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MESSAGE FROM THE IPPS PRESIDENT

Dear IPPS Members,

Best wishes for a happy new year of 2014. I hope this year brings you all health and happiness.

I am pleased to announce that our next major conference, the 13th World Congress on Parasitic Plants, will take place in Kunming, China, for the first time in Asia. Dr. Airong Li at Kunming Institute of Botany, Chinese Academy of Sciences and her colleagues with other Chinese scientists will organize the congress. We are looking forward to welcoming participants in particular from Asian countries which are rich sources of parasitic plants/weeds. The proposed date will be in June or July 2015, exact timing yet to be decided. Details will soon be available on the conference website.

As you will find in this issue, the first COST-STREAM meeting organized by Cristina Prandi and Hinanit Koltai was held in Jerusalem, Israel, in November. This meeting dealt with strigolactone-related topics and therefore strigolactones were discussed as host recognition signals for root parasitic plants and microorganisms including AM fungi and rhizobia in the rhizosphere, and as hormones regulating growth and developments of plants. Furthermore, their potential application in cancer prevention was also discussed. It was indeed a good mix of sciences on strigolactones and provided an excellent platform on which parasitic plant scientists can work together with colleagues from other research areas. Since many IPPS members are involved in this COST project, they were able to catch up on important progress in strigolactone research.

I hope this year brings further new insights into parasitic plants.

Sincerely,
Koichi Yoneyama, IPPS President
yoneyama@cc.utsunomiya-u.ac.jp

MEETING REPORTS**The Third Symposium on the Biology of Non-Weedy Parasitic Plants, Namur, Belgium, 12-15 September 2013.**

This meeting took place in the beautiful town of Namur, Belgium, in the Youth Hostel along the river Meuse. After the first two symposia on the biology of non-weedy hemiparasitic Orobanchaceae (at Wageningen in 2004, and České Budějovice in 2008), we decided to broaden the thematic range to all haustorial parasites, due to similar

methodologies used in research and many parallels in the biology across unrelated groups of parasitic plants. The first full day of lectures focused on ecology and ecophysiology, while the talks on the second day dealt with the evolutionary aspects.

The meeting had two invited speakers. Of these, David Watson (Charles Sturt University, Australia) gave an amazing talk about parasitic plants as important components of terrestrial ecosystems supported by many examples of his own work on the ecological interactions of Australian mistletoes. Vincent Merckx provided a fascinating outlook on the biology of mycoheterotrophic plants, which was followed by a discussion comparing their ecological behaviour with haustorial parasites.

Several of the 26 participants gave talks or presented posters on the ecophysiology of hemiparasites. Andras Demey (Ghent University, Belgium) summarized his PhD work on the effects of hemiparasites on nutrient cycling in grasslands. Jakub Těšitel (University of South Bohemia, Czech Republic) gave a talk on the effects of abiotic resources, namely water and mineral nutrients, on the parasitic and competitive components of the root hemiparasitic interaction. Gerhard Glatzel (Austrian Academy of Sciences) presented an ecophysiology-based hypothesis on the evolution of deciduousness in mistletoes. Petra Světlíková (University of South Bohemia, Czech Republic) presented a poster on the efficiency of sunfleck (patchy sunlight) harvesting by *Melampyrum pratense*, a root hemiparasite growing in forest understory. The poster by Michal Hejman (Czech University of Life Sciences) summarized the effects of application of various fertilizers on the population density and seed production of *Rhinanthus minor* in the long-term Rengen Grassland Experiment. Adrien Saulnier (Louvain University, Belgium) presented a poster on his MSc project detailing the patterns of seed formation in *Rhinanthus angustifolius*.

Population and community ecology of root parasites was another important topic of the conference. Jitka Kocková (University of South Bohemia, Czech Republic) gave a talk on a DNA barcoding-based approach to identification of host spectra of root hemiparasites. Petr Blažek (University of South Bohemia, Czech Republic) presented results of his experiments on the effects of different mowing treatments on the populations of *Rhinanthus*. Pavel Fibich (University of South Bohemia, Czech Republic) introduced a project on modelling of ecological niches of Central European hemiparasites based on the data from Czech National Phytosociological Database and a functional trait approach. Vojtěch Adamec (University of South Bohemia, Czech Republic) gave a talk on various aspects of ecology of the endangered early ecotype of *Melampyrum nemorosum*. Vilém Pavlů (Czech University of Life Sciences) presented results of an experiment investigating the effects of climatic

conditions on germination and growth of *Rhinanthus* and its effect on the host. Markéta Tahadlová (University of South Bohemia, Czech Republic) presented a poster on her project dealing with the interactions between root hemiparasites and herbivorous insects. Jakub Těšitel's poster introduced a restoration ecology project aiming to suppress the aggressive grass species *Calamagrostis epigejos* by *Rhinanthus* hemiparasites.

The evolutionary contributions mostly focused on individual species or species groups. Sidonie Bellot (University of Munich, Germany) gave a talk on the retention of the plastid genome in holoparasitic plant lineages exemplified by her study on the endophytic holoparasites in the Apodanthaceae. Milan Štech (University of South Bohemia, Czech Republic) presented results of his long-term investigation on the evolution and phylogeography of the *Melampyrum nemorosum* group, and the last lecture of the conference was given by Laurent Natalis (Louvain University, Belgium) on the role of bumblebees in shaping asymmetric hybridization between *Rhinanthus minor* and *R. angustifolius*. Šárka Svobodová (University of South Bohemia, Czech Republic) presented a poster on evolution and hybridization patterns in Central European *Euphrasia* species. Daniel Pinto Carrasco (University of Salamanca, Spain) had a poster on taxonomy and phylogeography of the *Odontites recordonii* group, an endemic of the Iberian Peninsula. Olena Peregrym presented her study on seed morphology and ornamentation of East European *Pedicularis* species, and Vinciane Mossion's poster outlined the plans for her PhD project on the taxonomy and phylogeography of the genus *Rhinanthus*.

The conference programme ended with a field excursion to calcareous grasslands in the hills surrounding the river Meuse close to Namur. We enjoyed this remarkably species-rich vegetation in its late summer shape. Although it was rather late for most annual hemiparasitic species, possibly occurring locally, we managed to find some fruiting plants of *Melampyrum pratense* at a forest edge. The social part of the conference included evening sessions filled with various discussions and supported by a supply of outstanding Belgian beer, and the last evening of the conference happily coincided with splendid fireworks at the Namur Festival.

The abstract book of the conference can be downloaded at <http://botanika.prf.jcu.cz/hemiparasites/>, and a special issue of Plant Ecology and Evolution <<http://www.plecevo.eu/>> with contributions from speakers at the conference is in the making, which will be published in early 2015.

Papers presented:

- David Watson - Parasitic plants as drivers of ecological communities patterns > predictions > processes.
 Andreas Demey - Impacts of hemiparasitic plants on the vegetation and biogeochemical cycling in two contrasting semi-natural grassland types.
 Jakub Těšitel - Fighting for resources—parasitism, competition and virulence in a hemiparasitic association.
 Petr Blažek - Response of grassland Rhinanthoid Orobanchaceae to different mowing dates.
 Vojtěch Adamec - Ecology of early ecotype of *Melampyrum nemorosum*.
 Jitka Kockova - Using DNA-barcoding and anatomical methods to reveal host spectra of hemiparasitic plants under natural conditions.
 Pavel Fibich - Modelling of niches of Central European root-hemiparasitic species.
 Vincent Merckx - Mycoheterotrophy: plants living on fungi.
 Sidonie Bellot - The evolutionary retention of plastid genomes in nonphotosynthetic plants: A comparative approach centred on the endoparasitic Apodanthaceae.
 Gerhard Glatzel - The evolution of deciduous mistletoes – a hypothesis.
 Milan Štech - Why is the *Melampyrum nemorosum* group taxonomically difficult?
 Laurent Natalis - The role of bumblebee pollinators in hybridization between two *Rhinanthus* species.

Jakub Těšitel and Renate Wesselingh

EWRS Working Group - Novel and Sustainable Weed Management in Arid and Semi-arid Agro-ecosystems Crete, Greece. Sept 29-Oct 3, 2013.

Contributions presented included:

- Cohen, Y. *et al.* - Parasitic weed mapping to improve management: the case of broomrape in tomato crops.
 Eizenberg, H. - Advanced technologies for tempo-spatial modeling of broomrapes (*Orobanche* and *Phelipanche* spp.) and herbicides application.
 Shilo, T. *et al.* - Aspects of glyphosate mechanism in Egyptian broomrape control.
 Sen, B. *et al.* - Effects of salt stress (NaCl) and broomrape (*Phelipanche aegyptiaca*) on superoxide dismutase and peroxidase activities of two tomatoes varieties.
 Ben David, O. *et al.* - Variation in response of a resistant sunflower cultivar to *Phelipanche aegyptiaca* and *Orobanche cumana*.
 Aly, R. *et al.* - Development of molecular markers based on ITS and *rbcL* genes to identify and distinguish between broomrape species in a soil sample.

Rabinovitz, O. *et al.* - Modeling imazapic movement applied by drip irrigation to maximize broomrape control.

Bab, R. *et al.* - Breaking dormancy at seeds of *Cuscuta approximata*

Boz, Ö. *et al.* - Determination of the frequencies and densities of broomrape and other weed species occurring in field tomato, sunflower and tobacco fields in Denizli Province of Turkey.

The full programme is available at:

http://www.ewrs.org/doc/EWRS_Chania_Scientific_Programme_2013.pdf.

Building a new research alliance to reclaim faba bean production area abandoned to *Orobanche*. Rabat, Morocco, 6-9 October, 2013.

This meeting brought together workers from 12 countries to discuss the current problems from *Orobanche crenata* and *O. foetida* in the Mediterranean zone and NE Africa which have resulted in a serious decline in the area of faba bean and other legumes grown in the region. Objectives included a better understanding of the variation within both these species, identification of new sources of resistance within faba bean, and the exploitation of new technology in the understanding of *Orobanche* biology, and the development of resistance in the crop to the parasites and to herbicides. The meeting was funded by a range of institutions including the UK BBSRC (Biotechnology and Biological Sciences Research Council), ICARDA (still fully active on a range of sites outside Syria) and INRA, Morocco (Institut National de la Recherche Agronomique).

The first session, hosted by the Institut Agronomique et Vétérinaire Hassan II, entitled 'Control of *Orobanche crenata* in legumes' heard 4 review papers. John Pickett described the successful technique for control of *Striga* species by intercropping with *Desmodium* spp. and the possibilities of transferring the essential genes from *Desmodium* to other species including cowpea initially and conceivably faba bean in the future. Fouad Maalouf described the history of discovery and exploitation of *Orobanche* resistance in faba bean in Egypt and recent work with herbicides. Diego Rubiales covered the corresponding history of resistance breeding and other techniques for the control of *Orobanche* species in Spain, commenting incidentally on the fact that there was uncertainty whether there was any source of resistance available in faba bean other than that discovered in Giza 402. Finally Jim Westwood described the Parasitic Plant Genome Project in USA which involves 4 main species including *O. aegyptiaca* and how results from this project might be applied to *O. crenata*.

In the session on Taxonomy and Distribution, Mariem Bouhadida first described the dual problems of *O. crenata* and *O. foetida* in Tunisia, the latter attacking faba bean in Tunisia only, though other biotypes attack other legumes elsewhere. She also described her exploration of molecular markers as a means of distinguishing populations with different host ranges. Chris Parker then described the serious infestation of faba beans in Kent UK which had only been discovered a few weeks previously. Although not completely new to the UK, this is only the second significant infestation to be recorded in the country, or indeed anywhere in northern Europe. He discussed the need for better understanding of the germination behaviour of the weed in these more temperate conditions and whether this infestation was just a freak occurrence or represented a result of global warming or of a shift in the behaviour of the weed. Giannantonio Domina reported on the distribution of *O. crenata* in Italy, mainly confined to Sicily and the extreme south of the mainland, and on some screening of faba bean varieties for resistance. Dense planting of faba bean has shown benefit. Tadessa Sefera Gela then painted an alarming picture of the dramatic spread of *O. crenata* in faba bean which has occurred in northern and western Ethiopia since it was first recognised in the 1980s. Faba bean is a major crop in Ethiopia grown on almost 500,000 ha and quantities have been exported in the past but domestic shortages have curtailed export activity. Many farmers are having to give up growing the crop and the area of production may be shrinking.

In the session on Breeding for Tolerance and Resistance, Ana Maria Torres described the search for and identification of QTLs for resistance to *O. crenata* and to *O. foetida* in faba bean, contributing to the eventual mapping of resistance genes in the crop. The following papers, presented by Mahmoud Abdelmohsen, and Sabah Atia covered various aspects of faba bean breeding and other work on *O. crenata* in Egypt where the problem of *O. crenata* has resulted in widespread replacement of the crop by wheat and clover, and a corresponding drastic fall in self-sufficiency in the crop from 99% down to below 50%. Current hopes are pinned on the variety Misr 3, released in 2012, which gives reasonably good yields in heavily infested sites. Walid El-Rodeny described the creation of an EST-SSR based linkage map of faba bean genome which should in time help map genes for resistance. Mahmoud Zeid's paper made a critical examination of the correlation between the most widely used measure of resistance/tolerance – spikes/plant - and various detailed measures of attachment frequency and parasitic biomass obtained when root systems are carefully washed and evaluated, and this led to a stimulating discussion on what constitutes 'resistance'. Progress was reported on the identification of relevant QTLs and molecular markers. It was also noted that infestation of faba bean is much less following irrigated crops of rice and cotton and is reduced

somewhat by intercropping with sugar beet or fenugreek. Moez Amri gave further detail of the situation in N.E. Tunisia, where *O. foetida*, since 1990, has been attacking chickpea, vetch, *Vicia narbonensis*, medics, *Lathyrus sativus*, lentil and fenugreek, as well as faba bean and other crop and wild species. Pea is apparently unaffected and may be suitable as a trap crop. Comparison with Spanish and Moroccan ecotypes had confirmed the extra virulence of the Tunisian material. Screening had revealed at least partial resistance in two varieties, 'Chourouk' and 'Najeh'. Finally in this session, Nasr Eldin Abdalla confirmed that the problem was continuing to spread in Sudan and referred to work with a range of introduced lines which showed some promise of partial resistance. However, an integrated approach was still needed, involving hygienic measures, trap crops and hand-pulling.

The third session, on Molecular Understanding of Interactions between Parasitic Weeds and their Hosts and Prospects for Engineering *Orobanche* Resistance and/or Herbicide Tolerance in Faba bean, began with Rachid Mentag describing the successful *in vitro* culture of *O. crenata* callus from which normal shoots could be regenerated, providing a valuable system for studying the molecular steps in the infection process. Donal O'Sullivan described progress in the creation of a dense SNP-based map of the faba bean genome and initiation in the UK of a mutagenesis programme aimed initially at selecting mutants with resistance to herbicides. Khalil Khamassi described related genetic diversity and gene mapping work carried out in a UK-Tunisia collaboration, while Abdelwahd Rabha reported on studies aimed at the possible parasite-induced expression of a selective sarcotoxin polypeptide and confirmed the successful integration of the sarcotoxin 1A gene construct in transgenic faba bean plants. Also in this session, Nadja Zermane reported on the situation of *O. crenata* in Algeria and described experiments with inoculation of faba bean with the rhizobacterium *Ralstonia picklettii*, resulting in significant reductions in *O. crenata* and increases in faba bean yield. Combination with the trap crop *Trifolium alexandrinum* boosted the benefits further. Masood Ali estimated there are 24 million ha of legume crops in India, the most important being lentil and chickpea. Faba bean was a very minor crop at present but could become more important in some northern states. *Orobanche* spp. do not currently attack legume crops, but rapeseed is seriously affected by *O. aegyptiaca*. Khalid Daoui described a successful system in the drier areas of Morocco of alley-cropping faba beans and/or wheat in olive.

The workshop included a number of discussion sessions where ideas were exchanged on future research and collaboration. These included 'resolutions' to co-operate more effectively in the areas of collecting and characterising *Orobanche* populations across its entire range, genetic transformation of faba bean, large-scale

mutagenesis programmes to find and deploy herbicide resistance and to highlight the ongoing need for novel solutions based on deeper understanding of the cellular and molecular biology of the interaction between *Orobanche* and faba bean.

Papers presented (names of presenters only – not full authorship):

Mini-symposium: Control of *Orobanche crenata* in legumes

John Pickett (Rothamsted Research, UK) - Can the highly successful control and eradication of *Striga* in cereals by intercropping with *Desmodium* offer opportunities for reclaiming faba bean production from *Orobanche*?

Fouad Maalouf (ICARDA) - Breeding faba bean for resistance to *Orobanche crenata*: past problems and future horizons.

Diego Rubiales (CSIC, Spain) - Resistance breeding and complementary control strategies for alleviation of *Orobanche* problem on legumes in the Mediterranean Basin

Jim Westwood (Virginia Tech, US) - Genomic insights into parasitism and opportunities for *Orobanche* control.

Taxonomy, host range and distribution of *Orobanche* spp.

Mariem Bouhadida (INRAT, Tunisia) - Distribution and genetic diversity of *Orobanche* in Tunisia.

Chris Parker (UK) - The status of *Orobanche crenata* in UK.

Giannantonio Domina (University of Palermo, Italy) - The status of *Orobanche crenata* in Sicily and preliminary observations on *Orobanche crenata* susceptibility in *Vicia faba*.

Tadesse Sefera Gela (EIAR, Ethiopia) - Status and distribution of *Orobanche* in faba bean production areas of Northern Ethiopia.

Characterization and exploitation of sources of tolerance of faba bean to *Orobanche*.

Mahmoud Ibrahim Abdel Mohsen (ARC, Giza, Egypt) - Current status of faba bean production in Egypt.

Sabah Attia (ARC, Giza, Egypt) - Misr 3 - a new Egyptian *Orobanche*-tolerant faba bean variety.

Ana Maria Torres (IFAPA, Spain) - Molecular approaches for the identification and validation of QTLs for *Orobanche* spp. resistance in faba bean.

Walid El-Rodeny (ARC, Sakha, Egypt) - Development of EST-SSR markers and construction of a linkage map in faba bean (*Vicia faba*).

Moez Amri (INRA, Tunisia) - The problem of *Orobanche* in Tunisia: current state, specificity and main results of the national faba bean breeding program to improve tolerance/resistance to *Orobanche foetida* and *Orobanche crenata*.

- Mahmoud Zeid (University of Alexandria, Egypt) - Development and evaluation of faba bean breeding materials suitable for mapping resistance/tolerance to *Orobanche crenata* using molecular markers.
 Nasr Eldin Khairi Abdalla (Agricultural Research Corporation, Sudan) - Reaction of faba bean genotypes to *Orobanche crenata* in Sudan.

Molecular understanding of interactions between parasitic weeds and their hosts and prospects for engineering *Orobanche* resistance and/or herbicide tolerance in Faba bean

- Rachid Mentag (INRA-Rabat, Morocco).- *In vitro* culture of *Orobanche crenata*.
 Nadjia Zermene (ENSA, Algeria) - Beneficial use of plant growth promoting *Rhizobacteria* for faba bean growth performance and broomrape control.
 Khalid Daoui (INRA-Meknès, Morocco) - Faba bean and wheat productivity in an alley cropping system basis on olive tree.
 Donal O'Sullivan (University of Reading, UK) - A genomic toolkit for genetic improvement of faba bean.
 Khalil Khamassi (INAT, Tunisia) - Analysis of genetic diversity and molecular mapping of SNP markers for *Vicia faba* L. var minor.
 Rabha Abdelwahd - Agrobacterium mediated transformation of faba bean with sarcotoxin

Chris Parker
 Donal O'Sullivan

The 1st meeting of STREAM - COST Action FA1206, Jerusalem, Israel 3th-7th November, 2013

STREAM (STRigolactones Enhanced Agricultural Methodologies) is the first official network in Europe focused on strigolactones (SLs) and is open to the rest of the world on this subject. Within this network the aims are: the creation of a multidisciplinary network of experts, of both basic and applied sciences, and the support and promotion of the coordination of SLs research activities and a transfer of knowledge which may lead to the development of targeted and sustainable agro-technologies. To implement the network aims, STREAM is structured into 4 Working Groups: WG1- SLs as plant hormones; WG2 - SLs and parasitic plants; WG3 - SLs and soil biota; and WG4 - SLs chemistry and biochemistry.

The 1st STREAM meeting in Jerusalem was our first stage for creating a multidisciplinary network of experts for all 4 working groups. The Organizing Committee of the meeting consisted of Chair of the Action: Prof Cristina Prandi (Italy), Vice Chair of the Action: Dr Hinanit Koltai (Israel) and the Local Organizers Dr Einav Mayzlish Gati and Smadar Weininger.

Papers presented included:

Opening lecture:

Koichi Yoneyama - Turning points in strigolactone research.

WG1- SLs as plant hormones;

- Ottoline Leyser - Strigolactone signalling in plants - knowns, unknowns.
 Catherine Rameau - Strigolactones and other long range signals regulating shoot branching in pea.
 Lorenzo Borghi - The strigolactone exporter PhPDR1 is asymmetrical localized in root tips and hypodermal passage cells: first insights into strigolactone polar transport.
 Sofie Goormachtig - A proteomic approach to reveal insights into strigolactone signalling.
 Hidemitsu Nakamura - Molecular mechanism of strigolactone perception by DWARF14.

WG2 - SLs and parasitic plants;

- Alejandro Pérez de Luque - Nanotechnology for strigolactone management in parasitic weeds.
 Radoslava Matusova - Response of the Slovak wild and weedy broomrapes to GR24.
 Philippe Delavault - CYP707A1, an ABA catabolic gene, is a ubiquitous component of parasitic plant seed germination in response to various germination stimulants.
 Maurizio Vurro - Possible use of strigolactone-degrading microbes for managing parasitic weeds.
 Diego Rubiales - Identification of broomrape resistance in faba bean based in low strigolactone exudation: applications for faba bean breeding.
 Radi Aly - Cucumber mosaic virus as carotenoid inhibitor reduce *Phelipanche aegyptiaca* infection in tobacco plants.

WG3: SLs and soil biota:

- Paola Bonfante - Plant fungal communication in arbuscular mycorrhizas: do you speak plantish or fungish?
 Didier Reinhardt - The search for metabolites involved in the regulation of arbuscular mycorrhiza.
 Juan A. Lopez-Raez - Strigolactones contribute to plant defence against necrotrophic fungi.
 Michael Walter - Integration of SL biosynthesis in greater carotenoid metabolism of mycorrhizal roots.
 Pieter Rozpadek - A novel model for phytoremediation-strigolactone research based on *Arabidopsis thaliana* mutants.

WG4 - SLs chemistry and biochemistry:

- B. Zwanenburg - Strigolactone research, quo vadis?
 François-Didier Boyer - New strigolactone analogues with specific activities.

Ernesto Occhiato - Synthesis and evaluation of fluorescent strigolactone analogues for *in vivo* investigation.

Tatiana E. Sesan - Strigolactone use in conservation agriculture systems.

Gunilla Carlsson - X-ray crystallography and free electron lasers in structural biology.

Francisco A. Macías - New tools mimicking nature for controlling parasitic weeds.

Further Developments Related to Strigolactones:

Ronit Yarden - Innovative application of strigolactones to inhibit cancer cells and cancer stem cells growth.

Each session was concluded by 4 flash presentations about relevant posters, and discussions. Posters for each session were displayed throughout the meeting and are listed on the conference website:

<http://streamisrael2013.wix.com/stream-israel-2013>

Cristina Prandi

22nd COLUMA Conference, International Meeting on Weed Control, Dijon, France, Dec 10-12, 2013.

Contributions included:

Duroueix, F. *et al.* - Lutte chimique contre l'orobanche rameuse en culture de colza. (oral)

Houngbedji, T. *et al.* - Étude de l'infection de la plante parasite *Rhaphicarpa fistulosa* en riziculture au Togo. (poster)

Boulet, C. *et al.* - Étude de la sensibilité des adventices vis-à-vis de l'orobanche rameuse (*Phelipanche ramosa* (L.) Pomel) en vue d'une lutte intégrée. (poster)

THONNINGIA SANGUINEA

Dr Ernst Specks, a floriculturist in Germany, has recently sent us pictures of this colourful parasitic plant, found in miombo (*Brachystegia*) forest in Zambia. Lytton Musselman has identified it as *Thonningea sanguinea*.

It is reported to cause serious damage to rubber trees in West Africa, and may also attack oil-palm and cacao. A single plant can spread to attack 20 or more trees over an area of 0.5 ha. The species is dioecious with male and female flowers on separate plants. Hepper and Gasson (1986) in *Haustorium* 16 described and illustrated tubers growing to 6 cm in diameter.

Burkill in *The useful plants of west tropical Africa* (1968) (http://plants.jstor.org/upwta/1_523) provides useful information on distribution (mainly in West Africa but across tropical Africa too) local names, and a very wide range of traditional medicinal and other uses including e.g. in Ivory Coast the flower-heads are tied to the ankles of

young infants to hasten their learning to walk. The pointed scales prevent sitting down in comfort! A number of more recent papers have confirmed the activity of extracts against a range of bacteria and fungi.



Photo: Ernst Specks.

If any reader has new observations on this fascinating plant do please let us know.

Chris Parker.

BIOCONTROL OF *STRIGA* – A PROGRESS REPORT

The Integrated *Striga* Management in Africa (ISMA project) is taking a multi-pronged approach to *Striga* control and this was described in the July 2013 edition of *Haustorium*, issue 63. A component of this project involves developing the field application of a biological control for *Striga hermonthica*. The main remit of the project in terms of field application is - does the biological control agent, *Fusarium oxysporum* f. sp. *strigae* offer the potential as a realistic method of control? In order to demonstrate this, field trials were conducted in Nigeria and Kenya from 2011 to 2013.

In Nigeria several multi-location trials were conducted under natural and artificial *Striga* infestation across major *Striga*-infested agro-ecological zones and maize based farming systems in northern Nigeria to validate the efficacy of *Striga* bioherbicide *F. oxysporum* f. sp. *strigae* (Fos). Inocula of Fos produced by our project partner University of Hohenheim in Germany, was delivered as a film-coat on maize seeds using gum Arabic and professional seed coating technology. The application of biocontrol in combination with both *Striga* resistant and susceptible maize varieties supported significantly fewer emerged parasites than the susceptible control. In combination with the resistant maize, biocontrol caused a marked reduction in

Striga emergence compared to the resistant control. Results showed that the efficacy of the biocontrol technology in combination with the *Striga* susceptible maize variety (the farmers' preferred, and therefore in practice, used variety) on *Striga* control and enhancement of maize grain yield was more pronounced in comparison to its combination with the resistant variety. This inconsistency in grain yield increase especially in the combination of Fos and resistant variety is due to poor *Striga* pressure i.e. the levels of *Striga* emergence were too low to reflect the real impact of Fos on grain yield. Therefore, to confirm the positive results obtained from the combination of biocontrol with the susceptible maize variety, and to verify the inconsistency in the results of its combination with the resistant maize variety, a series of extensive field validation trials were established in 2013 to comprehensively evaluate the control efficacy of isolate Foxy2 against *Striga* and its impact on grain yield across different environments where *Striga* populations are sufficiently high. The efficacy of biocontrol seed treatment technology is being evaluated in combination with *Striga*-resistant and susceptible maize varieties, and with farmer saved seeds included as controls. In addition, socio-economic benefit (cost-benefit) and impact of biocontrol technology is being assessed.



Typical disease symptoms on *Striga* shoots caused by *Fusarium oxysporum* f.sp. *strigae* isolate Foxy2

In Kenya, trials were proposed using the Ghanaian isolate Foxy 2 which was shown to be effective in West Africa. The use of a non-indigenous isolate of *Fusarium oxysporum* f.sp. *strigae* isolate Foxy 2 was required to be field tested under quarantine conditions under the supervision of KARI and KEPHIS. However results using the Ghanaian isolate were disappointing in the control of Kenyan *Striga*. Foxy2 showed poor performance and did not provide effective biocontrol of *Striga* under East

African conditions in Kenya. The low activity of Foxy 2 in East Africa may be due to ecological adaptations, in spite of Foxy2 being able to survive following seed treatment application and planting and proliferate in Kenyan soil in rhizosphere studies carried out by our project partner University of Hohenheim in Germany. As a consequence of this, an indigenous strain FK3 was isolated locally and tested for control of *Striga* across 2 seasons. This gave promising results over two seasons. Trial work is continuing for the next two growing seasons in Western Kenya.

Project partners: IITA (Dr. F. Beed and Dr. A. Elzein), The Real-IPM Company Ltd (Dr. H. Wainwright), Kenya; University of Hohenheim (Prof. G. Cadisch, Dr. F. Rasche and Prof. J. Kroschel), Germany; Institute for Agricultural Research – Ahmadu Bello University (Dr. A. Zarafi), Nigeria; University of Stellenbosch (Prof. A. Viljoen), South Africa; and McGill University (Prof. A. Watson), Canada.

Fen Beed
Abuelgasim Elzein
Henry Wainwright

CONGRATULATIONS

Our congratulations to Dr G.Nanjappa Dhanapal at University of Agricultural Science, Hebbal, Bangalore, on his recognition as 'Scientist of the year-2013' by the National Environmental Science Academy, New Delhi. He has also recently been promoted to the post of Principal Investigator and Scheme Head of the All India Coordinated Research Project on Weed Control in Bangalore.

PRESS REPORTS

Witchweed a serious threat: McVeigh

Red witchweed (*Striga asiatica*) could cost the grains and cane industries millions if it takes hold in Queensland, says State Agriculture Minister John McVeigh. Mr McVeigh today visited producers near Mackay whose properties have been affected by the recent detection of the exotic pest in mid-July. He said it had been a good opportunity to meet face-to-face with affected landholders to discuss their individual circumstances. 'We know in the United States it's a very significant problem, they spend in the order of \$250 million to address the issue,' Mr McVeigh said.

Up to 60 farming properties in the Mackay region could be affected by the serious pest. Biosecurity Queensland's Director Invasive Plants and Animals John Robertson said

this was the first confirmed detection of red witchweed in Australia. The weed is native to parts of Africa, the Middle East and Asia and causes around \$7 billion of damage to grain crops in Africa each year. 'While our priority is to minimise any biosecurity risks, an integral part of this response is to ensure there is some business continuity for individual producers,' Mr McVeigh said. 'We are working closely with both industry and local producers to find ways of allowing harvesting of crops to continue this year.'

Red witchweed has not been detected outside the five properties that originally reported the pest. Movement restrictions have been placed on four of these properties. 'The fifth property is being surveyed and will continue to be monitored but the weed hasn't been found on that property to date,' he said. 'Our surveillance teams have identified potential high risk pathways for the weed to spread, such as the movement of machinery.'

Canegrowers Queensland chair Paul Schembri said the weed is impacting on the livelihoods of affected farmers and the possibility of compensation had been discussed with the State government. 'Those four farmers are bearing an enormous bureaucratic burden and on behalf of the greater public good here,' Mr Schembri said.

Mr McVeigh also met with Biosecurity Queensland staff at the Local Control Centre in Mackay. 'The team is doing a great job in conducting surveillance for red witchweed and providing support and advice to the property owners,' he said. Landholders are urged to follow good biosecurity practices to reduce any potential spread of this weed, including appropriate clean down of machinery and equipment. If anyone suspects they have red witchweed, they must report the plant to Biosecurity Queensland immediately.

Farm Weekly, 8 August 2013.

Hunger looms as deadly weed destroys 450,000 tonnes of maize

Western Kenya and parts of Nyanza are at risk of losing an estimated 450,000 tonnes of maize. This is as striga — a parasitic weed continues to decimate over 300,000 hectares of the crop. More than 300,000 farmers in the counties of Bungoma, Siaya, Busia, Vihiga, Kisumu, Kakamega, Migori, and Homa Bay, are the most affected by the weed. This leaves about 1.5 million people at risk of starvation. The destructive weed is also showing traces in other food basket regions including areas in Rift Valley and Central.

Across East Africa, the weed infests up to 40 million hectares of smallholder farmland in the region —

occasioning yield losses ranging from 20-80 per cent and even total crop failure in severe infestation.

In its wake more than a million farmers are counting massive losses. Marking the 10th Anniversary celebrations of the African Agricultural Technology Foundation (AATF) in Nairobi last week, scientists, agro-dealers, farmers, and local seed companies warned that unless more was done, the weed will severely dent the country's efforts at ensuring food security. 'Over one million growers in Kenya, Tanzania, and Uganda have been counting losses as the weed destroys their crops,' AATF Seed System Manager Gospel Omanyia said. 'We have engaged the growers through new technology but the weed is yet to be fully contained,' he said, adding that seeds of the dangerous weed remain in the soil for up to 20 years. 'Due to its characteristics and longevity in the soil, it is able to infest new crops in each season, frustrating efforts to enhance food security.'

Striga is a parasitic weed that seriously constrains the productivity of staples such as maize, sorghum, millet and upland rice in sub-Saharan Africa. The weed survives by siphoning off water and nutrients from the crops for its own growth. Yet, according to the forum, this is just one of the challenges of food production on the continent.

Prof Gordon Conway from the Imperial College, London, blamed low commodity prices and poor technology as central to the problems that afflict African farmers. 'Government's must draft policies that encourage farmers to adopt modern technology,' Prof Conway said, noting that while farmers in developed countries produce up to 11 tonnes per hectare, local farmers hardly post a tonne. 'The beginning point could be adoption of drought-resistant seeds and use of appropriate technology to fight pests and diseases that threaten crop production,' he said.

The most incapacitating aspect to food production, however, is farmers' limited market access and its inevitable twin of poor commodity prices. Dr Denis Kyetere, the AATF executive director said governments should invest in structures and policies that link farmers to appropriate markets. 'This way, agriculture becomes a business and farmers are guaranteed where to sell their produce and at how much,' he said. He observed that the State should also work out modalities to help finance farming especially among smallholder farmers. 'Access to markets is also key to stemming post-harvest losses,' he said.

Nicholas Waitathu for Standard Digital, November 11th 2013.

Weed that denies Tanzania 1.7 m tonnes of maize annually

Recently, Open Forum on Agricultural Biotechnology in Africa (OFAB), Tanzania Chapter, organised its monthly meeting at COSTECH in Dar es Salaam which was attended by agricultural researchers, and media practitioners. During the meeting, researcher from Kenya, Dr Gospel Omanyia explained how striga weed, a parasitic plant, is causing loss of maize in different regions in Tanzania. He was presenting a paper titled: The Role of Seed Systems in Revitalisation of Agricultural Productivity in Africa: The Case Study of Strigaway Maize in Tanzania. Striga has been a major problem in sub-Saharan Africa daunting farmers for over seven decades and Tanzania is said to have the highest number of farma affected by striga weed in the entire region as it causes a loss of about 1.7 million tonnes of maize every year in Tanzania valued at 356 million dollars. Striga is a major contributor to food insecurity, especially among rural people whose diet comprises mainly of cereal staples and particularly maize, estimating that the lost 1.7 million tonnes of maize per year can feed more than 10 million people.

In Tanzania many regions are affected by the weed. They are Mwanza, Shinyanga, Mara, Tabora, Singida, Dodoma, Morogoro, Coast, Tanga, Lindi, Ruvuma, Iringa, Mbeya, Mtwara and Rukwa. In these regions, the parasitic weed striga has infested over 960,000 ha of farmland, which accounts for almost 70 per cent of the striga weed infested area in East Africa. Tanzanians depend much on maize as their main food crop but also Tanzania is bigger compared to other East African countries of Kenya and Uganda. Other infested countries in terms of ha include Malawi (268,000), Kenya (246,000), Ethiopia (80,000) and Uganda (38,000).

Innovations such as Strigaway (IRMaize) technologies are available for control. It is apparent that innovative technologies be adopted by farmers if the numerous challenges to agricultural productivity are to be adequately addressed. Experiences from commercialization efforts of the Strigaway (IR) maize further stress the need for a functional formal seed system to reach the farmers. In this regard, the seed systems should play a crucial role towards revitalizing agricultural productivity.

African Agricultural Technology Foundation (AATF) is a not-for-profit organisation that facilitates and promotes public-private partnerships for the access and delivery of appropriate agricultural technologies for sustainable use by smallholder farmers in Sub Saharan Africa (SSA) through innovative partnerships and effective stewardship along the entire value chain. The Foundation is a one-stop-shop that provides expertise and know-how that facilitates the identification, access, development, delivery and utilisation of agricultural technologies. AATF works towards food

security and poverty reduction in Sub-Saharan Africa, and its structure and operations draw upon the best practices and resources of both the public and private sectors. It also contributes to capacity building in Africa by engaging African institutions in the execution of tasks that contribute to the Foundation's mission and many other issues.

On its tenth anniversary AATF celebrates the achievements in managing 10 projects involving 10 countries in Africa. AATF accesses, develops, adapts and delivers appropriate agricultural technologies for sustainable use by smallholder farmers in Sub-Saharan Africa, through innovative partnerships. AATF is bringing appropriate technologies to help fix problems like bacterial wilt in banana, aflatoxins in peanuts and maize, striga 'vampire weed' control in maize, cassava mechanization, pod borer infestations in cowpea as well as drought tolerance in maize.

Gerald Kitabu for This Day, November 26, 2013.

Scientists battle striga (witchweed) in Uganda

Scientists in the region are battling Striga (witchweed) that has affected the productivity of staple foods such as maize, sorghum, millet and rice in the eastern part of the country. The most affected areas are mainly, Tororo, Moyo, Bugiri, Busia, Budaka and Iganga. Farmers bordering Uganda on Kenyan side and Tanzania have also been affected by the Striga weed. Seed systems manager of African Agricultural Technology Foundation (AATF), Dr. Gospel Omanyia said that over 100,000 hectares of land has been affected by the striga weed in Uganda.

Striga weed is parasitic weed that affects the productivity of staple food like maize, sorghum and millet. It causes damage to its host crop before emerging from soil by producing phytotoxins which are harmful to the host crop. Omanyia said that over one million hectares of land are affected by the weed in East Africa and over 40 million hectares of smallholder farmland in the sub-saharan Africa is affected.

'Striga weed seeds remain dormant and viable in the soil for up to twenty years. With every planting season, some of the seeds germinate and infest the crops while reproducing and increasing the striga seed in the soil,' he said.

AATF is partnering with African 2000 Network and National Agriculture Research Organization (NARO) to effectively manage striga weed infestations and enable farmers to increase on the grain yields. Ugandan Farmers in the affected areas are facilitated to access Imazapyr Resistant (IR) maize technology which is referred as 'Strigaway' maize by farmers and agro dealers.

Nicholas Kajoba for New Vision October 24, 2013

Hundreds expected at Tenbury Well mistletoe fair

Tenbury Wells in Worcestershire, UK, claims to be the mistletoe capital and is well known for its mistletoe auctions. Its annual festival has a procession led by druids.

In 2010, conservationists warned about future supplies over fears of a decline of its habitat. Mistletoe thrives in established apple orchards, which have seen a big decline over the past 60 years. Caroline Palethorpe, festival manager, said: 'It's important to Tenbury because it's the only place in the country where we have the unique mistletoe auctions which have been going for over 100 years. The area is renowned for fruit and particularly the apple tree, and therefore it grows in abundance.'



Poet Laureate Carol Ann Duffy performed poetry later on Saturday evening.

BBC News November 30, 2013.

NEW BOOKS

Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies. 2013. Edited by Daniel M. Joel, J. Gressel and L.J. Musselman. Published by Springer, Heidelberg. 513 pp. see: <http://www.springer.com/life+sciences/plant+sciences/book/978-3-642-38145-4>

We have sadly, so far, been unable to find a reviewer for this great new volume, but will hope to provide a review in the next issue. Meanwhile, the wide scope of the book may be judged from the following list of chapters.

1. Introduction: The parasitic syndrome in higher plants / H.S. Heide-Jørgensen

Part I: The Orobanchaceae and their parasitic mechanisms

2. The haustorium and the life cycles of parasitic Orobanchaceae / D.M. Joel

3. Functional structure of the mature haustorium / D.M. Joel
4. Haustorium initiation and early development / P.C.G. Bandaranayake and J.I. Yoder
5. Haustorium invasion into host tissues / A. Pérez-de-Luque
6. The physiology of the established parasite-host association / J.H. Westwood
7. Host reaction to attack by root parasitic plants / M.P. Timko and J.D. Scholes
8. Seed production and dispersal in the Orobanchaceae / D.M. Joel
9. The seed and the seedling / D.M. Joel and H. Bar
10. Induction of germination / K. Yoneyama, C. Ruyter-Spira, H. Bouwmeester
11. Germination eco-physiology / A.J. Murdoch and E. Kebreab
12. Are karrikin signalling mechanisms relevant to strigolactone perception? / D.C. Nelson
13. Changing host specificities: mutations or epigenetic? / T.J.A. Bruce and J. Gressel
14. Phylogenetic relationships and evolutionary trends in Orobanchaceae / G.M. Schneeweiss
15. Genomic evolution in Orobanchaceae / S. Wicke
16. Ecology of hemi-parasitic Orobanchaceae with special reference to their interaction with plant communities / D.D. Cameron and G.K. Phoenix

Part II: The weedy Orobanchaceae and their control

17. Weedy Orobanchaceae – The problem / J. Gressel and D.M. Joel
18. The parasitic weeds of the Orobanchaceae / C. Parker
19. Population diversity and dynamics of parasitic weeds./ B. Romàn
20. Molecular diagnosis of parasite seed banks / J. Prider, K. Ophel Keller and A. McKay
21. Marker-assisted and physiology-based breeding for resistance to Orobanchaceae / B. Pérez-Vich, L. Velasco, P.J. Rich and G. Ejeta
22. Integrated agronomic management of parasitic weed seed banks / Y. Goldwasser and J. Rodenburg
23. Chemical control / H. Eizenberg, J. Hershenhorn, J.H. Ephrath, and F. Kanampiu
24. Biotechnologies for directly generating crops resistant to parasites / J. Gressel
25. Allelopathy / J.A. Pickett, A.M. Hooper, C.A.O. Midega and Z.R. Khan
26. Biocontrol / A.K. Watson

Molecular Microbial Ecology of the Rhizosphere, 2013.

Edited by Frans J. de Bruijn. Two Volume Set. Published by Wiley-Blackwell, 1328 pp. ISBN: 978-1-118-29617-2.

These two volumes present a comprehensive coverage of anything related to the rhizosphere covering current

knowledge on the molecular basis of plant-microbe interactions in the rhizosphere, with contributions from authors around the world. Parasitic plants and the strigolactones are covered particularly in the three chapters 33, 34 and 35 by Yoneyama and co-workers, Lopez-Raez and co-workers and Bouwmeester and co-workers listed in the Literature section below, providing an extensive coverage of chemistry and biochemistry of the strigolactones and their biological effects in planta and in the rhizosphere, particularly in the germination of root parasitic plants and the induction of hyphal branching in arbuscular mycorrhizal fungi.

The full list of 118 chapters is available at:
<http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118296176.html>

THESIS

Biology of Field Dodder (*Cuscuta campestris* Yunk.) and options for its control. Marija Saric-Krsmanovic. PhD, Institute of Pesticides and Environmental Protection, Banatska 31b, 11080 Zemun-Belgrade, Serbia. Supervisor Dr Sava Vrbnicanin, December 2013.

Abstract: Determination of 23 populations of field dodder was conducted using light and scanning electron microscopy and subsequent molecular (PCR) methods in order to fully examine the biology and ecology of *Cuscuta campestris* and options for its control. The effects of different temperatures and rhizobacteria (PGPR) on germination of *C. campestris* seeds, as well as effects of different light treatments (red, far-red and blue light) on germination, growth, and height of attachment points of field dodder shoots on alfalfa stems were also investigated. We examined the effects of *C. campestris* on morphological (visualisation and fresh weight), anatomical (anatomy of leaf and stem of alfalfa; leaf and petiole of sugar beet) and physiological parameters (relative chlorophyll content, total carotenoids, nitrogen, phosphorus, potassium, organic and mineral matter and chlorophyll fluorescence) in alfalfa and sugar beet plants exposed and unexposed to herbicides (imazethapyr, glyphosate, propyzamide). The efficacy of imazethapyr, glyphosate, propyzamide and diquat in controlling field dodder in alfalfa crop was examined in field trials.

After examining 23 populations of field dodder, two species of the genus *Cuscuta* were identified: *Cuscuta campestris* Yunk. and *Cuscuta epithymum* (L.) Nath. An optimal temperature for germination of *C. campestris* seeds was found to be 30°C and treatment with red light (for 1h at daytime) produced the highest percentage of germinated seeds, while the highest percentage of seedlings attached to alfalfa stems at 4.65 cm height was found after treatment

with far-red light (for 45 min at daytime). Also, the highest percentage of germinated field dodder seeds was recorded after treatment with the rhizobacterium *Azotobacter chroococcum* isolated from wheat rhizosphere. An analysis of our data showed that the highest values of most parameters (visualization and fresh weight; relative content of chlorophyll and total carotenoids, effective yield and intensity of fluorescence, variable fluorescence, variable/maximal fluorescence ratio; thickness of stem epidermis, thickness of cortex, thickness of central cylinder and stem diameter of alfalfa; thickness of upper and lower leaf epidermis, thickness of palisade and spongy mesophylls, thickness of mesophyll in alfalfa and sugar beet leaves; diameter of tracheids, petiole hydraulic conductance, xylem area, diameter of phloem cells and petiole phloem area of sugar beet) were found in non-infested alfalfa and sugar beet plants, then in infested plants treated with herbicides, and the lowest in plants infested by *C. campestris* but untreated with herbicides. *C. campestris* was found to affect and reduce nearly all parameters of stem, leaf and petiole anatomy of the host plants, in contrast to some physiological parameters. The infested alfalfa and sugar beet plants were found to have higher contents of nitrogen, phosphorus, potassium and organic matter, compared to non-infested plants. The highest efficacy in controlling field dodder in alfalfa field was demonstrated by diquat (product Reglon forte 3 l/ha), then by glyphosate (product Glifol 0.8 and 1 l/ha), while the other two tested herbicides (propyzamide – product Kerb WP-50 and imazethapyr – product Pivot 100 M) showed lower efficacy.

FUTURE MEETINGS:

The XVI Congress on Molecular Plant-Microbe Interactions will be held July 6–10, 2014 in Rhodes Island, Greece at the Rodos Palace Hotel. No detailed programme as yet, but parasitic plants likely to be covered. To keep track, see: <http://www.mpmi2014rhodes-hellas.gr/index.php>

13th World Congress on Parasitic Plants, Kunming, China, June/July, 2015. Dates to be confirmed, and other details will be available on the IPPS web-site in due course.

GENERAL WEB SITES

For individual web-site papers and reports see LITERATURE

For information on the International Parasitic Plant Society, current issue of *Haustorium*, etc. see: <http://www.parasiticplants.org/> (N.B. currently a little out of date)

- For past and current issues of Haustorium see also:
<http://www.odu.edu/~lmusselm/haustorium/index.shtml>
- For the ODU parasitic plant site see:
<http://www.odu.edu/~lmusselm/plant/parasitic/index.php>
- For Dan Nickrent's 'The Parasitic Plant Connection' see:
<http://www.parasiticplants.siu.edu/>
- For the Parasitic Plant Genome Project (PPGP) see:
<http://ppgp.huck.psu.edu/>
- For information on the EU COST 849 Project (now completed) and reports of its meetings see:
<http://cost849.ba.cnr.it/>
- For information on the COST/STREAM conference see:
<http://streamisrael2013.wix.com/stream-israel-2013>
- For information on the EWRS Working Group 'Parasitic weeds' see:
http://www.ewrs.org/parasitic_weeds.asp
- For a description and other information about the *Desmodium* technique for *Striga* suppression, see:
<http://www.push-pull.net/>
- For information on the work of the African Agricultural Technology Foundation (AATF) on *Striga* control in Kenya, including periodical 'Strides in *Striga* Management' and 'Partnerships' newsletters, see:
<http://www.aatf-africa.org/>
- For Access Agriculture (click on cereals for videos on *Striga*) see:
<http://www.accessagriculture.org/>
- For The Mistletoe Center (including a comprehensive Annotated Bibliography on mistletoes up to 1995, but apparently incomplete since then) see:
<http://www.rmrs.nau.edu/mistletoe/>
- For information on future Mistel in derTumorthérapie Symposia see:
<http://www.mistelsymposium.de/deutsch/-mistelsymposien.aspx>
- For a compilation of literature on *Viscum album* prepared by Institute Hiscia in Arlesheim, Switzerland, see:
<http://www.vfk.ch/informationen/literatursuche> (in German but can be searched by inserting author name).
- For the work of Forest Products Commission (FPC) on sandalwood, see:
<http://www.fpc.wa.gov.au> (Search *Santalum*)
- For past and current issues of the Sandalwood Research Newsletter, see:
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- Gao JianMei, Li Ran, Zhang Lei, Jia LiLong, Ying XiXiang, Dou DeQiang, Li JianChun and Li HaiBo. 2013. *Cuscuta chinensis* seeds water extraction protecting murine osteoblastic MC3T3-E1 cells against tertiary butyl hydroperoxide induced injury. *Journal of Ethnopharmacology* 148(2): 587-595. [*C. chinensis* has been used traditionally in China to treat heart disease, diabetes, liver injury, cancer, and aging. In this study *C. chinensis* modulated the oxidative stress-induced apoptosis in MC3T3-E1 cells, probably due to its antioxidant activity.]
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- Gibot-Leclerc, S., Dessaint, F., Reibel, C. and le Corre, V. 2013. *Phelipanche ramosa* (L.) pomel populations differ in life-history and infection response to hosts. *Flora (Jena)* 208(4): 247-252. [Confirming a degree of host specialisation in two populations of *P. ramosa*, that on tomato/tobacco normally maturing in 14 weeks while that on oilseed rape matures only after 40 weeks. In reciprocal infections each population showed a higher aggressiveness on their natural hosts than on the other. The tomato/tobacco population completed its life cycle on both hosts within the 16 weeks of the experiment.]
- Glavaš, M. 2012. (Harmful effects on silver fir caused by white mistletoe.) (in Croatian) *Glasiilo Biljne Zaštite* 12(3): 239-244. [*Viscum album* occurs extensively in silver fir with up to 147 infections recorded per tree and 60% reduction in growth. The trees with diameter larger than 60 cm do not increase in volume and their yield is reduced. They may also become predisposed to attacks of pathogenic fungi and bark-beetles.]
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- Gonmadje, C.F., Doumenge, C., Sunderland, T.C.H., Balinga, M.P.B., Sonke, B., Beau, N., Dessein, S. and Robbrecht, E. 2013. (Phytogeographical analysis of Central African forests: the Ngovayang massif (Cameroon).) (in French) *Scripta Botanica Belgica* 50: 244-256. [The lowland forests of the Ngovayang massif in S. Cameroon are dominated by Leguminosae-Caesalpinioideae, followed by Olacaceae. No further detail in abstract.]
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- Guaraldo, A.de C., Boeni, B.de O. and Pizo, M.A. 2013. Specialized seed dispersal in epiphytic cacti and convergence with mistletoes. *Biotropica* 45(4): 465-473. [Noting similar dispersal systems of epiphytic cacti in the genus *Rhipsalis*, and Viscaceae mistletoes, which involve the same *Euphonia* spp. dispersal agents. Similar fruit morphologies and fruit chemistry are apparently convergent adaptive strategies that enable seeds of both groups to reach adequate microsites for establishment in host branches.]
- Habibur Rahman, Eswaraiyah, M.C., Saarang Ramesh and Rao, B.M. 2013. Study of anxiolytic activity of some essential oils used by inhalational exposure in mice. *Scholars Journal of Applied Medical Sciences* 1(1): 1-4. [Confirming that sandalwood oil (presumably from *Santalum album*) produces anxiolytic activity in mice.]
- Hasegawa, T., Izumi, H. and Yamada, H. 2013. Structural factors in the odor of α -santalol derivatives. *Natural Product Communications* 8(7): 869-871 [Relating to *Santalum album*.]
- Heide-Jørgensen, H.S. 2013. Introduction: The parasitic syndrome in higher plants. Chapter 1 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) *Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies*. Springer, Heidelberg, pp. 1-18.
- Hosagoudar, V.B., Amaranath Shetty, Vipinachandran, K. and Ashraf, E.M. 2013 Occurrence of a black mildew in *Santalum album* plantation at Anakulam, Thiruvananthapuram, Kerala, India. *Journal of Threatened Taxa* 5(10): 4521-4523. [Identified as *Asterina congesta*.]
- Hu YiXue, Zhang Nan, Yang SenYan and Yao Lei. 2013. (Anxiolytic efficacy of 4 kinds of essential oil.) (in Chinese) *Journal of Shanghai Jiaotong University - Agricultural Science* 31(4): 58-63. [Oil from sandalwood (presumably *Santalum album*) failed to show anxiolytic activity in rats.]

- Huang ShuangQuan and Shi XiaoQing. 2013. Floral isolation in *Pedicularis*: how do congeners with shared pollinators minimize reproductive interference? *New Phytologist* 199(3): 858-865. [Confirming that pollen placement and pickup on the bumblebee *Bombus richardsi* differed between *P. densispica*; *P. dichotoma* and *P. tricolor* helping to reduce reproductive interference, but the positions of pollen placement and stigma contact on the bee's body were not as precise as previously thought.]
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- Oluwole, O., Osungunna, M.O. and Abimbola, Y. 2103. Phytochemical and antimicrobial screening of *Globimetula oreophila* (Oliv) van Tiegh and *Phragmanthera capitata* (Spreng) Balle. *International Journal of Green Pharmacy*, 7(2): 127-130. [*P. capitata* and *G. oreophila* proved highly effective against *Escherichia coli*, *Klebsiella* spp., *Shigella* spp., *Salmonella typhi*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The former was the more active.]
- Oyinbo, O., Saleh, M.K. and Rekwot, G.Z. 2013. Determinants of herbicide utilization in *Striga hermonthica* control among maize farming households in Giwa local government area of Kaduna State, Nigeria. *Russian Journal of Agricultural and Socio-Economic Sciences*, 3(15): 63-67. [Showing that household size, household income and educational level were significant in influencing herbicide utilization by maize farmers while membership of farmers' associations and extension contact were significant institutional variables. Frustratingly no mention of the herbicide(s) involved.]
- Özogul, F., Kus, B. and Kuley, E. 2013. The impact of strawflower and mistletoe extract on quality properties of rainbow trout filets. *Journal of Food Science &*

- Technology 48(11): 2228-2238. [Mistletoe extract (presumably *Viscum album*) had no influence on the shelf life of fish.]
- Padmanaba, M., Sheil, D., Basuki, I. and Liswanti, N. 2013. Accessing local knowledge to identify where species of conservation concern occur in a tropical forest landscape. *Environmental Management* 52(2): 348-359. [Local informants in villages in Indonesia provided useful, reliable information on the distribution of a range of plant and animal species including *Rafflesia* spp.]
- Parker, C. 2013. The parasitic weeds of the Oriobanchaceae. Chapter 18 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) *Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies*. Springer, Heidelberg, pp. 313-344.
- Patykowski, J. and Kołodziejek, J. 2013. Comparative analysis of antioxidant activity in leaves of different hosts infected by mistletoe (*Viscum album* L. subsp. *album*). *Archives of Biological Sciences* 65(3): 851-861. [Finding that levels of superoxide dismutase differed somewhat according to the host on which *V. album* was growing. Also suggesting that *V. album* may be extremely tolerant to air pollution.]
- Payne, S.E., Kotze, A.C., Durmic, Z. and Vercoe, P.E. 2013. Australian plants show anthelmintic activity toward equine cyathostomins *in vitro*. *Veterinary Parasitology*, 196(1/2): 153-160. [*Santalum spicatum* among species causing complete inhibition of cyathostomin larvae (development from egg to third larval stage).]
- Pelser P.B., Nickrent, D. L., Callado, J. R. C. and Barcelona, J. F. 2013. Mt. Banahaw reveals: The resurrection and neotypification of the name *Rafflesia lagascae* (Rafflesiaceae) and clues to the dispersal of *Rafflesia* seeds. *Phytotaxa* 131: 35-40. [Examination of the *Rafflesia* population from Samar Island indicates that this corresponds to the type for *R. manillana*, and that the name *R. lagascae* Blanco should be applied to the different taxon previously referred to as *R. manillana* from Luzon. Ants were observed dispersing seeds of *R. philippensis*.]
- Pérez-de-Luque, A. 2013. Haustorium invasion into host tissues. Chapter 5 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) *Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies*. Springer, Heidelberg, pp. 75-86.
- Pérez-Vich, B., Velasco, L., Rich, P.L. and Ejeta, G. 2013. Marker-assisted and physiology-based breeding for resistance to Orobanchaceae. Chapter 21 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) *Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies*. Springer, Heidelberg, pp. 369-392.
- Peršoh, D. 2013. Factors shaping community structure of endophytic fungi-evidence from the *Pinus-Viscum*-system. *Fungal Diversity* 60(1): 55-69. [Discussing the significance of endophytic 'operational taxonomic units' in *Viscum album* ssp. *austriacum* and its host *Pinus sylvestris*.]
- Pickett, J.A., Hooper, A.M., Midega, A.O. and Khan, Z.R. 2013. Allelopathy. Chapter 25 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) *Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies*. Springer, Heidelberg, pp. 459-468.
- Piednoël, M., Carrete-Vega, G. and Renner, S.S. 2013. Characterization of the LTR retrotransposon repertoire of a plant clade of six diploid and one tetraploid species. *Plant Journal* 75(4): 699-709. [Reporting the characterization of long terminal repeat transposons in Orobanchaceae including the non-parasitic *Lindenbergia* as well as several closely related *Orobanche* and *Phelipanche* species. This is apparently the first report of these elements in the family.]
- Pineda-Martos, R., Velasco, L., Fernández-Escobar, J., Fernández-Martínez, J.M. and Pérez-Vich, B. 2013. Genetic diversity of *Orobanche cumana* populations from Spain assessed using SSR markers. *Weed Research (Oxford)* 53(4): 279-289. [Results reveal the existence of two distant gene pools, one in Cuenca province and another in the Guadalquivir Valley suggesting two distinct introduction events. Most populations from new areas corresponded to that from the Guadalquivir Valley. Different races (mainly E and F) occurred within the same gene pool, suggesting that current races might have evolved through mutation from a common genetic background.]
- Piwożarczyk, R. 2013. Seed productivity in relation to other shoot features for endangered parasitic plant *Orobanche picridis* F.W. Schultz (Orobanchaceae). *Polish Journal of Ecology* 61(1): 55-64. [Seeds per capsule in *O. picridis*, an endangered species in Poland and Ukraine, varied from 457 to 3,246. The mean number of seeds per shoot was 55,172 (range 8,911 to 151,050). Seed productivity depends significantly on shoot height.]
- Pleines, T., Esfeld, K., Blattner, F.R. and Thiv, M. 2013. Ecotypes and genetic structure of *Rhinanthus alectorolophus* (Orobanchaceae) in southwestern Germany. *Plant Systematics and Evolution* 299(8): 1523-1535. [Results of studies on 39 populations of 3 sub-species of *R. alectorolophus* indicate that the subspecies of *R. alectorolophus* do not form discrete entities and that the character combinations distinguishing them are homoplastic.]
- Plichta, R., Nadezhdina, N., Urban, J., Gebauer, R. and Steppe, K. 2013. Sap flow dynamics of *Quercus pubescens* and its hemiparasite *Loranthus europaeus*. *Acta Horticulturae* 991: 253-260. [Reporting on a field study in Czech Republic, under varying water stress conditions.]
- Pohl, R.T. and Mengs, U. 2013. The use of mistletoe extracts in cancer patients. *Zeitschrift für Phytotherapie*

- 34(4): 164-168. [A general review on use of lectins from *Viscum album* in cancer therapy.]
- Pouvreau, J.B., Gaudin, Z., Auger, B., Lechat, M.M., Gauthier, M., Delavault, P. and Simier, P. 2013. A high-throughput seed germination assay for root parasitic plants. *Plant Methods* 9: 32. [The method adapts the Mosmann's protocol for cell cultures to germinating seeds involving a standardized 96-well plate test coupled with spectrophotometric reading of tetrazolium salt reduction. It allows high-throughput screenings of allelochemicals (stimulants, inhibitors) or biological extracts on parasitic plant seed germination.]
- Prider, J., Keller, K.O. and Banks, S. 2013. Molecular diagnosis of parasitic weed banks. Chapter 20 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) *Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies*. Springer, Heidelberg, pp. 357-368.
- Queijeiro-Bolaños, M.E., Cano-Santana, Z. and Castellanos-Vargas, I. 2011. (Differential distribution of two species of dwarf mistletoe on *Pinus hartwegii* in the natural protected area "Zoquiapan and Annexes", State of Mexico.) (in Spanish) *Acta Botanica Mexicana* 96: 49-57. When *Arceuthobium vaginatum* ssp. *vaginatum* and *A. globosum* ssp. *grandicaule* coexist on the same host *P. hartwegii*, the former usually occurs lower in the tree than the latter.]
- Queijeiro-Bolaños, M.E., Cano-Santana, Z. and Castellanos-Vargas, I. 2013. Does disturbance determines the prevalence of dwarf mistletoe (*Arceuthobium*, Santalales: Viscaceae) in Central Mexico? *Revista Chilena de Historia Natural* 86(2): 181-190. [*Arceuthobium globosum* and *A. vaginatum* both infest *Pinus hartwegii*, to the extent of 47% and 37% of the trees respectively and tend to compete with each other. Both are affected by various types of disturbance.]
- Rahimi, A. and Atri, M. 2013. Study of flora of Miandasht Wildlife Refuge in northern Khorassan province, Iran. *Journal of Ecology and the Natural Environment* 5(9): 241-253. [*Orobanche picridis* among flora recorded.]
- Ramamoorthy R., Phua E.E., Lim S.-H., Tan H.T.-W. and Kumar P.P. 2013. Identification and characterization of RcMADS1, an AGL24 ortholog from the holoparasitic plant *Rafflesia cantleyi* Solms-Laubach (Rafflesiaceae). *PLOS One* 8: e67243. (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3695966/>) [Ectopic expression of a floral MADS-box gene (RcMADS1) from *Rafflesia cantleyi* in *Arabidopsis* caused early flowering and conversion of sepals and petals into leaf-like structures, and carpels into inflorescences.]
- Raupp, F.M. and Spring, O. 2013. New sesquiterpene lactones from sunflower root exudate as germination stimulants for *Orobanche cumana*. *Journal of Agricultural and Food Chemistry* 61: 44. [Besides dehydrocostus lactone, costunolide, tomentosin, and 8-epixanthatin were purified and identified. All four induced germination of *O. cumana* at nano- to micromolar concentrations. Costunolide did not stimulate germination of *P. ramosa*.]
- Revathy, S.S. and Murugesan, M. 2013. Physico chemical analysis and anti microbial activity of a Siddha herbo mineral drug Silasathu Paavanai. *International Journal of Pharma and Bio Sciences* 4(2): 215-221. [A traditional mixture used for obstruction in the urinary system which includes one quarter *Santalum album* has good activity against *E. coli*, the commonest urinary tract infection among patients with urolithiasis.]
- Rhoden, S.A., Garcia, A., Azevedo, J.L. and Pamphile, J.A. 2013. *In silico* analysis of diverse endophytic fungi by using ITS1-5,8S-ITS2 sequences with isolates from various plant families in Brazil. *Genetics and Molecular Research* 12(2): 935-950. [Noting that *Phomopsis* and *Cytospora* spp. have been recorded from unspecified Viscaceae.]
- Rodrigues, A., Shaya, S., Dickinson, T.A. and Stefanovic', S. 2013. Morphometric analyses and taxonomic revision of the North American holoparasitic genus *Conopholis* (Orobanchaceae). *Systematic Botany* 38(3): 795-804. [A fine-scale morphometric study, emphasizing calyx and bract morphology, strongly supported a taxonomic re-alignment of the genus to include three species, *C. americana*, *C. panamensis*, and *C. alpina*, each with various degrees of overlap with previously described taxa.]
- Rodriguez-Ojeda, M.I., Fernández-Martínez, J.M., Velasco, L. and Pérez-Vich, B. 2013. Extent of cross-fertilization in *Orobanche cumana* Wallr. *Biologia Plantarum* 57(3): 559-562. [Concluding that *O. cumana* is a partially allogamous species, with 20-30% out-crossing.]
- Rodriguez-Ojeda, M.I., Pineda-Martos, R., Alonso, L.C., Fernández-Escobar, J., Fernández-Martínez, J.M., Pérez-Vich, B. and Velasco, L. 2013. A dominant avirulence gene in *Orobanche cumana* triggers *Or5* resistance in sunflower. *Weed Research (Oxford)* 53(5): 322-327. [Crosses between *O. cumana* races E and F established that race E avirulence and race F virulence on sunflower variety P-1380 (resistant to E but not to F) are allelic and controlled by a single locus.]
- Román, B. 2013. Population diversity and dynamics of parasitic weeds. Chapter 19 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) *Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies*. Springer, Heidelberg, pp. 345-356.
- Rzedowski, J. and Calderón de Rzedowski, G. 2011. (Two new species of Phoradendron (Viscaceae) from the Oaxacan Mixtec (Mexico), one new and one supplementary.) (in Spanish) *Acta Botanica Mexicana*, 96: 3-10. [*P. perredactum*, a miniature leafless and practically acaulescent parasite of *Bursera discolor*, is newly described and illustrated. Most individuals were branched, less than 1 cm long with

- mainly female flowers, less frequent were 3 cm long, with mainly male flowers. Plus new information on *P. olae* concerning male plants and hosts. Both species occur in NW Oaxaca, Mexico.]
- Sadeghi-Nejad, B. and Azish, M. 2013. *In vitro* antibacterial and antifungal effect of some medicinal plants. African Journal of Microbiology Research 7(29): 3802-3806. [In Iran, '*Loranthus capitellatus*' (= *Macrosolen capitellatus*) among 5 species showing activity against certain bacteria and fungi but no detail in abstract.]
- Saji Kuriakose and Joe, I.H. 2013. Feasibility of using near infrared spectroscopy to detect and quantify an adulterant in high quality sandalwood oil. Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy, 115: 568-573. [Referring to unspecified *Santalum* spp.]
- Samie, A. and Mashau, F. 2013/ Antifungal activities of fifteen Southern African medicinal plants against five *Fusarium* species. Journal of Medicinal Plants Research 7(25): 1839-1848. [*Ximenia caffra* among species showing antifungal activity.]
- Saritha Kodithala, Yoganandam, G.P. and Kiranmai, M. 2013. Pharmacognostical, phytochemical and anticancer studies of *Dendrophthoe falcata* (L.f.) Ettingsh. (Loranthaceae) growing on the host plant *Azadirachta indica* (Meliaceae). International Journal of Pharma and Bio Sciences 4(2):1010-1018. [The methanolic extract of *D. e falcata* shows significant anticancer activity, associated with phenolic and flavonoid constituents which may originate from the host *A. indica*.]
- Scaffidi, A., Waters, M.T., Ghisalberti, E.L., Dixon, K.W., Flematti, G.R. and Smith, S.M. 2013. Carlactone-independent seedling morphogenesis in *Arabidopsis*. Plant Journal 76(1): 1-9. [Confirming that, while the commonly employed synthetic strigolactone GR24 acts non-specifically through both D14 and KAI2, carlactone is a specific effector of strigolactone signalling that acts through MAX1 and D14.]
- Scalon, M.C., Haridasan, M. and Franco, A.C. 2013. A comparative study of aluminium and nutrient concentrations in mistletoes on aluminium-accumulating and non-accumulating hosts. Plant Biology, 15(5): 851-857. [Analysing the concentrations of N, P, K, Ca, Mg, Cu, Fe, Mn, Zn in leaves and Al in leaves, seeds and branches of *Phthirusa ovata* and *Psittacanthus robustus* infecting *Miconia albicans*, an Al-accumulator, and *Ph. ovata* infecting *Byrsonima verbascifolia*, a non-Al-accumulator. On *M. albicans* Al accumulated only in the leaves of *Ph. ovata* while it occurred in all parts of *P. robustus*. Plus other differences.]
- Schneeweiss, G.M. 2013. Phylogenetic relationships and evolutionary trends in Orobanchaceae Chapter 14 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies. Springer, Heidelberg, pp. 243-266.
- Seema Chauhan. 2012. Reproductive biology of *Santalum album* L. The International Journal of Plant Reproductive Biology 4(1): unpaginated. [Pollination of *S. album* was brought about by *Melipona* bees and the baron butterfly (*Euthalia aconthea*). In open pollination the fruit-set varied between 5-20% . Results and pollen-ovule ratio indicate the tree is predominantly outbreeding exhibiting facultative xenogamy.]
- Seru Ganapaty, Maddi Ramaiah, Prudhivi Ramakrishna and Reddy, D.N. 2013. Scientific validation and formulation of three Indian Folklore medicinal plants. Journal of Pharmacy Research 6(8): 823-835. [Extracts of *Cuscuta epithymum* showed hepatoprotective activity.]
- She GaiMei, Zhang YingJun and Yang ChongRen. 2013. A new phenolic constituent and a cyanogenic glycoside from *Balanophora involucrata* (Balanophoraceae). Chemistry & Biodiversity 10(6): 1081-1087. [Noting that *B. involucrata* is used medicinally for the treatment of irregular menstruation, cough, hemoptysis, traumatic injury and bleeding, dizziness and gastralgia in Yunnan Province, China.]
- Shikha Sharma, Amrinder Kaur and Arjun Anania. 2013. Antimicrobial study of *Cuscuta reflexa* collected in different seasons. International Journal of Pharma and Bio Sciences 4(3): B-1393-B-1397. [*C. reflexa* showed highest activity against *Pseudomonas aeruginosa* and *E. coli* when collected in the rainy season while maximum activity against *Staphylococcus aureus* was from material collected during the spring.]
- Singh, L.J. 2013. *Macrosolen andamanensis* (Loranthaceae): a new species of mistletoes from Bay Islands, India. Indian Journal of Forestry 36(1): 55-59.
- Smith, J.D., Mescher, M.C., de Moraes, C.M., Glover, B. and Kachroo, P. 2013. Implications of bioactive solute transfer from hosts to parasitic plants. Current Opinion in Plant Biology 16(4): 464-472. [Reviewing the potential effects of the translocation of bioactive non-nutrient solutes - such as phytohormones, secondary metabolites, RNAs, and proteins - on the development and physiology of parasitic plants such as *Cuscuta*, *Orobanche* and *Striga* spp., and on their subsequent interactions with other organisms such as insect herbivores.]
- Southwell, I. 2012. Sandalwood in Australia. LINK Natural Products Digest, 8(2): 2-6. [Describing the 4 *Santalum* species which been developed commercially in Australia - *S. acuminatum*, *S. lanceolatum*, *S. album* and *S. spicatum*. Information is given on commercial and medicinal value of their essential oil, timber and fruits.]
- Spallek, T., Mutuku, M. and Shirasu, K. 2013. The genus *Striga*: a witch profile. Molecular Plant Pathology 14(9): 861-869. [Aspects of phylogeny, economic impact, parasitic life style and molecular discoveries

- relating to *S. hermonthica*, *S. asiatica* and *S. gesnerioides* are briefly reviewed.]
- Stan, R.L., Hangan, A.C., Dican, L., Sevastre, B., Hanganu, D., Catoi, C., Sarpataki, O. and Ionescu, C.M. 2013. Comparative study concerning mistletoe viscotoxins antitumor activity. *Acta Biologica Hungarica* 64(3): 279-288. [Classic doxorubicin therapy not only prevents the accumulation of ascitic fluid, but also significantly reduces the activity of plasma antioxidant enzymes in Ehrlich ascites carcinoma of mice. This effect was enhanced by combination with viscotoxins from *V. album*.]
- Stanga, J.P., Smith, S.M., Briggs, W.R. and Nelson, D.C. 2013. *SUPPRESSOR OF MORE AXILLARY GROWTH2 1* controls seed germination and seedling development in *Arabidopsis*. *Plant Physiology*, 163(1): 318-330. [Concluding that SMAX1 is an important component of KAR/SL signalling during seed germination and seedling growth but is not necessary for all MAX2-dependent responses and Hypothesising that one or more SMXL proteins may also act downstream of MAX2 to control the diverse developmental responses to KARs and SLs.]
- Start, A.N. 2013. Mistletoe flora (Loranthaceae and Santalaceae) of the Kimberley, a tropical region in Western Australia, with particular reference to fire. *Australian Journal of Botany* 61(4): 309-321. [The flora consisted of one genus with three species in the Santalaceae and five genera with 22 species in the Loranthaceae. *Amyema* was the largest genus in both regions. Host records included 165 species from 33 families. No further detail in abstract.]
- Stoyanov, K. 2013. (The trophic plasticity of the genus *Orobanche* L. (Orobanchaceae) in Bulgaria.) (in Bulgarian) *Agrarni Nauki* 4(12): 67-72. [Recording hosts of 18 species of *Orobanche* spp. including 32 new host/parasite combinations. Noting variation in degree of host specialisation.]
- Suganya, S. and Neelamegam, R. 2013. Effect of selected plant extracts of (on?) *Rhizoctonia solani* and the incidence of root rot disease of *Arachis hypogaea* (L.) Will. *Advances in Plant Sciences* 26(1): 47-52. [*Santalum album* among 3 species showing useful antifungal activity.]
- Švubová, R. and Blehová, A. 2013. Stable transformation and actin visualization in callus cultures of dodder (*Cuscuta europaea*). *Biologia (Bratislava)* 68(4): 633-640. [Confirming that *C. europaea* callus cells are competent for transformation, but under given conditions, these cells failed to realize their morphogenic and regeneration potentials.]
- *Švubová, R., Ovečka, M., Pavlovič, A., Slovákova, L. and Blehová, A. 2013. *Cuscuta europaea* plastid apparatus in various developmental stages: localization of THF1 protein. *Plant Signaling and Behavior* 8(5): e24037. (<http://www.ncbi.nlm.nih.gov/pubmed/23438585>)
- [Results suggest that chlorophylls present in early developmental stages of *C. europaea* have functions other than for photosynthesis.]
- Świerczyn'ska, J., Kozieradzka-Kiszkurno, M. and Bohdanowicz, J. 2013. Developmental and cytochemical studies of the endosperm chalazal haustorium of *Rhinanthus serotinus* (Scrophulariaceae). *Acta Biologica Cracoviensia. Series Botanica* 55(1): 99-106. [The chalazal haustorium is a huge single cell containing two enlarged nuclei. Results suggest it is a site of intense metabolic activity.]
- Tambekar, D.H., Tiwari, B.K., Shirsat, S.D. and Jaitalkar, D.S. 2013. Antimicrobial potential and phytochemical analysis of medicinal plants from Lonar lake. *International Journal of Life Sciences Biotechnology and Pharma Research* 2(3): 203-211. [*Santalum ovatum* among species showing antibacterial activity against *E. coli* and *Salmonella enterica*.]
- Tariq Habib, Malik, Z.H., Hussain, M.A. and Awan, A.A. 2013. The folklore of medicinal plants recorded from Leepa Valley, Azad Jammu and Kashmir. *African Journal of Plant Science* 7(7): 268-272. [*Cuscuta reflexa* among 43 species covered.]
- Teixeira, R. and Silva, L.R. 2013. Bioactive compounds and in vitro biological activity of *Euphrasia rostkoviana* Hayne extracts. *Industrial Crops and Products* 50: 680-689. [Studies on extracts of *E. rostkoviana* used medicinally in the Himalayas suggest some antiradical and antibacterial activity.]
- *Teodoro, G.S., van den Berg, E. and Arruda, R. 2013. Metapopulation dynamics of the mistletoe and its host in savanna areas with different fire occurrence. *PLoS ONE* 8(6): e65836. (<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0065836>) [In Brazil savanna, *Psittacanthus robustus* is a fire sensitive species and its host *Vochysia thyrsoidea* is fire tolerant. Confirming that *P. robustus* increases host mortality, but its effect is lessened by periodic burning that reduces the parasite.]
- Tesfamichael, A., Nyende, A.B, Githiri, S.M., Kasili, R.W. and Woldeamlak, A. 2013. Documentation of sorghum (*Sorghum bicolor* L. Moench) landraces: production, utilization and challenges in Eritrea. *Journal of Agricultural and Biological Science* 8(6): 498-508. [*Striga hermonthica* mentioned as a constraint, second to drought.]
- Těšitel, J., Hejčman, M., Lepš, J. and Cameron, D.D. 2013. How does elevated grassland productivity influence populations of root hemiparasites? Commentary on Borowicz and Armstrong (Oecologia 2012). *Oecologia* 172(4): 933-936. [see Haustorium 63 and excuse my garbled extract. Noting that competition for light may be detrimental to hemiparasites such as *Pedicularis canadensis* in the seedling stage but where it arises from increased nutrient, the parasite may yet benefit.]

- The Long Ngo and Hölscher, D. 2013. The abundance of five rare tree species in forests on limestone hills of northern Vietnam. *International Journal of Biodiversity and Conservation* 5(11): 729-740. [Including information on *Melientha suavis* (Opiliaceae).]
- Tibe, O., Sutherland, I.A., Lesperance, L. and Harding, D.R.K. 2013. The effect of purified condensed tannins of forage plants from Botswana on the free-living stages of gastrointestinal nematode parasites of livestock. *Veterinary Parasitology* 197(1/2): 160-167. [Extracts of *Viscum verrucosum* and *Tapinanthus oleifolius* were more active against some species of gastrointestinal nematode parasites from sheep than were those from *V. rotundifolium*.]
- Tignegre, J.B.S., Ouedraogo, J.T., Melis, R., Tongoona, P., Sibiya, J., Makanda, I. and Drabo, I. 2013. Identification of new sources of resistance to *Striga gesnerioides* in cowpea germplasm. *Plant Breeding* 132(3): 330-336. [Identifying a virulent new race of *S. gesnerioides*, SR Kp, in Burkina Faso, but also finding a range of cowpea genotypes with resistance to it.]
- Timko, M.P. and Scholes, J.D. 2013. Host reaction to attack by root parasitic plants. Chapter 7 in: Joel, D.M., Gressel, J. and Musselman, L.J. (Eds) *Parasitic Orobanchaceae - Parasitic Mechanisms and Control Strategies*. Springer, Heidelberg, pp. 115-142.
- Tivadar, B., Ildikó, V., Balázs, G. and Ferenc, D. 2013. (Influence of European mistletoe (*Viscum album*) to the structural change of apple (*Malus domestica*) woody tissue.) (in Hungarian) *Növényvédelem* 49(6): 245-252. [Acoustic measurement was more useful than impedance tomography.]
- Traoré-Coulibaly, M. and 10 others. 2013. Antiplasmodial and repellent activity of indigenous plants used against malaria. *Journal of Medicinal Plants Research* 7(42): 3105-3111. [The dichloromethane root extract of *Opilia celtidifolia* showed promising antiplasmodial activity against *Plasmodium falciparum*.]
- Tu Xiao, Ling Fei, Huang AiGuo, Zhang QiZhong and Wang GaoXue. 2013. Anthelmintic efficacy of *Santalum album* (Santalaceae) against monogenean infections in goldfish. *Parasitology Research* 112(8): 2839-2845. [Confirming the effectiveness of a chloroform extract of *S. album* at 40 mg/L against *Dactylogyrus* and *Gyrodactylus* spp.]
- Vanier, C.H., Newingham, B.A. and Smith, S.D. 2013. Canopy volume-aboveground biomass relationships of desert perennials and the effects of elevated CO₂. *Ecology* 94(11): 2656-2657. [Results suggest that aboveground biomass for desert perennial plants (including *Krameria* spp.) in elevated CO₂ conditions may be reasonably estimated from the allometry of plants under ambient CO₂.]
- Venditti, A., Serrilli, A.M. and Bianco, A. 2013. Iridoids from *Bellardia trixago* (L.) All. *Natural Product Research*, 27(15): 1413-1416. [Identifying 8 iridoid glucosides from *B. trixago*, 3 of them for the first time; also D-mannitol.]
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has been edited by Chris Parker, 5 Royal York Crescent, Bristol BS8 4JZ, UK (Email chrisparker5@compuserve.com), Lytton Musselman, Parasitic Plant Laboratory, Department of Biological Sciences, Old Dominion University, Norfolk Virginia 23529-0266, USA (fax 757 683 5283; Email lmusselm@odu.edu) and Harro Bouwmeester of Laboratory of Plant Physiology, Wageningen University, P.O. Box 658, 6700 AR Wageningen, the Netherlands (Email harro.bouwmeester@wur.nl): with valued assistance from Dan Nickrent, Southern Illinois University, Carbondale, USA. It is produced and distributed by Chris Parker and published by Old Dominion University (ISSN 1944-6969).

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