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Cover photos: Top: Olive branch laden with fruit (Muzzalupo and Perri, pp 60-68). Center: Symptoms of *Cercospora* spot on avocado fruit and fruit stalk; bottom: Morphology of *Phytophthora citricola* (Pérez-Jiménez, pp 1-24).

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Rosa María Pérez-Jiménez (Spain) Significant Avocado Diseases Caused by Fungi and Oomycetes (pp 1-24)

ABSTRACT

Invited Review: The fruit of the avocado is highly valued not only because of its high nutritional value but also for its role in the cosmetic and health industries. It was used for alimentation as fresh food 9,000 years ago by American communities and later semi-domesticated by Mayan and Aztec civilizations. Nowadays world avocado production is around 3,300 thousand tons harvested from almost 400,000.00 ha. located in tropical and subtropical areas across all continents. Production is increasing and has duplicated over the last 25-years. However, this crop is threatened by notable diseases which could economically limit production and reduce fruit quality. Among them, the disease named Phytophthora root rot caused by the oomycete *Phytophthora cinnamomi* stands out. This destructive invader, which causes extensive losses in agriculture and natural plant communities, is present wherever avocado is cultivated. The present review considers relevant features of the biology and pathogenicity of this plant pathogen of global significance, mainly derived from molecular studies, related to its evolution, population structure and genetic variability, together with current information on management strategies of avocado root rot. Other significant diseases caused by fungi and oomycetes which affect the tree in the field or as postharvest diseases such as branch cankers, fruit rots or anthracnose, are also presented following a “disease profile style”, i.e. symptoms, causal agents, epidemiology and control.

Víctor Hugo Durán Zuazo, Carmen Rocío Rodríguez Pleguezuelo (Spain) Mango Research and Biotechnology (pp 25-37)

ABSTRACT

Invited Review: Revolutionary modern biotechnology can complement conventional breeding and expedite mango improvement programmes through studies involving *in vitro* culture and selection, micropropagation, embryo rescue, genetic transformation, marker-assisted characterization, and DNA fingerprinting, etc. *In vitro* culture and somatic embryogenesis of several different genotypes have already been achieved. The nucellus excised from immature fruitlets is the appropriate explant for the induction of embryogenic cultures. A specific Random Amplified Polymorphic DNA (RAPD) marker is used for segregating polyembryonic and monoembryonic mango cultivars. Other techniques, such as amplified fragment-length polymorphism (AFLP), macrosatellites, and microsatellites, have also been used to identify mango cultivars and rootstocks and to assess their genetic relationships. Genetic transformation using *Agrobacterium tumefaciens* has been reported. Genes that are involved in fruit ripening have been cloned and there have been attempts to incorporate these genes into plants. The present review highlights the information on biotechnological studies conducted in mango, presenting some potential biotechnological solutions to concrete problems for the improvement of mango production.

Seral Yücel, Canan Can, Melike Yurtmen, Raziye Cetinkaya-Yildiz, Yesim Aysan (Turkey) Tomato Pathology in Turkey (pp 38-47)

ABSTRACT

Invited Review: Turkey ranks 4th in the world after China, India and USA for vegetable production with 25.6 million tones and has a 3.1% share. Tomato, melon and watermelon are the most common vegetables with a large cultivation area in Turkey. Tomato is an important crop species in Turkey and total tomato production was 9,440,000 t in an area of 255,000 ha. Major fresh market tomato production takes place in the Aegean, Mediterranean and Marmara regions. Tomato is an important fresh fruit in Turkey's export, and ranks third after citrus and stone fruits with a 14% share. Some pests and diseases cause important yield losses in greenhouses and field grown tomatoes. Important fungal diseases of tomato in Turkey are Fusarium wilt (*Fusarium oxysporum* f.sp. *lycopersici*), Fusarium crown and root rot (*Fusarium oxysporum* f.sp. *radicis-lycopersici*), late blight (*Phytophthora infestans*), gray mold (*Botrytis cinerea*), early blight (*Alternaria solani*), leaf mold (*Cladosporium fulvum*), white mold (*Sclerotinia sclerotiorum*), damping-off (*Pythium* spp., *Rhizoctonia solani*, *Fusarium* spp.), corky root rot (*Pyrenochaeta lycopersici*). Reported viral diseases are: Alfalfa mosaic, Cucumber mosaic, Potato leaf roll, Tomato mosaic and Tobacco mosaic, Tomato spotted wilt, Tomato yellow leaf curl, Tobacco etch, Potato virus X, tomato black ring, tomato ringspot, Potato Y and stolbur disease as MLO. The bacterial diseases include bacterial canker (*Clavibacter michiganensis* subsp. *michiganensis*), bacterial speck (*Pseudomonas syringae* pv. *tomato*), bacterial stem rot (*Erwinia* spp.) and tomato pith necrosis (*Pseudomonas* spp.). Soil disinfestation prior to planting in the case of greenhouse tomato production has become an important issue in Turkey because of the continuous plantation of the same crops. In greenhouse tomato production solarization alone and/or in

combination with low dosage fumigant applications are being widely used in the Mediterranean region, which accounts for 90% of greenhouse tomato production in Turkey. Training studies are being conducted for farmers on Integrated Pest Management (IPM) strategies after planting.

Gaetano Laghetti, Angela R. Piergiovanni, Gabriella Sonnante, Lucia Lioi, Domenico Pignone (Italy) The Italian Lentil Genetic Resources: A Worthy Basic Tool for Breeders (pp 48-59)

ABSTRACT

Invited Review: The present contribution reviews the lentil landraces traditionally cultivated in Italy. Due to its position in the middle of the Mediterranean, Italy represents a good territory for drawing more general conclusions. Literature regarding archaeobotanical studies, conservation, exploitation, and risk of genetic erosion or extinction of Italian germplasm is briefly discussed. Knowledge on agronomic evaluations, on variability assessed by genetic (AFLP, ISSR, SSR) and biochemical (SDS-PAGE) markers, and on relationships among the still cultivated landraces is reported. The distinctive traits of Italian lentil germplasm are evidenced, together with data on grain composition, due to its relevance for consumers and food industry. These data are discussed on the grounds of the necessity of adequate actions aimed at safeguarding these precious genetic resources. Three case studies are analysed in depth. The potential of lentil germplasm for breeding programmes aimed at the selection of ideotypes well adapted to Italian and Mediterranean environments are also discussed.

Innocenzo Muzzalupo, Enzo Perri (Italy) Genetic Characterization of Olive Germplasm by Molecular Markers (pp 60-68)

ABSTRACT

Invited Review: The olive tree is a member of the *Oleaceae* family, which contains the genera *Fraxinus*, *Forsythia*, *Forestiera*, *Ligustrum* and *Syringa*, as well as the genus *Olea*. Commercial olives are products of the *Olea europaea* L. species. There are roughly 20 species of *Olea* found throughout tropical and subtropical regions of the world, but only *O. europaea* L. produces edible fruit. The fruit of olive trees can either be processed to make table olives or milled to produce olive oil. Of the many different varieties of olives, some olives are cultivated specifically for table consumption while the majority are used for oil extraction. The origin of *O. europaea* in the Mediterranean basin is not clear. Since olive cultivation has been practiced in all Mediterranean basin countries for many millenia, the presence of a large number of synonymic and homonymic species is very probable. The species' poorly-defined genetic natures give rise to several problems, both for olive nurseries and for correctly estimating the platforms needed to properly classify and exploit olive products like canned olives and oil. From a commercial perspective, the Mediterranean basin grows many varieties of olive trees, and this region alone produces 99% and consumes 87% of the world's olive oil. Thus, a solution to this problem is highly desirable. A formidable effort has been made to characterize olive germplasm using different types of biochemical and molecular markers. This review highlights the importance of studying the degree and distribution of genetic diversity for better exploitation of olive resources and for the design of plant breeding programmes.

Vassilis A. Vassiliou (Cyprus) Bio-ecology and Control of *Pezothrips kellyanus* (Thysanoptera: Thripidae) on Citrus in Cyprus (pp 69-73)

ABSTRACT

Original Research Paper: Kelly's citrus thrips is one of the most common thrips species found in Cyprus citrus orchards. Kelly's citrus thrips larvae were the sole insect stage causing feeding damage mainly on immature lemon and grapefruit fruits. Under Cyprus conditions Kelly's citrus thrips adults prefer to concentrate mostly in the northern and eastern sides of both lemon and grapefruit canopies. The recorded mean number of adults in the northern side of lemon canopies was 60.7, followed by eastern – 48.4 adults ($F_{0.05(3,32)} = 2.431$; $P < 0.083$; Mean sq. = 2952.60), while on grapefruit canopies was 45.3 and 30.8 adults ($F_{0.05(3,32)} = 4.237$; $P < 0.012$; Mean sq. = 2578.30) in the northern and eastern sides, respectively. In 2006, damage of lemon and grapefruit fruits reached 64.0% and 45.8%, respectively, while in 2007 damage was recorded at 50.4% and 91.2%, respectively. Depending on weather conditions and pest's abundance, the first chemical spraying should be applied 10-20 days after massive petal fall and calyx closure at the fruitlet stage, and the second one-two weeks after the first application. Various insecticides were evaluated in field trials in lemon and grapefruit plantations against Kelly's citrus thrips. Statistically significant differences were observed in 2006 and 2007. In 2006, the best protection of lemons provided by the neonicotinoid acetamiprid (93.0%) and the carbamate methiocarb (79.7%), while on grapefruits the most effective insecticides were acetamiprid (95.1%) and the macrocyclic lactone spinosad (75.7%). In 2007, acetamiprid and the Insect Growth Regulator lufenuron provided 85.1%

and 82.2% protection of lemons, respectively, while on grapefruits best results were obtained with acetamiprid and the organophosphate chlorpyrifos providing 86.5% and 84.1% protection, respectively.

Pasquale Martiniello (Italy) Adaptability of Bermudagrass Turf Varieties to a Mediterranean Environment (pp 74-81)

ABSTRACT

Original Research Paper: The main agronomic interest in bermudagrass (*Cynodon dactylon* (L.) Pers.) in the last quarter of the 20th Century was in environments with harsh weather condition when the species was used as a turfgrass. Suitable varieties were mainly released in the USA and were well adapted to warm conditions of the USA bermudagrass belt, while information on their establishment and performance in Mediterranean sites was scant. An experiment on turf lawns using the most popular seed market bermudagrass varieties was established on a site with typical Mediterranean climate (Foggia, southern Italy). In July of 1999, the varieties were hand seeded in an experimental block design and evaluated across five years for qualitative, spring greenup and dormancy traits. The range of scores over the years was 7.9-8.4, 6-6.3 and 7.8-8.2, respectively for turf quality, colour and cover traits. A larger range of variation was observed in shoot density, in spring and summer assessment (21.6-29 and 21.2-30.4 stems 25 cm⁻², respectively). Results over seasons showed differences among cultivars for all qualitative characteristics. Spring score values were higher than those of other seasons for all traits. Autumn score was lower by 14.1%, 25.6% and 6.4% than the spring and summer season values, respectively for turf quality, colour and cover traits. All cultivars evaluated adapted well to the Mediterranean environment. When data was processed by a cluster method, a different adaptability among varieties to different seasons was shown. Varieties 'Jackpot' and 'Shangri-La' were in a group of best varieties in all seasons and for all qualitative traits.

Pasquale Martiniello (Italy) Response of Flora and Herbage to Variation of Chemical Elements in Topsoil of Protected European Union Lands of Mediterranean Environments (pp 82-90)

ABSTRACT

Original Research Paper: Pasturelands with bioclimatic mesomediterranean zones in southern Italy amount to 2.5 million ha which represent 44.6% of the national total; 25.8% of pasturelands are covered by National Parks. A further surface area of about 6.02 million ha, named Sites with Community Importance and Zones with Special Protection, has been considered by the European Union as protected areas. The flora and fauna biodiversity of these areas is protected by law. A high request of biomass for animal feeding stressed the sward of pasturelands of these areas. Chemical element-enrichment of topsoil in the protected lands was found to be a feasible method to increase herbage production without changing the ecosystem of native flora. The studies were established on pasturelands of two National Parks. The pastures' surfaces were enriched with nitrogen (N), phosphorous (P) and combined N-P with the aim of assessing the effect of application on biomass yield, herbage quality and flora composition. The environments studied differed in their biomass, qualitative characteristics of the herbage and properties of the topsoil. The effect of chemical compounds on soil and qualitative properties of biomass showed a similar trend of variation between environments. N, P and combined N-P compounds increased biomass production 41%, 56% and 57%, respectively more than the control. At the end of the experiments, combined N-P enrichment treatment lower the content of N_{tot} and P₂O₅ in topsoil and the variation of flora composition of natural pasture control. Combined N-P increased the milk feed unit (MFU) per hectare potential by 2924 compared to 1956 for N and 2769 for P, minimized the variation among flora composition, reduced the content of organic carbon and favoured the content of N and P₂O₅ in topsoil in comparison to the natural pasture control.

Harold C. Passam, Alexandra Koutri, Ioannis C. Karapanos (Greece) Comparative Effects of Chlormequat Chloride (CCC) and Gibberellic Acid (GA₃) on the Flowering and Seed Production of Lettuce (pp 91-93)

ABSTRACT

Original Research Paper: The objective of the present study was to determine if the application of chlormequat chloride (CCC) at the rosette stage would have a positive effect on seed stalk growth, flowering, seed yield and seed quality of lettuce in comparison with gibberellin (GA₃) or water (control) applied at the same stage. Seeds of lettuce were sown on 16 October (cvs. 'Great Lakes' and 'Parris Island') and 20 January ('Parris Island') and the plants of both sowings were cultivated in an unheated greenhouse until July and August, respectively. At the rosette stage (8 leaves), the plants were sprayed with 30 ppm GA₃, 500 ppm CCC or water (control). Although GA₃ induced rapid bolting, its effect on the time of flowering and harvest were less pronounced. GA₃ increased seed yield and in some cases the mean 1000-seed weight and percent germination. However, the

seed stalks of GA₃-treated plants were longer and thinner than those of the control. Treatment with CCC at the 8-leaf stage produced plants with better seed stalk characteristics (shorter and thicker), but yield and seed quality (mean 1000 seed weight, germination) were similar to the control and significantly less than that of the GA₃ treated plants. In 'Parris Island', the yield and quality of seed were better in the October sown crop than in the January sown crop. Whereas the application of GA₃ is indicated for lettuce seed production, especially in tightly-heading cultivars such as 'Great Lakes', CCC is beneficial only in terms of seed stalk characteristics.

Ira Stancheva (Bulgaria), Abd el Ghany Youssef (Egypt), Maria Geneva, Lubomir Iliev, Georgi Georgiev (Bulgaria) Regulation of Milk Thistle (*Silybum marianum* L.) Growth, Seed Yield and Silymarin Content with Fertilization and Thidiazuron Application (pp 94-98)

ABSTRACT

Original Research Paper: This study looks into the effect of foliar or soil fertilization and growth regulator thidiazuron (TDZ) treatment on the vegetative and reproductive growth, some physiological parameters, seed yield and silymarin content of field grown milk thistle (*Silybum marianum* L.) plants. Foliar fertilizer Agroleaf[®] of different NPK proportions was applied at different plant developmental stages. Combined application of the fertilizers with TDZ affected the growth, accumulation of nutrients (N, P, K), nitrate reductase activity, reducing sugars and free amino acids content positively. These changes were associated with altered flowering rate, enhanced seed ripening and increased yield. Treatment of milk thistle plants with TDZ in combination with foliar fertilizer increased seed yield due to an increase in the number of lateral stems, the number of flower heads and the seed fresh weight per flower head. Silymarin accumulation in the seeds was also positively influenced by the combined application of foliar fertilizer and TDZ.

Maria Grazia Alaimo, Daniela Vizzi (Italy) Pollution-Induced Histochemical and Chemical Adaptation in *Pinus* Needles from the Palermo Area (Italy) (pp 99-105)

ABSTRACT

Original Research Paper: We examined adaptations in histochemical composition and chemical element content in pine needles caused by pollution stress. Phenol content and trace element concentrations were measured in mature needles of *Pinus halepensis* Mill. and *Pinus piunea* L. from an urban ecosystem (the city of Palermo, Italy) and compared with samples collected in periurban sites where air pollution is presumably lower. Macro-, micro- and toxic element concentrations in needles are affected by urban pollution, seasonal conditions and by the passage of time: pollutant capture rates and phenol accumulation remain high in bioindicator plants; this indicates a sub-pathological reactivity to persistent stress factors that activates the plants' detoxification mechanism, prompting secondary metabolite production. Phenol content is positively correlated with some toxic elements (trace metals). Although this manuscript summarizes the results of a study conducted during a specific period, our findings can be considered representative and generalizable. The plants chosen for our investigations, *Pinus halepensis* Mill. and *Pinus pinea* L., are widely used as ornamental plants in many cities, including Palermo, where it is also employed as a biomonitor to check the quality of the environment.

Emilio Cervantes (Spain) Challenging *Arabidopsis thaliana* as the Ultimate Model Species: Can Seed Germination be the Achilles' Heel? (pp 106-109)

ABSTRACT

Research Note: *Arabidopsis thaliana* has reached maturity as a model system in plants. In this short text first, the meaning of the word model is discussed in relation to the ease with which developmental processes can be analyzed and also in relation to the influence that the model itself has on experimentation. Although the efficiency of *Arabidopsis* as a plant model has been demonstrated, and is beyond the scope of this discussion, the description of ecological strategies in plants indicates that *Arabidopsis* is an example of an r-type strategy species. Plants with the r-type strategy, and, in particular *Arabidopsis*, although structurally simple, may support complex regulatory processes. This could involve complex genome dynamics, in particular in response to given environmental conditions during situations such as, for example, seed germination.