011-2012, 2012-2013 and 2013-2014) were analyzed through bioclimatic indices adapted to viticulture as the Growing Degree Days (GDD). The heat accumulation in the vineyards according the phenological stage showed that Plot 5 reached the lowest value in GDD through the vegetative cycle, due its elevation and topographic situation. Inversely, Plot 1 reached the highest values of GDD, due the proximity of La Plata River (thermal amplitude). In 17.4 kilometers (distance from Plot 1 to Plot 5) was registered a difference of 0.86 degrees accumulated per day, showing a high spatial variability of temperature. The spatial variation of phenology within the region was lower than the spatial variability of temperature. Possibly, the differences in vineyards management techniques over the plots, play a preponderant role in the phenological performance in Tannat. That explained the fact that the hottest plots did not affect on the precocity of the four studied phenological stages. Futher studies of the interaction phenotype-environment are essential to contribute to a better adaptation to climate variability in this region.

Key words: Vinegrape, Phenology, Meso-climate, Tannat, Uruguay

OP 017:

EFFECT OF DIFFERENT CULTURAL PRACTICES ON THE PERFORMANCE OF THE RED WINEGRAPE VARIETY `MALBEC´ RECENTLY GROWN IN BEKAA-LEBANON

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Malbec is a red winegrape variety recently introduced to Lebanon and is well-known for producing rich wines. In 2013, it was grown in Mansoura-West Bekaa and Der el Ahmar-North Bekaa. The research started in 2014 in order to compare the performance of “Malbec” vines in separate growing systems with different climate conditions: system 1 (S1) at Der el Ahmar with no intervention on vine growth and nutrition and system 2 (S2) at Mansoura where canopy management and plant nutrition were adopted. Results showed that vines in S1 were less vigorous developing lower leaf number, leaf area, shoot number, shoot elongation and less productive, however in S1 earlier fruit veraison and maturity dates were reached.

Linear and multiple regressions showed that the effect of climatic factors on vine growth and production was hidden by the effect of different agricultural practices. Consequently, in 2015, the effect of pruning and irrigation was investigated on S1 vines after harvest. Comparison between 3 treatments: T1(Irrg/Prn), T2 (NotIrrg/Prn) and control showed that fruit number and fruit weight were the highest in T2 and the combined effect of both practices (T1) resulted in the highest leaf formation, leaf expansion, fruit dimensions and yields. It induced as well a significant increase in productivity which was 15 times higher than the control. Fruit veraison and maturity dates were the earliest in control. Finally, it is recommended to prune and irrigate "Malbec" vines after harvest for a better performance of this variety under the climate conditions of Northern Bekaa.

Key words: Malbec, Bekaa, pruning, irrigation, growth, productivity.

OP 018:

THE EFFECTS OF BAGGING TREATMENTS ON RIPENING, YIELD AND QUALITY OF TRAKYA İLKEREN TABLE GRAPE CVS

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The effects of three bagging treatments (Mogul 19 g/m^2, Mogul 30 g/ m^2 and Tyvek) and two spraying programs (standard and deficit) on ripening, yield and quality components have been determined on Trakya Ilkeren, an early table grape variety. The whole clusters were taken into bags at berry set. The deficit spraying differs from standard program with unique spraying before blooming against to *Lobesia botrana* and less one application against to mildew diseases. The temperatures in the Mogul bags were higher than out of the bags while these temperatures were similar for Tyvek bags. The relative humidity in the bags was less than surrounding air the bags for all bag types while it was higher in the Tyvek bags. Berry firmness decreased with all bagging treatments. The symptoms of powdery mildew on bagged clusters increased. The anthocyanin content of the grapes was higher at bagged clusters of Trakya Ýlkeren cv. and this trend more apparently for Mogul bags. The weight of the clusters of Trakya Ýlkeren had been increased by 17-18 %. Earliness was determined according to the maturity indice in the second year of the study. Mogul 19 g/ m2 provided 5 days of earliness while 2-4 days for Mogul 30 g/ m^2 according to control applications.

Key words: Grape, bagging, spraying, ripening, yield, quality

OP 019:

CROWN GALL (*Rhizobium vitis*) DISEASE EFFECTS ON PHYSICAL AND BIOCHEMICAL CHARACTERISTICS IN BERRIES OF NARİNCE (*Vitis vinifera* L.) CULTIVAR

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Crown gall (*Agrobacterium vitis*) is an economically important disease affecting growth of grapevine (*Vitis vinifera* L.). But the effects of the disease is generally focus on the lack of vine vigor rather than chemistry of berry content. In this study, impacts of crown gall disease on fruit yield and berry quality were investigated in the white wine grape cultivar Narince planted in a commercial vineyard. Narince vines showing symptoms and non-symptoms were compared. An equal number of 15 vines were evaluated in each group. Juice from grapes were collected at five stages of berry ripening after the onset of véraison. Number and total weight of clusters and berries were collected at the time of commercial harvest. Data on berry quality attributes (total soluble solids measured as Brix, juice PH, titratable acidity, and some phytochemical characters) were investigated in grape samples of symptomatic and non-symptomatic vines. Descriptive analysis were realized by variance analysis and the test of Duncan.

Key words: Crown gall, Narince cultivar (*Vitis vinifera* L.), yield, berry, quality

OP 020:

CHANGES IN POST-DISEASE AMOUNTS OF SOME PHENOLIC COMPOUNDS IN DIFFERENT VITIS SPECIES

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Powdery and downy mildew diseases are one of the most important diseases limiting viticulture. There are some changes in the metabolism of plants after these diseases. These include changes in the amounts of some phenolic substances or compounds. There are different explanations as to whether these changes are related to disease resistance.
In this study, some phenolic substance changes were evaluated before and after the both diseases. Total antioxidant activity, total phenolic substance, rutin and chlorogenic acid changes were studied for two years with Vitis varieties or genotypes belonging to different species. Especially after both diseases, significantly increase in total phenolic substance and antioxidant activity amounts attracted attention. Especially after the powdery mildew, it was seen that the increases were more prominent.
Changes in the amount of rutin and chlorogenic acid can vary depending on the cultivar or genotype. These results suggest that amount of the phenolic compounds may increase or decrease in post-disease, depending on the phenolic compound and also cultivar/genotype.

Key words: Antioxidant activity, grapevine, leaf extract, resistance, total phenolic content

OP 021:

FREEZING TOLERANCE OF SOME GRAPE VARIETIES AND ROOTSTOCKS

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Low temperatures can cause significant yield losses in vineyards due to winter bud injury. In order to cope with this problem, it is important to choose frosts-resistant varieties and rootstocks in grape grooving zones, and to identify resistant grape genotypes in the excessive frost-risk zones especially at high altitudes. In this study, 4 grape varieties Ekşi Kara, Gök

Üzüm, Müsküle and Antep Karası, and 2 grape rootstocks 99R and 110R were tested for resistance to low temperatures by single node cuttings. The test materials were taking at the end of vegetation period from producer vineyards at the 1400 m asl, and low temperatures as -12 °C and -18 °C for 12 and 24 hours in the thermo-cabin Ahm ESDE IN 450 brand was used. The injury rates of primary, secondary and tertiary primordia of the winter buds were examined under a binocular microscope (x 40) and the sprouting ratios of the tested material were determined in the growth cabinet in the laboratory. The highest damage rate of all primordia exposed to -18 °C for 24 hours was 100% damage in var. Antep Karası while the lowest damage was 96.67%, 90% and 86.67% in the same conditions in var. Gök Üzüm primary, secondary and tertiary primordia respectively. The injury rate of 110 R rootstock was 83.33% in primary buds and 61.33% in secondary and tertiary buds, and in 99R rootstock was 80%, 60% and 56.67% primordia respectively. Undamaged buds of cuttings were sprouted in growth cabinet, and developed well. The rootstocks were more resistant to freezing temperatures than the grape varieties. The present study reveals that the grape var. Gök Üzüm was native in the location and found more frost resistant than the introduced varieties. Black coloured variety Ekşi Kara was weaker to frost than white var. Gök Üzüm both were ancient in Anatolian peninsula.

Key words: Grape, *Vitis vinifera* L., low temperatures, frost tolerance

OP 022:
PHENOLIC COMPOSITION OF DIFFERENT PARTS OF GRAPE BERRY GROWN IN ANTALYA (TURKEY)

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The phenolic composition of 12 grape (Alicante Bouschet, Cabernet Sauvignon, Kalecik Karası, Öküzgözü, Alphonse Lavallee, Hafızali, Trakya İlkeren and 5 wild-type) genotypes obtained from Antalya region were examined in 2007 and 2008. Grape cultivars and types of pulp, peel, berry and seed were analyzed. The most abundant phenolic compounds were epicatechin in grape pulp, epicatechin in skin and grape berry, catechin in seed. Phenolic composition changed according to the genotype, grape samples and years.

Key words: Grape, phenolic composition, Antalya

OP 023:
ACCUMULATION AND REGULATION OF NORISOPRENOID VOLATILES IN WINE GRAPE BERRIES (*Vitis vinifera* L.)

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Norisoprenoids in grapes arouse great interest of winemakers due to their extremely low perception thresholds and pleasant floral and fruity odors. However, the regulation of norisoprenoids biosynthesis in grapes is still poorly understood. Ecological conditions vary greatly in the wine-growing regions of China. Our researches are aimed at the comparison of the production of norisoprenoid metabolites in Cabernet Sauvignon (*Vitis vinifera* L.) grapes, a non-aromatic variety and Muscat Blanc à Petit grain (*Vitis vinifera* L.) grapes, a muscat

variety, between two wine-growing regions in China. Gaotai has stronger sunshine, less rainfall and bigger day-night temperature difference compared to Changli. For both the cultivars, mature grape berries from Gaotai showed significantly lower concentrations of total norisoprenoids than the berries from Changli. Correspondingly, the genes encoding carotenoid cleavage dioxygenases (CCDs) also showed lower transcript abundance in the grape berries from Gaotai. To understand the transcriptional response of *VvCCDs* in 'Cabernet Sauvignon' to climate variation, a fusion system of *VvCCD* promoter with *GFP* gene was transferred into *Arabidopsis thaliana*. Fluorescence examination indicated the promoters of *VvCCD1*, *VvCCD4a* and *VvCCD4b* were all activated by high temperature, strong light and ABA induction. To further propose the transcription factors regulating *VvCCDs*, we assessed 60 transcriptome datasets of 'Cabernet Sauvignon' grape berries from different viticulture treatments, and found that both *VvWRKY32* and *VvREVEILLE6* were highly positively co-expressed with *VvCCD4a*. Afterwards, the full-length sequences of both transcription factors were cloned, and their transcriptional activations were confirmed by transactivation assay. The agrobacterium-mediated co-transformation of tobacco leaves confirmed that VvWRKY32 and VvREVEILLE6 significantly activated the *VvCCD4a*promoter and up-regulated the expression of *LUC* reporter gene. Overexpression *VvWRKY32* in 'Micro-Tom' tomato cultivar showed that both *SlCCD4a*and *SlCCD4b* were up-regulated by VvWRKY32. These findings primarily elucidate that VvWRKY32 is involved in the regulation of norisoprenoid biosynthesis in grape berries.

Key words: *Vitis vinifera*, Norisoprenoid, Carotenoid cleavage dioxygenase, regulation

OP 024:

IMPROVING OF CALLUS FORMATION IN SYRAH/110 R COMBINATION BY 5-CHLOROSALICYLIC ACID AND THIDIAZURON TREATMENTS

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Present study was performed to determine effects of two different chemicals on grafting parameters of Syrah/110 R combination. For this aim, it was utilized from four doses (0, 1, 2 and 4 mM) of 5-chlorosalicylic acid (5-CSA) treatment and two doses (0 and 3 ppm) of thidiazuron (TDZ) treatment. In the study, after omega grafting was performed, grafted cuttings were treated by different doses of 5-chlorosaliclic acid with or without thidiazuron. It was observed that 5-chlorosalic acid treatments led to various results in attributes of shoot and omega grafting in grafted cuttings taken out from the callusing room and the best results were particularly recorded for thidiazuron added 5-chlorosaliclic acid treatments with the doses of 2 and 4 mM. As a result, 5-CSA 2 mM + TDZ 3 ppm and 5-CSA 4 mM + TDZ 3 ppm treatments caused satisfactory results in terms of callus formation at grafting point in Syrah/110 R combination.

Key words: Grapevine, omega grafting, callusing, callus incentive compounds, 5-chlorosaliclic acid, thidiazuron

OP 025:

THE CHIP-CHANGE: A NEW METHOD TO CHANGE VARIETY IN VINEYARDS

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Chip-Change is a very practical and economical method for changing variety in vineyards using chip-budding grafting method. This method has many advantages over other classical grafting applications such as, cleft, notch and bark. A unique hand machine has been developed and training system is largely preserved in this method. It is seen that it is applied in a very practical way and approximate 2000 grapevines can be grafted daily with a team of 3 people in studies has been observed. *Vitis vinifera* L cv. Chardonnay, 'Sauvignon Blanc', 'Öküzgözü' (wine grapes) and *Vitis vinifera* L cv. Sultana (a table grape), Chip-Change has been made in İzmir/Torbali and Halilbeyli regions in 2013 and 2014. Data like grafting success (%), yield (tonnes/ha), average shoot length (cm) and grafting number are recorded. The grafting can be repeated several times in the same season. The grafting success has ranged from 90.58% to 95.4% in first applications. This rates was increased to 100% by the second applications. The following year, yields were 13.05 T/ha, 14.2 T/ha and 16.3 T/ha in vineyards that grafted with 'Chardonnay', 'Sauvignon Blanc' and 'Öküzgözü', respectively. Vineyard that changed to 'Sultana' had 11.4 T/ha grape yield in first season after grafting. In this method, there is no grapevine loss and the grape yield continues in the following year. These are the most important advantages of Chip-Change method.

Key words: vineyard, wine grape, table grape, grafting, chip-budding, chip-change.

OP 026:
BIOCHEMICAL AND METABOLOMIC CHARACTERIZATION OF BERRIES OF *Vitis vinifera* (L.) CV THOMPSON SEEDLESS WITH DIFFERENT FIRMNESS

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Fresh fruit exports are one of the main sources of economic income in Chile, and table grape is the most important specie. Once harvested, grape clusters must reach their target markets, resulting in long storage and transport periods. Therefore, the quality parameters of the fruits decrease, and the firmness of the berry is one of the most affected traits, resulting in a reduction of the profits for the producers. Firmness is a parameter that oscillates throughout the development of the grape berry, showing a lower firmness at the harvest than at the immature stages. In the present study, we evaluated the firmness of berries of *Vitis vinifera* (L.) cv. Thompson Seedless from different locations of Chile. We selected two orchards displaying contrasting berry firmness and evaluated cell wall polysaccharide composition and polar metabolites. Our results indicate that berries obtained from the softer orchard contained more soluble arabinose and rhamnose at veraison than the harder orchard based on metabolomic analyses. Moreover, sugar accumulation correlates with data obtained from cell wall monosaccharide quantification. Additionally, berries from harder orchards showed a decrease in rhamnose, arabinose and glucose monosaccharides on its cell wall components; altogether with an increase in soluble catechin at the veraison developmental stage. Furthermore, a similar pattern was observed in the cell wall monosaccharides at harvest, except for glucose that displayed an opposite behavior. In addition, polar metabolites

measured at harvest showed a different distribution than veraison. Thus, this work opens new insights about a link between polar metabolites, cell wall composition and berry firmness, suggesting the use of metabolomic tools to identify potential biomarkers associated to table grape berry quality. Conicyt-Fondecyt 1150492.

Key words: Table grape, firmness, quality

OP 027:

EFFECTS OF FOLIAR APPLICATION OF BOR AND ZINC ON THE TABLE GRAPE CHARACTERISTICS OF CVS EKŞİ KARA AND GÖK ÜZÜM (*Vitis vinifera* L.)

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Many locally important grape varieties have been producing for their local preference and well adaptation in own zones. Eksi Kara and Gök Üzüm (*Vitis vinifera* L.) are ancient varieties in the Anatolian peninsula, especially in the middle Taurus viticultural areas, and are utilised as table grape, raisin and grape juice production. Boron (B) plays a key role in fruit set and effects the formation of pollen grains and pollen tube growth, while zinc (Zn) plays an important role in different enzyme activities and cell division. Zn and B deficiencies cause significant yield losses in vineyards. Ekşi Kara has functional female flowers and it has been pollinated with hermaphroditic flowers of grape var. Gök Üzüm. In this study, two weeks after the fruit set, 1.5 g L^{-1} B and 2.5 g L^{-1} Zn were applied separately in the 20 years old producer vineyards at 1000 m asl that both of the varieties grafted onto 110 R rootstocks. The effects of the B and Zn treatments were evaluated by measuring berry and cluster size and fruit quality at the harvested crop. The foliar treatments affected berry and cluster sizes and measured fruit quality values in both varieties. Berry weight was increased 21.50% in Eksi Kara, and the cluster weight was increased 33% in Eksi Kara by B. Berry weight was increased 18.13% in Gök Üzüm and 9% in Eksi Kara by Zn. The increase in cluster weight was measured 47.92% and 46.74% in Eksi Kara and Gök Üzüm respectively by Zn. Fruit juice yield was increased 16.18% by Zn on the other hand 22% decrease detected in Gök Üzüm by B application. Fruit ripening process was not significantly altered by Zn while in Eksi Kara and Gök Üzüm caused an acceleration by B treatment. The present study reveals that the reaction of the varieties was differ to B and Zn applications.

Key words: Grape, *Vitis vinifera* L., foliar micronutrient application, fruit quality

OP 028:

QUALITATIVE ATTRIBUTES AND METABOLIC FINGERPRINTING OF MUST OBTAINED FROM SUN-DRIED GRAPES: THE IMPACT OF POSTHARVEST DEHYDRATION METHODS

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'Mavro' and 'Xynisteri' are the two predominant grape cultivars grown in Cyrpus, accounting for ca. 65% of the total cultivated area. Part of their production, after dehydration process

(exposure to sun) is destined for the production of 'Commandaria', a Protected Designation of Origin (PDO) amber-coloured dessert wine. Despite their economic importance, until recently no data regarding the primary and secondary metabolites of the aforementioned cultivars exist. The objectives of this work were first to monitor the main compositional changes during the sun-drying process of grapes from both cultivars and then to compare the effect of traditional sun-drying method (TM) with four alternative dehydration methods [(a) multiple horizontal wires (MHW), (b) multiple vertical pallets (MVP), (c) low greenhouse (LGH) and (d) hot-air dryer treatment (HAD)] on qualitative attributes, phenolic composition, aroma potential and browning compounds of musts obtained from dehydrated 'Xynisteri' grapes. Results highlighted significant differences in chemical composition of the grapes before and after the dehydration process. Apart from the increase in soluble solids content, a significant increment of glucose, fructose, total acidity, total phenols and total flavonoids contents was also monitored. Subsequently, forty and forty one phenolic compounds were identified and quantified by *LC-DAD-qTOF-MS* in 'Mavro' and 'Xynisteri', respectively, revealing the polyphenolic fingerprinting of the two cultivars. Results also indicated that changes in the phenolic composition are not essentially correlated with the concentration effect due to weight loss. Most of the phenols studied increased in concentration during dehydration process, while some went descending, suggesting that these phenolic fractions undergo predominantly degradation reactions. Regarding the efficacy of alternative dehydration methods, LGH and HAD treatments led to a significant reduction of the dehydration period. Results indicated no changes among the examined dehydration methods in reducing sugar composition, while HAD led to a dramatic rise of titratable acidity. Furthermore, all dehydration methods concentrated total bound volatiles and induced the formation of brown pigments. HAD and LGH methods increased significantly the phenolic content in grape musts, whereas MHW and MVP methods increased it slightly higher than the concentration factor. Flavonols, flavan-3-ols and flavanonols were the most affected polyphenolic groups. A significant increment of hydroxybenzoic and hydroxycinnamic acids, the predominant groups of phenolic compounds found in 'Xynisteri' grapes, was also monitored. Taking into consideration that HAD cannot be exploited under the existing legal framework, LGH showed the greatest potential for the production of high quality dehydrated 'Xynisteri' grape must.

Key words: Commandaria; Phenolic compounds, Postharvest dehydration, Bound volatiles, Melanoidins, LC-DAD-qTOF-MS, *Vitis vinifera*, Autochthonous cultivars, Sun-drying

OP 029:

COMPARISON OF ANTIOXIDANT CAPACITY AND PHENOLIC COMPOUND CONTENTS IN DIFFERENT TISSUES OF 16 RED GRAPE CULTIVARS GROWN IN KALECİK WHICH IS ONE OF THE IMPORTANT VINEYARDS IN TURKEY

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Many researches performed on phenolic compounds because of responsible for protecting grapevine against stress conditions, besides adding color and flavor characteristics to the grapes. Another reason for intensive studies conducted on them is because they have antioxidative effects on human health.
This reseach was carried out to determine and comparison of antioxidant capacity and phenolic contents in different tissues of 16 red grape varieties grown in Kalecik Viticultural

Research and Experiment Station Cultivar Collection vineyard. Grapes were harvested at the technological maturity period and used as a material with the purpose of determining the variation of phenolic compound contents in different tissues (seed, skin, cluster, leaves, pulp) of various varieties.
Antioxidant capacity in the seed and skin; total phenolic compounds in the seed, skin, cluster and leaves; total anthocyanin in the skin; catechin, epicatechin, quercetin, rutin, *trans*-resveratrol and *cis*-resveratrol in the seed, pulp, skin, cluster and leaves are determined.
The highest total phenolic compound contents which were determined in skin, seed, cluster and leaves are respectively; Bogazkere (51 675 mg/kg DW), Trakya Ilkeren (107 625 mg/kg DW), Red Globe (123 250 mg/kg DW) and Red Globe (45 250 mg/kg DW). Syrah (493.8 µmol/g trolox DW) has the highest antioxidant capacity value in the skin and Öküzgözü (1086.1 µmol/g trolox DW) has the highest antioxidant capacity value in the seed according to the results of analysis. The highest content of catechin was determined in the seed of Öküzgözü (30 069.1 mg/kg DW), epicatechin in the seed of Cardinal (8 151 mg/kg DW), routine in the leaves of Trakya Ilkeren (733 mg/kg DW), quercetin in the leaves of Köhnü (36.1 mg/kg DW), *trans*-resveratrol in the cluster of Syrah (45.7 mg/kg DW) and *cis*-resveratrol in the leaves of Köhnü (8.3 mg/kg DW).

Key words: Grape, Phenolic compounds, Antioxidant capacity, Quercetin, trans-resveratrol

OP 030:
TECHNICAL PROPERTIES OF NEW AGROTEXTILE FABRICS IMPROVING VINEYARD MICROCLIMATE, TABLE GAPE YIELD AND QUALITY

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Light, temperature and humidity are major environmental factors to be controlled to achieve high tablegrape yield/quality, especially in vineyards having overhead canopies protected by plastic covers. The overall covering effect is often not-well understood: it is related to final air/soil microclimate that, in turn, depends mainly on technical characteristics of cover materials.
Two recent agrotextile plastic fabrics were investigated in this two-year trial aimed to deepen understand effects of vineyard microclimate on grape yield/quality as related to properties of the artefacts. Two 1-hectar plots were covered with two transparent sheets apt to advance ripening: 1) *Coverlys*®, new PE fabric; 2) PE based commercial film (reference). Both sheets are provided with UV stabilizers and other additives. Optical properties were spectrophotometrically analyzed. In the second year, a white-reflective woven groundcover, *Lumilys*®, was laid-out on half inter-rows of each plot. Air/soil microenvironment, vine phenology, shoot and berry growth, vine water status were monitored.
Coverlys® showed higher IR_{long} retention (+30%), UV transmittance (+37%), and light diffusivity; PE film had higher photosynthetically-active-radiation (PAR, +11%) and IR_{short} (+8%) transmittance. Air temperatures and RH, vine growth and phenology (ripening-time included), were similar for both coverings, indicating that it is possible a compensatory balance among radiometric properties affecting cover thermal power. *Lumilys*® lying on soilintensified PAR reflection by 85% *vs*. bare surface, lowered temperature, and, being semipermeable to evaporation, improved humidity (+18%) and vine water status. At first

year, *Coverlys*® enhanced berry weight (+10) and, slightly, theoretical yield (+6), possibly due to more diffuse light that, being better distributed into canopy, favors photosynthetic efficiency. At second year, *Lumilys*® increased bunch weight/productivity by 18%, thanks to a greater large berry percentage likely related to the improved light environment. *Coverlys*® plus *Lumilys*® intensified skin color and total flavonoid content, both known to be stimulated by high PAR and UV fluxes.

Key words: protected cultivation, cover optical properties, light environment, berry physical & chemical features

OP 031:

DEFICIT IRRIGATION STRATEGIES IN (VITIS VINIFERA L.) CV. CRIMSON SEEDLESS TABLE GRAPE: PHYSIOLOGICAL RESPONSES, GROWTH, YIELD AND FRUIT QUALITY

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Climate change adaptation strategies and sustainable viticultural practices have become more important. Adaptation of climate change refers to research of adjusting to the present or future expected effects of climate change. These effects are not similar all around the world. Especially, Mediterranean zone is undergoing environmental changes with negative impacts towards current and future sustainability. One of the most common problem in Mediterranean regions is water scarcity in terms of viticultural activities and so to increase of irrigation efficiency is a key goal for viticulture. For this purpose, deficit irrigation strategies come out for the minimising the negative effect of drought on yield and quality to save water in modern viticulture. The objective of this study was determine the relationship between vine water status and vine performance and to describe the effects of water stress on vine growth, vine physiology, berry development, quality and yield parameters for table grape production. The experiment was conducted in Viticultural Research Institute of Manisa province during 2 years 2016-2017. Plant material was Crimson Seedles (*Vitis vinifera* L.) grafted onto 1103 Paulsen rootstock. Three irrigation treatments were applied: T1 was control treatment and irrigated until field capacity, T2 was irrigated 35% of T1 and T3 was irrigated 65% of T1. All irrigation treatments were applied by sub-surface drip irrigation system. Vine water status was monitored through midday leaf water potential while soil moisture was monitored by MobiCheck probe before the irrigations. Results showed that midday leaf water potential values were negatively decreased with the water stress increment and stomatal conductance values were higher in water deficit treatments compare to the control. Water stress treatments affected the total anthocyanin, antioxidant activity, total phenolics and flavonoids composition differently. At harvest, deficit irrigation treatments had higher TSS, better CIRG index and smaller berry size compared with the control.

Key words: Water stress, grapevine physiology, leaf water potential, berry composition

OP 032:

COMPARISON OF THE EFFECT OF DORMEX (HYDROGEN CYANAMIDE) ON THE PERFORMANCE OF 3 SEEDLESS TABLE GRAPES VARIETIES CULTIVATED UNDER GREENHOUSE OR OPEN-FIELD CONDITIONS IN LEBANESE COAST

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Greenhouse cultivation of seedless table grapes is an emerging trend highly appreciated in Lebanon; however, it is restricted to some areas. Insufficient chilling hours under greenhouse are causing serious problems on bud-break and consequently causing yield reduction. The application of hydrogen cyanamide (Dormex) is known to be an effective mean for dormancy release, widely used in the global table grape industry. Therefore, the experiment investigated the effect of its application with a concentration of 3.5% after pruning (leaving 6 buds /shoot) on seedless table grapes varieties. It was applied (Dormex+) or not (Dormex-) on ARRA 15 (var.1), ARRA18 (var.2) and ARRA 19 (var.3) varieties grown under greenhouse (Indoor) or in open-field (Outdoor) in an experimental site situated on the Lebanese coast. Control consisted of: Dormex-/Outoor. Results showed that Dormex application improved shoots dry matter accumulation indoor and outdoor with best effects indoor. For all varieties percent budburst and number of flowers/shoot were enhanced in Dormex+/Indoor compared to control by 60% and 83% respectively. Dormex application induced homogenous budburst and this was mostly observed indoor. Also, indoor, it improved bud formation on newly emerging shoots mainly in var.3. and induced the highest fruit number and average weight of individual fruit in all varieties. Finally, earlier harvest dates in Dormex+/outdoor compared to Dormex-/outdoor for var.1 and var.3. Main advantages of Dormex application were improvement of budburst uniformity and production.

Key words: Lebanon, Greenhouse, seedless varieties, Dormex application, budburst.

OP 033:
GRAPE BERRY SPLITTING IS NOT LIMITED TO HUMID CLIMATES

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In dry climatic regions, precipitation is limited during the growing season, and the relative humidity is low. Splitting exposes the flesh cells of grape berries to the dry air and leads to dehydration. The incidence of berry splitting in dry regions may be underestimated due to the shriveled appearance of split berries. Absorption of rain water across the berry surface seems not to be the only pathway causing berry splitting. Instead, we observed cases that are not directly related to rain-induced splitting in arid eastern Washington. The berry splitting severity was 20% in a Concord vineyard that was drought-stressed before veraison, but only 1% in the non-stressed portion. In an irrigation study with Concord, the splitting severity was slightly higher when irrigation water was applied at 50% of vineyard evapotranspiration (ET) compared with 100% ET, but only if the water deficit was relieved at veraison. However, we did not observe a similar effect in Cabernet Sauvignon irrigated at only 25% ET before but not after veraison. These results suggested that water deficit may increase the susceptibility to berry splitting in vulnerable varieties. In another case, we observed berry splitting in field-grown Zinfandel but not in Merlot in multiple seasons. In addition to its weaker skin, the tight clusters and large berries of Zinfandel contributed to berry splitting, whereas cuticle thickness could not explain splitting susceptibility. Correlation analysis indicated one berry per mm length of rachis is the critical cluster compactness to induce splitting in Zinfandel. These results demonstrated that absence of rainfall is not sufficient to prevent berry splitting. Awareness of the factors involved in berry splitting is still necessary for growers in arid regions.

Key words: cracking, dry climate, regulated deficit irrigation, water stress, cluster compactness

OP 034:

INFLUENCE OF ENVIRONMENTAL PARAMETERS ON TERPENES AND POLYPHENOLS CONTENTS IN VITIS VINIFERA L. CV. SHIRAZ GRAPE AND WINE

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Climate is one of the major components of '*Terroir*', which determines the uniqueness and the quality of wine. In the context of climate change and ozone depletion, majority of Australian wine producing regions are experiencing dramatic changes in growing season temperature, rainfall, carbon dioxide concentration and UV radiation. These changes may impact the phenological development of grapevine, and influence the production of some secondary metabolites in grape berries. Terpenes and polyphenols are two major chemical families important for the aroma/flavour/taste of grape and resultant wine, and may also contribute to the antioxidant activity/health benefits of grape and wine. In the past three years, the University of Melbourne partnering with the Victorian State Government and Australian wine industry, conducted systematic researches to investigate the influences of climatic parameters on the production of terpene and flavonoids in grape and wine. Viticultural field trials were conducted with simulation of climate change conditions using artificial heating devices, carbon dioxide generators and UV shading films in both warm and cool climate wine regions in Victoria. Grape samples were harvested at grape maturity with selected samples fermented into wine using small-scale winemaking technique. Grape and wine samples were extracted and subjected to HS-SPME-GCMS and HPLC analysis to quantify the concentration of terpenes and polyphenols. Principle component analysis coupled with modelling tools such as Partial least squares discriminant analysis were applied to model the influences of climate change on the chemical composition and therefore quality of grape and wine. This research finding is imperative for Australian wine industry to increase the understandings on the influences of climate change on grape polyphenols and terpenes contents, and allows industry to exploit the potential adaptation strategies to minimize the detrimental influences of climate change on grape/wine quality.

Key words: climate change, terpenes, polyphenols, aroma compounds, antioxidants

POSTERS

PP01:

THE DETERMINATION OF OUTPUTS AND QUALITIES OF CUTTINGS OF SOME AMERICAN ROOTSTOCKS

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The aim of this research is to determine the output and quality of cuttings of taking from 99 R, 41B, 1103 Pa and Kober 5BB american rootstocks.

Cane length (m/vine), cane number (number/vine), branch number (number/shoot), node number (unit/shoot), average node length (cm), 1st grade cutting number (number/vine), 2nd grade cutting number (number /vine), total cutting number (number/vine), total wood weight (kg/vine), total cutting weight (kg/vine) and cutting output (%) (total cutting weight/ total wood weight) were recorded for per rootstock.
Among the rootstocks, cane length, cane number, branch number, node number, average node length ranged 29,2-54,3 m/vine, 11,0-19,0 number/vine, 4,1-9,5 number/vine, 19,8-31,0 number/vine, 8,6-13,0 cm respectively. 41 B and 1103 Pa rootstocks had more branches than that of other rootstocks. Among the rootstocks, Kober 5 BB had the least node number.
Among the rootstocks, 1_{st} grade cuttings number (7-11 mm diameter), 2_{nd} grade cutting number, (4-6 mm diameter), total cutting number and cutting output ranged 23,5-71,5 number/vine, 24,0-53,0 number/vine, 51,0-118,5 number/vine and 45,6-77,2 respectively. In terms of total cutting number, 1103 pa showed the superiority than other rootstocks. Kober 5 BB, 41 B and 1103 Pa rootstocks had the higher cutting outputs with about 70% than that of 99 R about with 50%.

Key words: grape, rootstock, cuttings, vegetative development, cutting output

PP02:
EFFECTS OF "TRELLISING" AND "BARAN" SYSTEMS ON FROST TOLERANCE IN ÜZÜMLÜ (ERZINCAN) VINEYARDS

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In this study, the effects of “Trellising” and “Baran” systems on the frost tolerance of the dormant buds of the Karaerik grape were determined. In the research, after the winter cold, one-year old sticks of the Karaerik grape were taken before the pruning in the spring. The viability rate of primary, secondary and tertiary buds of the first 4 effective bud was determined by the sectioning method under a binocular microscope. As a result, the viability rates of primary buds in the Baran system in 2012, 2013 and 2014 were determined as 20.7%, 30.6% and 36.1% respectively, and the viability rates of the primary buds of the tubules taken from the trellising systems were determined as 27.8%, 38% and 46.1% respectively. Equivalent results were observed in secondary and tertiary buds as well. In the viability test, there was no statistically significant difference in the primary, secondary and tertiary bud levels in terms of the damage caused by the low winter temperatures betwen the systems used. In the end of our study, it has been concluded that it is possible to use the trellising system as an alternative to the Baran system, frequently preferred in the region, because of many advantageous aspects.

Key words: baran, karaerik, cold damage, trellising

PP03:
EFFECTS OF DIFFERENT SALICYLIC ACID CONCENTRATIONS ON ROOTING OF RAMSEY VINE ROOTSTOCK

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Although the mechanism of action of salicylic acid on rooting has not yet been fully elucidated, it is known that it has increased in the root number per cutting and root length by reducing the time spent rooting in the cuttings. Even though the rootstocks used in viticulture are resistant to phylloxera, they have different selective properties in terms of soil, climate, cultural conditions, diseases and harmfulness according to grapevine cultivar. It is known that there are rooting problems on the cuttings of Ramsey rootstock preferring due to its strong development of grape varieties grafted onto it, high grafting rate, high resilience to nematodes and moderate resilience to phylloxera and ability to develop well on less fertile soil. In this study, the effects of different concentration of salicylic acid applications on the rooting of Ramsey rootstocks obtained from Manisa province were investigated. In this direction, the effects of the salicylic acid applied for 1 hour in 0.1, 0.25, 0.5 and 1 mmol concentrations on roots, root counts, root lengths and root weights of Ramsey cuttings having one bud planted in perlite were examined.

Key words: vine rootstock, Ramsey, rooting, salicylic acid

PP04:
EFFECTS OF SHADING TREATMENTS ON PHYSICAL AND CHEMICAL CHANGES OF SULTANİ ÇEKİRDEKSİZ BERRIES

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During the recent years, the usage of covering and shading materials has become more common in order to protect table grapes against to adverse effects of climate conditions and to extend harvesting period. It was aimed to determine the effects of shading treatments on physical and chemical changes of Sultani Çekirdeksiz berries during 2010-2012. There were 4 treatments in the study; Control, 35%, 55%, 75% shading materials and vines were covered in veraison period with all these shading metarials. Also, all cultural practices were applied according to the table grape production. The experimental design was randomized block with three replications and there were 6 vines in each replication. The berry weight, TSS, pH, berry width, berry length values were measured every week since veraison period (during 7 week). According to the average of the 3 years; when the values taken in the first week are accepted as the starting point, the increment in TSS, berry weight, berry width and berry length is slowed down as the shading ratio increases. In addition, TSS values are increasedin harvesting period compared to the first week as 57%, 46%, 49% and 30% with the treatments of control, 35%, 55% and 75% shading ratios respectively. Also, it has been determined that as the shading ratio increases, the ripening speed slows down and the harvesting period is delayed.

Key words: Sultani Çekirdeksiz, tablegrape, late harvest, shading

PP05:
ADVENTITIOUS ROOT DEVELOPMENT IN CUTTINGS OF GRAPEVINE ROOTSTOCK 140 RU AS INFLUENCED BY DIFFERENT ROOT-PROMOTING APPLICATIONS

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Hardwood cuttings of grapevine rootstocks have occasionally difficulties in terms of their rooting performances in grape growing. Hence, this research was carried out to test the effects of different root promoting chemicals alone or in combination with each other on shoot and root characteristics of hardwood cuttings in grapevine rootstock 140 Ruggeri (140 Ru) with rooting problem. For this purpose, different root promoting chemicals were used as alone or in combination with each other such as Control, 1% hydrogen peroxide (H2O2), 4 mM putrescine (PUT), 4% sucrose (SUC), 1% H2O2 + 4 mM PUT, 1% H2O2 + 4% SUC, 4 mM PUT + 4% SUC and 1% H2O2 + 4% SUC + 4 mM PUT in the research. Among these applications, combined applications were notedly found to be more potent than alone applications. The results of current study revealed that applications of 1% H2O2 + 4% SUC and 1% H2O2 + 4 mM PUT enhanced the adventitious root formation and other root characteristics in hardwood cuttings of difficult-to-root grapevine rootstock 140 Ru. For this reason, study findings confirmed that combined applications of H2O2, SUC and PUT may be beneficial root promoting chemicals to improve adventitious root formation in hardwood cuttings of grapevine rootstock 140 Ru.

Key words: Grapevine rootstock, hardwood cutting, adventitious root, low rooting ability, rooting promoters

PP06:
EVALUATION OF LOCAL MINOR CULTIVARS AND MARGINAL AREAS TO IMPROVE WINES AND INCREASE THE SUSTAINABILITY OF THE DISTRICT `COLLI PIACENTINI´

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In several areas, global warming is endangering the sustainability of viticulture. Accelerated sugar accumulation and acidity loss are challenging growers and changing the styles of produced wines. The wine district of ‘Colli Piacentini’ is dominated by local cultivars for the production of white sparkling wines, i.e. ‘Ortrugo’ and ‘Malvasia di Candia aromatica’. In 2017, two strategies were evaluated to counteract the effects of warming trends and, more specifically: i) the ripening dynamics of 20 minor yet autochthonous cultivars were compared with the patterns exhibited by ‘Ortrugo’, trying to understand if local biodiversity can be useful in a rapidly changing scenario; ii) basic chemistry of solutes accumulated in ‘Ortrugo’ and ‘Malvasia di Candia aromatica’ berries was characterized from veraison to harvest in five vineyards located between 165 and 380 m above the sea level (a.s.l.) trying to extrapolate the effect due to elevation. Among the minor cultivars, ‘Barbesino’, ‘Molinelli’ and ‘Bucalò’ were the most promising genotypes as ‘Barbesino’ maintained the highest levels of acidity throughout ripening (+2.8 g/L than ‘Ortrugo’ at harvest), whereas ‘Molinelli’ and ‘Bucalò’ had appreciable low ratios between sugars and acidity at harvest (-0.55 and –1.13 than ‘Ortrugo’, respectively). The ripening pattern of ‘Ortrugo’ and ‘Malvasia di Candia aromatica’ changed distinctively as a function of site elevation and at 380 m a.s.l. the evolution of ripening of both genotypes was substantially shifted by 7 and 10 days, respectively, in comparison with dynamics observed in vineyards located at 165 m a.s.l. Preliminary results point out that the reconsideration of local biodiversity and the colonization

of formerly marginal hilly areas might be useful tools to maintain and/or increase the sustainability and the competitiveness of the wine district.

Key words: Climate change, genetic resources, biodiversity, rural development, ripening, fruit composition.

PP07:
PRE-HARVEST FOLIAR APPLICATION OF CALCIUM CHLORIDE ON IMPROVING BERRY QUALITY, YIELD AND POSTHARVEST STORAGE LIFE OF TABLE GRAPE CVS. `PERLETTE´ AND `KINGS´S RUBY'

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Grapes (*Vitis vinifera* L.) are most perishable and need certain pre-harvest measures to improve berry quality. Therefore, study was conducted for the improvement of early bearing grape cultivars ‘Perlette’ and ‘King’s Ruby’ by the application of pre-harvest sprays of calcium chloride ($CaCl_2$) concentrations. Table grape cvs. ‘Perlette’ and ‘King’s Ruby’ were sprayed at 15 days interval from fruit set till ripening with different concentration of $CaCl_2$ (0, 0.5%, 0.75% and 1.0% w/v) to evaluate the photosynthetic activity and postharvest quality. Pre-harvest sprays of 0.5% and 0.75% maintained increased net photosynthetic rate (A) in ‘King’s Ruby’ and ‘Perlette’ respectively; whereas transpiration rate (E) and stomatal conductance (gs) was significantly higher with 0.75% treatment in both cultivars. Pre-harvest foliar sprays of 0.5% and 0.75% $CaCl_2$ significantly improved berry quality with increased berry length and diameter. Meanwhile, postharvest biochemical quality of both grape cultivars i.e. ‘Perlette’ and ‘King’s Ruby’ was significantly improved by exhibiting higher TSS, TA, ascorbic acid contents, sugars, total phenolic contents and total antioxidants. Hence, it can be concluded from our results that pre-harvest application of different CaCl2 concentrations not only improved growth and development of grape berries but also maintained better physico-chemical properties with higher antioxidative potential of grape cvs. ‘Perlette’ and ‘King’s Ruby’ under long term cold storage conditions.

Key words: Grapes, Calcium Chloride, Perlette, King’s Ruby, Post-Harvest, Stomatal Conductance, Antioxidants

PP08:
PHENOLIC COMPOUND AMOUNTS IN THE SKIN AND SEEDS OF SOME VARIETIES AND TYPES OF VITIS LABRUSCA L. CULTIVATED IN TURKEY

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Phenolic compounds are secondary products of plants and their amounts vary according to the varieties of grapes and the different tissues of these varieties. Phenolic compounds, which are the most important compound group of secondary metabolites, are also frequently studied on, due their value in terms of human health. In this study; the levels of catechin, epicatechin, routine, quercetin, *trans*-resveratrol and *cis*-resveratrol compounds, which are known to

positively contribute to human health, have been determined in the seed, pulp, skin, cluster and leaves of 18 varieties and types of *Vitis labrusca* L.
Within the 18 *Vitis labrusca* type and variety, the highest amount of catechin was determined in the cluster of the Steuben variety (12 480 mg/kg DW), the highest amount of epicatechin in the seed of the 53 Güneysu 05 type (5 080 mg/kg DW), the highest amount of routine content in the leaf of the Neptune variety (140 mg/kg DW) and the highest amounts of quercetin (188.6 mg/kg DW), *trans*-resveratrol (98.2 mg/kg DW) and *cis*-resveratrol (146.2 mg/kg DW) in the leaf of the Steuben variety.

Key words: *Vitis labrusca*, trans-resveratrol, catechin, epicatechin

PP09:
EFFECT OF DRYING METHODS ON FATTY ACID COMPOSITION OF THOMPSON SEEDLESS RAISINS WITH RESPECT TO CHANGES IN MOISTURE CONTENTS

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The fatty acid composition of Thompson seedless raisins was analyzed by gas chromatography (GC) coupled with the mass spectrum (MS) during the process of drying. The grapes were harvested at the fully ripe stage with a total soluble solid of 20-22 ºBrix. The unique air drying and common sun drying methods were used for making raisins and these took 42 and 28 days, respectively. Total 16 fatty acids were detected and identified; including 10 saturated fatty acids (SFA) and 6 unsaturated fatty acids (USFA). Amongst 16 fatty acids; tetracosanoic acid, tricosanoic acid, heptadecanoic acid and 9-hexadecenoic acid were detected during the drying of raisin. The stearic acid and linoleic acid were the leading fatty acids. A significantly higher concentration of SFA and USFA was observed in air-dried raisins than sun-dried samples. In case of air-dried raisins, the concentration of fatty acids was increased with decreased moisture content, while the non-significant effect was found in sun-dried treatment during drying. The higher concentration of USFA could be a good source of diet for the human.

Key words: GC/MS, fatty acid, raisin, air-dried, sun-dried

PP10:

TABLE GRAPE BREEDING IN HEBEI PROVINCE, CHINA

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China is one of the leading countries for grape growing in the world with 799,200 ha planting areas and 13,669,000 Mt annul production in 2016. The table grape account for 85% of the grape planting areas and total output in China. Consumers in China generally prefer large berry size, firm flesh, uniform colour and high eating quality fresh grapes. The lack of ideal table grape cultivars with big berries and good quality has become the bottle-neck of table

grape industry development in China. To meet the demand for table grape industry, The table grape breeding program was initiated in the early 1980's in Changli Research Institute of Fruit Trees, HAAFS. The breeding methods are the classical crossing breeding with embryo rescue, molecular mark assisted selection, polyploidy (triploidy and tetraploidy) breeding. Seven new table grape cultivars have been released and registered including 3 triploid seedless cultivar: Wuhezaohong (Zhao et al., 2000), 'Champion Seedless'(Zhao et al.,2009) and 'Moonlight Seedless' in 2009; and 4 tetraploid cultivars in 2013: 'Spring light' , 'Honey light', Sapphire light and Peak light. The main Characteristics of seven new cultivars are presented in this paper including the phenology, productivity, ripening time, bunch, berries, disease resisitance, viticultural performance and adaptability to local environment conditions. The specific management technologes for protecting cultivation is also introduced.

Key words: tablegrape, breeding, polyploidy, new cultivar, China

PP11:
COMPARISON OF MORPHOLOGICAL AND GENETIC CHARACTERISTICS OF SOME WELL-KNOWN GRAPE VARIETIES

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In this study; early grape varieties which Alphonse Lavallée, Royal, Early Cardinal, Cardinal and types were characterized by ampelographic and molecular methods. In this study, genetic and ampelographic differences and similarities among them were investigated. 4 types belonging to Cardinal and 2 grape varieties with a total of 6 important standard grape varieties (Vitis vinifera L.) in Turkey were examined according to morphological properties. According to the OIV, UPOV and IBPGR standarts, 68 characteristics of shoot, leaf, flower, cluster berry and seeds of the all the varieties and types mentioned, have been described by using the methods of "Minimal Descriptor List for Grapevine Varieties" with "Grape Descriptors". Furthermore, quality and phenological characters were determined. In the study; genetic analysis of 6 varieties and types with 2 reference varieties, total 8 genotype, are done by using of 22 microsatellite markers. At the end of the study it is revealed that there were ampelographic differences among cultivars and Alphonse Lavallée and Royal varieties is noteworthy that genetically close.

Key words: *Vitis vinifera* L., SSR, table grape, ampelography

PP12:
MINERAL CONTENT OF BERRIES IN NATIVE GRAPE CULTIVARS GROWN IN MID-BLACKSEA ZONE

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Fruits present safe and healthy nutrition in the human diet. They are rich sources of certain micronutrients. Environmental factors such as temperature, rainfall, sunshine, wind, soil and many other growing conditions effects chemical composition in the berries. The present study

was conducted to investigate 25 grape cultivars from the Mid-Black Sea zone in terms of berry mineral composition. Analysis was performed according to official methods procedure and the contents of P, Ca, Mg, Cu, Mn, Fe, Zn, B and Se were determined by ICP-OES (Inductively Coupled Plasma Optical Emission Spectroscopy) and K was measured by AAS (Atomic absorption spectroscopy). The results indicated that the mineral composition of grapes were found to be different according to genotype and ecology.

Key words: Grape, mineral nutrients, cultivar, health

PP13:
THE EFFECT OF CADMIUM (CD) TOXITY ON MINERAL ABSORPTION OF GRAPEVINE ROOTSTOCKS

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Vitis vinifera vines can be protected from pests such as phylloxera and nematodes by grafting them to rootstock varieties derived from other vine species and resistant hybrids. Grapevine rootstocks may have different absorption capability or tendency for some specific minerals. The high concentrations of Pb, Cu, Zn and Cd lead to disturbances in plant development. Cd is one of the toxic heavy methals affecting the environment, plant and human health. In this study, the responses to cadmium (Cd) toxicity of 12 grapevines rootstock genotips (5BB, 8B, SO4, 420A, 99R, 110R, 140 Ru, 1103P, 1045P, Dogridge, Harmony and 41B) and grafted grapevine (Narince / 41 B) plants were investigated. CdSO4 was applied at the rates of 0, 5, 10 and 20 mg kg-1 to in a single dose to the soil in pots during the growing season. Mineral absorption (the Cd, N, P, K, Cu, Mn, Fe and Zn) in petiol were evaluated for all plants. The increase of Cd doses were increased Cd, P, and K, however decreased Mn and Fe concentrations. Cd absorption was highest at 420 A (1,094 mg kg-1) and lowest at 1045 P (0,55 mg kg-1). 41 B rootstock plants absorbed all nutrients more than grafted plants.

Key words: grapevine rootstocks, heavy methal, nutrient uptake

PP14:
EFFECTS OF BIOPESTICIDE AND BIOSTIMULANT APPLICATIONS ON VEGETATIVE DEVELOPMENT OF YOUNG GRAFTED SAPLINGS

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This study was conducted to evaluate the effects of commercial formulations of the biopreperat (BP) applications on vegetative development of potted grafted grapevine plants. Two biopesticide (T22 planter box (*Trichoderma harzianum* Rifai KRL-AG2) and T22-ERS (*Trichoderma harzianum* Rifai KRL-AG2+endo mychoriza) and biostimulant (disperroot) were tested in the study. Potted grafted saplings of Royal cultivars on 1103P, 110 R, 5 BB, 1613 C and Ramsey rootstocks were used. In the practice, T22, T22-ERS and DR were applied to grafted and potted plants. Grafted and potted young saplings were grown in open areas. The shoot and root growth parameters were determined at the vegetation end. Effect of BP applications to young saplings in pot on growing parameters of shoot and root were

changed according to rootstocks and treatments. DR and T22-ERS treatments to young saplings in pot were had a positive effect on the shoot and root growing parameters of young saplings. The result of, DR or T22-ERS applications were advised for shoot and root development of young saplings planted vineyard.

Key words: *Vitis vinifera* L., *Trichoderma*, *Mycorrhiza*, Shoot, Root, Development

PP15:

EFFECTS OF WATER STRESS ON BERRY DEVELOPMENT AND COMPOSITION OF `CARDINAL´ (*Vitis vinifera* L.) TABLE GRAPES

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Vineyard irrigation techniques in viticultural regions of Turkey, require the development of efficient water management strategies according to the climate change effects. Therefore water deficit treatments have become more important in recent years. In this research it was aimed to describe the effects of water stress on berry development (berry size, colour), berry composition as well as anthocyanin content, phenolics, flavonoids, antioxidant activity. The experiment was conducted in Viticultural Research Institute of Manisa province during two consecutive years 2016-2017. Plant material was 'Cardinal' (*Vitis vinifera* L.) grafted onto 1103 Paulsen rootstock. Three irrigation treatments were applied: T1 was control treatment and irrigated until field capacity, T2 was irrigated 35% of T1 and T3 was irrigated 65% of T1. All irrigation treatments were applied by sub-surface drip irrigation system. Vine water status was monitored through midday leaf water potential while soil moisture was monitored by MobiCheck probe before the irrigations. Results showed that total anthocyanin, phenolics, flavonoids and antioxidant activity were increased with deficit irrigation techniques. It is determined that berry quality increased linearly for light-to-high levels of water stress, whereas berry size decreased above a certain water stress threshold. The effect of vine water status on the CIRG index was greater than the fruit size. Also, water stress accelerated ripening and T2 had the highest total soluble solid values.

Key words: Berry growth, water deficit, leaf water potantial, anthocyanin, CIRG index, berry ripening

PP16:
EFFECTS OF TWO EXTREME BUD LOAD AND LEAF REMOVAL TREATMENTS ON BERRY FEATURES AND YIELD IN CV. SULTANA (*Vitis vinifera* L.)

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This research was carried out in vegetation period of grapevines in Alaşehir, Turkey where raisins are grown extensively. The effects of three different bud load levels (15 buds, 25 buds and 30 buds/m2) and two different leaf removal (25 % and 50 %) treatments on yield (kg/vine), number of clusters, cluster weight (g), cluster length (cm), cluster width (cm), berry weight (g), berry length (mm) and berry width (mm) of own-rooted *Vitis vinifera* L. cv. Sultana were investigated in this study. Vine spacing was 3.0 to 2.0 m and the vines were cane pruned on a Y type trellis system. Leaf removal treatments were performed only once

approximately one month before verasion. In this research, healthy berries were sampled separately from the top and from the bottom part of the bunch. Then values were analyzed separately (P≤0.05). Morphological and chemical (data not shown) analyzes were done in these berries. Number of cluster, cluster weight, cluster width, berry weight, berry length and berry width parameters were affected negatively by the extreme bud load (30 buds/m2) and 50% leaf removal treatments. Differences between these values were found significant statistically (P≤0.05).

Keywords: leaf removal, berry growth, bud load, raisin, berry

PP17:
PRODUCERS' APPROACHES ABOUT GOOD AGRICULTURAL PRACTICES IN MANİSA AND İZMİR

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This study includes the agricultural enterprises which apply and do not apply good agricultural practices in Manisa and İzmir provinces. The basic purposes of this research are; to make a comparison between the enterprises apply and do not apply good agricultural practices, to determine the awareness of the producers to good agricultural practices, to specify the tendency of the farmers towards good agricultural practices and to present the factors affecting to good agriculture. In the scope of the study, 25 grape producers in Manisa and 20 mandarin producers in Izmir that apply good agricultural practices have been participated in a survey. Besides, the same survey was also conducted with the same number of producers which do not apply good agricultural practices. To analyze the data, simple calculations such as average, percentage, frequency and through the use of the crosstabs were used and the social-economic status of the producers and some technical and economical specifications of the enterprises were determined. The tendency of the producers towards performing good agricultural practices and the factors affecting to these tendencies have been observed. The tendency of the producers were determined by using Logit Regression Analysis.

Key words: GAP, Grape, Logit, Producers, Approaches

PP18:
FORECASTING AND EVALUATION FOR RAISIN PRODUCTION IN TURKEY

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Turkey is the leading producer and exporter, accounting for 25% of the world's total raisin production and 40–45% of total raisin exports. The main objective of the study is to forecast Turkey's raisin production. A time series modeling approach (Double Exponential Smoothing) has been used to forecast raisin production in Turkey. The forecasts for the production of raisin in Turkey have been made for the next seven years using by annual data on 1982–2016 years in this study. The analysis of data showed that Turkey's raisin production

is increasing trend. The forecast results have shown that the raisin production in Turkey will be around 299,860 tons in 2017.

Key words: Raisin, Forecast, Time Series, Double Exponential Smoothing

PP19:
EFFECTS OF DIFFERENT POTASSIUM FERTILIZATIONS ON TOTAL PHENOLICS AND ANTHOCYANIN CONTENT OF CABERNET SAUVIGNON GRAPE VARIETY IN MANİSA REGION

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In the current fertilization study, effects of different potassium forms on total phenolics and anthocyanin contents of Cabernet Sauvignon grape variety were investigated in the years 2014 and 2015. This study was carried out in experimental vineyard of Manisa Viticultural Research Institute. Fertilization programme was performed according to the soil tests. Soil samples were taken from 0-30 and 30-60 cm depths after pruning. Nitrogen (Ammonium Nitrate) and Phosphorus (Mono Ammonium Phosphate) fertilizers were applied at constant amounts. Potassium given as KNO_3, K_2SO_4, KNO_3 + $K_2SO_4$and control was applied in four different practices via a drip irrigation system. As a result; it was determined that anthocyanin contents of grapes affected statistically by fertilization practices in both consecutive years 2014-2015. On the other hand; total phenolic contents of samples affected by fertilization practices only in 2015. KNO_3 + K_2SO_4 applications and K_2SO_4 applications had the highest values in 2014 and 2015 with two years average, respectively.

Key words: Cabernet Sauvignon, fertilizer, total phenolics, anthocyanin

PP20:
DETERMINATION OF CLUSTER AND BERRY CHARACTERISTICS OF SOME REGIONAL GRAPE VARIETIES

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This study was conducted to determine the cluster and berry characteristics of some local grape varieties (Bulama, Urla Siyahı, Halis Gemre, Karazdağı, Beyaz İri Üzüm, Balçova Karası, Beyaz Çavuş and Veyis) located in the Regional Genetic Resources Collection Parcel in the Manisa Viticulture Research Institute. In this context, varieties cluster width, height and size, berry width, height and size as well as berry weight and color of skin were measured. Although their characteristics vary according to the variety, it was found that the cluster weight varies between 285 and 740 g and the berry weight varied between 3.32 and 5.62 g. These varieties were collected as important genetic resources worth preserving, and it is anticipated that they can be used as source material in cultivation techniques and breeding studies.

Key words: Vine, genetic resources, local grape varieties, quality.

PP21

THE EFFECTS OF DIFFERENT DOSE GIBBERELLIC ACID (GA3) AND FERTILIZER APPLICATIONS ON NUTRITIONAL VALUE OF SULTANİ ÇEKİRDEKSİZ GRAPE VARIETY ACCORDING TO THE SOIL AND PLANT ANALYSIS

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The aim of this research is the examination of mineral nutrition uptake by foliar and soil analyses in Sultani Çekirdeksiz (Sultana) applied of the different doses of fertilizer and gibberellic acid. This study was conducted own rotted Sultani Çekirdeksiz experiment vineyard at Manisa Research Institute in Alaşehir province. Five different GA_3 and four different fertilizer doses including controls were applied on Sultani Çekirdeksiz in the completely randomized block design with split plots as three replications. Each replication had 6 vines. Table grape yield and quality values were obtained from 2010 to 2012. The GA_3 applications were 0, 35, 70, 140, 210 ppm and suggested dose for fertilization was determined by the soil analysis. Four doses were formed by multiplication of suggested dose and 0, 0.5, 1, 1.5 coefficients. Soil samples were taken at flowering, verasion and harvest times and two different depths (0-30, 30-60cm). Total N content was obtained by using kjeldahl methods, available P (phosphorus) by the method of Olsen spectrophotometer readings are made. Changeable K (potassium), Ca (calcium), Mg (magnesium) of 1 N ammonium acetate by the method of atomic absorption spectrometer reading is performed. Results are obtained in mg kg^{-1}. Leaf samples were taken at flowering, verasion and harvest times. Total N content was obtained by using kjeldahl methods. Phosphorus content was determined in spectrophotometer using the phosphor vanado molibdo phosphoric yellow color in the filtrate attained from nitric–perchloric acid mixture and the wet oxidation method. The amounts of K, Ca and Mg were measured using the atomic absorption spectrophotometer in the filtrate after wet oxidation. The results were presented as percent (%) for macro nutrition elements.

Key words: Sultani Çekirdeksiz, Gibberellic Acid (GA3), fertilizer, soil analysis, leaf analysis, macro elements

PP22:

THE EFFECT OF DIFFERENT PH ON GROWTH AND MINERAL CONTENT OF GRAPEVINE AND ROOTSTOCKS

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In this study, we investigated the effect of pH on plant growth and mineral content in *Vitis vinifera* L. cv. Sultana and Kober 5BB, and 41B rootstocks. Plants were grown in media with with pH 4.5, 7.0 and 8.5 and the effect of different pH on fresh or dry root weight and fresh or dry shoot weight and mineral content were analyzed. While the effect of different pH on the root length of the Kober 5BB was significant, no significant effect was observed in the 41B rootstock and Sultana variety. The effect of pH on fresh root weight was significant in all plants, and the fresh root weight significantly decreased with increasing pH. The shoot length

and leaf area of Kober 5BB and sultana seedless variety were significantly affected by different pH values, and as pH increased, shoot length and leaf area decreased. Overall, grapevine varieties were adversely affected by high pH and this effect was more pronounced in shoot development than in root development. Macro nutrient contents were significantly affected by different pH treatments. Despite the presence of a higher amount of Fe in the leaves of grapevine varieties grown in the soils with pH8.5, they showed symptoms due to iron deficiency. The effect of pH on Zn contents in leaves was observed only in Kober 5BB rootstock, with increasing Zn content in response to high pH.

Key words: pH, Sultana seedless, Kober 5BB, 41B, plant growth, mineral content

PP23:
DETERMINATION OF VITICULTURE POTENTIAL OF BUYUKCAY MICROCATCHMENT, PROJECT DESIGNED WITHIN THE SCOPE OF MURAT RIVER BASIN'S REHABILITATION PROJECT, USING GEOGRAPHICAL INFORMATION SYSTEM

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Viticulture in Turkey, which has suitable and convenient cultivation facilities, has an old and rooted culture. Grapes are one of the non-cultivated plants cultivated in the world and in Turkey because of the fact that they are not very selective in terms of climate and soil and have alternative evaluation possibilities. Our country, which is an important grape producer, does not adequately reflect this potential to both grape production and vineyard area. Problems, several economic reasons, lack of vineyard areas, not breeding appropriate varieties in appropriate regions, most importantly, in determining the most suitable sites for vineyard breeding and not using the technological facilities in the breeding can be listed. In this study, the maps such as the slope map, exposure map, soil map and elevation groups of Büyükçay Microcatchment of Elazıg province were overlapped with ArcGIS 10.2 program and the potentials of the vineyards area were determined and classified. With this study, it will be possible to determine the most suitable places for viniculture and to improve the cultivation environments of the vineyards to be established in these places and to contribute to both producer and country economy by increasing grape production and added value. In the future it will be inevitable to evaluate these places and other places with viniculture potential in other regions.

Key words: Viticulture, Murat River, grape, Turkey

PP24:
EFFECTS OF COLCHICINE APPLICATIONS ON VIABILITY AND PLOIDY LEVEL IN VITRO SHOOT TIP CULTURE AT MİCHELA PALIERI AND TEKİRDAG MİSKETİ GRAPE VARIETIES

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This study was carried out in 2014-2015 at Tissue Culture Laboratory of Tekirdağ Viticultural Research Institute with Michele Palieri and Tekirdağ Misketi grape cultivars. The explants were taken about one month after full bloom. Different concentrations of colchicine were added to the Murashige Skoog (MS) nutrient medium *in vitro* culture. The explants, which were kept in the colchicine medium at various periods, were transferred to the MS nutrient medium that is without chemical mutagen. The explants were grown at 16 hour bright and 8 hour dark photoperiod, with the temperature of 25 ± 1^0C and the light of 3500 lux / m^2. The results of the *in vitro* shoot tip culture study were showed that the grape genotypes give different responses to chemical mutagens. Reacts of the grape genotypes changed due to the dose and duration of colchicine in terms of viability rate. Tekirdağ Misketi was evaluated as sensitive to chemical mutagen because of low viability rate. Polyploidy could not be detected with flow cytometry analyzes and DNA contents of the samples were determined as 1.00 pg diploid (2n) size.

Key words: Colchicine, Polyploidy, Grape, Shoot tip, in vitro.

PP25:
THE EFFECTS OF EXTREME LEAF HARVEST TREATMENTS ON CHEMICAL COMPOSITION AND PHENOLIC COMPOUNDS IN MUST AND WINES OF NARİNCE CULTIVAR GROWING IN DIFFERENT TERROIRS

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This study was conducted to determine the effects of two different leaf harvest treatments (control, 6 harvest) on must and wine composition of Narince grapes grown in Tokat City Center (Central), Erbaa and Niksar districts in 2014. Approximately 45% of the leaves were removed with 6 leaf harvest. Leaf harvest treatments reduced grape yields (Central, 40.8%; Erbaa, 63.6%; Niksar, 39.6%) compared to control. The grapes harvested at industrial maturity stage were processed to wine with microvinification method. The pH, total soluble solid contents (TSSC), total acidity, specific gravity, ethyl alcohol, volatile acid, reducing sugar, total sulphur dioxide, total phenolics, total flavonoids and some phenolic compounds of the must and wines were determined. In all three territories, leaf harvest treatments increased TSSC, total acidity and ripening index of the must and ethyl alcohol content of the wine. The specific gravity, total phenolics and flavonoids of both must and wine increased, but sensory analyses scores were reduced with treatments. In addition, it was observed that total phenolic compound and total flavonoid amounts were increased due to UV radiation at high altitudes in experimental vineyards. Increases in total temperature of 37 °C and over caused a decrease in the amount of phenolic compounds according to climate-based calculations. It has been concluded that 37 °C is the critical temperature for phenolic compounds in the Narince cultivar. In both must and wine samples, vanillic acid and catechin from 8 individual phenolic compounds were detected in greater amounts than the others. It has been determined that 6 leaf harvest treatment reduces the quality parameters of must and wine in Narince cultivar.

Key words: Narince, altitude, extreme leaf harvest, must, wine, total phenolic compounds, total flavonoid

PP26
CURRENT STATUS OF REGISTERED GRAPEVINE SAPLINGS IN LEBANON

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Grapevine is an important component of the Lebanese agricultural production system with 10,609 ha of cultivated area of which 70% are occupied by table grapevines *vs.* 30% of industrial grape. Information about saplings is not yet available in the country. This study presents the first report on the status of grapevine saplings in Lebanon, whether they are locally produced or imported, in addition to the resulting impact on the diversity of the Lebanese fruit germplasm. The work was mainly focused on an exhaustive desk analysis of the registers of the Ministry of Agriculture over 2012-2014. Data recorded during the three years study reveals that both table and industrial grapes ranked first among the other fruit crops for the registered imported saplings with an estimated yearly average of 815,132 saplings. The saplings import of grapevine appears as substantial with a share of industrial grapevine two times greater than the one of table grapevine. For table grapes, imported material totalled to yearly average of 291,413 saplings belonging mainly to Superior seedless, Cardinal, Michele Pallieri, Italia and Red globe. For industrial grapevine, imported material totalled a yearly average of 523,720 saplings where the major share went mostly to Cabernet Sauvignon Blanc, Syrah, Viognier, Chardonnay and Merlot. At the germplasm diversity level, grapevine ranked second after peach with 118 registered varieties including 77 varieties of industrial grapevines and 41 for table grapes. Many of these imported varieties are newly released after a long process of genetic improvement; they are still under patency protection and should not be authorized to be propagated in Lebanon; knowing that Lebanon lack an operational system to protect new varieties and that the country is not yet a member of the International Union for the Protection of New Varieties. Surprisingly, none of the registered saplings circulating in the country are exclusively locally produced, while the non-registered locally produced saplings remain an important informal market for the local varieties.

Key words: *Vitis vinifera* L., saplings, import, local production, quantities, varieties, diversity.

PP27:
ORGANIC AMENDMENTS APPLICATION TO SOIL OF MECHANICALLY PRUNED VINEYARDS: EFFECT ON YIELD AND GRAPE COMPOSITION OF CV. `SYRAH´ (*Vitis vinifera* L.)

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The effect of five different soil organic amendments on vine performance and wine quality of mechanically box pruned vineyards was evaluated from 2012 until 2015. Two field trials, with a randomized complete block design, were established on Syrah vineyards at Quinta do Côro (QC) and Quinta do Gradil (QG), Tejo and Lisboa wine regions respectively. Organic amendments - biochar (BIOC), municipal solid waste compost (MSWC), cattle manure (Manure) and sewage sludge (Sludge) – were applied annually, in an amount corresponding to 5000 kg of organic matter per hectare. In the first year (2012) no effect was found. In the following years, Sludge, Manure and MSWC originated higher yields, than BIOC and TEST.

In 2013 and 2014 those differences were associated with the cluster weight, while in 2015 both the number of clusters per vine and their individual weight concurred for the higher yields observed. Sludge increased the number of shoots per vine and their weight, when compared to BIOC and TEST only in 2014. Sludge, Manure and MSWC increased the vine total dry matter production and the Ravaz index, when compared to TEST. Regarding to grape composition, analysed in 2013 and 2014, the Sludge treatment presented grapes with lower sugar concentration in both years and lower pH, anthocyanins and total phenols in 2013, when compared to BIOC and TEST. MSWC and Manure had an intermediate behaviour, with no significant differences when compared to the other treatments. The application of sewage sludge in mechanically pruned vineyards originated the highest yields, but with reduced quality. On the other hand, MSWC and Manure improved yield without significant quality loss, proving to be good options for increase vineyard profitability.

Key words: Grapevine, organic amendment, mechanical pruning, yield, quality

PP28:
DETERMINATION OF EHS (EFFECTIVE HEAT SUMMATION) REQUIREMENTS OF SOME GRAPE VARIETIES IN SANLIURFA CONDITIONS

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Thanks to its geographical position Turkey is one of the important grape producer countries of the world. Anatolia, as well as to take part in as quite favorable climate for viticulture, made host to the initial grape grower nations. For this reason, the status of viticulture in Anatolian history is very essential and important. Researches has shown that there are nearly 1200 grape varieties grown in Turkey. All of these varieties, most of which are indigenous, can not be produced economically and presented to consumers. Although this situation has a wide range of causes, the ecological wishes of the grapes are some of this reason. Varieties of grapes are adopted to the locations where they first time cultivated and have been growing for many years and shows optimum efficiency in these regions. However, when it is desired to establish a vineyard in a different ecology with these varieties, firstly the climatic characteristics of the location is examined. The annual temperature distribution, rainfall regime and quantity, frost and sunny days are some of the features examined. It is very important to know the monthly mean temperature values of the location where the new vineyard will be installed, in order to determine the most suitable grape varieties for that region. By using these values, it can be determined whether or not the harvest maturity of the grape to be vineyard established to the region can be reached. The most commonly used method for this aim is; the comparison of EHS requirements of varieties what determined at the previously growth ecology with the climate characteristics of the location to be newly establish.
Southeastern Anatolia Region has the highest temperature values and the longest vegetation period in Turkey's viticulture regions. Sanliurfa stands out in the region thanks to the high temperature regime and the extremely long vegetation period from the beginning of April to the end of November. It is possible to grow all varieties of grapes from too early to too late which is cultivated nowadays, in Sanliurfa in the direction of EHS requirements. Sanliurfa, where is located in the warm EHS ecology with 2844-3394 daydegree (dd), is one of the most suitable regions in Turkey for the calculation of EHS requests of grape varieties.
In this study, it was tried to determine the EHS requirements of some grape varieties grown in Sanliurfa conditions. It has been determined that, in terms of effective heat summation

requirement, Red Globe variety is highest with 2337,8 dd and Trakya Ilkeren variety is lowest with 1173,6 dd. In addition, Red Globe, Horoz Karasi and Ata Sarisi varieties were identified as very late maturing grape varieties.

Key words: Effective heat summation, Sanliurfa, Maturity time