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The Involvement of Auxin, Giberelin and Some Micro Nutrients in the Incidence of Blossom End Browning (BEB) in Anna Apple Fruits

Dr. Mostafa Sultan, Horticulture Depertment, Faculty of Agriculture, Al-azhar University, 00202 Nasr city - Cairo, Egypt; sultanmostafa2010@gmail.com (presenting author)

Prof. Galal Baghdady, Horticulture Depertment, Faculty of Agricul, Cairo, Egypt; galalbaghdady@gmail.com (co-author)

Blossom end browning (BEB) is a physiological disorder attacking Anna apple (Malus domestica Borkh.) in Egypt and causes high economic losses of the production. The previous study showed that BEB is mainly due to low calcium concentration in the blossom end tissue of BEB-disordered fruit. The present study handled ihe involvement GA, IAA and some micronutrients in BEB incidence. Mature Anna apple fruits were harvested from six years old trees budded on M.M.106 rootstock, grown in sandy soil and irrigated by drip irrigation system. The collected fruits were stored under ambient temperature until ripe stage. Thereafter, samples of sound and BEB-disordered fruits were taken from three parts which are: distal fruit end (A), middle zone (B) and proximal fruit end (C). All sample were prepared for determine GA, IAA and micro elements. The results revealed that BEB incidence was highly correlated with high GA and low both IAA and zinc (Zn) concentrations. These results suggested that the imbalance between endogynous GA and IAA and low Zn concentration play indirect role in BEB incidence in Anna apples.

Keywords:

disorder –GA – IAA– micro elements – browning

Comparative observations of phenological characters of continuously flowering high-bush blueberry `Blue Muffin´ in temperate and subtropical climates

Prof. Hisayo Yamane, Laboratory of Pomology, Graduate School of Agriculture, Kyoto University, Kyoto 606-8502, Japan; hyamane@kais.kyoto-u.ac.jp (presenting author)

Dr. Kuo-Tan Li, Department of Horticulture and Landscape, National Taiwan University, Taipei, Chinese Taipei; kuotanli@ntu.edu.tw (co-author)

Mr. Ryusuke Matsuzaki, Laboratory of Pomology, Graduate School of Agriculture, Kyoto University, Kyoto, Japan; matsuzaki.ryusuke.78e@st.kyoto-u.ac.jp (co-author)

Mr. Shu Ebihara, Laboratory of Pomology, Graduate School of Agriculture, Kyoto University, Kyoto, Japan; 10shu20ebi@gmail.com (co-author)

Mr. Tai-Shan Li, Laboratory of Pomology, Graduate School of Agriculture, Kyoto University, Kyoto, Japan; litaishan910706@gmail.com (co-author)

Prof. Dr. Ryutaro Tao, Laboratory of Pomology, Graduate School of Agriculture, Kyoto University, Kyoto, Japan; rtao@kais.kyoto-u.ac.jp (co-author)

The production of blueberries (Vaccinium spp.) has increased rapidly because of their appealing taste and health benefits. Most blueberry cultivars bloom once a year; thus, their harvest period is limited. Therefore, there is a long off-season from autumn to spring when fresh blueberries are not available in the Japanese market. 'Blue Muffin', a high-bush blueberry cultivar, flowers continuously in the temperate zone. Although this unique trait might contribute to shortening the off-season, the phenology of 'Blue Muffin' plants growing in different climates has not been fully characterized. We cultivated 'Blue Muffin' at two sites with different climates; Kyoto, Japan (temperate) and Taipei, Taiwan (subtropical), and compared phenological characters such as flowering, leaf shedding, and depth of dormancy. In the temperate Kyoto climate, 'Blue Muffin' started to bloom in early April, a little earlier than the southern high-bush 'Sharp Blue' and later than the southern high-bush 'O'Neal'. 'Blue Muffin' also bloomed from July until December, when it shed leaves after exposure to low temperatures. 'Blue muffin' required more chilling time for dormancy release than did 'O'Neal', which requires approximately 500 chill hours. In the Taipei climate, 'Blue Muffin' periodically flushed before and after mid-summer and the terminal and adjacent buds of new flushes produced flowers. It remained evergreen and continuously bloomed on the current-season shoots through winter, and so few flower buds remained in the following spring. These results suggested that 'Blue Muffin' has a unique genetic mechanism for flower initiation that is less sensitive to a long photoperiod and high temperature, which usually stop flower initiation in blueberry. These comparative observations suggest that 'Blue muffin' has retained genetically controlled endodormancy and lost flowering inhibitory factor(s) during the paradormant phase.

Keywords:

blueberry, flowering, off-season fruit production, paradormancy

FEIJOA SELLOWIANA BERG AS SUBTROPICAL CROP ON SOUTH COAST OF THE CRIMEA

Dr. Elena Shishkina, Crimea, Yalta, Russian Federation; fruit_culture@mail.ru (presenting author)

Evergreen subtropical plant, feijoa, is a quite new crop. It is originated from South America. Feijoa was imported into Russia (Yalta) in 1900 and later on spread along the Black Sea Coast of the Caucasus. In the beginning it was cultivated in gardens and parks as a collection and experimental plant. 6 specimens of F. sellowiana were brought into Nikita botanical gardens from Sukhumi botanical garden in 1910 and planted as ornamental. In 1936-1937 seed source planting material was imported again from Sukhumi experimental stati

on of All-Russian Institute of Plant-growing. Some dozens of fruit-bearing plants originated from those plantations have been kept up to now and became the main basis for further breeding work.

Hybrid fund became a result of intraspecific crossings, chemical mutagenesis and sowing of seeds (open pollination). The researches were based on collection plantations of Nikita botanical gardens, situated in western south coastal subtropical region of the Crimea, where the climate is Mediterranean, arid with very mild winter. The average annual air temperature is12,4°C. Total temperature sum above 10°C makes 3670-3940. The average out of absolute annual minimum temperatures reaches -6…-9°C. Annual precipitation makes 550 mm, where 260 mm fall during vegetative period. The soil type is brown, weak carbonate, heavy-textured loamy on the clay slates and limestone. As a result of long-term researches the best feijoa forms were successfully chosen according to parameters as follows: productivity and stable fruiting, economically valuable characters (early ripening, large fruit, high taste qualities) and high frost-resistance. Effective cultivation of fruit-bearing crop feijoa on South Coast of the Crimea is quite possible on irrigated and wind-protected areas at 200 m above the sea level.

Keywords:

feijoa, hybrids, breeding, forms, climate, characters

FEIJOA SELLOWIANA BERG AS SUBTROPICAL CROP ON SOUTH COAST OF THE CRIMEA

Dr. Elena Shishkina, Crimea, Yalta, Russian Federation; fruit_culture@mail.ru (presenting author)

Irina Chernobay, Yalta, Nikita 3, Yalta, Russian Federation; chernobaj52@mail.ru (co-author)

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resistance. Effective cultivation of fruit-bearing crop feijoa on South Coast of the Crimea is quite possible on irrigated and wind-protected areas at 200 m above the sea level.

Keywords:

feijoa, hybrids, breeding, forms, climate, characters

Morphological, anatomical and physiological features of assimilation apparatus changes in the apricot plants (Prunus armeniaca L.) infected by Plum pox virus

Valentina Brailko, The Nikita Botanical Gardens, Nikita, 298648, Yalta, Russian Federation; valentina.brailko@yandex.ru (presenting author)

Prof. Dr. Olga Mitrofanova, The Nikita Botanical Gardens, Nikita, 298648, Yalta, Russian Federation; invitro_plant@mail.ru (co-author)

Prof. Dr. Sergey Chirkov, Lomonosov State University, Moscow, Russian Federation; s-chirkov1@yandex.ru (co-author)

Natalya Mesyaz, The Nikita Botanical Gardens, Nikita, 298648, Yalta, Russian Federation; fruit_culture@mail.ru (co-author)

Prof. Dr. Irina Mitrofanova, The Nikita Botanical Gardens, Nikita, 298648, Yalta, Russian Federation; irimitrofanova@yandex.ru (co-author)

The Southern coast of the Crimea refers to the arid climate zone with an unstable moisture. Under the conditions of an excessive amount of sunlight and a lack of atmospheric moisture, drought and disease resistance, heat tolerance should be considered the main criteria for apricot plants normal growth and development. The aim of study was to identify the effects of apricot plant assimilation apparatus changes on the structural and physiological characteristics associated with the appearance of the Plum pox virus (PPV) symptoms. Five apricot cultivars (Khersonskiy-23, Khersonskiy-26, Ananasoviy Ukrainskiy, Iskorka Tavrydy and Salyeri) were investigated in late July 2017 (the average daily air temperatures – 24-28°C, the maximum was 35.6°C, relative air humidity – 24-57%, the supply of productive moisture in soil was 38-49 mm (25-37% HB). The main symptoms of PPV on 10-40% of leaves and up to 30% fruits were revealed. Leaf blade structure in the damaged cultivars was characterized by decrease of the leaf size and thickness (‘Iskorka Tavrydy’ – from 220 ± 17 µm to 174 ± 11 µm) as well as palisade tissue (‘Iskorka Tavrydy’ and ‘Salyeri’ – 24-30%), and increase of the intercellular spaces in the spongy parenchyma in the cultivar Ananasoviy Ukrainskiy. In the cultivars Khersonskiy-23 and Salyeri an increase of stomata number 1.5-2 times was noted in the damaged plants. Evaluation of the photosynthetic apparatus activity demonstrated photoinhibition in leaves with visible symptoms in the cultivars Khersonskiy-23, Iskorka Tavrydy and Salyeri ((Fm-Fst)/Fm=0.52-0.58 a.u.). The total water content in leaf tissues was 62-68%. Water deficiency was 14-23% (maximum in damaged cultivars Khersonskiy-26 and Iskorka Tavrydy'. Thus, morphological,

anatomical and physiological changes have been indicated a decrease in resistance to the hydrothermal stress and deterioration of functional state of the damaged apricot plants. This study was funded by a research grant № 14-50-00079 of the Russian Science Foundation.

Keywords:

apricot, PPV, symptoms, tolerance, structural characteristics, water regime, photosynthetic apparatus

Tropical low-chill stone fruit production in Florida: a review of success and challenges

Dr. Ali Sarkhosh, Horticultural Sciences Department, University of Florida, Gainesville FL 32611, United States of America; sarkhosha@ufl.edu (presenting author)

Dr. Mercy Olmstead , Callifornia Strawberry Commission, Watsonville CA 95076, United States of America; mercy1@ufl.edu (co-author)

José X. Chaparr, Horticultural Sciences Department , University of Florida, Gainesville FL 32611, United States of America; jaguey58@ufl.edu (co-author)

Stone fruit industry in Florida once had a production of over 3000 acres in north-central Florida. However, challenges in marketing and a series of freezes overwhelmed the industry. As a result, the industry size significantly reduced to less than 400 acres by 2008. A successful stone fruit breeding program at the University of Florida has released varieties well-adapted to sub--tropical production regions. Some of these varieties have formed the basis of a low chill stone fruit industry in subtropical countries. Since 2003 the breeding program has been shifted to breed varieties with lower-chilling requirements. Growing these varieties in central and southern Florida not only reduced the risk of production but also allowed growers to target a crucial market gap from late March to early May when either international exports or domestic production cannot satisfy the national demand. All these breeding programs accompany with extensive research and extension programs on low chill stone fruit production helped that the Florida peach industry in 2016 produced over seven million pounds fruit from estimated 2,000 acres. This is indicating a resurgence of interest in low chill stone fruit production, especially peaches in Florida as growers are looking for a profitable substitute fruit crop to diversify their production systems. Producing high-quality stone fruit while reducing the production cost will allow sustainable development of the industry in Florida. Orchard management or pre-harvest practices can significantly affect fruit characteristics such as fruit size, sweetness, firmness, etc., which can directly affect consumers preferences, satisfaction and procuring patterns. To improve fruit quality in low-chill stone fruit in Florida, research on adoption of superior management practices as well as strategies for extension of these practices to growers are needed. Although, most of these technologies and strategies are already exist for growing stone fruit in temperate zones. Success and challenges will be presented and discussed in this review.

Keywords:

Fruit quality, production technologies and strategies, stone fruit, management practices

Study on the dormancy processs of strawberry in different latitudes and altitudes

Dr. Chuanfei Zhong, Institute of Forestry and Pomology, BAAFS, Rui Wang Fen, Xiang-Shan, Hai Dian District, Beijing 100093, China; 86356754@qq.com (presenting author)

Dr. Yuntao Zhang, Institute of Forestry and Pomology, BAAFS, Rui Wang Fen, Xiang-Shan, Hai Dian District, Beijing, 100093, China; zhytao1963@126.com (co-author)

Yan Zhang, Institute of Forestry and Pomology, BAAFS, Rui Wang Fen, Xiang-Shan, Hai Dian Distric, Beijing, 100093, China; 1356016593@qq.com (co-author)

Dr. Yushan Qiao, Nanjing Agricultural University, Weigang on the 1st, Xuanwu District, Nanjing, Jiangsu, China; 1678307267@qq.com (co-author)

Jinfeng Li, Zhenjiang Institute of Agricultural Science, Ninghang Road No.112, Huayang Town, Zhengjiang, Jiangsu, China; lijinfeng512@126.com (co-author)

Hong Wang, No. 2238, Beijing Road, Panlong District, Kunming, Yunnan, China; 285327470@qq.com (co-author)

Bang Tao, No. 2238, Beijing Road, Panlong District, kunming, Yunnan, China; 282697422@qq.com (co-author)

Libao Deng, No. 174, University Road, Nanning, Guangxi, China; denglibao2000@126.com (co-author)

Ruihong Luo, No. 174, University Road, Nanning, Guangxi, China; 415339331@qq.com (co-author)

Jing Dong, Institute of Forestry and Pomology, BAAFS, Rui Wang Fen, Xiang-Shan, Hai Dian District, Beijing, 100093, China; zhytao1963@126.com (co-author)

Jian Sun, Institute of Forestry and Pomology, BAAFS, Rui Wang Fen, Xiang-Shan, Hai Dian District, Beijing, 100093, China; sjroad@126.com (co-author)

Studying and comparing the reaction of different strawberry (Fragaria X ananassa) cultivars dormancy to environmental signals and the effect of forcing culture time on the growth and development of diffenrent cultivars.

In the study, two experiments were designed. The one of experiment was conducted at three different latitudes (Beijing,Yunnan, Nanjing) in China simultaneously, Measuring the length of the petiole of the youngest fully developed leaf (flat leaf area), leaf length and leaf width of the middle and left every ten days from September 22 to early December. The other experiment was forcing culture time on the growth and development of 13 low chilling requirement cultivars and 3 high chilling requirement cultivars in Beijing.

Beijing latitude is 39.968886 and elevation is 58 meters, Nanjing latitude is 31.9532445 and elevation is 24 meters, Kunning latitude is 25.078558 and elevation is 2117 meters, Chengde latitude is 41.20567 and elevation is 508 meters. The dormancy didn't appear in Kunming, Chengde was earlier than Nanjing and Beijing for getting into dormancy, the date of dormancy in Chengde was longest,

followed by Beijing, Nanjing and Kunming. All 13 low chilling requirement cultivars excepted 'Jingning' occured their dormancy in late October, released from dormancy in late November. 3 high chilling requirement cultivars got into dormancy in early October, released from dormancy in the middle January. In the first stage of dormancy the vegetative growth became weak as the forcing culture time and reached to their lowest points at the deepest dormant stage. Strawberry dormancy may begin earlier and keep longer in high atitude and high latitude region of China. The mechanism of dormancy and environment interaction will be further studited.

Keywords:

strawberry, dormancy process, forcing culture

Flowering phenology of `Arbequina´ olive in the subtropical climate of the island of Tenerife

Raul De La Rosa, IFAPA, Centro Alameda del Obispo, Av. Menendez Pidal s/n, 14080 Córdoba, Spain; raul.rosa@juntadeandalucia.es (presenting author)

Ms. Guacimara Ms. Medina-Alonso, Servicio Técnico de Agricultura y, Desarrollo Rural, Cabildo Insular de, Tenerife, 38570 Tenerife, Spain; guacimaram@tenerife.es (co-author)

Dr. Lorenzo León, IFAPA, Centro Alameda del Obispo, Av. Menendez Pidal sn, 14080 Cordoba, Spain; lorenzo.leon@juntadeandalucia.es (co-author)

Mr. Jose Francisco Navas-López, IFAPA, Centro Alameda del Obispo, Av. Menendez Pidal sn, 14080 Cordoba, Spain; josef.navas@juntadeandalucia.es (co-author)

Dr. Ignacio Jesús Lorite-Torres, IFAPA, Centro Alameda del Obispo, Av. Menendez Pidal sn, 14080 Cordoba, Spain; ignacioj.lorite@juntadeandalucia.es (co-author)

Olive growing is currently being expanded to new areas, some of the with climatic conditions different from the Mediterranean Basin. One example is Canary Islands, characterized by a subtropical climate with high winter temperatures and small annual thermal oscillations and low rainfall. In these conditions, olive presents asynchronous flowering, several bloomings throughout a year and very long blooming periods Besides, the future situation of climate change may make Mediterranean winters soften, similar to the current Canarian climate. The purpose of the present work is to evaluate the effect of a subtropical climate with high winter temperatures on the reproductive phenology of 'Arbequina' olive cultivar. Flowering of cultivar Arbequina were observed in three orchards situated in different altitudes Canales Altas (CA) (630 m), El Viso (VS) (410 m) and Los Tomillos (TM) (200 m) in Tenerife for two years. BBCH scale was used to describe flowering phenology stages. Initial results show that flowering started in CA at the end of December. This greatly contrasted with the flowering time on the Mediterranean area were flowering normally started in April-May. First flower buds appeared later in lower orchards, in February in VS and in March in TM. However, full flowering (65 BBCH stage) was reached earlier in TM than in CA and VS. Blooming in 'Arbequina' was longest in the orchard situated in the highest growing area (CA), and the shorted was in TM (the lowest orchard). Pre-flowering also decrease with altitude (less altitude implied less days in pre-flowering), Besides, several branches were observed in 4 trees in CA and TM. Photographs were taken in 3 different dates. The flowering stage of each axil of each shoot was

recorded. No relationship has been observed between the bud position on the shoot and the phenology of the subsequent flowers. The effect of the subtropical climate on the pattern of oil accumulation is also underway. The high differences on flowering time between Tenerife and the Mediterranean area are responsible for differences also on the time for oil accumulation. However, the pattern of oil accumulation is similar in both areas. These should be confirmed in forthcoming years of study. This research was partly supported by IFAPA project AVA201601.2, partially funded by European Regional Development Fund (ERDF).

Keywords:

floral biology, Olea europaea, blooming period, climate change

Changes in physical properties, chemical and elemental composition and antioxidant capacity of pomegranate (cv. Ruby) fruit at five maturity stages

Dr. Olaniyi Fawole, Merriman Street, 7600 western cape Stellenbosch, South Africa; olaniyi@sun.ac.za (presenting author)

This study was conducted to investigate the physical and compositional changes as well as antioxidant properties of pomegranate fruit (cv. Ruby) at five distinct maturity stages between 54 and 139 days after full bloom (DAFB). Physico-chemical properties such as fruit mass, size, juiciness, colour, total soluble solids (TSS), pH, titratable acidity (TA), individual organic acids and sugars, and phenolic composition were investigated. Mineral element concentrations were determined using inductively coupled plasma optical emission spectrometry (ICP-OES) while total antioxidant capacity was measured by DPPH scavenging activity (DPPH) and ferric ion reducing power (FRAP). Results showed that major compositional changes in fruit are developmentally regulated. Significant increases in total soluble solids (TSS), sugars (glucose and fructose) and anthocyanins composition, coupled with significant decline in titratable acidity (TA), organic acids and total phenolics occurred with advancing maturity. Principal component analysis (PCA) showed that fruit at advanced maturity stages (132 and 139 DAFB) were characterized by intense peel and aril pigmentation and better juice quality. PCA results also showed that peel and aril colour attributes and indices of sugar/acid ratio (TSS/TA and BrimA index) could be useful measures of fruit maturity and ripeness for 'Ruby' pomegranate cultivar, and therefore might be suitable for the development of reliable fruit maturity index to assess fruit optimal maturity.

Keywords:

Pomegranate; Maturity; Antioxidant capacity; Anthocyanins

PRE HARVEST MANAGEMENT OF THE POST HARVEST DISEASES OF MANGO THROUGH FOLIAR APPLICATION OF FUNGICIDES WITH THEIR DIFFERENT INTEGRATED MODULES

Mr. Tariq Muhammad Malik, Mango Research Institute, Punjab Multan, Pakistan; mtmalik64@hotmail.com (presenting author)

Dr. Hameed Ullah, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; hameedullah60@hotmail.com (co-author)

Mr. Talal Tariq, DES COMSAT, Vehari, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; engr.maqboolahmad@gmail.com (co-author)

Mr. Abid Khan, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; abidhameedkhan@yahoo.com (co-author)

Mr. Javed Iqbal, Mango Research Institute, Multan, Pakistan; javedsaqi@gmail.com (co-author)

Ms. Fatma Bibi, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; fatima.bibi71@gmail.com (co-author)

In mango, post harvest diseases cause high and unsustainable losses in markets worldwide including Pakistan. Integrated crop management practices provide efficient control of latent infection in fruits that may occur in long term cool storage and marketing. Recognizing the limitation of hot water and other post harvest treatment options, five integrated modules for the foliar application of different fungicides were assessed as pre harvest management strategy for the control of post harvest diseases like anthracnose and stem end rot. One spray of the relevant fungicide paramount for the control of particular disease and falling in its specific module was also done according to the schedule on c.vs Sindhri and S.B Chaunsa. On maturity, fruits from each experimental plant were collected and kept for ripening at 25±1 0C in separated boxes to note the symptoms expressions according to the standardized severity scale. Colletotrichum gleosporioides, Alternaria alternata and Lasiodiplodia theobromae were identified as pathogenic fungi isolated from fruits showing anthracnose and SER respectively. Maximum decrease in anthracnose and SER of mango by 84.84% and 79.09% was recorded in the said manner in case of S.B Chaunsa in T4 where maximum number (06) sprays were made as pre-harvest management of the post harvest diseases. Same trend was recorded in c.v Sindhri with 66.76 & 44.19% decrease in anthracnose and stem end rot in pattern. This best pre harvest fungicidal module may be included in the holistic disease management program of post harvest diseases of mango.

Keywords:

Fungicidal modules, Post harvest diseases, Mango, Pakistan

PROACTIVE BIOCHEMICAL APPROACH TO MANAGE FLOWER DISEASES DURING DORMANT PHASE OF MANGO IN PAKISTAN

Mr. Tariq Muhammad Malik, Mango Research Institute, Punjab Multan, Pakistan; mtmalik64@hotmail.com (presenting author)

Dr. Hameed Ullah, Mango Research Institute, 60000 punjab Multan, Pakistan; hameedullah60@hotmail.com (co-author)

Mr. Talal Tariq, DES COMSAT Vehari, 60000 punjab Multan, Pakistan; engr.maqboolahmad@gmail.com (co-author)

Mr. Abid Khan, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; abidhameedkhan@yahoo.com (co-author)

Mr. Maqbool Ahmad, Mango Research Institute, 60000 punjab Multan, Pakistan; engr.maqboolahmad@yahoo.com (co-author)

Mr. Samad Raza, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; samad.uaf@gmail.com (co-author)

Mango (Mangifera indica) is prone to flower diseases like powdery mildew and anthracnose (Blossom blight) which may result in poor flowering and ultimately reduce fruit setting. Management of the fungi associated with these diseases during overwintering phase intend to cause primary infection was done through foliar sprays of naturally occurring oils containing glyceroides like coconut, palm and soya bean oils at the concentrations of 0.5 and 1.0% of each on mango cultivar Anwar Retual by adopting RCBD with three replications. Spray of these concentrations was done on the selected experimental plants during over wintering phase of the fungi associated with mango plants, when minimum temperature was observed below 100C. Two sprays of broad spectrum fungicides were also done during August September and February March as a constant factor on the non experimental plants of the same field in order to avoid external air borne infection. Incidence of powdery mildew and blossom blight during flowering season (February-March) was recorded with tagging of 20 inflorescences on each experimental plant. Maximum decrease over control by 95.12% in blossom blight of mango was observed in T7 where soya bean oil was sprayed at 1.0% concentration. Same treatment also remained very effective in controlling the powdery mildew of mango by 87.89%. Hence it is worth mentioning that use of natural oil might be counted as preventive and biochemical tool of the strategy to manage the flower diseases and to produce the organic mangoes as well in Pakistan.

Keywords:

Soya bean oil, Flower diseases, Mango, Pakistan

Determination of Yield, Quality and the Chilling Requirements of Some Local Cherry Cultivars Grown in Omerli/Mardin

Prof. Dr. Ayzin B. Küden, University of Cukurova, Faculty of Agriculture, Department of Horticulture, 01330 Adana, Turkey; abkuden@cu.edu.tr (presenting author)

Herdem Ms. Iskenderoglu, Univ. Cukurova, Fac. of Agriculture, Univ. Cukurova, Fac. of Agriculture, Univ. Cukurova, Fac. of Agriculture, 01330 Adana, Turkey; abkuden@gmail.com (co-author)

Dr. Songül Comlekcioglu, Cukurova Üniversity, 01330 Adana, Turkey; songulcomlekcioglu@gmail.com (co-author)

Dr. Burhanettin IMRAK, Cukurova Üniversity, 01130 Adana, Turkey; bimrak@cu.edu.tr (co-author)

Mr. Kadir Sarier, Cukurova Üniversity, 01330 Adana, Turkey; kasaier@cu.edu.tr (co-author)

Prof. Dr. Ali Küden, Cukurova Üniversity, 01330 Adana, Turkey; akuden@cu.edu.tr (co-author)

This research was carried out at the cherry orchards of a grower in Omerli/Mardin province, on 0900-Ziraat, Starks Gold, Erkenci (Local), Novari (Local) cherry cultivars. In this research the chilling requirements of the experimented cherry cultivars were determined by two different methods (standart and chill unit). Also, total GDH (Growing Degree Hours), and phenological and morphological observations and pomological analysis were done.

Erkenci and Starks Gold cherry cultivars broke dormancy on 17th January 2014 and their chilling requirements were determined to be 807 hours below 7.2 °C and 376 chill units. The chilling requirements of 0900-Ziraat and Novari cherry cultivars broke dormancy on 27th January 2014 and their chilling requirements were found to be 915 hours below 7.2 °C and 469 chill units.

The chilling duration of Mardin- Ömerli area was found to be 1411 hours below 7.2 °C and 758 chill units. Erkenci was found to be the earliest ripening cherry cultivar which was ripen on 20th May 2014. 0900-Ziraat and Starks Gold cherry cultivars were the highest yielding cherry cultivars (50 kg/tree and 45 kg/tree, respectively) and ripen on 10th June 2014.

Keywords:

Prunus avium L., chilling requirements, growing degree hours (GDH), 0900-Ziraat, pomology

SEASONAL DISTRIBUTION OF FRUIT FLY WITH REFERENCE TO METEOROLOGICAL PARAMETERS AND AVAILABABILITY OF SUSCEPTIBLE MANGO VARIETIES IN PAKISTAN

Mr. Abid Khan, Mango Research Institute, 60000 punjab Multan, Pakistan; abidhameedkhan@yahoo.com (presenting author)

Dr. Hameed Ullah, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; hameedullah60@hotmail.com (co-author)

Mr. Tauseef Babar, Mango Research Institute, 60000 punjab Multan, Pakistan; babar80@ymail.com (co-author)

Mr. Muhammad Malik, Mango Research Institute, 60000 punjab Multan, Pakistan; mtmalik64@hotmail.com (co-author)

Ms. Sidra Kiron, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; cidrakiran@gmail.com (co-author)

Mr. Atif Iqbal, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; atifmrimultan@gmail.com (co-author)

Fruit Fly is one of the most destructive insect pests of tropical and subtropical fruits in Pakistan. It is main constrain in export of mangoes, being a quarantine pest of the mango importing countries of the world. In present study, seasonal distribution of Fruit Fly was examined in mango region to formulate its exact management strategy. For this purpose, Methyl Eugenol traps were used during 2015-17 with record of species identification, thermal regime and relative humidity. Bactrocera zonata and Bactrocera dorsalis were recognized as the predominant species in mango growing areas. It was observed that cumulative population of both species was 31.22% followed by 24.45% of the total population of the whole year (2015-16) during the months of July and June respectively. During 2016-17, maximum population of this pest was recorded by 20.46% during the month of June followed by the population noted during May by 17.42%. The thermal regime and RH during maximum infestation for the year 2015-16 fluctuated from 28.29oC to 34.75oC and 69.84% RH respectively while it ranged from 28.63oC to 39.50oC with RH of 63.98% during June 2016-17. High temperature and low RH during June 2016-17 resulted in early ripening of the mid seasonal varieties like S.B Chaunsa which is also supposed to be more susceptible to this obnoxious pest. Consequently high population of Fruit Fly was recorded during June 2016-17. It means that availability of susceptible mangoes has also paramount importance along with the meteorological parameters for high infestation of Fruit Fly.

Keywords:

Fruit Fly, seasonal distribution, S.B. Chaunsa, Meteorological parameters

EXPLOITATION OF QUANTITATIVE STUDIES PERTAINING TO MANGO FRUIT FLY IN PAKISTAN

Mr. Abid Khan, Mango Research Institute, 60000 punjab Multan, Pakistan; abidhameedkhan@yahoo.com (presenting author)

Dr. Hameed Ullah, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; hameedullah60@hotmail.com (co-author)

Mr. Maqbool Ahmad, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; engr.maqboolahmad@yahoo.com (co-author)

Mr. Asif Rehman, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; asifurrehman23@gmail.com (co-author)

Ms. Iftikhar Ahmad, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; rocky_91294@yahoo.com (co-author)

Mr. Muhammad Zaffar, Mango Research Institute, Mango Research Institute, Mango Research Institute, 60000 punjab Multan, Pakistan; shahzadvh@gmail.com (co-author)

Fruit Fly is the major constraint in export of Pakistani mangoes being quarantine pest of the high end markets of the world. On account of the said reason, the export of mango is not exceeding from 5 percent of the total produce in Pakistan for the last decade. As the mango industry of Pakistan has been equipped with the processing facilities in near past, so it was imperious to review the quantitative studies for mango fruit fly regarding cultivars susceptibility, species prevalence, sex ratio and losses in field. The study was conducted through adopting the already standard method like

male annihilation technique (MAT) using methyl eugenol to ascertain the infestation and species occurrence for three exportable mango cultivars viz. Sindhri, Chaunsa (SB) and Chaunsa (white). The fallen fruits under each experimental tree were collected on daily basis for the assessment of loss and species identification while susceptibility level of each variety was examined with the keen observation of apparently infested fruits on the tree followed by the dissection and rearing in laboratory. It was found that 45-70.11% fruit drop in these varieties at maturity stage was only due to attack of fruit fly. Cv. Sindhri was observed more prone to fruit fly with the highest larval infestation percentage by 19.2 followed by 10.41 and 8.66 percent in cultivars Chaunsa (SB) and Chaunsa (white) respectively. Two species named Bactrocera zonata and Bactrocera dorsalis were predominantly prevalent in experimental orchard by 93.03 and 6.97 percent respectively with sex ratio of 3:1 for both species totally in contrast to the previous findings. The new inquiry in hand will be useful to stream line the management strategy against this challenging insect pest in Pakistan.

Keywords:

Mango fruit fly, cultivar susceptibility, species, sex ratio, crop losses

Performances of Low Chill Cherries Under Subtropical Conditions

Prof. Dr. Ali Kuden, Cukurova univ. Fac.of Agric., Dept. of Horticulture, 01330 Adana, Turkey; akuden@cu.edu.tr (presenting author)

Prof. Dr. Ayzin B. Kuden, Univ. Cukurova, Fac. of Agriculture, 01330 Adana, Turkey; abkuden@gmail.com (co-author)

Dr. Burhanettin IMRAK, Cukurova Üniversity, 01130 Adana, Turkey; bimrak@cu.edu.tr (co-author)

Ms. Busra Ceyhanli, Univ. Cukurova, Fac. of Agriculture, 01330 Adana, Turkey; bsraceyhanl@gmail.com (co-author)

Cherry harvest time in the world is mostly concentrated in June and July, as it is in Turkey. Out of season cherry growing in April, May and August is getting more important in Europe as well as in California, USA. For the early season cherries, we set up an experiment in 2010 with planting distances of 3x1 m in Adana both at Cukurova Univ. (50 m altitude), Abdioglu village (17 m altitude) and in Ceyhan (30 m altitude). The cherry cultivars used in the experiment were; Minnie Royal, Royal Helen, Royal Lynn, Royal Hazel, Rosie, Royal Nuie (Bailey), Royal Edie, Royal Tioga, Royal Marie, Minnie Royal and Royal Lee. The chilling hours of these cultivars were; Minnie Royal (400-500), Royal Helen (750), Royal Lynn (500), Royal Hazel (500), Rosie (R. Rainier) (700), Royal Bailey (Ansel) (750), Royal Edie (750), Royal Tioga (500), Royal Marie (Royal Tenaya) (500), Royal Lee (500).

The chilling accumulation below 7°C during 2016 and 2017 winter duration was calculated to be 652 hours in Adana and 924 hours in Ceyhan.

Some results on the blooming and the harvesting dates of the cultivars in Abdioglu/Adana was given here. Royal Bailey: blooming on 8th March, 2017, harvested on 27th of April. Minnie Royal: harvested on 27th of April, Royal Lynn: blooming on 8th March, 2017, harvested on 27th of April, Royal Helen: harvested on 1st June, 2017.

Keywords:

Prunus avium L., earliness, harvesting time, chilling accumulation

Factors impinging on tolerance to seasonal abiotic stresses in peach as a model for temperate species

Dr. Maria Luisa Badenes, Instituto Valenciano de Invest. Agrarias, IVIA, CV-315, Km. 10,7, 46113 Moncada Valencia, Spain; badenes_mlu@gva.es (presenting author)

Ms. Alba LLoret, IVIA, CV-315, Km. 10,7, 46113 Valencia Moncada, Spain; lloret_alb@gva.es (co-author)

Dr. Gabino Rios, Instituto Valenciano de Invest. Agrarias, IVIA, CV-315, Km. 10,7, 46113 Valencia Moncada, Choose a country; rios_gab@gva.es (co-author)

Dormancy plays a crucial role in plant meristem survival during the cold period in temperate climates. Meristem growth cessation and specific mechanisms for stress tolerance operate during this period, alleviating the deleterious effect of low temperature and water deprivation. We performed genomic and molecular studies centred on specific changes of gene expression in buds undergoing dormancy release in order to identify putative factors and pathways underlying the improved tolerance of dormant buds.

We have identified PpSAP1 and PpeS6PDH genes coding respectively for a stress associated protein-like and a sorbitol-6-phosphate dehydrogenase enzyme, both of which are down-regulated in dormancy released flower buds of peach. Overexpression of PpSAP1 in plum decreases water loss under desiccation conditions and impairs cell growth. Interaction of PpSAP1 with polyubiquitin chains by two-hybrid analysis and gene expression studies in transgenic plum overexpressing PpSAP1 depict a scenery in which PpSAP1 could modulate water loss and cell growth by an ubiquitin-dependent mechanism affecting transcriptional regulation of specific targets.

On the other hand, PpeS6PDH is a key enzyme involved in sorbitol synthesis, as stated by biochemical assays of purified recombinant protein. PpeS6PDH shows higher expression in dormant buds, in concordance with sorbitol accumulation data. Sorbitol has been described as a compatible solute and cryoprotectant in different species, which suggests its participation in freezing and water stress tolerance mechanisms in dormant buds.

Keywords:

transcriptional regulation, water stress tolerance, temperature stress

PERPENDICULAR-V AND HEDGEROW PEACH ORCHARD TRAINING SYSTEM IN THE BRAZILIAN SUBTROPIC

Dr. Graciela Sobierajski, Av Luiz Pereira dos Santos 1500, 13214-820, Jundiai/São Paulo State, Brazil; sobierajski@iac.sp.gov.br (presenting author)

Lais Zanchetta Antonio, Av Luiz Pereira dos Santos 1500, 13214-820 Jundiaí-São Paulo, Brazil; laiszma@gmail.com (co-author)

Taiane Santos Silva, Av Luiz Pereira dos Santos 1500, 13214-820 Jundiaí-São Paulo, Brazil; ss.taiane@gmail.com (co-author)

Mr. José Luiz Hernandes, Av Luiz Pereira dos Santos, 1500, 13214-820 Jundiaí-São Paulo, Brazil; jlhernandes@iac.sp.gov.br (co-author)

Dr. Mario José Pedro Júnior, Av Doutor Theodureto de A. Camargo, 1500, 13020-902 Campinas-São Paulo, Brazil; mpedro@iac.sp.gov.br (co-author)

The peach culture was introduced in Brazil at 1532 and as commercial crop is grown in open center–vase with four branches lead. From 70' the training system was changed to two branches lead to grow into transverse direction, called Perpendicular-V. This system is the most used in São Paulo State, Brazil, because allows the orchard densification. However, the life time of orchard is reducing from 15 to 8 years and the main reason is due to branch internal that are exposed to excess solar radiation. Aiming at offering new opportunities for peach crop in Brazil, an experiment was installed in 2016 to evaluate the Hedgerow's system in balance to Perpendicular-V, using the cultivar Tropic Beauty grafted onto cultivar Okinawa. Ten plants per treatment were used and microclimatic equipment was installed inside the plant to measure temperature and solar radiation. In 2017, 24 fruits were collected randomly from each tree to evaluate fruit quality. From six measured parameters only the soluble solids (SS – Hedgerow: 9.64; Perpendicular-V: 9.59) was not statistically significant (95% probability). Most of fruit physico-chemical characteristics were better in the Hedgerow system. The results from both training systems were respectively to Hedgerow and Perpendicular-V: fruit weight (g) – 97.56 and 90.44; yield in pulp (g) – 92.42 and 85.70; pulp firmness (Kg.cm-2) – 4.27 and 3.50; titratable acidity content (TA) – 0.76 and 0.71; e Ratio (SS/TA) – 12.79 and 13.58. The microclimatic data did not show difference between treatments, probably because the juvenility of the orchard. The data show that the Hedgerow system should be an alternative to Brazilian's growers for producing superior fruit quality without yield reduction. Another advantage is the facility to conduce the orchard and the possibility of pruning mechanization.

Keywords:

Training system, peach, Tropic Beauty, Okinawa, Brazil

The effects of two steady chilling temperatures on the dormancy of two apple cultivars

Dr. Giuliano Finetto, Institute for Agricultural Sciences, Via A. Milani 19, 37124 Verona, Italy; giulianofinetto@tin.it (presenting author)

The investigation of the effect of the temperatures close to0°Con the dormancy of temperate fruits was done in few cases. The matter is particularly important both for cultivation of temperate fruit tree in the highlands of the tropical and sub-tropical zones and for the reliability of the formulae used to calculate the chilling accumulation and requirement.

During the fall season for four years, 30 one-year twigs and 30 shoots with spurs were taken from the two cultivar trees in the field on first days of October and November. The materials were held in refrigerator at daily temperature 0°C, +5°C. After 21 days of treatments the shoots were put in growth chamber at 21°C. The number of opened buds (apical and lateral) were counted and expressed both as percentage of the total and as bud develop stage index. The data were compared with the shoots under the winter outdoors temperatures, from October up to the end of dormancy. Field temperatures were recorded and elaborated using Richardson's and Erez's formulae.

The buds, treated at 0°C and +5°C, overcame the dormancy around 30 days .

The results indicate that 0°C promoted the break of endo-dormancy in the cultivars examined similarly to +5*C. but the responses are related to phenological stage and kind of buds when the cold treatments were applied . The formulae utilised to estimate the chilling requirements cultivars should consider the effect of cold temperature during dormancy. Finally the time to reach the overcoming of endo-dormancy (D50) decreased steadily according to the chilling accumulation of buds likely this overlapped the heating requirement

Keywords:

heating requirement, chilling requirement , bud development index

Study on grape varieties suitable for planting in tropical and subtropical regions

Assoc. Prof. Mohammad Ali Nejatian, Temperate and Cold Fruits Research Center, Horticultural Science Research Institute, Shahrak NahaloBazr, Mahdasht Road., Karaj, Iran; nejatianali@yahoo.com (presenting author)

Grape plants are tropical and subtropical regions of temperate regions, but is also cultivated. To cultivate grape varieties typically used in climates that are common in temperate regions. This creates a series of problems, including failure to chilling requirement and therefore relieve cold bud dormancy, apical dominance, reduced fertility, plant diseases, and the growing imbalance. Therefore, in order to identify data needs cooling down and suitable for tropical and subtropical area, varieties Khalili, Dastechin, Sbzmal Kashmar, Shahani Gazvin, Sahebi, Yaghoti, Gzndaee and the number of foreign names (Black Seedless, Perlette, Turkmenistan 4) were selected from the National Collection, cultivars with early bud burst. The experimental design was completely randomized with three replicates and each experiment was performed in two cuttings. The first were collected 6 cutting with the same diameter and 3 buds, ten-day intervals in the early autumn of 1390, soon after the fall leaves until the end of March .Germination and seedling weight change curve was calculated for each stage. Factors considered include the percentage of bud burst, the number of days to bud burst half the number of days to first bud burst full-blown bud and interval were recorded. Measured in a field in winter on the Each Cultivar was 10 cane. Results showed that Perlette with 217 hours GDH and 468 hours CU is the best varieties for planting in tropical and subtropical regions and Dastechin with 706 hours CU and 272 hours GDH is The most inappropriate varieties to plant in those areas.

The impact of different ways of pollination on Korla Pear Fruit Growth and endogenous hormones

Dr. Shutian Tao, College of Horticulture, 1 Weigang, Nanjing Agricultural University, 210095 Nanjing, China; shutian_tao@hotmail.com (presenting author)

Mr. Weikang RUI, 1 Weigang, Nanjing Agricultural University, Nanjing, China; ruiweikang@njau.edu.cn (co-author)

Mr. Xin Gong, 1 Weigang, Nanjing Agricultural University, Nanjing, China; 1293046895@qq.com (co-author)

By measuring endogenous hormones content in the pulp, fruit weight, volume and dynamic change of vertical and horizontal diameter of Korla fragrant pear fruit during growth and development under different ways of pollination. To explore the impacts of different ways of pollination on Korla Pear Fruit Growth in the sight of endogenous hormones. The results showed that there are differences in endogenous hormone and the growth of fruit by different ways pollination. And the difference is not obvious in the early stage of fruit growth while in the late stage obvious. When harvesting the weight, vertical and horizontal diameter, volume of fruit by artificial pollination were slightly larger than those by bee pollination, significantly larger than those by liquid pollination and natural pollination. In the period of July 8 - August 19 ,the content of IAA in fruit by artificial pollination was significantly higher than other ways of pollination (P

Keywords:

Korla Pear ; Fruit Growth ; Endogenous Hormones ; Pollination

Effect of fruit bagging on lignin metabolism and expression of related genes in `Dangshansuli´ pear

Dr. Shutian Tao, College of Horticulture, 1 Weigang, Nanjing Agricultural University, 210095 Nanjing, China; shutian_tao@hotmail.com (presenting author)

Mr. Xiaofei Song, 1 Weigang, Nanjing Agricultural University, Nanjing, 210095, China; 2015104031@njau.edu.cn (co-author)

A study was conducted to investigate the effect of fruit bagging on lignin metabolism during the development of pear (Pyrus bretschneideri Rehd 'Dangshansuli') fruits. The average weight of the fruits increased in an "S" curve, and bagging reduced fruit weight at maturity. The lignin content in stone cells was always higher in the bagged fruits than in the controls. Bagging suppressed the activities of phenylalanine ammonia-lyase (PAL) and cinnamyl alcohol dehydrogenase (CAD) during fruit development, whereas the activities of guaiacol peroxidase (G-POD) and syringaldazine peroxidase (S-POD) increased under bagging. Real-time fluorescent quantitative PCR analysis of the expression of enzyme genes related to lignin metabolism showed that bagging reduced the relative expression of PAL, POD2, and POD3, had little effects on the expression of CAD1 and CAD2, and promoted the relative expression of POD1 and POD4. The lignin content in stone cells was significantly associated with fruit fresh weight, POD2 activity and POD4, and the correlation analysis showed that POD2 and POD4 may play important roles in lignin metabolism.

Keywords:

sclereids, cell wall, cultivation, lignification

Foliar application of calcium and paclobutrazol shows opposite effects on stone cell formation and related enzymes active in pear fruit

Dr. Shutian Tao, College of Horticulture, 1 Weigang, Nanjing Agricultural University, 210095 Nanjing, China; shutian_tao@hotmail.com (presenting author)

Mr. Yazhou Yuan, 1 Weigang, Nanjing Agricultural University, Nanjing, China; 1810341401@qq.com (co-author)

Mr. Xin Gong, 1 Weigang, Nanjing Agricultural University, Nanjing, China; 1293046895@qq.com (co-author)

In this study, foliar application of calcium chloride and paclobutrazol was employed to investigate the relationship between stone cell content and related enzyme activity, by using 'Dangshansuli' and 'Kousui' pear fruit as materials. Results showed that, two chemicals used in this experiment possessed opposite effects on the fruit. For both cultivars, the calcium chloride could inhibit the activities of phenylalanine ammonialyase (PAL), peroxidase (POD) and polyphenol oxidase (PPO), and also the formation of stone cells on each stage of fruit development , compared with the controlled treatment, while paclobutrazol promoted the corresponding metabolism. Besides, cell wall-bound peroxidase (POD Ⅱ) always had higher activity than peroxidase (POD Ⅰ) in cytoplasm of fruit. Comparison between these two cultivars also indicated the higher activities of PAL, POD and PPO in 'Dangshansuli' pear than that in 'Kousui' pear. Further more, highest content of total phenolics was found in paclobutrazol treated 'Dangshansuli', while the lowest was found in calcium chloride treated

'Kousui' pear fruit 20 days after blossom, which was reasonable and agreed with lignin and stone cells in the matured fruit. Basing on the regression analysis for all data, the positive relationships among activities of PAL, POD, PPO, content of stone cell and lignin were obviously observed, with the related coefficient as RPAL-lignin=0.95, RPAL-stone cell=0.99, RPOD Ⅰ-lignin=0.79, RPOD Ⅰ-stone cell=0.6, RPOD Ⅱ-lignin=0.85, RPOD Ⅱ-stone cell=0.68, RPPO-lignin=0.95, RPPO-stone cell=0.93.

Keywords:

Calcium, Paclobutrazol, Lignin, Stone cell, Enzyme

Flowering and Fruit Quality Characteristics of Some Low Chill Peach Genotypes

Prof. Dr. Ayzin B. Küden, University of Cukurova, Dean of the Faculty of Agriculture, Department of Horticulture, 01330 Adana, Turkey; abkuden@cu.edu.tr (presenting author)

Mr. Kadir Sarier, ukurova Üniversity, ukurova Üniversity, ukurova Üniversity, 01330 Adana, Turkey; kasaier@cu.edu.tr (co-author)

Dr. Burhanettin IMRAK, ukurova Üniversity, ukurova Üniversity, ukurova Üniversity, 01130 Adana, Turkey; bimrak@cu.edu.tr (co-author)

Dr. Songül Comlekcioglu, ukurova Üniversity, ukurova Üniversity, ukurova Üniversity, 01130 Adana, Turkey; songulcomlekcioglu@gmail.com (co-author)

Prof. Dr. Ali Küden, ukurova Üniversity, ukurova Üniversity, ukurova Üniversity, 01130 Adana, Turkey; akuden@cu.edu.tr (co-author)

The results of phenological and pomological analysis on the peach genotypes of low chill peach, nectarine and flat peach breeding program is given in this research. Among 123 genotypes VenüsXGransun and JalousiaXGransun combinations gave the earliest flowering ones. Genotype No. 6 VenüsXGransun combination flowered on February 25, 2016 while genotype No.4 (flat peach) and Venus nectarine (parent) cultivar flowered the latest (March 13, 2016).

The pomological analysis could be done only on 53 fruiting genotypes. The biggest fruits (140.80 g) were obtained from genotype No. 28 (flat peach). All the genotypes gave red skin color with fruit flesh color of yellow (47 genotypes), orange (3 genotypes) and white (3 genotypes). For the fruit shape characteristics; 16 eliptic, 16 round and 21 oval shaped fruits were determined. Among these 53 genotypes 38 of them were determined to be peach and 15 of them were nectarines. Also, 28 genotypes were found to be cling stone, 10 of them were free stone and 15 of them were semi free stone fruits.

Keywords:

Breeding nectarine and flat peaches, phenological and pomological analysis, subtropical conditions

Role of using rootstock to fire blight resistance on quince

Dr. Müge Sahin, Agean Agricultural Research Institute , MenemenIzmir, MenemenIzmir, Turkey; mugesahin67@hotmail.com (presenting author)

Prof. Dr. Adalet Misirli, Ege Universitesi, 304zmir, Turkey; adalet.misirli@ege.edu.tr (co-author)

Mr. Salih Gökkür, Aegean Agricultural Research Institute, 304zmir, Turkey; salihgkr@gmail.com (co-author)

Mr. Celal Safak, Aegean Agricultural Research Institute, 304zmir, Turkey; celal.safak@tarim.gov.tr (co-author)

Mr. Deniz Aksoy, Aegean Agricultural Research Institute, 304zmir, Turkey; deniz.aksoy@tarim.gov.tr (co-author)

Prof. Dr. Hatice Özaktan, Ege Universitesi, 304zmir, Turkey; hatice.ozaktan@ege.edu.tr (co-author)

Mr. Mustafa Akbaba, Ege Universitesi, 304zmir, Turkey; mustafa.akbaba@ege.edu.tr (co-author)

Quince has been taken over in pear cultivation as a rootstock since the 14th century and is widely used in Europe. Early maturation, high yield and dwarfing can be achieved with quince rootstocks and it can be easily reproduced by both traditional and tissue culture methods. One of the most important problems in pome fruit species is fire blight disease, which enters the plant through natural openings, causing flower, shoot and root burn. Root blight is the most devastating type of infection and it is transmitted through the bottom shoots in addition to the disease progressing in the vascular system. It's stated that the rootstocks are especially affect the susceptibility of fire blight on apple, but there is no study on quince. This study is planned to determine the effect of rootstock on the susceptibility of quince genotypes to fire blight disease. For this purpose, registered varieties Ege 22 and Zeybek 35 and genotype 2168 were grafted on Quince A rootstock (medium susceptible) with chip budding and hardwood cutting. Two and tree years old quince seedlings (grafted and produced by wood steel) inoculated with mixtures of virulent 3 Erwinia amylovora strains and 7, 14, 21 and 28 days after artificial inoculations course of the disease obtained weekly and sensitivity index at 28th day were determined. As a result of artificial inoculations, it was determined that the use of rootstock was not effective on the susceptibility of quince.

Keywords:

Rootstock, scion, interaction, Erwinia amylovora, Cydonia oblonga, grafting, resistance

Future chill risk assessment using chillR

Dr. Eike Luedeling, Universität Bonn, Auf dem Hügel 6, 53121 Bonn, Germany; luedeling@uni-bonn.de (presenting author)

Temperate fruit and nut trees in warm locations are threatened by climate change, because they may fail to satisfy their chilling requirements in a warmer future. This risk is difficult to quantify, because 1) limited validity of chilling requirement estimates across locations makes site-specific assessments necessary; 2) the effective chill accumulation period is often unknown; 3) advanced chill metrics, in particular Chill Portions, are difficult to compute; and 4) many researchers and orchard managers are poorly equipped for state-of-the-art climate risk analysis.

The chillR package for R helps overcome these challenges. Functions contained in this open-source package simplify many computational tasks involved in chill quantification, such as filling gaps in daily or hourly temperature records and producing hourly temperature curves from daily data. chillR contains representations of common chill (and heat) models, which can easily be applied to temperature records. Users can also define additional temperature response functions. chillR can delineate temperature response phases based on long-term phenology records (through Partial Least Squares regression), as well as quantify chill (and heat) accumulation during these phases. Evaluation of the relative sensitivity of phenological dates to variation in accumulated heat and chill allows assessing a cultivar's susceptibility to warming. Finally, chillR makes use of a weather generator to produce typical chill distributions for climate scenario ensembles to facilitate climate risk assessment.

chillR's functions are demonstrated using a long-term almond bloom dataset from Tunisia. They are used to delineate temperature response phases, compute chilling requirements and determine the sensitivity of bloom dates to variation in winter temperature. Risk analysis for an ensemble of 75 climate scenarios forecasts dramatic chill losses over the coming decades, which highlight development of adaptation measures as an urgent priority for this region.

Keywords:

winter chill, climate risk assessment, Dynamic Model, PLS regression, temperate trees

Breeding Studies Program on Summer Apple Cultivars Suitable to Subtropical Conditions

Prof. Dr. Ali Kuden, Cukurova univ. Fac.of Agric., Dept. of Horticulture, 01330 Adana, Turkey; akuden@cu.edu.tr (presenting author)

Prof. Dr. Ayzin Küden, Univ. Cukurova, Fac. of Agriculture, Univ. Cukurova, Fac. of Agriculture, Univ. Cukurova, Fac. of Agriculture, 01330 Adana, Turkey; abkuden@gmail.com (co-author)

Dr. Burhanettin IMRAK, ukurova Üniversity, ukurova Üniversity, ukurova Üniversity, 01130 Adana, Turkey; bimrak@cu.edu.tr (co-author)

Mr. Kadir Sarier, ukurova Üniversity, ukurova Üniversity, ukurova Üniversity, 01330 Adana, Turkey; kasaier@cu.edu.tr (co-author)

The aim of this apple breeding program is to obtain summer apple cultivars suitable to subtropical conditions. The crossings were applied in the apple orchard planted on M9 rootstock with 3.5x0.90m distances. Granny Smith, William's Pride, Galaxy Gala and Golden Dorset apple cultivars were used as parents. Crossings were done in April 2011, the seeds were stratificated for 60 days under +4°C and sawn in pots in January 2012.

The plants were transplanted to open field conditions in 2014. The first selections were done in 2015 and 2016. The second selection was done in 2017 and the first fruits harvested and early ripening (July and August) genotypes were determined. Among them, 55 genotypes from Granny Smith x William's Pride combination, 69 genotypes from William's Pride x Granny Smith combination, 11 genotypes from Galaxy Gala x Granny Smith combination and 20 genotypes from Granny Smith x Galaxy Gala combination were selected as elite plant material. The phenological observations and pomological analysis will be continued in July and August in 2018.

Keywords:

Crossing, summer apples, low chilling, warm climates

Keynote: Growing Deciduous Fruits, Chilling and Dormancy Breaking Research under Low Chill Conditions

Prof. Dr. Ayzin B. Küden, University of Cukurova, Dean of the Faculty of Agriculture, Department of Horticulture, 01330 Adana, Turkey; abkuden@cu.edu.tr (presenting author)

Cukurova plain is located at the Mediterranean region at 50 m of sea level. It has subtropical conditions with limiting factors of growing high chilling fruit species. Since 1980's studies have begun to grow peaches, apricots, plums, apples, pears, strawberries, etc. in this unsuitable climatic conditions. Then starting to chilling experiments in 1985, low or medium chilling cultivars were introduced to this area.

During this duration different methods of chilling accumulation and calculation of chilling requirements were experimented. The performances of fruit species and cultivars under different ecological conditions were investigated.

In 1990's, cherry growing studies have begun with the determination of chilling requirements of the cultivars. Then studies were continued with growing of low chilling cherry cultivars. In this paper, all these studies and the experiences on dormancy will be given.

Keywords:

Chilling requirements, dormancy breaking, subtropical climatic conditions, temperate fruits

Cultural practices to overcome dormancy in the temperate fruit trees in tropical and subtropical zones

Dr. Giuliano Finetto, Institute for Agricultural Sciences, Via A. Milani 19, 37124 Verona, Italy; giulianofinetto@tin.it (presenting author)

The cultivation of temperate fruit trees in the tropical and subtropical zones has to overcome several snags mainly related to the tackling endo-dormancy of the buds.

One way is utilizing suitable cultivars with low winter-chilling requirements. In some cases there is a tendency in existing early-ripening varieties to have low chilling requirement but their quality is poor. During last years the breeders have combined the low chilling requirement and earliness with an improvement of quality.

In some species the selection of suitable rootstocks has reduced the chilling requirement of the scion by decreasing its vigour.

However in many tropical and subtropical zones the application of some cultural practices are necessary to improve the production and the quality. The practices aim to induce leaf-fall , early dormancy and reduce the vigour of the shoots,

The cultural practices like with-holding irrigation water, defoliation , use of certain methods of pruning and growing the trees with some training forms have shown good results.

The application of cultural practices can a valuable strategy both to improve the production of the temperate fruits in tropical and subtropical zones and reduce the possible damages to environment by spraying of chemicals for breaking dormancy.

Keywords:

Breeding, breaker, training form, pruning, irrigation

Cultural practices to overcome dormancy of the temperate fruit trees in tropical and subtropical zones

Dr. Giuliano Finetto, Institute for Agricultural Sciences, Via A. Milani 19, 37124 Verona, Italy; giulianofinetto@tin.it (presenting author)

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In some species the selection of suitable rootstocks has reduced the chilling requirement of the scion by decreasing its vigour.

However in many tropical and subtropical zones the application of some cultural practices are necessary to improve the production and the quality. The practices aim to induce leaf-fall , early dormancy and reduce the vigour of the shoots,

The cultural practices like with-holding irrigation water, defoliation , use of certain methods of pruning and growing the trees with some training forms have shown good results.

The application of cultural practices can a valuable strategy both to improve the production of the temperate fruits in tropical and subtropical zones and reduce the possible damages to environment by spraying of chemicals for breaking dormancy.

Keywords:

Breeding, breaker, training form, pruning, irrigation

Molecular Mechanisms in plant adaptability to climate change, peach as a model

Prof. Maria Luisa Badenes, Instituto Valenciano de Invest. Agrarias, IVIA, CV-315, Km. 10,7 , 46113 Moncada Valencia, Spain; badenes_mlu@gva.es (presenting author)

Ms. Alba LLoret, IVIA, CV-315, Km. 10,7, 46113 Valencia Moncada, Spain; loret_alb@gva.es (co-author)

Dr. Gabino Ríos, Instituto Valenciano de Invest. Agrarias, CV-315, Km. 10,7 , 46113 (Valencia) Moncada, Spain; rios_gab@gva.es (co-author)

Perennial plants in temperate climates remain in a non-growing latent state during the cold period of winter, to ensure an optimal protection against low temperatures and drought. The dormancy period is induced by low temperatures, but also dormancy release results from quantitative and cumulative perception of chilling. This trait is highly genotype-dependent, and the main limiting factor for production in a climate change scenario.

Peach has been widely used for studying seasonal dormancy in adult tissues at physiological and molecular level, as a model for other perennial plants from temperate climates. Molecular studies of buds from varieties that differed in chilling requirements are needed to study correlation between bud characteristics during dormancy with genetic chilling requirements, physiology status and transcriptomic studies of genes linked to dormancy release.

This study reviews the different genes identified whose expression correlates with the dormancy status of buds. Studies of DORMANCY-ASSOCIATED MADS-box (DAM) whose expression is up regulated during dormancy are presented. Also, a gene coding a stress associate protein (SAP) with two finger domains, correlates its expression in dormant buds with dormancy release. A SAP-like gene of peach is repressed in flower buds after dormancy release, but hydric stresses induce its expression, similar to other SAP genes in plants. The constitutive expression of SAP-like in plum increases its tolerance to water stress. Sorbitol is the primary photosynthetic product and the major phloem-translocated form of carbon in the Rosaceae. Drought stress increases sorbitol accumulation in peach. The ortholog PpeS6PDH gene expression is affected by cold and water deficit stress

suggesting a role of this gene in protection against abiotic stresses, particularly chilling and desiccation, in flower buds of peach. Understanding the molecular mechanisms involved in dormancy release is a key to manage production in warmer conditions

Keywords:

dormancy release, stress associate protein, tolerance to drought stress

Relationship among entomosporium severity, defoliation, and vegetative'reproductive variables in pear of Brazil

Prof. Dr. Amauri Bogo, Av. Madre Benvenuta, 2007 - Itacorubi, 88035-901 Florianopolis, Santa Catarina, Brazil; amauri.bogo@udesc.br (presenting author)

Dr. Mayra Juline Gonçalves, Av. Madre Benvenuta, 2007 - Itacorubi, Salvatina F dos Santos,235, 88034600 Florianopolis-Santa Catarina, Brazil; mayra.juline@hotmail.com (co-author)

Dr. Rosa Maria V. Sanhueza, BR 116, km 7320, 95200000 VacariaRS-Rio Grande do Sul, Brazil; rosamaria@proterra.agr.br (co-author)

Prof. Dr. Ricardo T. Casa, Av. Luis de cames, 2007, 88.520000 Lages-Santa Catarina, Brazil; ricardo.casa@udesc.br (co-author)

Prof. Dr. Leo Rurato, Av. Luis de cames, 2007, 88520000 Lages-Santa Catarina, Brazil; leo.rufato@udesc.br (co-author)

Dr. Betina P. De bem, Av. Luis de cames, 2007, 88520000 Lages-Santa Catarina, Brazil; betadebem@yahoo.com.br (co-author)

Prof. Dr. Fabio N. Silva, Av. Luis de cames, 2007, 88520000 Lages-Santa Catarina, Brazil; fabio.silva@udesc.br (co-author)

This study aimed to evaluate the relationship among entomosporium severity, defoliation, and vegetative and reproductive variables of three European pear cultivars in southern Brazil. The ELS severity, defoliation, and natural leaf fall were assessed in three pear Packham's Triumph, Abate Fetel, and Williams cultivars every two weeks from the appearance of the first symptoms at the beginning of January until the end of April, during the 2012/2013 and 2013/2014 growing season. The vegetative and reproductive variables were evaluated in July, during the dormant period. The entomosporium severity data were integrated over time, and converted into the area under the disease progress curve (AUDPC). For all cultivars and growing seasons, the coefficients of determination (R2) of the linear regressions of entomosporium severity versus defoliation were significant ($P < 0.05$). Defoliation in trees affected by entomosporium was significantly higher than natural leaf fall in trees protected by fungicides. A negative correlation was observed among defoliation, branch fertility index, and plant height, indicating that the higher the defoliation, the lower the development of vegetative and reproductive variables and plant size and vigor. Significant differences were observed in entomosporium severity among cultivars when AUDPC data was evaluated.

Keywords:

Entomosporium mespili, Pyrus communis L., area under disease progress curve, natural leaf fall.

Pestalotiopsis spp. causing necrotic leaf spot on grapevines in southern Brazil

Prof. Dr. Amauri Bogo, Av. Madre Benvenuta, 2007 - Itacorubi, 88035-901 Florianopolis, Santa Catarina, Brazil; amauri.bogo@udesc.br (presenting author)

Dr. Claudia G. Piva, Av. Luis de cames, 2007, 88520000 Lages-Santa Catarina, Brazil; claudiaguginski@gmail.com (co-author)

Prof. Dr. Leocir J. Welter, Rodovia Ulysses Gaboardi, 3000 - Km 3, 89520-000 Curitibanos-Santa Catarina, Brazil; leocir.welter@ufsc.br (co-author)

Prof. Dr. Rubens O. Nodari, Av. Admar Gonzaga, 88034500 Florianopolis-Santa Catarina, Brazil; rubens.nodari@ufsc.br (co-author)

Ms. Beatriz Gomes, Rodovia Ulysses Gaboardi, 3000 - Km 3, 89520-000 Curitibanos-Santa Catarina, Brazil; beatrizgomes707@gmail.com (co-author)

Ms. Viviane Viviane Milcheski, Rodovia Ulysses Gaboardi, 3000 - Km 3, 89520-000 Curitibanos-Santa Catarina, Brazil; viviane_milcheski@hotmail.com (co-author)

Dr. Gustavo H. F. Klabunde , Av. Admar Gonzaga, 88034500 Florianopolis-Santa Catarina, Brazil; klabunde.gustavo@gmail.com (co-author)

Many species of the genus Pestalotiopsis are common in tropical and temperate regions and are often isolated as endophytic, saprophytic or pathogenic. There are few reports of Pestalotiopsis spp. as a primary disease in grapevine, especially in typical symptoms of anthracnose. Recently, Pestalotiopsis has been reported in South Korea, Australia and the USA causing grape diseases in branches, woody tissue, fruits, flowers and leaves, being the second most commonly isolated fungus of grapevine cancers in Texas/USA. The present study aimed to characterize the occurrence of Pestalotiopsis spp. causing anthracnose symptoms in grape leaves, branches and fruits at southern Brazil. Samples of grapevine plant tissues (Vitis vinifera L.) with typical symptoms of anthracnose were collected in 21 municipalities of the three southern Brazilian states from November 2013 to March 2015. The pathogen was isolated in potato agar dextrose culture medium and morphological characterization of the isolates as size of the conidia (width and length), size and number of apical appendages, growth rate index and final colony diameter were assessed. The pathogenicity of the isolates were tested on grape leaves and fruits. Data were submitted to analysis of variance and the means compared by the Scott Knott test at 5% probability of error and the isolates grouped by multivariate analysis. The ITS genomic region of one representative isolates was sequenced. The isolates showed morphological variation and were distributed into five groups. Comparison of the nucleotide sequence obtained for the isolates through BLAST and phylogenetic analysis confirmed the presence of Pestalotiopsis spp., suggesting the presence of more than one species of the genus. The pathogenicity test confirmed the ability of the isolates to cause grape leaf lesions and fruit rot. This study represents the first report of the identification and characterization of the genus

Pestalotiopsis causing diseases in grapevine in southern Brazil using morphological and molecular approaches.

Keywords:

Vitis vinifera, morphological and molecular features, ITS genomic region, pathogenicity

UFV Arano, UFV Deno and UFV Guato ' early ripening peach cultivars for mild climates

Prof. Dr. Claudio Horst Bruckner, Universidade Federal de Viçosa, Dept. de Fitotecnia, 36570-900 Viçosa MG, Brazil; bruckner@ufv.br (presenting author)

Prof. Dr. Carlos Eduardo Magalhães dos Santos, Universidade Federal de Viçosa, Dept de Fitotecnia, 36570-900 Viçosa-MG, Brazil; carlos.magalhaes@ufv.br (co-author)

Prof. Dr. Danielle Fabiol Pereira da Silva, Universidade Federal de Goias, Unidade de Ciências Agrarias, 75801-615 Jatai-GO, Brazil; daniellefpsilva@gmail.com (co-author)

Dr. Jose Osmar Costa e Silva, EMATER, Inst Paranaense de Assist. Técnica e Ext Ru, Av Prof. Joao B. Lovato, 360, 83414-060 Colombo-PR, Brazil; joksilva7@yahoo.com.br (co-author)

The peach breeding program of Universidade Federal de Viçosa (UFV) aims to develop cultivars adapted to low chilling winter and with good fruit quality for fresh marked. The described cultivars were selected among progeny UFV109. In1986 the peach 'Alô doçura' were crossed with nectarine 'Colombina', generating progeny UFV 886. From that progeny was selected the plant UFV 886-883. From this plant, seeds were collected after open pollination in 2003, generating the progeny UFV 2003. From this progeny, the plant UFV 2003-3 was selected and crossed with ‘Tropic Beauty’ in 2009, generating progeny UFV 109. The present genotypes (UFV 109-8, UFV 109-13 and UFV 109-14) were selected and named respectively UFV Arano, UFV Deno and UFV Guato. The three selections grafted on Okinawa rootstock has medium to high vigor and very low chilling requirement. The fruits of UFV Arano are large, with white melting pulp and the skin with yellow orange ground color covered by anthocyanin. The pulp is non-adherent to the stone and has medium sugar content and medium acidity. The fruits of UFV Deno are of medium size, with red blush melting flesh and the skin with yellow ground color covered by anthocyanin. The pulp is non-adherent to the stone. The fruits of UFV Guato are of medium size, with cream white melting pulp and the skin with yellow orange ground color strong covered by anthocyanin. The pulp is semi-adherent to the stone. The fruits of the three cultivars become ripe very early. The cultivars will be important for early peach production in mild climate areas in Brasil.

Keywords:

Prunus persica, breeding, cultivar, low chilling requirement.