HAUSTORIUM

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MESSAGE FROM THE IPPS PRESIDENT

Dear IPPS members,

I hope you have had a good summer.

The WCPP-15 meeting took place in Amsterdam, the Netherlands, from the 30th June to 5th July. Over 110 participants attended the meeting from different parts the world. The meeting was excellent both scientifically and socially; both the location and the weather were beautiful! I would like to thank Harro Bouwmeester and his team for their hospitality, their hard work and excellent organisation, before and during the meeting, which made it a great success.
I would also like to thank the scientific committee and the session organisers for their input into the scientific programme and the organisation of the individual sessions. We had excellent keynote, oral and poster presentations as described by Lytton Musselman and Nick Flanders in their meeting report below. I would particularly like to congratulate the students and young scientists on the exciting work they are doing.

I would like to update everyone on the proposed changes to the IPPS website and structure of the IPPS Executive Committee. As Harro and I explained at the end of the Congress, we would like to update and modernize the IPPS website so that it better serves the members of the Society. The new website will be more interactive and incorporate the websites for the biennial WCPP congresses within its structure. The website will also have a page for the societiy's newsletter, Haustorium. Harro is currently exploring the possibility of employing the WCPP_15 website designer, to design the new structure of the IPPS website.

As part of these changes the role of the Editor and Members at Large will change. The Editor will have overall responsibility for the content and structure of the website, helped by the Members at Large. In addition to the current Member at Large (Prof Airong Li) a second Member at Large will be elected to help with the website and will also help Chris Parker put together Haustorium. At the conference we asked for nominations for the position of Editor and the new Member at Large. I am delighted to announce that Professor Susann Wicke has kindly agreed to take on the position of Editor. Susann is currently a Group Leader in Plant Evolutionary Genomics at the University of Munster and will bring a great deal of expertise to the Editor position. I have received two nominations for the new Member at Large position and I will shortly,via e-mail, organise the election for this position.

With very best wishes,

Julie

Julie Scholes, IPPS President
(j.scholes@sheffield.ac.uk)

THE FUTURE OF HAUSTORIUM

N.B. LITERATURE -Therapeutic uses. Chris Parker intends to continue assembling the Literature section with the help of colleagues. However he would like to reduce the work load by including only exceptionally interesting items on therapeutic uses.These amount to up to one third of all the items covered, yet he is not aware of any active interest in these. **If anyone is really interested in these and/or wishes to help by covering them we could discuss how they access the relevant sources.**

MEETING REPORT

15th World Congress on Parasitic Plants. Amsterdam, the Netherlands, 30th June – 5th July.

I believe I was the only one at this congress who attended the first symposium on parasitic plants held in Malta in 1973 and organized by Chris Parker and the European Weed Research Council. With the perspective of the resident fossil, I was pleased to see the large number of young scientists eloquently displaying their research prowess. This bodes well for the future of our discipline. No doubt the availability of numerous financial awards encouraged the participation of early career scientists.

The progress made since Malta in understanding how parasitic plants function is astounding. Papers presented at the meeting in Amsterdam had enormous explanatory power that drew heavily upon the extensive genetic and genomic data created during the past decade.

Compared to earlier meetings there was more emphasis on *Cuscuta* and fewer presentations in posters and papers on mistletoes, Balanophoraceae, Rafflesiaceae, Santalalean families, and nothing on *Cassytha*. But the data presented and the methods used have potential to answer questions in those groups.

This congress grew out of a series of earlier symposia where a major emphasis was on parasitic weeds of agricultural importance, especially *Striga* in Africa and *Orobanche* in the Middle East. Control of these devastating weeds was an overarching concern at those meetings. So the question can be asked, How has a more complete understanding of parasitic behavior, especially the elegant communication between host and parasite, affected the small holder farmer. In my view not much, an opinion shared by several colleagues at the meeting. The witchweed problem in Africa, for example, seems little mitigated since I lived in Sudan in the early 1980's. Perhaps we need to devote time at the next congress to address the relationship of research to control.

The organization of the congress was superb. The selection and vetting of speakers ensured quality presentations with session chairs selected for their expertise evident in the way questions and discussions were handled. The quality of the papers was attested by the fact that almost all congress registrants were present at every session.

Posters were an important part of the congress. Ample, dedicated time was devoted to viewing the posters with the authors present. The poster sessions immediately followed the paper presentations ensuring good participation. Like similar meetings, one of the most important aspects was plenty of time for personal interaction.

Grateful thanks are due the organizing and scientific committees and especially to our Dutch hosts. Their efforts in the selection of the venue, arrangements for meals, coffee breaks, drinks at the poster sessions, projection quality, and all the other details requisite for a smooth running and profitable congress are commendable and much appreciated.

Lytton John Musselman,
Old Dominion University, Norfolk, Virginia 23529-0266 USA

Oral presentations:

NB Full authorship – and abstracts – will be found at: https://www.wcpp2019.org/wp-content/uploads/2019/07/WCPP2019_Conference_book_final.pdf

Host Plant Resistance

Jianqiang Wu – 'The parasite *Cuscuta australis* with a streamlined genome mediates inter-plant systemic signals.'
Herbivory defense signals are transferred between plants by *C. australis*, even plants in different families; signals between hosts = ecological benefit of parasite. Also signals for N uptake and N itself moved through dodder from N rich host to N poor host. This *Cuscuta* species coordinates flowering with host species flowering

Michael Axtell - '*Cuscuta* microRNAs target host mRNAs involved in defence and vascular function.'
Regulatory RNAs are transported from *C. campestris* to host; microRNAs from *Cuscuta* target host mRNAs, down-regulating host mRNAs, helping the parasite. mRNA targets in the host help with resistance to *Cuscuta*, for instance clotting phloem at wound. Genome of *Cuscuta* with host genes that include introns confirms horizontal gene transfer; microRNAs transported by *Cuscuta* could come from host genes. Variation in microRNAs of *Cuscuta* match variation among mRNAs of different host species to ensure match; portions of host mRNAs that are conserved across host species thus conserved in *Cuscuta.*

Koh Aoki – 'Interspecific long-distance movement of *Cuscuta* small RNAs control biological processes in host-parasitic plant complex.'
Small RNA's from *Cuscuta* move long distance in the host (to apex); small RNAs from host move long distances in *Cuscuta* (*C. japonica* and *C. campestris.)*

Markus Albert – 'A peptide motif of a parasitic plant cell wall protein is recognized by the receptor protein CuRe1 and induces defence in tomato.'
Solanum lycopersicum resistant to *Cuscuta reflexa* with insurmountable epidermis but not *S. pennellii; S. lycopersicum* with receptor for *Cuscuta* factor (a peptide), *S. pennellii* without receptor. This molecular signal is only responsible for partial resistance

Neelima Sinha – 'Molecular basis for tomato resistance to the parasitic plant *Cuscuta*.'

Transcriptome of *Cuscuta campestris* during pre-haustoria phase prompts hydrolase activity, penetration of stem. Host-induced gene silencing due to small RNA from host into *Cuscuta*; must have initial parasitism for *Cuscuta* to receive RNA from host, then subsequent haustoria are decreased. In resistant strains of tomato, after parasite detection, lignin genes are upregulated and cortical cell walls become lignified. Virus-based gene expression used in susceptible strain so cortex becomes lignified.

Dana Sisou – 'Characterization of resistance to sunflower broomrape (*Orobanche cumana W*[sic].) insunflower (*Helianthus annuus* L.).'
Possible sunflower resistance mechanisms to *O. cumana*: 1) no root stimulant to cause germination; 2) prevention of the development of haustoria; 3) blocking nutrient flow to the parasit*e* or poisoning it. Grafting experiment to show resistance in sunflower resistant variety EMEK3 is exclusive to root tissue. Lignification in host prevents penetration; *O. cumana* seeds germinate so resistance is pre-haustorial.

Stephane Munos and Begoña Pérez-Vich – 'International consortium on sunflower broomrape resistance.'
Proposing the creation of an international group to study sunflower broomrape. Goals: to classify and standardize races for international use; develop seed bank for different populations and assess molecular diversity; characterize molecular interactions between parasite and host; 4-year long project with partners around the world.

Ecology, Phylogeny, and Evolution

Susan Wicke – 'Eco-evolutionary causes and consequences of parasitism in plants.'
How does evolution of plastome reduction occur?
Recreate ancestral genome and search for genes lost in a non-random way; transition to obligate parasitism from facultative leads to most molecular evolution. Evidence for DNA transfer in nuclear genome in Orobanchaceae. 2000 species in Orobanchaceae but only 30 species weedy, why these? Data gathered on ecology, geography, and hosts: before weediness, host switching and switching to rapid life history. Multiple transitions to weediness withinin *Phelipanche*. Possibly the opposite in *Striga* (non-weeds arising from weedy sp.).

Claude dePamphilis – 'Novel genetic code and record-setting AT-richness in the highly reduced plastid genome of the holoparasitic plant *Balanophora.*'
Holoparasites: reduction in plastome without chlorophyll, plastome possibly lost in *Rafflesia*
4 critical genes in plastome – if they are transferred or lost, plastome would be lost.
Balanophora plastome with accelerated evolution + with extreme bias towards AT codons resulting in lots of stop codons but genes still transcribed; stop codons read as sense codons here? If genes with novel code were transferred to nuclear genome, they would not be transcribed making plastome non-removable.

Airong Li - 'A neglected alliance in battles against parasitic plants: AM and rhizobial symbioses alleviate damage to a legume host by root hemiparasitic *Pedicularis* species.'
Parasitic plant can give non-host an advantage when competing with host species. Soil microbes help host plant achieve a more stable system, leading to more diversity? Field-level experiments with parasite + soil microbe removals: interactions between effects of parasites + microbes, e.g. if stressed for N due to *Pedicularis*, N-requiring AM fungi addition does not help host as much as addition in absence of parasite.

Peter Toth - 'When the same is not the same.'
Phenotypic variation in volatile organic compounds (VOC's) in *Orobanche flava* across different habitats in response to different pollinators?
In habitat with only fly pollinators, VOC's resemble aphids to attract flies?

Luyang Hu - 'Genetic diversity of *Orobanche cumana* (sunflower broomrape) populations at the world level revealed by SSR markers.'
Analyzed genetic diversity in *O. cumana* across Europe and Asia: E. China with highest genetic diversity, either due to species originating there or faster evolution there.

Lammert Bastiaans – 'Facultative parasitism: an evolutionary precursor of complete parasitism or an effective strategy in its own right?'
Facultative parasitism: habit representing transition to obligate parasitism, or superior strategy offering greater flexibility?
Rhamphicarpa with higher seed bank turnover than obligate, but produces more seeds when attached to a host. Simulation study of equilibrium seed bank density: facultative better strategy than obligate with high seed mortality and low host plant abundance

Renate Wesselingh – *'*Fitness of reciprocal F1 hybrids between *Rhinanthus minor* and *R. major.'*

Over time in mixed populations of *Rhinanthus major* and *R. minor,* most hybrids more like *R. majo.* Pollinator preference? Planted F1 hybrids and examined emergence rate; hybrid strain with poor germination in lab with equal emergence rate to other hybrids, why?

Genes

Kirsten Krause - '*Cuscuta campestris*: A plant genome under the influence of a parasitic lifestyle.
Cuscuta campestris has reduced CO_2 fixation, few stomata, uses recycled C instead of atmospheric? How is photosynthesis possible with RNA polymerase gene lost from plastid genome in *Cuscuta*? Protein transport from nucleus to plastid. Knocking out genes in *Arabidopsis* that have been lost in *Cuscuta* plastome allow functional photosynthesis but slower. Yellow color in *Cuscuta* are from carotenoids, provinding protection in high light environments?

Satoko Yoshida – 'Genetic basis for host and parasitic plant communication.'
Striga asiatica genome: some gene families such as photosynthesis contracted but not lost; other families such as water transport, strigolactone receptors expanded/duplicated. Transcriptomics: lateral root development in *Arabidopsis* similar to haustorium development in *Striga.*
Facultative *Phtheirospermum* has similar genes enriched as *Striga;* mutants with genes knocked out form fewer haustoria, not sure which genes yet.

Daniel Steele – 'Exploring the evolutionary origin of haustorium development in root parasitic plants.'
Transcriptomics across haustorial development phases to identify genes involved in haustorium development in *Triphysaria versicolor.* Mapped promoter for regulation of these genes on phylogeny Found multiple hemiparasites in Orobanchaceae with promoter but not as much up-regulation in non-parasitic *Lindenbergia.*

Elizabeth Kelly- 'Where the action is: gene expression at the parasite-host interface.'
Comparing, in *Triphysaria versicolor, Striga hermonthica* and *Phelipanche aegyptiaca,* gene expression in the parasite body, interface, and host body, distinct gene expression profiles in each tissue. Parasite tissues have upregulation of genes involved with cell wall, water transport, proteases, vs. host tissues with up-regulation of genes involved with water transport and stress. Some defense genes down-regulated in host, why? Controlled by parasite? Parasite transcripts in host and host transcripts in parasite.

Claude dePamphilis – 'Convergent horizontal gene transfer and crosstalk of mobile nucleic acids in parasitic plants.'
Has horizontal gene transfer contributed to genes up-regulated in haustoria?. Identified HGT genes using gene trees; HGT genes expressed in haustoria approx. half of the time. Mobile RNAs in *Cuscuta campestris* from HGT? Yes, including genes for defense and cell wall modification. No HGTs from Poales in *Cuscuta*, but yes in *Striga.* HGT was transfer of DNA not RNA as introns included. HGTs interacting with small RNAs more than random genes, function as silencers of host defense?

James Bradley – 'The identification of candidate pathogenicity-related genes from the genome of *Striga hermonthica.'*
Genes identified that allow *Striga* to overcome resistance in resistant strains of rice. Comparing proteins secreted by *Striga* and not by *Mimulus* to identify pathogenicity-related genes. Transcriptomics across life cycle of *Striga* on rice to identify upregulated genes, including those involved with cell wall modification.

Benjamin Anderson – 'Lack of evidence for horizontally transferred genes in mitochondria of *Cuscuta* species.'
Parasites good candidates for HGT making it easy to identify as distantly related to host. Lots of HGT in mitochondria of *Rafflesia*, but not in mitochondria of *Cuscuta.*

Molecules and Biochemistry

Tadao Asami – 'Chemicals that control *Striga* germination.'
Discussing control of *Striga* using strigolactone inhibitors in host, suicidal germination with synthetic strigolactones (such as ethylene mimics), or strigolactone receptor inhibitors. Host mutants with strigolactone inhibitors developed which show little change in host morphology.

Shelley Lumba - 'Signaling pathways in *Striga hermonthica* germination.'
Testing genes for strigolactone receptors by putting in *Arabidopsis* mutants with germination defect to see if SLs rescue mutants and allow germination (assay). Construct protein similar to that transcribed by candidate gene → on phylogeny protein in parasites and not elsewhere.

Salim Al-Babili – 'Complementary hormone-based approaches for *Striga* control.'
Developing chemicals to mimic strigolatones to induce suicidal germination of *Striga* seeds but not affect host. Developing chemicals to down-

regulate SL synthesis by host that also promote host growth.

Yuichiro Tsuchiya – 'A femto-molar range suicide germination stimulant for the parasitic plant *Striga hermonthica'.*
Synthetic strigolactone must act only on *Striga* as natural SLs attract AM fungi to increase P uptake; must understand SL receptors on *Striga* to optimize selectivity of synthetic SL. Testing chemical that is cheap, active, and *Striga*-specific in field in Kenya.

Amir Arellano Sab – 'Structural and biochemical characterization of strigolactone parasitic receptors, understanding their functionality and how to inhibit them.'
Striga with multiple strigolactone receptors: get structures; look at dynamics; make less sensitive structure more sensitive. Shows we can design *Striga* specific germination inhibitors.

Atsushi Okazawa - 'Identification and characterization of α-galactosidase capable of hydrolyzing planteose in *Orobanche minor* as a target for control of root parasitic weeds.'
Can we target metabolism of planteose, used during germination of *Orobanche minor,* for control? Screening enzyme inhibitors for effect on *O. minor* germination gave some compounds which reduce radicle elongation.

Jean-Bernard Pouvreau – 'Cannalactone: a new non-canonical strigolactone exuded by *Cannabis sativa* roots with a pivotal role in host specialization within French broomrape (*Phelipanche ramosa*) populations.'
Which stimulant from hemp required by *Phelipanche ramosa* to germinate? New strigolactone exuded by hemp called cannalactone described.

Control and Management

Damaris Odeny – 'Striga research on finger millet: protocols, GWAS and RNA sequencing.'
Genotyped finger millet populations with 20K SNPs; looking at transcriptomics across *Striga* attachment and penetration in petri dish showing the upregulated genes include those involved in cell wall modification.

Hanan Eizenberg – 'Parasitic weed management – opportunities and challenges.'
Multiple control methods needed with new infestations,. Here focus on control using herbicides. New technologies for mapping infections post-emergence to be used in predicting control areas for subsequent years. Hyperspectral detection for pre-emergence detection based on changes in host leaf; optimized protocol for pre- and post-emergence control with herbicides.

Binne Zwanenburg – 'Advances in parasitic weed control in the field'.
Natural stigolactone structure too complex/expensive to be used in weed control; need synthetic mimics that degrade in soil quickly as natural SLs do . Critical to time crop planting after suicidal germination of parasite. Alternative option to suicidal germination: use borax/thiourea to remove natural SLs from soil and reduce parasite germination.

Jonathan Gressel - Correctly multi-targeted Host-Induced Gene Silencing (HIGS) should allow full and sustainable control of parasitic weeds.'
Using Host-induced Gene Silencing with small interfering RNA's targeting genes expressed at the parasite-host interface promising. Target multiple sites to delay resistance; trans-genic but no new proteins made; also expressed only in roots.

Boubacar Kountche – 'Realizing the suicidal germination strategy to control *Striga hermonthica* in rain-fed agriculture of sub-Saharan Africa.'
Developed strigolactone analogs to induce suicidal germination in *Striga* to be used in rain-fed agriculture of sub-saharan Africa. Field trials reduced *Striga* seed bank and did not affect AM fungi, Need to optimize application timing.

Jonne Rodenburg – 'How do fertilisers affect the facultative parasitic weed *Rhamphicarpa fistulosa* ?'
Control of facultative parasite *R. fistulosa* includes herbicide, hand-weeding, use of resistant rice varieties, early sowing of rice. Could fertilizer help in the *Rhamphicarpa*/rice system as in *Striga* control?
Pot and field trials to look at effects of fertilizer on rice growth with or without parasite and on *parasite* growth with or without host. Fertilizer overall helps rice and *parasite* when grown together, but interaction exists: rice with fertilizer and parasite does worse than rice with fertilizer alone. Over time, *R. fistulosa* infestation may increase with fertilizer with more capsules produced each year.

Evgenia Dor – 'Development of chickpea (*Cicer arietinum* L.) mutant resistant to imidazolinone herbicides for broomrape management.'
Developed chickpea line resistant to herbicide used to control broomrapes – *Orobanche crenata* and *Phelipanche aegyptiaca*; mutant not resistant to other herbicides. Testing with heterozygotes showed resistance is semi-dominant trait.

Parasitic Plant Biology

Julie Scholes – 'Understanding the arms race: host resistance and parasite virulence in the *Striga* - cereal interaction.'
Striga hermonthica on rice: how does parasite overcome resistance? What about post-attachment defenses? *Striga* ecotypes vary in virulence; also need to study genes in resistant rice lines. Infect rice cultivars with *Striga* seedlings in rhizotron and collect parasite seedlings post-attachment. Look at transcription during attachment in host to identify candidate defense genes then use RNAi to test candidate genes by knocking them out in mutants + infecting with *Striga.* After RNAi, *Striga* biomass increases on mutant rice; but likely other genes involved in defense. Some *Striga* infections even with resistant lines. Identify genes involved in virulence: collect *Striga* seedlings that vary in virulence after growing on rice hence identify candidate genes based on big difference in allele frequency between *Striga* ecotypes. Some SNP differences non-synonymous, effecting genes for receptors, cell wall, proteases.

Jakub Tesitel – 'Native parasitic plants: a solution of plant invasions worldwide?'
Problem of alien plant invasions, also native plants invading natural communities to detriment of biodiversity. Traits of worst invaders: tall plants, clonal, N-fixing. Among different control measures: biotic resistance - generalist enemy native to area that invader is impacting. Parasitic plant as biotic resistance. Generalist parasite should have stronger negative effect on invader than on native hosts to restore competitive balance. A few examples presented across world, including *Rhinanthus* to help control *Calamagrostis* in grasslands of central Europe. Most suitable - root hemiparasites, parasitic vines, mistletoes

Pradeepa Bandaranayake 'Transcriptomics to farmer field: a system biology approach for commercializing root parasitic *Santalum album* (sandalwood).'
S. album in silviculture: fertilizer not needed, grows on marginal lands. Not popular in agriculture due to variation in yield, slow growth, and germination problems. Optimized seed germination and genotyped superior oil producing lines + optimized tissue culture of superior genotypes. Tested hosts for early growth, long term need to find optimal woody host.

Guilin Chen – 'Reproductive biology and pollination of *Cynomorium songaricum* (Cynomoriaceae).'
C. songaricum of conservation concern. Mesh bag experiment showed insects responsible for most pollination, with most common pollinators determined to be from Diptera. Inflorescences increase in temperature to increase volatility of fly-attracting chemicals.

Yaxin Wang – '*Triphysaria* controls vegetative self-recognition by restricting release of HIFs in roots.'
Triphysaria with self-recognition: root exudates from *Triphysaria* do not induce haustoria ; need to understand self-recognition to engineer crop plants invisible to parasitic weeds. Showed experimentally that exudate from *T*. roots does not inhibit germination. Need to know genes that produce host inducing factor, possibly DMPQ, to see if over-expressed in hosts.

Mamadou Cissoko – 'Analysis of genetic variation in pre and post attachment resistance mechanisms in maize inbred lines to the parasitic weed *Striga hermonthica*; implications for control.'
Need to determine mechanism underlying maize resistance to *Striga*, including post-attachment defense. Post-attachment resistance in maize lines - *Striga* blocked in cortex. Variation in amount of strigolactone in root exudate from different maize lines. Variation in germination rate of *Striga* with root exudate from different maize lines but not correlated with SL%, need to identify SL's most correlated with *Striga* germination.

Desalegn Etalo – 'Impact of the soil microbiome on *Striga* -sorghum interaction.'
Does soil microbiome provide *Striga* suppression? Screening soil types from W. Europe for *Striga* activity gives large variation, due to microbes? Removing microbes using radiation leads to increase in *Striga.* What is mechanism for anti-*Striga* effect of soil microbes? Bacterial volatiles reduce *Striga* germination in presence of GR24; some fungi infect *Striga.* Microbiome as part of Integrated Management.

Parasitic Plant- Host Interaction

Mike Timko – 'War and peace – the molecular dynamics of compatible and incompatible *Striga* -host plant associations.'
Heritable sources of monogenic resistance in dicot cowpea-*Striga* system; also genetic

variation in *S. gesneriodides* infecting cowpea. Identified genes for resistance in cowpea using SSR's and SNPs across susceptible and resistant varieties showed 1 gene similar to more general defense gene, but is it responsible for resistance? RNAi to silence gene in resistant race - now susceptible. Overexpressed gene in susceptible race - now resistant. What is nature of resistance response? Look at gene expression across attack by *Striga* in resistant vs. susceptible cowpea. Incompatible interaction: host root tissue killed off followed by cell wall construction later. Compatible: down-regulation of genes used by resistant strain; turned off by parasite?Whether to elicit or to suppress hypersensitive response in host, parasite must communicate with host. Look for differentially expressed genes between virulent and not virulent *Striga* strains and use structural criteria to identify genes likely responsible for transported molecules. Found gene similar to cowpea gene and showed it is used by *Striga* to suppress defensive response in host by applying to resistant cowpea to make susceptible. Multiple molecules involved in signaling response/lack of response

Thomas Spallek – 'What model plants can tell us about parasitic plants.'
Studied genes expressed in *Phtheirospermum* early in haustorial development following cytokinin transfer to induce hypertrophy; genes identified using CRISPR mutants. Mutant hosts without hypertrophy had more haustorial attachments from *Phtheirospermum*; hypertrophy function here may be increasing sink for nutrients/water from parasite to host. Next - investigate size variation in *Phtheirospermum*, maybe xylem bridges w/o parasitism?

James Westwood – 'Message received: Evidence for translation of mobile mRNAs in *Cuscuta* -host interactions.'
Are mRNA's transferred from host to parasite as food, for information, or both? Detected host proteins in parasite and vice versa; movement of large, membrane-associated proteins certainly as mRNA. *Arabidopsis* mutants for genes of proteins transported by *Cuscuta* in hosts affected in signaling pathway for defense mechanism hence *Cuscuta* manipulating host with small molecule transfer likely.

Songkui Cui - 'The roles and functions of lignin in parasitic plant-host interaction.'
Lignins as haustorium-inducing factor (HIF): shown for *Striga* + *Phtheirospermum*; *Arabidopsis* mutants without lignin HIF had reduced parasitism, but not completely resistant. Lignins as resistance: resistant rice varieties with more lignin; remove ability to make lignin and susceptible rice strain now resistant. Tagged lignins shown to be taken in by parasite, used for strength as driving force for invasion by haustoria?

Min-Yao Jhu – 'A receptor and pathways discovered in the lignin-based resistance to *Cuscuta campestris* in Heinz hybrid tomato cultivars.'
Used RNAseq to identify few genes involved in tomato resistance to *C. campestris.* 2 genes upregulated using virus-based gene expression hence increase lignin. Other genes for resistance apparently used to detect parasite identified using CRISPR mutants.

Estelle Billard – 'Cytokinins act as signaling molecules within the rhizosphere to trigger haustorium formation in the holoparasitic plant *Phelipanche ramosa'*
For holoparasites like *Phelipanche ramosa* what is haustorial intitiation factor? Germinate with GR24 and add host + get haustoria, but what is the factor? Cytokinins induce haustoria, but are they from host or soil microbes? *Arabidopsis* mutant without cytokinin production shows less haustoria from *P. ramose.* But what is role of soil microbes? Cytokinins used to attract mycorrhizae.

Luiza Teixeira-Costa – 'Striking vegetative developmental convergence in endoparasitic angiosperms.'
Endoparasitic habit now thought to have evolved independently in 4 lineages, morphological and anatomical examples of convergence shown here. Development: parasites get bigger after penetrating host xylem through rays, and establishment with xylem only with onset of flowering; host vessels diverging toward parasite flowers possibly due to reverse flux of auxins from parasite to host. Phloem-phloem connections in 2 of 4 lineages.

Posters

Abera, S. – 'Deciphering the sorghum root microbiome for *Striga*-suppressive bacteria.'

Adewale, S. – 'Genome-wide association analysis of *Striga* resistance in early maturing tropical maize. inbred lines.'

Bellis, E.S. – 'Adaptation of sorghum landraces across gradients of *Striga hermonthica* occurrence.'

Bernal-Galeano, V. – '*Cuscuta campestris*: Transformation and other tools for parasitic plant research.'

Blanco-Ania, D. – 'Hybrid-type strigolactone analogues and mimics derived from auxins.'

Ceccantini, G. – 'Unfitting pipes! Patterns of connection between mistletoes and their hosts: anatomical and hydraulic consequences for angiosperms parasitizing conifers.'

Chabaud, M. 'Phenotyping of early stages of wild Helianthus species/ *Orobanche cumana* interaction towards the identification of new resistances.'

Cvejić, S. – 'Breeding strategies for *Orobanche cumana* resistance in sunflower.'

Denysenko- Bennett , M. – 'Duplicative horizontal gene transfer of mitochondrial atp8 gene observed in *Cistanche armena* (Orobanchaceae).'

Dor, E. – 'Development of chickpea (*Cicer arietinum L.*) mutant resistant to imidazolinone herbicides for broomrape management.'

Edlund, M. – 'How do shifts in parasitism affect chloroplast genomes in the Santalales?'

Emran, S. – 'Metabolic and biochemical aspects of interaction between species of carrots to root parasite.'

Feng, Y. – 'Holoparasitism breaks the evolutionary stasis of mitochondrial genome evolution in Orobanchaceae.'

Fischer, K. – 'Element distribution at *Cuscuta*/host infection sites suggests the existence of selective mineral transport barriers.'

Flanders, N. – 'Effects of environmental conditions on survival of a bird-dispersed mistletoe, *Phoradendron leucarpum.'*

Gedil, M. – 'Identification of differentially expressed genes associated with tolerance to *Striga hermonthica* in tropical maize inbred lines.'

Haider, I. – 'Structural basis for specific inhibition of the highly sensitive ShHTL7 receptor.'

Hudzik, C. – 'Uncovering how and when *Cuscuta campestris r*ecognizes a host to produce inter-species miRNAs.'

Imarhiagbe, O. – 'Studies on *Thonningia sanguinea Vahl.* (Balanophoraceae) in Southern Nigeria: I. Range and host preference.'

Imarhiagbe, O. – 'Studies on *Thonningia sanguinea Vahl*. (Balanophoraceae): II. Reproductive phenology, sex ratio and insect pollinators at the Okomu National Park, Southern Nigeria.'

Imarhiagbe, O. – 'Studies on *Thonningia sanguinea Vahl*. (Balanophoraceae) in Southern Nigeria: III. Distribution, habitat characteristics and phytosociology.'

Imarhiagbe, O. – 'Studies on *Thonningia sanguinea Vahl*. (Balanophoraceae) In Southern Nigeria: IV. Patterns of genetic diversity and population structure within and between populations.'

Imerovski, I. – ' Validation of broomrape resistance QTLs in sunflower line HA-267.'

Jamil, M. – 'A new generation of methyl phenlactonoate strigolacatone analogs with high efficiency and simple structure.'

Jhu, M-Y. – 'A receptor and pathways discovered in the lignin-based resistance to *Cuscuta campestris* in Heinz hybrid tomato cultivars.'

Johnson, N. – 'Sequence divergence among trans-species small RNAs in parasitic plant genus Cuscuta compensates for target-site diversity in hosts.'

Kibet, W. – 'Finding a good decoy for *Striga hermonthica* suicidal germination.'

Kokla, A. – 'The role of hormones in parasitic plant infection.'

Krasylenko, I. – ' Plant-to-plant interactions: cytoskeleton of stem and root parasitic plants.'

Kunguni, J.S. – 'Natural resistance to witchweed in cultivated and wild finger millet accessions.'

Li, C. – 'Elucidating strigolactone biosynthesis in *Zea may*s (maize).'

Libiakova, D. – 'Transformation and regeneration protocol of parasitic plant *Phelipanche ramosa.'*

Lyko, P. – 'Trophic specialization and host-related diversification in the Broomrape family (Orobanchaceae).'

Lyko, P. – 'Genome sequencing of branched broomrape and reconstruction of the evolutionary history of the *Phelipanche ramosa/P. aegyptiaca* species complex.'

Mirzaei, K. – ' Does introgression between two parasitic plants have local adaptation advantages for their offspring?.'

Mitiku, K. – 'Molecular detection of the *Striga* seedbank in Ethiopian soils.'

Park, S-Y. - 'Ethylene-mediated host responses increase resistance to *Phelipanche aegyptiaca.'*

Park, S-Y. – *'Cuscuta campestris* Jasmonate-Induced Protein 23 (CcJIP23) is a functional mobile protein.'

Park, S-Y. – 'Message received: evidence for translation of mobile mRNAs in *Cuscuta*-host interactions.'

Phon-or, N. – ' Identification and characterization of QTL underlying resistance in rice to the parasitic weed, *Striga asiatica.'*

Rabefiraisana, J., - 'Assessing the tolerance of the advanced putative mutant rice lines M5 generation (*Oryza sativa*) to *Striga hermonthica* attack.'

Rapley, D. – 'Does silicon enhance rice resistance to the root parasitic weed, *Striga hermonthica*, and the Egyptian cotton leafworm, *Spodoptera littoralis*?'

Sibinelli, V. – 'Wood radial and axial variation of some *gigantica Loranthaceae* mistletoes.'
Sibinelli, V. – 'Comparative wood anatomy of Brazilian mistletoes genera of Loranthaceae.'
Steele, D. – 'Exploring the evolutionary origin of haustorium development in root parasitic plants.'
Sugimoto, Y. – 'Aberrant protein phosphatase 2C leads to ABA insensitivity, high transpiration rate and sustenance of parasitism in *Striga hermonthica.'*
Takahash, I. – 'Development of propiconazole derivatives as strigolactone biosynthesis inhibitors.'
Teixeira-Costa, L., - ' What's in a name? That which we call a haustorium by any other name would cause misunderstanding of parasitic plant biology.'
Tessema, T. – 'Scaling up of Integrated Striga Control in Sorghum in Ethiopia.'
Tourneur, S. – 'miPEPs: new tools to study and control *Orobanche cumana.*'
von Muenchow, - 'Lifecycle synchronization between parasitic plants and their hosts assessed by molecular evolutionary analysis and host-induced gene silencing.'
Wada, S. – 'Structural and functional analysis of haustorium inducing factors for the parasitic plant *Striga hermonthica.'*
Wallach, A. – 'Biology and management of *P. aegyptiaca* in cabbage.'
Wang, Yanting – 'Transcriptional changes in tomato roots upon P starvation and the role of strigolactones in this response.'
Wang, Yaxin – '*Triphysaria* controls vegetative self-recognition by restricting release of HIFs in roots.'
Wicke, S. – 'Eco-evolutionary causes and consequences of parasitism in plants.'
Yang, Beifen – 'Inoculation of rhizobia enhanced the damage of holoparasitic plant on host plant which will not be affected by exogenous nitrogen.'
Yang, Chong – 'Dual transcript profiling of plant-plant interaction between parasitic weed *Orobanche cumana* and sunflowers.'
Yoneyama, Kaori – 'Characterization of germination stimulants for *P. ramosa.'*
Zhang, H. – 'Phylogenetic and functional analyses of parasitism genes in haustorial formation and development.'

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MISTLETOE (*VISCUM ALBUM*) AND ITS HOSTS IN BRITAIN

Viscum album, the only native British mistletoe, is rich in associated folklore, and commercially important for the Christmas markets and its medicinal uses. Like all mistletoes, it is a hemiparasite, photosynthetic, and attached only to the host xylem, initial contact with which stimulates hypertrophy of the host tissue. It is hence a gall-causer, inducing variable but often marked and conspicuous swelling of the host.

V. album on branch of *Malus* 'Golden Hornet' at Chertsey, Surrey, 2019, showing marked swelling (photo: Graham Carey)

It occurs throughout Central Europe, N. Africa, and S.W. & E. Asia, and has been introduced to California and Vancouver Island (Briggs 2003). In Britain, it occurs mainly in the south, especially the south-west. Northwards, it is scarce or absent, though successfully introduced around Edinburgh, and in Ireland (Nelson 2007). It is the most plurivorous of all mistletoes, recorded worldwide on over 450 species in 44 families (Barney *et al*. 1998) and with over 200 hosts in Britain. National surveys were carried out by the Botanical Society of the British Isles (BSBI) in 1969 – 70 and by BSBI and Plantlife from 1994 - 96. Various other surveys are noted in Spooner (2018). These all record its common hosts as *Malus domestica*, *Tilia* x *europaea*, *Robinia pseudoacacia*, various *Acer* and

Populus taxa, and some other rosaceous genera, particularly *Crataegus* and *Sorbus*. Curiously, few of its hosts are native; Perring (1973), for example, notes 'the amount growing on native trees in native situations is negligible'. Most hosts, then, are exotics, recorded mainly in arboreta and botanic gardens. At Oxford Botanic Garden, 20 hosts were documented in 1901 by T.E. Jefferies stating that it is 'now on a greater number of different kinds of tree than could be seen in a similar area anywhere' (Anon. 1901).

There are many host compilations for Britain, amongst the earliest those by Baxter (1834) and Jesse (1844) who recorded 38 hosts, including *Acer opalus* not subsequently reported in Britain. Bull (1907) documented 32 hosts from Herefordshire, and a survey in Britain by the *Quarterly Journal of Forestry* received records from 39 hosts (Somerville 1914). Later, Nicholson (1932) listed 164 hosts, at least 76 from Britain. Many county floras also provide host records.

Around 70% of records are from rosaceous genera, including several exotic *Crataegus*, *Malus* and *Sorbus* such as *S. pohuashanensis* known only from Valley Gardens, Windsor. But not all rosaceous genera are involved; *Amelanchier*, *Cotoneaster* and *Prunus* are scarce host genera, and for *P. laurocerasus* and *P. lusitanica* only single early records exist. Notable is a recently discovered street tree of *P. padus* at West Molesey, Surrey with a small bunch of mistletoe, apparently the first and only example of this as a host in Britain. For *Rosa* there are few reports, and on *Pyrus* it is also rare, due evidently to toxins in the berries which cause branch cankers generally preventing development of the mistletoe (Paine 1950). See also Fennel, Haustorium 75: 9.

Barriers to colonisation by mistletoe may also be chemical or mechanical. The latter involve thickness of the bark and lignified fibres, particularly effective for beech (*Fagus sylvatica*) on which mistletoe is virtually unknown.

V. album on Fagaceae in general is rare, and its occurrence on native oaks (*Quercus petraea, Q. robur*) has been venerated since the Druids. A survey of British mistletoe-oaks, recently updated by Box (2019), records just 13 extant trees only six of which are native taxa (5 *Q. robur*, 1 hybrid). However, a new record on *Q. rubra* from Petworth Park, Sussex was made in November 2017 (Spooner 2018), and there are two mistletoe-bearing *Q. palustris* at Valley Gardens (Spooner 2016), unknown to Box, so that ten examples of the red oak group are currently known in Britain. *Castanea sativa* is also virtually unknown as a host, with in Britain just one remarkable occurrence from Spalding (Lincolnshire) (Hodgson 1931).

Mistletoe resistance by oaks is genetically fixed by the host tree and involves structural elements of the bark. Differential production of polyphenols, stimulated by the mistletoe, may also be involved. Such chemical barriers linked to the genetics of the host trees produce some seeming anomalies. For example, mistletoe is common on hybrid black poplars (*P.* x *canadensis* agg.) but virtually absent on the parent *P. nigra* and its cultivars, due evidently to the production of flavonoids which accumulate during initial development of the haustorium and prevent penetration (Hariri *et al.* 1991; Sallé *et al*. 1994).

Scarce hosts in Britain include species of *Aesculus*, *Alnus*, *Betula*, *Carpinus*, *Corylus*, *Fraxinus*, and for *Ilex aquifolium*, *Laburnum anagyroides*, *Mespilus germanica*, *Ostrya carpinifolia*, *Platanus,* and *Ribes* only two or three records exist. *Juglans regia* and typical *J. nigra* have no recent records, except a notable occurrence on *J. nigra* 'Alburiensis', at Albury Park, Surrey, where the clone originated. *Rhamnus cathartica* is also a notable host, reported by Bull (1907) but unknown subsequently except for a remarkable occurrence at Box Hill, Surrey recently recorded by Ann Sankey (Surrey Botanical Society).

A few hosts occasionally reported on the Continent have only single records in Britain, including *Ailanthus altissimus* and *Diospyros virginiana* at Oxford, *Carya cordiformis*, species of *Davidia*, *Magnolia virginiana*, *Parrotia persica*, *Photinia serrulata*, and *Tamarix gallica*. Furthermore, a few hosts in England appear to be unique, including *Alnus maximovicii* at Virginia Water, and *Hamamelis* 'Red Glow' (Mabey 1996), an otherwise unrecorded host genus. Others include *Acer macrophyllum*, *A. rubra*, *Arbutus* sp., *Catalpa bignonioides, Cladrastis tinctoria, Crataegus brainerdii, Cydonia japonica, Gymnoclados dioica, Philadelphus coronarius, Rhododendron mollis, Robinia viscosa, Sorbus rondaiensis, S. ferreri,* and *Symphoricarpos albus*. *Viburnum* seems to be an unrecorded host genus anywhere, though there is an unconfirmed report by Jefferies (in Anon. 1901) from Oxford Botanic Garden. Finally, *Pistacia terebinthus* was listed for Britain by Hawksworth (1974), but this appears to be an error (see Nicholson 1932).

Broadleaf taxa are all host to a single taxon, *V. album* ssp. *album*. However, two other subspecies, on conifers, occur in Europe: *V. album* ssp. *abietis* on *Abies*, and *V. album* ssp. *austriacum* on *Pinus*, *Picea*, and occasionally other genera. Neither is officially recognised from Britain. However, at least seven conifers have been reported as hosts in Britain, including *Taxus baccata, Abies alba*, *Cedrus libani*, ?*Cupressus* sp., *Larix decidua*, *Picea mariana* and *Pinus ?sylvestris*. Mostly, these are unverifiable early records; only 'a cemetery cypress' from Stratford-upon-Avon (Mabey 1996) is more recent and, if still extant, is certainly worth further attention. The major British floras make no mention of other subspecies of *Viscum*, although McClintock and Fitter (1956) state: 'the others, very rare in Britain, grow respectively on pines and larches, and on firs'. The presence and status in Britain of these taxa would be worth clarifying.

For further discussion and fuller references see Spooner (2018).

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Brian Spooner,
Chair, British Plant Gall Society

PHELIPANCHE AEGYPTIACA IN WESTERN IRAN

Phelipanche aegyptiaca (Pers.) Pomel (Egyptian broomrape) has recently become invasive in rapeseed/canola plantations in western Iran, after introduction of the crop to cultivation in the region. It is also an increasing threat for new rapeseed cultivations and other host crops limiting the choice of rotational crops. Rapeseed is grown as a winter crop in the region and there is a tendency among farmers for mono-cropping due to its economic value as an oil crop (Taab, personal observations). Recently, more than 3000 hectares of rapeseed were found to be infested by *P. aegyptiaca* in Ilam province, with similar infestations reported in some other provinces in Iran. The level of infestation is estimated to be between 10 to 80%. (Ilam Agricultural Organisation; personal comnucation).

Although the rapeseed yield loss due to *P. aegyptiaca* in the infested fields in west of Iran has not yet been quantified, yield reductions of 65-70% are expected.

Seed germination of *P. aegyptiaca* up to 100% can occur at temperatures ranging between 15 and 35°C. Thus, it is assumed that rising temperatures due to ongoing climate change could contribute to an increase of infestation.

Infestation of *Phelipanche aegyptiaca* on rapeseed in Dasht Abbas, Ilam, Iran. Photo Z. Nazari.

Broomrape species are difficult weeds to control and no control measures have been applied so far in this region, encouraging the further spread of the problem. Research is needed to survey the infested areas and to develop suitable control measures.

Acknowledgment:
I acknowledge the help of Chris Parker in identifying the species and Miss Z. Nazri for providing the plant samples.

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NEW AND CURRENT PROJECTS

Delivering high-yielding, disease-resistant finger millet to farmers.

Farmers can soon access finger millet varieties that not only withstand drought but are also resistant to parasites and diseases. This is due to the boost received from a finger millet Crop Wild Relatives (CWR) pre-breeding project led by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and funded by the Crop Trust which ensures funding until 2020. Finger millet is highly valued for its nutritional qualities and recognized as a Smart Food, yet production of finger millet remains below its potential. Farmers claim that the two key constraints to increased production are the blast disease and a parasitic weed called *Striga.* 'Blast is the most destructive disease of finger millet,' said Dr. Henry Ojulong, a cereals breeder at ICRISAT. 'Blast can occur at all stages of plant growth and can affect the leaves, neck and fingers.' In Kenya, blast can cause an estimated average yield loss of about 30 percent. Similarly, *Striga*, a sap-sucking weed, can lead to a complete loss of crops and once it's in a farmer's field, it is nearly impossible to eradicate.
'This project involves working with crop wild relatives (CWR) of finger millet since some of those have developed tolerance to either blast or *Striga*,' reported ICRISAT's Dr. Damaris Odeny, who is the principal investigator of the five-year CWR finger millet pre-breeding project.

'We are delighted with the progress shown by the team during Phase 1,' said Dr. Benjamin Kilian, the Crop Wild Relatives Pre-breeding Project Coordinator. 'Thanks to the support from the Government of Norway, we will be supporting the project further. Our end goal is to raise finger millet production by providing farmers with access to varieties that not only withstand drought but are also resistant to blast and *Striga*.'

The team started by collecting wild finger millet samples and screening them for resistance to blast and *Striga*. 'We used wild relatives of finger millet because we observed that some of them growing alongside cultivated finger millet on farmers' fields were not affected by either *Striga* or blast disease,' explained Dr Odeny. The wild types, however, lack many traits that cultivated varieties may have, such as grain size and color, early maturation or high yield.
During the first phase of the CWR project, the team, which included researchers not only from ICRISAT but also from the Kenya Agricultural and Livestock Research Organization (KALRO) – Kisii Center and Maseno University, was successful in identifying wild finger millet

samples showing resistance to *Striga* and blast disease as well as drought tolerance. The team also identified finger millet qualities preferred by farmers and consumers so that the project would ensure that new varieties maintained these qualities.

'In Phase 2 of the project (2018-2020), we will now introduce these unique characteristics into cultivated varieties with the support of the Crop Trust,' said Dr. Odeny. The team will work toward releasing farmer-preferred varieties that have been improved using the superior traits from wild finger millets.

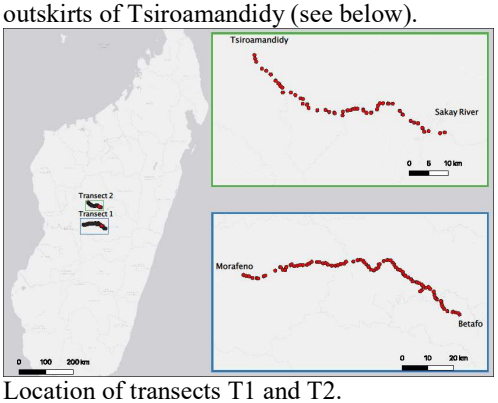
Christine Wangari, ICRISAT, Kenya

N2AFRICA – new *Striga* project – update.

Following the item in Haustorium 75 relating to the N2Africa Project, their Podcaster No. 54 (September 2018 - January 2019) includes detail of their *Striga* project in western Kenya:
Objectives will include:
1. Quantify *Striga* seed bank in maize fields of high and low infestation.
2. Correlate seed bank and *Striga* emergence with soil physiochemical characteristics.
3. Compare *Striga* emergence and seed bank between maize in monoculture
or rotation with a legume crop.
'This research will provide updated understanding of the
degree by which *Striga* parasitism can be combated by
legumes. Future work will include further characterization of
the *Striga*-reducing benefit provided by legumes.'

***Striga asiatica* Madagascar fieldwork summary 2019.**

For my first year of PhD studies I undertook fieldwork in Madagascar between February and March 2019, as part of a team from the University of Sheffield and CIRAD. The principal aim was to model the distribution and abundance of *Striga asiatica* across the middle-west region and to update information on *Striga* distribution. Available records are sparse, and no studies of distribution have been undertaken for over 20 years.
Fieldwork involved undertaking two long-distance, driven transects in which *Striga* abundance in fields adjacent to the road was obtained. These comprised a transect of 116km along RN34 (T1, n=153) and one of 70km along RN1 (T2, n=83). T1 was located between the towns of Betafo and Morafeno and T2 was located between 3km east of the Sakay and the outskirts of Tsiroamandidy (see below).



Location of transects T1 and T2.

One field on either side of the road was surveyed every kilometre. In the absence of fields in the immediate vicinity of the 1km sections, the next available field was located and surveyed. Fields almost exclusively comprised a main crop of either maize or rice, though a very small number of fields were surveyed with other main crops.
Fields were divided into quadrats, with two observers recording *Striga* density within up to three quadrats per field, measuring 10m wide by 20m in length. Where a field was over 1200m^2 is size, survey was limited to 3x200m^2 quadrats per observer. In each instance a field corner was randomly selected as the point to begin survey (Figure 2).
Striga density was estimated within quadrats using a six-point, density structured scale, ranging from absent (0) to very high (5). Based on available information, crop type, rice variety, companion crop, previous crop, estimated mean crop height, and percentage cover and data were collected. Information on fertiliser addition and any other pertinent information on the general area were recorded (where available). Photos of each field were also obtained. In addition, soil samples were collected from 104 fields and were analysed for NO3 and pH.

We are looking at whether the effects of rice variety had a significant effect on *Striga* density, as well as the effect of the spatial distribution of the weeds, and we hope to post results very soon!
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Pea (*Pisum sativum*) breeding for disease and pest resistance

The aim of this Project (AGL2017-82907, 2018-2020) is to provide a biotechnological support to disease and pest resistance breeding of pea (*Pisum sativum*) and grasspea (*Lathyrus sativus*) giving continuity to a long term research program. This is approached by a serie of concatenated strategies: 1) Search for sources of resistance; 2) Use of identified resistances in breeding by crossing and selection; 3) Advanced QTL mapping for resistance and genome-enabled prediction; 4) Molecular characterization of plant/pathogen interaction; 5) Development of alternative control methods including allelopathy and bioprotection.

In the Mediterranean Basin broomrape (*Orobanche crenata*) is the major constraint for pea production, followed by ascochyta blight (*Didymella pinodes*), powdery mildew (*Erysiphe pisi*) and rust (*Uromyces pisi*). We started broomrape resistance research in pea in the frame of project 1FD97-0393 (1999-2001) in which, after a huge search we found that resistance was very scarce, with only some levels of incomplete resistance identified in a few accessions of *P. sativum* and in wild *Pisum* spp. These sources of resistance were successfully crossed with pea cultivars and introduced into our pea breeding program that already yielded the registration of the first pea cultivars resistant to broomrape (Fig. 1). Mechanisms of resistance have been characterized both in pea and in the model legume *Medicago truncatula*. Resistance available so far seems to be of complex inheritance, so in the frame of subsequent projects we approached the search for QTLs. These pea activities were complemented with work on faba bean (*Vicia faba*), crop in which we coordinated the European FP5 project EUFABA (2003-2005), getting expertise in resistance breeding. Contributing to the programs of other colleagues we covered also some small activities on vetch (*V. sativa*), chickpea (*Cicer arietinum*), lentil (*Lens culinaris*) and common bean (*Phaseolus vulgaris*).

Altogether, this enabled us to consolidate a pea program at Córdoba, that is the major target of our group. In the current project we give continuity to the breeding program with a major emphasis on combining existing levels of broomrape resistance with desirable agronomic

traits and resistance to other pests and diseases. This is complemented with exhaustive phenotyping of large germplasm collections under controlled condition and in multi-environment field trials to enable Genome Wide Association studies and Genomic Selection. In addition to this contribution towards understanding plant/pathogen interaction, this project intends to provide applied solutions to farmers, delivering resistant germplasm together with alternative control strategies in integrated control packages covering a number of major pests (aphid and weevil) and diseases (powdery mildew, rust, ascochyta blight and fusarium wilt).

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REQUEST FOR SEEDS OF *OROBANCHE CRENATA*

I am happy to inform you that, thanks to an agreement between the Faculty of Agricultural, Food and Forest Sciences of the University of Palermo and the Experimental Zoo-prophylactic Institute of Sicily and the Biobank of the Mediterranean will host a section dedicated to the seeds of parasitic Orobanchaceae.

This core collection will give the opportunity to all of us interested in the study of this group to easily access to material of different origins. All of us are aware of the importance of the local

selection of parasites and hosts that exists in this group. Therefore the availability of seeds of different origins will allow the realization of more accurate experiments. Seed housed in the Biobank will be supplied to users representing recognised organisations, who make requests on behalf of that organisation. The contributors of the Core collection will have a privileged channel to request the supply of seeds.

In order to create this core collection I invite all of you to deposit samples in the Biobank and the spring that is about to begin can be a good time to make targeted collections of Orobanchaceae growing both on agricultural and natural environments.

Those interested can contact me for the instructions for seed collection.

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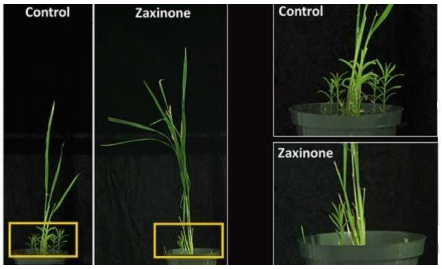
PRESS REPORTS

Metabolite stimulates a crop while suppressing a weed



Striga infestation (the smaller plants highlighted inside yellow boxes) in both control and in zaxinone-treated rice plants. Zaxinone limits the ability of *Striga* to take hold, allowing healthier plants to grow with improved yields. Credit: Salim Al-Babili

A newly discovered, naturally occurring metabolite that promotes growth in rice plants and thwarts infestation by a common parasitic plant could help improve global food security, say KAUST researchers. Plant scientists are working on methods for generating healthy, nutritious crops to feed the world's growing population. However, breeding strong plants that provide reliable, sustainable yields is beset with challenges, including battling parasitic infestations and plant infections. Apocarotenoids are organic compounds found in the tissues of most living things; they can act as hormones and signaling molecules which, among other functions, stimulate metabolic processes. Scientists are just beginning to untangle the complex networks of these compounds in plants, with surprising results. Under the guidance of KAUST faculty Salim Al-Babili, Takashi Gojobori and Ikram Blilou, the KAUST team, together with scientists in Italy, have identified a novel apocarotenoid metabolite called zaxinone that is synthesized by a previously overlooked group of enzymes, carotenoid cleavage dioxygenases (CCDs), found in most plants. As well as promoting plant growth, zaxinone reduces infestation by the root parasite, *Striga*, also known as witchweed.

The first author of the paper Jian You Wang explains, *Striga* is a parasitic plant that infests cereals. Plant hormones called strigolactones are released by host plants into soil, and *Striga* seeds use this to germinate and build a structure that connects them to the host roots, where they siphon off nutrients, minerals and water. This strips the host of resources needed for its own growth, drastically reducing yields. *Striga* now affects more than 60 percent of farmland in sub-Saharan Africa and is spreading quickly; it is one of the seven major biotic threats to global food security.'

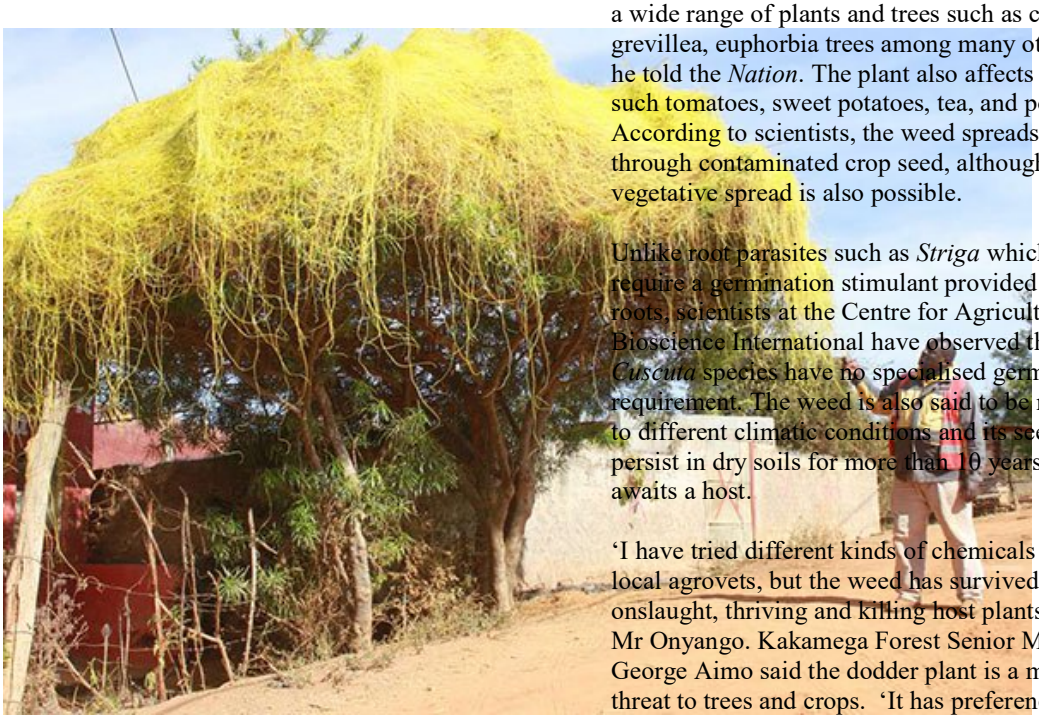
The team used sequence databases to analyze the distribution and activity of CCD genes across 69 different plant species, including rice. They identified a gene and its associated enzyme in one CCD subfamily that produces zaxinone. They investigated mutant rice plants with reduced zaxinone content to find that they had poor growth and elevated levels of strigolactones. 'Next, we exposed mutant and wild-type plants to increased zaxinone levels,' says Wang. 'This treatment rescued the mutant plants and promoted the growth of wild-type plants. We were surprised to find that this metabolite regulates strigolactone levels with the knock-on effect of tackling *Striga* infestation.' 'We are very excited about zaxinone—it could be used to alleviate *Striga* infestation or as a bio-stimulant to accelerate plant growth,' Al-Babili adds. 'We're currently performing metabolomics and transcriptomics studies to fully understand this growth regulator and how it functions.'

Read more at: https://phys.org/news/2019-03-metabolite-crop-suppressing-weed.html#jCp

and see Litertature item Jian You Wang et al. 2019. below.

King Abdullah University of Science and Technology
March 7, 2019

Dodder plant poses threat to trees and crops



A tree in Wote town, Makueni County, invaded by dodder.

Kakamega Forest Senior Manager George Aimo said the dodder plant is a major threat to trees and crops. When Samuel Onyango, a smallholder farmer from Kisumu County, first noticed yellowish spaghetti-like leafless vines hanging loosely on his fence some three years ago, he did not bother about them. Little did he know that it was a killer weed that would end up strangling his crops and even trees.

The weed, known as field dodder or *Cuscuta japonica*, whose origin has been traced to North America, is a parasitic plant; meaning that it draws nutrients from host plants and trees — suffocating them, sometimes to death. 'It is becoming a nightmare particularly in western Kenya, the Rift Valley and in parts of the Central region,' said Dr Eston Mutitu, a Senior Entomologist and Chief Research Scientist at the Kenya Forest Research Institute (Kefri). The dodder builds a canopy on the host plant and casts thousands of tendrils to form a dense spectacle before it strangles it. According to scientists, the weed spreads mainly through contaminated crop seed, although vegetative spread is also possible. 'The biggest problem is that *Cuscuta* has hundreds of host plants, some of them are of great economic importance,' said Dr Mutitu. 'We have observed a huge impact on a wide range of plants and trees such as citrus, grevillea, euphorbia trees among many others,' he told the *Nation*. The plant also affects crops such tomatoes, sweet potatoes, tea, and potatoes. According to scientists, the weed spreads mainly through contaminated crop seed, although vegetative spread is also possible.

Unlike root parasites such as *Striga* which require a germination stimulant provided by host roots, scientists at the Centre for Agriculture and Bioscience International have observed that *Cuscuta* species have no specialised germination requirement. The weed is also said to be resilient to different climatic conditions and its seed can persist in dry soils for more than 10 years as it awaits a host.

'I have tried different kinds of chemicals from local agrovets, but the weed has survived the onslaught, thriving and killing host plants,' said Mr Onyango. Kakamega Forest Senior Manager George Aimo said the dodder plant is a major threat to trees and crops. 'It has preference of certain species, though we cannot rule out that it can affect other trees species. Though it has not yet attacked any species in Kakamega Forest, it is present on the forest fence,' said Mr Aimo. The forester said that despite its short lifespan, the parasitic weed can easily damage a forest if not dealt with in time.

Prof Matthew Dida, the Head of the Department of Agriculture at Maseno University, said that there are different kinds of dodder species which can affect indigenous vegetables and trees. 'It is possible that the parasitic plant could evolve to affect other species that have not been under attack so far,' said Prof Dida, pointing out that the most affected tree species in western Kenya are in the family of the yellow oleander, usually preferred for live fencing. According to Dr Mutitu, Kefri has started analysing the weed to understand the biology of host plants among

other issues, with a view of coming up with a mitigation strategy. 'We are looking for a possibility of chemical control of the weed and in the long term biological control,' said Dr Mutitu. 'We are also exploring other avenues including positive uses of *Cuscuta*,' he said, referring to a new study published in the American Journal of Agriculture and Forestry, which suggests that the weed could be an important source of medicine.

So far, farmers are using manual methods of control which include uprooting infested plants and burning them. However, in other areas people who are yet to understand the weed preserve it particularly on their fences confusing it is a flower. 'There is need to sensitise the public on the impact of the dodder weed,' said Ms Abigael Koech, a phytosanitary expert at the Kenya Plant Health Inspectorate. Dodder's many other names include love vine, knot weed, strangle weed, strangle vine, angel's hair, gold-thread, devil's ringlet, hell-bind, hair weed, devil's hair, hail weed and witches' shoelaces.

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(NB. There have been a number of press reports of new *Cuscuta* problems in Kenya over the past years. Our attempts to determine exactly which species have been involved have not been successful. It is almost certain that more than one species is involved, but the suggestion that this is *C. japonica* is alarming as this is a serious invasive species not previously recorded from Africa. It is an Asian species common in eastern Asia. It does not originate from North America as suggested, though it has been introduced to USA as a medicinal herb, and become invasive in parts of California (see Haustorium 51). Our enquiries continue.)

PhD SCHOLARSHIP OPPORTUNITY AT NRI

Innovative fertiliser solutions to combat *Striga* on smallholder sorghum farms in Africa. Two farmer-preferred *Striga* control technologies that potentially have the necessary synergy to be integrated are *Striga*-resistant/tolerant varieties and crop nutrition through fertilisers. A PhD project is offered by Natural Resources Institute (NRI), University of Greenwich, UK, in collaboration with Rothamsted Research, to investigate how this concept can be developed in the most effective and affordable technology for smallholder farming systems. The main supervisor from NRI will be Dr Jonne Rodenburg (j.rodenburg@gre.ac.uk); co-supervision will be provided by Dr Stephan Haefele of Rothamsted Research. Applications need to be made online via https://www.gre.ac.uk/research/study/apply/application-process. In the first part of the application select the following: Agriculture, Health and Environment (MPhil/PhD). The closing date for applications is midnight (UTC) on 31 October 2019. The scholarship must commence before 6 January 2020.

THESIS

An overview of *Phelipanche ramosa* seeds: sensitivity to germination stimulants and microbiome profile. Sarah Huet. Masters Thesis. Universite de Nantes, France. (Supervisors Lucie Poulin and Jean-Bernard Pouvreau)

Phelipanche ramosa, a.k.a. broomrape, is a parasitic plant of the Orobanchaceae family that infests numerous hosts in Europe and Mediterranean basin. It causes huge yield losses on various crops and especially on oilseed rape whose cultivation is threatened in western France. One of the special features of broomrape is its seed germination. Indeed, broomrape seeds cannot germinate without perceiving a germination stimulant (GS) exuded by its host. Two main types of growth stimulant have been identified hitherto: strigolactones and isothiocyanates. These molecules are known to be exuded by several crops but can also be modified or degraded by microorganisms. Additionally, three *P. ramosa* genotypes have been distinguished with specific preferential hosts: oilseed rape for genotype 1, hemp for genotype 2a and tobacco for genotype 2b. This study is based on seed samples that cover this genetic diversity. Herein, we observed that seeds coming from different hosts had different sensitivities to growth stimulants. Concomitantly, we described the bacterial and fungal communities associated with *P. ramosa* seeds and observed that the originating host of the parasitic seeds was the most influent factor shaping the seed microbiome. We also noticed a terroir effect, especially on fungal communities. Furthermore, we characterize the *P. ramosa* seed

core microbiome. Thus, this study continues the research effort on broomrape host specialization and highlights the growing evidence of the key role of microbiome in host plant – parasitic plant interactions.

BOOK REVIEW

Strigolactones – Biology and Applications. Edited by Hinanit Koltai and Cristina Prandi, 2019. Springer Nature Switzerland AG, xxx pp.

This is an excellent textbook on strigolactones (SLs) for graduate students, postdoctoral fellows, teachers and all scientists who would like to better understand SLs.

SLs were originally identified as germination stimulants for root parasitic weeds and thus, I think, have been well-known chemicals (only?) among IPPS members. In the first decade of this century, SLs have been shown to be not detrimental but beneficial metabolites to plants themselves as they function as rhizosphere signals for symbionts in particular arbuscular mycorrhizal fungi (AMF), and in addition, as a novel class of plant hormones regulating plant architecture and response to abiotic stresses. In the last two decades, biosynthesis, perception, and signal transduction of SLs have been extensively studied but not yet fully characterized.

This book, the fruit of the COST action FA1206 "Strigolactones: biological roles and applications", contains 6 chapters which were written by experts in each research field.

Chapter 1: Strigolactone Biosynthesis and Signal Transduction
Chapter 2: Strigolactones as Plant Hormones
Chapter 3: Strigolactones and Parasitic Plants
Chapter 4: The Role of Strigolactones inn Plant–Microbe Interactions
Chapter 5: Evolution of Strigolactone Biosynthesis and Signalling
Chapter 6: The Chemistry of Strigolactones

In general, all chapters are written carefully in plain English and Figures, Glossaries, and Synopses help readers to understand each topic. As the Editors explain in 'Introduction', each chapter starts with a general introduction which enables readers to look deeply into the specific aspects addressed by every single chapter. I strongly recommend this book to all IPPS members who are interested in the biology, genetics, and chemistry of SLs.

I noticed that in most experiments rac-GR24 was used as a standard SL. However, it is a mixture of enantiomers that have different affinities to the receptors, D14 and KAI2. Therefore, optically pure isomer or natural SLs should be used from now on. It is rather easy to separate enantiomer of rac-GR24 for us chemists and thus I encourage biologists to ask chemists for optically pure SLs. Of course, it is preferable to use natural SLs in any experiments. It may be possible to establish plant cell cultures or in vitro cell-free systems for the production of natural SLs. Furthermore, as plants produce and release not a single but a mixture of SLs, effect of different SL mixtures on various biological functions need to be examined in the future.

I noticed some minor mistakes and typos:
Page 22, Fig. 1.9; The structure of heliolactone needs to be corrected (see Fig. 1.3). MeCLA+18 should be MeCLA+16, conversion of CLA to MeCLA is not catalyzed by MAX1 but by a methyltransferase.
Page 22, line 4; The enzyme LATERAL…..(LBO) should not be in italic.
Page 101, Fig. 3.5; The structures of sorgomol and heliolactone should be corrected (see Fig. 6.2 and Fig. 1.3, respectively)
Page 102, line 4 from the bottom; CCD8 should be in italic.
Page 104, line 4; ent-2'-epi-orobanchol should be orobanchol to avoid possible confusion.
Page 105, line 5 from the bottom; physic should be physical
Page 127, line 2; Kaori et al. 2008 should be Yoneyama et al. 2008 (see Page 140).
Page 130, 133; diastereoisomers should be stereoisomers (enantiomers); rac-GR24 is a mixture of enantiomers but not of diastereo(iso)mers. See Glossary in Chapter 6.
Page 140; Yoneyama K, Xie X, Sekimoto H, Takeuchi Y, Ogasawara S, Akiyama K, Hayashi H, Yoneyama K (2008) Strigolactones, host recognition signals for root parasitic plants and arbuscular mycorrhizal fungi, from Fabaceae plants. New Phytol 179 (2):484–494.
Page 174, line 2; 'form' should read 'from'??

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FORTHCOMING MEETINGS

IUFRO World Congress 2019 – Technical Session - Complex interactions of mistletoe, ecosystems, and people. Curitiba, Brazil. 29 September – 5 October, 2019.
http://www.iufro2019.com
Or contact: David Shaw, Oregon State University, dave.shaw@oregonstate.edu

World Oilseed Congress (WOS), Lviv, Ukraine November 6-7, 2019. https://worldoilseed.org/
International Biological, Agricultural and Life Science Congress (BIALIC), Lviv, Ukraine, November 7-8, 2019. https://bialic.org/

BELATED ACKNOWLEDGEMENT

For many years I have worked with CABInternational (CABI), writing and editing data sheets on weeds , originally for their Plant Protection CD, later available on line, and then on a broader range of plant species for their Invasive Species Compendium (https://www.cabdirect.org/?target=%2fcabdirect%2fsearch%2f%3fsearchtype%3dadvance-search%26q%3d). For this work I have had access to their very comprehensive database, CAB Direct, 'the most thorough and extensive source of reference in the applied life sciences', covering plants generally and not just weeds.

I have always felt that this invaluable source should be acknowledged in Haustorium, but I was anxious that I might be contravening some prohibition against distillation of this sort. I was worried I would be found out and banned from using it any longer!

As my work for CABI had dwindled, my access finally expired and I have had to come clean. Fortunately they have very generously renewed my access and allowed me to continue preparing the Literature items as usual, for which I am very grateful. CAB Direct is the source of the bulk of items scanned, supplemented by Frontiers and ResearchGate, and personal pointers.

Chris Parker.

GENERAL WEB SITES

For individual web-site papers and reports see LITERATURE

* these websites may need copy and paste.

For information on the International Parasitic Plant Society, past issues of Haustorium, etc. see: http://www.parasiticplants.org/
For Dan Nickrent's 'The Parasitic Plant Connection' see: http://www.parasiticplants.siu.edu/
*For the Parasitic Plant Genome Project (PPGP) see: http://ppgp.huck.psu.edu/
For information on the new Frontiers Journal 'Advances in Parasitic Weed Research' see: http://journal.frontiersin.org/researchtopic/3938/advances-in-parasitic-weed-research
For information on the EU COST 849 Project (now completed) and reports of its meetings see: http://cost849.ba.cnr.it/
For a description of the PROMISE project (Promoting Root Microbes for Integrated *Striga* Eradication), see: http://promise.nioo.knaw.nl/en/about
*For PARASITE - Preparing African Rice Farmers Against Parasitic Weeds in a Changing Environment: see http://www.parasite-project.org/
For the Index of Orobanchaceae prepared by Óscar Sáchez Pedraja, Gerald Schneeweiss and others (updated December 2018), see: http://www.farmalierganes.com/Otrospdf/publica/Orobanchaceae%20Index.htm
For the Annotated Checklist of Host Plants of Orobanchaceae, see: http://www.farmalierganes.com/Flora/Angiospermae/Orobanchaceae/Host_Orobanchaceae_Checklist.htm
For information on the EWRS Working Group 'Parasitic weeds' see: http://www.ewrs.org/parasitic_weeds.asp
For a description and other information about the *Desmodium* technique for *Striga* suppression, see: http://www.push-pull.net/
For information on the work of the African Agricultural Technology Foundation (AATF) on *Striga* control in Kenya, including periodical 'Strides in *Striga* Management' and 'Partnerships' newsletters, see: http://www.aatf-africa.org/
*For Access Agriculture (click on cereals for videos on *Striga*) see: http://www.accessagriculture.org/
For information on future Mistel in derTumortherapie Symposia see:

http://www.mistelsymposium.de/deutsch/-mistelsymposien.aspx

For a compilation of literature on *Viscum album* prepared by Institute Hiscia in Arlesheim, Switzerland, see: http://www.vfk.ch/informationen/literatursuche (in German but can be searched by inserting author name).

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

For 6th Mistletoe Symposium, Germany, November 2015 see: http://www.sciencedirect.com/science/journal/09447113/22/supp/S1

LITERATURE

***indicates web-site reference only**
Items in bold selected for special interest
Items in blue relate to therapeutic uses of parasitic plants

*Abbes, Z., Trabelsi, I., Kharrat, M. and Amri, M. 2019. Intercropping with fenugreek (*Trigonella foenum-graecum*) enhanced seed yield and reduced *Orobanche foetida* infestation in faba bean (*Vicia faba*). Biological Agriculture and Horticulture May 2019. (https://www.tandfonline.com/doi/abs/10.1080/01448765.2019.1616614?journalCode=tbah20) [Inter-cropping with *T. foenum-gracum* reduced emergence and underground numbers of *O. foetida* on both susceptible variety Badi and resistant Najeh, and increase seed yield, particularly in Najeh.]

Abdelhalim, T.S., Babiker, A.G.T. and Finckh. 2019. Effects of powder and aqueous extracts of *Euphorbia hirta* on *Phelipanche ramosa* germination and haustorium initiation. Archives of Phytopathology and Plant Protection 51(17-18): 979-992. [Dried powder or aqueous extracts of *E. hirta* increasd germination of *P. ramosa* and reduced haustorial initiation, suggesting that they could also be used as 'spot treatments to induce suicidal germination of *Striga hermonthica.'*]

Abiolu, O.A. 2018. Ethnobotanical study of medicinal plants in southwestern Nigeria and traditional healers' perception of indigenous knowledge digitisation. Inkanyiso: The Journal of Humanities and Social Sciences 10(1): 90-102. [A survey of 18 traditional healers found that *Phragmanthera capitata* was among the most favoured sources.]

Akhil Saxena, Dwarika Prasad and Rajesh Haldhar. 2018. Investigation of corrosion inhibition effect and adsorption activities of *Cuscuta reflexa* extract for mild steel in 0.5 M H_2SO_4. Bioelectrochemistry 124: 156-164. [*C. reflexa* extract contains 3-methoxy-3,4,5,7-tetrahydroxy flavone, which decreases the corrosion rate of mild steel in acidic medium. The maximum corrosion inhibition efficiency was observed at 500 mg/L inhibitor concentration.]

Akhter, G. and Khan, T.A. 2019. First report of disease complex caused by *Meloidogyne incognita* and *Orobanche aegyptiaca* in brinjal. Trends in Biosciences 11(13): 2414-215. [In Iran.]

Akhter, G. and Khan, T.A. 2018. Screening of brinjal (*Solanum melongena* L.) varieties against obligate root parasite, *Orobanche aegyptiaca*. Journal of Crop and Weed 14(3): 203-208. [Noting that brinjal is seriously damaged by *O. aegyptiaca* in Uttar Pradesh, India and reporting that of 30 varieties compared for their susceptibility, only 3 (Mahy 112, Mahy 80 and Nagina) were tolerant, and only one, Mahy Ruby was moderately resistant. None was fully resistant.]

Akhter, G., Khan, T.A. and Zafar, A. 2018. A rare abnormality in flower of *Orobanche aegyptiaca* – a new report. Pakistan Journal of Weed Science Research 24(4): 363-366. [Reporting abnormalities in flowers of *O. aegypiaca* UP, India, involving double pistils and 8 stamens, accompanied by a reduction of pollen viability from the normal 86% to 33%.]

Al-Gburi, B.K.H., Al-Sahaf, F.H., Al-Fadhal, F.A. and del Monte, J.P. 2019. Detection of phytochemical compounds and pigments in seeds and shoots of *Cuscuta campestri*s parasitizing on eggplant. Physiology and Molecular Biology of Plants 25(1): 253-261. [Studying the different content of protein, total phenolic, total soluble carbohydrates, plant hormones and pigments in seeds, and in shoots (flower and filament). ABA content was particularly high in the seeds.]

Aly, R., Bari, V., Londner, A., Nassar, J.A., Taha-Salaime, L. Eizenberg, H. and Lati, R. 2019. Development of specific molecular markers to distinguish and quantify broomrape species in a soil sample from

infected field. BIORXIV pre-print (https://www.biorxiv.org/content/10.1101/602284v2) [Describing a DNA technique for detecting, and distinguishing between, the seeds or other material of *Orobanche crenata, O. cumana* and *Phelipanche aegyptiaca* in soil.]

*Aly, R., Lati, R., Abu Nassar, J., Ziadna, H., Achdari, H., von Münchow, C.S., Wicke, S., Bari, V.K. and Eizenberg, H. 2019. The weedy parasite *Phelipanche aegyptiaca* attacks *Brassica rapa* var. *rapa* L. for the first time in Israel. Plant Disease 103(7): (https://apsjournals.apsnet.org/doi/pdf/10.1094/PDIS-02-19-0285-PDN) [Noting that *P. aegyptiaca* is the most serious and extensive parasitic weed in Israel and for the first time was found in white turnip as the winter crop following summer tomatoes which were infested with this weed. And using mitochondrial DNA to confirm its distinction from *P. ramosa, P. mutelii* or *P. nana*.]

*Amanuel Ayanaw Abunie and Gemedo Dalle. 2018. Woody species diversity, structure, and regeneration status of Yemrehane Kirstos Church Forest of Lasta Woreda, North Wollo Zone, Amhara Region, Ethiopia. 2018. International Journal of Forestry Research 2018: Article ID 5302523. (https://www.hindawi.com/journals/ijfr/2018/5302523/) [*Olea europaea* ssp. *cuspidata* and *Osyris quadripartita* among the six most abundant species recorded.]

Amini, E., Nasrollahi, F., Sattarian, A., Kor, S. and Boozarpour, S. 2018. Molecular and micro-morphological evidences of the genus *Cuscuta* in Iran. Rostaniha 19(2): 113-129. [Seed and pollen morphology and a nuclear rDNA ITS dataset were used to examine relationships among *Cuscuta australis*, *C. chinensis* and *C. campestris*. Multiple collections of each species were monophyletic (as expected) and differences in micromorphological characters were noted.]

Amri, M., Trabelsi, I., Abbes, Z. and Kharrat, M. 2019. Release of a new faba bean variety "Chourouk" resistant to the parasitic plants *Orobanche foetida* and *O. crenata* in Tunisia. International Journal of Agriculture and Biology 23(3): 499-505. ['Chourouk' was developed from a cross between the *Orobanche*-resistant line selected by INRAT, 'XBJ90.03-20-1-1-1-1-1-1-D', and '19TB', selected by INRA' France for its resistance to *Ascochyta* blight and low tannin. Field trials in Tunisia showed Chourouk to suffer only 32% yield loss in faba bean compared with 55% for the resistant Najeh and 87% for susceptible varieties and yielding 4-6 times that of the latter. It produces little stimulant but is thought to have other resistance mechanisms. It also shows rsitance to *O. crenata.*]

Anchal Rana, Sudhir Singh and Ashok Kumar. 2018. Parasitic association of *Cuscuta* with *Polygonatum verticillatum* Linn. Indian Forester 144(6): 584-585. [Regrettably no abstract available, but probably referring to *C. reflexa.*]

Anil Duhan, Punia, S.S., Samunder Singh and Hooda, V.S. 2018. Sensitivity and terminal residues of various herbicides screened for the control of broomrape in tomato. Indian Journal of Weed Science 50(2): 146-152. [Studying the sensitivity of sulfosulfuron, ethoxysulfuron, mesosulfuron+iodosulfuron, metribuzin and imezethapyr to tomato varieties Himsona and Rocky, and their persistence in fruits and soil. Only sulfosulfuron proved selective for control of *Phelipanche aegyptiaca* in tomato.]

*Anselmo-Moreira, F., Teixeira-Costa, L., Decccantini, G. and Maria Furlan, C. 2018. Mistletoe effects on the host tree *Tapirira guianensis*: insights from primary and secondary metabolites. Chemoecology 29(1): 11-24. (https://link.springer.com/article/10.1007%2Fs00049-018-0272-6) [Analyses showed decreased carbohydrates in leaves of *T. guaianensis* parasitised by *Phorandendron perrottetii*. Also a rise in tannin content in non-infested branches of infested trees, suggesting a systemic effect of the parasite on the host. High flavanoids were detected at the attachment site.]

Anusorn, K. and Intanon, S. 2019. Flowering phenology of common Chinese mistletoe (*Macrosolen cochinchinensis*) and its infestation of jackfruit (*Artocarpus heterophyllus*).) (in Thai) Kaen Kaset = Khon Kaen Agriculture Journal 47(Suppl.1): 1431-1436. [*M. cochinchinensis* flowered 2-3 times in 6 months and was continuously flowering and fruiting on jackfruit, *A. heterophyllus*. There was significant reduction of lead mass in the host.

*Azevedo, J.M.L., Santos, C.G.G., Caires, C.S., Araújo Neto, J.C.A. and Souza, R.C. 2018. Morphometry and germination of *Passovia pyrifolia*, *Struthanthus marginatus* and

Phoradendron mucronatum diaspores. Planta Daninha 36: e018170863. (http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-83582018000100218&lng=pt&nrm=iso&tlng=en) [Germination is best at the alternating temperatures of 20-30°C for *P. pyrifolia* and *P. mucronatum* and at a constant 20°C for *S. marginatus* (parasitising *Citrus sinensis* and *Annona squamosa* in Brazil). Light reduced the germination of *P. mucronatum* and *S. marginatus* but not *P. pyrifolia*. Germination of all three was improved when the epicarp was removed.]

Babita Mishra, Sandeep, C., Sushant Arade, Sruthi Subbanna and Syam Viswanath. 2018. Assessment of heartwood and oil content of *Santalum album* Linn. in natural and naturalized populations across contrasting edapho-climatic conditions in India. Indian Forester 144(7): 675-685.

Badu-Apraku, B., Fakorede, M.A.B., Annor, B. and Talabi, A.O. 2018. Improvement in grain yield and low-nitrogen tolerance in maize cultivars of three eras. Experimental Agriculture 54(6): 805-823. [Describing a three-stage breeding programme aimed at resistance to drought, low soil fertility and *Striga hermonthica*. Maize line 2009 TZEE-OR_2 STR was the most stable, with competitive yield across environments, while 2004 TZEE-W Pop STR C_4 2, and TZEE-W STR 104, TZEE-W STR 108 and 2012 TZEE-W DT STR C_5 were high yielding but 'less stable'.]

*Badu-Apraku, B., Talabi, A.O., Fakorede, M.A.B., Fasanmade, Y., Gedil, M., Magorokosho, C. and Asiedu, R. 2019. Yield gains and associated changes in an early yellow bi-parental maize population following genomic selection for *Striga* resistance and drought tolerance. BMC Plant Biology.19(129): 05 April 2019. (https://link.springer.com/article/10.1186/s12870-019-1740-z) ['This study demonstrated that genomic selection was effective for yield improvement in the bi-parental maize population under *Striga*-infested environments and resulted in concomitant yield gains under optimal environments. However, due to low genetic variability of most traits in the population, progress from further genomic selection could only be guaranteed if new sources of genes for *Striga* resistance and drought tolerance are introgressed into the population.]

Bhat, N.A., Licha Jeri, Yogendra Kumar and Mir, A.H.. 2018. First observation of field dodder and its host range in Meghalaya. Indian Journal of Weed Science 50(2): 192-194. [*Cuscuta campestris* newly recorded from, mainly, *Mikania micrantha*, *Parthenium hysterophorus* and *Duranta erecta*.]

Bilas Singh, Singh, G. and Rathore, T.S. 2018. The effects of woody hosts on *Santalum album* L. tree growth under agroforestry in semi-arid north Gujarat, India. Indian Forester 144(5): 424-430.

*Bilgen, B.B., Baru, A.K. and Demirbas, S. 2019. Genetic characterization of *Orobanche cumana* populations from the Thrace region of Turkey using microsatellite markers. Turkish Journal of Botany 43(1): 38-47. (https://dergipark.org.tr/download/article-file/625126) [Six populations of *O. cumana* were found to fall into 2 main clusters. Most variation was within populations.]

Bradley, L.E., Kelly, C.A. and Bowers, M.D. 2018. Host plant suitability in a specialist herbivore, *Euphydryas anicia* (Nymphalidae): preference, performance and sequestration. Journal of Chemical Ecology 44(11): 1051-1057. [*E. anicia* feeds on *Castilleja integra* in the lab but in the field mucn prefers *Penstemon* glabra (Plantaginaceae), perhaps due to the presence of the iridoid glycoside macfadienoside in the former.]

Brotherton, S.J., Joyce, C.B., Berg, M.J. and Awcock, G.J. 2019. Immediate and lag effects of hydrological change on floodplain grassland plants. Plant Ecology 220(3): 345-359. [Showing that *Rhinanthus minor* was soon lost under wetter conditions.]

Burgess, T.I., Howard, K., Steel, E. and Barbour, E.L. 2018. To prune or not to prune; pruning induced decay in tropical sandalwood. Forest Ecology and Management 430: 204-218. [Identifying a wide range of rot fungi in heartwood of *Santalum album*, and recommending pruning when trees are young, preferably at the beginning of the dry season, to decrease the amount of potential decay.]

Caballo, C., Castro, P., Gil, J., Izquierdo, I., Millan, T. and Rubio, J. 2018. STMS (sequence tagged microsatellite site) molecular markers as a valuable tool to confirm controlled crosses in chickpea (*Cicer arietinum* L.) breeding programs. Euphytica 214(12): 231. [The technique is being used in

the search for various disease resistance and for resistance to *Orobanche foetida*.]

Calderón-González, A., Pouilly, N., Muños, S., Grand, X., Coque, M, Velasco, L and Pérez-Vich, B. 2019. An SSR-SNP linkage map of the parasitic weed *Orobanche cumana* Wallr. including a gene for plant pigmentation. Frontiers in Plants Science 19 June, 2019: (https://doi.org/10.3389/fpls.2019.00797)

Chabra, A., Monadi, T., Azadbakht, M. and Haerizadeh, S.I. 2019. Ethnopharmacology of *Cuscuta epithymum*: a comprehensive review on ethnobotany, phytochemistry, pharmacology and toxicity. Journal of Ethnopharmacology 231: 555-569. [A wide-ranging review covering the traditional uses of *C. epithymum* by rural people as a geriatric drug, detergent, purgative, treatment for melancholic humor, joint, kidney, urinary tract, gastrointestinal system, nervous system, *etc.* In modern medicine, the extract shows anti-microbial, cytotoxic, anticonvulsant, anti-urease, immune stimulatory, hepatoprotective effect, and antioxidant activity.]

Chao ChienLiang, Huang HsinWen, Huang HuiChi, Chao HsinFan, Yu ShuenWen, Su MuhHwan, Wang ChaoJih and Lin HangChing. 2019. Inhibition of amyloid beta aggregation and deposition of *Cistanche tubulosa* aqueous extract. Molecules 24(4): 687.

Chávez-Salcedo, L.F., Queijeiro-Bolaños, M.E., López-Gómez, V., Cano-Santana, Z., Mejía-Recamier, B.E. and Mojica-Guzmán, A. 2018. Contrasting arthropod communities associated with dwarf mistletoes *Arceuthobium globosum* and *A. vaginatum* and their host *Pinus hartwegii.* Journal of Forestry Research 29(5): 1351-1364. [Species richness, abundance and diversity in Central Mexico were significantly different for the three studied plants, as well as sampling month and the interaction of these two factors (except for diversity). The results suggest that the canopy of *P. hartwegii* is an important element in the ecosystem, providing a mosaic of resources and conditions to the associated fauna. It is also proposed that mistletoes are key species within the forest canopy, as they greatly influence the establishment of diverse organisms, particularly arthropods.]

Cheng QingWei and 12 others. 2010. Callus of East Indian sandalwood co-cultured with fungus *Colletotrichum gloeosporioides* accumulates santalenes and bisabolene. Molecules 24(6): 1111. [Callus of *Santalum album* was co-cultured with fungi *C. gloeosporioides*. Analysis of the solvent extract showed the presence of santalenes and bisabolene, precursors of santalol. Another fungus, *Penidiella kurandae*, did not induce santalenes or bisabolene. This study provides an opportunity to further studies on the santanol biosynthetic pathway and the fungal endophyte-plant interaction in sandalwood.]

Chen Jie, Liu XueFeng, Jia HanQi and Zhu WenBo. 2018. First report of leaf-spot disease caused by *Sphaeropsis visci* on Asian mistletoe [*Viscum coloratum* (Kom.) Nakai] in China. Journal of Forestry Research 29(6): 1769-1774.

Chen ZhuLin, Wang XueFeng and Sun HanZhong. 2019. (Diagnosis of total phosphorus content in young sandalwood based on visible light and near infrared images.) (in Chinese) Journal of Beijing Forestry University 41(2): 88-96. [Describing techniques for diagnosis of total P in young sandalwood (*Santalum album*?) helping optimise the use of P fertilizer and avoiding the ecological problems such as groundwater pollution caused by excessive fertilization.]

Chikoye, D., Ekeleme, F., Hauser, S., Menkir, A., Kamara, A.Y., Neuenschwander, P., Ajuonu, O. and Ajeigbe, H.A. 2019. Weeds affecting field crops and water bodies in Africa. In: Neuenschwander, P. and Tamò, M. (eds) Critical issues in plant health: 50 years of research in African agriculture: 365-396. [This IITA publication includes a section on *Striga hermonthica* in maize describing the available methods of control; rotation with legumes including soyabean and cowpea; application of inorganic and organic nitrogen; resistant and tolerant varieties; herbicide-treated seed of herbicide-resistant maize varieties. Some integration of different methods has proved successful but the overall conclusion is that the problem is far from solved. Adoption and integration of available methods is often limited by biophysical and socio-economic factors and there is a pressing need for further research.]

Chitura, T., Muvhali, P.T., Shai, K., Mushonga, B. and Kandiwa, E. 2018. Use of medicinal plants by livestock farmers in a local municipality in Vhembe District, South Africa. Applied Ecology and Environmental Research 16(5): 6589-6605. [Noting the use of *Ximenia americana* for treating wounds.]

Čiča, K.H. and 7 others. 2019. Characterisation of flavour compounds in *Biska* - a herbal spirit produced with mistletoe. Journal of the Institute of Brewing 125(1): 143-154. [Detecting 166 aromatic compounds in the spirit distilled from *Viscum album* known as 'Biska' in Croatia. Major components were ethyl esters (medium and long chain fatty acids), fatty alcohols , isopropyl myristate, aldehyde decanal and some terpenes.]

Cirocco, R.M., Facelli, J.M. and Watling, J.R. 2018. A native parasitic plant affects the performance of an introduced host regardless of environmental variation across field sites. Functional Plant Biology 45(11): 1128-1137. [Results suggest that the native *Cassytha pubescens* has negative effects on *Ulex europaeus* in the field in Australia.]

Clements, D.R., Day, M.D., Oeggerli, V., Shen, S.C., Weston, L.A., Xu, G.F., Zhang, F.D. and Zhu, X. 2019. Site-specific management is crucial to managing *Mikania micrantha.* Weed Research 59(3): 155-169. [Including reference to the use of *Cuscuta campestris* for biological control but cautioning against the risk of damage to non-target species.]

*Clermont K., Yaxin Wang, Siming Liu, Zhenzhen Yang , dePamphilis, C.W., Yoder,J.I. Collakova, E. Westwood, J.H. 2019. Comparative metabolomics of early development of the parasitic plants *Phelipanche aegyptiaca* and *Triphysaria versicolor.* Metabolites 2019(9): (https://www.ncbi.nlm.nih.gov/pubmed/31200467) [A study of amino acid and central carbon metabolites in two parasite species and their hosts over the course of early development from seedlings through host-attached parasites. *P. aegyptiaca* and *T. versicolor* differ substantially from each other, likely reflecting different host dependencies.]

Cochavi, A., Ephrath, J., Eizenberg, H. and Rachmilevitch, S. 2018. *Phelipanche aegyptiaca* parasitism impairs salinity tolerance in young leaves of tomato. Physiologia Plantarum 164(2): 191-203. [Concluding that *P. aegyptiaca* parasitism reduced the salt tolerance of tomato plants by promoting the accumulation of salts from the rhizosphere and impairing the host's osmotic adjustment ability.]

Coelho, R.P., Feksa, D.L., Oliveira, P.M., Güllich, A.A.daC., Pilar, B.C., Piccoli, J.daC.E. and Manfredini, V. 2018. Protective effect of the hydroalcoholic extract of *Tripodanthus acutifolius* in hypercholesterolemic Wistar rats.Biomedicine & Pharmacotherapy 97: 300-309. [Regarding oxidative damage to biomolecules, *T. acutiformis* showed a protective effect on lipids , proteins and DNA. Histological analysis of the aortic artery showed that treatment was able to decrease aortic vasculature. Hence, *T. acutiformis* is rich in antioxidant compounds and may be an alternative for the treatment of hypercholesterolemia.]

Cui JinLong, Gong Yi, Vinod Vijayakumar, Zhang Gang, Wang MengLiang, Wang JunHong and Xue XiaoZan. 2019. Correlation in chemical metabolome and endophytic mycobiome in *Cynomorium songaricum* from different desert locations in China. Journal of Agricultural and Food Chemistry 67(13): 3554-3564. [Concluding that endophytic fungi may influence the production of metabolites involved in the effectiveness of *C. songaricum* as a traditional medcine.]

Cui XiangDan, He Xin, Zhu JieBo, Liu LiYuan, Quan JiShu and Yin XueZhe. 2018. (Inhibition of *Boschniakia rossica* polysaccharides on oxidative stress-induced apoptosis in vascular endothelial cells.) (in Chinese) Shipin Kexue / Food Science 39(9): 127-133. [Polysaccharides from *B. rossica* had an inhibitory effect on oxidative stress-induced apoptosis in human vascular endothelial cells *in vitro*, likely through inhibiting mitochondrial apoptosis and death receptor pathways.]

De Novais, L.M.R. and 12 others. 2019. 4′-hydroxy-6,7-methylenedioxy-3-methoxyflavone: a novel flavonoid from *Dulacia egleri* with potential inhibitory activity against cathepsins B and L. Fitoterapia 132: 26-29. [This flavonoid found to inhibit activity of cathepsins, involved in some types pf cancer.]

DeSiervo, M.H., Jules, E.S., Bost, D.S., de Stigter, E.L. and Butz, R.J. 2018. Patterns and drivers of recent tree mortality in diverse conifer forests of the Klamath Mountains, California. Forest Science 64(4): 371-382.

*Ding JiaJi, Gu CaiMei, Huang LinFang and Tan Rui. 2018. Discrimination and geographical origin prediction of *Cynomorium songaricum* Rupr. from different growing areas in China by an electronic tongue. Journal of Analytical Methods in Chemistry 2018: ID 5894082. (https://www.hindawi.com/journals/jamc/201

8/5894082/) [Confirming the effectiveness of an 'electronic tongue' for discriminating between popualtions of *C, songaricum* from different parts of the country.]

Dieni, Z., Tignegre, J.B.delaS., Tongoona, P., Dzidzienyo, D., Asante, I.K. and Ofori, K. 2018. Identification of sources of resistance to *Alectra vogelii* in cowpea [*Vigna unguiculata* (L.) Walp.] germplasm from Burkina Faso. Euphytica 214(12): 234. [Among 20 cowpea varieties identified as resistant to *S. vogelii*, Komcalle, IT99K-573-2-1 and IT98K-205-8 are improved and farmers' adopted varieties and are thus recommended for farmer use.]

*Drozdoff, L., Klein, E., Kiechle, M. and Paepke, D. 2018. Use of biologically-based complementary medicine in breast and gynecological cancer patients during systemic therapy. BMC Complementary and Alternative Medicine 18: No.259. (https://bmccomplementalternmed.biomedcentral.com/track/pdf/10.1186/s12906-018-2325-3) [Among 448 patients with breast or ovarian cancer in a clinic in Germany, 25% chose to have supplementary treatment with preparations of *Viscum album*.]

*Du KunZe, Li Jin, Guo XinRong, Li YuHong and Chang YanXu. 2018. Quantitative analysis of phenolic acids and flavonoids in *Cuscuta chinensis* Lam. by synchronous ultrasonic-assisted extraction with response surface methodology. Journal of Analytical Methods in Chemistry 2018: ID 6796720. (https://www.hindawi.com/journals/jamc/2018/6796720/) [Describing an elaborate technique for quantifying the different potential active compounds in extracts of *C. chinensis*.]

*Dvorakova, M., Hylova, A., Soudek, P., Petrova, S., Spichal, L. and Vanek, T. 2019. Triazolide strigolactone mimics as potent selective germinators of parasitic plant *Phelipanche ramosa*. Pest Management Science 75(7): 2049-2056. (https://onlinelibrary.wiley.com/doi/abs/10.1002/ps.5330) [Reporting the synthesis of triazolide strigolactone mimics which stimulate germination of *P. aegyptiaca* at 5 X 10^{-10} M, but do not stimulate that of *Striga hermonthica* even at 1 X 10^{-5} M.]

Emaikwu, V., Ndukwe, I.G., Iyun, O.R.A. and Anyam, J.V. 2019. Preliminary phytochemical and antimicrobial activity screening of crude extracts of bird lime (*Tapinanthus globiferus*). Journal of Applied Sciences and Environmental Management 23(2): 305-308. [Several species of the genus *Tapinanthus* have folkloric use by Hausa and Fulani tribes of Northern Nigeria as a remedy for numerous human and animal ailments including stomach ache, diarrhea, dysentery, wounds and swellings. Preliminary analyses showed presence of flavonoids, steroids and terpenes, and activity against a range of common pathogenic bacteria.]

Eom, J. and 9 others. 2018. Pleurodesis using mistletoe extract delivered via a spray catheter during semirigid pleuroscopy for managing symptomatic malignant pleural effusion. Respiration 95(3): 177-181. [Pleurodesis with mistletoe (*Viscum album*) extract delivered via a spray catheter during semirigid pleuroscopy is a safe and effective procedure for managing symptomatic malignant pleural effusion.]

Fadini, R.F., Fischer, E., Castro, S.J., Araujo, A.C., Ornelas, J.F. and de Souza, P.R. 2018. Bat and bee pollination in *Psittacanthus* mistletoes, a genus regarded as exclusively hummingbird-pollinated. Ecology 99(5): 1239-1241. [*P. acinarius* and *P. eucalyptifolius* found to be bat (*Glossophaga soricina* and *Phyllostomus discolor*)-, and bee (*Centris* and *Neoxylocopa* spp.)-pollinated, respectively, in Brazil.]

Fantaye Belay and Kasa Meles. 2019. Variety × nitrogen fertilizer interaction on *striga* control, yield and yield related attributes of sorghum [*Sorghum bicolor* (L.) Moench] under striga infestation conditions of Abergelle district, Northern Ethiopia. International Journal of Life Sciences (Amravati) 7(1) 11-20. [Early, *Striga*-resistant sorghum variety Gobye gave highest yield of 1743 kg/ha while another, Abshir gave lower yields.]

Fatima, T., Srivastava, A., Hanur, V.S., Somashekar, P.V. and Rao, M.S. 2019. Genetic diversity estimates of *Santalum album* L. through microsatellite markers: implications on conservation. American Journal of Plant Sciences 10(3): 462-485. [Genetic diversity within and among 14 populations of sandalwood from three states was determined. 97% of the variation was within population and clustering methods gave three groups with admixtures of alleles from different states. It is suggested that populations with high genetic diversity be

conserved to counter genetic erosion owing to harvesting.]

Felenda, J.E., Turek, C. and Stintzing, F.C. 2019. Antiproliferative potential from aqueous *Viscum album* L. preparations and their main constituents in comparison with ricin and purothionin on human cancer cells. Journal of Ethnopharmacology 236: 100-107. [Phenolic compounds found in all 'Iscucin' (*V. album*) preparations may contribute to the cytotoxic activity of the component ML-1 by antioxidative action. However, further studies are necessary to evaluate the role of another component, VT-A, and possible synergistic actions to the antiproliferative effect of aqueous *V. album* extracts.]

Feng BingWei, Song YongGui, Xu QiongMing, Xu PengFei, Zeng Qiang, Shan BaiXi , Liu KuangYi and Su Dan. 2018. Simultaneous determination of savaside A, acteoside, and isoacteoside in rat plasma by UHPLC-MS/MS: comparative pharmacokinetic and bioavailability characteristics of *Monochasma savatieri* via different routes of administration. Journal of Separation Science 41(24): 4408-4418. [Comparing different methods of extraction and application of *M. savatieri* (Orobanchaceae) as a traditional medicine in China.]

Fjordheim, K., Moen, A., Hjelle, K., Bjune, A.E. and Birks, H.H. 2018. Modern pollen-vegetation relationships in traditionally mown and unmanaged boreal rich-fen communities in central Norway. Review of Palaeobotany and Palynology 251: 14-27. [Proposing that the presence of '*Pedicularis*-type' pollen suggests that the site had been subject to mowing in the past.]

Fontúrbel, F.E., Bruford, M.W., Salazar, D.A., Cortés-Miranda, J. and Vega-Retter, C. 2019. The hidden costs of living in a transformed habitat: ecological and evolutionary consequences in a tripartite mutualistic system with a keystone mistletoe. Science of the Total Environment 651(2): 2740-2748. [Studying the variability in the mistletoe *Tristerix corymbosus,* its pollinator (*Sephanoides sephaniodes*) and its seed disperser (*Dromiciops gliroides*) in a 'transformed habitat' and finding that the mistletoe may be resilient but its highly specialized interactions along with changes in its spatial configuration depict a more complex scenario, which probably impose a cost in terms of lower genetic diversity and increased relatedness that might compromise its long-term viability.]

Francisco-Gutiérrez, A., Cházaro-Basáñez, M., Espejo-Serna, A., García-Franco, J., Torres-Cantú, G. 2019. *Aphyllon castilloi* sp. nov. (Orobanchaceae) from Veracruz, Mexico. Nordic Journal of Botany 37(4): 1-8. [The new species inhabits a restricted area of tropical semi-deciduous forest (unlike others in the genus which are from sandy deserts), parasitising *Simsis foetida*.]

*Francisco Ornelas, J., Licona-Vera, Y. and Vásquez-Aguilar, A.A. 2018. Genetic differentiation and fragmentation in response to climate change of the narrow endemic *Psittacanthus auriculatus*. Tropical Conservation Science 11: 1-15. (https://journals.sagepub.com/doi/pdf/10.1177/1940082918755513) [Chloroplast DNA sequences were used to examine the phylogeographic patterns of this mistletoe in Oaxaca and conducted ecological niche modeling The species occurs in northern and southern groups that are genetically differentiated, consistent with a model of range contraction during glacial cycles and expansion during interglacials. No range changes were predicted under future scenarios of climate change.]

Fujioka1, H., Samejima1, H., Suzuki, H., Mizutani1, M., Okamoto, M., and Sugimoto, Y. 2019. Aberrant protein phosphatase 2C leads to abscisic acid insensitivity and high transpiration in parasitic *Striga*. Nature Plants 5: 258–262. (https://www.nature.com/articles/s41477-019-0362-7) [Identifying protein phosphatase ShPP2C1 as being responsible for the lack of response of *Striga* to ABA, making it continue to transpire under drought conditions and so continue to draw nutrients from the host.]

Furlan, C.M., Anselmo-Moreira, F., Teixeira-Costa, L., Ceccantini, G. and Salminen, J.P. 2019. Does *Phoradendron perrottetii* (mistletoe) alter polyphenols levels of *Tapirira guianensis* (host plant)? Plant Physiology and Biochemistry 136: 222-229. [The authors suggest that the parasite alters the biochemistry of the host by altering tannin chemistry, as reported in several other host-parasite studies]

Gao FangLei, Che XiuXia, Yu FeiHai and Li JunMin. 2019. Cascading effects of nitrogen, rhizobia and parasitism via a host plant. Flora

(Jena) 251: 62-67. ['Interestingly, both rhizobium inoculation and N addition significantly increased biomass of *C. australis*, and both parasitism by *C. australis* and N addition significantly reduced biomass of rhizobia. Therefore, parasitic plants can benefit from rhizobia and N addition via improved host (soyabean) growth. Rhizobia suffer from parasitic plants by competing with them for photosynthetic carbon from the host, and from high N supply likely because high N reduces their affinity for symbiotic partnerships with the host. Our results highlight the complex cascading effects of biotic and abiotic interactions via host plants.]

Göl, Ç., Serdar, B., Öztürk, M., Coşkuner, K.A. and Bİlgİlİ, E. 2018. (The effect of pine mistletoe (*Viscum album* L. subsp. *austriacum* (Wiesb.) Vollman) on wood anatomy of Scots pine (*Pinus sylvestris* L.).) (in Turkish) Düzce Üniversitesi Bilim ve Teknoloji Dergisi / Duzce University Journal of Science & Technology 6(4): 1354-1363. [Certain parameters of the wood structure of *P. sylvestris* were found to be reduced by up to 80% by *V. album*.]

*Gonzalez, A.M., Sato, H.A. and Marazzi, B. 2019. Embryology in *Helosis cayennensis* (Balanophoraceae): structure of female flowers, fruit, endosperm and embryo. Plants 8(3): pp.74. (https://www.mdpi.com/2223-7747/8/3/74/htm) Gonzalez, A.M., Sato, H.A. and Marazzi, B. 2019. Embryology in *Helosis cayennensis* (Balanophoraceae): structure of female flowers, fruit, endosperm and embryo. Plants 8(3): pp.74. [Light and scanning electron microscopy was used to study female inflorescences and flowers. The female gametophyte named the *Helosis*-type is a bisporic four-celled embryo sac, provided with a typical egg apparatus and a uni-nucleated central cell.]

*González-Elizondo, M., Flores-Villegas, M.Y., Álvarez-Zagoya, R., González-Elizondo, M.S., Márquez-Linares, M.A., Quiñonez-Barraza, S., Howell, B.E. and Mathiasen, R.L. 2019. Effects of Mexican dwarf mistletoe (*Arceuthobium vaginatum* subsp. *vaginatum*) on the growth of *Pinus cooperi* in Durango, Mexico - a case study. Forest Pathology 49(1): e12473. (https://onlinelibrary.wiley.com/doi/10.1111/efp.12473) [Moderate to severe infestation by *A. vaginatum* caused 50% and 17% reductions of timber volume and height respectively in *P. cooperi*.]

Gulwaiz Akhter, Khan, T.A. and Aiman Zafar. 2018. First report of *Orobanche cernua* parasitism on *Allium cepa* in Banda district of Uttar Pradesh, India. Journal of Crop Improvement 32(5): 681-689.

Guo YuanHeng, Cao LiLi, Zhao Bing, Zhao QingSheng, Huang YuanRong and Xiao ChuanMing. 2018. Hepatoprotective effect of phenylethanoid glycosides from *Cistanche deserticola* against chronic hepatic injury induced by alcohol. Shipin Kexue / Food Science 39(13): 176-183. [Results indicate that the glycosides from . *C. deserticola* possess hepatoprotective properties against chronic alcohol-induced liver injury, the mechanisms involving the modulation of related enzyme (including superoxide dismutase, glutathione S-transferase, glutathione peroxidase) activities and the reduction of lipid peroxidation products such as malondialdehyde.]

Hagos Kidane and Tsehaye Brhane. 2018. Improving faba bean production of smallholder farmers' through on-farm popularization of *Orobanche crenata* tolerant variety in southern Tigray, north Ethiopia. International Journal of Agriculture and Biosciences 7(4): 229-235. [Commenting that the relatively newly-introduced *O. crenata* is now 'the main constraint of faba bean production in the highland areas of southern Tigray, and can cause up to 100% yield loss.' Trials over two seasons, with the tolerant variety 'Hashenge' (previously known as ILB4358) gave substantially higher yields than local varieties and was favoured by a large majority of farmers on most of its characteristics, other than being late maturing and not having good flavour in the local 'wat' dishes.]

*Heidari, M. and Bayat, M. 2018. (Investigating the oak trees with diffent dimensions contaminated by *Loranthus europaeus* in the middle Zagros (case study: Gilan-e Gharb, Kermanshah).) (in Persian) Iranian Journal of Forest and Range Protection Research 16(1): Pe35-Pe46. (http://ijfrpr.areeo.ac.ir/article_117131_f44168dc4c11c620ebd255900a1ed942.pdf) [A survey of 9 tree species, dominated by *Quercus brantii*, concluding that the level of infection by *L. europaeus* was closely correlated with tree size.]

Hemmati, R. and Gholizadeh, R. 2019. *Talaromyces trachyspermus* a potential biocontrol agent for branched broom rape (*Orobanche ramosa*). Australasian Plant Pathology 48(3): 217-219. [Results suggest that *T. trachyspermus* (Trichocomaceae) has potential for safe biocontrol of *O. ramosa* in Iran.]

Herawan, T. and Putri, A.I. 2018. (Influence of arbuscular mycorrhiza and *Portulaca* sp. host to acclimatization of cendana (*Santalum album* L.) plantlets.) (in Indonesian) Jurnal Pemuliaan Tanaman Hutan 12(2): 157-165. [Showing that mycorrhiza are important to prevent mortality of *S. album* plantlets on *P. oleracea.*]

Heriyanto, N.M., Samsoedin, I. and Bismark, M. 2019. (Biodiversity flora and fauna in the region forest Bukit Datuk Dumai Riau Province.) (in Indonesian) Jurnal Sylva Lestari 7(1): 82-94. [Forest in the Riau Province of Indonesia dominated by three tall species including *Ochanostachys amentacea* (Olacaceae).]

Hódar, J.A., Lázaro-González, A. ad Zamora, R. 2018. Beneath the mistletoe: parasitized trees host a more diverse herbaceous vegetation and are more visited by rabbits. Annals of Forest Science 75(3): 77. [A study in SE Spain, concluding that parasitism by *Viscum album,* by creating patches of greater nutrient availability under the host canopy, extends its effects beyond the host tree to other members of the forest community, which in turn contributes to environmental heterogeneity with their activity.]

Honsa, Z.L., Mashtoubabc, S., Howarthabd, G.S., Honsab, L.C.C., Simsone, L., Cheahbf, K.Y. and Bastianf, S.E.P. 2018. Comparative effects of mistletoe extracts in combination with 5-Fluorouracil on viability of IEC-6 and Caco-2 intestinal epithelial cells. Australian Journal of Herbal and Naturopathic Medicine 30(4): 174-179. [Extracts of *Viscum album* from three different hosts were compared. Those from *Fraxinus* were most potent in reducing colon cancer cell viability. Those from *Malus* were least effective and those from *Quercus* were intermediate. Some activation was apparent in combination with 5-fluoracil.]

Hoseyni, S.M., Najafi, H., Sani, B. and Mozafari, H. 2018. Role of new herbicides in dodder (*Cuscuta campestris*) control in sugar beet (*Beta vulgaris*) fields. Applied Ecology and Environmental Research 16(4): 5117-5125. [*C. campestris* well controlled by propyzamide with beneficial effects on sugar beet yield (in Iran).]

Huish, R. and Klopf, R. 2018. Environmental correlates to population structure and health of the rare piratebush (*Buckleya distichophylla*) within Poor Mountain Natural Area Preserve, Virginia. Natural Areas Journal 38(2): 148-153. [Concluding that successful sexual reproduction within this piratebush population may be rare, and establishing a detailed baseline assessment of the largest extant piratebush population, enabling future study of factors relevant to the long-term viability of this species.]

*Imerovski, I., Dedić, B., Cvejić, S., Miladinović, D., Jocić, S., Owens, G.L., Tubić, N.K. and Rieseberg, L.H. 2019. BSA-seq mapping reveals major QTL for broomrape resistance in four sunflower lines. Molecular Breeding 39(March 2019): 41. (https://link.springer.com/article/10.1007%2Fs11032-019-0948-9) [Four F3 families of sunflower from Serbia, Spain, Romania and Romania were phenotyped for resistance to *Orobanche cumana* race G. Resistance was polygenic and numerous QTLs were identified, including a new QTL or3.2 on chromosome 3 which was found to be consistently associated with resistance to race G.]

Inusa, A., Sanusi, S.B., Linatoc, A.C., Mainassara, M.M. and Ibrahim, M.A. 2018. Phytochemical and antibacterial screening of mistletoe (*Agelanthus dodoniesfolius* (DC)) collected from shea butter tree (*Vitelleria paradoxa*). Science World Journal 13(3): 33-36. [Confirming that *Agelanthus dodoneifolius* which has been used ethno-botanically in Northern Nigeria for the treatment of diarrhea, dysentery, and stomach ache, has anti-bacterial activity agains *Staphlococcus aureus*.]

Jahani-Azizabadi, H., Durmic, Z., Vadhanabhuti, J. and Vercoe, P.E. 2019. Effect of some Australian native shrubs essential oils on in vitro rumen microbial fermentation of a high-concentrate diet. Journal of Animal and Plant Sciences 29(1): 8-15. [Among 8 oils tested, only *Santalum spicatum* treatment reduced methane (50% reduction) and ammonia-N (59% reduction) without serious effect on overall fermentation.]

***Jamil, M. and 13 others including Al-Babili, S. 2019. Methylation at the C-3′ in D-ring of strigolactone analogs reduces biological**

activity in root parasitic plants and rice. Frontiers in Plant Science 2 April 2019. (https://www.frontiersin.org/articles/10.3389/fpls.2019.00353/full) [Describing the greatly increased activity of previously published strigolactone analogues, AR8 and AR36 after de-methylation, yielding MP13 and MP26 respectively which showed enhanced promise as triggers for suicidal germination of *Striga hermonthica*.]

Jia Dan, Xu Shuo, Sun Jie, Zhang ChuanBo, Li DasHuai and Lu WenYu. 2019. *Yarrowia lipolytica* construction for heterologous synthesis of α-santalene and fermentation optimization. Applied Microbiology and Biotechnology 103(8): 3511-3520. [Describing the synthesis of α-santalene by *Yarrowia lipolytica,* an oleaginous yeast, which has been metabolically engineered to produce valuable compounds such as terpenoids and biofuel.]

Jiao LiChao, He Tuo, Dormontt, E.E., Zhang YongGang, Lowe, A.J. and Yin YaFang. 2019. Applicability of chloroplast DNA barcodes for wood identification between *Santalum album* and its adulterants. Holzforschung 73(2): 209-218. [Reporting the refinement of a DNA bar-coding technique for reliable identification *of Santalum album, S. acuminatum, S. lanceolatum, S. murrayanum and S. spicatum*.]

Jimoh, O.A., Ihejirika, U.G., Balogun, A.S. and Uwaeziozi, U.C. 2018. Antioxidative effect of mistletoe leaf meal supplemented diets in laying pullets. Archivos de Zootecnia 67(260): 526-530. [Another paper referring to '*Viscum album'* in Nigeria.]

Justine, V.T., Muskhazli Mustafa and Go, R. 2018. Effect of antimicrobial activities on the various solvents extracts of leaves of *Scurrula ferruginea* (Jack) Danser (Loranthaceae). Pertanika Journal of Tropical Agricultural Science 41(2): 677-686.

*Kaitera, J., Kauppila, T. and Hantula, J. 2018. New alternate hosts for *Cronartium* spp.: *Odontites*, *Euphrasia*, *Rhinanthus* and *Papaver*. Forest Pathology48(6): e12466. (https://onlinelibrary.wiley.com/journal/14390329) [*Cronartium spp. (C. flaccidum* and *C. ribicola*) responsible for blister rusts in *Pinus* spp. were found to sporulate variously on *Melampyrum sylvaticum, Odontites verna*, *Rhinanthus minor, R. serotinus* and *Euphrasia stricta*.]

Keskİn, D. and Ceyhan-Guvensen, N. 2018. Determination of bioactive components and antimicrobial activity of methanolic extracts of mistletoe leaves (*Viscum album* L. subsp. *album* L.). Fresenius Environmental Bulletin 27(12): 7991-7996. [Ethanol, methanol, hexane, chloroform, isopropanol and water extracts of leaves of *V. album* were compared for their antimicrobial activity against 11 bacteria and one yeast. The methanolic extract was the most effective against *Streptococcus faecalis* and *Bacillus subtilis*.]

*Kim EunSun, Zaya, D.N., Fant, J.B. and Ashley, M.V. 2019. Reproductive trade-offs maintain bract color polymorphism in scarlet Indian paintbrush (*Castilleja coccinea*). PLoS ONE 14(1): e0209176. (https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0209176) [Results indicate that the red-bract form has higher seed set when cross-pollinated, but the yellow-bract form has higher seed set when not self-pollinated. Such reproductive assurance, which would be important for fluctuations in pollinator abundance or colonizing new areas, may act as a selective agent to maintain such polymorphisms.]

Kim YoungHoon, Kim InBo, Park ChoonHo and Kim JongBae. 2018. Korean mistletoe lectin enhances natural killer cell cytotoxicity via upregulation of perforin expression. Asian Pacific Journal of Allergy and Immunology 36(3):175-183. [Demonstrating that the signal transduction controlling NK lymphocyte cytotoxicity was mediated by upregulation of the NKG2D receptor and expression of a cytotoxic effector molecule. These results suggested that lectin from *Viscum album coloratum* possessed immunological activity, mediated by NK cell activation.]

Klutsch, J.G. and Erbilgin, N. 2018. Dwarf mistletoe infection in jack pine alters growth-defense relationships. Tree Physiology 38(10):1538-1547. [Studying the defence reactions of *Pinus banksiana* to infection by *Archeuthobium americanum* shows the long term affect on phloem resistance and radial growth. Resource allocation by the host is long lasting and will affect later infections.]

*Koenig, W.D., Knops, J.M.H.,Carmen, W.J., Pesendorfer, M.B. and Dickinson, J.L. 2018. Effects of mistletoe (*Phoradendron villosum*) on California oaks. Biology Letters 14(6): 20180240.

(https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2018.0240) [Coming to the slightly surprising conclusion that there were no detrimental effects of *Phoradendron villosum* on *Quercus douglasii, Quercus kelloggii* or *Quercus lobata*. This species therefore resembles an epiphyte more than a parasite - and provides important ecosystem services.]

Kong ZweLing, Johnson, A., Ko FanChi, He JiaLing and Cheng ShuChunL. 2018. Effect of *Cistanche tubulosa* extracts on male reproductive function in streptozotocin-nicotinamide-induced diabetic rats. Nutrients 10(10): 1562. [The presence of echinacoside in extracts of *C. tubulosa* is known to improve memory and sexual ability, reduce impotence, and minimize constipation.This study confirmed that it also has antioxidant, anti-inflammatory, and steroidogenesis effects.]

***Kountche, B.A., Jamil, M., Yonli, D., Nikiema, M.P., Blanco-Ania, D., Asami, T., Zwanenburg, B. and Al-Babili, S. 2019. Suicidal germination as a control strategy for *Striga hermonthica* (Benth.) in smallholder farms of sub-Saharan Africa. People, Plants, Planet 1(2): 107-118. (https://nph.onlinelibrary.wiley.com/doi/10.1002/ppp3.32) [Pot and field experiments, conducted with the stimulants, Nijmegen-1, GR24, MP1 and MP2 gave varying results, affected by soil type and crop (sorghum or millet). But up to 60% reduction in emergence of *S. hermonthica* was achieved in best conditions. MP1 gave the best results. Overall they confirm that the technique is worth further development.]**

Koval, L.V., Horshkova, L.M., Kuzmenko, L.O, Mehem, O.M., Burchak, L.V.and Polyakova, A.S. 2018. (Sozological peculiarities of the flora of the Desna Plateau (Ukraine).) (in Ukrainian) Biosystems Diversity 26(1): 37-45. [A survey concluded there were 85 rare species threatened by anthropogenic impact included *Pedicularis sceptrum-carolinum* (near its northern limit) and *P. kaufmannii*.]

*Kovar, L. and 12 others. 2018. PacBio-based mitochondrial genome assembly of *Leucaena trichandra* (Leguminosae) and an intrageneric assessment of mitochondrial RNA editing. Genome Biology and Evolution 10(9): 2501-2517. (https://academic.oup.com/gbe/article/10/9/2501/5076815) [The mitochondrial genome of *Leucaena* was compared to those from 7 other legumes, 8 diverse angiosperms, and *Lophophytum mirabile* (Balanophoraceae). It was previously shown (Sanchez-Puerta et al. 2017) that for the latter, 80% of its protein coding genes are derived from its legume host through horizontal gene transfer.]

Krishnakumar, N. and Parthiban, K.T. 2018. Comparison of phytochemical constituents of the identified sandalwood (*Santalum album* L.) genetic resources in India. Journal of Essential Oil-Bearing Plants 21(3): 658-666. [Forty-five constituents of the oil from *S. album* were identified, α and β-santalol being the most important for quality. Identifying the regions of India with the highest santalol content.]

*Krupp, A., Heller, A. and Spring, H. 2019. Development of phloem connection between the parasitic plant *Orobanche cumana* and its host sunflower. Protoplasma 13 pp. (https://link.springer.com/article/10.1007/s00709-019-01393-z) [Describing the ultrastructure of the phloem elements, very intermixed in the haustorium, but the sieve-element plastids of the *O. cumana* were larger, often irregular in shape and contained few, small starch inclusions, while those o the host were significantly smaller, always roundish with more and larger starch inclusions. This made it possible to trace the exact contact site of host and parasite sieve elements to show a direct symplastic phloem connection between the two species. Also showing that undifferentiated cells of the parasite could connect to fully differentiated sieve elements of the host.]

Kubícek, J., Špinlerová, Z., Michalko, R., Vrška, T. and Matula, R. 2018. Temporal dynamics and size effects of mistletoe (*Loranthus europaeus* Jacq.) infection in an oak forest. Austrian Journal of Forest Science/Centralblatt für das gesamte Forstwesen 135(2): [Studying the development of *L. europaeus* on *Quercus petraea* with time and the size of the host in the Podyjí National Park, Czech Republic, concluding that the rate of infestation was rapid in young trees and declined with host age.]

*Kusuma, Y.W.C., Noerwana, O. and Isagi, Y. 2018. New evidence for flower predation on three parasitic *Rafflesia* species from Java. Tropical Conservation Science 11: 6 pp. (https://journals.sagepub.com/doi/pdf/10.1177/1940082918796011) [Finding that that two

small mammals predated a flower bud of *R. patma* in West Java, Indonesia, one of which has not previously been identified as a predator of *Rafflesia* flowers. Also detected was a wasp infection in *R. rochussenii* and predation by another animal on *R. zollingeriana*. Overall, flower bud predation by animals damaged up to 10% of the surveyed flowers.]

Lans, C. 2019. Do recent research studies validate the medicinal plants used in British Columbia, Canada for pet diseases and wild animals taken into temporary care? Journal of Ethnopharmacology 236: 366-392. [*Viscum album* among plants used to treat heart problems in pets.]

Lázaro-González, A., Hódar, J.A. and Zamora, R. 2019. Mistletoe versus host pine: does increased parasite load alter the host chemical profile? Journal of Chemical Ecology 45(1): 95-105. [Assessing needles of *Pinus nigra* subsp. *salzmannii* for changes induced by infection with *Viscum album* ssp. *austriacum* and finding the content of monoterpenes to increase with level of parasitism while content of N decreased. These changes corresponded with the effects of other stresses. Low levels induced reactions resembling those against drought while medium and high parasitism elicited responses comparable to those against burning and defoliation.]

Li MengJiao, Chen Qing, Li Ting, Ye WanHui and Shen Hao. 2018. (Influence of parasitic plant *Cuscuta campestris* on leaf chlorophyll fluorescence parameters of five mangrove species.) (in Chinese) Guangxi Zhiwu / Guihaia 38(10): 1261-1266. [Confirming that *C. campestris* was unable to establish on mangrove species (*Acanthus ilicifolius, Bruguiera gymnorrhiza* and *Kandelia candel*) or on associated species *Cerbera manghas* and *Heritiera littoralis*. Hence it was safe to use *C. campestris* to control *Mikania micrantha* (in China).]

, *Chen* Xin-lian, Cui Ying-xian, Xu Zhi-chao, Li Yong-hua, Song Jing-yuan, Duan Bao-zhong, Yao Hui. 2017. Gene losses and partial deletion of small single-copy regions of the chloroplast genomes of two hemiparasitic *Taxillus* species. Scientific Reports 7, 12834. [The complete chloroplast genomes of two *Taxillus* species are reported (first for Loranthaceae) that are 121-122 kb in size, smaller than relatives owing to the loss of all ndh genes, ribosomal protein genes, tRNA genes, ycf genes, and the infA gene.]

Libiaková, D., Ruyter-Spira, C., Bouwmeester, H.J. and Matusova, R. 2018. *Agrobacterium rhizogenes* transformed calli of the holoparasitic plant *Phelipanche ramosa* maintain parasitic competence. Plant Cell, Tissue and Organ Culture 135(2): 321-329.

*Lichota, A. and Gwozdzinski, K. 2018. Anticancer activity of natural compounds from plant and marine environment. International Journal of Molecular Sciences 19(11): 3533. [Including a section on *Viscum album*.]

Lim SeoNung, Lee WonWoo, Lee DooSuk;,Nam InJeong, Yun NaYoung, Jeong YoonSeon, Rho TaeWoong and Kim SunYoung. 2018. Botanical formulation HX109 ameliorates TP-induced benign prostate hyperplasia in rat model and inhibits androgen receptor signaling by upregulating Ca^{2+}/CaMKKβ and ATF3 in LNCaP cells. Nutrients 10(12): 1946. [Confirming promising effects of a mixture of *Cuscuta australis*, *Taraxacum officinale* and *Nelumbo nucifera* in treatment of BPH.]

*Li, Ying, Zhou Jian-guo, Chen Xin-lian, Cui Ying-xian, Xu Zhi-chao, Li Yong-hua, Song Jing-yuan, Duan Bao-zhong and Yao Hui. 2017. Gene losses and partial deletion of small single-copy regions of the chloroplast genomes of two hemiparasitic *Taxillus* species. Scientific Reports 7, 12834. (https://www.nature.com/articles/s41598-017-13401-4) [The complete chloroplast genomes of two *Taxillus* species, *T. chinensis* and *T. sutchuenensis,* are reported (first for Loranthaceae) that are 121-122 kb in size, smaller than relatives owing to the loss of all ndh genes, ribosomal protein genes, tRNA genes, ycf genes, and the infA gene.]

*Lin MingKuem, Lee MengShiou, Huang HuiChi, Cheng TunJen, Cheng YihDih and Wu ChiRei. 2018. *Cuscuta chinensis* and *C. campestris* attenuate scopolamine-induced memory deficit and oxidative damage in mice. Molecules 23(12): 3060. (https://www.mdpi.com/1420-3049/23/12/3060/htm) [Demonstrating that that both *Cuscuta* species exhibited a protective activity against SCOP-induced memory deficit, cholinergic dysfunction, oxidative damage and neuro-inflammation in

mice. *C. campestris* showed better potential than *C. chinensis*.]

Liu XiaoJin, Xu DaPing, Yang ZengJiang, Zhang NingNan and Pan LiJun. 2018. Investigation of exogenous benzyladenine on growth, biochemical composition, photosynthesis and antioxidant activity of Indian sandalwood (*Santalum album* L.) seedlings. Journal of Plant Growth Regulation 37(4): 1148-1158. [Results suggest that suggested that leaf application of 1 mg L^{-1} benzyladenine was the most suitable concentration for enhancing seedling quality during the nursery period.]

*Liu Ying, Hwang EunSon, Ngo, H.T.T., Perumalsamy, H., Kim YeonJu, Li Lu and Yi TaeHoo. 2018. Protective effects of *Euphrasia officinalis* extract against ultraviolet B-induced photoaging in normal human dermal fibroblasts. International Journal of Molecular Sciences 19(11): 3327.

Liu Yue and 9 others. 2018. *Cistanche deserticola* polysaccharides protects PC12 cells against OGD/RP-induced injury. Biomedicine & Pharmacotherapy 99: 671-680. [*C. deserticola polysaccharides at* 5 µg/ml provided a neuroprotective effect against oxygen-glucose deprivation/reperfusion -induced injury by inhibiting oxidative stress and regulating the DJ-1 pathway after ischaemia stroke.]

Llorent-Martínez, E.J., Fernández-de Córdova, M.L., Zengin, G., Bahadori, M.B., Aumeeruddy, M.Z., Rengasamy, K.R.R. and Mahomoodally, M.F. 2019. *Parentucellia latifolia* subsp. *latifolia*: a potential source for loganin iridoids by HPLC-ESI-MSn technique. Journal of Pharmaceutical and Biomedical Analysis 165: 374-380. [Analysing the various antioxidant and other potentially active components of extracts of *P. latifolia*. Abstract inadequate but 'loganin and its isomers, rutin, and luteolin-*O*-hexoside were the most abundant compounds. Results suggest that *P. latifolia* may be a valuable source of phyto-agents for the management of noncommunicable diseases.']

Lompo, O., Lykke, A.M., Lankoandé, B. and Ouédraogo, A. 2018. Influence of climate on fruit production of the yellow plum, *Ximenia americana,* in Burkina Faso, West Africa. Journal of Horticulture and Forestry 10(4): 36-42. [Determining that the optimum climate for *X. americana* was in the south-Sudanian phytogeographic zone, with a mean fruit weight per tree of 1.49±0.26 kg while the lowest value was observed in the sub-Sahel zone, with 0.67±0.11 kg.]

Lopez-Laphitz, R.M., Ezcurra, C. and Vidal-Russell, R. 2018. Cryptic species in the Andean hemiparasite *Quinchamalium chilense* (Schoepfiaceae: Santalales). Systematics and Biodiversity 16(3): 260-270. [Two cryptic species within *Q. chilense* exist: the Mountain and Matorral–Desert lineages that correlate with climatic and morphological differences.]

*López-Rodríguez, R., Herrera-Ruiz, M., Trejo-Tapia, G., Domínguez-Mendoza, B.E., González-Cortazar, M. and Zamilpa, A. 2019. In vivo gastroprotective and antidepressant effects of iridoids, verbascoside and tenuifloroside from *Castilleja tenuiflora* Benth. Molecules 24(7): 1292. (https://www.mdpi.com/1420-3049/24/7/1292/htm) [Finding that verbascoside, tenuifloroside and mixture geniposide/musseanoside all displayed gastroprotective effects and antidepressant activity and were likely to be the active ingrediants of *C. tenuifolia,* used medicinally in Mexico.]

Ma XueQin, Liu JingJing, Yang LingLing, Zhang Bo, Dong YanHong and Zhao QiPeng. 2018. *Cynomorium songaricum* prevents bone resorption in ovariectomized rats through RANKL/RANK/TRAF6 mediated suppression of PI3K/AKT and NF-κB pathways. Life Sciences 209:140-148. [*C. songaricum* exhibited potential therapeutic effect on bone metabolism of ovariectomized rats, and this effect was possibly exerted by RANKL/RANK/TRAF6 mediated down-regulation of NF-κB and PI3K/AKT pathways.]

*McKibben, M. and Henning, J.A. 2018. Hemiparasitic plants increase alpine plant richness and evenness but reduce arbuscular mycorrhizal fungal colonization in dominant plant species. PeerJ 6: 5682. (https://peerj.com/articles/5682/) [Finding that the presence of *Castilleja* spp. (*C. angustifolia, C. miniata* and/or *C. sulphurea*) was associated with an 11% increase in plant richness and a 5% increase in plant evenness, regardless of elevation; also that it reduced mycorrhizal fungal colonization within dominant plant species by ~20%, regardless of elevation (in California).]

*Maes, W.H., Huete, A.R., Avino, M., Boer, M.M., Dehaan, R., Pendall, E., Griebel, A.

and Steppe, K. 2018. Can UAV-based infrared thermography be used to study plant-parasite interactions between mistletoe and eucalypt trees? Remote Sensing 10(12): 2062. (https://www.mdpi.com/2072-4292/10/12/2062/htm) [Using thermal imagery to confirm that mistletoes (apparently several species but none named) have significantly lower temprature by 0.2-0.3°C and can confirm their presence in the canopies of *Eucalyptus fibrosa* and *E. moluccana* with infection rates of 69-75%.]

*Maisetta, G., Batoni, G., Caboni, P., Esin, S., Rinaldi, A.C. and Zucca, P. 2019. Tannin profile, antioxidant properties, and antimicrobial activity of extracts from two Mediterranean species of parasitic plant *Cytinus*. BMC Complementary and Alternative Medicine 19(82): 5 April 2019. (https://link.springer.com/article/10.1186/s12870-019-1740-z) [The profiles of C. *hypocistis* and *C. ruber* revealed significant amounts of gallotannins, in particular 1-*O*-galloyl-β-D-glucose. In addition, pentagalloyl-*O*-β-D-glucose was present in all extracts. These are likely to be the active compounds contributing to their antioxidant and antimicrobial activities.]

Mandumbu, R., Mutengwa, C., Mabasa, S. and Mwenje, E. 2019. Challenges to the exploitation of host plant resistance for *Striga* management in cereals and legumes by farmers in sub-Saharan Africa: a review. Acta Agriculturæ Scandinavica, Section B - Soil & Plant Science 69(1): 82-88. [A general review of *Striga*-resistance mechanisms, discussing the reasons why none are completely effective, and the need for integration of different mechanisms along with increased soil fertility etc.]

*Manju Sharma, Levenson, C., Browning, J.C., Becker, E.M., Clements, I., Castella, P. and Cox, M.E. 2018. East Indian sandalwood oil is a phosphodiesterase inhibitor: a new therapeutic option in the treatment of inflammatory skin disease. Frontiers in Pharmacology 9(March) 200. (https://www.frontiersin.org/articles/10.3389/fphar.2018.00200/full) [Reporting that 75% of pediatric eczema/atopic dermatitis patients treated with topical *Santalum album* formulations achieved a >50% reduction in their Eczema Area and Severity Index score. Also discussing the active ingredients and reactions involved.]

Mao ChangLi, Wu Yu, Zhang FengLiang and He MeiYing. 2019. (Genetic diversity of *Scleropyrum wallichianum* based on AFLP markers.) (in Chinese) Journal of Tropical and Subtropical Botany 27(1): 29-35. [*Scleropyrum wallichianum* (= *S. pentandrum*) is a root parasitic tree in Cervantesiaceae. Genetic diversity was assessed using AFLP markers obtained from seven populations from Yunnan Province. 88.5% of the variation existed within populations, thus *in situ* and *ex situ* protections were proposed to increase genetic diversity.]

Mao JiHua, Jia DaiShun, Chen Fu, Jing YueBo, Li RongBo, Li YongPeng, Chen ZhongHua and Li Jiang. 2018. (Hypocotyle grafting techniques of rare and endangered plant *Malania oleifera*.) (in Chinese) Journal of West China Forestry Science 47(5): 39-45.[Optimum grafting techniques for the 'rare and endangered' *M. oleifera* (Olacaceae) were: grafting in early June, cut-grafting, semi-lignified scion, retaining half a leaf, grafting at 6 cm height of hypocotyle, covering the grafting part with grafting membrane, growing the grafted plantlet with medium formula of 50% yellow sub-soil+20% +10% vermiculite +10% perlite +10% calcium magnesium phosphate fertilizer, and shading with 60% shade net.].

*Matata, D.Z., Ngassapa, O.D., Machumi, F. and Moshi, M.J. 2018. Screening of plants used as traditional anticancer remedies in Mkuranga and Same districts, Tanzania, using brine shrimp toxicity bioassay. Evidence-based Complementary and Alternative Medicine 2018 : ID 3034612. (https://www.hindawi.com/journals/ecam/2018/3034612/) [Referring to '*Loranthus micranthus*' (= *Englerina gabonensis* = *L. micrantherus*) among the most used anti-cancer remedies in Tanzania.]

Maul. K., Krug, M., Nickrent, D.L., Müller, K.F., Quandt, D. and Wicke S. 2019. Morphology, geographic distribution and host preference are poor predictors of phylogenetic relatedness in the mistletoe genus *Viscum* L. Molecular Phylogenetics and Evolution 131:106-115. [Nuclear ITS and chloroplast markers were used to generate a molecular phylogeny for 59 (of the ca. 120 species). *Viscum* originated in Africa and diversified via geographic isolation following long-distance dispersal to continental Asia and Australia. Multiple

switches from ancestral dioecy to monoecy occurred as well as multiple cases of the evolution of scale leaves.]

Mayelis, M.S.H. and Barros-Barrios, M. 2018. Diversity of weevils (Coleoptera: Curculionidae) in orchards of pecanero walnut in the north of Coahuila, Mexico. Revista Mexicana de Ciencias Agrícolas 9(2): 473-480. [Incidentally noting the occurrence of *Smicronyx interruptus* and *S. sculpticollis* of interest as possible biocontrol agents for *Cuscuta* spp.]

Mejri, S., Mabrouk, Y., Belhadj, O. and Saidi, M. 2018. *Orobanche foetida* resistance in two new faba bean genotypes produced by radiation mutagenesis. International Journal of Radiation Biology 94(7): 671-677. [Confirming that low induction of seed germination is a major component of resistance to *O. foetida* in the resistant variety Badi and two mutant lines P2 M3 and P7 M3. A parallel reduction in infection was accompanied by the continuous enhancement of the peroxidase activity, the polyphenol oxidase activity and the phenylalanine ammonia lyase activity in faba bean roots.]

*Misse, P.T.E. 2019. Development project to allay poverty and food insecurity in the north and far-north regions of Cameroon. SSRN Electronic Journal: 12 pp. (https/ssrn.com/abstract=3328098) [Describing a project aiming to overcome constraints on productivity in N. Cameroon. with particular emphasis on *Striga hermonthica.* Proposing three strategies: increased soil organic matter, legume rotations or intercrops, and growing *Striga* trap crops or non-host crops.]

Mochamad, L. Hermanto, B. and Hestianah, E.P. 2019. Determination of progesterone compounds in the crude methanol extract of benalu duku leaves. Veterinary World 12(3): 358-366. [Describing a complex technique for determining the presdece of progesterone in leaves of *Dendrophthoe pentandra* from the host *Lansiumdomesticum*, used as a traditional medicine in Indonesia.]

Mohamed, M.Kh.A. and El-Sayed, A.F. 2018. Effect of sowing dates on the competition between faba bean (*Vicia faba*, L.) genotypes and the parasitic weed, "*Orobanche crenata*, Forsk.". Alexandria Journal of Agricultural Sciences 63(2): 83-91. [Six bean varieties including Sakha1, Sakha3, Giza843, Misr3 were sown at two dates in Egypt but results not clear from the abstract.]

Mohapatra, S.R., Bhol, N. and Nayak, R.K. 2018. Influence of potting mixture on growth and quality of sandalwood (*Santalum album* L.) seedlings. Indian Forester 144(11): 1049-1053. [Comparing a wide range of media for the rearing of seedlings of *S. album*, and finding best results from a mixture of sand + red soil + vermicompost in 1:1:1 ratio.]

Mursidawati, S., Wicaksono, A. and Teixeira da Silva J.A. 2019. Development of the endophytic parasite, *Rafflesia patma* Blume, among host plant (*Tetrastigma leucostaphylum* (Dennst.) Alston) vascular cambium tissue. South African Journal of Botany 123: 382-386. [An anatomical study that confirms previous observations (e.g. Nikolov et al. 2014 Annals of Botany 114:233). [The authors indicate that the endophyte spreads within the host vascular cambium in a linear manner, but not as a continuous strand.]

Mutuku, J.M. and eleven others. 209. The structural integrity of lignin is crucial for resistance against *Striga hermonthica* parasitism in rice. Plant Physiology 179(4): 1796-1809. [The results demonstrate that enhanced lignin deposition and maintenance of the structural integrity of lignin polymers deposited at the infection site are crucial for the post-attachment resistance of rice variety Nipponbare against *S. hermonthica*.]

Nadİroğlu, M., Behçet, L. and Çakılcıoğlu, U. 2019. An ethnobotanical survey of medicinal plants in Karlıova (Bingöl-Turkey). Indian Journal of Traditional Knowledge 18(1): 76-87. [*Rhinanthus serotinus* ssp. *aestivalis* among species not previously recorded locally as medicinal herbs.]

Nave, L.E., Heckman, K.A., Muñoz, A.B. and Swanston, C.W. 2018. Radiocarbon suggests the hemiparasitic annual *Melampyrum lineare* Desr. may acquire carbon from stressed hosts. Radiocarbon 60(1): 269-281. [By girdling host trees and comparing the parasites response to non-girdled the authors indicate that the parasite takes more carbon and nitrogen from stressed trees.]

N'cho, S.A., Mourits, M., Rodenburg, J. and Lansink, A.O. 2018. Inefficiency of manual weeding in rainfed rice systems affected by parasitic weeds. Agricultural Economics 50(2): 151-163. (https://doi.org/10.1111/agec.12473) [Using a' directional input distance function DEA approach' and 'a truncated bootstrap regression' to establish that the technical

inefficiency of weeding labour was high in both Côte d'Ivoire (58%) and Benin (69%) implying that a substantial fraction of weeding labour could be saved without reducing rice yield or use of other inputs.]

Nickrent, D.L., Anderson, F. and Kuijt J. 2019. Inflorescence evolution in Santalales: Integrating morphological characters and molecular phylogenetics. American Journal of Botany 106: 402-414. [Molecular phylogenetic analyses were conducted on representatives of 146 of the 163 genera in the order. A grouping of three flowers (i.e., both dichasia and triads) was optimized on samples of the posterior distribution of trees from the Bayesian analysis using BayesTraits. This feature was not plesiomorphic for the order. Includes extensive discussion of inflorescence types in Santalales (minus the holoparasites).]

Nurochman, D., Matangaran, J.R., Santosa, G., Suharjito, D. and Sari, R.K. 2018. Autecology and morphological properties of sandalwood (*Santalum album*) in Pidie District, Aceh, Indonesia. Biodiversitas: Journal of Biological Diversity 19(2): 406-412. [Studies relating to *S. album* as an endangered species established that it was most commonly associated with *Syzygium cumini* and *Ziziphus oenopolia* in this region of Indonesia.]

Nyang'au, I.M., Kelboro, G., Hornidge, A.K., Midega, C.A.O. and Borgemeister, C. 2018. Transdisciplinary research: collaborative leadership and empowerment towards sustainability of push-pull technology. Sustainability 10(7): 2378. ['In this study, the push-pull technology was used as a boundary object to enable interactions among stakeholders across science-practice boundaries engaged in the control of stemborers in maize in SW Ethiopia.']

*Oboh, G., Babatola, L.J. and Ademiluyi, A.O. 2018. In vitro inhibitory effects of mistletoes (*Loranthus begwensis* L.) phenolic-rich extracts on α-amylase, α-glucosidase, and angiotensin converting enzyme activities. Journal of Food Biochemistry 42(4): e12504. (https://onlinelibrary.wiley.com/doi/10.1111/jfbc.12504) [This study compared the activity of extracts of '*L. begwensis*'(=*Tapinanthus bangwensis*) from different hosts (not specified in abstract) for their possible antidiabetic, antihypertensive, and antioxidant properties.]

*Oei ShiaoLi, Thronicke, A., Kröz, M., Herbstreit, C. and Schad, F. 2018. The internal coherence of breast cancer patients is associated with the decision-making for chemotherapy and *Viscum album* L. treatment. Evidence-based Complementary and Alternative Medicine 2018: ID 1065271. (https://www.hindawi.com/journals/ecam/2018/1065271/) [Studying the basis on which cancer patients choose to have supplementary treatment with *V. album*.]

Ogeron, C., Odonne, G., Cristinoi, A., Engel, J., Grenand, P., Beauchêne, J., Clair, B. and Davy, D. 2018. Palikur traditional roundwood construction in eastern French Guiana: ethnobotanical and cultural perspectives. Journal of Ethnobiology and Ethnomedicine 14(28): No.28. [Noting the use of timber from *Minquartia guianensis* for poles in the construction of permanent buildings.]

Ojelel, S., Mucunguzi, P., Katuura, E., Kakudidi, E.K., Namaganda, M. and Kalema, J. 2019. Wild edible plants used by communities in and around selected forest reserves of Teso-Karamoja region, Uganda. Journal of Ethnobiology and Ethnomedicine 15(3): (9 January 2019). [Noting that *Ximenia africana* is among the five most frequently used wild plants in local traditional medicine.]

*Omojokun, O.S., Oboh, G. and Ademiluyi, A.O. 2018. Effects of drying on cholinesterases and angiotensin-I converting enzyme inhibitory potential and phenolic constituents of African mistletoe (*Loranthus bengwensis* L) leaves from kolanut host tree. Journal of Food Biochemistry 42(4): e12510. (https://onlinelibrary.wiley.com/journal/17454514) [Sun-drying proved better than oven- or shade-drying for optimum activity in extracts of leaves of '*L. bengwensis*' (= *Tapinanthus bangwensis*). 20 phenolic compounds were identified with caffeic being the most predominant. Concluding that the extracts from this parasite infecting kolanut (*Cola* spp.) host trees can be used as a therapeutic agent in the management of Alzheimer's disease and hypertension.]

Opole, R.A. 2019. Opportunities for enhancing production, utilization and marketing of finger millet in Africa. African Journal of Food, Agriculture, Nutrition and Development 19(1): 13863-13882. [Proposing the increased cultivation of *Eleusine coracana* in Kenya, but noting its susceptibility to *Striga* spp.]

Ortiz, S., Lecsö-Bornet, M., Bonnal, C., Houze, S., Michel, S., Grougnet, R. and Boutefnouchet, S. 2019. Bioguided identification of triterpenoids and neolignans as bioactive compounds from anti-infectious medicinal plants of the Taira Atacama's community (Calama, Chile). Journal of Ethnopharmacology 231: 217-229. [Gram positive strains of clinical interest were highly sensitive to *Krameria lappacea*. A bioguided approach led to identification of conocarpan as the main bioactive compound.]

Osunlana, O.R., Bello, M.O., Johnson, J.A. and Afolabi, O.B. 2018. Antioxidant, compositional evaluation and blood pressure modulating potentials of *Bryophyllum pinnatum* (Lam.), *Viscum album* (L.) and *Artocarpus altilis* (Parkinson) leave extracts. Potravinárstvo: Slovak Journal of Food Sciences 12(1): 422-430. [Antioxidant activity of *V. album* was intermediate between that of the other two species. All considered to be of value in treatment of high blood pressure.]

Öztürk, L., Sİvrİ, N., ŞİN, B. and Kadıoglu, İ. 2018. Host range and distribution of European mistletoe *Viscum album* in Northwestern Marmara, Turkey. IX International Scientific Agriculture Symposium "AGROSYM 2018", Jahorina, Bosnia and Herzegovina, 4-7 October 2018. Book of Proceedings, 1075-1080. [A survey confirmed occurrence of *V. album* on wild pear, pear, almond, plum, apricot, oak, spruce tree, willow, cherry and poplar trees in Edirne, Kırklareli and Tekirdağ provinces. Cherry and pear were the most seriously damaged, to the point of tree death under the most dense infestations.]

Park InKyu, Yang SungYu, Kim WookJin, Noh PuReum, Lee HyunOh and Moon ByeongCheol. 2018. The complete plastome of *Cuscuta pentagona* Engelm. Mitochondrial DNA Part B 3(2): 523-524. [Complete chloroplast genome sequences for seven taxa exist in Genbank: *C. campestris* (not *C. gronovii*),*C. chinensis, C. exaltata, C. japonica, C. obtusiflora, C.* "*pentagona*", and *C. reflexa*. As pointed out by Costea and Stefanović in Haustorium 68, *C. pentagona* is often confused with *C. campestris*. The size of the plastome reported here is 86.38 kb whereas the previously misidentified one is 86.74. The voucher specimen should be checked.]

Park JongHeum, Kim YoNa, Kim JaeKyung, Park HaYoung and Song BeomSeok. 2019. Viscothionin purified from mistletoe (*Viscum album* var. *coloratum* Ohwi) induces insulin secretion from pancreatic beta cells. Journal of Ethnopharmacology 234: 172-179. [The study indicates that the hypoglycemic effect of *V. album* is mediated by its insulinotropic action and α-glucosidase inhibitory activity, and the effect is due to viscothionin, one of its major bioactive constituents.]

Park Su, Park GwangHun, Kim HaNa, Son HoJun, Song HunMin, Kim HyunSeok, Jeong HyungJin and Jeong JinBoo. 2018. Anti-inflammatory effect of the extracts from the branch of *Taxillus yadoriki* being parasitic in *Neolitsea sericea* in LPS-stimulated RAW264.7 cells. Biomedicine & Pharmacotherapy 104: 1-7.

Pei WenJing, Guo RuiLi, Zhang JinLi and Li XueQin. 2019. Extraction of phenylethanoid glycosides from *Cistanche tubulosa* by high-speed shearing homogenization extraction. Journal of AOAC International 102(1): 63-68. [Describing an improved method for extraction of echinacoside and acteoside themain active ingredients in *C. tubulosa*.]

Petersen, G., Zervas, A., Pedersen, H.Æ. and Seberg, O. 2018. Genome Reports: Contracted genes and dwarfed plastome in mycoheterotrophic *Sciaphila thaidanica* (Triuridaceae, Pandanales). Genome Biology and Evolution 10: 976–981. [The mycoheterotrophic plant *Sciaphila thaidanica* has a tiny plastome, only 12.7 kb in size and it contains only 20 potentially functional housekeeping genes.]

Piwowarczyk, R., Guzikowski, S., Depa, Ł. and Kaszyca, N. 2018. First report of *Smynthurodes betae* (Hemiptera: Aphididae) on *Phelipanche ramosa* (Orobanchaceae). Florida Entomologist101(2): 339-341. [Recording damaging effects of *S. betae* on *P. ramosa* in Poland, and suggesting further study of its potential for biological control.]

Piwowarczyk, R. and Mielczarek, L. 2018. First report of *Eumerus mucidus* (Diptera: Syrphidae) on *Cistanche armena* (Orobanchaceae) and from Armenia. Florida Entomologist 101(3): 519-521.

Piwowarczyk, R. Mielczarek, L. and Guzikowski, S. 2018. First report of *Phytomyza orobanchia* (Diptera: Agromyzidae) from Poland and *Chymomyza amoena* (Diptera: Drosophilidae) on

Phelipanche ramosa (Orobanchaceae). Florida Entomologist 101(3): 540-542.

Piwowarczyk, R., Pedraja, O.S., Moral, G.M., Fatvush, G., Zakaryan, N., Kartashyan, N. and Aleksanyan, A. 2109. Holoparasitic Orobanchaceae **(***Cistanche***,** *Diphelypaea***,** *Orobanche***,** *Phelipanche***)** in Armenia: distribution, habitats, host range and taxonomic problems. Phytotaxa 386(1): 101-106. [36 species described with distribution, habitat, phenology, host range, illustrations and taxonomic clarifications. One new combination – *Phelipanche cernua* ssp. *sinaica*.]

Popović, T., Milićević, Z., Oro, V., Kostić, I., Radović, V., Jelušić, A. and Krnjajić, S. 2018. A preliminary study of antibacterial activity of thirty essential oils against several important plant pathogenic bacteria. Pesticidi i Fitomedicina 33(3/4): 185-195. [Oil of *Santalum album* showed no useful effect against *Erwinia amylovora, Xanthomonas campestris* pv. *campestris* or *Pseudomonas syringae* pv. *syringae*.]

Putri, A.I. and Herawan, T. 2018. (Rooting regeneration of *in vitro* and *ex vitro* plantlets of cendana (*Santalum album* Linn.) tissue culture.) (in Indonesian) Jurnal Pemuliaan Tanaman Hutan 12(2): 147-155. [Comparing two clones and finding significant differences in the root regeneration of plantlets of *S. album,* one showing much stronger secondary root regeneration, favourable for success in acclimatisation.]

*Quintana-Rodríguez, E., Ramírez-Rodríguez, A.G., Ramírez-Chávez, E., Molina-Torres, J., Camacho-Coronel, X., Esparza-Claudio, J., Heil, M. and Orona-Tamayo, D. 2108. Biochemical traits in the flower lifetime of a Mexican mistletoe parasitizing mesquite biomass. Frontiers in Plant Science 2018(9): 1031. (https://www.frontiersin.org/articles/10.3389/fpls.2018.01031/full) [Studying, in impressive detail, the sequence of events in production and quality of nectar in *Psittacanthus calyculatus* over a mainly 3-day period. Although it refers to nectar secretion as 'the only' reward to engage flower visitors (mainly humming birds), it also refers to volatiles, the most important of which was β-ocimene.]

Rai, I.D., Manish Bhardwaj, Gautam Talukdar, Rawat, G.S. and Sambandham Sathyakumar. 2018. Large scale infestation of Blue pine by Himalayan dwarf mistletoe in the Gangotri National Park, Western Himalaya. Tropical Ecology 59(1): 157-161. [Recording extensive infestation of *Pinus wallichiana* by *Arceuthobium minutissimum* in N. India, not previously reported. It is possibly being supported by climate change.]

*Reynel, M.B., Villegas, Y., Kiene, H., Werthmann, P.G. and Kienle, G.S. 2018. Intralesional and subcutaneous application of *Viscum album* L. (European mistletoe) extract in cervical carcinoma in situ: a CARE compliant case report. Medicine (Baltimore) 97(48): e13420. (https://journals.lww.com/md-journal/Fulltext/2018/11300/Intralesional_and_subcutaneous_application_of.70.aspx) [Reporting complete remission of symptoms in a 47-year-old Peruvian woman with recurrent candidal vaginitis who had been diagnosed with colpocervicitis and squamous metaplasia 8 years ago, after 5 months of treatment with *V. album* extracts.]

Ribeiro, D.A. and 9 others. 2019. Conservation priorities for medicinal woody species in a cerrado area in the Chapada do Araripe, northeastern Brazil. Environment, Development and Sustainability 21(1) 61-77. [Including *Ximenia americana* among 'priority species'.]

Risberg, B. 2019. (Flora in Altai and north-western Mongolia.) (in Swedish) Svensk Botanisk Tidskrift 113(2): 127-133. [Calling for help in identifying *Pedicularis* spp. which are well represented in this region.]

Rodríguez-Mendieta, S., Lara, C. and Ornelas, J.F. 2018. Unravelling host-mediated effects on hemiparasitic Mexican mistletoe *Psittacanthus calyculatus* (DC.) G. Don traits linked to mutualisms with pollinators and seed dispersers. Journal of Plant Ecology 11(6): 827-842. [Studying the flower morphology, nectar production, pollinator visitation rate and female reproductive fitness of *P. calyculatus* populations on cultivated host species *Crataegus mexicana* and native hosts *Quercus crassipes* and *Prunus serotina* at three different locations. Hummingbird visitation and pollen production were highest when host was *C. mexicana* while there were larger flowers, fruits and seeds on the other hosts. The effects of host species, study site and floral trait covariates significantly affected all fitness measures, indicating that the reproductive fitness of the mistletoe is affected differently depending on the host species and their site of occurrence.]

Ronald, M., Charles, M., Stanford, M. and Eddie, M. 2019. Mulching offers protection from *Striga asiatica* L. Kutnze parasitism in sorghum genotypes. Acta Agriculturæ Scandinavica, Section B - Soil & Plant Science 69(2):167-173. [Assessing the susceptibilty of 10 sorghum genotypes to *S. asiatica* at two levels of mulching in pots in South Africa. Genotypes Mukadziusaende, Chiredhi and Hlubi were able to maintain height despite infestation by *Striga*. Mulching was beneficial in most cases. *S. arundinaceum* was highly susceptible.]

Saive, M., Frederich, M. and Fauconnier, M.L. 2018. Plants used in traditional medicine and cosmetics in Mayotte Island (France): an ethnobotanical study. Indian Journal of Traditional Knowledge 17(4): 645-653. [*Santalum album* among the most used.]

Sangüesa-Barreda, G., Camarero, J.J., Pironon, S., Gazol, A., Peguero-Pina, J.J. and Gil-Pelegrín, E. 2018. Delineating limits: confronting predicted climatic suitability to field performance in mistletoe populations. Journal of Ecology (Oxford) 106(6): 2218-2229. [Exploring the possible adaptability of *Viscum album* populations to future climate change, using a population on *Pinus sylvestis* in a moist, cool climate and another on *P. halapensis* in a warm dry climate. Concluding that populations in the warm climate were less fitted for future climate chance.]

Santiago, M.B., Moraes, T.daS., Massuco, J.E., Silva, L.O., Lucarini, R., da Silva, F.,Vieira, T.M., Crotti, A.E.M. and Martins, C.H.G. 2018. In vitro evaluation of essential oils for potential antibacterial effects against *Xylella fastidiosa*. Journal of Phytopathology 166(11/12): 790-798. [Results suggest the oil of sandalwood (*Santalum album*?) has antibacterial action and is a promising natural source for the development of new pesticides against *X. fastidiosa*.]

Schad, F., Axtner, J., Kröz, M., Matthes, H. and Steele, M.L. 2018. Safety of combined treatment with monoclonal antibodies and *Viscum album* L. preparations. Integrative Cancer Therapies 17(1): 41-51. [Results from a study involving 474 treatments on 43 patients suggested that 'together with theoretical consideration of potential botanical-drug interactions', combined treatment with *V. album* and monoclonal antibodies is safe.]

*Scharenberg, F. and; Zidorn, C. 2018. Genuine and sequestered natural products from the genus *Orobanche* (Orobanchaceae, Lamiales). Molecules 23(11): 2821.

*Schelkunov, M.I., Penin, A.A. and Logacheva, M.D. 2018. RNA-seq highlights parallel and contrasting patterns in the evolution of the nuclear genome of fully mycoheterotrophic plants. BMC Genomics 19:602. (https://bmcgenomics.biomedcentral.com/track/pdf/10.1186/s12864-018-4968-3) [Concluding from studies of the mycoheterotrophic orchids *Epipogium aphyllum* and *E. roseum* and *Hypopitys monotropa* (Ericaceae) that full heterotrophy leads to profound changes in nuclear gene content. The observed increase in the rate of nucleotide substitutions is lineage specific, rather than a universal phenomenon among non-photosynthetic plants.]

Schmeda-Hirschmann, G., Burgos-Edwards, A., Theoduloz, C., Jiménez-Aspee, F. and Vargas-Arana, G. 2019. Ethnopharmacological relevance: Journal of Ethnopharmacology 229: 167-179. [*Minquartia guianensis* among plants used traditionally, in alcohol, for enhancing male sexual performance, but not as active as others.]

Schneider, A.C., Braukmann, T., Arjan Banerjee and Stefanović, S. 2018. Convergent plastome evolution and gene loss in holoparasitic Lennoaceae. Genome Biology and Evolution 10(10): 2663-2670. [The plastomes of two species, *Lennoa madreporoides* and *Pholisma arenarium*, are 83.6 and 81.2 kb in size, respectively. Some genes are under relaxed selection (e.g. many associated with photosynthesis) whereas others appear to be under purifying selection, e.g. rbcL, suggesting a nonphotosynthetic function.]

*Schötterl, S., Huber, S.M., Lentzen, H., Mittelbronn, M. and Naumann, U. 2018. Adjuvant therapy using mistletoe containing drugs boosts the T-cell-mediated killing of glioma cells and prolongs the survival of glioma bearing mice. Evidence-based Complementary and Alternative Medicine 2018: ID 3928572. (https://www.hindawi.com/journals/ecam/2018/3928572/) [Treatment of glioblastoma cells with ISCADOR Qu that contains a high mistletoe (*Viscum album*) lectin concentration, but also viscotoxins and other compounds, as well as with Aviscumine or

native ML-1, enhanced the expansion of cancer cell-specific T-cells as well as T-cell-mediated tumor cell lysis. They f urther modulated the expression of immune response associated genes, such that *in vivo*, subcutaneous ISCADOR Qu injections at increasing concentration induced cytokine release in immunocompetent VM/Dk-mice. Finally, ISCADOR Qu, if applied in combination with tumor irradiation and TMZ, further prolonged the survival of glioma mice.]

Schweiger, J.M I., Kemnade, C., Bidartondo, M.I. and Gebauer, G. 2019. Light limitation and partial mycoheterotrophy in rhizoctonia-associated orchids. Oecologia 189(2): 375-383. [Concluding that both *Neottia ovata* and *Ophrys insectivora* can be considered as partially mycoheterotrophic and at least in *O. insectifera*, the degree of partial meterotrophy can be fine-tuned according to light availability. However, exploitation of mycorrhizal fungi appears less flexible in saprotroph-associated orchids than in orchids associated with ectomycorrhizal fungi.]

Sdiri, M., Li XiangMin, Du, W.W., El-Bok, S., Xie YiZhen, Ben-Attia, M. and Yang, B.B. 2018. Anticancer activity of *Cynomorium coccineum*. Cancers 10(10): 35. [Treatment of mice with murine cancer cell line B16, followed by peritoneal injection of the water extract prolonged mouse survival significantly apparently due to down-regulation of c-myc expression. Further investigation showed that treatment with *C. coccineum* induced the overexpression of the tumor suppressor Foxo3 and other molecules involved in inducing autophagy and exerts its antiproliferative activity through the induction of cell death pathway. *C. songaricum* was less active.]

Sequeira, A.S., Rocamundi, N., Ferrer, M.S., Baranzelli, M.C. and Marvaldi, A.E. 2018. Unveiling the history of a peculiar weevil-plant interaction in South America: a phylogeographic approach to *Hydnorobius hydnorae* (belidae) associated with *Prosopanche americana* (Aristolochiaceae). Diversity 10(2): 33. [After studying 18 sites where *H. hydnorae* occurred in Chaco Province, Argentina results indicated 'a long trajectory of host-tracking through space and time, where the weevil has expanded its geographic range following its host plant, without significant demographic growth'.]

Shayanowako, A.I.T., Shimelis, H., Laing, M.D. and Mwadzingeni, L. 2018. Genetic diversity of maize genotypes with variable resistance to *Striga asiatica* based on SSR markers. Cereal Research Communications 46(4): 668-678. [The extent of genetic diversity among 37 diverse maize genotypes was determined using simple sequence repeat (SSR) markers. The maize genotypes were selected based on their variable resistance to *S. asiatica*. A total of 191 alleles were detected and the number of effective alleles varied from 2 to 21 per locus with a mean of 11. Based on this analysis several open pollinated varieties were selected from different clusters for breeding.]

Shazia Noureen, Sobia Noreen, Ghumman, S.A., Fozia Batool, Mahira Arshad, Fozia Noreen, Umair Ishtiaq and Bukhari, S.N.A. 2018. Seeds of giant dodder (*Cuscuta reflexa*) as a function of extract procedure and solvent nature. Notulae Botanicae, Horti Agrobotanici, Cluj-Napoca 46(2) 653-662. [Exploring the optimum extraction procedures for antioxidant activity of *C. reflexa*, considered a 'superb' source of traditional herbal medication for eyes, liver, spleen and kidney in Romania.]

Shi BiXian, Xu DongSheng, Wu YuanZhu, Lei ZhongHua, Lai ChengXia and Zhao Jun. 2018. (Effect of soil conditions on sunflower broomrape parasitism.) (in Chinese) Acta Botanica Boreali-Occidentalia Sinica 38(9): 1717-1721. [Finding that sandy loam soil was much more favourable than loam or clay to the growth and development of *Orobanche cumana* on sunflower. Further, a temperature of 25-30°C, soil moisture of 60%-70% and soil pH 8 were optimal for the parasite.]

*Silva, A.R., Fernandes, Â., García, P.A., Barros, L. and Ferreira, I.C.F.R. 2019. *Cytinus hypocistis* (L.) L. subsp. *macranthus* Wettst.: nutritional characterization. Molecules 24(6): 1111. (https://www.mdpi.com/1420-3049/24/6/1111/htm) [Analysis of *C. hypocistis* and its nectar proved both to be excellent sources of nutritional compounds, which supports its use during past periods of scarcity.]

Smith, D.R. 2018. Plastid genomes hit the big time. New Phytologist 219: 491-495. [A short but information packed review of variation in plastomes, which is more than you might

currently think. Covers green and red algae as well as nonphotosynthetic species.]

Solomon Assefa Derese, Shimelis, H., Laing, M. and Fentahum Mengistu. 2018. The impact of drought on sorghum production, and farmer's varietal and trait preferences, in the north eastern Ethiopia: implications for breeding. Acta Agriculturæ Scandinavica, Section B - Soil & Plant Science 68(5): 424-436. [Concluding that overall, sorghum breeding programmes should be directed at developing farmers' ideal sorghum varieties with high grain and biomass yield, adequate level of drought and *Striga* tolerance. In addition, development of farmer preferred medium-maturing sorghum varieties suitable for April planting would strengthen its productivity and increase varietal adoption rate in the area.]

Song DeZhi, Cao Zhen, Liu ZaiBing, Tickner, J., Qiu Heng, Wang Chao, Chen Kai, Wang ZiYi, Dong ShiWu and Xu JiaKe. 2018. *Cistanche deserticola* polysaccharide attenuates osteoclastogenesis and bone resorption via inhibiting RANKL signaling and reactive oxygen species production. Journal of Cellular Physiology 233(12): 9674-9684. [*C. deserticola* polysaccharide (CDP) is already known to have antitumour, anti-inflammatory, and antioxidant activity. This study confirmed that CDP may also represent a candidate drug for the treatment of osteoporosis caused by excessive osteoclast activity.]

Song Xue, Jiang Lu, Guo Qiang, Sun YanJun and Zan QiJie. 2018. Effect of other plants by applying *Cuscuta campestris* Yuncker to control *Mikania micrantha* H. B. K. Journal of Guangxi Normal University - Natural Science Edition 36(4): 139-150. [Recording the successful use of *C. campestris* as a biological control to reduce *Mikania micrantha* in forest parks in China. Among other plants incidentally parasitised, 15 were unharmed. 138 other species were affected to varying degrees but none were killed.]

*Sotero-García, A.I., Arteaga-Reyes, T.T., Martínez-Campos, Á.R. and Galicia, L. 2018. (Effect of pruning on *Arcceuthobium* spp. in dense and semi-dense forests of *Pinus hartwegii* (Lindl.).) (in Spanish) Madera y Bosques 24(2): e2421582. (http://myb.ojs.inecol.mx/index.php/myb/article/view/e2421582/1771) [Pruning reduces the incidence of dwarf mistletoe in semi dense and dense forest, and its effect was permanent during the evaluated period. Species of *Archeuthobium* noted stated in abstract.]

Spooner, B.M. 2018. Hosts of mistletoe in Britain - common, rare and puzzling. Cecidology 33(2): 56-66. [As papers in Cecidology (the official journal of the British Plant Gall Society) are not readily available to non-members, we have asked their Chairman, Dr Spooner to summarise this and some previous relevant publications. Please see above.]

Stander, M.A., Brendler, T., Redelinghuys, H. and van Wyk, B.E. 2019. The commercial history of Cape herbal teas and the analysis of phenolic compounds in historic teas from a depository of 1933. Journal of Food Composition and Analysis 76: 66-73. [Mainly discussing 'rooibos' herbal tea in S. Africa, made from *Aspalathus linearis,* but incidentally recording for the first time that the tea known as 'reed tea', or '*riettee*' is made from *Thesium macrostachyum* and other *Thesium* spp. and is the same as the tea that is still used in the Wupperthal area as '*lidjiestee*'.]

Stojanova, B., Delourme, R., Duffé, P., Delavault, P. and Simier, P. 2019. Genetic differentiation and host preference reveal non-exclusive host races in the generalist parasitic weed *Phelipanche ramosa.* Weed Research (Oxford) 59 No.2 pp.107-118. [Studying 100 populations in France and finding one group from W. France which attacked oilseed rape and tobacco but not hemp. The two other groups were more widespread and attacked hemp mainly, or tobacco mainly and tomato but not oilseed rape. The differential behaviour of the groups was associated with differential germination rates.]

*Su, H-J., Barkman, T.J, Hao, W., Jones, S.S., Naumann, J., Skippington, E., Wafula, E.K., Hu, J-M., Palmer, J.D. and dePamphilis, C.W. 2019. Novel genetic code and record-setting AT-richness in the highly reduced plastid genome of the holoparasitic plant *Balanophora*. Proceedings of the National Academy of Sciences 116: 934-943. (https://www.pnas.org/content/116/3/934) [Truly one of the most remarkable plastomes yet seen among holoparasitic angiosperms, not only because it is tiny (15.5 kb) but also because it has 88% AT and apparently remains functional with biased codon usage by using a novel genetic code.]

Suetsugu, K., Ohta, T. and Tayasu, I. 2018. Partial mycoheterotrophy in the leafless orchid *Cymbidium macrorhizon*. American Journal of Botany 105(9): 1595-1600. [Concluding that despite its leafless status, fruiting plants of *C. macrorhizon* were capable of fixing significant quantities of carbon. Considering the autotrophic carbon gain increases during the fruiting season, its photosynthetic ability may contribute to fruit and seed production that *C. macrorhizon* should, therefore, be considered a partially mycoheterotrophic species rather than fully mycoheterotrophic, at least during the fruiting stage.]

Szurpnicka, A., Zjawiony, J.K. and Szterk, A. 2019. Therapeutic potential of mistletoe in CNS-related neurological disorders and the chemical composition of *Viscum* species. Journal of Ethnopharmacology 231: 241-252. [A review.]

Tănase, M. 2018. *Cuscuta epithymum* L. (Convolvulaceae), the most widespread species in Southern Transylvania, Romania. Scientific Papers Series - Management, Economic Engineering in Agriculture and Rural Development 18(4): 369-374. [Noting that *C. epithymum* is the most widespread *Cuscuta* species in Romania affecting more crops than other species, especially the perennial legumes alfalfa, sainfoin, clovers and bird's foot trefoil. Other hosts mentioned include *Rhinanthus serotinus. C. campestris, C. europaea* and *C. lupuliformis* also occur.]

Tănase, M. 2018. Approach to the current state of knowledge on dodders (*Cuscuta* L. Convolvulaceae) from a taxonomic, morphological and physiological point of view. Scientific Papers Series - Management, Economic Engineering in Agriculture and Rural Development 18(4): 359-368. [A general review.]

Tao Rui, Miao Lin, Yu Xiean, Orgah, J.O., Barnabas, O., Chang YanXu, Liu ErWei, Fan GuanWei and Gao XiuMei. 2019. *Cynomorium songaricum* Rupr demonstrates phytoestrogenic or phytoandrogenic like activities that attenuates benign prostatic hyperplasia via regulating steroid 5-α-reductase. Journal of Ethnopharmacology 235: 65-74.

Tao Yi , Gu XiangHui , Li WeiDong and Cai BaoChang. 2018. Fabrication and evaluation of magnetic phosphodiesterase-5 linked nanoparticles as adsorbent for magnetic dispersive solid-phase extraction of inhibitors from Chinese herbal medicine prior to ultra-high performance liquid chromatography-quadrupole time-of-flight mass spectrometry analysis. Journal of Chromatography, A 1532: 58-67. [Reporting the successful use of this technique in the extraction and purification of the active ingredient echinacoside from *Cistanche tubulosa*.]

Tong ZeYu, Wang XiangPing, Wu LingYun and Huang ShuangQuan. 2019. Nectar supplementation changes pollinator behaviour and pollination mode in *Pedicularis dichotoma*: implications for evolutionary transitions. Annals of Botany 123(2): 373-380. [*P. dichotoma* typically produces very little nectar and visiting been collect only pollen, resulting in sternotribic (ventral) pollination. When a sugar solution was added to mimic nectar, the bees switched to foraging for nectar resulting in nototribic (dorsal) pollination.]

Trần H.Đ., Lưu H.T., Nguyễn Q.Đ., Nguyễn H.C., Athen P., and Wong K.M. 2018. Identification, sexual dimorphism and aspects of the natural history of *Sapria himalayana* (Rafflesiaceae) on Vietnam's Lang Biang Plateau. Botanical Studies 59:29. [This species, first seen in Vietnam in 1959, was rediscovered in 2017. Eight populations were studied and detailed descriptions of the male and female flower morphology were made. These data extend knowledge of the natural history of this plant. These populations in the Lâm Đồng Province are being designated as Protected Research Reserves.]

Tsiftsis, S., Djordjević, V. and Tsiripidis, I. 2019. *Neottia cordata* (Orchidaceae) at its southernmost distribution border in Europe: threat status and effectiveness of Natura 2000 Network for its conservation. Journal for Nature Conservation 48: 27-35. [A survey of the 'vulnerable' *N. cordata* in forests of *Pinus sylvestris* and *Picea abies* showed that the latter was more favourable to its conservation and the most appropriate management measure is the maintenance of the tree layer canopy closed.]

Turnau, K., Jędrzejczyk, R., Domka, A., Anielska, T. and Piwowarczyk, R. 2018. Expansion of a holoparasitic plant, *Orobanche lutea* (Orobanchaceae), in post-industrial areas - a possible Zn effect. Science of the Total Environment 639: 714-724. [The data presented support the hypothesis that the expansion of *O. lutea* on *Medicago sativa* is most likely supported by the increased

concentrations of Zn and Cd in areas connected with industrial waste. Although, on industrial wastes the host yield was decreased in the parasite presence, its photosynthetic capacity was even increased.]

*Vogel, A. and 13 others. Footprints of parasitism in the genome of the parasitic flowering plant *Cuscuta campestris*. Nature Communications 9(6): 2515. (https://www.nature.com/articles/s41467-018-04344-z) [Genes needed for high photosynthetic activity are shown to be lost, explaining the low photosynthesis rates displayed by the parasite. Also, several genes involved in nutrient uptake processes from the soil are lost. On the other hand, evidence for horizontal gene transfer by way of genomic DNA integration from the parasite's hosts is also found.]

Vurro, M., Boari, A., Thiomiano, B and Bouwmeester, H. Strigolactones and Parasitic Plants. 2019. in: Koltai, C and Prandi, C. (eds) Strigolactones - biology and applications: pp. 89-120.[Reviewing the role of strigolactones in the germination of *Orobanche, Phlipanche* and *Striga* species, covering their distribution,agricultural importance and life cycle, and the role of strigolactones in seed germination, parasite development, host specificity, plant nutrition and microbiome composition. Also, some weed control approaches involving strigolactones are discussed. See Book Review above for listing of other chapters.]

*Wada, S., Songkui Cui and Yoshida, S. 2019. Reactive oxygen species (ROS) generation is indispensable for haustorium formation of the root parasitic plant *Striga hermonthica*. Frontiers in Plant Science 22 March 2019. (https://www.frontiersin.org/articles/10.3389/fpls.2019.00328/full) [Exploring the role of reactive oxygen species (ROS) in activation of haustorial initiation in *S. hermonthica*, as in the oxidation of syringic acid to produce DMBQ in sorghum roots; and confirming from results with NADPH oxidases and peroxidises that that ROS and ROS-regulating enzymes are indeed indispensable in downstream signaling of haustorium-inducng factors for haustorium formation.]

Walder, M., Armstrong, J.E. and Borowicz, V.A. 2019. Limiting similarity, biotic resistance, nutrient supply, or enemies? What accounts for the invasion success of an exotic legume? Biological Invasions 21(2): 435-449. [Concluding that the invasive *Lespedeza cuneata* (in USA) could be reduced by increasing soil fertility and by shading but not by sowing of *Pedicularis canadensis*.]

Wang GuoYan, Baskin, C.C., Baskin, J.M., Yang XueJun, Liu GuoFang, Ye XueHua, Zhang XinShi and Huang ZhenYing. 2018. Effects of climate warming and prolonged snow cover on phenology of the early life history stages of four alpine herbs on the southeastern Tibetan Plateau. American Journal of Botany 105(6): 967-976. [Assessing the impact of changes in climate on 4 species on the Tibetan plateau, including *Pedicularis fletcheri*. Both warming and alteration of the snow cover regime can influence plant recruitment by affecting seedling phenology, growth, and survival, but prolonged snow cover would partly mediate the effects of warming on *P. fletcheri*.]

***Wang, JianYou and 18 others including Muhammad Jalil and Al. Babili, S. 2019. The apocarotenoid metabolite zaxinone regulates growth and strigolactone biosynthesis in rice. Nature Communications 10, 1–9. (https://www.nature.com/articles/s41467-019-08461-1) [The authors through a survey of grass Carotenoid Cleavage Dioxygenases (CCDs) identified a clade named Zaxinone Synthase (ZAS) which is widely distributed in the plant kingdom. Its product zaxinone is required for normal growth and development of rice plants and is a negative regulator of strigolactone biosynthesis and release. Chemical modification of zaxinone may afford practical compounds applicable to agricultural production for promoting plant growth and development and for combating root parasitic weeds.]**

Wang, W.B., An, M.N., Feng, Y.L. and Qu, B. 2019. First report of dodder (*Cuscuta australis*) on the invasive weed *Xanthium strumarium* var. *canadense* in China. Plant Disease 103(3): 591. [*C. australis* caused wilting, senescence and stunted growth in *X. strumarium,*and few or no fruit were produced.]

*Wang XiaoYue, Xu Rong, Chen Jun, Song JingYuan, Newmaster, S.G., Han JianPing, Zhang Zheng and Chen ShiLin. 2018. Detection of Cistanches Herba (*Rou Cong Rong*) medicinal products using species-specific nucleotide signatures. Frontiers in Plant Science 9: 1643.

(https://www.frontiersin.org/articles/10.3389/fpls.2018.01643/full) [Sixty-six different sources of Cistanches Herba which should only contain *Cistanche deserticola* and *C. tubulosa,* were studied and 36.4% adulteration was found. 19.7% involved adulteration with *Cynomorium songaricum* or *Cistanche sinensis*, and 16.7% involved substitution with *Cy. songaricum*, *Ci. sinensis*, or *Boschniakia rossica*.]

Wang Yue, Ye XiaoXin, Wang Kai, Li PuFang, Guo ZhenGuo, Chen FangJie and Ma YongQing. 2018. (Effect of maize and gibberellic acid on sunflower broomrape germination, control and growth in sunflower field.) (in Chinese) Zhongguo Shengtai Nongye Xuebao / Chinese Journal of Eco-Agriculture 26(11): 1672-1681. [In a pot experiment growing maize reduced emergence of *Orobanche cumana* in sunflower the following year. Application of GA_3 to the maize 20 and 40 days after emergence further reduced *O. cumana* emergence and increased sunflower head size.]

Wei YingQin, Sun ManMan and Fang HaiYan. 2019. Dienzyme-assisted salting-out extraction of flavonoids from the seeds of *Cuscuta chinensis* Lam. Industrial Crops and Products 127: 232-236. [Describing a technique for enhancing the extraction of anti-oxidant flavonoids, particularly 1,1-diphenyl-2-picrylhydrazyl, from seeds of *C. chinensis*.]

*Weissenstein, U., Kunz, M., Oufir, M., Wang, J.T., Hamburger, M., Urech, K., Regueiro, U. and Baumgartner, S. 2019. Absence of herb-drug interactions of mistletoe with the tamoxifen metabolite (E/Z)-endoxifen and cytochrome P450 3A4/5 and 2D6 in vitro. BMC Complementary and Alternative Medicine 19(23) (18 January 2019). (https://bmccomplementalternmed.biomedcentral.com/articles/10.1186/s12906-019-2439-2) [Confirming that a *Viscum album* extract did not interfere with the activity of endoxifen against breast cancer cells, and at higher doses provided an additive effect.]

*Werthmann, P.G., Inter, P., Welsch, T., Sturm, A.K., Grützmann, R., Debus, M., Sterner, M.G. and Kienle, G.S. 2018. Long-term tumor-free survival in a metastatic pancreatic carcinoma patient with FOLFIRINOX/Mitomycin, high-dose, fever inducing *Viscum album* extracts and subsequent R0 resection: a case report.Medicine (Baltimore) 97(40): e13243. (https://journals.lww.com/md-journal/Fulltext/2018/12070/Long_term_tumor_free_survival_in_a_metastatic.20.aspx) [Noting that *V. album* extracts have been commonly used as a component of treatment in advanced pancreatic cancer and confirming its apparent value, in conjunction with chemotherapy, integrated medicine and surgical procedures in an individual. 'Further investigations seem highly worthwhile.']

Werthmann, P.G., Kempenich, R., Lang-Avérous, G. and Kienle, G.S. 2019. Long-term survival of a patient with advanced pancreatic cancer under adjunct treatment with *Viscum album* extracts: a case report. World Journal of Gastroenterology 25(12): 1524-1530. [Presenting the case of a patient with pancreatic cancer with R1-resection with development of liver metastasis during the course of treatment who showed an overall survival of 63 months and a relapse-free survival of 39 months under increasing supplementarty *V. album*. The possible synergistic effect on tumor control of radiofrequency ablation treatment and immune-stimulatory effects of *V. album* extract should be further investigated.]

*Wicke, S. and Naumann, J. 2018. Molecular evolution of plastid genomes in parasitic flowering plants. Advances in Botanical Research 85: 315-347. [This is an excellent review of the state of affairs with parasitic angiosperm plastomes up to that point in time (not including the Su *et al*. 2019 study of *Balanophora*). Provides a model for plastome degradation and much more about the molecular evolution of this organelle.]

Wilson, A.B. and Musselman, L.J. 2018. *Agalinis* - a root parasite on loblolly pine. In: General Technical Report - Southern Research Station, USDA Forest Service 2018 No. SRS-234 Proceedings pp. 49-50. [Noting that loblolly pine (*Pinus taeda* is the most widely planted pine species in the Southern United States and that as well as increasing damage from of *Seymeria cassioides* (Orobanchaceae), the trees are now being damaged by *Agalinis fasciculata.* Providing information on its identification, distribution and impact.]

*Wiseglass, G., Pri-Tall, O. and Mosquna, A. 2019. ABA signaling components in *Phelipanche aegyptiaca.* Scientific Reports 9: article 6476. (https://www.nature.com/articles/s41598-

019-42976-3) [The phytohormone abscisic acid (ABA) was shown to regulate *P. aegyptiaca* seed dormancy following strigolactone germination stimulus. Transcription analysis of signalling components revealed five ABA receptors and two co-receptors (PP2C) with multiple alleles in two *P. aegyptiaca* ABA receptors. *P. aegyptiaca* is capable of biochemically perceiving ABA, whereas the potential genetic loss of subfamily III receptors in this species could position *P. aegyptiaca* as a valuable model in the ABA perception research field.]

Woith, E., Melzig, M.F. 2019. Extracellular vesicles from fresh and dried plants - simultaneous purification and visualization using gel electrophoresis. International Journal of Molecular Sciences 20(2): 357. [Extracellular vesicles from *Viscum album* were purified, which is perhaps the first proof that they are stable enough to overcome the drying process of plant material.]

Wu ChiehJu, Chien MeiYin, Lin NanHei, Lin YiChiao, Chen WenYing, Chen ChaoHsiang and Tzen, J.T.C. 2019. Echinacoside isolated from *Cistanche tubulosa* : Molecules 24(4): 720. [The results suggest that phenylethanoid glycosides, particularly echinacoside, are active constituents putatively responsible for the anti-aging effects of *C. tubulosa* and may be considered to develop as non-peptidyl analogues of ghrelin.]

Wu Chung-Shien, Wang Ting-Jen, Wu Chia-Wen, Wang Ya-Nan and Chaw Shu-Miaw. 2017. Plastome evolution in the sole hemiparasitic genus laurel dodder (*Cassytha*) and insights into the plastid phylogenomics of Lauraceae. Genome Biology and Evolution 9: 2604–2614. [As expected, the dodder look-alike has also experienced reductions in its plastome size (114.6 kb) compared to other Lauraceae (150-157 kb). It has lost its inverted repeat and pseudogenized ndh and rpl23 genes.]

*Wu HaiWang, Feng YiHui, Wang DongYing, Qiu WeiYu, Yu QingYing, Yang LiLin, Liang Chun, Luo SongPing and Gao Jie. 2018. Effect of total flavones from *Cuscuta chinensis* on anti-abortion via the MAPK signaling pathway. Evidence-based Complementary and Alternative Medicine 2018: ID 6356190. (https://www.hindawi.com/journals/ecam/2018/6356190/) [Results suggest that *C. campestris* mediates its anti-abortion effect by interfering with MAPK the signaling pathway.]

Xia, B., Hu, J.Y., Zhu, X.F., Liang, Y., Ren, X., Wu, Y.H. and Chen, D.X. 2018. First report of sunflower broomrape wilt caused by *Fusarium brachygibbosum* in China. Plant Disease 102(11): 2372.

Xie XiaoNan, Mori, N., Yoneyama, K., Nomura, T., Uchida, K., Yoneyama, K. and Akiyama, K. 2019. Lotuslactone, a non-canonical strigolactone from *Lotus japonicus*. Phytochemistry 157: 200-205. [Lotuslactone stimulated branching in *Gigaspora maragarita* and also strongly elicited germination of *Phelipanche ramosa* and *Orobanche minor*, but seeds of *Striga hermonthica* were 100-fold less sensitive to this stimulant.]

Xu ChaoQun and 22 others. 2019. Genome sequence of *Malania oleifera*, a tree with great value for nervonic acid production. Gigascience 8(2): giy164. (https://academic.oup.com/gigascience/article/8/2/giy164/5300121) [Describing the genome sequence of *M. oleifera* (Olacaceae) an IUCN red-listed tree restricted to the Karst region of southwest China.]

Xu Feng, Huang XuLong, Wu HongMei and Wang XiangPei. 2018. Beneficial health effects of lupenone triterpene: a review. Biomedicine & Pharmacotherapy 103: 198-203. [Noting that lupenone, which has various pharmacological activities including anti-inflammatory, anti-virus, anti-diabetes, anti-cancer and improving Chagas disease, without serious toxicity, occurs in a range of families including Balanophoraceae.]

Yahia, M.A. and 12 others including Babiker, A.G.E. 2018. Laboratory and field studies of *Trichoderma harzianum*, bacterial strains and imazethapyr on *Orobanche crenata* Forsk infesting *Vicia faba*. Asian Journal of Agriculture and Food Sciences 6(6): 209-217. [*T. harzianum* applied in the planting hole and imazapyr applied at planting time, each, on their own, or in combination with *Bacillus megatherium* var. *phosphaticum* and *Rhizobium leguminosarum*, delayed emergence of *O. crenata. T. harzianum* alone or in combinations also increased faba bean biomass and grain yield.]

*Yahyaabadi, S.R., Honari, H., Abdolahi, M., Aghaie, S.M. and Ebrahimi, M. 2019. (Subcloning and expression of *ML1-stxB* fusion gene of mistletoe lectin in *E. coli* and production of its antibody in mouse.) (in

Persian) Qom University of Medical Sciences Journal 12(12): Pe43-Pe52. (http://journal.muq.ac.ir/article-1-1920-en.pdf) ['According to this study, ML1 protein has ribosome inactivating properties and STxB has adjuvant and carrier functions, therefore, this recombinant protein can be a candidate vaccine against ML-1 toxin of *Shigella* dysentery, which its antibody can be used as identifier.']

Yang ShengZehn, Chen ZiXuan, Chen ChienFan and Chen PoHao. 2018. *Striga crispata* sp. nov. (Orobanchaceae), a new hemiparasitic species from Taiwan. Taiwania 63(4): 287-291. [It most closely resembles, *S. parviflora* (R. Brown) Benth, but can be differentiated by longer corollas that are pink or pinkish purple in color, corolla-lobes with crispate margins, and an ornamented seed surface that is only covered by the primary ridge. A detailed description and photographs included.]

*Yang TianQuan, Yu Qian, Xu Wei, Li DeZhu, Chen Fu and Liu AiZhong. 2018. Transcriptome analysis reveals crucial genes involved in the biosynthesis of nervonic acid in woody *Malania oleifera* oilseeds. BMC Plant Biology 2018(18): 247.

Yatoo, M.I., Umesh Dimri, Arumugam Gopalakrishnan, Archana Saxena, Wani, S.A. and Kuldeep Dhama. 2018. *In vitro* and *in vivo* immunomodulatory potential of *Pedicularis longiflora* and *Allium carolinianum* in alloxan-induced diabetes in rats. Biomedicine & Pharmacotherapy 97: 375-384. [This is the first study to show that *P. longiflora* ethanol extract has more potent *in vitro* and *in vivo* immunomodulatory activities than *A. carolinianum*, especially in alloxan-induced diabetic rats. However, further research is needed to identify the different molecular mechanisms involved in mediating this immunomodulatory response.]

Ye Ying, Song YaNan, Zhuang JuHua, Wang GuoYu, Ni Jing and Xia Wei. 2019. Anticancer effects of echinacoside in hepatocellular carcinoma mouse model and HepG2 cells. Journal of Cellular Physiology 234(2): 1880-1888. [Determining the mode of action of echinacoside as due to decreasing the expression of triggering receptors expressed on myeloid cells 2, and phosphoinositide 3-kinase signaling.]

Ying Li and 8 others. 2017. Gene losses and partial deletion of small single-copy regions of the chloroplast genomes of two hemiparasitic *Taxillus* species. Scientific Reports 7, 12834. [The complete chloroplast genomes of two *Taxillus* species are reported (first for Loranthaceae) that are 121-122 kb in size, smaller than relatives owing to the loss of all ndh genes, ribosomal protein genes, tRNA genes, ycf genes, and the infA gene.]

Yirgu, A. 2019. Coffee plants and coffee-shade trees: mini review. In: Esayas Mendesil, Gezahegn Berecha, Getachew WeldeMichael, Kifle Belachew and Taye Kufa (Eds.). Proceedings of the Ethiopian Coffee Science Society (ECSS): Enhancing Conference 7,8 April 2017, Jimma, Ethiopia, pp. 161-168. [A brief review, recording that mistletoes affecting coffee and/or its shade plantsin Ethiopia included *Viscum triflorum*, *V. congolense, V. tuberculatum, Phragmanthera macrosolen, P. regulans, P. dscallensis, Korthalsella japonica* and *Englerina woodfordioides*. Noting that heavy infestation of coffee itself could lead to serious loss of yield.]

*Yoneyama, K., Xiaonan Xie, Yoneyama, K., Nomura, T., Ikuo Takahashi, Tadao Asami, Akiyama, K., Mori, N, Kusajima, M and Nakashita H. 2019. Regulation of biosynthesis, perception, and functions of strigolactones for promoting arbuscular mycorrhizal symbiosis and managing root parasitic weeds. Pest Management Science 75: 2353-2359. (https://doi.org/10.1002/ps.5401) [A 'mini-review' discussing SL biosynthesis and perception inhibitors that effectively reduced numbers of attached root parasites *Orobanche minor* and *Striga hermonthica* without affecting their host plants; tomato and rice, respectively. AM colonization also enhanced plant resistance to pathogens.]

Yoo JaeMyung, Park KwangIl and Ma JinYeul. 2019. Anticolitic effect of *Viscum coloratum* through suppression of mast cell activation. American Journal of Chinese Medicine 47(1): 203-221. [*V. coloratum* has been used as a traditional medicine for treatment of inflammatory diseases in Korea but its effect on inflammatory bowel was unknown. This study confirms anticolitic action of *V. coloratum* through inhibiting the activation of mast cells. Hence it may be useful as a phytomedicine or functional food for inflammatory bowel disease.]

Yu Runxian, Zhou Songyan, Zhou Qiujie, Liu Ying and Zhou Renchao. 2019. The complete chloroplast genome of a hemiparasitic plant *Tolypanthus maclurei* (Loranthaceae). Mitochondrial DNA Part B 4: 207-208. [Yet another short paper reporting the basics on the plastome of *Tolypanthus* which is 123.5 kb in size having lost most ndh genes.]

Yuan LangXing, Wang JianHua, Chen ChaoRui, Zhao KunKun, Zhu ZhiXin and Wang HuaFeng . 2108. Complete chloroplast genome sequence of *Scurrula notothixoides* (Loranthaceae): a hemiparasitic shrub in South China. Mitochondrial DNA Part B 3(2): 580-581. [Another short paper reporting the basic results of sequencing the plastome of this mistletoe which is 123.8 kb in size.]

*Yuan PengFei, Li JinYu, Aipire, A., Yang Yi, Xia LiJie, Wang XinHui, Li YiJie and Li JinYao. 2018. *Cistanche tubulosa* phenylethanoid glycosides induce apoptosis in H22 hepatocellular carcinoma cells through both extrinsic and intrinsic signaling pathways.BMC Complementary and Alternative Medicine 18(275). (https://bmccomplementalternmed.biomedcentral.com/articles/10.1186/s12906-018-2201-1) [Results suggest that *C. tubulosa* polyethanoid glycosides suppress H22 hepatocellular cancer cell growth through both extrinsic and intrinsic apoptosis pathways.]

Yue GarLee, Wong LokSze, Leung HoiWing, Gao Si, Tsang YuenShan, Lin ZhiXiu, Tse ManKit and Lau BikSan. 2019. Evaluation of the safety profiles of estrogenic Chinese herbal medicines in breast cancer. Phytomedicine 56: 103-117. [Looking into the possible adverse effects of *Cynomoium deserticola* when used to treat breast cancer. Results reasonable reassuring but 'the potential harmful effects of estrogenic Chinese herbal medicines on breast cancer growth should be verified in both cell-based and tumor-bearing mice models.']

Yuliandra, Y., Armenia, A., Arief, R., Jannah, M.H. and Arifin, H. 2019. Reversible hepatotoxicity of *Cassytha filiformis* extract: experimental study on liver function and propofol-induced sleep in mice. Molecular Plant 12(1): 44-58. [Confirming that a *C. filiformis* extract is toxic to the liver in mice, but the toxicity is reversible at certain doses.]

Zagorchev, L.I., Albanova, I.A., Tosheva, A.G., Li JunMin and Teofanova, D.R. 2018. Metabolic and functional distinction of the *Smicronyx* sp. galls on *Cuscuta campestris*. Planta 248(3): 591-599. [Studying the metabolic activity within the galls of *Smicronyx* on *C. campestris* and the way it differs from other tissues.]

Zagorchev, L.I., Albanova, I.A., Tosheva, A.G., Li JunMin and Teofanova, D.R. 2018. Salinity effect on *Cuscuta campestris* Yunck. parasitism on *Arabidopsis thaliana* L. Plant Physiology and Biochemistry 132: 408-414. [The mutual adaptation of the parasite-host pair to salinity slightly altered the regular response to abiotic stress of *A. thaliana*, but no detrimental additive effect of biotic and abiotic stress was observed.]

Zaheer Abbas, Jan Alam, Khan, S.M., Manzoor Hussain and Abbasi, A.M. 2019. Diversity, ecological feature and conservation of a high montane flora of the Shigar valley (Karakorum Range) Baltistan region, Northern Pakistan. Pakistan Journal of Botany 51(3): 985-1000. [Among 346 specied identified, *Pedicularis staintonii* is listed among the endemic and critically endangered.]

Zeid, M.M. and Komeil, D.A. 2019. Same-hill intercropping of different plant species with faba bean for control of *Orobanche crenata*. Alexandria Science Exchange Journal 40(2):228-238. [Fenugreek and radish each inhibited germination of *O. crenata* to some extent when grown with faba bean *in vitro*. Fennel did not. Under farmer's field conditions, however, no benefit was observed.]

Zervas, A., Petersen, G. and Seberg, O. 2019. Mitochondrial genome evolution in parasitic plants. BMC Evolutionary Biology 19: 87. [The mitochondrial gene content of 11 hemiparasitic and holoparasitic plants showed that they do not have significantly higher substitution rates than autotrophic plants.]

Zhang Hong, Xiang Zhou, Duan Xin, Jiang JuanLi, Xing YiMing, Zhu Cheng, Song Qiang and Yu QinRong. 2019. Antitumor and anti-inflammatory effects of oligosaccharides from *Cistanche deserticola* extract on spinal cord injury. International Journal of Biological Macromolecules 124: 360-367. [Finding that oligosaccharides from a *C. deserticola* extract was effective against inflammation, oxidative stress, and apoptosis in spinal cord injury male albino rats.]

*Zhang XinHua and 10 others. 2019. Identification and functional characterization

of three new terpene synthase genes involved in chemical defense and abiotic stresses in *Santalum album*. BMC Plant Biology 19(115): 28 March 2019. (https://link.springer.com/article/10.1186/s12870-019-1720-3) [Results results suggest the ecological importance of three new SaTPS genes in defensive response to biotic attack and abiotic stresses in *S. album*.]

Zhao Shuyi, Li Jialiang, Ma Rui, Miao Ning, Mao Qiyun and Mao Kangshan. 2019. Characterization of the complete chloroplast genome of *Taxillus nigrans*. Mitochondrial DNA Part B 4: 472-473. [Yet another short paper reporting on the plastome of yet another species of *Taxillus* which is 121.4 kb in size. See also Li et al. (2017).]

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