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MESSAGE FROM THE IPPS PRESIDENT

Dear IPPS Members,

Happy New Year and best wishes for 2009. We are now just a few months away from our next Parasitic Plant Congress, which will take place from June 8-12 in Kusadasi, Turkey. The setting, a beautiful Mediterranean resort, promises to provide a wonderful atmosphere for discussion and relaxation. Of course the scientific program will also be excellent, showcasing the best research in all aspects of parasitic plants. If you have not already done so, start planning your contribution and be sure to note the March 20 deadline for abstract submission. More information on the meeting and the abstract submission process is provided later in this issue in the Forthcoming Meetings section.

As a new feature of our meeting, we plan to give prizes for best student and poster presentations. We hope this will add some fun to the proceedings and give a few people the nice surprise of some extra spending money in Kusadasi.

On a more administrative note, I want to update you on some subjects under discussion by the Executive Committee. In order to enhance our mission of fostering research and education on parasitic plants, we want to overhaul the society website to make it more useful for IPPS members and the general public. To this end we are exploring the option of hiring of a professional website manager who can help us develop more features and improve the overall quality of the site. However, taking on new financial obligations requires that we also have reliable income from dues, and this means that we need a stable membership and an improved mechanism for collecting dues. It has been our past practice to collect dues primarily in association with meeting registration, which is convenient, but means that members who miss a meeting have their membership lapse with no easy way to renew it. Although in practice we have still counted such people among the active members, this leads to less income and confusion when it comes to election time or making special offers to members. To resolve this, we are revisiting our dues collection mechanism and hope to integrate it into the redesigned website so that payments would take place independent of meetings. We hope the result will be a system that provides the society with a clear membership, predictable income, and improved service to our members. I will provide more information as we progress with our plans, but welcome any input from you during this process.

Sincerely,

Jim Westwood, IPPS President

ISSN REGISTRATION

Haustorium now has its own ISSN number !

The National Serials Data Program (NSDP) at the Library of Congress has made an ISSN assignment for Haustorium (online version) - ISSN 1944-6969.

HOST SPECIFICITY AND SPECIATION IN PARASITIC PLANTS

Host specificity as a driver of speciation

Parasitic plants show considerable variation in their host specificity. For example, while some European species of *Cuscuta* can infect hundreds of taxonomically diverse families, others such as *Rafflesia* spp. in Southeast Asia parasitize just one or two species of *Tetrastigma* vine (Nais, 2001). Although the potential host range of parasitic plants is often broad, the performance of the parasite may be suboptimal on all but a few hosts (Press and Graves, 1995). It has been suggested that host-generalist strategies may have evolved among heterogeneous plant communities where parasites can infect many potential hosts. Conversely, where host availability is more stable, the selective advantages of host specificity may outweigh the disadvantages of suboptimal growth on secondary hosts (Norton and DeLange, 1999). However host specificity in parasitic plants is related not just to the abundance and diversity of potential hosts, but also to physiological constraints such as host susceptibility and resistance; host specificity in parasitic angiosperms is usually a consequence of both the parasite's ability to recognize and attack the host plant, and the resistance of that host plant (Marvier and Smith 1997; Yoder 2001).

Parasites that are isolated on hosts with distinct ecologies may be subject to genetic divergence. For example phytophagous insects (like parasitic plants) are discriminate users with respect to the host plants on which they feed. This pattern of host specificity appears to have driven genetic divergence, and ultimately speciation in these insects (Funk *et al*., 2002). Parasitic plants have received comparatively less attention than these 'model' insects from evolutionary biologists. This may be because host range determination in parasitic plants is problematic (Norton and DeLange, 1999). For example root parasites such as *Orobanche* spp. often flower a considerable distance from their host. In addition, many parasitic plants are also experimentally intractable such as the tropical *Rafflesia* spp., hence cross-infection experiments useful for determining host range are practically impossible to conduct. Thus, our understanding of host specificity as a potential catalyst for speciation in parasitic plants lags behind that of phytophagus insects. However in light of recent research into a handful of hemiparasites and holoparasites, a similar pattern of host-driven speciation in parasitic plants is now emerging.

Several investigations have revealed evidence of host-mediated genetic divergence in hemiparasitic mistletoes in the Santalales. Early work by Clay *et al*. (1985) used reciprocal transplant experiments which demonstrated that *Phoradendron* spp. had a greater fitness when cultivated on the local host species compared with those transplanted to novel hosts. This host specificity appears to have led to the evolution of races which are morphologically similar, but physiologically distinct. Later research using molecular approaches confirmed the presence of host-driven divergence in other mistletoe species; for instance, Nickrent and Stell (1990) used isozyme data to identify two distinct host races of hemlock dwarf mistletoe (*Arceuthobium tsugense*), in which genetic diversity has been influenced by both geographic location and host range. Similarly, a molecular analysis using AFLPs of the dwarf mistletoe *A. americanum* on its *Pinus* hosts, revealed that both geographical isolation and host identity have contributed to genetic race formation in this species (Jerome and Ford 2002). Glaciations and founder effects may have structured the genetic diversity of *Arceuthobium* taxa, and the host races identified by this research may be in a state of incipient speciation. Host specificity has also led to genetic divergence among races of the European mistletoe (*Viscum album*). Host-specific subspecies of *V. album* have been identified which are morphologically indistinct, yet chloroplast DNA (cpDNA) and nuclear DNA internal transcribed spacer (nDNA ITS) sequence data support their separation into genetically distinct races (Zuber and Widmer 2000). Taken together, these findings suggest that host race formation may have been an important promoter of taxonomic complexity and speciation in mistletoes, and potentially among other hemiparasites.

Host-driven speciation in holoparasites

Investigations into the taxonomic and phylogenetic relationships among the holoparasites have been hindered by their extreme reductions in morphology and genome size (dePamphilis and Palmer 1990). Nonetheless, a handful of studies indicate that host specificity may also have influenced patterns of speciation in this poorly understood group. Holoparasites often show patterns of extreme specialisation. For example in the broomrape genus (*Orobanche*), most species have a very narrow host range (Schneeweiss, 2007), and some are more-or-less restricted to a single host species for example: *O. serbica* on *Artemisia alba; O. lucorum* on *Berberis vulgaris;* and *O. laserpitii-sileris* on *Laserpitium siler.* On the other hand, a few species have evolved a very broad host range, for example *O. minor* parasitizes a diverse range of angiosperms from at least 16 orders in both the monocots and eudicots (Thorogood *et al*., in preparation). However cultivation experiments have shown that races of *O. minor* that are physiologically adapted to particular hosts may exist (Musselman and Parker 1982). Furthermore, molecular marker data indicate that this species comprises morphologically cryptic taxa which are isolated from gene flow by host specificity (Thorogood *et al*., 2008). For example, populations of *O. minor* parasitizing sea carrot (*Daucus carota* ssp. *Gummifer*) are genetically isolated from *Trifolium*-specific populations in Britain by differences in host ecology, and by inbreeding.

Phylogenetic analyses have recently placed the holoparasitic family Cytinaceae as sister to the recently described neotropical Muntingiaceae in the Malvales (Nickrent, 2007). *Cytinus* spp. in the Mediterranean and Macaronesia show marked trends in their host specificity, and are restricted to hosts within the Cistaceae. For example *C. hypocistis* occurs on several *Cistus* spp. and *Halimium* spp., however populations appear to show patterns of specificity at a local level (Thorogood and Hiscock, 2007). In addition, molecular AFLP data also indicate that distinct races have evolved alongside infrageneric sections of the Cistaceae at a regional level in the Mediterranean Basin (de Vega *et al*., 2008). Thus, in the *Cytinus* genus, host specificity appears to have been an important driver of genetic divergence among local populations, and speciation on a regional scale

In summary, host race formation, coupled with cryptic morphology, may have contributed to the taxonomic complexity associated with parasitic plants. Given our rudimentary understanding of the evolution of many families, and the complexity of host-parasite relationships, host specificity may be an underestimated driver of speciation in parasitic plants.

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THE POTENTIAL OF *RHIZOBIUM* MUTANTS FOR BIOLOGICAL CONTROL OF *OROBANCHE CRENATA*

Pea (*Pisum sativum* L.) is the most widely grown grain legume in Europe and the fourth-most in the world. *Orobanche crenata* is a root holoparasitic plant which constitutes the major constraint for pea cultivation in the Mediterranean area and Middle East. The most feasible method of control is breeding for resistant genotypes although little resistance is available within cultivated pea (Rubiales *et al*., 2003). Different mechanisms involved in resistance against *Orobanche* have been identified in several host species, such as cell wall deposition, vessel occlusion, accumulation of phenolic compounds, necrosis as in the hypersensitive response (HR) (Goldwasser et al., 2000).

Gene expression associated with phytoalexin synthesis and jasmonic acid (JA) pathways have been described in the host while parasitic plant-plant interaction is established (Griffitts *et al.,* 2004, Joel and Portnoy 1998, Westwood *et al*., 1998). Although it has been demonstrated that some genes associated with the salicylic acid (SA) pathway are not induced in the host by *Orobanche* infection (Griffitts *et al.,* 2004), the efficacy to decrease the level of *Orobanche* infection by exogenous application of the SA synthetic analogue benzothiadiazole (BTH) (Sauerborn *et al*., 2002), demonstrates that defence against *Orobanche* is inducible through the SA pathway.

Pea (Fabaceae) is able to establish species-specific symbiosis with *Rhizobium leguminosarum* bv. *viceae*. This symbiotic coexistence is established by a complex signal exchange initiated by the exudation of phenolic compounds by the host roots, mainly flavonoids. These compounds activate the expression of a number of genes in the symbiotic bacteria which induce the secretion of a signal molecule called the Nod factor. Nod factor is a key molecule in the specific recognition of the host by the symbiotic bacteria which triggers in the host a number of responses which allow the symbiotic colonization (Perret *et al.,* 2000). In a *Rhizobium*-legume compatible interaction, defences mediated by different regulatory signals are induced in the legume plant. However this defence is transitory and the legume plant rapidly recognizes the compatible *Rhizobium* as a partner.

Some compatible *Rhizobium* strains have been reported to decrease *O. crenata* infections in pea, being a defence mediated through activation of oxidative process, LOX pathway and production of possible toxic compounds, including phenolics and pisatin, inhibiting germination of *O. crenata* seeds and causing a browning reaction in germinated seeds (Mabrouk et al., 2007).

On the other hand, Martínez-Abarca *et al.*, 1998 demonstrated that an increase in SA is observed when the plants are inoculated with an incompatible *Rhizobium* unable to synthesize the Nod factor. It leads us to think of the possibility to induce defence against *Orobanche,* mediated through the SA pathway, by the inoculation of incompatible *Rhizobium*. To achieve that, we treated *O. crenata*-inoculated peas with *R. leguminosarum* 248, mutant *nodC*$^{-}$ and we found a reduction of 74% in *O. crenata* infection. This mutant is altered in respect to the production of the protein NodC which directs the synthesis of the chitin oligosaccharide backbones of *Rhizobium* LCOs (Kamst et al., 1997). Our results suggest that the use of *nodC*$^{-}$ *Rhizobium* mutants to stimulate defence in *Orobanche* susceptible pea plants mediated by SA pathway.

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STRIGA ASIATICA IN NEPAL

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Striga asiatica (L.) Kuntze is an annual serious root parasite in many crops like sorghum, corn, sugarcane, and millet. It is the most widespread witchweed in the world and causes great economic loss in agriculture. The flower color varies; it can be red, deep red, white, pale pink, or yellow. Leaves are opposite, linear, entire, sessile, rough with small prickles or scabrid - like sand paper. The plant remains grey or green even after drying.

This weed was collected in Nawalparasi district, Nepal. Nawalparasi is one of the six districts of Lumbini zone covering terai, inner terai, and hilly areas. Geographically, it lies between 26^{o} 12' - 27^{o} 47' north latitude and 86^{o} 36' - 84^{o} 35' east longitude with altitude ranging from 100-1936 m. The specimen was collected in 1991 by Dr. Jagat D Ranjit in a field of mixed cropping of maize, pigeon pea and millet. The flower color was light pink. Researchers, technicians and farmers are not very familiar with this weed. The presence of *S. asiatica* in this country is a threat and the weed must be considered a serious problem no matter how little the field is infested. Voucher specimens are preserved in the Agronomy Division, Nepal Agriculture Research Council (NARC), in Khumaltar.

Jagat D. Ranjit
Lytton J. Musselman

UPDATES FROM THE PARASITIC PLANT CONNECTION

September 2008
It may seem from the long period of time between this and the last report that nothing was being done to the Parasitic Plant Connection (http://www.parasiticplants.siu.edu/). Such is not the case! There have been a number of updates and, as you would expect, additions of numerous photographs. A number of family alliances have changed owing to information obtained from molecular data. This is especially true for members of Santalales. Within this order, two new genera have been named (*Staufferia* and *Pilgerina*, both in 'Santalaceae' from Madagascar) and among holoparasitic Orobanchaceae, the genus *Eremitilla* was named and described. Previous molecular work placed Rafflesiaceae *sensu stricto* in Malphighiales, but additional work showed it is related to Euphorbiaceae. The original study that separated Cynomoriaceae from Balanophoraceae also showed the latter to be affiliated with Santalales. This result has been confirmed by two additional and independent studies. From these, it should be apparent that there is much work taking place with parasitic plants and that interest in them is increasing.

December 2008
The widespread use of digital cameras has resulted in a virtual explosion of photographs on the internet! Moreover, these armies of professional and amateur photographers are sharing their photos with the world by posting on web sites such as Flickr and Picasa web. I have recently conducted a series of searches, mainly on the Flickr web site, for photographs of parasitic plants. This resulted in literally thousands of hits, many of which are of species not previously shown on the Parasitic Plant Connection. Several hundred links to individual photos or photo sets were then added. This method of sharing photos has the benefit of not requiring separate server space for image storage but has a possible down side if these links are not stable over time. Enjoy the richness and diversity that adding these links provides!

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PRESS RELEASES

'Four new cowpea varieties released' 30 October 2008

The Savanna Agricultural Research Institute of the Council of Scientific and Industrial Research has released four new varieties of cowpea that have the potential to increase significantly the level of production from 50 to 100 per cent and also the income of cowpea producers. A statement issued by the Director of Crop Services of the Ministry of Food and Agriculture named the varieties as Bawutawuta, Songotra, Padi-Tuya and Zaayura. It said the newly developed varieties were tested under sole and additive series intercropping conditions in on-station trials for three years (2005-2007) and adaptive trials with farmers for another three years (2006-2008). They were developed to address the constraints of low yield potentials of existing varieties, susceptibility to insect pests and *Striga gesneriodes* infection, poor soil fertility and terminal drought which militate against cowpea production.

The varieties, the statement said, were adapted to sole cropping conditions, with grain yield variations of 1.6 to 2.5 tons per hectare in the Guinea Savanna zone compared with 0.75 to 1.2 tons per hectare in the Sudan savanna zone. It said through the formal and informal sensory evaluations, these varieties had been shown to have very good cooking qualities for kosei, watse and tubani preparations. 'These varieties combined high yields and relatively larger grain sizes with high levels of resistance to aphids, bruchids and *Striga gesnerioides* and therefore have the potential of reducing the cost of production and storage.'

Cowpea is one of the most important grain and fodder legume crops in Ghana and over 75 per cent of annual national output is realised in the three northern regions, which lie within the Guinea and Sudan Savannah zones.

Ghana News Agency

'More yield, less crop loss from new *Striga*-resistant maize' 18 December 2008

IITA, Ibadan, Nigeria – Maize farmers in West and Central Africa (WCA) could soon enjoy increased harvests and reduced crop losses due to *Striga* with the introduction of two new resistant varieties - TZLComp1Syn W-1 (Sammaz 16) and IWDC2SynF2 (Sammaz 15) - developed by IITA in partnership with the Institute for Agricultural Research (IAR), Zaria, Nigeria.

Sammaz 16, a late-maturing maize variety, produces 3.2 tons per hectare under heavy *Striga* conditions. Even under extreme infestation, harvest loss from this variety is less than 10%. It also exhibits significantly less *Striga* damage and supports fewer emerged parasites than the susceptible farmers' varieties. It also has good plant and ear qualities and is highly-tolerant to root and stalk lodging. The crop could be harvested within 110-120 days.

On the other hand, Sammaz 15, an intermediate-maturing variety, could yield 4.42 tons per hectare, which is 23% higher than the average production of local varieties under *Striga* infestation. Aside from being resistant to *Striga*, Sammaz 15 is also highly-tolerant to root and stalk lodging, has good ear and plant aspects, and excellent husk cover. The crop is ready for harvest 100-110 days after planting.

These varieties, which have been released early this month, were tested in crop trials conducted by IITA and IAR in Northern Nigeria. ‘The results of trials of Sammaz 15 and Sammaz 16 show great potential for increased maize production not only in Nigeria but also in other countries in the WCA Region by cutting losses due to *Striga* and, consequently, boosting farmers' incomes,’ says Abebe Menkir, IITA maize breeder.

In the moist savannah of coastal and central Sub-Saharan Africa, *Striga*, or witch-weed, causes maize yield losses amounting to about US$ 7 billion yearly and adversely affecting the livelihoods and food security of more than 130 million people dependent on the crop in these regions. The parasitic plant is endemic in Africa and constitutes the most important biotic constraint to cereals production, with infested areas estimated between 21 to 50 million hectares.

‘There are several options available for the control of *Striga* in maize, but the most economically-feasible, easily accessible, safe and sustainable approach is the use of resistant or tolerant cultivars that resource-poor farmers can cultivate solely or in combination with cultural management options as well as in rotation with legumes that promote suicidal *Striga* germination,’ adds Menkir.

In the past few years, buoyed by the recent global food crisis, maize has seen a significant increase in demand, with utilization of the crop for food, feed and other industrial uses hitting well over 100 million tons per annum. Africa produces about 26 million tons of maize annually, with Nigeria contributing about 7 million tons.

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MEETINGS

2nd Symposium on the biology of non-weedy hemiparasitic Orobanchaceae, České Budějovice, August 27th – 30th 2008.

The first symposium on the biology of non-weedy hemiparasitic (ex-)Scrophulariaceae held in Wageningen, the Netherlands in 2004 was organised by Dr Siny ter Borg and colleagues as a discussion forum for parasitic plant researchers working in a non-agronomic context. That first meeting had a strong focus on the community level impacts of parasitic plants, especially *Rhinanthus* species. In the latest meeting, organised by Milan Štech, Jakub Těšitel and Jan Lepš at the University of South Bohemia, Czech Republic, there was a shift in focus to a more diverse range of topics from molecular systematics and conservation genetics to whole organism physiology and mathematical modelling.

Duncan Cameron and colleagues (Universities of Sheffield, Würzburg and Beijing Normal University) investigated the properties of nitrogen-fixing, leguminous hosts that make them such good hosts for *Rhinanthus minor*. Cameron *et al.* hypothesised that compatible amino acids that are easily assimilated by the parasite may underpin the host quality of legumes for *R. minor*. Through investigation of host and parasite amino acid profiles, N content, ABA relations and haustoria anatomy Cameron *et al.* showed that the ability of the host to fix N *per se* did not underpin host quality; rather the high susceptibility of these hosts and the well developed haustoria formed as a result appear to be the primary factors influencing host quality in the legumes. **Fan Jiang and colleagues (Beijing Normal University and the Universities of Sheffield and Würzburg)** also investigated the physiology of nutrient acquisition by *R. minor* harnessing the physiological dichotomy between the polyol-rich parasite (primarily mannitol) and its largely polyol-free host barley. Using this host-parasite system, Jiang *et al.* investigated the role of mannitol in the acquisition of the essential micro nutrient boron, known to form phloem-soluble complexes with polyols such as mannitol. Using the incremental flow model technique, Jiang *et al*. provide the first quantitative evidence for boron partitioning showing significantly more B recycling in the parasite compared with that in the host. **Ai-Rong Li and Kai-Yun Guan (Kunming Institute of Botany, China)** again looked at nutrient acquisition this time focussing on the relative importance of arbuscular mycorrhizas for the uptake of nutrients by Chinese species of *Pedicularis*. Li *et al*. showed that despite the assumptions that parasitic plants are generally non-mycorrhizal, the majority of the *Pedicularis* species studied engage in tri-partite symbioses forming arbuscular mycorrhizal associations with fungi whilst also forming haustoria on host plants. Li *et al*. demonstrated that arbuscular mycorrhizal associations significantly enhance the growth of colonised plants and thus conclude that *Pedicularis* has at least two trophic strategies in its life, parasitism of other plants and mineral nutrient acquisition via mycorrhizal fungal symbionts. In the two subsequent presentations, **Pavel Fibich and Jan Lepš (University of South Bohemia, Czech Republic)** employed mathematical modelling to investigate the influence of community productivity on the effects of hemi-parasites on host communities. At low and intermediate productivities, the host and parasite are able to co-exist with the parasite dominating in the former scenario and the host in the latter scenario. In communities with high productivity, the persistence of the parasite is unstable and can go extinct in the community as a result of increased competition for light. Following the predictions of Fibich and Lepš, **Ondřej Mudrák and Jan Lepš (University of South Bohemia)** provided experimental support showing that the extent of parasite-induced suppression of the grasses in a community facilitated by *Rhinanthus minor* is strongly influenced by the nutrient status of the soil with *R. minor* mortality highest and parasite-induced suppression of the grasses lowest under high nutrient conditions.

The shifts in the physiology of *R. minor* during its transition between free-living plant and parasitizing a host were investigated by **Fan Jiang and colleagues (Beijing Normal University and University of Würzburg)**. Jiang *et al*. removed the barley host of *R. minor* 14 days after attachment, these 'host-free attached' plants were similar in terms of their growth and development when compared with parasites still attached to their host. However, in contrast with attached parasites, host-free attached parasites developed 'normal' stomatal behaviour. Two explanations for these changes were discussed; 1) the supply of dissolved organic nitrogen by the degrading host root system and 2) a possible increase in growth promoting soil microorganisms using the degrading host root system as a substrate. **Renate A. Wesselingh (Université Catholique de Louvain, Belgium)** investigated variation in flowering time in *Rhinanthus angustifolius*. Early flowering 'vernal' and late flowering 'aestival' ecotypes were identified; vernal ecotypes flower early, have few branches and are relatively small while aestival plants are bigger, have more branches and flower in mid-season. These differences are linked to the number of nodes produced before the first flower. Moreover, within-population differences in flowering time may also be explained by differences in node number, just as among ecotypes. In the final talk of the session, **Feng Gao (University of Sheffield)** presented preliminary work for her PhD project investigating the effects of *Pedicularis* and *Castilleja* on host communities and their potential use to manage urban landscapes due to the high amenity value of these parasites.

The *Melampyrum-Rhinanthus-Euphrasia* group forms a clade within the hemiparasitic Orobanchaceae, and represents an important component of the European flora. However the phylogenetic relationships within this group are only poorly resolved. **Jakub Těšitel and colleagues (University of South Bohemia)** aimed to resolve the phylogenetic relationships within this group to a very fine detail using taxa from all genera.The initial results based on nDNA ITS sequence data are largely concordant with recent phylogenetic studies of this family. They showed the 'presence of a perennial life history and plants with rhizome as a plesiomorphy in the evolution of the whole group, except for the most basal genus *Melampyrum*' and hypothesised that the annual life cycle (a predominant feature of the majority of European species), appears to have evolved independently on multiple occasions. **Jerome Vrancken and Renate A. Wesselingh (Université Catholique de Louvain)** investigated large-scale genetic relationships between *Rhinanthus minor* and *R. angustifolius*. Interestingly, this study revealed a disparity between cpDNA and nDNA data, which appears to be the result of past and current gene flow between these species. *R. minor* and *R. angustifolius* were found to share common cpDNA haplotypes. An analysis of the geographic distribution of these shared haplotypes revealed a pattern of asymmetric introgression, and possible chloroplast capture of *R. minor* by *R. angustifolius*. In addition, AFLP data indicated the presence of hybridisation events, confirmed the pattern of asymmetric introgression identified by cpDNA data, and also suggested that *R. minor* is less affected by inter-specific gene flow than *R. angustifolius*. **Véronique Ducarme and Renate A. Wesselingh (Université Catholique de Louvain)** further investigated natural hybridization between *Rhinanthus minor* and *R. angustifolius* using a dominant marker-based approach. RAPDs and ISSRs identified bilateral introgression, but gene flow to *R. angustifolius* appeared to be more prominent. Investigations into the breeding systems of these species revealed that *R. angustifolius* is mostly outcrossing whereas *R. minor* is largely selfing; the higher outcrossing rate of *R. angustifolius* has probably increased the probability of backcrossing with this species. Finally, a hydric variation study showed that *R. angustifolius* was as fit as *R. minor,* or out-competed this species under all conditions investigated, suggesting a lower environmental resilience may have contributed to the decline of *R. minor* observed in natural populations. **Chris Thorogood and colleagues (University of Bristol)** discussed their investigations into the host specificity of *Orobanche minor*, and how this process may have driven ecological divergence. Populations of *O. minor* parasitizing red clovers and sea carrots in Northern Europe were morphologically continuous, yet genetically distinct according to ISSR markers and SCAR-based sequence data. These genetic races were then cultivated in a reciprocal cross experiment using Petri dish bioassays and pots to reveal that populations are also physiologically adapted to their local hosts. Finally, cytochemical staining and cross-pollinations revealed that populations of *O. minor* are selfing and probably inbreeding, which may reinforce patterns of genetic and physiological divergence. Together, these data suggest that host specificity may be an important driver of speciation in parasitic plants such as *O. minor*. **Milan Štech and colleagues (University of South Bohemia)** gave an outline of a new project investigating genetic variation and phylogeographic patterns in the taxonomically complicated *Melampyrum subalpinum* group in central Europe. Hybridisation, coupled with an unusual diversity of ecological niches and host plants are proposed to have contributed to the taxonomic complexity of this group in Central Europe. This three-year study will combine investigations into phenotypic plasticity and morphometric analysis with genetic approaches to overcome the taxonomic difficulties associated with this group.

In the final session **Rhiannon Crichton (RBG Edinburgh and University of Aberdeen, UK)** gave an outline of her PhD project investigating the 'Conservation genetics of *Melampyrum sylvaticum*', a nationally scarce hemiparasite in the UK that has suffered a 70% loss in distribution over the last 100 years. Rhiannon aims to discover how best to manage the genetic diversity of *M. sylvaticum* in the UK. In the concluding presentation of the meeting, **Jakub Těšitel and colleagues (University of South Bohemia)** discussed their investigation into the genetic diversity in the *Melampyrum sylvaticum* group in the Alps, Carpathians and Hercynian Massif. The evolutionary history of the complex was investigated using geometric morphometrics, along with nDNA ITS and cpDNA *trn*L-*trn*T sequence data. Data from all markers corroborated two distinct groups: a western lineage and an eastern lineage. The pronounced molecular differentiation of these lineages indicates they may be of Pleistocene origin, and suggests they may constitute distinct species. Transitional populations may therefore be the result of recent hybridisation between these lineages. Furthermore, the data refuted the traditional delimitation of the Carpathian microspecies *M. herbichii* and *M. saxosum,* highlighting the importance of a combined morphometric and molecular marker-based approach.

A special issue of the journal "Folia Geobotanica" will be published in late 2009/early 2010 highlighting the developments in understanding the biology of non-weedy members of the Orobanchaceae presented at the meeting.

Duncan Cameron (University of Sheffield, UK)
Chris Thorogood (University of Bristol, UK)

Papers presented:

Jana Bubníková and Jan Lepš - The interaction of fertilization and removal of *Rhinanthus minor* on sward productivity, species cover and diversity.

Duncan Cameron *et al.* - Does legume nitrogen fixation underpin host quality for the hemiparasitic plant *Rhinanthus minor*?

Jan Chlumský and Milan Štech - Genetic diversity and distribution of *Melampyrum subalpinum* group in the Central Europe: preliminary preview.

Rhiannon Crichton - Conservation genetics of *Melampyrum sylvaticum.*

Véronique Ducarme and Renate A. Wesselingh - Ecological and genetic aspects of natural hybridization between *Rhinanthus minor* and *R. angustifolius.*

Pavel Fibich and Jan Lepš - The model of population dynamics of root hemiparasitic plants along a productivity gradient.

Feng Gao - Role of hemiparasites in the development of the naturalistic herbaceous vegetation.

Fan Jiang *et al.* - Growth and development of the facultative root hemiparasite *Rhinanthus minor* after removal of its host.

Fan Jiang *et al.* - Mobility of Boron-polyol complexes in the hemiparasitic association between *Rhinanthus minor* and *Hordeum vulgare*: the effects of nitrogen nutrition.

Ai-Rong Li and Kai-Yun Guan - Nutrient strategies of root hemiparasitic *Pedicularis* (Orobanchaceae) from the northwest of Yunnan Province, China.

Ondřej Mudrák and Jan Lepš - Interactions of *Rhinanthus minor* with its host plant community at two nutrient levels.
Laurent Natalis and Renate A. Wesselingh - Pollinator behaviour, pollen transfer and hybrid formation between *Rhinanthus minor* and *R. angustifolius.*
Milan Štech *et al.* - Addressing genetic variation and phylogeographic pattern in the *Melampyrum subalpinum* group.
Šárka Svobodová and Milan Štech - Morphological variability of *Euphrasia stricta* and *Euphrasia nemorosa* in the Czech Republic.
Jakub Těšitel *et al.* - The *Melampyrum sylvaticum* group in Central Europe – comparison among variation patterns in the Alps, Carpathians and Hercynian Massif.
Jakub Těšitel *et al.* - Phylogeny and life history evolution of the *Melampyrum-Rhinanthus-Euphrasia* clade – initial results based on ITS sequence data.
Chris Thorogood *et al*. - Host-driven divergence in the parasitic plant *Orobanche minor* (Orobanchaceae)
Jerome Vrancken and Renate A. Wesselingh - Large-scale genetic relationships between two *Rhinanthus* species.
Renate A. Wesselingh - Counting nodes: timing of flowering in the annual *Rhinanthus angustifolius.*
Joerg Wunder *et al.* - The *Melampyrum nemorosum* group in the region of Trentino / South Tyrol.

Managing parasitic weeds: integrating science and practice. Ostuni, Italy, September 21-26, 2008.

This international meeting, attended by thirty participants from 11 countries, was arranged by the European Weed Research Society (EWRS) Parasitic Weeds Research Group with financial support from the Cooperative Research Programme of OECD (Organisation for Economic Co-operation and Development), the National Research Council of Italy and the Weizmann Institute, Israel.

'The group discussed how new ideas, new approaches, new solutions, or new methodologies coming from different fields of application are beginning to and may further be used in the field as the science progresses. They described and discussed how each technology should be integrated with others to synergistically effect reliable control, while reducing weed seed banks so that susceptible crops can be part of a rotation. A further aim of the conference was to create a network of new recruits and experienced scientists that could have, find or create new opportunities to collaborate in this field of science that requires a global collaborative approach. In this perspective, links have also been created with scientists working with many other host-parasite interactions, or with symbiotic interactions. This is because parasitic weeds can interact, for example, with the host plants using the same root signals used by plants to attract their symbiotic organisms, such as rhizobia or arbuscular mycorrhizal fungi; mechanisms of plant resistance can have common pathways with phytopathogenic fungi; molecular approaches can have the same procedures as the study of other plant species.

Hence this small conference was proposed and organized, with a restricted number of top scientists working on many different aspects of plant parasitism, or in closely related fields, sharing their ideas and expertise, and bringing solutions from theory to practice, from the lab to the field.'

(from EWRS Newsletter)

The papers presented are listed below. They are not discussed or summarised here as they will be published in a special issue of Pest Management Science, to appear later in 2009. This issue consists of peer-reviewed research papers and reviews arising from the meeting. The issue is edited by Jonathan Gressel at the Weizmann Institute of Science in Israel, and Maurizio Vurro at the National Research Council in Italy. For more information on the issue, please email Alexandra Carrick (alcarric@wiley.com). The Table of Contents is available from maurizio.vurro@ispa.cnr.it

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The individual papers will be listed and reviewed in the next issue of Haustorium. However, abstracts of four other contributions which will not be included in the Pest Management Science issue also appear below.

Presenting authors and titles (full authorship not indicated)

Erwin Balazs, Maurizio Vurro and Jonathan Gressel – Introduction.
Chris Parker - Observations on the current status of *Orobanche* and *Striga* problems worldwide.
John Yoder - Engineering host resistance against parasitic weeds with RNA interference.
Koichi Yoneyama - Strigolactones; structures and biological activities.
Harro Bouwmeester - Strigolactones: ecological significance and use as a target for parasitic plant

control.
Binne Zwanenburg - Structure and function of natural and synthetic signaling molecules in parasitic weed germination.
Daniel M. Joel - Is seed 'conditioning' essential for *Orobanche* germination?
Consuelo M. De Moraes and Mark C. Mescher - Hormone-mediated plant defence responses to parasitic plants and other antagonists.
Maria J. Harrison - Laser microdissection and its application to analyze gene expression in the arbuscular mycorrhizal symbiosis.
David G. Lynn - Parasitic angiosperms, semagenesis, and general strategies for plant-plant signaling in the rhizosphere.
Jianxiong Li, Karolina E. Lis, and Michael P. Timko - Molecular genetics of race specific resistance of cowpea to *Striga gesnerioides*. (not presented)
Julie D. Scholes - A major QTL for resistance of rice to the parasitic plant *Striga hermonthica* is not dependent on genetic background.
James H. Westwood - RNA translocation between parasitic plants and their hosts.
Alejandro Pérez-de-Luque - Nanotechnology for parasitic plant control.
Antony M. Hooper - New genetic opportunities from legume intercrops for controlling *Striga* spp. parasitic weeds.
D Rubiales - Breeding approaches for crenate broomrape (*Orobanche crenata* Forsk.) management in pea (*Pisum sativum* L.).
Maurizio Vurro - Natural metabolites for parasitic weed management.
Alan Watson - Integrating *Fusarium oxysporum* f. sp. *strigae* into cereal cropping systems in Africa.
David C. Sands - Methods for selecting hypervirulent biocontrol agents of weeds: Why and How.
Jonathan Gressel - Transforming a *NEP*1 toxin gene into two *Fusarium* spp. to enhance mycoherbicide activity on *Orobanche* – failure and success.
Brian G. Rector - A sterile-female technique proposed for control of certain parasitic and intractable weeds: advantages, shortcomings, and risk management.
Sarah J Hearne - Control; the *Striga* conundrum.

Maurizio Vurro and Jonny Gressel are to be thanked and congratulated on the excellent arrangements for this meeting, not least for the excellence of the food, which at one point included a delicacy specially prepared by Maurizio – marinated *Orobanche crenata*. Recipe provided on request!

Chris Parker.

Abstracts of 4 additional items presented at the above meeting:

Unravelling the strigolactone biosynthetic pathway: nutrient deficiency and ABA regulation

Juan Antonio Lopez-Raez[1], Wouter Kohlen[1], Tatsiana Charnikhova[1], Radoslava Matusova[1], Patrick Mulder[2], Carolien Ruyter-Spira[1], Catarina Cardoso[1], Francel Verstappen1,[3], Harro Bouwmeester[1,3]

1 Laboratory for Plant Physiology, Wageningen, The Netherlands
2 RIKILT, Institute of Food Safety, ditto
3 Plant Research International, ditto

Strigolactones are signalling molecules playing a double role in the rhizosphere as host detection signals for arbuscular mycorrhizal (AM) fungi and root parasitic plants, and acting as a shoot branching inhibition hormone. Strigolactones are biosynthetically originating from carotenoids through the action of carotenoid cleavage enzymes. The biosynthesis of these signalling compounds is tightly regulated by environmental conditions such as nutrient availability, mainly phosphate (Pi). However, although it is known that limited-Pi conditions improve the production and/or exudation of strigolactones, there is no information concerning the effect of these stress conditions on the enzymes involved in strigolactone production. We have recently demonstrated that tomato is a good system to study the production and regulation of these important signalling compounds. Here, we focus on the biosynthetic origin of strigolactones, and an analysis of Pi starvation-induced changes in gene expression in tomato roots using a microarray study is described. In addition, the relationship of these signalling compounds with the carotenoids and the hormone abscisic acid (ABA) will be discussed.

Maize germination stimulants characterization and quantification.

Tatsiana Charnikhova[1], Juan Antonio Lopez-Raez[1], Patrick Mulder[2], Bart Steenbergen[1], Jacques Vervoort[3], Pieter de Waard[3], Muhammad Jamil1 and Harro Bouwmeester[1].

1 Laboratory of Plant Physiology, Wageningen, The Netherlands,
2 RIKILT, Institute of Food Safety, ditto
3 Laboratory of Biochemistry, ditto

Maize (*Zea mays*) is an important food crop in North and South America, Africa, Asia, Europe and is a host of the devastating root parasitic weed *Striga hermonthica* (Bouwmeeter *et.al.*2003; Matusova a *et.al*. 2005). In this study, germination stimulants for

root parasites produced by different cultivars of maize such as Dent, A188, H99, hybrids A188xH99, WH 502, HP3253 and maize mutants were investigated.

Characterization and quantification of strigolactones in maize root exudates were done by comparing retention times, MRM transitions and MS^2-spectrums of germination stimulants with those of strigolactone standards (sorgolactone, strigol, orobanchol, 5-deoxystrigol, solanacol and orobanchyl acetate) using ultra performance liquid chromatography coupled to tandem mass spectrometry (UPLC-MS/MS).

In maize Dent roots exudates we found 5-deoxystrigol, strigol and sorgolactone. Maize cultivars A188 and H99 and maize hybrids A188xH99, WH 502 , HP3253 were found to exude small amounts of known strigolactones such as orobanchol, strigol, orobanchyl acetate, sorgolactone but also 5 unknown (new) germination stimulants. Their tentative identification and structure elucidation by LC/MS/MRM, MS^2 and NMR will be discussed.

References:

Bouwmeester, H.J., Matusova, R., Zhongkui, S.and Beale, M. H. 2003. Secondary metabolite signaling in host-parasitic plant interactions. Current Opinion in Plant Biology 6(4): 358–364.

Matusova, R., Rani, K., Verstappen, F.W.A., Franssen, M.C.R., Beale, M.H. and Bouwmeester, H.J. 2005. he strigolactone germination stimulants of the plant-parasitic *Striga* and *Orobanche* spp are derived from the carotenoid pathway. Plant Physiology 139: 920–934.

Chemical control of broomrape – an overview

Joseph Hershenhorn

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During the last decades chemical control demonstrated great success in controlling various weeds. However, field success in the control of the weedy root parasites *Orobanche* and *Striga* was scarcely documented. The only herbicides known to control broomrapes belong to the aceto lactate synthase (ALS) inhibiting herbicides – sulfonylureas and imidazolinones. However, the main obstacle in achieving adequate broomrape control is the low safety margin of these two groups of herbicides toward most of the crops, which are sensitive to the parasite. Since the main developmental stages of the parasite occurs underground, there is a lack of knowledge as to the rates needed for effective herbicide control, the number of applications, and above all the timing of application. The sulfonylurea herbicides are active through the soil solution. Therefore, overhead irrigation is needed to drive the herbicide into the relevant soil profile. On the other hand the imidazolinones act systemically, penetrating the plant through the crop foliage, translocated to the infected roots, and sucked by the attached parasite until reaching a lethal dose which kills it.

A successful protocol for controlling *Orobanche aegyptiaca* in processing tomato was developed in Israel and registered for commercial use. The successful control in heavily infested fields involves three sulfosulfuron applications followed by overhead irrigation (by sprinklers or moving pivot) and two applications of imazapic starting at 63 days after planting.

During the last 3 years, minirhizotron camera observations were made in experiments conducted in commercial processing tomato fields in various climatic regions in Israel. The observations enabled us to define the dynamics of *O. aegyptiaca* development as correlated with Growth Degree Days (GDD). It also enabled defining the length of time, in GDD units, during which the herbicide remains active in soil. Based on the minirhizotron information, a decision support system (DSS, named Pick-It ver.1.0) was developed. The DSS is intended for use by the growers in Israel. It directs the grower to the most effective treatments for broomrape control according to the estimated infestation level in his field.

The effect of branched broomrape (*Orobanche ramosa*) infection on fruit quality of tomato.

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Dipartimento di Scienze Agronomiche, Agrochimiche e delle Produzioni Animali, Università degli Studi di Catania, Catania, Italy. e-mail: amg.longo@unict.it

Branched broomrape (*Orobanche ramosa* L.) is the most widespread and damaging of the broomrape species, affecting large areas of solanaceous (primarily tobacco, potato, tomato and eggplant) crops, across the Mediterranean Basin, North Africa and Asia. In Italy, it is responsible for significant yield losses in tobacco, cabbage and both field- and greenhouse-grown tomato. Needless to say, fruit quality and composition are important components to improve the marketable value of tomatoes but no data are available in the literature about the influence of the broomrape. The aim of the present research was to evaluate the changes in physical characteristics and chemical composition of tomatoes in relation to branched broomrape infection. The field study was conducted, over the 2004-2005 season, on the coastal plain of Siracusa (Sicily), southern Italy. In order to grow tomato plants both in the absence and in the presence of branched broomrape, the experimental area, naturally infested by *O. ramosa* before the experiments, was first solarized by covering with a 30 µm transparent polyethylene film from 2 July to 17 September 2004. Two days after planting, branched broomrape seed was mixed with finely sieved sand and placed in a soil layer at a depth of 10-15 cm uniformly around the host plant. Over the harvesting period physical (fresh weight, dry matter, colour, firmness, mesocarp thickness, and seed number) and chemical fruit determinations (reducing sugar, soluble solids, ash content, titratable acidity, pH and vitamin C) were carried out. Under the specific condition of these experiments, the presence of branched broomrape was significantly and clearly associated with a reduction of fresh and dry weight, mesocarp thickness, red colour, firmness, titratable acidity, reducing sugars, soluble solid, ash and vitamin C content of tomatoes. On the contrary, the number of seeds per fruit significantly increased in infected plants.

International Symposium on broomrape (*Orobanche* spp.) in sunflower, Antalya, Turkey, Nov 30 to Dec. 3, 2008.

The pathogenic composition of *Orobanche cumana* populations in sunflower fields has rapidly changed in recent years, with new aggressive races causing heavy damage in particular in Eastern Europe, Turkey and Spain. For this reason more than eighty participants, from fifteen countries attended the *Orobanche*-sunflower meeting in Antalya (Turkey) on 30 November - 3 December 2008. The meeting was carefully organized by the Trakya Agricultural Research Institute in collaboration with the Turkish Plant Breeders Association, the International Sunflower Association and the FAO, and chaired by Dr Yalcin Kaya. The venue was a pleasant 'All Included' hotel on the Turkish Mediterranean coast, which allowed calm and fruitful discussions.

The meeting was mainly dedicated to reports on new *Orobanche* resistances in sunflower and to a detailed discussion of the identification of the new *O. cumana* races in the various countries of broomrape istribution. Therefore most of the participants were people involved in sunflower breeding.

After two introductory lectures on biological aspects of host-parasite interaction, the meeting included an update on the broomrape problem in various countries, and detailed discussions on the use of IMI (imidazolinone resistant) sunflower cultivars in combination with resistance to *O. cumana*, and on the combination of vertical and horizontal *Orobanche* resistance mechanisms in the same genotype for more durable resistance. Molecular studies to identify QTLs associated with broomrape resistance genes, as well as pyramidization of different resistance genes and combination of different resistance mechanisms have also been presented in the conference. The need to integrate any treatment of broomrape within the context of the management of other weeds in sunflower fields has been emphasized.

This topic will be further discussed during the coming IPPS Congress in June 2009. We will then have a special session on the distribution of the various *O. cumana* races and their identification by sunflower differentials and by molecular markers, and will also dedicate time for the discussion of integrated *Orobanche* management in sunflower and in other crops.

Some of the papers listed below will be published in 'Helia'.

Danny Joel

Papers presented:

Höniges, A. *et al.* *Orobanche* resistance in sunflower.

Joel, D.M. and Plakhine, D. - Seed conditioning of *Orobanche* in agricultural fields: ecophysiological aspects.

Bülbül, F. *et al.* - Broomrape (*Orobanche* spp.) problem in the eastern Mediterranean region of Turkey.

Dedić, B. *et al.* - Current status of broomrape (*Orobanche cumana* Wallr) in Serbia.

Fernández-Escobar, J. *et al.* - sunflower broomrape (*Orobanche cumana* Wallr.) in Castilla-León, a traditionally non broomrape infected area in Northern Spain.

Pacureanu Joita, M. *et al.* - Virulence and aggressiveness of sunflower broomrape (*Orobanche cumana* Wallr.) populations, in Europe.

Christov, M. *et al.* - The wild species *Helianthus* - source of resistance to the parasite *Orobanche cumana.*

Jinga, V. *et al.* - Behavior of some sunflower cultivar at the broomrape attack in Romania.

Gontcharov, S.V. - Sunflower breeding for resistance to the new broomrape race in the Krasnodar region of Russia.

Hladni, N. *et al.* - The use of new Rf inbred lines originating from interspecific population with *H.*

deserticola for the production of sunflower hybrids resistant to broomrape.
Melero-Vara, J.M. *et al.* - The performance of sunflower hybrids resistant to race F of *Orobanche cumana* Wall. in naturally infested fields.
Kaya, Y. *et al.* - The evaluation of broomrape resistance in sunflower hybrids.
Antonova, T.S. *et al.* - The virulence of broomrape (O*robanche cumana* Wallr.*)* populations on sunflower in some regions of Northern Caucasus.
Gunduz, O. and Goksoy, A.T. - Determination of superior hybrid combinations in sunflower and testing hybrid performance in broomrape (*Orobanche cumana Wallr.*) infested areas.
Fernández-Martínez, J.M. *et al*. - Ongoing research strategies for sunflower broomrape control in Spain.
Dicu, G. *et al.* - Improving sunflower for resistance to *Orobanche* and sulfonylureas herbicides - sunflower hybrid PF100.
Esmaailifar, A. *et al.* - Control of broomrape in Iran.
Demirci, M. and Kaya, Y. - Status of *Orobanche cernua* Loefl. and weeds in sunflower production in Turkey.

FORTHCOMING MEETINGS

The 10th World Congress on Parasitic Plants will be held in Kusadasi, Turkey, June 8-12, 2009. Contribution and participation from researchers, industry and all relevant people on any weedy or non-weedy parasitic plant is encouraged. The programme will consist of oral presentations and posters. The Organizers and Scientific Committee will select speakers for the session topics on the website from the submitted abstracts. Therefore, if you wish to be considered for a talk, please submit your abstract by March 20. Submit your abstract on the web site http://www.ippsturkey.com/default.asp?link=abstract.

The abstracts will be disseminated to symposium registrants in a Symposium Abstract Book. Each abstract will be one page. To submit abstract:

1. Compose the body of your abstract using 10 point and Arial font in your own word processing programme. Please limit it to 300-350 words. Please check spelling and grammar. Do not include either the title of your abstract or the authors' names and addresses in that text, the title and authors will be entered separately.

2. When you are ready to submit your abstract, have available the names, addresses and e-mails of your co-authors (if any). Please indicate presenting/attending author.

3. Please indicate two sessions in the order of relevance. The scientific committee will allocate your presentation depending on all submissions.

Sessions:
Evolution and phylogeny of parasitic plants
Parasite biochemistry and physiology (including molecular biology)
Ecology and population biology of parasitic species.
Host-parasite communication (including germination stimulation, haustorial induction, etc.)
Host and non-host responses to parasitism
Parasitic weed management (including economics)
Regulation and phytosanition
Breeding for parasitic plant control
Special topics 1: biological aspects of mistletoes (or hemiparasites)
Special topics 2: climate change and parasitic plants
Special topics 3: *Orobanche cumana*

4. Please show your preference as oral or poster. However, the ultimate decision will be made by the scientific committee.

5. Submit your abstract online no later than March 20, 2009.

6. For oral presentations, presenting author should register before April 17, 2009.

7. For poster presentations one author should register before May 2, 2009 to have your abstract published.

Organization Committee

Contact for scientific queries: Ahmet Uludag (secretary@ippsippsturkey.com). For registration and accommodation queries: Deniz Yanar Servi (info@ippsturkey.com). Or refer to the conference website: www.ippsturkey.com .

GENERAL WEB SITES

For individual web-site papers and reports see LITERATURE

For information on the International Parasitic Plant Society, past and current issues of Haustorium, etc. see: http://www.ppws.vt.edu/IPPS/

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

For information on the 10th World Congress on Parasitic Plants in Kusadasi, Turkey, June 8-12, 2009, see: http://www.ippsturkey.com

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

For the ODU parasite site see: http://www.odu.edu/~lmusselm/plant/parasitic/index.php

For Lytton Musselman's *Hydnora* site see: http://www.odu.edu/webroot/instr/sci/plant.nsf/pages/lecturesandarticles

For Dan Nickrent's 'The Parasitic Plant Connection' see: http://www.parasiticplants.siu.edu/

For The Mistletoe Center (including a comprehensive Annotated Bibliography on mistletoes) 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 the Parasitic Plants Database including '4000 entries giving an exhaustive nomenclatural synopsis of all parasitic plants' (last updated 2003), the address is: http://www.omnisterra.com/bot/pp_home.cgi

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

For past and future issues of the Sandalwood Research Newsletter, see: http://www.jcu.edu.au/mbil/srn/index.html (Contents of issues 22 and 23 have not been noted in Haustorium – to be included in Haustoriium 55)

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

* indicates web-site reference only

*AATF. 2007. Strides in *Striga* management. Newsletter Issue 1. African Agricultural Technology Foundation (http://www.aatf-africa.org/UserFiles/File/Strides_Issue-1_Dec07.pdf) (Recording the commercialisation of IR (imidazolinone-resistant) maize seed as 'Strigaway' for control of *Striga*, and noting projects for its promotion in South Africa, Tanzania and Uganda as well as in Kenya.)

*AATF. 2008. Strides in *Striga* management. Newsletter Issue 2. African Agricultural Technology Foundation (http://www.aatf-africa.org/UserFiles/File/Strides_Issue-2_Mar08.pdf) (Recording the placement of over 600 demonstrations of IR maize in Uganda. Also the arrangement of training for stockists and distributors of the 'Strigaway' seed.)

*AATF. 2008. Strides in *Striga* management. Newsletter Issue 3. African Agricultural Technology Foundation (http://www.aatf-africa.org/newsdetail.php?newsid=115) (Reporting on the STEP and FIST projects in W. Kenya. We hope to have more on these in Haustorium 55)

Abbes, Z., Kharrat, M., Simier, P. and Chaïbi, W. 2007. Characterization of resistance to crenate broomrape (*Orobanche crenata*) in a new small-seeded line of Tunisian faba beans. Phytoprotection 88(3): 83-92. (Reporting a high degree of resistance in faba bean line XBJ90.03-16-1-1-1-1, leading to double the yield of a susceptible check, apparently associated with low stimulant production and a deeper root system.)

Abdalla, M.M.F., Darwish, D.S. , Shafik, M.M. and El-Wahab, M.M.H.A. 2007. Investigations on faba beans, *Vicia faba* L. 21-selection for *Orobanche*-tolerance in segregating generations of faba bean. Egyptian Journal of Plant Breeding 11(1): 317-333. (Recording some success in selection of more resistant and/or tolerant lines of faba bean.)

Adamou, I., Pierre, N.J., Pogenet, P., Tchimbi, B. and Gonlaina, G. 2007. Soil degradation in the Sudano-guinea savannas of Mbe, Cameroon: farmers' perception, indicators and soil fertility management strategies. Research Journal of Agriculture and Biological Sciences 3(6): 907-916. (40% of farmers in the humid savannas recognise *Striga hermonthica* as an indicator of low soil fertility.)

Adrian-Romero, M., Blunden, G., Patel, A.V., Armstrong, N., Meléndez, P. and Cuervo, A.C. 2007. Betaines and *N*-methylprolines from Venezuelan plants. Natural Product Communications 2(8): 863-868. (*N*-methylprolines were isolated from four species of Loranthaceae (unspecified in abstract).)

Aflakpui, G.K.S., Bolfrey-Arku, G.E.K., Anchirinah, V.M., Manu-Aduening, J.A. and Adu-Tutu, K.O. 2008. Incidence and severity of *Striga* spp. in the coastal savanna zone of Ghana: results and implications of a formal survey. Outlook on Agriculture 37(3): 219-224. (65% of farmers surveyed reported *Striga* (presumably *S. hermonthica*) in maize, 5% each in cowpea (presumably *S. gesnerioides)* and in millet. Occurrence had apparently increased greatly over the past 40 years.)

Ajeigbe, H.A., Singh, B.B. and Emechebe, A.M. 2008. Field evaluation of improved cowpea lines for resistance to bacterial blight, virus and striga under natural infestation in the West African Savannas. African Journal of Biotechnology 7(20): 3563-3568. (Main emphasis on bacterial blight but incidental recording a wide range of responses of 25 cowpea lines to *Striga geseneriodes.* No ideal combination of resistances.)

Alexandrov, V. and Dimitrov, S. 2007. Response of introduced sunflower hybrids to broomrape (*Orobanche cumana* W.). Bulgarian Journal of Agricultural Science 13(5): 521-527. (Of 16 introduced hybrids, none were immune but one was 'resistant' and 9 showed moderate resistance.)

Alla, M.M.N., Shabana, Y.M., Serag, M.M., Hassan, N.M. and El-Hawary, M.M. 2008. Granular formulation of *Fusarium oxysporum* for biological control of faba bean and tomato *Orobanche*. Pest Management Science 64(12): 1237-1249. (Four different wheat flour-kaolin formulations of microconidia and chlamydospores from *F. oxysporum* (Foxy I and Foxy II) gave excellent suppression of *O. ramosa* and *O. crenata*. A microconidia-rich formulation had the best shelf life.)

Ameloot, E., Verlinden, G., Boeckx, P., Verheyen, K. and Hermy, M. 2008. Impact of hemiparasitic *Rhinanthus angustifolius* and *R. minor* on nitrogen availability in grasslands. Plant and Soil 311(1/2): 255-268. (In a study conducted in Belgium, presence of the *Rhinanthus* spp. resulted in reduced grass and legume growth and hence reduced total N in above ground vegetation. Total N in the soil was increased but was relatively less available.)

Amudavi, D.M., Khan, Z.R., Midega, C.A.O., Pickett, J.A., Lynam, J. and Pittchar, J. 2008. Push-pull technology and determinants influencing expansion among smallholder producers in Western Kenya. In: Jayaratne, K.S.U. (ed.) Proceedings of the 24th Annual Conference, Association for International Agricultural and Extension Education, Costa Rica, March 9-15, 2008: 38-50. (Describing efforts to extend the push-pull technology including *Desmodium* for *Striga*-control and noting difficulties in the supply of *Desmodioum* seed and in the market systems needed to increase uptake.)

Aritra Pal, Debreczeni, J.É., Madhumati Sevvana, Gruene, T., Kahle, B., Zeeck, A. and Sheldrick, G.M. 2008. Structures of viscotoxins A1 and B2 from European mistletoe solved using native data alone. Acta Crystallographica Section D, Biological Crystallography 64(9): 985-992.

Babalola, O.O. and Odhiambo, G.D. 2007. *Klebsiella oxytoca* '10mkr7' stimulates *Striga* suicidal germination in *Zea mays*. Journal of Tropical Microbiology and Biotechnology 3(2): 13-19. (Suggesting that the rhizobacterium *K. oxytoca* is a plant growth promoter and can stimulate suicidal germination of *Striga hermonthica*.)

Badu-Apraku, B., Fakorede, M.A.B. and Lum, A.F. 2008. S_1 family selection in early-maturing maize populations in *Striga*-infested and *Striga*-free environments. Crop Science 48(5): 1984-1994. (S_1 recurrent selection was effective in improving grain yield and resistance to *S. hermonthica* in two early, white and yellow, maize populations.)

Bacieczko, W. and Myśliwy, M. 2008. The distribution of *Orobanche pallidiflora* Wimm. & Grab. in Poland. Folia Universitatis Agriculturae Stetinensis, Agricultura, Alimentaria, Piscaria et Zootechnica 260(5): 5-13. (The rare and endangered *O. pallidiflora* occurs at only 40 sites in Poland. Distribution and habitat are decribed.)

Bar-Nun, N. and Mayer, A.M. 2008. Methyl jasmonate and methyl salicylate, but not *cis*-jasmone, evoke defenses against infection of *Arabidopsis thaliana* by *Orobanche aegyptiaca*. Weed Biology and Management 8(2): 91-96.

Barcelona, J.F., Pelser, P.B., Cabutaje, E.M. and Bartolome, N.A. 2008. Another new species of *Rafflesia* (Rafflesiaceae) from Luzon, Philippines: *R. leonardi.* Blumea 53(1): 223-228. (*R. leonardi* most closely resembles *R. lobata* and *R. manillana* but differs in its flower size, and disk that lacks all but rudimentary processes.)

Barea, L.P. 2008. Nest-site selection by the Painted Honeyeater (*Grantiella picta*), a mistletoe specialist. Emu – Austral Ornithology 108(3): 213-220. (Nesting of this bird species was predominantly in *Acacia homalophylla*, the principal host for *Amyema quandang*, while at least half these nests were in the mistletoe itself.)

Barina, Z. and Pifkó, D. 2008. New or interesting floristical records from Albania. Acta Botanica 50(3/4): 231-236. (Recording the occurrence of *Orobanche lavandulacea* near the Adriatic coast.)

Barkman, T.J., Bendiksby, M., Lim, S.H., Salleh, K.M., Nais, J., Madulid, D. and Schumacher, T. 2008. Accelerated rates of floral evolution at the upper size limit for flowers. Current Biology 18(19): 1508-1513. (Discussing the rate of increase in flower size in Rafflesiaceae, of 20 to 90 cm/million years, and concluding that they could continue to get bigger.)

Basant Ballabh, Chaurasia, O.P., Zakwan Ahmed and Singh, S.B. 2008. Traditional medicinal plants of cold desert Ladakh - used against kidney and urinary disorders. Journal of Ethnopharmacology 118(2): 331-339. (Reviewing the use of a range of medicinal plants including *Santalum album*.)

Benvenuti, S. 2008. (Parasitization dynamics and seed dispersal of dodder (*Cuscuta campestris*) on host-weeds present on winter-wheat stubbles.) (in Italian) In: Brunelli, A. (ed.) Giornate Fitopatologiche 2008, Cervia (RA), 12-14 marzo 2008, Volume 1: 485-492. (Noting a very high seed-bank of *C. campestris* seeds, of 10,000 to 20,000/m^2 and very low annual germination of 1%. Also the importance of weed hosts, especially *Ammi majus*, and the need to destroy them soon after crop harvest to prevent parasite seed production.)

Besserer, A., Bécard, G., Jauneau, A., Roux, C., Séjalon-Delmas, N. 2008. GR24, a synthetic analogue of strigolactones, stimulates the mitosis and growth of arbuscular mycorrhizal fungus *Gigaspora rosea* by boosting its energy metabolism. Plant Physiology 148: 402-413. (Minimal reference to parasitic plants, but useful observations on the mode of action of strigolactones in *G. rosea*.)

Bhardwaj, S K. and Laura, J.S. 2008. Antibacterial activity of some plant extracts against *Rathyibacter tritici*. Biosciences, Biotechnology Research Asia 5(1): 283-288. (Extracts of *Cuscuta reflexa* were third most active of 20 species against *R. tritici* – causal agent of tundu in wheat.)

Bolin, J. F., Maass, E., and Musselman, L. J. 2009. Pollination biology of *Hydnora Africana* Thunb. (Hydnoraceae) in Namibia: Brood site mimicry with insect imprisonment. International Journal of Plant Science 170(2): 157-163. (Describes the mechanisms whereby the flower traps and holds pollinators, chiefly *Dermestes maculates*, to ensure dusting of the insect body with pollen.)

Boutiti, M.Z., Souissi, T. and Kharrat, M. 2008. Evaluation of *Fusarium* as potential biological control against *Orobanche* on Faba bean in Tunisia. In: Julien, M.H., Sforza, R., Bon, M.C., Evans, H.C., Hatcher, P.E., Hinz, H.L. and Rector, B.G. (eds) Proceedings of the XII International Symposium on Biological Control of Weeds, La Grande Motte, France, 22-27 April, 2007: 238-244. (Of 149 *Fusarium* strains isolated from infected *Orobanche crenata* and *O. foetida* two were tested further in pots, resulting, with suitable formulation, in 100% control of both species.)

Braun, N.A., Butaud, J.F. Bianchini, J.P., Kohlenberg, B., Hammerschmidt, F.J., Meier, M. and Raharivelomanana, P. 2007. Eastern Polynesian sandalwood oil (*Santalum insulare* Bertero ex A. DC.) - a detailed investigation. Natural Product Communications 2(6): 695-699. (Analysis of essential oils confirmed the close relationship of Eastern Polynesian (*S. insulare*) to East Indian (*S. album*) and New Caledonian (*S. austrocaledonicum* var. *austrocaledonicum*) sandalwood oils.)

Brocke, C., Eh, M. and Finke, A. 2008. Recent developments in the chemistry of sandalwood odorants. In: Kraft, P. and Swift, K.A.D. (eds.) Chemistry & Biodiversity 5(6): 1000-1010. (Describing the preparation of 3 novel sandalwood oils, and discussing their sensory properties and structure-odour relationship.)

Büssing, A., Tröger, W., Stumpf, C. and Schietzel, M. 2008. Local reactions to treatments with *Viscum album* L. extracts and their association with T-lymphocyte subsets and quality of life. Anticancer Research 28(3B): 1893-1898. (Results indicate that the induction of moderate local reaction in response to *V. album* extract application was associated with better T cell function and quality of life than when a strong reaction occurred.)

Butaud, J.F., Gaydou, V., Bianchini, J.P., Faure, R. and Raharivelomanana, P. 2007. Dihydroxysesquiterpenoids from *Santalum insulare* of French Polynesia. Natural Product Communications 2(3): 239-242. (Compounds with antibacterial and antifungal activities identified in *S. insulare* may contribute to the recognized activities of this material in Polynesian traditional medicine.)

Cazetta, E. and Galetti, M. 2007. (Frugivory and host specificity in the mistletoe *Phoradendron rubrum* (L.) Griseb. (Viscaceae). (in Portuguese) Revista Brasileira de Botânica 30(2): 345-351. (The main hosts of *P. rubrum* were *Tabebuia ochracea* and *Melia azedarach* and the main seed dispersers were the birds *Euphonia chlorotica* and *E. cyanocephala*.)

Ćebovic, T., Spasic, S. and Popovic, M. 2008. Cytotoxic effects of the *Viscum album* L. extract on Ehrlich tumour cells *in vivo*. Phytotherapy Research 22(8): 1097-1103. (Recording a significant reduction in the incidence of cancer in mice that received the *V. album* extract compared with the control group, possibly due to induction of oxidative stress in the Ehrlich tumour cells.)

Chan ShunWan, Li Sha, Kwok ChingYee, Benzie, I.F.F., Szeto YimTong, Guo DeJian, He XiaoPing and Yu HoiFu, 2008. Antioxidant activity of Chinese medicinal herbs. Pharmaceutical Biology 46(9): 587-595. (Among 40 herbs tested, *Taxillus sutchuenensis* was among the highest in antioxidant activity and/or total phenolic content.)

Chhikara, A. and Friedman, C.M.R. 2008. The effects of male and female *Arceuthobium americanum* (lodgepole pine dwarf mistletoe) infection on the relative positioning of vascular bundles, starch distribution, and starch content in *Pinus contorta* var. *latifolia* (lodgepole pine) needles. Botany 86(5): 539-543. (*A. americanum* greatly reduced starch grains in the needles of *P. contorta*. Male parasites had a greater effect on the positioning of vascular bundles than did female parasites.)

Chitra, R. and Raj, S.V. 2008. Endangered medicinal trees in Indian divergent ecosystems. International Journal of Forest Usufructs Management 9(1): 24-29. (*Santalum album* among the species reviewed for their distribution, therapeutic uses and conservation.)

*Ciesla, W.M., Geils, B.W. and Adams, R.P. 2004. Hosts and geographic distribution of *Arceuthobium oxycedri.* Rocky Mountain Research Service Research Note 11 WWW Version 1.2 Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. (http://www.fs.fed.us/rm/pubs/rmrs_rn11/). (Not new, but updated August 2008. A valuable compilation of host range and distribution sites for *A. oxycedri* throughout its range, including Turkey – perhaps we could see it there in the course of the 2009 Congress?)

Conklin, D.A. and Geils, B.W. 2008. Survival and sanitation of dwarf mistletoe-infected ponderosa pine following prescribed underburning. Western Journal of Applied Forestry 23(4): 216-222. (Results indicate that under-burning can be a viable tool to manage *Arceuthobium* spp. in *Pinus ponderosa*, given sufficient fire intensity.)

Córdoba, E., González-Verdejo, C.I., Die, J., Román, B. and Nadal, S. 2008. First report of *Orobanche crenata* on sulla (*Hedysarum coronarium*) in Andalusia, southern Spain. Plant Disease 92(12): 1709. (*H. coronarium* grown following a previous crop of *Vicia narbonensis* which had been heavily infested with *O. crenata*, was also lightly infested – possibly the first report of infestation of this host.)

Costea, M., Aiston, F. and Stefanovic, S. 2008. Species delimitation, phylogenetic relationships, and two new species in the *Cuscuta gracillima* complex (Convolvulaceae). In: Graham, S.W. and Bruneau, A. (eds) Special Issue: Systematics Research. Botany 86(7): 670-681. (Eight taxa are described, including the new spp. *C. punana* from Ecuador and *C. vandevenderi* from Mexico. *C. colombiana* is redefined to include *C. aristeguietae*, and *C. deltoidea* is broadened to encompass *C. serruloba*. A taxonomic key, descriptions, and illustrations are provided.)

Cumbleton, P. 2008. *Castilleja*: saying goodbye to the host. Plantsman 7(4): 218-221. (Reporting that many *Castilleja* spp. can be grown without a host, and particularly recommending *C. miniata*, *C. pruinosa*, *C. applegatei* and *C. chromosa* as ornamentals.)

da Silva, G.G., de Souza, P.A., de Morais, P.L.D., dos Santos, E.C., Moura, R.D. and Menezes, J.B. 2008. (Wild plum fruit characterization (*Ximenia americana*).) in Piortuguese) Revista Brasileira de Fruticultura 30(2): 311-314. (Confirming that the fruits of *X. americana (Olacaceae)* are rich in vitamin C, with high contents of soluble solids and acidity.)

da Silva, A.L., Ferreira, J.G., Martins, B. da S., Oliveira, S., Mai, N., Nunes, D.S. and Elisabetsky, E. 2008. Serotonin receptors contribute to the promnesic effects of *P. olacoides* (Marapuama). Physiology & Behavior 95(1/2): 88-92. (Referring to *Ptychopetalum olacoides* (Olacaceae).)

Darwish, D.S., Abdalla, M.M.F., Saber, H.A. and Sedik, M.T. 2007. Investigations on faba beans, *Vicia faba* L. 22 - Reaction of six faba bean genotypes and *Orobanche* to the herbicide glyphosate. Egyptian Journal of Plant Breeding 11(1): 401-409. (Best overall results were recorded from the higher (54g/feddan) dose of glyphosate and for variety Cairo 2, and the worst from variety Giza 2.)

de Araújo, M.R.S., Assunção, J.C.da C., Dantas, I.N.F., Costa-Lotufo, L.V. and Monte, F.J.Q. 2008. Chemical constituents of *Ximenia americana*. Natural Product Communications 3(6): 857-860. (Chemicals isolated from *X. americana* (Olacaceae) included 2 steroids, 5 pentacyclic triperpenoids and a new furanosesquiterpene. The latter did not inhibit the growth of human leukaemia, human colon, or human breast cancer cell lines.)

Demırbas, S. and Acar, O. 2008. Superoxide dismutase and peroxidase activities from antioxidative enzymes in *Helianthus annuus* L. roots during *Orobanche cumana* Wallr. penetration. Fresenius Environmental Bulletin 17(8a): 1038-1044. (Characterizing the activities of these antioxidative enzymes in roots of parasitized sunflower cultivars Pioneer 4223, Sanay, and Isera. Higher activity during first week after inoculation is linked to resistance in the Pioneer cultivar.)

Dugje, I.Y., Kamara, A.Y. and Omoigui, L.O. 2008. Influence of farmers' crop management practices on *Striga hermonthica* infestation and grain yield of maize (*Zea mays* L.) in the savanna zones of northeast Nigeria. Journal of Agronomy 7(1): 33-40. (Maize variety 97 TZL Comp-1-W was resistant and gave improved yields in southern and northern Guinea savannas but not in Sudan savannah. Other practices with beneficial effect included rotation with soyabean or groundnut, 100 kg N/ha and three hoe weedings.)

Dunwell, J.M., Gibbings, J.G., Tariq Mahmood and Naqvi, S.M.S. 2008. Germin and germin-like proteins: evolution, structure, and function. Critical Reviews in Plant Sciences 27(5): 342-375. (A detailed review of these proteins which are implicated in a wide variety of plant functions, including response to parasitic plants.)

Eizenberg, H. and Joel, D.M. 2007. The canon of potato science: 18. Parasitic weeds. In: Struik, P.C., Lommen, W.J.M., Haverkort, A.J. and Storey, R.M.J. 2007. Potato Research 50(3/4): 275-278. (A short review of parasitic weeds in potato, including *Orobanche ramosa*, *O. aegyptiaca* and *O. cernua*, also *Cuscuta campestris*. Noting that there are so far no resistant varieties to *Orobanche* spp., but rimsulfuron controls *O. ramosa* and *O. aegyptiaca* when applied 3 times with overhead irrigation.)

El-Husseini, N., El-Ghani, M.M.A. and El-Naggar, S.I. 2007. Floristic analysis and biogeography of Tubiflorae in Egypt. Acta Biologica Szegediensis 51(1): 65-80. (Noting *Cuscuta* and *Orobanche* among the most species-rich genera.)

*Elluru, S.R., van Huyen, J.P.D., Delignat, S., Kazatchkine, M.D., Friboulet, A., Kaveri, S.V. and Bayry, J. 2008. Induction of maturation and activation of human dendritic cells: a mechanism underlying the beneficial effect of *Viscum album* as complimentary therapy in cancer. BMC Cancer 8(161) 4 June 2008. (http://www.biomedcentral.com/1471-2407/8/161) (Confirming that *V. album* preparations stimulate the maturation and activation of human dendritic cells which may facilitate anti-tumoral immune responses.)

Ene, A.C., Ameh, D.A., Kwanashie, H.O., Agomo, P.U., Atawodi, S.E. 2008. Preliminary *in vivo* antimalarial screening of petroleum ether, chloroform and methanol extracts of fifteen plants grown in Nigeria. Journal of Pharmacology and Toxicology 3(4): 254-260. (Studies failed to confirm the anti-malarial properties of extracts of *Thonningea sanguinea*.)

Engdal, S. and Nilsen, O.G. 2008. Inhibition of P-glycoprotein in Caco-2 cells: effects of herbal remedies frequently used by cancer patients. Xenobiotica 38(6): 559-573. (A mistletoe (presumably *Viscum album*) herbal extract was the most active of a number of herbal remedies tested.)

Engdal, S., Steinsbekk, A., Klepp, O. and Nilsen, O.G. 2008. Herbal use among cancer patients during palliative or curative chemotherapy treatment in Norway. Supportive Care in Cancer 16(7): 763-769. (A very few patients used mistletoe (?*Viscum album*) preparations in conjunction with conventional chemotherapy.)

Fernández-Aparicio, M., Andolfi, A., Cimmino, A., Rubiales, D. and Evidente, A. 2008. Stimulation of seed germination of *Orobanche* species by ophiobolin A and fusicoccin derivatives. Journal of Agricultural and Food Chemistry 56(18): 8343-8347. (The most active was ophiobolin A, and the most sensitive species were *O. aegyptiaca, O. cumana* and *O. minor*.)

Fernández-Aparicio, M., Pérez-de-Luque, A., Prats, E. and Rubiales, D. 2008. Variability of interactions between barrel medic (*Medicago truncatula*) genotypes and *Orobanche* species. Annals of Applied Biology 153(1): 117-126. (Accessions of *M. truncatula* show little variability in their resistance to *O. crenata* but such differences are shown on *O. nana* and some other *Orobanche* species. The genetic variation observed for induction of germination and subsequent attachment will be useful for isolating and characterising genes involved in early stages of *Orobanche*-host plant interaction.)

Fernández-Aparicio, M., Sillero, J.C. and Rubiales, D. 2009. Resistance to broomrape species (*Orobanche* spp.) in common vetch (*Vicia sativa* L.). Crop Protection, 28: 7-12. (Reporting infestation of *V. sativa* by *O. crenata, O. aegyptiaca* and to *O. foetida*. Describing resistance in cultivar Mezquita which is demonstrated early against *O aegyptiaca* resulting in reduced tubercle formation, but later against *O. crenata* resulting in retarded tubercle development.)

Fıdan, I., Ozkan, S., Gurbuz, I., Yesılyurt, E., Erdal, B., Yolbakan, S. and Imır, T. 2008. The efficiency of *Viscum album* ssp. *album* and *Hypericum perforatum* on human immune cells *in vitro*. Immunopharmacology and Immunotoxicology 30(3): 519-528. (Results suggest these extracts may be used as an adjuvant treatment option for immune activation in immuno-suppressed patients.)

Filip, G.M. 2005. Diseases as agents of disturbance in ponderosa pine. In: Ritchie, M.W., Maguire, D.A. and Youngblood, A. (eds) General Technical Report - Pacific Southwest Research Station, USDA Forest Service No.PSW-GTR-198: 227-232. (Noting that, although *Arceuthobium* spp. spread slowly, their localized effects can be ‘quite spectacular’.)

French, G.C., Hollingsworth, P.M., Silverside, A.J. and Ennos, R.A. 2008. Genetics, taxonomy and the conservation of British *Euphrasia*. Conservation Genetics 9(6): 1547-1562. (The diploid *E. vigursii* and *E. rivularis* form morphologically and genetically definable units, but the tetraploid taxa show varying degrees of overlap, complicating the task of designing conservation measures.)

Fujii, N. 2007. Chloroplast DNA phylogeography of *Pedicularis* ser. *Gloriosae* (Orobanchaceae) in Japan. Journal of Plant Research 120(4): 491-500. (Results suggest that the continental species, *P. sceptrum-carolinum* and *P. grandiflora* are ancestral and there was subsequent differentiation into the two Japanese lineages, *P. gloriosa*, *P. iwatensis* and *P. ochiaiana* in one and *P. nipponica* in the other.)

Ganesan, S., Manikandan, P. and Sekar, R. 2008. Angiospermic parasitic plants and their hosts in the southern districts of Tamil Nadu, India. Journal of

Economic and Taxonomic Botany 32(1): 63-71. (Eighty-four host species belonging to 35 families are infested by 14 parasitic plants (unspecified in abstract), including one root parasite.)

García-Franco, J.G., López-Portillo, J. and Ángeles, G. 2007. The holoparasitic endophyte *Bdallophyton americanum* affects root water conductivity of the tree *Bursera simaruba*. Trees: Structure and Function 21(2): 215-220. (*B. americanum* (Rafflesiaceae) reduces xylem vessel number by 40%, and conductivity of parasitized roots by 61% to 85%. Effects on host tree growth not reported.)

Geng XingChao, Tian XueFei, Tu PengFei and Pu XiaoPing, 2007. Neuroprotective effects of echinacoside in the mouse MPTP model of Parkinson's disease. European Journal of Pharmacology 564(1/3): 66-74. (Suggesting that echinacoside from *Cistanche salsa* improves the behavioral and neurochemical outcomes in a mouse model of Parkinson's, making the compound an attractive candidate treatment for various neurodegenerative disorders.)

Ghazanfar, S.A. 2007. Flora of Sultanate of Oman. Volume 2, Crassulaceae - Apiaceae. Scripta Botanica Belgica 36: 220 pp. (Including families Loranthaceae and Santalaceae.)

Gibbons, P., Briggs, S.V., Ayers, D.A., Doyle, S., Seddon, J., McElhinny, C., Jones, N., Sims, R. and Doody, J.S. 2008. Rapidly quantifying reference conditions in modified landscapes. Biological Conservation 141(10): 2483-2493. (Mistletoe infestation as one of many factors in prediction of biodiversity of vegetation in S.E. Australia.)

Gomez-Roldan, V. *et al.* 2008. Strigolactone inhibition of shoot branching. Nature (London) 455(7210): 189-194. (Listed in Haustorium 53 as web-site only. Now published.)

González-Verdejo, C.I., Die, J.V., Nadal, S., Jiménez-Marín, A., Moreno, M.T. and Román, B. 2008. Selection of housekeeping genes for normalization by real-time RT-PCR: analysis of *Or-MYB1* gene expression in *Orobanche ramosa* development. Analytical Biochemistry 379(2): 176-181. (*Or-act1* and *OR-ubq1* were expressed more stably than *18S rRNA* or *Or-tub1*.)

González-Verdejo, C.I., Dita, M.A., Nadal, S., Moreno, M.T. and Román, B. 2008. Sucrose application suppresses infection of the parasitic plant *Orobanche ramosa* in tomato (*Lycopersicon esculentum*). Agrociencia (Montecillo) 42(5): 513-517. (Sucrose did not affect *O. ramosa* germination but reduced radicle length, and number of attachments and nodules formed. Method/doses not indicated in abstract.)

Grewell, B. J. 2008. Hemiparasites generate environmental heterogeneity and enhance species coexistence in salt marshes. Ecological Applications 18(5): 1297-1306. (Involving *Cordylanthus maritimus* ssp. *palustris* and *Cordylanthus mollis* ssp. *mollis.*)

Guo YiQing, Kim KilUng, Lee InJung, Yoder, J.I. and Shin DongHyun, 2008. Haustorium induction of parasitic plant: a new bioassay method to determine allelopathic potential. In: Kong, C.H. and Labrada, R. (eds) Allelopathy Journal 22(2): 371-378. (The allelopathic effects of 3 rice cultivars were correlated with different ROS (reactive oxygen species) activity and with their tendency to cause haustorium initiation in *Triphysaria versicolor*, suggesting this species can be used to evaluate the allelopathic potential of plant species.)

Gussarova, G., Popp, M., Vitek, E. and Brochmann, C. 2008. Molecular phylogeny and biogeography of the bipolar *Euphrasia* (Orobanchaceae): recent radiations in an old genus. Molecular Phylogenetics and Evolution 48(2): 444-460. (Discussing the development and dispersal of the genus over the past 11 million years.)

Hessburg, P.F., Povak, N.A. and Salter, R.B. 2008. Thinning and prescribed fire effects on dwarf mistletoe severity in an eastern Cascade Range dry forest, Washington. Forest Ecology and Management 255(7): 2907-2915. (Thinning produced the greatest reductions in severity of *Arceuthobium* spp. (unspecified) in ponderosa pine and douglas-fir. Burning effects on vegetation were enhanced when combined with thinning.)

Huang TsurngJuhn, Chen YiYen, Li YenPing, Hung ChengYu, Chiang TzenYuh and Chou ChangHung, 2008. Isolation and characterization of microsatellite loci in *Pedicularis verticillata* L. using PCR-based isolation of microsatellite arrays (PIMA). Conservation Genetics 9(5): 1389-1391. (Suggesting that the results can be used in the conservation of this endangered species, of value in Chinese medicine.)

Idžojtic, M.**,** Glavaš, M.**,** Zebec, M.**,** Pernar, R.**,** Kušan, Ž.**,** List, D. and Grahovac-Tremski, M. 2008. (Intensity of infection with yellow mistletoe and white-berried mistletoe on the area of the forest administrations Zagreb and Koprivnica.) (in Croatian) Šumarski List 132(3/4): 107-114. (Giving data on occurence of *Loranthus europaeus* and *Viscum album* on *Quercus petraea*, *Q. robur*, *Fraxinus angustifolia*, *Robinia pseudoacacia*, *Acer pseudoplatanus* and *Alnus glutinosa*.)

Idžojtic, M., Pernar, R., Glavaš, M., Zebec, M. and Diminic, D. 2008. The incidence of mistletoe (*Viscum album* ssp. *abietis*) on silver fir (*Abies alba*) in Croatia. Biologia (Bratislava) 63(1): 81-85. (*V. album* can be considered a bio-indicator of silver fir decline, and probably a significant contributor to that decline. Where mistletoe incidence is great it can be presumed that silver fir is significantly damaged.)

Ikie, F.O., Schulz, S., Ogunyemi, S., Emechebe, A.M. and Togun, A.O. 2007. Influence of legume cropping patterns and organic/inorganic soil amendments on *Striga* seedbank and subsequent sorghum performance. Advances in Environmental Biology 1(1): 11-19. (Showing that trap-crops soybean and cowpea produced results similar to those obtained with ethylene, while urea reduced the *S. hermonthica* seedbank and improved sorghum yield. Poultry manure tended to increase *Striga* infestation.)

Jagadish, M.R., Ahmed, S.M., Madhu, K.S., Viswanath, S. and Rathore, T.S. 2008. Effect of seed source and collection time in *Santalum album* L. on germination parameters. International Journal of Forest Usufructs Management 9(1): 51-57. (Comparing seed of *S. album* from 4 districts of Karanatka, India - Hosakote, Mysore, IWST and Bijapur - those from Mysore performed best. Seed collection was best in mid-season.)

Jayasuriya, K.M.G.G., Baskin, J.M. and Baskin, C.C. 2008. Dormancy, germination requirements and storage behaviour of seeds of Convolvulaceae (Solanales) and evolutionary considerations. Seed Science Research 18(4): 223-237. (Seeds of 46 species germinated after imbibition (following scarification), except those of *Cuscuta europaea*, which is reported to display combinational dormancy.)

Jayasuriya, K.M.G.G., Baskin, J.M., Geneve, R.L., Baskin, C.C. and Chien ChingTe, 2008. Physical dormancy in seeds of the holoparasitic angiosperm *Cuscuta australis* (Convolvulaceae, Cuscuteae): dormancy-breaking requirements, anatomy of the water gap and sensitivity cycling. Annals of Botany 102(1): 39-48. (Breaking of dormancy is associated with water entry via an opening of the hilar fissure, rather than via bulges adjacent to the micropyle as in other Convolvulaceae.)

Jayasuriya, R.T., Jones, R.E. and van de Ven, R. 2008. An economic decision tool for responding to new weed incursion risks in the Australian grains industry. Technical Series - CRC for Australian Weed Management 14: 41 pp. (Including a case study on *Orobanche ramosa*.)

Jiang Fan, Jeschke, W.D., Hartung, W. and Cameron, D.D. 2008. Mobility of boron-polyol complexes in the hemiparasitic association between *Rhinanthus minor* and *Hordeum vulgare*: the effects of nitrogen nutrition. Physiologia Plantarum 134(1): 13-21. (Long-distance boron transport is facilitated by the formation of boron-polyol complexes. The findings are consistent with a close relationship between boron re-translocation and mannitol concentrations in phloem vessels.)

Jiang ZhiHong, Wen XiaoYun, Tanaka, T., Wu ShaoYu, Liu Zhongqiu, Iwata, H., Hirose, Y., Wu Shuguang and Kouno, I. 2008. Cytotoxic hydrolyzable tannins from *Balanophora japonica*. Journal of Natural Products 71(4): 719-723. (Four balanophotannins identified. Balanophotannin E showed cytotoxicity to Hep G2 cancer cells.)

Jiménez, M., André, S., Barillari, C., Romero, A., Rognan, D., Gabius, H.J. and Solís, D. 2008. Domain versatility in plant AB-toxins: evidence for a local, pH-dependent rearrangement in the 2γ lectin site of the mistletoe lectin by applying ligand derivatives and modelling. FEBS Letters 582(15): 2309-2312.

Jones, C.G., Keeling, C.I., Ghisalberti, E.L., Barbour, E.L., Plummer, J.A. and Bohlmann, J. 2008. Isolation of cDNAs and functional characterisation of two multi-product terpene synthase enzymes from sandalwood, *Santalum album* L. Archives of Biochemistry and Biophysics 477(1): 121-130.

Kabambe, V.H., Kanampiu, F. and Ngwira, A. 2008. Imazapyr (herbicide) seed dressing increases yield, suppresses *Striga asiatica* and has seed depletion role in maize (*Zea mays* L.) in Malawi. African Journal of Biotechnology 7(18): 3293-3298. (Imazapyr seed dressings greatly suppressed emergence and flowering of *S. asiatica*, but contrary to the title, the abstract suggests there was no significant increase in maize yield. In the following season, without further treatment there were again good reductions of *S. asiatica*, but without effect on maize yield.)

Kabambe, V., Katunga, L., Kapewa, T. and Ngwira, A.R. 2008. Screening legumes for integrated management of witchweeds (*Alectra vogelii* and *Striga asiatica*) in Malawi. African Journal of Agricultural Research 3(10): 708-715. (Among soybean varieties Kudu was highly susceptible to *A. vogelii*, but Bossier and Ocepara-4 were relatively resistant and have potential as trap crops for *S. asiatica*, along with pigeon peas and green manure crops of mucuna and crotalaria which are immune to *Alectra*.)

Kamara, A.Y., Chikoye, D., Ekeleme, F., Omoigui, L.O. and Dugje, I.Y. 2008. Field performance of improved cowpea varieties under conditions of natural infestation by the parasitic weed *Striga gesnerioides*. International Journal of Pest Management 54(3): 189-195. (Confirming the immunity of cowpea varieties IT97K-499-35 and IT90K-82-2 to *S. gesenderioides* in NE Nigeria, and yield benefits of 30-126% over local varieties. but noting concerns about their adoption because of their medium-sized white seeds. Farmers in this zone prefer large-seeded brown cowpea.)

Karakas, A., Turker, A.U. and Gunduz, B. 2008. Effects of European mistletoe (*Viscum album* L. subsp.

album) extracts on activity rhythms of the Syrian hamsters (*Mesocricetus auratus*). Natural Product Research 22(11): 990-1000. (Recording some effects of *V. album* extracts on circadian rhythm in *M. auratus*.)

Khan, J.A., Singh, S.K. and Ahmad, J. 2008. Characterisation and phylogeny of a phytoplasma inducing sandal spike disease in sandal (*Santalum album*). Annals of Applied Biology 153(3): 365-372. (Studies to identify the phytoplasma responsible for spike disease in *S. album* concluded that it belongs to aster yellows subgroup 16SrI-B.)

*Kilimo Trust, 2008. Program 2 - Unlock cereal production potential in East Africa by eliminating the *Striga* threat. http://www.thekilimotrust.org/index.php?option=com_docman&task=doc_view&gid=17 (Describing an ambitious 12 year project for reducing the losses to *Striga* in East Africa. The first 6 year programme, already begun with baseline studies is estimated to cost $23 million. We hope to include more on this and the (related?) AATF projects in Haustorium 55.)

Kim, J.H., Kim, D.W., Kang, K.H., Jang, B.G., Yu, D.J., Na, J.C., Kim, S.H., Lee, D.S., Suh, O.S., Choi, K.D., Kim, S.K. and Lee, K.H. 2007. Effects of dietary Korean mistletoe on performance and blood characteristics in broilers. Korean Journal of Poultry Science 34(2): 129-136. (When chickens were fed with *Viscum album* var. *coloratum*, *Salmonella* sp. of the caeca significantly decreased and lymphocyte count was significantly higher when compared with an antibiotic control.)

Kostov, K., Batchvarova, R. and Slavov, S. 2007. Application of chemical mutagenesis to increase the resistance of tomato to *Orobanche ramosa* L. Bulgarian Journal of Agricultural Science 13(5): 505-513. (Chemical mutagenesis of tomato seeds with ethylmethanesulfonate yielded 16 apparently immune individuals from which 6 lines were developed with improved resistance.)

Kostov, T. and Pacanoski, Z. 2007. Weeds with major economic impact on agriculture in Republic of Macedonia. Pakistan Journal of Weed Science Research 13(3/4): 227-239. (Noting that tobacco, sunflower, tomato, lucerne and clover were favoured hosts for *Orobanche* spp. (*O. cumana* and *O. ramosa*) and *Cuscuta* spp. (*C. arvensis* and *C. epythimum*) in Greece. Also noting occurrence of *Rhinanthus major* and *Melampyrum arvense* in cereal crops.)

Krause, K. 2008. From chloroplasts to "cryptic" plastids: evolution of plastid genomes in parasitic plants. Current Genetics 54(3): 111-121. (A current review of the contributions of parasitic plants to understanding plastid genomes, including discussion of new insights into *matK* and Rubisco based on their loss or retention in parasitic species.)

Kruk, J. and Szymańska, R. 2008. Occurrence of neoxanthin and lutein epoxide cycle in parasitic *Cuscuta* species. Acta Biochimica Polonica 55(1): 183-190. (Indicating that presence of the lutein epoxide cycle and of neoxanthin is independent and variable among the 8 *Cuscuta* species studied.)

Kudi, T.M. and Abdulsalam, Z. 2008. Costs and returns analysis of striga tolerant maize variety in Southern Guinea Savanna of Nigeria. Journal of Applied Sciences Research 6: 649-651. (*Striga*-tolerant varieties were highly profitable giving a gross margin of Naira 94479.21/ha compared to Naira 15683.73/ha for the farmers' varieties.)

Kuijt, J. 2008. *Pusillanthus* (Loranthaceae), a new monotypic genus from Venezuela. Novon 18(3): 370-373. (Describing a new genus based on *Phthirusa trichodes* with umbellate capitulum, tetramery, bisexual flowers with nearly sessile anthers, the absence of epicortical roots, and the presence of a conspicuous indument.)

Kurus, J. and Podstawka-Chmielewska, E. 2007. (*Melampyrum arvense* L. as an element of agricultural landscape.) (in Polish) Annales Universitatis Mariae Curie-Sklodowska. Sectio E, Agricultura 62(2): 137-144. (Populations of *M. arvense* make an attractive component of the roadside flora. Occurrence in neighbouring cereal fields is limited.)

Laengler, A., Spix, C., Seifert, G., Gottschling, S., Graf, N. and Kaatsch, P. 2008. Complementary and alternative treatment methods in children with cancer: a population-based retrospective survey on the prevalence of use in Germany. European Journal of Cancer 44(15): 2233-2240. (Including some reference to the use of *Viscum album* extracts.)

Lawrence, B.M. 2008. Progress in essential oils. Perfumer & Flavorist 33(7): 44-55. (An update is provided on the composition of essential oils from *Santalum austrocaledonicum*.)

Leung HoiYan and Ko KamMing, 2008. Herba Cistanche extract enhances mitochondrial ATP generation in rat hearts and H9c2 cells. Pharmaceutical Biology 46(6): 418-424. (The results indicate that extracts of *Cistanche deserticola* increase mitochondrial ATP generation in rat hearts *ex vivo* and H9c2 cells *in situ*, possibly through enhancing oxidative phosphorylation.)

Lewis, K.C., Selzer, T., Shahar, C., Udi, Y., Tworowski, D. and Sagi, I. 2008. Inhibition of pectin methyl esterase activity by green tea catechins. Phytochemistry 69(14): 2586-2592. (A green tea extract blocked esterase activity of pectin methyl esterases from parasitic plants *Cuscuta pentagona* and *Castilleja indivisa*.)

Li DongXiao, Yang XiaoBo, Zhang GuoGuang, Chang JingLing and Chen Liang, 2008. Plant regeneration *in vitro* of *Cuscuta chinensis* Lam. Journal of Tropical and Subtropical Botany 16(3): 279-282. (Recording successful callus maintenance for over 12 months and regeneration of shoot growth in suitable culture solutions.)

Li MinGai, Wunder, J., Bissoli, G., Scarponi, E., Gazzani, S., Barbaro, E., Saedler, H. and Varotto, C. 2008. Development of COS genes as universally amplifiable markers for phylogenetic reconstructions of closely related plant species. Cladistics 24(5): 727-745. (A study of Orobanchaceae confirmed the usefulness of COS (Conserved Ortholog Set) genes for phylogenetic reconstructions.)

Li Yang, Zhao YanLi, Huang Ning, Zheng YongTang, Yang YongPing and Li XiaoLi, 2008. Two new phenolic glycosides from *Viscum articulatum.* Molecules 13(10): 2500-2508. (Two new glucopyranosides.)

Liebst, B. 2008. Do they really hybridize? A field study in artificially established mixed populations of *Euphrasia minima* and *E. salisburgensis* (Orobanchaceae) in the Swiss Alps. Plant Systematics and Evolution 273(3/4): 179-189. (Yes.)

Lin ZhenJian, Lu XiaoMing, TianJiao, Fang YuChun, Gu QianQun and Zhu Weiming, 2008. GPR12 selections of the metabolites from an endophytic *Streptomyces* sp. associated with *Cistanche deserticola*. Archives of Pharmacal Research 1(9): 1108-1114. (Among compounds detected, only tyrosol can promote an increase of intracellular cAMP special on GPR(G-Protein-Coupled Receptor)12 transfected cells, suggesting it may be a possible ligand for GPR12.)

Lin ZhenJian, Wen JiangNi, Zhu TianJiao, Fang YuChun, Gu QianQun and Zhu WeiMing, 2008. Chrysogenamide A from an endophytic fungus associated with *Cistanche deserticola* and its neuroprotective effect on SH-SY5Y cells. Journal of Antibiotics 61(2): 81-85. (The fungus is *Penicillium chrysogenum*.)

Littley, E., Friedman, C.M.R. and Flood, N.J. 2008. The effects of *Arceuthobium americanum* infection on *Pinus contorta* var. *latifolia* needles. Northwest Science 82(3): 237-240. (In addition to causing significant yearly timber loss *A. americanum* causes pine needles to be shorter, thinner, and narrower with larger, more densely packed stomata.)

Long ShuSheng, Lendzemo, V., Kuyper, T.W., Kang ZhengSheng, Vierheilig, H. and Steinkellner, S. 2008. A simple staining method for observation of germinated *Striga* seeds. Seed Science Research 18(2): 125-129. (Among a range of dyes tested, Blue (Geha) ink in 5% acetic acid is recommended to make *Striga* radicles more conspicuous and readily counted in germination assays.).

López-Ráez, J.A. and Bouwmeester, H. 2008. Fine-tuning of strigolactone biosynthesis under phosphate starvation. Plant Signalling and Behaviour 3(1): 1-3. (Reporting the results of a microarray experiment with tomato, focusing on carotenoid metabolism.)

López-Ráez, J.A., Charnikhova, T., Mulder, P., Kohlen, W., Bino, R., Levin, I. and Bouwmeester, H. 2008. Susceptibility of the tomato mutant *high pigment-2*^{dg} (*hp-2*^{dg}) to *Orobanche* spp. infection Journal of Agricultural and Food Chemistry 56(15): 6326-6332. (In spite of the high carotenoid content of the mutant tomato, strigolactone production was lower, resulting in reduced susceptibility to *Orobanche aegyptiaca*.)

Lorite, J., Ruiz-Girela, M. and Castro, J. 2007. Patterns of seed germination in Mediterranean mountains: study on 37 endemic or rare species from Sierra Nevada, SE Spain. Candollea 62(1): 5-16. (Including reference to *Odontites granatensis* and the need to understand its dormancy.)

Magnusson, M. 2008. (*Orobanche elatior* in Skåne, southernmost Sweden.) (in Swedish) Svensk Botanisk Tidskrift 102(3/4): 163-176. (*O. elatior* is classified as endangered in Sweden. Its main hosts are *Centaurea scabiosa* and perhaps *C. jacea*. It is threatened by encroachment of nitrophilous herbs and by *Prunus* and *Crataegus* scrub. Early burning, grazing or cutting are beneficial.)

Mahadevappa, S.G. and Bhanumurthy, V.B. 2007. Relative efficacy of trifluralin and imazethapyr for weed control in lucerne (*Medicago sativa* L.). Progressive Research 2(1/2): 73-75. (Pre-emergence imazethapyr at 0.2 kg ha was superior to trifluralin for control of *Cuscuta* (?*campestris*) and the crop was free of the weed up to 60 days after sowing.)

Maikai, V.A., Kobo, P.I. and Adaudi, A.O. 2008. Acute toxicity studies of aqueous stem bark extract of *Ximenia americana*. African Journal of Biotechnology 7(10): 1600-1603. (Extracts of *X. americana* (Olacaceae) caused weight loss in mice but no acute toxicity.)

Manyong, V.M., Alene, A.D., Olanrewaju, A., Ayedun, A.B., Rweyendela, V., Omanya, G., Mignouna H.D. and Bokanga, M. 2008. Baseline study of *Striga* control using IR maize in Western Kenya: an agriculture collaborative study on *Striga* control by the African Agricultural Technology Foundation and the International Institute of Tropical Africa. 56 pp. (A study of the status of *S. hermonthica* in 800 households in W. Kenya confirms it as a major and increasing threat.)

Manyong, V.M., Nindi, S.J., Alene, A.D., Odhiambo, G.D., Omanya, G., Mignouna H.D. and Bokanga, M. 2008. Farmer perceptions of imazapyr-resistant (IR) maize technology on the control of *Striga* in western Kenya: an agricultural collaborative study on *Striga* control by the African Agricultural Technology Foundation and the International Institute of Tropical Agriculture. Nairobi, Kenya: African Agricultural

Technology Foundation. 82 pp. (Reviewing the uptake by, and perception of, farmers of the use of herbicide/herbicide-resistant maize, and/or *Desmodium* for control of *S. hermonthica*. Noting good results where adopted, but problems of supplying the inputs and adequate extension.)

Maruyama, S., Akasaka, T., Yamada, K. and Tachibana, H. 2008. *Cistanche salsa* extract acts similarly to protein-bound polysaccharide-K (PSK) on various types of cell lines. Journal of Traditional Medicines 25(5/6): 166-169. (Results suggest that *C. salsa* is a biological response modifier similar to PSK and exerts an immuno-modulatory effect on both cellular and humoral immunity, and a direct anti-cancer effect.)

Maruyama, S., Yamada, K. and Tachibana, H. 2008. Immunomodulatory factors in *Cistanche salsa*. Journal of Traditional Medicines 25(3) 87-89. (*C. salsa* is used as a medicinal tonic in Japan. An extract induced growth inhibition and apoptosis in the human Burkitt's lymphoma cell line Namalwa, apparently due to at least 2 active ingredients, possibly polysaccharides.)

Matthews, J.M., Miegel, D., Hayton, D. and Lamey, S. 2008. Seedbank management of *Orobanche ramosa* in South Australia. Proceedings of the 16th Australian Weeds Conference, Cairns Convention Centre, North Queensland, Australia, 18-22 May, 2008: 309-311. (Showing seed viability of *O. ramosa* slowly declining after four years. And reporting useful effects from ‘Bio-Seed Eradicator’, ‘Basamid’ and a range of herbicides.)

Mauromicale, G., lo Monaco, A. and Longo, A.M.G. 2008. Effect of branched broomrape (*Orobanche ramosa*) infection on the growth and photosynthesis of tomato. Weed Science 56(4): 574-581. (*O. ramosa* strongly reduced shoot growth of tomato by acting as a sink for assimilate, but also by reducing the efficiency of carbon assimilation via a reduction in leaf chlorophyll content and photosynthetic rate.)

Mavlonov, G.T., Ubaidullaeva, K.A., Kadryaeva, G.V. and Kuznetsova, N.N. 2008. Cytotoxic components of *Cuscuta*. Chemistry of Natural Compounds 44(3): 409-410. (No abstract available.)

Meyer, A., Rypniewski, W., Szymanski, M., Voelter, W., Barciszewski, J. and Betzel, C. 2008. Structure of mistletoe lectin I from *Viscum album* in complex with the phytohormone zeatin. Biochimica et Biophysica Acta, Proteins & Proteomics 1784(11): 1590-1595. (Crystals of a complex of lectin-1 from *Viscum album* and the hormone zeatin were grown on the International Space Station. Diffraction data demonstrate the ability of mistletoe to protect itself from the host transpiration regulation by absorbing the host plant hormones as part of a defence mechanism.)

Mitei, Y.C., Ngila, J.C., Yeboah, S.O., Wessjohann, L. and Schmidt, J. 2008. NMR, GC-MS and ESI-FTICR-MS profiling of fatty acids and triacylglycerols in some Botswana seed oils. Journal of the American Oil Chemists' Society 85(11): 1021-1032. (Including results for *Ximenia caffra* (Olacaceae).)

Mounnissamy, V.M., Kavimani, S., Balu, V. and Quine, S.D. 2008. Effect of ethanol extract of *Cansjera rheedii* J. Gmelin (Opiliaceae) on hepatotoxicity. Journal of Pharmacology and Toxicology 3(23): 158-162. (‘Treatment of rats with the ethanol extract significantly altered the serum marker enzymes and antioxidant level near to normal against paracetamol-intoxicated rats.’)

Mounnissamy, V.M., Kavimani, S., Balu, V. and Quine, S.D. 2008. Anthelminthic activity of *Cansjera rheedii* J. Gmelin (Opiliaceae). Journal of Biological Sciences 8(4): 831-833. (Confirming the anthelminthic potential of the aerial parts of *C. rheedii*.)

Mulvaney, C.R., Molano-Flores, B. and Whitman, D.W. 2006. Is insect herbivory contributing to the threatened status of *Agalinis auriculata* (Orobanchaceae) in Illinois? Journal of the Torrey Botanical Society 133(4): 560-565. (Concluding that herbivory by the tree cricket *Oecanthus nigricornis*, the moth *Endothenia hebesana* and the butterfly *Junonia coenia*, combined with habitat loss and other biotic constraints may hinder the recovery of *A. auriculata*.)

Murai, Y., Kokubugata, G., Yokota, M., Kitajima, J. and Iwashina, T. 2008. Flavonoids and anthocyanins from six *Cassytha* taxa (Lauraceae) as taxonomic markers. Biochemical Systematics and Ecology 36(9): 745-748. (Results from the study do not support the hypothesis that *C. pubescens* and *C. filiformis* var. *duripraticola* are conspecific but confirm that *C. filiformis* var. *duripraticola* is a variety of *C. filiformis,* and that *C. pergracilis* is distinct. Other Japanese and Australian species studied were. *C. muellerii* (close to *C. pubescens*) and *C. glabella* (close to *C. pergracilis*).)

Murray, S. 2008. Rare genetic find delivers high-quality sandalwood oil. Partners in Research for Development. July/October: 22-23. (Discussing the potential of *Santalum austrocaledonicum* and *S. lanceolatum* as superior sources of sandalwood oil in Vanuatu and in Queensland, Australia.)

Myśliwy, M. 2008. Barlinek-Gorzów Landscape Park as a refugium of rare and endangered vascular plant species. Parki Narodowe i Rezerwaty Przyrody 27(2):3-18. (A list of rare and threatened plants occurring in Western Pomerania and in Poland includes *Cuscuta epithymum.*)

N'Guessan, J.D., Bidié, A.P., Lenta, B.N., Weniger, B., André, P. and Guédé-Guina, F. 2007. *In vitro* assays for bioactivity-guided isolation of antisalmonella and antioxidant compounds in *Thonningia sanguinea* flowers. African Journal of Biotechnology 6(14): 1685-1689. (The flowers of *T. sanguinea* are used traditionally to treat microbial diseases in W. Africa. Compounds thought to be responsible for activity were identified as brevifolin carboxylic acid and gallic acid.)

Nanni, B. and Ragozzino, E. 2007. (*Fusarium* for biological control of *Orobanche ramosa*.) (in Italian) Informatore Agrario 63(10): 92-93. (Noting the potential of *F. oxysporum*.)

*Naseri, M.K.G., Anvari, A. and Badavi, M. 2007. (Spasmolytic effect of *Cuscuta pentagona* fruit aqueous extract on rat ileum.) (in Persian) Scientific Journal of Kurdistan University of Medical Sciences 12(2): pe9-pe20, 2. http://www.muk.ac.ir (*C. pentagona* (Convolvulaceae) has been used in Iran for gastrointestinal disorders. Results suggest that its spasmolytic effects are mediated via calcium channels.)

Ndhlala, A.R., Muchuweti, M., Mupure, C., Chitindingu, K., Murenje, T., Kasiyamhuru, A. and Benhura, M.A. 2008. Phenolic content and profiles of selected wild fruits of Zimbabwe: *Ximenia caffra*, *Artobotrys brachypetalus* and *Syzygium cordatum.* International Journal of Food Science & Technology 43(8): 1333-1337. (*X. caffra* (Olacaceae) contained relatively high amounts of phenolics and flavanols.)

Nwanosike, M.R.O. 2005. Evaluation of mistletoes (*Tapinanthus* sp.) on the ornamental plants and trees in selected academic and research institutions in Zaria, Nigeria. Journal of Agriculture, Forestry and Social Sciences 3(2): 86-91. (*Dalbergia sissoo*, *Gmelina aborea*, *Khaya senegalensis*, *Thevetia nerrifoliea*, and *Azadirachta indica* were all severely infested with *Tapinanthus* sp. (and/or other spp.?). Some stands of *D. sissoo* were completely killed.)

Oakazaki, A. 2007. Study on parasite plants regarding loss of photosynthesis ability and mutant phytochrome. Kagaku to Seibutsu 45(10): 674-676. (Involving genetic analysis of phytochrome A in *Orobanche minor*.)

Oboh, I.E. and Nworgu, Z.A.M. 2008. Oxytocic properties of the aqueous extract of *Globimetula braunii* (Loranthaceae). Pakistan Journal of Pharmaceutical Sciences 21(4): 356-360. (The oxytocic effects measured in rats support the use of the leaves of *G. braunii* to hasten delivery in traditional medicine.)

Ollerton, J., Stott, A., Allnutt, E., Shove, S., Taylor, C. and Lamborn, E. 2007. Pollination niche overlap between a parasitic plant and its host. Oecologia 151(3): 473-485. (In the system *Orobanche elatior* and its host *Centaurea scabiosa*, the bumblebee *Bombus pascuorum* is a common pollinator, but there is no evidence for serious competition.)

Oluwaseun, A.A. and Ganiyu, O. 2008. Antioxidant properties of methanolic extracts of mistletoes (*Viscum album*) from cocoa and cashew trees in Nigeria. African Journal of Biotechnology 7(17): 3138-3142. (Suggesting useful antioxidant properties from mistletoes on cocoa and cashew. But certainly not *V. album* (does not occur in W. Africa) – perhaps a *Tapinanthus* sp.?)

Orr, A.G. 2008. Competition for larval food plant between *Delias argenthona* (Fabricius) and *Delias nigrina* (Fabricius) (Lepidoptera: Pieridae) in coastal wallum habitat in Southern Queensland. Australian Entomologist 35(1): 27-35. (Larvae of both *D. argenthona* and *D. nigrina* feed on the mistletoes *Dendrophthoe vitellina* and *Muellerina celastroides* but *Diplatia furcata* is utilised only by *D. argenthona*, and *Amyema congener* only by *D. nigrina*.)

Othira, J.O., Deng, A.L., Onek, L.A., Kemey, J. and Omolo, E.O. 2008. Potential application of *Hyptis spicigera* for biological control of *Striga hermonthica* infestation. African Journal of Agricultural Research 3(10): 747-752. (In trials in W. Kenya *S. hermonthica* emergence and seed-bank were reduced and maize yield increased by 50% following a *H. spicigera* fallow but simultaneous inter-cropping reduced maize yield.)

Parveen, Z., Deng YuLin, Saeed, M.K., Dai RongJi, Ahamad, W. and Yu YuHong, 2007. Antiinflammatory and analgesic activities of *Thesium chinense* Turcz extracts and its major flavonoids, kaempferol and kaempferol-3-*O*-glucoside. Yakugaku Zasshi = Journal of the Pharmaceutical Society of Japan 127(8): 1275-1279. (The ethyl acetate extract of *T. chinense* and the two flavonoids showed significant anti-inflammatory and analgesic activity, but the chloroform extract was inactive.)

Park JeongMi, Manen, J.F., Colwell, A.E. and Schneeweiss, G.M. 2008. A plastid gene phylogeny of the non-photosynthetic parasitic *Orobanche* (Orobanchaceae) and related genera. Journal of Plant Research 121(4): 365-376. (Analysis of the plastid gene *rps2* appears to be a good tool for resolving relationships within *Orobanche*, but less useful for related lineages. Over 70 taxa from Orobanchaceae are included in the analysis.)

Patil, V.L. and Angadi, S.S. 2008. Effect of management practices on *Striga* incidence, quality, yield and economics of sorghum. Plant Archives 8(1): 185-188. (Field trials in Karnataka, India, failed to show a benefit from farmyard manure in controlling *Striga*

(? *asiatica*), but a combination with 150 kg N/ha, and cowpea as a trap crop, gave highest net returns.)

Pattanayak, S. and Priyashree, S. 2008. Hepatoprotective activity of the leaf extracts from *Dendrophthoe falcata* (L.f) Ettingsh against carbon tetrachloride-induced toxicity in wistar albino rats. Pharmacognosy Magazine 4(15): 218-222. (Confirming that leaves of *D. falcata* possess potential hepatoprotective activity, apparently due to phenolic compounds and flavonoids, validating the traditional use of *D. falcata* for liver disorders.)

*Pettengill, J.B. and Neel, M.C. 2008. Phylogenetic patterns and conservation among North American members of the genus *Agalinis* (Orobanchaceae). BMC Evolutionary Biology 8(264): 26 Sep. 2008. (http://www.biomedcentral.com/1471-2148/8/264) (DNA studies suggest six main lineages in N. American species of *Agalinis*, most of which do not correspond to previously assumed groupings. The status of the endangered species *A. acuta* is particularly uncertain and requires further study.)

Piato, Â.L., Detanico, B.C., Jesus, J.F., Lhullier, F.L.R., Nunes, D.S. and Elisabetsky, E. 2008. Effects of Marapuama in the chronic mild stress model: further indication of antidepressant properties. Journal of Ethnopharmacology 118(2): 300-304. (The study supports the traditional claims, in the Amazon, for antidepressant properties for ethanol extracts from *Ptychopetalum olacoides* (Olacaceae) and additionally suggests that they prevent stress-induced HPA (hypothalamo-pituitary-adrenal axis) hyperactivity.)

Prider, J., Facelli, J.M., Watling, J. and Virtue, J. 2008. *Cytisus scoparius* plants infected by the native parasitic plant *Cassytha pubescens* have reduced growth and reproductive output. Proceedings of the 16th Australian Weeds Conference, Cairns Convention Centre, North Queensland, Australia, 18-22 May, 2008: 193. (Infection by *C. pubescens* prevents the expansion of leaf and flower buds and reduces fruiting by about 50%. Effects tended to be localised to the infected branches of the host.)

Qin, Xiaoqiong, Yang, SeungHuan, Kepsel, A.C., Schwartz, S.H. and Zeevaart, J.A.D. 2008. Evidence for abscisic acid biosynthesis in *Cuscuta reflexa*, a parasitic plant lacking neoxanthin. Plant Physiology 147: 816-822. (Confirming that isolated stem tips of *C. reflexa* accumulated ABA, and showing synthesis from 9-cis-violaxanthins and 9-cis-neoxanthins, via xanthoxin.)

Quested, H.M. 2008. Parasitic plants - impacts on nutrient cycling. Plant and Soil 311(1/2): 269-272. (Commenting on the paper by Ameloot *et al.* (see above) and noting that their results reinforce the need to include parasitic plants in community and ecosystem theory.)

Radwan, O., Gandhi, S., Heesacker, A., Whitaker, B., Taylor, C., Plocik, A., Kesseli, R., Kozik, A., Michelmore, R.W. and Knapp, S.J. 2008. Genetic diversity and genomic distribution of homologs encoding NBS-LRR disease resistance proteins in sunflower. Molecular Genetics and Genomics 280(2): 111-125. (Describing the nucleotide binding site (NBS) leucine-rich repeat (LRR) proteins found in sunflower and referring to their role in protection against biotic stresses, including parasitic plants (*Orobanche* spp.).)

Rani, K., Zwanenburg, B., Sugimoto, Y., Yoneyama, K. and Bouwmeester, H.J. 2008. Biosynthetic considerations could assist the structure elucidation of host plant produced rhizosphere signalling compounds (strigolactones) for arbuscular mycorrhizal fungi and parasitic plants. Plant Physiology and Biochemistry 46(7): 617-626. (Postulating structures for strigolactones that have been isolated but for which so far the structure has not been elucidated; also proposing structures of strigolactones that may be discovered in the future.)

Rocca, M.A. and Sazima, M. 2008. Ornithophilous canopy species in the Atlantic rain forest of southeastern Brazil. Journal of Field Ornithology 79(2): 130-137. (The flowers of *Psittacanthus dichrous* (Loranthaceae) are visited primarily by hummingbirds. Perching birds also visit the flowers, but destroy them.)

Rogers, Z.S., Nickrent, D.L. and Malécot, V. 2008. *Staufferia* and *Pilgerina*: two new endemic monotypic arborescent genera of Santalaceae from Madagascar. Annals of the Missouri Botanical Garden 95(2): 391-404. (Two new genera, *Staufferia* and *Pilgerina*, are described and illustrated, together with the features distinguishing them from *Okoubaka* and *Scleropyrum* respectively.)

Rojas, E.I., Herre, E.A., Mejía, L.C., Arnold, A.E., Chaverri, P. and Samuels, G.J. 2008. *Endomelanconiopsis*, a new anamorph genus in the Botryosphaeriaceae. Mycologia 100(5): 760-775. (A new genus of ascomycete isolated from leaves of cocoa and *Heisteria concinna* (Olacaceae) in Panama.)

Rubiales, D., Fernández-Aparicio, M., and Rodriguez, M.J. 2008. First report of crenate broomrape (*Orobanche crenata*) on lentil (*Lens culinaris*) and common vetch (*Vicia sativa*) in Salamanca Province, Spain. Plant Disease 92(9): 1368. (A first report of *O. crenata* from Central Spain.)

Sambuichi, R.H.R., de Oliveira, R.M., Mariano Neto, E., Thévenin, J.M.R., de Jesus Júnior, C.P., de Oliveira, R.L and Pelição, M.C. 2008. Conservation status of ten endemic trees from the Atlantic Forest in the south of Bahia-Brazil. Natureza & Conservação 6(1):

208-225. (Noting that *Acanthosyris paulo-alvinii* (Santalaceae) is classified as at critical risk.)

*Santos-Izquierdo, B. Pageau, K., Fer, A., Simier, P. and Robins, R.J. 2008. Targeted distribution of photo-assimilate in *Striga hermonthica* (Del.) Benth parasitic on *Sorghum bicolor* L. Phytochemistry Letters 1(2): 21 August 2008: 76-80. (via http://www.sciencedirect.com/science/journal/18743900) (Studies of $^{13}C/^{12}C$ isotope ratio confirm that *S. hermonthica* photo-assimilate is directed primarily towards the synthesis of new photosynthetic capacity.)

Sapkota, L. 2007. Ecology and management issues of *Mikania micrantha* in Chitwan National Park, Nepal. Banko Janakari 17(2): 27-39. (Noting that introduction of *Cuscuta reflexa* may be an appropriate measure for control of *M. micrantha*.)

Sarma, H., Sarma, C.M. and Bhattacharjya, D.K. 2008. Host specificity of *Cuscuta reflexa* Roxb. in the Manas Biosphere Reserve, Indo-Burma hotspot. International Journal of Plant Production 2(2): 175-180. (Noting ten host plants for *C. reflexa* with highest numbers in *Ziziphus mauritiana*.)

Seifert, G., Jesse, P., Laengler, A., Reindl, T., Lüth, M., Lobitz, S., Henze, G., Prokop, A. and Lode, H.N. 2008. Molecular mechanisms of mistletoe plant extract-induced apoptosis in acute lymphoblastic leukemia in vivo and in vitro. Cancer Letters 264(2): 218-228. (An extract of *V. album* from *Pinus* showed greater cytotoxicity than one from *Abies*, but both showed improved survival in an in vivo SCID-model of pre-B acute lymphoblastic leukemia (up to 55.4 days) in contrast to controls (34.6 days) without side effects.)

Slocum, M.G. and Mendelssohn, I.A. 2008. Effects of three stressors on vegetation in an oligohaline marsh. Freshwater Biology 53(9): 1783-1796. (Occurrence of *Cuscuta pentagona* (in Louisiana, USA) was favoured by herbicide application.)

Stefanovic, S. and Costea, M. 2008. Reticulate evolution in the parasitic genus *Cuscuta* (Convolvulaceae): over and over again. Botany 86(8): 791-808. (Presenting five cases of discordance between phylogenies derived from plastid and nuclear data, and interpreting them as results of five independent hybridization events. Including description of a new Mexican species – *C. liliputana*.)

Suetsugu, K., Kawakita, A. and Kato, M. 2008. Host range and selectivity of the hemiparasitic plant *Thesium chinense* (Santalaceae). Annals of Botany 102(1): 49-55. (*T. chinensis* has a wide host range, parasitizing 22 out of 38 species in the study, but with some apparent post-attachment preference for *Lespedeza juncea* and *Eragrostis curvula*.)

Sun WeiDong, Chen Fei and Sun Yun, 2008. The inhibiting effects of Herba Cistanche on begnin prostatic hyperplasia. Journal of Yangzhou University, Agricultural and Life Sciences Edition 29(3): 55-58. (Acteoside distilled from *Cistanche tubulosa* reduced the prostate gland fresh weight in the rat.)

Sun ZhongKui, Hans, J., Walter, M.H., Matusova, R., Beekwilder, J., Verstappen, F.W.A., Ming Zhao, van Echtelt, E., Strack, D., Bisseling, T. and Bouwmeester, H.J. 2008. Cloning and characterisation of a maize carotenoid cleavage dioxygenase (*ZmCCD1*) and its involvement in the biosynthesis of apocarotenoids with various roles in mutualistic and parasitic interactions. Planta 228(5): 789-801. (Noting that mycorrhization led to a decrease in germination of *Striga hermonthica* as examined in a bioassay.)

Surata, I.K. and Butarbutar, T. 2008. Shading system on sandalwood seedlings in Timor, East Nusa Tenggara, Indonesia. In: Harrison, S., Gregorio, N. and Herbohn, J. (eds) Small-scale Forestry 7(3/4): 311-318. (Comparing a range of shading and sheltering systems to improve seedling survival under conditions of high rainfall and low sunlight.)

Swarbrick, P.J., Huang, K., Liu, G., Slate, J., Press, M.C. and Scholes, J.D. 2008. Global patterns of gene expression in rice cultivars undergoing a susceptible or resistant interaction with the parasitic plant *Striga hermonthica*. New Phytologist 179(2): 515-529. (Resistant rice responded to parasitism as if to a microbial pathogen, with up-regulation of defence genes including pathogenesis-related proteins, pleiotropic drug resistance ABC transporters, genes involved in phenylpropanoid metabolism and WRKY transcription factors. Susceptible plants down-regulated gene expression associated with plant growth regulator signalling and metabolism, biogenesis of cellular components and cell division.)

Tang WanXia, Hioki, H., Harada, K., Kubo, M. and Fukuyama, Y. 2008. Clerodane diterpenoids with NGF-potentiating activity from *Ptychopetalum olacoides*. Journal of Natural Products 71(10): 1760-1763. (Four new compounds identified from the Brazilian plant *P. olacoides* (Olacaceae). A mixture of 2 of them, ptychonal hemiacetal and ptychonal exhibited neurite outgrowth-promoting activities on NGF-mediated PC12 cells.)

Taylor, B.R., Ferrier, J., Lauff, R. and Garbary, D.J. 2008. New distribution records for flowering plants in Antigonish County, Nova Scotia. Proceedings of the Nova Scotian Institute of Science 44(2): 109-123. (*Comandra umbellata* among the rare species discussed.)

Teferi Aregawi, Solomon Melaku and Lisanework Nigatu, 2008. Management and utilization of browse species as livestock feed in semi-arid district of North Ethiopia. Livestock Research for Rural

Development 20(6): 86. (*Ximenia americana* (Olacaceae) among 20 species studied.)

Tenpe, C.R., Upaganlawar, A.B., Khairnar, A.U. and Yeole, P.G. 2008. Antioxidant, antihyperlipidaemic and antidiabetic activity of *Dendrophthoe falcata* leaves - a preliminary study. Pharmacognosy Magazine 4(16(suppl.)): S182-S187. (An ethanol extract of *D. falcata* leaves possesses good antioxidant, antihyperlipidemic and antidiabetic activity.)

Tennant, D.J. 2008. Small cow-wheat *Melampyrum sylvaticum* L.; Scrophulariaceae in England. Watsonia 27(1): 23-36. (*M. sylvaticum* is a rare plant of Scotland, N. Ireland and N. England. Its distribution and ecology are discussed together with the reasons for its decline.)

Thiele, K.R., Wylie, S.J., Maccarone, L., Hollick, P. and McComb, J.A. 2008. *Pilostyles coccoidea* (Apodanthaceae), a new species from Western Australia described from morphological and molecular evidence. Nuytsia 18: 273-284. (Describing *P. coccoidea*, a holoparasitic plant, distinguished from the related *P. collina* and *P. hamiltonii* by morphological features of flowers and fruits.)

*Thorogood, C.J. and Hiscock, S.J. 2007. Host specificity in the parasitic plant *Cytinus hypocistis*. Research Letters in Ecology 2007: 84234. http://www.hindawi.com/GetPDF.aspx?doi=10.1155/2007/84234 (Studies in S. Portugal confirmed only 2 host species for *C. hypocystis*, *Halimium halimifolium* at 3 sites, and *Cistus monspeliensis* at one other where *H. halimifolium* did not occur.)

Thorogood, C.J., Rumsey, F.J., Harris, S.A. and Hiscock, S.J. 2008. Host-driven divergence in the parasitic plant *Orobanche minor* Sm. (Orobanchaceae). Molecular Ecology 17(19): 4289-4303. (Using ISSR and SCAR techniques to show distinct genetic differences between populations of *O. minor* parasitizing clover or wild carrot and concluding that host specificity may be an important driver of allopatric speciation in parasitic plants.)

Timus, A. and Croitoru, N. 2007. The state of tobacco culture in Republic Moldova and phytosanitary problems of tobacco production. Rasteniev'dni Nauki 44(3): 209-212. (*Orobanche ramosa* and *Cuscuta* spp. listed among the most harmful weeds. And noting some herbicide treatments that are used.)

Tomilov, A.A., Tomilova, N.B., Wroblewski, T., Michelmore, R. and Yoder, J.I. 2008. Trans-specific gene silencing between host and parasitic plants. Plant Journal 56(3): 389-397. (Host plants expressing a silencing gene construct for GUS transmit the silencing signal to *Triphysaria* and reduce GUS expression in the parasite near the point of attachment. The signal was also able to move from one host plant to another through a section of parasite root bridging the two hosts.)

Toshkova, T. 2007. (Broomrape - distribution, biology, control methods.) (in Bulgarian) Agricultural Science (Selskostopanska Nauka) 40(5): 11-20. (Geographical distribution, biology, hosts, economic importance, and control of *Orobanche* species are described, presumably for Bulgaria.)

Tosi, L. and Natalini, G. 2008. (Warning of orobanche on peas and beans.) (in Italian) Informatore Agrario 64(14): 70. (Infestations of *Orobanche rapum-genistae*, *O. crenata* and *O. minor* recorded in pea and bean (*Phaseolus vulgaris*) in Umbria in 2007. Some suppression achieved with olive residues and deep ploughing.)

Tóth, P., Tóthova, M. and Cagáň, L. 2008. Potential biological control agents of field bindweed, common teasel and field dodder from Slovakia. In: Julien, M.H., Sforza, R., Bon, M.C., Evans, H.C, Hatcher, P.E., Hinz, H.L. and Rector, B.G. (eds) Proceedings of the XII International Symposium on Biological Control of Weeds, La Grande Motte, France, 22-27 April, 2007:216-220. (*Smicronyx jungermanniae* (Curculionidae) was the principal natural enemy of *Cuscuta campestris* in Slovakia. Larvae induce stem galls, which prevent flowering and fruiting.)

Umehara, M. *et al.* 2008. Inhibition of shoot branching by new terpenoid plant hormones. Nature (London) 455(7210): 195-200. (Listed in Haustorium 53 as web-site only. Now published.)

Uščuplic, M., Treštic, T., Dautbašic, M. and Mujezinovic, O. 2008. (The influence of mistletoe (*Viscum album* ssp. *abietis* /Wiesb./ Abromeit) on the biomass of Silver fir (*Abies alba* Mill.) needles.) Radovi - Šumarski Institut Jastrebarsko 43(1): 31-38. (Silver fir in Bosnia-Hercegovina is seriously threatened by *V. album* ssp. *abietis*. High infestation reduced needle biomass and increased susceptibility to pathogens and pests.)

Vicas S.I., Prokisch, J. and Socaciu, C. 2007. Variation in antioxidant activity of fresh and dried leaves of *Viscum album* using automatic FRAP assay. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Agriculture 63/64: 367. (No abstract available.)

Vicas, S., Rugină, D. and Socaciu, C. 2008. Antioxidant activities of *Viscum album*'s leaves from various host trees. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Agriculture 65(1): 327-332. (*V. album* from 5 hosts in Romania, *Acer campestre*, *Malus domestica*, *Fraxinus excelsior*, *Populus nigra* and *Robinia pseudoacacia* were compared in vitro. That from *R. pseudoacacia* had the highest antioxidant activity, that from *P. nigra* the least, just under half.)

Vicas S.I. and Socaciu, C. 2007. The biological activity of European mistletoe (*Viscum album*) extracts and their pharmaceutical impact. Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Agriculture 63/64: 217-222. (Deducing that lectins and viscotoxins are not the only active components of *V. album* extracts. Also reviewing recent studies on the cytotoxic activity of mistletoe extracts on tumour cells, and the role of *V. album* in diabetes and hypertension.)

Vidal-Russell, R. and Nickrent, D.L. 2008. Evolutionary relationships in the showy mistletoe family (Loranthaceae). American Journal of Botany 9(8): 1015-1029. (The 3 relict root-parasitic genera, *Nuytsia*, *Atkinsonia* and *Gaiadendron* (with chromosome number x = 12) are supported as successive sister taxa to the remaining 70 genera which form a .monophyletic group of aerial parasites, divided into one clear sub-tribe Loranthinae (x = 9) and a more weakly supported Psittacanthinae (x = 8) containing the S. American *Tristerix* and *Notanthera* and the New Zealand genus *Tupeia*.)

Vijyata Kapoor and Sharma, Y.P. 2007. Host range, severity and intensity of *Cuscuta campestris* Yuncker infestations in Jammu Province of Jammu and Kashmir. Indian Journal of Weed Science 39(1/2): 146-148. (No abstract available.)

Vissoh, P.V., Gbèhounou, G., Ahanchédé, A., Röling, N.G. and Kuyper, T.W. 2008. Evaluation of integrated crop management strategies employed to cope with *Striga* infestation in permanent land use systems in southern Benin. International Journal of Pest Management 54(3): 197-206. (Reporting limited benefits from transplanting sorghum and from trap-crops for the control of *S. hermonthica* and *S. gesnerioides*, serious pests in S. Benin.)

Wada, H., Koyama, H., Takahashi, N. and Takahashi, A. 2006. Distribution of mistletoes (*Viscum album*) and site preference of seed-dispersing birds on canopy layer of pure stand of beech trees. Tohoku Journal of Forest Science 11(2): 97-101. (No abstract available.)

Wang Yan, Deng Min, Zhang ShuYan, Zhou ZheKun and Tian WeiXi, 2008. Parasitic loranthus from Loranthaceae rather than Viscaceae potently inhibits fatty acid synthase and reduces body weight in mice. Journal of Ethnopharmacology 118(3): 473-478. (Tests on mice showed the activity of extracts from 11 species of Loranthaceae was vastly greater than those from *Viscum articulatum* or *V. liquidambaricola* in inhibiting fatty acid synthesis, confirming the potential for *Taxillus chinensis* and other Loranthaceae in control of obesity.)

Wegge, P. and Kastdalen, L. 2008. Habitat and diet of young grouse broods: resource partitioning between Capercaillie (*Tetrao urogallus*) and Black Grouse (*Tetrao tetrix*) in boreal forests. Journal of Ornithology 149(2): 237-244. (*Melampyrum sylvaticum* is consumed by capercaillie, more than by black grouse (in Norway), associated with the occurrence of this species in the more insect-rich *Vaccinium* vegetation favoured by the capercaillie.)

Westbury, D.B. and Dunnett, N.P. 2008. The promotion of grassland forb abundance: a chemical or biological solution? Basic and Applied Ecology 9(6): 653-662. (Sowing *Rhinanthus minor* increased species richness to a greater extent than the application of the herbicide fluazifop-p-butyl.)

Westfall, J. and Ebata, T. 2007. 2007 summary of forest health conditions in British Columbia. B. C. Ministry of Forests and Range, Mackenzie Forest District. Pest Management Report Number 15: 72 pp. (Including reference to *Arceuthobium* spp.)

Wickett, N.J., Zhang, Y., Hansen, S.K., Roper, J.M., Kuehl, J.V., Plock, S.A., Wolf, P.G., de Pamphilis, C.W., Boore, J.L. and Goffinet, B. 2008. Functional gene losses occur with minimal size reduction in the plastid genome of the parasitic liverwort *Aneura mirabilis*. Molecular Biology and Evolution 25(2): 393-401. (*Aneura mirabilis* is a parasitic liverwort that exploits an existing mycorrhizal association between a basidiomycete and a host tree. It is the only known parasitic seedless land plant with a completely non-photosynthetic life history. The pattern of genome evolution is comparable with that in parasitic angiosperms but suggests that its plastid genome is in the early stages of decay following the relaxation of selection pressures.)

Williams, A.M., Secomb, N.M. and Virtue, J.G. 2008. Understanding the behaviour of dazomet in dryland broad acre field situations. Proceedings of the 16th Australian Weeds Conference, Cairns Convention Centre, North Queensland, Australia, 18-22 May, 2008: 339. (Reporting on a study to determine the lethal dose exposures required to kill seeds of *Orobanche ramosa*, not yet completed.)

Wölfle, U. 2008. (*Ximenia americana*.) (in German) Zeitschrift für Phytotherapie 29(3): 150-153. (Providing a detailed overview of *X. americana* (Olacaceae) and its uses in traditional medicine in Africa, due to its antibacterial and antiviral effects, and for its edible pulp.)

Woomer, P.L. and Savala, C.E.N. 2008. *Striga* Technology Extension Project (STEP): Long Rains 2008 Report. Forum for Organic Resource Management and Agricultural Technology. Nairobi, Kenya. 36 pp. (Describing the early results from a one-year project introducing large numbers of farms to the use of imazapyr-treated maize seed for control of *Striga hermonthica* in W. Kenya (see item on AATF above).

Wurochekke, A.U., Anthony, A.E. and Obidah, W. 2008. Biochemical effects on the liver and kidney of rats administered aqueous stem bark extract of *Xemenia americana*. African Journal of Biotechnology 7(16): 2777-2780. (Extracts of *Ximenia* (not *Xemenia*) *americana* (Olacaceae) apparently caused liver damage but did not affect kidneys.)

Yagame, T., Fukiharu, T., Yamato, M., Suzuki, A. and Iwase, K. 2008. Identification of a mycorrhizal fungus in *Epipogium roseum* (Orchidaceae) from morphological characteristics of basidiomata. Mycoscience 49(2): 147-151. (*Coprinellus disseminatus* (= *Coprinus disseminatus*) identified as mycobiont of the achlorophyllous *E. roseum*.)

Yang FuSheng, Li YuFei, Ding Xin and Wang XiaoQuan, 2008. Extensive population expansion of *Pedicularis longiflora* (Orobanchaceae) on the Qinghai-Tibetan Plateau and its correlation with the Quaternary climate change. Molecular Ecology 17(23): 5135-5145. (Studies of chloroplast DNA suggest that the southeast Tibetan plateau was either a refuge for *P. longiflora* during the Quaternary climatic change or is the place of origin of the species. The present wide distribution of the species has resulted from 'recent' population expansions dated back to 120,000-17,000 years ago.)

Yang JianXiong, Wang Yali, Bao Yu and Guo Juan, 2008. The total flavones from Semen cuscutae reverse the reduction of testosterone level and the expression of androgen receptor gene in kidney-yang deficient mice. Journal of Ethnopharmacology 119(1): 166-171. ('Semen cuscutae' almost certainly derived from seeds of *Cuscuta chinensis*.)

Yarnell, E. and Abascal, K. 2008. Holistic approaches to prostate cancer. Alternative and Complementary Therapies 14(4): 164-180. (Listing *Viscum album* extracts among many others with potential for the treatment of prostate cancer.)

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*Zhongkui Sun, Hans, J., Walter, M.H., Matusova, R., Beekwilder, J., Verstappen, F.W.A., Zhao Ming and Bouwmeester, H.J. 2008. Cloning and characterisation of a maize carotenoid cleavage dioxygenase (*ZmCCD1*) and its involvement in the biosynthesis of apocarotenoids with various roles in mutualistic and parasitic interactions. Planta 2 DOI 10.1007/s00425-008-0781-6 (http://www.springerlink.com/content/048m047j71486972/fulltext.pdf) (CCD1 expression was increased in response to root colonization by arbuscular mycorrhizal fungi, but is not considered to be part of the pathway leading to strigolactone synthesis.)

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