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MESSAGE FROM THE IPPS PRESIDENT

Dear IPPS Members,

Grab a bright marker and color in the days of June 7-12, 2011 on your calendars. These are the dates of our next grand meeting, the 11th World Congress on Parasitic Plants. The venue is set in the beautiful small town of Martina Franca, Italy. Although next summer may seem like the distant future, it will be here before we know it, and it’s not too early to start planning. Certainly the lead organizers, Maurizio Vurro (Local Arrangements) and Hanan Eisenberg (Program Chair), have already been busy and preparations will continue over the next several months. Participants can start their planning by visiting the congress website (http://ipps2011.ba.cnr.it/) to get more information and pre-register to ensure that you receive timely notices about registration and abstract submission deadlines. Although the congress program is still taking shape, it promises to be exciting. Just a quick glance at the contents of this newsletter reflects the rapid progress in the world of parasitic plant science. From the news briefs to the literature section you can see evidence of breakthroughs in applied and basic research on parasitic plants. All this and more will be showcased in Italy next year.

The new IPPS website (http://www.parasiticplants.org/) has now been active for six months. The site has had over 3,500 visitors from countries around the world. I know from the comments I’ve received that the site is reaching far beyond the membership of our society and we should continue efforts to reach out to the rest of the world to further the society’s mission of educating the public about parasitic plants. We should also consider how the website can be used to enhance research collaboration and productivity. I welcome your comments and suggestions (and parasite photos!) on ways to further improve the site’s effectiveness.

Sincerely,
Jim Westwood, IPPS President
westwood@vt.edu

RAFFLESIA IN THE PHILIPPINES: AN ERA OF DISCOVERY

I wish to report here some amazing cases of discovery in the ‘Queen of the Parasites’, Rafflesia, particularly with regard to the Philippines. This genus boasts the largest flower in the world and is perhaps equally infamous for its foul smell. This reputation was derived from R. arnoldii of Sumatra whose flower is over one meter in diameter. The discovery of this species in 1818 by Sir Stamford Raffles and Dr. Joseph Arnold was reported by Robert Brown in 1822. Actually, Rafflesia was first discovered by Louis Deschamps in Java between 1791 and 1794 but his notes and illustrations, seized by the British in 1803, were not available to western science until 1861. By the turn of the 20th century, six more species were described (three from Sumatra, two from the Philippines, one from Borneo). Between 1910 and 1918, five new species accounts were published for Rafflesia from Borneo and peninsular Malaysia. A long hiatus then ensued until Dr. Willem Meijer described five species in 1984. Finally, in 1989 another Rafflesia enthusiast, Dr. Kamarudin Mat Salleh, described R. tengku-adlinii from Borneo. The beautifully illustrated book ‘Rafflesia of the World’ by J. Nais (2001) lists 18 species for the genus: in Borneo (7), Sumatra (6), Philippines (2), Peninsular Malaysia and Thailand (2), and Java (1).

One would think that a plant genus as conspicuous as Rafflesia, known for over 200 years and wonderfully documented in a book published in 2001, would be ‘well-covered.’ But in the year following the book’s publication, the “world order” for Rafflesia changed abruptly. A flower of a previously undescribed species of Rafflesia was seen by members of a conservation group (The Antique Outdoors) in Sibalom Natural Park, Antique Province, on the island of Panay. They informed Dr. Julie Barcelona, then of the National Museum of the Philippines, who, along with Dr. Edwino Fernando of the University of the Philippines at Los Baños, named it R. speciosa. This sparked a flurry of media attention and generally raised the awareness of many Filipinos about this botanical wonder specifically, as well as their biological heritage in general.

Up until 2002, the Philippines were thought to harbor just two species of Rafflesia: R. manillana of Luzon and Samar Islands and R. schadenbergiana of Mindanao which has flowers reaching 80 cm in diameter. Within three years, another large-flowered species was discovered in Mindanao, but it was clearly different than R. schadenbergiana. This species, which occurred in Compostella Valley Province, was named R. mira by Dr. Edwino Fernando and Perry Ong in 2005. Dr. Domingo Madulid published the name R. magnifica for the same taxon; however, it appeared later that year and thus it should be considered a synonym. Also in 2005, Renee Galang discovered a second Rafflesia on Panay and together with Dr. Madulid named it R. lobata for the lobed, open diaphragm of the flower. At this point, the Philippines boasted five Rafflesia species.

A mammalogist named Danny Balete collected a small-flowered Rafflesia in the Bicol Region of southern Luzon but at the time (1991) he thought it was R. manillana. When shown living specimens of that species in 2002, he
knew the Bicol *Rafflesia* was different. In 2006 Dr. Barcelona and colleagues published this new species in his honor, *R. baletei*. This species also demonstrates how ‘*Rafflesia* fever’ can sometimes go head to head against taxonomic nomenclatural rules. Unaware of a paper already in press describing *R. baletei* from the adjacent Mt. Isarog, a group of researchers from the Camarines Sur State Agricultural College (now Central Bicol State University of Agriculture) proposed the name ‘*R. irigaense*’ for a population of *Rafflesia* discovered by a mountaineer, Mr. Dominico Bagacina, on the nearby Mt. Asog. In an attempt to commemorate Mt. Iriga (= Mt. Asog), and likely to promote regional pride and ecotourism, this name was proposed at a meeting at the National Museum of the Philippines. This was subsequently reported in the *Philippine Daily Inquirer* newspaper. But alas, reporting plant names in newspapers does not constitute valid publication, so the name *R. baletei* stands.

More nomenclatural funny business ensued in 2007. Mount Banahaw in Luzon, a popular destination for mountaineering and religious groups, seemed an unlikely spot to find a new species of *Rafflesia*. But this is exactly what occurred – in fact three times! In 2007, Drs. Barcelona and Madulid and their colleagues independently published names for this *Rafflesia* (*R. banahaw* and *R. banahawensis*, respectively). Further investigation by Dr. Barcelona showed, however, that this species was the same as the one already named by Blanco in his Flora de Filipinas (1845) – *R. philippensis* found in Monte de Majaijai (an old name for Mt. Banahaw). Yes, botanists must, at times sink names they themselves proposed! The year 2007 was also exciting because *R. schadenbergiana*, not seen since 1882 and presumed extinct, was seen flowering in Bukidnon Province of Mindanao. Only a few infected *Tetrastigma* vines are known, so this large-flowered species is critically endangered.

In 2005, a *Rafflesia* was discovered by a villager named Sumper Aresta from the Cagayan Province of northern Luzon. Julie Barcelona and collaborators collected the type of the eighth Philippine *Rafflesia* species, naming it *R. leonardi* in 2008 in honor of Leonardo Co, an expert on the flora of the Sierra Madre of Luzon where this species occurs. It differed from *R. manillana*, which grows sympatrically with it, by its larger size, a relatively smooth disk (processes absent or reduced), and the lack of windows in the floral tube.

A biodiversity survey of the Sierra Madre mountain range in northeastern Luzon in 2004 resulted in a collection of specimens of *Rafflesia* that did not fit any previously described species from the Philippines. It most resembled *R. tengku-adlinii* of northern Borneo, but differed in ramanten morphology, disk processes and anther number. In 2009, Dr. Barcelona and coauthors named this species *R. aurantia* for its orange colored flower. The species is known only from only one population in Quirino Protected Landscape – a bit of a misnomer given that portions of this region are being impacted by gold and copper mining.

One could end this incredible story of discovery here and be impressed that the Philippines has now surpassed Borneo in *Rafflesia* species diversity (nine total). But the saga continues. Just this year, during a small-mammal survey conducted by staff of the Philippine Eagle Foundation and the Field Museum in Chicago, another small-flowered species of *Rafflesia* was discovered in Mindanao by Danny Balete – a fellow who has now found three new species of this parasite! The scientific name cannot be mentioned in this account because the paper describing it is not yet published. Suffice it to say that this species is one of the most remarkable yet seen, not by its size (for indeed it is the smallest in the genus) but by other unusual morphological features.

**Figure:** Although *Rafflesia* is famous for having the largest flower in the world, some species, such as this *R. baletei* from Mt. Iriga (Mt. Asog), Camarines Sur Province in the Philippines, has a flower measuring only 12 cm in diameter. Photo by Dan Nickrent.

Since 2003, only two other *Rafflesia* species have been described from regions outside the Philippines: *R. bengkulensis* (Sumatra) and *R. azlanii* (Peninsular Malaysia). Could this flurry of discovery in the Philippines simply be a function of the number of people looking for this plant or to greater intrusion into forested areas? Are there more species yet to be discovered in Indonesia and Malaysia? As amazing as it may seem, there is anecdotal evidence that even more species of *Rafflesia* exist in the Philippines. So the lesson to learn from this is that many
tropical regions of the world remain woefully under-explored. We should also appreciate the power of many eyes trained to a particular search image. The indigenous people often already know about Rafflesia, but their knowledge has simply not been transferred to western scientists. If we value biodiversity, or at least concede the possibility that future generations will, we must continue to support efforts that document and preserve it in areas rich with such botanical treasures.

References:


Daniel L. Nickrent, Department of Plant Biology, Southern Illinois University, Carbondale, IL 62901-6509 USA

LITERATURE HIGHLIGHTS

EVIDENCE FOR NUCLEAR THEFT

Parasitic plants are known thieves; they rob water, nutrients, and even genes from host plants. However the origin of the stolen genes is typically mitochondria, so it may have been assumed that the security surrounding the nucleus is much tighter, until now. A recent paper in Science by Yoshida et al. reported clear evidence that Striga hermonthica obtained a nuclear gene from its sorghum host or closely related species (Yoshida et al., 2010a).

S. hermonthica is a devastating parasitic plant which infects Poaceae species including major crops such as sorghum, maize and rice. As S. hermonthica belongs to the eudicot Orobanchaceae family and only infects monocot plants, the authors reasoned that it may be possible to detect nuclear horizontal gene transfer (HGT) if it occurs by identifying monocot specific genes in the S. hermonthica genome. From a large scale expressed sequence tag (EST) analysis of S. hermontica about 17,000 non-redundant sequences were examined (Yoshida et al., 2010b). Remarkably, one gene, designated ShContig9483, shows high similarity to genes in sorghum but has no homologs in eudicots. Genomic analysis of ShContig9483 shows that the high similarity (more than 80%) extends outside of the open reading frame, indicating its relatively recent translocation.
What could be the mechanism of nuclear HGT by S. hermonthica? Parasitic plants are able to connect their own vasculature to that of their hosts to obtain nutrients and water. It is also known that mRNA can be transferred from hosts to parasites, probably through their connected phloem (Roney, et al., 2007). Thus one possibility is that ShContig9483 was originally captured by S. hermonthica as mRNA. Interestingly, Yoshida et al. found 13 consecutive adenine (A) nucleotides immediately after the 3’ end of the ShContig9483 genomic region that is homologous to the sorghum genes. This sequence may indicate that a poly-A tail was added to a transcriptional unit of the originally transferred monocot gene. Consistent with this hypothesis, a sorghum EST clone was found to contain a poly-A tail attached 30bp downstream of the homologous region.

The comparative genomics analysis of a eudicot parasite and its monocot hosts detected clear evidence for nuclear HGT of a monocot specific gene. As this method is not able to detect nuclear HGT of genes that are common to both eudicot and monocot plants, the frequency of nuclear HGT in S. hermonthica is not clear. The percentage of monocot specific genes in a monocot genome is around 20% and as S. hermonthica is unlikely to discriminate the origin of genes, we suspect that more nuclear HGT will be found if other genes are investigated in detail.


Ken Shirasu and Satoko Yoshida, RIKEN, Plant Science Center, 1-7-22 Suehiro-cho, Tsurumi-ku, Yokohama, 230-0045, Japan.

CELLULAR INTERACTIONS AT THE HOST-PARASITE AND POLLEN-PISTIL INTERFACES IN FLOWERING PLANTS

Research into the host-parasite interface from the cellular to the molecular level has proliferated in recent decades; however host plant resistance mechanisms are multifaceted, complex, and vary between host species (Serghini et al., 2001; Rubiales, 2003; Labrousse et al., 2004). This has impeded the identification of durable resistance traits in the battle against infestation by parasitic weeds. Characterising host resistance pathways using natural host-parasite systems is one relatively unexplored avenue of research that may yield untapped sources of resistance (Thorogood and Hiscock, 2010). Similarly, comparing host-parasite interactions with well characterised processes such as the pollen-pistil interaction in flowering plants may draw interesting new parallels.

To address the knowledge gap between natural and agricultural host-parasite systems, Thorogood and Hiscock (2010) recently examined the compatibility of natural Orobanche-host plant interactions, and identified discrete early-acting and late-acting incompatibility responses. This complemented recent research which underscored the importance of layers of incompatibility in the resistance of various non-host eudicots to Striga hermonthica (Yoshida and Shirasu, 2009). Interestingly, self-incompatible pollen-pistil interactions are also categorised by early-acting and late-acting mechanisms of pollen tube rejection (Hiscock and Allen 2009), leading the authors to speculate that further parallels may be drawn between host-parasite and pollen-pistil interactions in flowering plants.

Pollen-pistil interactions in flowering plants comprise a series of complex cellular interactions involving a continuous exchange of signals between the haploid pollen and the diploid maternal tissue of the pistil (Hiscock and Allen, 2009). Significant progress has been made in elucidating the molecular identity of these signals and the cellular interactions they regulate. These events have been particularly well studied at the cellular and molecular level in species with self-incompatibility (SI) systems, which trigger the arrest in development of incompatible pollen on the stigma. The possibility of a consensus in cellular programmes among these SI systems, and incompatible host-parasite interactions in flowering plants remains to be explored.

Technological advances have greatly facilitated the identification of components involved in complex cellular interactions such as the pollen-pistil interaction. For example advances in microarray technology, such as the availability of genome-wide Affymetrix arrays for Arabidopsis and rice, coupled with the development of reliable cDNA subtraction techniques, such as suppression-subtractive hybridization (SSH), have facilitated the transcriptomic profiling of genes with expression specific to, or up-regulated in, pollen and pistil tissues (Hiscock and Allen, 2009). This has opened up new avenues for pollen-pistil interaction research, particularly the opportunity to identify candidate genes involved in pollen-stigma interactions, and potentially shared components of pollen-stigma signalling pathways among different species. Furthermore, Next Generation Sequencing using the Illumina approach will facilitate sequencing the entire transcriptome of multiple samples simultaneously to
produce quantitative data without prior knowledge of the genome, in theory making it suitable for any species.

Genomic and sequencing technologies such as these offer great hope for unraveling cell signalling networks involved in pollen-stigma interactions. Assuming parallels exist among complex cellular interactions in flowering plants, drawing upon new directions in pollen-pistil interaction research may be fertile new ground for generating hypotheses and new avenues of research into host resistance to parasitic plants.

References:


Chris Thorogood, School of Biological Sciences, University of Bristol, Woodland Road, Bristol. BS8 1UG

OBITUARY

ALFRED M. MAYER (1926-2010)

Professor Alfred Mayer was an Emeritus Professor of Plant Sciences at the Hebrew University of Jerusalem in Israel, who dedicated his last twenty years to the study of parasitic plants.

Alfred Mayer was born in Germany in 1926, and as a son to a Jewish family found a safe haven in Holland after the rise of the Hitler regime in Germany. Later his family managed to escape from Holland prior to its occupation, so he finished school in London, where he lived during the rest of the war. He obtained his Ph.D. from the University of London, and became a member of the department of Botany of the Hebrew University of Jerusalem in 1952. In 1997 he officially retired after a fruitful academic and administrative career, but his scientific career continued until very recently, combining pioneering and productive research in phytochemistry, plant biochemistry and physiology, with a significant contribution also to the understanding of parasitic plants.

After his formal retirement, Professor Mayer put many efforts into parasitic plant research. His research included a detailed analysis of the changes in broomrape seeds during conditioning and germination. He then moved on to the study of enzymatic activities during haustorium penetration, comparing it with the invasion mechanisms of pathogenic fungi.

He passed away at the age of 83 while some research projects on Orobanche are still in progress, including studies of the involvement of jasmonate in host resistance to Orobanche infection, and the possible use of various chemical agents to control broomrape germination and infection.
Mayer initiated and laid the foundations of many of the physical and academic aspects of the Institute of Life Sciences of The Hebrew University of Jerusalem, and at the same time devoted much of his time to education and teaching. In fact he has been teaching at the university for more than fifty years, always updated with cutting edge knowledge, and creative in challenging complicated biological systems.

His scientific enthusiasm, pioneer ideas, and gentle personality will be missed.

Danny Joel, Newe-Ya’ar Research Center, ARO, Haifa 31900, Israel.

CONGRATULATIONS

‘Bristol botanist wins Linnean Society prize’

Dr Christopher Thorogood has been awarded the 2010 Irene Manton Prize by The Linnean Society of London for his thesis on parasitic plants. (Abstract below)

The Irene Manton Prize is awarded for the best thesis in botany examined for a doctorate of philosophy during a single academic year (September to August). Dr Thorogood was named the winner by the President of The Linnean Society, Dr Vaughan Southgate, at the 222nd Anniversary Meeting of the Society this week.

Dr Christopher Thorogood conducted his doctoral research under the supervision of Professor Simon Hiscock at the University of Bristol’s School of Biological Sciences. His thesis entitled ‘Host Specificity and speciation in the holoparasitic angiosperm Orobanche minor Sm. (Orobanchaceae)’ was largely based on his own ideas and his passionate interest in parasitic plants, particularly broomrapes.

In addition to his scientific achievements, Chris is also a botanical illustrator and has exhibited botanical watercolour and oil paintings at the University of Bristol Botanic Garden. He used these skills to illustrate parts of his thesis with pen and ink drawings of floral anatomy, and other features of parasite morphology.

University of Bristol, 26 May 2010.


NEWS

STRIGA QUARANTINE LIFTED IN SOUTH CAROLINA AFTER A HALF CENTURY

A milestone event will be marked this year in the effort to eradicate Striga asiatica from the US. After finding no new plants in 2009, federal and state plant protection officials have initiated a process to lift the quarantine restrictions on the last of the infested area in South Carolina, signaling the final phase of a 53-year eradication effort. This is subject to continued survey. If new finds of witchweed occur in 2010 or later, infested acres may have to remain under restriction or be re-restricted. This event is noteworthy because it reflects the persistence of Striga and the time commitment needed for eradication of a parasitic weed.

An infestation of S. asiatica was first reported in North Carolina in 1956 and subsequent surveys revealed that a total of 175,000 ha were infested at the peak of the outbreak, spanning parts of both North and South Carolina (Eplee, 1992). The US implemented an eradication program that has relied on a combination of monitoring, public awareness, containment and devitalization of seeds in the soil by ethylene gas to trigger suicidal germination. Surveys in 2010 revealed no new Striga plants in South Carolina, although 728 ha in North Carolina continue to be infested and will require continued eradication efforts for...
several more years. Even in South Carolina, the plan calls for another 10 years of monitoring to ensure that no *Striga* appears undetected to reestablish the infestation.

It is interesting that in 1992, after substantial success in reducing the area of *Striga* infestation, it was predicted that lifting of quarantine restrictions for the entire Carolinas infestation would be possible by 1995 (Epilee, 1992). The elimination of all plants in a *Striga* population is clearly a significant challenge. Officials are anticipating that escalating demand for biofuel ethanol from corn will entice farmers to rotate back to corn after several years of planting non-host crops, and could result in reappearance of *Striga*.

Reference:


Jim Westwood, Virginia Tech, westwood@vt.edu

Alan Tasker, USDA APHIS PPQ, Alan.V.Tasker@aphis.usda.gov

**PRESS RELEASES**

‘Affordable solution to costly pests’

Extract:

LAKE VICTORIA, Kenya, Apr 16 (IPS) - The International Centre for Plant Physiology and Ecology (ICIPE), based at Mbaita, on the Kenyan shores of the world’s second-largest freshwater body, is advocating ‘push-pull cultivation’ as the answer to feeding future generations in Africa.

Up to 30,000 small farmers in East Africa, mostly in Kenya, have adopted this natural method of controlling pests and weeds in maize, the staple crop. Push-pull cultivation intersperses the desmodium plant with maize in a plot, and plants napier grass as a border on all sides. The desmodium repels, or pushes, the stem borer from the maize, and controls the dominant weed, *Striga*; the napier grass attracts, or pulls, the borer towards it.

Approximately 25,375,000 hectares in sub-Saharan Africa are under maize cultivation, of which 6,122,000 ha are affected by the parasitic *Striga* weed which strangles the maize plant. East Africa loses US$7 billion worth of maize worth of maize due to *Striga* and around $5-6 billion from the cereal parasite stem-borer insect, according to ICIPE.

The chemical-free system against them was developed by ICIPE scientists in collaboration with Rothamsted Research in the United Kingdom, the Kenya Agricultural Research Institute and various national partners, with funding from Kilimo Trust (East Africa), Gatsby Foundation (UK) and Biovision (Switzerland).

While farmers may opt to use fertiliser on a push-pull field, desmodium both retains moisture in the soil and fixes its nitrogen content at the rate of 110 kilogrammes per hectare per year. The plant remains in the field after the maize is harvested, and is simply trimmed back to allow new maize to be planted. ‘This is the answer to Africa’s food security,’ says Dr. Zeyaur Khan, principal scientist developing the push-pull project at ICIPE. ‘This will provide the magic number of $2 and over in Africa.’ Khan says farmers in Africa will stop migrating to cities in search of incomes if they can earn more than $2 a day in their fields. Khan says the production of maize by farmers using the method has gone up from less than one tonne per hectare previously to 3.5 tonnes per ha, an increase that ensures year-long food for smallholder family. Both desmodium and napier are fodder grasses that also help cattle and milk production, besides giving extra income through the sale of its seeds.

At Ebukanga village near Mbaita, 45 year old Agnes Mbuvi says her production of maize on her 50 by 40 metre plot has gone up from half a bag (45 kilos) to a remarkable 6 bags (540 kilos) of maize per harvest. ‘I have enough milk throughout the year, enough food, the soil is easy. I am happy,’ she says. Mbuvi, a widow, also adds that the extra income from the sale of surplus maize and milk has helped her educate her children. Not far away, 50 year-old Elfus Ameyo, a part-time plumber, says his even smaller ‘push-pull’ plot now gives him 2 bags (180 kg) of maize instead of the one ‘debe’ (16 kg tin) he would get previously. ‘School education helps in changing the minds of people,’ he says, explaining why his neighbor has not yet adopted the system in spite of seeing Ameyo’s huge increase in yield. ‘We don’t need much money, we need appropriate technology,’ says Khan, who is critical of multinational seed and fertiliser agencies and international donors supporting the giving of seed and chemical fertilizers to farmers in Africa.

ICIPE is now testing the efficacy of the push-pull method in rice cultivation, and against the cotton bollworm, both features that bode good news for millions of Asia’s small farmers. In the context of climate change, ICIPE is encouraging farmers to plant cotton as a second crop in addition to a food crop. The roots of the cotton plant also produce chemical flavinoids and isoflavinoids, similar to the desmodium root, that help kill the *Striga* weed.

‘Drought tolerant and Striga-resistant maize for Ghana’

Four drought tolerant and Striga-resistant corn varieties developed by the International Institute of Tropical Agriculture (IITA) and the National Maize Program of Ghana were released to Ghanaian farmers recently. Three early maturing lines EVDT-W 99 STR QPM Co; TZEE-W Pop STR QPM C0; and TZEE-W Pop STR QPM C0 and one intermediate maturing, drought tolerant QPM hybrid were released by the Ghanaian Crops Research Institute in collaboration with the Savannah Agricultural Research Institute and Industrial Research of Ghana.

‘With the release of these varieties, farmers in Ghana now have options not only in terms of maturity, grain color and type but also varieties which can tolerate the two major stresses which prevent increased maize production and productivity in the sub-region,’ IITA Maize Breeder, Dr. Baffour Badu-Apraku, said. In addition, Ghana Grains and Legumes Development Board of the Food and Agriculture Ministry, Dr. Robert Asuboah is optimistic that these ‘insurance’ crops will enable farmers to produce crops and profit during periods of drought.


From Crop Biotech, April 8, 2010.

‘New varieties to boost maize output in West and Central Africa’

Maize production in West and Central Africa is set to get a much-needed boost with the release of improved varieties by the Nigeria National Variety Release Committee. The varieties address many of the major constraints to maize production such as drought, low soil fertility, pests, diseases, and parasitic weeds. Researchers developed the varieties through conventional plant breeding by tapping naturally-available traits. The varieties were developed by the International Institute of Tropical Agriculture (IITA) in partnership with the Institute for Agricultural Research (IAR) of the Ahmadu Bello University in Zaria and Institute of Agricultural Research and Training (IARandT) of Obafemi Awolowo University in Ile Ife, Nigeria.

The released maize include 13 open-pollinated varieties of extra-early-, early-, intermediate-, and late-maturity with resistance to the parasitic weed Striga hermonthica and stem borers, tolerance to drought, and with good adaptation to sub-optimal soil nitrogen. Four hybrids with drought-tolerance have also been released.

The committee also approved two Striga-resistant and two white and two yellow productive hybrids developed at IITA in partnership with Premier Seeds Nigeria Limited. The company will commercially produce and market these hybrids.

Abebe Menkir, IITA maize breeder, says that the release of these varieties will hasten the adoption of improved maize cultivars by farmers in Nigeria, consequently increasing yields, raising farm incomes, and improving food security. The release of the improved varieties has sparked renewed optimism for maize farming in the region. ‘These varieties have the potential to provide farmers with opportunities to overcome the challenges to maize production in West and Central Africa,’ he added. Maize farmers often suffer from infestation of parasitic weeds and prolonged droughts, rendering their fields harvestless and farming households with little food and insufficient income for most of the year. Low soil fertility is often as devastating as droughts, while stem borers in the forest regions also hurt productivity.

Every year, IITA distributes improved open-pollinated varieties and hybrids to national partners and the private sector within and outside of WCA through regional trials. These trials have been used as vehicles for selecting promising varieties and hybrids adapted to specific conditions in the different countries for extensive testing and later release.

IITA

‘Striga resistant varieties to boost sorghum yields’

Extract:
In April, scientists in eastern and central Africa embarked on identifying sources of resistance to Striga, a parasitic weed. Supported by the Association for Strengthening Agricultural Research in Eastern and Central Africa (Asareca), the researchers from Sudan, Kenya, Eritrea and the International Crop Research Institute (ICRISAT) are using biotechnological tools in locating and identifying Quantitative Trait Loci (QTL) that gives resistance to Striga. QTL is a statistical method that links two types of information phenotypic data (trait measurements) and genotypic data (usually molecular markers) - in an attempt to explain the genetic basis of variation in complex traits.

According to Dr Charles Mugoya, the programme manager of the Agro biodiversity and biotechnology programme of Asareca, knowing the location and identification of QTLs for Striga resistance is a useful tool in aiding marker assisted breeding/selection (MAB or MAS) of sorghum for
MAS is an indirect selection process where a trait of interest is chosen not based on the trait itself but on a marker (morphological, biochemical or one based on DNA/RNA variation) linked to it. So far, QTLs underlying different resistance phenotypes have been identified and the scientists are now backcrossing populations to generate Striga resistance QTLs into farmer preferred sorghum varieties.

Mugoya said Striga hermonthica, also locally known as the witchweed, is a major constraint to sorghum production in particular and cereal production in general, especially in more marginal areas like semi-arid regions, where continuous cropping as a result of population pressure, has led to widespread soil infertility. The weed is genetically diverse and several factors contribute to its diversity. These include a high turnover of several generations of witch weed populations leading to high genetic diversity; hybridisation; broad geographic distributions; long distance dispersal and locally adapted host races.

‘Owing to its great potential genetic diversity, efforts to control it, through conventional breeding to generate Striga resistant varieties or agronomic practices to reduce the Striga seed bank in the soil, have been ineffective and Striga continues to be a menace, with reported cases of up to 100 per cent sorghum yield loss in the region,’ he noted.

The project promises to increase sorghum productivity in order to address food insecurity and poverty in East and Central African semi-arid zones and boost yields by at least by 20 per cent.

Steven Tendo,
Saturday Monitor, 9 June, 2010.
For full version see: http://www.monitor.co.ug/Magazines/Farming/-/689860/934808/-/xc1k6t/-/

‘Nigerian scientists introduce two new cowpea varieties’

Extract:
Nigerians scientists have released two new and improved cowpea varieties to farmers as part of efforts to raise production and improve farmer incomes in Nigeria’s savannah region, an official of the International Institute of Tropical Agriculture (IITA), Ibadan has said.

The varieties - IT89KD-288 and IT89KD-391 - were developed by scientists working at the Institute, in collaboration with the Institute for Agricultural Research of Ahmadu Bello University, Zaria; the University of Maiduguri, Borno and the Agricultural Development Programmes of Borno, Kaduna, Kano, and Katsina States.

Godwin Atser, the West African corporate communications officer of the IITA, said both varieties have proven superiority over the current lines being cultivated and aim to overcome the challenges faced by cowpea farmers in the country. ‘For instance, IT89KD-288 (now SAMPEA-11) is a dual-purpose cowpea variety with large white seeds and a rough seed coat.’ Mr. Atser said. ‘It has combined resistance to major diseases including Septoria leaf spot, scab, and bacterial blight, as well as to nematodes, and tolerance to Nigeria’s strain of Striga gesnerioides - a parasitic weed that severely lowers yield.’

Alpha Kamara, an IITA agronomist who is leading efforts to rapidly disseminate the varieties to farmers, added: ‘It also has a yield advantage of at least 80% over the local varieties.’

Emmanuel Ogala, April 19, 2010
For full version see: http://234next.com/csp/cms/sites/Next/News/5556524-147/nigerian_scientists_introduce_two_new_cowpea.csp#

‘Africa: scientists to develop drought-resistant cowpea’

Scientists conducting research have discovered a means of developing a variety of cowpea that is resistant to drought. The improved variety when introduced to farmers would help overcome constraints of disease, parasitic weeds, insect pest and drought especially in Sub-Saharan Africa.

The researchers from the International Institute for Tropical Agriculture (IITA), University of California, Riverside separately discovered that a portion of the cowpea known as the genome is responsible for disease and drought resistance among other. This discovery has led to the researchers’ working on improving the resistance of the plant to drought.

Known for its rich protein content, 70 per cent of world cowpea is grown in the savannah region of Africa and is a source of incomes to its consumers. However, cowpea faces several production constraints among which are diseases, insect pests, parasitic weeds such as Striga, and drought which is becoming increasingly important in the cowpea producing zones of sub-Saharan Africa.

Tina A. Hassan
Daily Trust, 30 March 2010.
‘Wetlands organization says rival group’s planting of parasite akin to a ‘restoration train wreck’.

A lengthy article in ‘The Argonaut’ by Gary Walker describes the disagreement between the Ballona Institute, and the Friends of the Ballona Wetlands over the introduction by the Institute, of Cuscuta salina to state-owned Ballona Wetlands in California, USA. The Friends complain that it is tending to eradicate Jaumea carnosa (Asteraceae) and Salicornia virginica (Chenopodiaceae). With additional posted comments.


THESIS

Host specificity and speciation in the holoparasitic angiosperm Orobanche minor Sm. (Orobanchaceae). Christopher John Thorogood, PhD. School of Biological Sciences, University of Bristol (supervised by Simon Hiscock and Fred Rumsey) April 2009.

Abstract: The holoparasitic angiosperm Orobanche minor sensu lato parasitizes a taxonomically diverse range of angiosperms, and has therefore been considered to be a host-generalist. However even host-generalist parasites may show host specificity on a local or regional scale. This study examines the host specificity of O. minor, and its potential to drive population divergence and speciation in this parasitic plant. Divergent host ecology appears to have genetically isolated intra-specific taxa O. minor var. minor and O. minor ssp. maritima on their local hosts, red clover (Trifolium pratense) and sea carrot (Daucus carota ssp. gummifer) respectively. Inter-simple sequence repeat (ISSR) marker-based data provided strong evidence for genetic divergence of morphologically cryptic populations. Patterns of genetic divergence were reinforced by phylogenetic analyses based on sequence-characterised amplified region (SCAR) markers derived from ISSR loci, which clearly differentiated host-specific clades. To explore the possibility of a physiological basis for population divergence, host-parasite interactions were then examined by cultivating clovers and carrots in Petri dish bioassays (‘rhizotrons’), and inoculating them with Orobanche. A series of histological studies were carried out, and compatible and incompatible pathways of parasite development were characterised, which suggested that host-resistance responses may determine early patterns of host specificity. Reciprocal infection studies identified increased fitness of populations when cultivated on their local hosts, indicating that cryptic taxa in fact comprise adaptive host-specific races. Microscopic techniques, coupled with controlled pollinations, identified a high potential for self-fertility in O. minor, indicating that selfing and inbreeding may reinforce these patterns of adaptive population divergence by isolating host-specific populations from gene flow. Finally, this analysis was extended by sampling populations from multiple hosts, across a broad geographic range. Sequence data identified an exotic host-generalist lineage and a native host-specialist lineage of O. minor, suggesting genetic structure in this species is defined by both host specificity and geography. These lineages may have hybridised following anthropogenic activity and host-shifts. Using the host-generalist holoparasite O. minor as a model, this study clearly demonstrates that host-driven divergence may be an important catalyst for speciation in parasitic plants.

BOOK REVIEW


Having reached the age when many botanists would have willingly (or unwillingly!) slowed their rate of publication, Job Kuijt has again demonstrated his unparalleled knowledge and unbounded energy by producing this monograph of Psittacanthus. As with his monograph of Phoradendron (Kuijt 2003), this work summarizes and synthesizes information on a taxonomically difficult mistletoe genus. Psittacanthus is the most speciose New World Loranthaceae genus. It is also widespread (Mexico to Paraguay) and conspicuous with its often large and colorful bird-pollinated flowers. It (plus the related Aetanthus) is distinguished from other members of the family by seeds lacking endosperm. Although previous contributions to the taxonomy of the genus have been made, no modern monograph existed. Thus, all students of parasitic plants should be delighted that the author’s 50+ years of experience with this group has culminated in this landmark publication. It is difficult to imagine anyone else accomplishing this goal. Previous estimates of the number of Psittacanthus species were gross underestimates. This monograph describes and provides illustrations for 119 species. Most remarkably, 51 of these are new. When new species named previously by the author are included, the total is 62, i.e. over half the species in the genus.

As with all the author’s previous work, his strength is in the meticulous documentation of the morphology of the organisms. Most of the illustrations were prepared by the author and these are both scientifically and artistically superb. Two keys to species are provided: for Mexico / Central America and South America / Caribbean (justified because species distributions do not overlap between these regions). The keys are generally workable, usually requiring both vegetative and floral features for
identification. In terms of production, the work was very well edited, being essentially free of typographical and other errors. The text is engaging and provides a cornucopia of ideas for further testing using ecological and biosystematic methods. For example, *P. ramiflorus* occurs in two geographically disjunct regions where the plants show morphological differences. A population genetics study might help determine whether these are best represented by one or two species.

Forty three species occur in Brazil (some exclusively so), thus this country represents the region where further work is needed. A recent compilation of *Psittacanthus* photographs for the Parasitic Plant Connection web site resulted in 35 species but also demonstrated that mysteries still exist (e.g., compare the photographs of *P. biternatus* from Goiás and Pará in Brazil). The author states ‘I regret not having seen more species in the field and hope my presentation does not suffer unduly in consequence.’ Indeed, most of the descriptions were prepared from herbarium material, but this would be inevitable for any monographer given that 23 species are extremely rare and known only from the type specimen. On a brighter conservation note, some of these species (e.g. *P. nudus* and *P. pascoensis*) may actually be more common, as documented by recent additional collections.

The species are arranged alphabetically as the author did not attempt a subgeneric classification of the genus. As properly indicated on p. 7, there is currently no species-level phylogeny of *Psittacanthus*. The author correctly acknowledges that an evolutionary interpretation of morphological character trends (e.g. dyads evolving from triads) requires a robust molecular phylogeny of the genus. This paragraph also states ‘the phylogenetic affinities within the family have not been adequately resolved…’, a concept which apparently predates the appearance of Vidal-Russell and Nickrent (2008). Had this work been read and cited, the statement on p. 31 regarding a possible relationship between *Psittacanthus* and *Desmaria, Ligaria*, and *Tristerix* would have been removed or revised. The x = 8 chromosome group of small-flowered Loranthaceae (e.g. *Struthanthus, Cladocolea, Oryctanthus*, etc.) form a well-supported clade along with *Psittacanthus*, not including the above three genera.

Despite any such minor shortcomings, this work is a remarkable achievement. Where would we be without the monographs produced by the author, such as for *Cladocolea* (Kuijt, 1975), *Oryctanthus* (Kuijt, 1976), and *Tristerix* (Kuijt, 1988) (and soon *Dendropemon*!). These works provide the taxonomic framework upon which depends further studies on the ecology, physiology, morphology, anatomy, development and phylogeny of these fascinating organisms called mistletoes.

References:


Daniel L. Nickrent, Department of Plant Biology, Southern Illinois University, Carbondale, IL 62901-6509. nickrent@plant.siu.edu

FORTHCOMING MEETINGS

A Summer School on ‘Rhizosphere Signalling’ is to be held 23-25 August 2010 at Wageningen, The Netherlands. Twelve keynote speakers are arranged. Additionally, there will be 20 slots for participants to present their work. For more information and registration (deadline July 26th, 2010) see: http://www.graduateschool-eps.info, check Summer School ‘Rhizosphere Signaling’
The 5th World Cowpea Research Conference will be held on September 27 to October 2010 in Dakar, Senegal. The theme of the conference is ‘Improving livelihoods in the cowpea value chain through advancement in science’. Topics of discussion include cowpea genetic improvement and use of molecular tools, human nutrition and processing, and enterprise development. Details of the conference are available at: http://cowpea2010.iita.org/ or email Christian Fatokun at c.fatokun@cgiar.org or Katherine Lopez at k.lopez@cgiar.org for direct inquiries.

The 11th World Congress on Parasitic Plants will be held at the Park Hotel San Michele in Martina Franca, Puglia, Italy, 7-12 June 2011.

The Congress continues a long tradition of regularly assembling the world’s experts on parasitic plants for professional and scientific meetings, which started in 1973 with the first international meeting in Malta.

The Congress will bring together scientists representing a wide spectrum of disciplines, research approaches, and geographical representation of parasitic plant research. Assembling specialists with different perspectives, all focused around the common theme of plant parasitism, provides a stimulating environment for learning, exchanging ideas, and connecting with old and new colleagues.

Parasitic plants - both the weedy species that severely constrain agriculture and the many other non-weedy species - present unanswered questions with regard to their origin and evolution from non parasitic plants, population structures and dynamics, evolutionary pathways towards crop parasitism, ecology, physiology, molecular biology, and the structure, function and development of their haustoria.

The Congress will include presentations at the cutting edge of parasitic plant research and management of parasitic weeds. A major emphasis in the Congress will be the fostering of interaction among participants.

For further detail, see the official web-site: http://ipps2011.ba.cnr.it

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/

For past and current issues of Haustorium see also: http://www.odu.edu/~lmusselm/haustorium/index.shtml

For information on the 11th World Congress on Parasitic Plants in Martina Franca, Italy, June 2011, see: http://ipps2011.ba.cnr.it

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/ (Including large numbers of sequences from Triphysaria versicolor, Striga hermonthonica, and Orobanche aegyptiaca, with BLAST capability and searchable by keyword and gene ontology terms)

For the Striga hermonthonica EST Database see: http://striga.psc.riken.jp/strigaDB/index.php
(A searchable database with BLAST, SSR and SNP searching, and gene ontology functions)

For the announcement of Gebisa Ejeta’s World Food Prize, including video of Hillary Clinton’s address see: http://www.worldfoodprize.org/about/about.htm

For abstracts from the 9th World Congress on Parasitic Plants see: http://www.cpe.vt.edu/wcopp/index.html

For The Mistletoe Center (including a comprehensive Annotated Bibliography on mistletoes, up to 2005) see: http://www.rmrs.nau.edu/mistletoe/

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 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 the work of Forest Products Commission (FPC) on sandalwood, see: http://www.fpc.wa.gov.au (Search Santalum)

For information on the Kilimo Trust *Striga* project see:
www.thekilimotrust.org

For information on the work of the African Agricultural Technology Foundation (AATF) on *Striga* control in Kenya, including periodical ‘Strides in *Striga* management’ newsletters, see: http://www.aatf-africa.org/

**LITERATURE**

**STRIGOLACTONES**

A special issue of Plant and Cell Physiology (Vol 51 No. 7) has just been published on strigolactones. All papers can be downloaded free. See: http://pcp.oxfordjournals.org/current.dtl A selection of the more relevant papers will be included in the Literature section of our next issue.

**MYCO-HETEROTROPHY**

New Phytologist has just published a ‘Special Virtual Issue’ (Volume 185 No. 3) on the topic of myco-heterotrophy, containing 25 articles. See: http://www3.interscience.wiley.com/cgi-bin/fulltext/123242499/PDFSTART These will be reviewed in some way in our next issue.

**CURTIS’S BOTANICAL MAGAZINE**

Volume 26 No 4 of this magazine is devoted to parasitic plants and their potential cultivation. Single copies are available from the publishers for £14.50 each via: http://www.wiley.com/bw/cservices/single.asp?site=1 The individual papers are noted below.

**CORRECTION**

Rodenburg, J. and Johnson, D.E. 2009. Weed management in rice-based cropping systems in Africa. Advances in Agronomy 103: 149-218. - It was wrongly suggested in the last issue of Haustorium that this paper reported *Striga* spp. as weeds in lowland rice. This should have read ‘upland rice’. Our apologies - and see the new more detailed paper by Rodenburg *et al.* on this subject under Literature below.

**NEW ITEMS**

* indicates web-site reference only


Albert, M., van der Krol, S. and Kaldenhoff, R. 2010. *Cuscuta reflexa* invasion induces Ca²⁺ release in its host. Plant Biology 12(3) 554-557. (Calcium release in tomato was closely associated with the *Cuscuta* haustorium.)


Amon, A.D.E., Soro, D., N’Guessan, K. and Traoré, D. 2010. (Loranthaceae: vascular parasitic plants of trees and shrubs in south-east Côte d’Ivoire.) (in French) Journal of Applied Biosciences 25: 1565-1572. (Species identified were *Tapinanthus bangwensis, T. belvisii* and *Phragmathera capitata*, infesting 80 host species in 31
families. T. belvisii was mainly coastal. Most farmers practice cutting off the infested branch.


Bandaranayake, P.C.G., Filappova, T., Tomilov, A., Tomilova, N.B., Jamison-McClung, D., Ngo, Q., Inoue, K. and Yoder, J.I. 2010. A single-electron reducing quinone oxidoreductase is necessary to induce haustorium development in the root parasitic plant Triphysaria. Plant Cell (22) 1404-1419. (This substantial paper provides a large leap forward in understanding the mechanisms that mediate haustorium formation. The enzymes characterized regulate the production of phenolic-derived reactive oxygen species involved in haustorium signaling.)

Barbu, C. 2009. Impact of mistletoe attack (Viscum album ssp. abietis) on the radial growth of silver fir. A case study in the North of Eastern Carpathians. Annals of Forest Research 52: 89-96. (Recording significant reductions in growth of Abies alba from V. album ssp. abietis over a period of many years in Romania.)

Barcelona, J.F., Co, L.L., Balete, D.S. and Bartolome, N.A. 2009. Rafflesia aurantia (Rafflesiaecae): a new species from northern Luzon, Philippines. Gardens’ Bulletin (Singapore) 61(1): 17-27. (This new species, related to R. tengku-adlinii is considered to be highly threatened by the disappearing dipterocarp forest. See also article in text above.)


Barnoaeia, I. and Iacobescu, O. 2009. Using pixel and object based IKONOS image analysis for studying decay in silver fir stands. Annals of Forest Research 52: 151-162. (Exploring the potential for satellite imagery to survey Abies alba for damage from mistletoe (presumably V. album) and other problems. Results not convincing?)


insect imprisonment. International Journal of Plant Sciences 170(2): 157-163. (A detailed study confirming the hide beetle *Dermentes maculatus* as the commonest insect visitor, which may be trapped in the flower for 3 days before escaping, carrying viable pollen.)


Bowen, M.E., McAlpine, C.A., Seabrook, L.M., House, A.P.N. and Smith, G.C. 2009. The age and amount of regrowth forest in fragmented brigalow landscapes are both important for woodland dependent birds. Biological Conservation 142(12): 3051-3059. (Mistletoes (unspecified) cited as an important factor for woodland regrowth forest in fragmented brigalow landscapes are both important for woodland dependent birds.)

Brand, J.E. 2009. Effect of different *Acacia acuminata* variants as hosts on performance of sandalwood (*Santalum spicatum*) in the northern and eastern Wheatbelt, Western Australia. Australian Forestry 72(4): 149-156. (*S. spicatum* developed better on *A. acuminata* narrow-phyllode variant and *A. acuminata* small-seed variant than on the typical form or on *A. burkittii* or *A. oldfieldii*.)

Breteler, F.J. 2007. A reconsideration of the species delimitation in *Diogoa* (afrotropical Olacaceae). Systematics and Geography of Plants 77(2): 239-245. (*Strombosia retivenia* previously treated in Nigeria as synonymous with *Diogoa zenkeri* is newly described and illustrated as a separate species, *D. retivenia*.)


Brown, R.H., Nickrent, D.L. and Gasser, C.S. 2010. Expression of ovule and integument-associated genes in reduced ovules of Santalales. Evolution and Development 12(2) 231-240. (Plant morphologists have long been fascinated with embryo sac reduction in parasitic plants. This is one of the first papers to elicit information on the genetic basis of this phenomenon and should stimulate similar studies in other groups of parasites.)

Bülbül, F., Aksoy, E., Uygur, S. and Uygur, N. 2009. Broomrape (*Orobanche* spp.) problem in the eastern Mediterranean region of Turkey. Helia 32(51): 141-152. (Reporting that in this region, *O. aegyptiaca/O. ramosa* were present in 28% of the tomato greenhouses and 80% of tomato fields. *O. crenata* and *O. aegyptiaca/O. ramosa* were present in 58% of faba bean and 75% of lentil fields. *O. cumana* does not affect sunflower in this region but does occur elsewhere in the country.)

Cai RunLan, Yang MeiHua, Shi Yue, Chen Jun, Li YongChao and Qi Yun. 2010. Antifatigue activity of phenylethanoid-rich extract from *Cistanche deserticola*. Phytotherapy Research 24(2): 313-315. (Confirming alleviation of fatigue in mice, supporting traditional use.)


Chivandi, E., Davidson, B.C. and Erlwanger, K.H. 2008. A comparison of the lipid and fatty acid profiles from the kernels of the fruit (nuts) of *Ximenia caffra* and *Ricinodendron rautanenii* from Zimbabwe. Industrial Crops and Products 271 29-32. (Concluding that *X. caffra* is potentially an important source of essential fatty acids.)


Codrea, N. 2008. (Crop potential of some sunflower hybrids at Cogealac Varieties Testing Center during 2002-2004.) (in Romanian) Lucrări Științifice - Universitatea de Științe Agronomice București. Seria A, Agronomie 51: 617-623. (Among 4 hybrids tested, Select was susceptible to *Orobanche cumana* while Favorit, Jupiter and Neptun were apparently immune.)


Costea, M., García Ruiz, I. and Welsh, M. 2008. A new species of Cuscuta (Convolvulaceae) from Michoacán, Mexico. Brittonia 60(3): 235-239. (C. cotijana is described from NW Mexico, related to C. jalapensis and occurring on a wide range of hosts including maize and avocado.)

Cullen, J. 2009. Phelypaea boissieri: Orobanchaceae. Curtis’s Botanical Magazine 26(4): 379-388. (P. boissieri is described and illustrated. The history of the genus is described and a key to the species is provided; also instructions for its cultivation.)


Díaz-Ruiz, R., Torres, A.M., Satovic, Z., Gutierrez, M.V., Cubero, J.I. and Román, B. 2010. Validation of QTLs for Orobanche crenata resistance in faba bean (Vicia faba L.) across environments and generations. TAG Theoretical and Applied Genetics 120(5): 909-919. (Two QTLs contribute to O. crenata resistance in all three locations tested, with other QTLs associated with resistance in only one or two of the locations.)


Domínguez, L.S., Melville, L., Sérisc, A., Faccio, A. and Peterson, R.L. 2009. The mycoheterotroph Arachnitis uniflora has a unique association with arbuscular mycorrhizal fungi. Botany 87(12): 1198-1208. (Showing that the Glomus fungus associated with A. uniflora (Coriaceae) has a unique intra-cellular structure in the root cortex.)


Dong ShuQi, Ma YongQing, Shui JunFeng and Sun YaJun. 2009. Germination of Orobanche minor seeds as induced by rhizosphere soil extracts from winter wheat of different historical periods. Journal of China Agricultural University 14(2): 59-63. (Referring to ‘allelopathic’ effects of wheat stimulating germination of O. minor. But abstract also refers to inhibition. Not clear.)


Dor, E., Hershenhorn, J., Andolfi, A., Cimmino, A. and Evidente, A. 2009. Fusarium verticillioides as a new pathogen of the parasitic weed Orobanche spp. Phytoparasitica 37(4): 361-370. (F. verticillioides, isolated from O. cumana was highly pathogenic to O. aegyptiaca, O. ramosa and O. cumana but did not affect O. crenata. A toxic metabolite was isolated and identified as fusaric acid.)

Ducarme, V. and Wesselingh, R.A. 2010. Performance of two Rhinanthus species under different hydric conditions. Plant Ecology 206(2): 263-277. (Confirming that Rhinanthus angustifolius performs better than R. minor in all moisture conditions but especially when wet.)


Encheva, J., Shindrova, P. and Penchev, E. 2008. Developing mutant sunflower lines (Helianthus annuus L.) through induced mutagenesis. Helia 31(48): 61-72. (Sunflower mutants generated by ultrasound included a number with high resistance to Orobanche cumana.)


Ertürk, Ö. 2010. Antibacterial and antifungal effects of alcoholic extracts of 41 medicinal plants growing in Turkey. Czech Journal of Food Sciences 28(1): 53-60. (Viscum album among the most active species tested.)

Fadini, R.F., Gonçalves, D.C.M. and Reis, R.P.F. 2009. Consistency in seed-deposition patterns and the distribution of mistletoes among its host trees in an Amazonian savanna. Australian Journal of Botany 57(8): 640-646. (Dispersal of seeds of Psittacanthus plagiophyllus by the bird Elaea cristata was predominantly onto larger and previously infected cashew (Anacardium occidentale).)


Fallahpour, F., Koocheki, A., Mahalati, M.N. and Rastegar, M.F. 2010. Tolerance of sugarbeet varieties to dodder (Cuscuta campestris). Proceedings of 3rd Iranian Weed Science Congress, Volume 1: Weed biology and ecophysiology, Babolsar, Iran, 17-18 February 2010: 137-142. (Among 5 commercial varieties, Flores was the most tolerant and Castillo the most susceptible.)


Fernández-Escobar, J., Rodríguez-Ojeda, M.I., Fernández-Martínez, J.M. and Alonso, L.C. 2009. Sunflower broomrape (Orobanche cumanana Wallr.) in Castilla-León, a traditionally non-broomrape infested area in northern Spain. Helia 32(51): 57-64. (This province has previously been free of O. cumana but has become infected in recent years by race F.)

horizontal resistance, use of herbicide on
imidazolinone-resistant varieties and detailed
monitoring of race development in the weed.)
Fondevilla, S., Fernández-Aparicio, M., Satovic, Z.,
Emeran, A.A., Torres, A.M., Moreno, M.T. and
Rubiales, D. 2010. Identification of quantitative trait
loci for specific mechanisms of resistance to
*Orobanche crenata* Forsk. in pea (*Pisum sativum* L.).
Molecular Breeding 25(2): 259-272. (Four QTLs were
each found to explain from 10 to 17% of the variation
in field resistance to parasitism. QTLs involved in
specific mechanisms of resistance, such as low
induction of parasite seed germination, reduced
tuberce establishment, and slower tubercle
development were also identified.)
Antibodies raised against tobacco aquaporins of the
PIP2 class label viscin tissue of the explosive dwarf
(Throwing light on the processes involved prior to the
explosive release of seeds by *Arceuthobium
americanum*.)
Friedman, C.M.R. and Sumner, M.J. 2009. Maturation of
the embryo, endosperm, and fruit of the dwarf
mistletoe *Arceuthobium americanum* (Viscaceae).
(A very detailed study.)
Gal-On, A., Naglis, A., Leibman, D., Ziadna, H.,
Kathiravan, K., Papayiannis, L., Holdengreber, V.,
Broomrape can acquire viruses from its hosts.
Phytopathology 99(11): 1321-1329. (Showing that
cucumber mosaic virus could be transmitted from
tomato to *Phelipanche aegyptiaca* and could replicate
in the latter. Tomato mosaic virus, potato virus Y, and
tomato yellow leaf curl virus were also transmitted but
there was less clear evidence of replication.)
Geman, D.A., Dyachenko, S.A., Kosachev, P.A.,
Smirnov, S.V. and Shmakov, A.I. 2009. Supplements to
the flora of the West Mongolia. Botanicheskii
Zhurnal 94(10): 1583-1593. (Newly recorded species
include *Euphrasia altaica*.)
Ghribi-Gammar, Z., Jilani, I.B.H., Daoud-Bouattour, A.
and Saad-Limam, S.B. 2010. In: Neffati, M.,
Belgacem, A.O. and El Mourid, M. (Eds)
International Journal of Plant Sciences (Muzaffarnagar)
4(2): 651. (First report of *D. falcata* on *Cryptolepis
buckhani* in Gujarat, India.)
Gontcharov, S.V. 2009. Sunflower breeding for resistance
to the new broomrape race in the Krasnodar Region of
Russia. Helia 32(51): 75-80. (Line VK 623 has been
used in the development of varieties resistant to *O.
cumana* races E and F but the recessive nature is a
drawback.)
Isolation and evaluation of indigenous fungal and
bacterial isolates as potential bioagents against
broomrape (*Orobanche cernua*) in Jordan. Plant
Pathology Journal (Faisalabad) 8(3): 98-105.
(Identifying a range of pathogens from *O. cernua*
including a *Cylindrocladium* sp., *Fusarium oxysporum*
and *F. solani*; also a *Streptomyces* sp.)
(*C. ruber*, a parasite of *Cistus creticus*, is described
and illustrated, together with information on its
phylogeny, systematics, distribution, habitat, ecology,
phenology and cultivation.)
Gregory, S.C., van der Haegen, W.M., Chang, W.Y. and
West, S.D. 2010. Nest site selection by western gray
squirrels at their northern range terminus. Journal of
Wildlife Management 74(1): 18-25. (Presence of
*Arceuthobium* (unspecified) in ponderosa pine increased
the chances of nesting by the squirrel *Sciurus griseus*.)
Gressel, J. 2009. Biotech and gender issues in the
(Emphasising the role of new technology,
especially that leading to *Striga*-resistant varieties, in
alleviating the burden on women in third-world
farming.)
Gressel, J. and Valverde, B.E. 2009. The other, ignored
HIV - highly invasive vegetation. Food Security 1(4):
63-478. (Emphasising the enormous importance of
weeds (‘Highly Invasive Vegetation’) in third world
agriculture, and including an analysis of the *Striga*
problem, and the potential for new technological,
especially transgenic, solutions along with existing
approaches.)
casual species (1990-1993) at three sites in Ygarden
municipality, Hordaland, westernmost Norway. Blyttia
68(1): 9-11. (The only records for this species in
Norway.)
research in anthroposophic medicine. Alternative
Therapies in Health and Medicine 15(6): 52-55. (A
general review, including reference to mistletoe, presumably mainly *Viscum album.*

Han JianPing, Song, JingYuan, Liu Chang, Chen Jun, Qian Jun, Zhu YingJie, Shi LinChun, Yao Hui and Chen ShiLin. 2010. Identification of *Cistanche deserticola* and *Cistanche tubulosa* species (Orobanchaceae) based on sequences of the plastid psbA-trnH intergenic region. Acta Pharmaceutica Sinica 45(1): 126-130. (Suggesting that the psbA-trnH intergenic spacer region represents a barcode that can be used to distinguish *C. deserticola* and *Cistanche tubulosa*, the preferred medicinal species, from *C. sinensis, C. salsa, Orobanche pycnostachya* and *Boschniakia rossica.*)


Hladni, N., Jocic’, S., Miklic’, V., Saftic’-Pankovic’, D. and Škoric’, D. 2009. Using new Rf inbred lines originating from an interspecific population with *H. deserticola* for development of sunflower hybrids resistant to broomrape. Helia 32(51): 81-90. (Hybrids derived from inbreds RHA-D-2, RHA-D-5, RHA-D-6, RHA-D-7 and RHA-D-8, which had been developed from *H. deserticola*, showed resistance to *Orobanche cumana* races E and F.)

Ho ShangTse, Tung YuTangm, Cheng KaiChung and Wu JyhHorng. 2010. Screening, determination and quantification of major antioxidants from *Balanophora laxiflora* flowers. Food Chemistry 122(3): 584-588. (Identifying several components of flower extracts from *B. laxiflora* with excellent antioxidant activities.)

Hopper, S.D. 2009. *Nuytsia floribunda*: Loranthaceae. Curtis's Botanical Magazine 26(4): 333-368. ( *N. floribunda* is described and illustrated, its mythological and practical use by Australian aborigines, its phylogeny, biology, ecology and systematics are described; also its possible cultivation and propagation.)


*Ibrahim, H.I. and Omotesho, O.A. 2010. Economic analysis of alternative *Striga hermonthica* control methods in the Northern guinea Savanna of Nigeria. Electronic Journal of Environmental, Agricultural and Food Chemistry 9(1): 138-144. (See previous entry – confirming higher maize yield and lower *Striga* counts with the *Striga* tolerant maize variety Acr 97 TZL COMP.1-W, compared with local varieties with or without extra N fertilizer.)

Ibrahim, H.I., Omotesho, O.A. and Adewunmi, M.O. 2010. Effect of five *Striga hermonthica* control methods on input use, striga counts and maize yield in the Northern guinea Savanna of Nigeria. Electronic Journal of Environmental, Agricultural and Food Chemistry 9(1): 145-149. (See previous entry – confirming higher maize yield and lower *Striga* counts with the *Striga* tolerant maize variety.)

Ilic’, N. 2009. (Decline of sessile oak [*Quercus petraea* (Mattuschka) Lieblein] and occurrence of the mistletoe *Loranthus europaeus* Jacq. on mountain Motajica.) (in Serbo-Croat) Radovi Šumarskog Fakulteta Univerziteta u Sarajevu 39(1): 21-33. (Attributing the decline in oak forest at least partly, if not mainly, to *L. europaeus*, which infests up to 80% of older trees in the study area.)


and herbicides, Babolsar, Iran, 17-18 February 2010: 115-118. (Best results obtained with rimsulfuron 90 g/ha 30, 40 and 50 days after planting.)


Jinga, V., Iliescu, H., Stefan, S. and Manole, D. 2009. Response of some sunflower cultivars to broomrape attack in Romania. Helia 32(51): 127-134. (Hybrids HS 1900, Turbo, Justin and Favorit showed absolute resistance to O. cumana. Good control was also achieved with herbicides trifuralin and imazamethabenz.)


Kelly, S.K., Friedman, C.M.R. and Smith, R.G. 2009. Vascular cells of the lodgepole pine dwarf mistletoe (Arceuthobium americanum) fruit: development, cytochemistry, and lipid analysis. Botany 87(12): 1177-1185. (The explosive fruits of Arceuthobium species are frequently mentioned in introductory texts though the mechanism has received little study. Using histological methods and chemical analyses, the authors elucidate the origin of the vesicular cells and suggest that their accumulation of lipid functions in the discharge of the seed.)


Krishna, A.R. and Valli, P.K.D. 2009. Studies on biological control of Cuscuta chinensis Lamk - a parasitic weed by Euphorbia hirta L Indian Journal of Weed Science 41(1/2): 101-102. (Showing that 'C. chinensis' (probably C. campestris?) fails to develop normally on E. hirta and when the latter is inter-planted with green gram (Phaseolus aureus), it also reduces the attack on the crop and increases crop yield.)


Kuijt, J. 2009. Miscellaneous mistletoe notes, 48-60: descriptions of twelve new species of Loranthaceae and...
Viscaceae. Brittonia 61(2): 144-162. (Describing 12 new species - Aetanthus trifolius, Cladocolea rostrifolia, Dendrophthora lanceolata, D. rotundata, D. tenuis, D. werfii, Oryctanthus minor, Phoradendron pascoi, P. vasquezianum, Struthanthus apiculatus, S. schultesi, and S. sessiliflorus. Also noting that Cladocolea alternifolia, previously thought to be extinct, occurs on Ilha Grande, just west of Rio de Janeiro, Brazil.)


Lashkari, A., Meibodi, M.A.B., Moeini, M.M. and Mirhadi, S.M.J. 2010. Survey the possibility chemical and cultural control of tomato weed field with concern on broomrape (Orobanche aegyptiaca). Proceedings of 3rd Iranian Weed Science Congress, Volume 2: Key papers, weed management and herbicides, Babolsar, Iran, 17-18 February 2010: 278-281. (Some control with glyphosate, and with sulfosulfuron + metsulfuron but not with sulfosulfuron alone, rimsulfuron, ammonium sulphate or urea.)

Laszczyk, M.N. 2009. Pentacyclic triterpenes of the lupane, oleanane and ursane group as tools in cancer therapy. Planta Medica 75(15): 1549-1560. (Noting that mistletoe (presumably Viscum album) could be a source of active triterpenes.)

Lee ChanHo, Kim JoonKi, Kim HyeYeon, Park SungMin and Lee SunMee. 2009. Immunomodulating effects of Korean mistletoe lectin in vitro and in vivo. International Immunopharmacology 9(13/14): 1555-1556. (Results suggest that extracts of Viscum album var. coloratum enhance the immune system through modulation of lymphocytes, NK cells, and macrophages.)

Leimu, R. 2010. Habitat quality and population size as determinants of performance of two endangered hemiparasites. Annales Botanici Fennici 47(1): 1-13. (Performance of Melampyrum arvense was influenced only by habitat quality, while that of M. cristatum depended also on population size.)


Li DongXiao, Wang, L.J., Yang XiaoPo, Zhang GuoGuang and Chen LiAng 2010. Proteomic analysis of blue light-induced twining response in Cuscuta australis. Plant Molecular Biology 72(1/2): 205-213. (Results suggest the blue light-induced twining in C. australis seedlings may be mediated by proteins involved in light signal transduction, cell wall degradation, cell structure, and metabolism.)

Li DongXiao, Zhang HuiHuang, Zhang GuoGuang and Chen Liang. 2009. The effects of different lights and gibberellin on establishment of parasitism between dodder and its hosts. Journal of Tropical and Subtropical Botany 17(5): 458-464. (Demonstrating that there was not only HER (high energy reaction) in dodders, but also dark conversion from Pfr to Pr, and there were mutual interactions of phytochromes and cryptochromes in twining.)


Ma LiJie, Chen GuiLin, Nie LiSha and Ai Min. 2009. Effect of Cynomorium songaricum polysaccharide on telomere length in blood and brain of D-galactose-induced senescence mice. China Journal of Chinese Materia Medica 34(10): 1257-1260. (Concluding that extract of C. songaricum can exert an anti-aging effect by increasing telomere length in senescent mice.)

MacRaid, L.M., Radford, J.Q. and Bennett, A.F. 2010. Non-linear effects of landscape properties on mistletoe parasitism in fragmented agricultural landscapes. Landscape Ecology 25(3): 395-406. (Moderate landscape fragmentation may increase abundance of Amyema miquelii but more extreme fragmentation results in a reduction associated with loss of the associated seed-dispersing bird Dicaeum hirundinaceum.)


Masrievic’, S. and Medic’-Pap, S. 2009. Broomrape in Serbia from its occurrence till today. Helia 32(51): 91-100. (Describing the spread of Orobanche cumana race E in Serbia, believed to have been introduced with confectionary sunflower in the 1990s.)


Mathiasen, R.L. and Daugherty, C.M. 2009. Arceuthobium abietinum subspecies wiensis, a new subspecies of fir dwarf mistletoe (Viscaceae) from Northern California and Southern Oregon. Madroño 56(2): 118-126. (Distinguishing this new subspecies, attacking red fir and Brewers spruce, from A. abietinum ssp. concolor (on white fir) and ssp. magnifica (on red fir) on morphological and host-range differences.)

Mathiasen, R.L., Daugherty, C.M. and Reif, B.P. 2009. Arceuthobium rubrum (Viscaceae) in Mexico. Madroño 56(2): 99-103. (Establishing that the disjunct population in S. Mexico previously given specific status as A. oaxacanum is not morphologically or genetically distinguishable from A. rubrum.)


Meighani, F., Minbashi, M. and Yazdani, M. 2009. Study of tomato (Lycopersicon esculentum) cultivars tolerance to Orobanche aegyptiaca. Applied Entomology and Phytopathology 77(1): Pe93-Pe111. (Cultivar Petorak proved most tolerant and Primoearly the most susceptible (in Iran).)

Menkir, A., Adetimirin, V.O., Yallou, C.G. and Gedil, M. 2010. Relationship of genetic diversity of inbred lines with different reactions to Striga hermonthica (Del.) Benth and the performance of their crosses. Crop Science 50(2): 602-611. (In a study of 45 diallel crosses of 10 parental lines of maize in Benin and Nigeria, the broad range of genetic divergence detected with AFLP markers indicates a significant reservoir of diversity among resistant lines that can be exploited in breeding.)


Meulebrouck, K., Verheyen, K., Brys, R. and Hermy, M. 2009. Limited by the host: host age hampers establishment of holoparasite Cuscuta epithymum. Acta Oecologica, 35(4): 533-540. (Establishment of the endangered C. epithymum is greater on younger Calluna vulgaris and is thus affected by the heathland management regime.)

Meulebrouck, K., Verheyen, K., Hermy, M. and Baskin, C. 2010. Will the sleeping beauties wake up? Seasonal dormancy cycles in seeds of the holoparasite Cuscuta epithymum. Seed Science Research 20(1): 23-30. (Dormancy in seeds of C. epithymum declined over the winter but was re-imposed with higher spring temperatures. Most seeds had germinated after 31 months.)


(Factors discussed include presence of mistletoe (unspecified).)


Motazedi, S., Jahedi, A. and Farnia, A. 2010. Integrated broomrape (*Orobanche aegyptiaca*) control by sulfosulfuron (WG 75%) herbicide with wheat mulch applied in field potato. Proceedings of 3rd Iranian Weed Science Congress, Volume 2: Key papers, weed management and herbicides, Babolsar, Iran, 17-18 February 2010: 227-229. (Potato yield loss from *O. aegyptiaca* estimated at 71%. Good control and yiled benefit recorded from sulfosulfuron +/- wheat mulch.)

Mounnissamy, V.M., Subramanian Kavimani, Gnanapragasam Sankari, Dhayalamurthi S., Quine, S.D. and Subramani, K. 2009. Effect of *Cansjera rheedii* J. Gmelin (Opiliaceae) on diuretic activity in rats. *Journal of Pharmacy Research* 2(10): 1627-1628. (*Santalum lanceolatum* was relatively unaffected by different grazing regimes involving cattle and/or rabbits.)


Nezamabadi, N., Haghdadi, S., Minbashi, M. and Meighani, F. 2010. Investigating broomrape chemical control in potato under controlled and natural conditions. Proceedings of 3rd Iranian Weed Science Congress, Volume 2: Key papers, weed management and herbicides, Babolsar, Iran, 17-18 February, 2010: 264-267. (Best results on *Orobanche aegyptiaca* attained with rimsulfuron 30 g/ha applied 30, 40 and 50 days after planting.)

Nickrent, D. L., Malécot, V., Vidal-Russell, R. and Der, J.P. 2010. A revised classification of Santalales. *Taxon* 59: 538-558. (Molecular and morphological data were used to revise the classification of the sandalwood order. Four new family names as well as a new classification for Loranthaceae are proposed.)

Nikam, T.D. and Barmukh, R.B. 2009. *GA₃* enhances in vitro seed germination in *Santalum album*. *Seed Science and Technology* 37(2): 276-280. (Good germination achieved when the endocarp was removed and seeds pre-treated with *GA₃* for 12 h, then inoculated on Murashige and Skoog's medium fortified with or without benzylamino purine.)

Nun, N.B. and Mayer, A.M. 2009. Possible function of isoleucine in the methyl jasmonate response of *Arabidopsis to Phelipanche aegyptiaca*. *Phytoparasitica* 37(5): 485-488. (Demonstrating that the partial resistance to *P. aegyptiaca* induced by methyl jasmonate is greatly enhanced by exposure to isoleucine.)


Ogura-Tsujita, Y., Gebauer, G., Hashimoto, T., Umata, H. and Yukawa, T. 2009. Evidence for novel and specialized mycorrhiza; parasitism: the orchid *Gastrodia confusa* gains carbon from saprophytic *Mycena*. *Phytoparasitica* 37(5): 485-488. (Demonstrating that the partial resistance to *P. aegyptiaca* induced by methyl jasmonate is greatly enhanced by exposure to isoleucine.)

Okiei, W., Ogunlesi, M. and Ademoye, M.A. 2009. An assessment of the antimicrobial properties of extracts of various polarities from *Chasmanthera dependens*, *Emilia coccinea* and *Cuscuta australis*, herbal
medications for eye diseases. Journal of Applied Sciences 9(22): 4076-4080. (Extracts of C. australis exhibited some anti-microbial activity, supporting its medicinal use in Nigeria.)


Osadebe, P.O. and Omeje, E.O. 2009. Comparative acute toxicities and immunomodulatory potentials of five Eastern Nigeria mistletoes. Journal of Ethnopharmacology 126(2): 287-293. (Comparing extracts of ‘Loranthus micranthus’ (= Ileostylos micranthus) growing on 5 different hosts. All had useful immunomodulatory potential, the best being from Kola acuminata.)


Petrichenko, V.M., Suchmina, T.V., Syropyatov, B.Y. and Shestakova, T.S. 2009. The hypotensive activity of extracts from some plants of the Scrophulariaceae family occurring in perm territory. Rastitel’nye Resursy 45(1): 140-147. (Hypotensive activity of Euphrasia brevipila, Odontites vulgaris, Rhinanthus vernalis and Melampyrum pratense was higher than that of non-parasitic members of the family.)


Pujadas Salvà, A.J. and Muñoz Garmendia, J.F. 2010. Orobanche pseudo-rosmarinus A. Pujadas et Muñoz Garm. sp. nov. (Orobanchaceae) from the eastern...
Mediterranean region. Acta Botanica Croatica 69(1): 1-6. (O. pseudo-rosmarina is applied to specimens previously wrongly ascribed to O. rosmarina.)


Quan JiShu, Piao Long, Wang Xia, Li Tian and Yin XueZhe. 2009. Rossicaside B protects against carbon tetrachloride-induced hepatotoxicity in mice. Basic and Clinical Pharmacology and Toxicology 105(6): 380-386. (Exploring the protective effect of rossicaside B, the major phenylpropanoid glycoside from Boschniakia rossica.)


Renner, S.S., Schaefer, H., Crane, P.R., Friis, E.M. and Chaloner, W.G. 2010. The evolution and loss of oil-offering flowers: new insights from dated phyllogenies for angiosperms and bees. Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences 365(1539): 423-435. (Noting Krameria species (Krameriaceae) among the more recently evolved plants to have oil-bearing flowers.)

Roat, B.L., Jeewa Ram and Choudhary, S.L. 2009. Effect of partially purified plant products preparation against Alternaria alternata (Fr.) Keissler inciting fruit rot of chilli. Current Agriculture 33(1/3): 79-82. (Extracts of Santalum album apparently not effective.)


Rotta, E., de Araujo, A.J. and de Oliveira, Y.M.M. 2006. (Urban trees attacked by mistletoe in a municipal central park of Curitiba city, Paraná: a case study.) (in Portuguese) Boletim de Pesquisa e Desenvolvimento - Embrapa Florestas 26, pp 25. (About 14% of trees affected by one or other of Tripodanthus acutifolius, Struthanthus vulgaris or S. polylyrhusus.)


Runyon, J.B., Mescher, M.C., Felton, G.W., de Moraes, C.M. 2010. Parasitism by Cuscuta pentagona sequentially induces JA and SA defence pathways in tomato. Plant, Cell and Environment 33(2): 290-303. (Confirming that the defensive responses to C. pentagona in older tomato plants are comparable to those elicited by herbivore and fungal attack.)
Runyon, J.B., Mescher, M.C., de Moraes, C.M., Jander, G. and Howe, G. 2008. Parasitism by Cuscuta pentagona attenuates host plant defenses against insect herbivores. Plant Physiology 146(3): 987-995. (Infection of tomato by C. pentagona reduces the release of the antiherbivore phytohormone jasmonic acid when the tomato is then attacked by army worm (Spodoptera exigua).)

Sabová, L., Plátová, M., Szilagyi, K., Sabo, R. and Mojiži, J. 2010. Cytotoxic effect of mistletoe (Viscum album L.) extract on Jurkat cells and its interaction with doxorubicin. Phytotherapy Research 24(3) 365-368. (Synergism between V. album extract and doxorubicin only shown at high doses.)


Smith-Ramirez, C., Celis-Diez, J.L., von Jenschych, E., Jimenez, J.E. and Armesto, J.J. 2010. Habitat use of remnant forest habitats by the threatened arboreal marsupial Dromiciops gliroides (Microbiotheria) in a rural landscape of southern Chile. Wildlife Research 37(3): 249-254. (Concluding that the abundance of D. gliroides was correlated with inter-connectedness of remnant forest patches but not clearly with the occurrence of Tristerix corymbosus whose fruits are a favoured food source.)


Struwe, I., Gertsson, C.A. and Coulianos, C.C. 2009. Insects monophagous on mistletoe (Viscum album L.) newly discovered in Sweden: Capcosypa visci (Curtis, 1835) (Hemiptera, Psyllidae) and Pinalius visicola (Puton, 1888) (Hemiptera, Miridae). Entomologisk Tidskrift 130(3/4): 155-160. (Noting also that V. album is now very localised in Scandinavia.)


Sundararaj, R., Karibasavaraja, L.R., Gaurav Sharma and Raja Muthukrishnan. 2008. Hemipteran fauna (Insecta) infesting sandal Santalum album Linn. in southern

Tafokou, R.B.J., Dondjang, J.P., Nkommenek, B.A., Smith, M. and Kemeuze, V. 2010. (Diversity and sustainable management of Loranthaceae in the uplands of West Cameroon.) (in French) Bois et Forêts des Tropiques 303: 41-52. (Noting that 6 species of Loranthaceae (unspecified in abstract) occur on fruit trees in Cameroon: all are used in traditional medicine and need to be protected.)


Tewodros Mesfin, Tesfahunegn, G.B., Wortmann, C.S., Tonessia, C., Wade, M., Cissé, N. and Severin, A. 2009. (Under dry conditions, skip-row planting and tied ridging for sorghum production in semiarid areas of Ethiopia. Agronomy Journal 102(2): 745-750. (Observing that, in each treatment, some attachments elicited a resistance response characterised by obstructions at the endodermis, or within the stele, comparable with those observed in resistant crop cultivars.)

Thorogood, C.J. and Hiscock, S.J. 2010. Compatibil ity Tojibaev, K.S. and Holubec, V. 2010. Monitoring of the resistance response characterised by obstructions at the endodermis, or within the stele, comparable with those observed in resistant crop cultivars.)


Tonessia, C., Wade, M., Cissé, N. and Severin, A. 2009. (Characterization of Striga gesnerioides from Senegal: reaction of various cowpeas (Vigna unguiculata (L.) Walp.) to Striga gesnerioides strains from Sénégal.) (in French) Journal of Applied Biosciences 24: 1462-1476. (Strains of S. gesnerioides appear to differ from the 5 others in W. Africa, but cultivars B301 and IT81D-994 are resistant to all, and other cowpea lines are resistant to one or more populations.)

Torretta, J.P. and Basilio, A.M. 2009. (Pollen dispersion and reproductive success of four tree species of a xerophytic forest from Argentina.) (in Spanish) Revista de Biología Tropical 57(1/2): 283-292. (Jodina rhombifolia (Santalaceae) is entomophyly, although spontaneous autogamy could favor reproduction in the absence of pollinators.)

Troncoso, A.J., Cabezas, N.J., Fuández, E.H., Urzúa, A. and Niemeyer, H.M. 2010. Host-mediated volatile polymorphism in a parasitic plant influences its attractiveness to pollinators. Oecologia 162(2): 413-425. (Showing that insects as well as birds are involved in pollination of Tristerix verticillatus and that they are attracted by volatiles, differing according to the host tree species.)


Vachev, T., Ivanova, D., Minkov, I., Tsagris, M. and Gozmanova, M. 2010. Trafficking of the potato spindle tuber viroid between tomato and Orobanche ramosa. Virolology 399(2): 187-193. (Confirming that PSTV was transferred from the host tomato to O. ramosa and replicates in the latter, but does not move from parasite to host.)


Welsh, M., Stefanovic’, S. and Costea, M. 2010. Pollen evolution and its taxonomic significance in Cuscuta (dodders, Convolvulaceae). Plant Systematics and Evolution 285(1/2) 83-101. (Continuing intensive study of the genus Cuscuta, the Stefanovic lab present extensive data on pollen morphology which supports their large data sets of molecular information. This works shows the genus to fit meaningfully into the family Convolvulaceae.)

Westerwood, J.H., Yoder, J.I., Timko, M.P. and de Pamphilis, C.W. 2010. The evolution of parasitism in plants. Trends in Plant Science 15(4): 227-235. (This is a succinct, cogent update on research into the evolution of parasitism in angiosperms by leading experts on the subject. Using powerful molecular techniques, the authors suggest that one key factor was the ability to recognize host plants as well as regulate movement between host and parasite via the haustorium. Like other studies, the presence and function of storied cambial cells in the haustorium is not mentioned.)

Wu Yan, Shi HaiMing, Bao Zhong, Wang MengYue, Tu PengFei and Li XiaoBo 2010. Application of molecular markers in predicting production quality of cultivated Cistanche deserticola. Biological and Pharmaceutical Bulletin 33(2): 334-339. (Showing that combined ISS R and RAPD data could categorize C. deserticola individuals into three groups according to their respective echinacoside content.)


Wünsche, A. 2009. Distribution of common mistletoe (Viscum album subsp. album) in the Oberlausitzer Gefeilde and the eastern Oberlausitz. Berichte der Naturforschenden Gesellschaft der Oberlausitz 17: 115-118. (A general survey of V. album in parts of Saxony, Germany, showing greater range than previously thought and one new host - Fraxinus pennsylvanica.)

Xie Hong, Zhu Hui, Cheng Cong, Liang Yu and Wang Zhao. 2009. Echinacoside retards cellular senescence of human fibroblastic cells MRC-5. Pharmazie 64(11): 752-754. (Suggesting echinacoside, a phenylethanoid from Cistanches salsa, has potential anti-senescence activity.)

Yahya, A.F., Hyun, J.O., Lee, J.H., Choi, T.B., Sun, B.Y. and Lapitan, P.G. 2010. Distribution pattern, reproductive biology, cytotoxicomic study and conservation of Rafflesia manillana in Mt. Makiling, Laguna, Philippines. Journal of Tropical Forest Science 22(2): 118-126. (Concluding that the main threats to R. manillana (2n=22) on its host Tetrastigma harmandii are from sex ratio imbalance, unsuccessful pollination and seed dispersal; and habitat disturbances caused by tropical typhoons.)

database of S. hermonthica expressed gene sequences: 17,317 unigenes with 10,319 contigs and 6,818 singletons. Includes initial characterization of Striga genes to those of other crops and Triphysara. A set of SSRs was developed from the database and used to characterize genetic diversity in Striga populations.


HAUSTORIUM 57 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), Jim Westwood, Dept. of Plant Pathology, Physiology and Weed Science, Virginia Tech, Blacksburg, VA 24061-0331, USA (Email westwood@vt.edu) and Diego Rubiales, Dep. Mejora y Agronomía, Instituto Agricultura Sostenible, CSIC, Apdo 4084, E-14080 Cordoba, Spain (Email: ge2ruozd@uco.es); with valued assistance from Chris Thorogood, Dept. of Biological Sciences, University of Bristol, UK, and Dan Nickrent, Southern Illinois University, Carbondale, USA. It is produced and distributed by Chris Parker and published by Old Dominion University (ISSN 1944-6969). Send material for publication to any of the editors.

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