e - news
Centro de Botânica Aplicada à Agricultura
CBAA
4th edition | Jan 2013

CBAA is a well renowned research centre in plant and vegetation sciences, microbiology, grapes and wine. Our mission is to:

- Carry out excellent fundamental and strategic/applied research towards the generation of economic and societal impact
- Train scientists
- Make our findings available to economical agents and society in general

CBAA aims at stimulating scientific excellence, rendering the Center a reference institution in fundamental and applied integrative biological studies. Research at CBAA focuses on four main RESEARCH AREAS as well an additional integrated platform with multidisciplinary approaches.

- Epigenetics, genetic diversity and selection
- Environmental ecophysiology and functional genomics
- Microbes, food and wine
- Plant diversity and conservation

Award from "Ordem dos Engenheiros" attributed to the PORVID

Award Ordem dos Engenheiros – 75 anos, Engenharia Agronómica "A vinha e o vinho – Património Histórico Nacional" attributed to the PORVID ("Portuguese Association for Grapevine Diversity", an organization that groups ISA/CBAA, other research institutions and Vinea&Wine enterprises), 2012, Convento do Beato.

Prof. Antero Martins receiving the award

http://www.isa.ulisboa.pt/files/publicacoes/ref/ref4PV.pdf

FORTHCOMING EVENTS

Beekeeping and Biodiversity
"Apicultura e Biodiversidade"
SCAP, ISA/UTL; CBAA; ESACBranco

8th & 9th, Mar 2013. Centro Cultural Raiano, Idanha a Nova, Castelo Branco

Bees, particularly honey bees, play an important role in the pollination of a wide range of crops and wild plants. The production of about 80% of the 264 crop species cultivated in the European Union depends directly on insect pollinators, mostly bees, and the global annual monetary value of pollination is estimated to be billions of dollars. In addition to pollination, bees also provide us with foods and food services, such as: honey, pollen, larvae, wax for food processing, propolis in food technology, and royal jelly as a dietary supplement and ingredient in food. This symposium expects an improvement on knowledge transfer between research and apiculture. A more integrated approach in assessing bees and other pollinator survival and their implications on global biodiversity is necessary. Since given the importance of bees in the ecosystem and the food chain and given the multiple services they provide, their protection is essential.

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RELEVANT PUBLICATIONS

Broad-sense heritability in the context of mixed models for grapevine initial selection trials

In classical models of quantitative genetics (i.e., balanced data with no random effects other than those associated with genotypes and error and diagonal variance-covariance matrices), the proportion of total variance (phenotypic variance) that is genetic is called heritability. However, this classical concept is not always applicable. This study addresses to the genetic analysis and selection in grapevine. The aims were to study: (1) the applicability of a generalised measure of broad-sense heritability to evaluate the success of the genotypic selection and compare it to the classical approach (2) the effect of different models on the accuracy and precision of the genotypic variance component and the generalised broad-sense heritability estimates. The results showed that the computation of a measure of generalised broad-sense heritability is feasible and useful for evaluating the efficiency of genotypic selection. In this study, 88% of the fitted models did not comply with the standards for applying the classical concept of heritability. The differences between both the classical and generalised broad-sense heritability estimates increased with the complexity of the model.

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Gonçalves, E. et al. (2012). Broad-sense heritability in the context of mixed models for grapevine initial selection trials. Euphytica, online first doi:10.1007/s10681-012-0787-9

Characterization of chickpea (*Cicer arietinum*) accessions in the field - leaf gas-exchange and temperature

Costa, J.M. et al. (2012). Characterization of chickpea (*Cicer arietinum*) accessions in the field - leaf gas-exchange and temperature. Libro de Actas XI Simposio Hispano-Portugués de Relaciones Hídricas en las Plantas, Sevilla, 17 - 20 de Septiembre de 2012, pp. 288-291.

The agricultural sector needs fast, reliable and non-invasive methods to characterize crops' physiological condition in response to stress. We combined thermal imaging, leaf gas exchange and Chl a fluorescence to characterize resistance to water stress in six genotypes of *Cicer arietinum* (chickpea). Field trials were carried out in Elvas, South Portugal. Plants were grown under rain-fed conditions. Observations were done at two development stages: 1) beginning flowering (end April 2011) and 2) end of flowering (mid June 2011). Leaf temperature and water use efficiency were higher at end than at beginning of flowering due to soil water deficits and decreased transpiration. The photochemical efficiency of photosystem II (ΦPSII) remained similar along the trial. The limitations of thermal imaging to characterize different genotypes are discussed, namely in terms of the effect of leaf morphology (e.g. small size leaflets as it occurs with chickpea) and of the phenological phase.

www.rhsevilla2012.com/
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Chemical composition and antibacterial activity of the essential oils from the medicinal plant *Mentha cervina* L. grown in Portugal

Mentha cervina is a medicinal plant traditionally used in Portugal in folk medicine, in different gastric disorders and inflammations of the respiratory tract. In order to validate those traditional uses, *M. cervina* essential oils (EOs) were characterized by GC and GC–MS and their antimicrobial activity was tested against 23 bacterial strains (including multiresistant strains). The EOs were dominated by the monoterpenes pulegone (52–75%), isomenthone (8–24%), limonene (4–6%), and menthofuran (1–2%). The most effective antibacterial activity was expressed by the EOs against the Gram-negative bacteria, *E. coli* and *A. baumannii*, with MIC values of 1 mg/ml. The EOs complex mixtures were more active than the individual aromatic components supporting the hypothesis that the EOs antibacterial activity is a function of the synergistic effect of their different aromatic components. These results show the potential role of *M. cervina* EOs as antibacterial agents and validate the traditional use of this plant.

Rodrigues L. et al. (2011) Chemical composition and antibacterial activity of the essential oils from the medicinal plant *Mentha cervina* L. grown in Portugal. Medicinal Chemistry Research. (published online November 2011) doi:10.1007/s00044-011-9858-z

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Critical period for weed control in potatoes in the Huambo Province (Angola)

The effects of different weed management periods on potatoes were studied in three areas (Bailundo, Chianga and Calenga) of the central highlands of Angola and in three cropping seasons, from June 2005 to May 2007. Six weed-management treatments were used to identify critical periods of competition and to allow the development of more precise management recommendations. Total potato yield ranged from about 22 t ha-1 in weed-free plots to about 3 t ha-1 with no weed control – a yield loss of 86%. Major weed species – *Galinsoga parviflora*, *Cyperus esculentus*, *Bidens bilernata*, *Amaranthus hybridus*, *Nicandra physaloides*, *Portulaca oleracea* and *Datura stramonium* – differed from area to area. The species *G. parviflora* dominated the weed flora in all three areas – 73, 97 and 72 plants m-2 50 days after crop emergence in Bailundo, Chianga and Calenga respectively, in dry season trials; while *C. esculentus* was also present in Chianga and Calenga, with an average density of ca 30 plants m-2 in dry season trials. Gompertz and logistic equations were fitted to data representing increasing periods of weed-free growth and weed interference, respectively. Critical periods for weed control, with a 95% weed -free total yield, were estimated from 26 to 66 and from 20 to 61 days after emergence for the rainy and dry seasons, respectively. Weed competition before or after these critical periods had negligible effects on crop yield.

http://dx.doi.org/10.1590/S0100-83582011000200013

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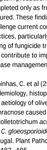
Angola nicandra

*Cleome monophylla*L., (CAPPARIDACEAE)



Commelina nigritana Benth. var. gambiae (C.B. Clarke) Brenan (COMMELINACEAE)

Gonçalves, E. et al. (2012). Broad-sense heritability in the context of mixed models for grapevine initial selection trials. Euphytica, online first doi:10.1007/s10681-012-0787-9

Deficit Irrigation in Mediterranean Vineyards - a Tool to Increase Water Use Efficiency and to Control Grapevine and Berry Growth

Water is increasingly scarce in Mediterranean Europe and irrigated agriculture is one of the largest and most inefficient users of this natural resource. Moreover, ecological topics such as the "water foot print" became more relevant for the academy, society and the agri-food industry. The wine sector needs to improve its economical and environmental sustainability. Deficit irrigation (water supply below full crop evapotranspiration) can be a tool for a more efficient use of water in viticulture with likely positive effects on berry quality. Better knowledge of genotype responses (e.g., photosynthesis, water use efficiency) to water stress together with the use of remote sensing (e.g. thermal imaging) can help to optimize crop/soil management, improve yield and berry quality under increasingly adverse climate conditions. Other important challenge is o determine how water stress regulate enzymes and proteins of the various metabolic pathways and affect berry composition and quality.

Costa, J.M. et al. (2012). Deficit Irrigation in Mediterranean Vineyards - a Tool to Increase Water Use Efficiency and to Control Grapevine and Berry Growth. Acta Horticulturae 931, 159-170

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Drought stress response in *Jatropha curcas* growth and physiology

Jatropha curcas is a non edible oil crop predominately used to produce bio-diesel. However, tolerance to drought remains poorly described for Jatropha curcas accessions from different geographical and climatic origins. To address this issue we studied the response of two J. curcas accessions, one from Indonesia (wet tropical clim ate) and the other from Cape Verde islands (semi-arid climate). Potted seedlings (with 71 days) of both accessions were subjected to continuous well watered conditions (control) or to a drought stress period followed by re-watering. Both accessions maintained high leaf relative water content (70-80%) even at maximum stress. Net photosynthesis (An) was not affected by mild to moderate stress but it abruptly dropped at severe stress due to lower stomatal conductance. Plant growth was reduced to mimize water loss but no significant differences were found between accessions. Drought stress did not reduce chl contents but led to reduced chl a/b. Both accessions showed fast recovery of both stomatal and photochemical parameters suggesting a good tolerance to water stress.

Sapeta, H. et. al. (2013). Drought stress response in Jatropha curcas: growth and physiology. Environmental and Experimental Botany, 85, 76–84

http://dx.doi.org/10.1016/j.envexpbot.2012.08.012

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Jatropha curcas

Epidemiology, histopathology and aetiology of olive anthracnose caused by *Colletotrichum acutatum* and C. gloeosporioides in Portugal

Anthracnose (*Colletotrichum acutatum* and *C.gloeosporioides*)

Anthracnose is an important disease affecting mature olive fruits, causing significant yield losses, and poor fruit and oil quality. In Portugal, high anthracnose incidence was recorded during 2003–2007 with 41% of 908 orchards surveyed displaying disease symptoms. In another 14% of the orchards, the pathogen was recorded in symptomless plants. Disease severity was on average 36%, frequently reaching 100%. In Portugal, anthracnose is endemic to neglected orchards of susceptible cultivars, but under favourable conditions it can also severely affect less susceptible cultivars. Pathogens were genetically heterogeneous, with *Colletotrichum acutatum* genetic group A2 as the most frequent (80%), followed by group A4 (12%) and group A5 along with *C. gloeosporioides* (3–4%), while groups A3 and A6 of *C. acutatum* were sporadic. Important geographic variations were observed in the frequencies of these populations, accompanied by year-to-year populational shifts. Epidemiology and histopathology studies showed the presence of the pathogens on vegetative organs year-round, particularly on olive leaves and branches, and on weeds. These represent inoculum reservoirs where secondary conidiation occurs, and conidia are then dispersed by spring rains reaching flowers and young fruits or by autumn rains reaching pre-mature fruits. Unripe fruits were colonized without showing symptoms up to penetration of the cuticle, but further colonization and symptom production was completed only as fruits matured. These findings challenge current control practices, particularly the timing of fungicide treatment, and contribute to improved disease management.

Tsahinhas, C. et al (2011). Epidemiology, histopathology and aetiology of olive anthracnose caused by *Colletotrichum acutatum* and *C. gloeosporioides* in Portugal. Plant Pathology 60 (3): 483 - 495.

DOI: 10.1111/j.1365-3059.2010.02397.x

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Genetic Variability Evaluation and Selection in Ancient Grapevine Varieties

The present work aims to contribute to a better understanding of the interest in the intravarietal variability of the ancient varieties (for selection, for reconstructing history, to halt genetic erosion). This work addresses the question of how to obtain a representative sample of the variability within a variety; describes experimental designs that are suitable for large field trials containing more than 100 genotypes; studies the most usual mixed models used to analyse data from large field trials of grapevine varieties; gives some results on the intravarietal genetic variability of two autochthonous Portuguese varieties. In addition, mass genotypic selection regarding several traits is carried out to demonstrate the potential of genetic variability and the advantages of the mass genotypic selection over clonal selection.

Gonçalves, E., Martins, A. (2011). Genetic Variability Evaluation and Selection in Ancient Grapevine Varieties, cap. 15, 333-352. In Plant Breeding, Abdurakhmonov, I.Y. (eds), Intech, 352pp. ISBN 978-953-307-932-5.

http://cdn.intechweb.org/pdfs/25564.pdf

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