WHAT HAPPENED TO HAUSTORIUM?

The editors apologize for the delay in publishing HAUSTORIUM 32. The good news is that we have received support from the Food and Agriculture Organization for HAUSTORIUM. This has enabled us to upgrade computer capabilities and develop a homepage. But we still very much need contributions from you! And we still need long term financial support.

WE’RE ON THE WORLD WIDE WEB!!

HAUSTORIUM now has its own homepage! Find us at the Old Dominion University homepage: www.odu.edu Select College of Sciences, the Department of Biological Sciences, then faculty, then Musselman. At the end of the Musselman page click on HAUSTORIUM. This homepage will be updated regularly. You can contact us electronically at: ljml100f@viper.mgb.odu.edu.

THE SEVENTH INTERNATIONAL SYMPOSIUM ON PARASITIC WEEDS

Possible venues and dates for the next parasitic weed symposium were discussed at Cordoba. Norfolk, Virginia was suggested as a possible site. The date is yet to be determined but is very tentatively planned for May 1999. Suggestions and offers for sponsorship are eagerly sought!

ICRISAT Strigu Review

A Review of Strigu Control in Sorghum and Millet was held at ICRISAT, Samanko, Mali on 27-28 May 1996. Participants from National Agricultural Research Programs in West and Southern Africa; Universities and Research Institutes in UK, Germany and USA; as well as ICRISAT scientists from Africa and India attended the two-day meeting. The review was based on a series of papers which summarized and synthesized the present status of research on methodologies for control of Strigu in sorghum and millet. This was complemented by working groups which critically reviewed ICRISAT’s past and present efforts on Strigu control and made priority recommendations on future research needs to improve the focus and organization of the research and collaboration with existing and new partners (NARS, IARCs, ARIs, NGOs etc.).

The main recommendations of the review included the reinforcement of ICRISAT’s strategy to develop integrated control methodologies; the need for ICRISAT to place more emphasis on Strigu in sorghum; the need to enhance collaborative linkages for strategic research especially related to better understanding of variability within major Strigu spp. for developing sound strategies for resistance breeding and developing improved screening methodologies through the use of existing bioassays and molecular marker technology; the need to develop a well-balanced, multi-disciplinary team in West Africa; and the importance of supporting the Parasitic Weeds Theme of the System-wide IPM Initiative to foster collaboration with IITA and CIMMYT. A pro-
ceedings from the review is being prepared for publication by ICRISAT in 1997.

J. Lenne, ICRISAT, Patancheru, India

---

A ROOT PARASITE FROM THE UPLANDS OF SRI LANKA

During a recent visit to Sri Lanka it was possible to travel to some of the higher altitude areas in the center of the island, where the world-famous tea industry is based. The natural sub-montane flora in the 2000-2500 m range bears a striking similarity to the Himalayan flora found at a similar altitude in Nepal some 1400 miles to the north. In both habitats the majestic Rhododendron arboreum is a dominant tree species and the large species of Magnolia of the middle Himalayas are mimicked by Michelia nilagirica in Sri Lanka. Among the sub-shrubs Berberis zeylanica is a reminder of the gaudy yellow flowered Himalayan species Mahonia napaulensis which has contributed so much to the genetic foundation of the varieties of Mahonia favored by horticulturists.

This dwarf montane forest is engulfed by cloud for large parts of the year and it is thought to intercept significant amounts of precipitation. Experiments are currently underway to quantify the contribution of this interception to the soil water balance and its importance to the water economy of the upper Mahaweli river catchment. It was while inspecting the site of an experiment in this montane forest that the striking root parasite Christisonia bicolor was spotted.

Christisonia has one of the largest and most spectacular flowers I have seen in the Orobanchaceae. The genus is confined to Asia and most records are from south India and Sri Lanka (the only Himalayan collection - a single collection from Sikkim - has been C. hookeri, interestingly) though it extends to China in the North to Burma, the Philippines and Peninsular Malaysia in the East. Clumps of Christisonia bicolor can be found among the dark understory of the mature forest. Trimen in the Handbook Flora of Ceylon records that it is parasitic on the roots of Acanthaceae. These are likely to be Strobilanthes species which are common sub-shrubs in the area. In India both C. calcarata and C. neilgherrica are reported to be parasitic on Strobilanthes spp. (Hooker, 1850). Very little has been published on the genus since it was first described by Gardner in 1847 who recognized seven species. Several additions have been made to the genus subsequently and at least three are endemic to Sri Lanka. There are two closely related parasitic genera Aeginetia and Campbellia and the taxonomic boundaries between them are not clear and similarly, there is no agreement on the species limits within Christisonia. Christisonia aurantiaca is considered synonymous with C. bicolor but this is not apparent from the illustrations in Wight or from Gardners original descriptions.

There appears to be almost no information on this group of plants in modern literature. There are illustrations of C. calcarata in Wight 1885 and of C. aurantiaca and C. lawii in Neilgherry Plants published in 1893. Wight was also impressed by the beauty of these plants and suggested that they could be as popular in cultivation as orchids were it not for their parasitic habit. He predicted that one day they would become popular horticultural subjects but to date this has not happened.

The stem is a flattened structure partially submerged in the soil but appearing cobbled and uneven from the numerous large flower buds on the surface. Flowers appear singly or in small groups. They are tubular up to 5 cm. in length opening to a weakly defined bilabiata mouth. The throat of the corolla is deeply purple fading to white at the margins. The style is very persistent with a large clavate, papillose stigma up to 75 mm broad. Styles remain erect from the flattened stem after the corolla has disappeared and the viscid stigma remains pendulous with several in various stages of maturity. Anthers are in two pairs with pronounced spurs articulating on the tips of the filaments at their centers. There appears to be no chlorophyll in any part of the plant. The pollination biology of this peculiar plant can only be guessed but the viscid
persistent stigmata might be attractive to slugs or to snails.

[For beautiful line drawings of these plants, see HAUSTORIUM 32 on the Web]

Philip Bacon, Oxford Forestry Institute, University of Oxford, South Parks Road, Oxford, UK

---

**FOURTH INTERNATIONAL WORKSHOP ON OROBANCHE RESEARCH**

This symposium is scheduled for 23-26 September 1998 in Albena, Bulgaria and is sponsored by the Institute for Wheat and Sunflower in Bulgaria. The institute is a leading center for Orobanche research in sunflower. Sessions will include germination, physiology, growth and development, resistance and other topics of interest to parasitic plant researchers. Albena is a small resort city on the beautiful Bulgarian Black Sea coast. For further information contact the Technical Secretariat for the symposium at fax number (359) 058 26364.

---

**SIXTH INTERNATIONAL PARASITIC WEEDS SYMPOSIUM**

The Sixth International Symposium was successfully held in Cordoba from 16 to 18 April. About 150 delegates and their spouses attended from at least 30 countries, and enjoyed what must have been the cultural highlight of our series so far, as well as a scientific programme to equal any. The meetings were held in the exquisite atmosphere of the Palacio de Congressos only just outside the walls of the ancient mosque, but the facilities were very much up-to-date. Just over 100 papers were accepted for publication in the attractive Proceedings entitled 'Advances in Parasitic Plant Research' which was available on arrival. About half these were presented orally, the remainder as posters.

The meeting was opened by a representative of the main sponsors, the Directorate General of Agricultural Research, Consejero de Agricultura y Pesca, Junta de Andalucia. Professor Jose Cubero then treated us to a thought-provoking review of the progress and content of the six symposia so far.

The first invited lecture, presented by Dan Nickrent, showed how new molecular techniques using ribosomal RNA, could be used to clarify the evolutionary and phylogenetic relationships between and within different families of parasitic plants. Results have suggested a reappraisal of several of these relationships and confirmed many others. A number of other papers pursued the same theme, using both molecular and more traditional cladistic techniques. These tended to confirm the possible separation of the 'agrestal' *Striga asiatica* from other closely related taxa such as *S. hirsuta* and *S. lutea*, while suggesting a relatively close relationship between *S. hermonthica* and *S. aspera*, the former perhaps representing another 'agrestal species' derived from the latter (invited paper by Mohamed, Musselman and others). The concept of agrestal species might also be applied to the Old World *Orobanchae cernualcumana* which has relatively recently evolved to attack New World species such as sunflower, tomato and tobacco. The separation of this pair of species, as well as the *O. ramosalaeugypta* pair appeared to be justified by several of the studies. A workshop devoted to the topic of molecular biology provided useful reminders of its potential but also of the need for careful selection of technique to match the objectives of the study. In the most detailed review of the subject to date, Jose Cubero came to valuable conclusions on the relationships within Orobanchaceae, based on cytogenetic studies.

Turning to more conventional morphology and development, there were welcome descriptions of less familiar parasites, including an excellent invited paper from Alfredo Cocucci on *Prosopanche* (Hydnoraceae) in Argentina. Other papers touched upon *Rhamphicarpa*, *Thesium*, *Santalum* and *Arnyema*, trichomes in *Striga*, tuberisa-
tion in *Orobanche*, predation and redistribution of *Orobanche* seeds by soil fauna, while a further novelty was a time-lapse video showing the strange circumnutations of *Viscum album*, as it arrives at the most efficient arrangement of its branches for light interception (R. Dorka).

Papers on host/parasite relationships were introduced by an invited lecture from Klaus Wegmann (not included in the Proceedings), followed later by one on nitrogen effects by Arnold Pieterse and that by Danny Joel on the haustorium and resistance mechanisms. The effects of nitrogen on germination continue to attract attention, while the work of Malcom Press and colleagues reinforces the idea of a role for N in protecting the host from damage. This team also demonstrated clearly how the influence of *Striga* on cereal hosts involves a great deal more than the mere removal of carbon metabolites (which can explain most of the effects of *Orobanche* on tobacco and tomato) though the relative importance of effects on host photosynthesis and re-partitioning of resources, is still not fully clear. Other papers concerned the transfer of S, N and alkaloids from various hosts to *Cuscuta*. Inge Dorr gave us further elegant demonstration of symplastic connections in several host/parasite systems and some new structures in the xylem connections of *Striga hermonthica*.

Several papers reinforced the probable importance of phytoalexins in host resistance, while others showed correlations between peroxidase activity and resistance to *Cuscuta* in tomato, and between enzymes triggering lignin synthesis and the *Cuscuta*-resistance of *Phaseolus*. A report on the induction by *Orobanche* of a defence-related gene in tobacco (by Westwood and others) seems likely to be followed by many more on this theme at future meetings.

In terms of selection and breeding for resistance, no outstanding advances were reported on resistance to *Striga* in maize or sorghum, though several Spanish groups reported valuable new sources of *Orobanche* resistance in wild species of *Helianthus* and *Vicia* while Riches reported encouraging progress in the search for resistance to *Striga* spp. in rice and Scharpf corresponding progress in the (very long) process of developing resistance to *Arceuthobium* in ponderosa pine.

Papers on biocontrol were discussed in a workshop session, at which serious doubts were expressed over the practicality and economics of the use of *Fusarium* spp. as mycoherbicides, whether for *Striga* or *Orobanche*. However, the importance of natural soil suppression (by bacteria, as well as fungi) was also emphasized and hopes expressed that ways could be found to enhance this phenomenon, which is presumed to be responsible for surprising declines in soil seed counts of *S. hermonthica* in some studies in Kenya.

For more direct control, the most novel results have been with herbicides applied as seed-dressings, using seeds of normal faba bean treated with imidazolinone herbicides such as imazapyr for control of *O. crenata* (Luis Garcia-Torres and colleagues) and seeds of genetically-engineered herbicide-resistant maize treated with imazapyr and sulphonylureas for control of *S. hermonthica* (Gordon Abayo, Joel Ransom and colleagues). In neither case is complete control achieved but the idea promises to provide the farmer with a relatively simple and inexpensive technique. An especially welcome report was that showing successful selective control of *O. aegyptiaca* in tomato with application of triasulfuron via sprinkler irrigation (Kleifeld and colleagues). Other papers reported promise from more conventional applications of chlorsulfuron to sorghum to control *Striga* in Sudan, imidazolinone herbicides to faba bean to control *Orobanche foetida* in Tunisia and for control of *Cuscuta* in carrots in Israel. Among papers on non-chemical methods, the transplanting of sorghum as a means of reducing *Striga* attack is confirmed as one more option to be considered. Trap-cropping to reduce the *S. hermonthica* seed bank gave disappointing results in Kenya, emphasizing the need for a better understanding of the factors affecting *Striga* germination in the
field, including varietal differences within trap-crops. Another paper was the first to report on the potential for use of agro-forestry species for control of Striga, and we hope will be followed by many more as realization grows of the importance of long-term improvement in soil fertility.

In a final session on integrated control systems there were no outstanding new ideas, but a welcome increase in consideration of the role of extension and education in the development and delivery of ideas for integrated control systems.

Jose Cubero and Maria-Teresa Moreno are to be congratulated on their superb contributions to the success of this meeting and for arranging fascinating programmes for the evenings and for accompanying persons. All of us will remember Cordoba as a wonderfully colorful, convivial city.

Enquiries about the availability of the Proceedings should be addressed to:

D. Rafael Cantizano
Direccion General de Investigacion Agraria
Consejeria de Agricultura, Pesca y Alimentacion
c/Juan de Lara Nieto 1
41013 Sevilla
SPAIN

C. Parker

---

**POSTDOCTORAL RESEARCH POSITION IN MAIZE**

The Rockefeller Foundation seeks a postdoctoral maize breeder to help implement a program supporting research on the production of African maize varieties with durable resistance to parasitic weeds of the genus Striga. The selected candidate will be assigned to a research institute in Africa that is a grantee of the Foundation. Write to:

Postdoctoral Search-Maize Breeder
Agricultural Sciences Division
The Rockefeller Foundation
420 Fifth Avenue
New York, NY 10018-2702

---

**TWO EXCELLENT NEW BOOKS ON PARASITIC PLANTS**


Dwarf Mistletoes is a wonderful book that will be THE resource on dwarf mistletoes for years to come. Beautifully laid out (except, inexplicably, for the front cover with a title difficult to discern against the mistletoe background), this world class monograph is carefully planned, thorough, well documented, and readable. pp After the succinct introduction, the life cycle of Arceuthobium is discussed, emphasizing seedling establishment of the parasite. I find the diagram of the life cycle and the figure of the intriguing ballistic fruits (pages 8 and 9) to be especially useful for classes when discussing fruit dispersal and phanerogamic parasites. Following chapters discuss sexual reproduction, biogeography, host relationships (especially important since dwarf mistletoes are serious forest pathogens), ecology (including biotic relationships other than host-parasite), physiology, pathology, and control. In short, everything you want to know about dwarf mistletoes is here including a table documenting those established beyond their natural ranges, medicinal uses, etc, etc.

Approximately half of the book deals with taxonomy, including molecular systematics. The "formal taxonomy" section includes distribution maps, excellent color photographs (although some are too dark in my copy), and list of specimens examined. Most helpful, however, are the observations of the authors, both keen students of nature who convey their fascination with dwarf mistletoes even in the "formal taxonomy". The list of references is exhaustive and the indices functional.
This book is in memory of the first author, Frank Hawksworth, who died while the present book, a successor to a 1972 edition, was being written. Frank's enthusiasm, keen observation, and love of mistletoes is appropriately enshrined in this outstanding volume. (Adapted from a review to appear in ECONOMIC BOTANY)


"...an attempt to provide a baseline of information to fill the gap since Kuijt's [1968] text" is the raison d'aitre the editors give for this volume. Simply put, Kuijt's book can probably never be replaced by a single volume due to the tremendous advances made since, and in many cases because of, his Biology of Parasitic Flowering Plants. There are simply too many papers. As Press and Graves note, many of these papers are included in the proceedings of the symposia on parasitic weeds. While these volumes are readily available, they are not handled the same way as other archival literature and thus, alas, not utilized as they should be.

The present work should ameliorate this situation by providing a modern (at least up to 1995) treatment of parasitic angiosperms. Almost three decades have elapsed between Parasitic Plants and The Biology of Parasitic Flowering Plants. Therefore, it is not surprising that the approach is different. The eleven chapters are organized more around how the parasites function rather than on taxonomy and morphology. There is an introductory chapter and two chapters on parasitic weeds. The remainder deal with germination, haustorial initiation, mineral nutrition, carbon and nitrogen relations, water relations, reproductive biology, genes and genomes, and host responses.

Press and Graves suggest that this book will find value as a textbook. The cost is prohibitive for general student use, especially when compared to the relatively inexpensive albeit less stringently edited symposia volumes. Considering the state of flux in the field of parasitic angiosperms, I felt it was better to use the book as a reference in my course in parasitic vascular plants and emphasize rather the primary archival and electronic literature.

This book is very carefully edited and contains useful tables and charts. However, the incredibly poor binding (at least on my copy) lessens its value.

L. J. Musselman

PARASITIC PLANT INITIATIVE FOR THE INTERNATIONAL AGRICULTURAL CENTERS

On August 26 through August 30, 1996, the parasitic flowering plants task force met at IITA, Cotonou to develop a project proposal and formally launch this aspect of the CG system-wide IPM initiative. During the course of the meeting, the participants focussed on developing a collaborative, CG system-wide project for integrated parasitic flowering plant management in West Asia and all of Africa. The outcome of the meeting was a logical framework for the project entitled Collaborative Integrated Parasitic Plant Management (CoIPPM). The logical framework contains 21 outputs and 67 activities centered around two project themes: research and implementation. In addition, the activities of the project were further focussed around development of 13 pilot sites in the ecoregions associated with the African Highlands Initiative (3 sites), the Desert Margins Initiative (3 sites), the Moist Savanna Consortium (3 sites), North Africa (3 sites), and West Asia (1 site).

It was decided that outputs should be allocated 52% to research and 48% to implementation. The outputs were prioritized within each of these two project themes, and projected funding was assigned to each output based on the prioritization. In addition, it was decided that the IARC to NARES split of the budget allocations would be 20% to 80%, respectively. This resulted from the conviction that this project was heavily oriented toward on-farm adoption.
and that NARES would need a larger share of the funds to accomplish this. Matching funds from the IARCs and NARES (based on current core and special project allocations) were estimated to be approximately equal to requested supplemental funding.

Dana K. Berner, International Institute for Tropical Agriculture, Ibadan, Nigeria.

**LITERATURE**


Americanos, P. G. and N. A. Vouzounis. 1995. Control of *Orobanche* in cabbage. Technical Bulletin 170. 7 pp. Agricultural Research Institute, Ministry of Agriculture, Natural Resources and the Environment, Nicosia, Cyprus. (Four plants of *O. aegyptiaca* per host can cause total crop failure. Two applications of glyphosate 60-100 g/ha or imazaquin 5-10 g/ha successful some years but not reliable?)


Antonova, T. S. and S. J. ter Borg. 1996. The role of peroxidase in the resistance of sunflower against *Orobanche cumana* in Russia. Weed Research 36: 113-121. (Distinguishing races C and D on the basis of extra-cellular excretion of peroxidase from seedlings of C - resulting in reaction with host phenolics and the creation of a lignin barrier and resistance - but not from D - hence no host reaction, and a consequent virulence.)


Noire. Serie A, Sciences Naturelles 47:47-50. (Recording a lepidopteran damaging flowers.)


Barker, E. R., M. C. Press, J. D. Scholes and W. P. Quick. 1996. Interaction between the parasitic angiosperm Orobanche aegyptiaca and its tomato host: growth and biomass allocation. The New Phytologist 133: 637-642. (Damage noted from the lowest infection rate and up to 80% reduction in biomass at high levels. Stem and fruit reduced but not leaves and roots.)


Bennetts, R.E., G.C. White, F.G. Hawksworth and S.E. Severs. 1996. The influence of dwarf mistletoe on bird communities in Colorado ponderosa pine forests. Ecological Applications 6: 899-909. (24 of 28 bird species positively correlated with levels of Arceuthobium vuginatum, perhaps due to more death of branches, snags, nesting sites, etc.: hence control of dwarf mistletoe can damage wildlife habitat.)


Berner, D., R. Carsky, K. Dashiell, J. Kling and V. Manyong. 1996. A land management based approach to integrated Striga hermonthica control in sub-Saharan Africa. Outlook on Agriculture 25: 157-164. (An outline of possible control measures, with emphasis on rotation with soyabean, clean crop seed, enhancing soil suppressiveness, varietal resistance and seed treatment with herbicide.)


Boukar, I., D.E. Hess and W.A. Payne. 1996. Dynamics of moisture, nitrogen and Striga infestation on pearl millet transpiration and growth. Agronomy Journal 88: 545-549. (Infestation and damage from S. hermonthica in pots higher under reduced moisture; also higher with added N but this associated with much increased root length. Attachments per m of root reduced by N.)

News 72: 42. (Noting a conference in Germany at which medical uses of *Viscum album* were discussed, products Iscador, Helixor and Abnoba being used in cancer treatment.)


Carsky, R. J., R. Ndikawa, R. Kenga, L. Singh, M. Fobasso and M. Kamuanga. 1996. Effect of sorghum varieties on *Striga hermonthica* parasitism and development. Plant Varieties and Seeds 9: 111-118. (Moderately resistant varieties S-35 and CS-54 supported less *S. hermonthica* emergence and seed production, and significantly lower seed numbers in the soil, than local varieties Djigani and Damongari.)


Cetinsoy, S. 1995. Biology and chemical control of *Melampyrum arvense* L. in cereal fields of Anatolia. The Journal of Turkish Phytopathology 24: 63-68. [A slightly belated English version of his 1980 paper in Turkish, reporting on average densities of 17 *M. arvense* per sq. m in cereal fields in Kutaya province (in 1976) and best control by bromoxynil plus MCPA.]

Cheng-Zhong Zhang. 1996. Fructosides from *Cynomorium songaricum*. Phytochemistry 41: 975-976. (*Cynomorium songaricum* grows in NW China and is used traditionally for kidney disorders.)


Debrah, S. K., D. Sanogo and F. O. Boadu. 1996. On-farm experiments with sorghum to assess the acceptability of new varieties and herbicide treatments. Experimental Agriculture 32: 219-223. [A survey studying farmers’ criteria for using herbicide (2,4-D) for control of S.
hermonthica and adopting new sorghum varieties.]


Dhanapal, G.N. and P.C. Struik. 1996. Broomrape (Orobanche cernua) control before attachment to host through chemically or biologically manipulating seed germination. Netherlands Journal of Agricultural Science 44: 279-291. (In lab and pot experiments, O. cernua stimulated moderately by GR 24 and ethephon, and by exudates from Vigna radiata, V. mungo, sunflower and sesame; less well by pea, pigeonpea and soybean.)


Domínguez, J. 1996. R-41, a sunflower restorer inbred line, carrying two genes for resistance against highly virulent Spanish population of Orobanche cernua. Plant Breeding 115: 203-204. (Identifying two dominant genes for resistance to O. cernua population EC94.)


Donohue, K. 1995. The spatial demography of mistletoe parasitism on a Yemeni Acacia. International Journal of Plant Sciences 156: 816-823. (Plicosepalus curvijlorus commonest in low-density stands of A. tortilis but complex interactions noted between host and parasite populations.)


Fan ZhiWei, Dong XingGuo, Zhou YuFang and Shen YiDe. 1995. Chemical control of Chinese taxillus on rubber trees. Planter 71: 459,468. (Taxillus chinensis reportedly controlled 80% by injection of 'Miesangling 3'.)


Alectra sessiliflora plus 4 newly described - A. hildebrandtii, A. humber-
tii, A. ibityensis and Pseudomelasma pedicularioides.)

Fischer, E. 1996. Sieversandreas, a new monotypic genus of Scrophulariaceae-
Gerardieae from Madagascar. Bulletin du Musé Nationale de l'Histoire Natu-
relle, Paris 4e series 18, section B, Adansonia (3-4): 213-217. (Related to
Sophubia and presumably hemi-
parasitic?)

names of Scrophulariaceae occurring in
Germany. Feddes Repertorium 108: 111-117.

Fischl, G. 1996. [A leaf-spot disease of mist-
etoe (Viscum album L.).] (In Hungari-
(Refers to 'control by
'...Botryophaeostoma visci (Sphaerop-
sis visci)' and to 'a new pathogen of V.
album, Plectophomella visci...'.)

Forstreuter, W., C. Beyer and H. C. Weber.
1995. (Comparative investigation of
haustoria of the Loranthaceae.) (in Ger-
man) Feddes Repertorium 106:
439-444. (Development and structure
of haustoria described for the root-
parasitic Atkinsonia ligustrina, Gaia-
dendron punctatum and Nuytsia flori-
bunda and the mainly epiphytic
Tripodanthus acutifolius.)

Freyer, R., K. Neckermann, R. M. Maier
and H. Kossel. 1995. Structural and
functional analysis of plastid genomes
from parasitic plants: loss of an intron
within the genus Cuscuta. Current
Genetics 27: 580-586. (Comparison of
C. europaea and C. reflexa.)

Biochemical synthesis of
2,6-dimethoxy-para- benzoquinone, a
haustorial stimulant of Striga asiatica
(L.) Kuntze. Natural Products Letters 9:
153-159.

Frost, H. M. 1995. Striga hermonthica sur-
veys in Western Kenya. Proceedings,
Brighton Crop Protection Conference -
(Concludes the Striga problem has the
potential to spread to other regions of
Kenya. Some useful information on
farmer attitudes and knowledge • or
lack of it.)

Frost, D.L., A.L. Gurney, M.C. Press and
J.D. Scholes. 1997. Striga hermonthica
reduces photosynthesis in sorghum: the
importance of stomatal limitations and a
potential role for ABA? Plant, Cell and
Environment 20: 483-492. (In root
chambers studies, photosynthesis
reduced in CSH-1 more than in Ochuti,
perhaps due to differential change in
stomatal conductance; however, both
varieties equally affected in increased
root:shoot ratio and reduced shoot
biomass.)

Gao, Jian-Jun, Zhong-Jian Jia and Carles
Codina. 1996. An eremophilane sesqui-
terpenoid from Pedicularis striata Pall
ssp. arachnoidea. Phytochemistry 43:
1411-1412.

Gabius, S., K. Kayser and H. J. Gabius.
1995. [Mistletoe (Viscum album)
extracts and their application • from a
scientific point of view.] (in German)
Munschener Medizinische Wochenschrift
137: 602-606.

Garcia-Torres, L., M. Castejon-Munoz, F.
Lopez-Granados and M. Jurado-
Exposito. 1995. Imazapyr applied
post-emergence in sunflower (Helianthus
annuus) for broomrape (Orobanche cer-
nua) control. Weed Technology 9: 819-824. (Good selective control
achieved with 10-15 g/ha applied at 12
to 19 leaf stages.)

Garcia-Torres, L., M. Castejon-Munoz, F.
Lopez-Granados and M. Jurado-
Exposito. 1995. [HTCS (herbicide-
treated crop seed) treatments for the
control of broomrape (Orobanche spp.).]
(in Spanish) In: Proceedings 1995 Con-
gress of the Spanish Weed Science Soci-
[Soaking crop seed in 14% herbicide
product for 3-5 minutes gives promising
results in faba bean and pea (with imaz-
ethapyr), in lentil (with imazapyr) and
in sunflower (with propyzamide).]

Garcia-Torres, L., M. Castejon-Munoz, F.
Lopez-Granados and M. Jurado-
Exposito. 1995. [Imazapyr applied
post-emergence in sunflower (Helianthus
The parasitic angiosperm *Striga hermonthica* can reduce photosynthesis of its sorghum and maize hosts in the field. Journal of Experimental Botany 46: 1817-1823. (Photosynthesis in infested CK60 sorghum and H511 maize reduced by 46% and 31% respectively by 63 days after planting: Ochuti sorghum parasitized but photosynthesis unaffected.)


Hershenhorn, J., Y. Goldwasser, D. Plakhine, G. Herzlinger, S. Golan, R. Russo and Y. Kleifeld. 1996. Role of pepper (Capsicum annuum) as a trap and catch crop for control of Orobanche aegyptiaca and O. cernua. Weed Science 44: 948-951. (Pepper caused more germination of O. aegyptiaca than tomato but was less attacked; sweet peppers were less attacked than paprika or hot peppers; 3 pepper varieties caused germination of O. cernua but were not attacked at all.)

Hezewijk, M.J. van and J.A.C. Verkleij. 1996. The effect of nitrogenous compounds on in vitro germination of Orobanche crenata Forsk. Weed Research 36: 395-404. (Germination strongly inhibited by 4 mM ammonium sulphate, but only partially by 8 mM urea and not at all by 16 mM nitrate.)


Johnson, D.E., C.R. Riches, R. Diallo and M.J. Jones. 1997. Striga on rice in West Africa; crop host range and the potential of host resistance. Crop Protection 16: 153-157. (Rice was susceptible to S. aspera from maize and rice; to S. hermonthica from maize, sorghum and rice; and to S. asiatica from maize and Andropogon gayanus : 5 vars of O. glaberrima and 2 of O. sativa (IR 47255 -B-B-5-4 and IR 49255 -B-B-5-2) were partially resistant to S. aspera and S. hermonthica.)

Jurado-Exposito, M., M. Castejon-Munoz and L. Garcia-Torres. 1996. Broomrape (Orobanche crenata) control with imazethapyr applied to pea (Pisum sativum) seeds. Weed Technology 10: 774- 780. (Orobanche crenata well controlled (SO-SO%) and pea undamaged by seed dressing or seed soaking with imazethapyr equivalent to 20-40 g/ha, leading to significant increase of crop yield.)


Kroschel, J., A. A. Abbasher and J. Sauerborn. 1995. Herbivores of Striga hermonthica in northern Ghana and approaches to their use as biocontrol agents. Biocontrol Science and Technology 5: 163-164. (Noting that Smicronyx umbrinus commonly causes damage in Ghana but not in Tanzania, Malawi or Madagascar, while Junonia orithya occurs in all areas.)

Kroschel, J., A. Hundt, A.A. Abbasher and J. Sauerborn. 1996. Pathogenicity of fungi collected in northern Ghana to Striga hermonthica. Weed Research 36: 515-520. (Encouraging results with two isolates of Fusarium oxysporum and one of F. solani - S. hermonthica well controlled and no apparent pathogenicity to sorghum.)


Kim, S. K. 1995. Genetics of maize tolerance of *Striga hermonthica*. IITA Research 11: 1-6. (Concludes that tolerance to *Striga* damage is inherited quantitatively.)


Ladley, J. J. and D. Kelly. 1995. Explosive New Zealand mistletoe. Nature 378: 766. (Suggesting a solution to Kuijt's 'unsolved mystery' -the reason for the flowers of some Loranthaceae opening from the base. This is shown to occur in *Perixilla tetrapetala* when flowers, normally opened by birds, are not visited.)


Lagoke, S. and L. E. van der Straten, editors. 1996. *Striga* Newsletter. Number 6. 26 pages. (Both numbers 5 and 6 of the newsletter are an excellent source of information on current research and surveys.)


Larson, D. L. 1996. Seed dispersal by specialist versus generalist foragers: the plant's perspective. *Oikos* 761: 113-120. (Studies on *Phoradendron californicum* and three bird species, the specialist mistletoe-feeder *Phainopepla nitens* and the generalists, Gila woodpecker (*Melanerpes uropygialis*) and mocking bird (*Mimus polyglottus*).)

Lechowski, Z. 1995. Element contents and guard cell physiology of the root hemiparasite *Melampyrum arvense* L. before and after attachment to the host plant. Journal of Plant Nutrition 18: 2551-2567. (P, Na, N, Cl etc measured in host, *Capsella bursa-pastoris* and parasite before and after attachment. Results include the interesting observation that stomata usually closed in the dark in the unattached parasite but remained open after attachment.)

area basis is low-15 and 23% of that in the host \textit{(Capsella bursa-pastoris)} before and after attachment respectively. Chlorophyll and carotenoids are low; respiration high - X1.8 and 2.6 before and after.

Lechowski, Z. 1997. Stomatal response to exogenous cytokinin treatment of the hemiparasite \textit{Melampyrum arvense} L. before and after attachment to the host. Biologia Plantarum 39: 13-21. (Before attachment to host, cytokinin increased stomatal aperture: after attachment, parasite insensitive to additional cytokinin and/or K.)


Loffler, C., A. Sahm, V. Wray, F. C. Czygan and P. Proksch. 1995. Soluble phenolic constituents from \textit{Cuscuta reflexa} and \textit{Cuscuta platyloba}. Biochemical Systematics and Ecology 23: 121-128. (Phenolic content, highest in the haustorial region, was not influenced by the host on which they were growing.)


Marshall, J. D., T. E. Dawson and J. R. Ehleringer. 1994. Integrated nitrogen, carbon, and water relations of a xylem-tapping mistletoe following nitrogen fertilization of the host. Oecologia 100: 430-438. (Work with \textit{Phoradendron juniperum} on \textit{Juniperus osteosperma} partially confirms the hypothesis that the gas-exchange characteristics of mistletoes are designed to ensure adequate nitrogen gain, but also suggests that the low water-use efficiency of the parasite is an inevitable consequence of an imbalance in C and N assimilation.)

Martinez, del Rio, C., M. Hourdequin, A. Silva and R. Medel. 1995. The influence of cactus size and previous infection on bird deposition of mistletoe seeds. Australian Journal of Ecology 20: 571-576. (Interesting observations on the interrelations of \textit{Tristerix aphyllus} with \textit{Minus thencan} (the Chilean mockingbird), and the cactus hosts \textit{Echinopsis chilensis} and \textit{Eulychnia acida} in Chile.)


in two faba bean genotypes. Weed Research 37: 39-49. (Crop density had only minor effects but var. 402/29/84 showed excellent resistance, associated with hypersensitivity, a smaller root system, and early flowering.)


Mathiasen, J. S., B. W. Geils, C. E. Carson and F. G. Hawkins. 1995. Larch dwarf mistletoe not found on alpine larch. Fort Collins, Colorado, USA Research Note - Rocky Mountain Forest and Range Experiment Station, USDA Forest Service no RM-533, 4 pp. (Noting that previous reports of Arceuthobium laricis on Larix lyallii are erroneous, the host being re-identified as L. occidentalis.)


Mertzig, C. and S. Prien. 1996. (Occurrence of pine mistletoe in forest stands in Niederlausitz.) (in German) AFZ/Der Walt, Allgemeine Forst Zeitschrift fur Waldwirtschaft und Umweltvorsorge 51: 160-162. (Three forms of V. album ssp. laxum distinguished. Planting broad-leaved trees around stand margins suggested as a means of reducing incidence.)

Merti, S.S. and M.M. Hosmani. 1994. Broomrape control in bidi tobacco by soil solarization. Tobacco Research 20(1): 67-70. (O. cernua reduced 78% by clear polyethylene 0.05 mm thick for 40 days.)


Murty, D. S., S. A. Bello and S. E. Eladele. 1995. Screening sorghum for resistance to Striga under artificial field inoculation. International Sorghum and Millets Newsletter 36: 84-86. (Three techniques used; Framida least attacked of 10 vars in all tests.)


Nimbal, C. I., J. F. Pedersen, C. N. Yerkes, L. A. Weston and S. C. Weller. 1996. Phytotoxicity and distribution of sorgoleone in grain sorghum germplasm. Journal of Agricultural and Food Chemistry 44: 1343-1347. (Showing that sorgoleone comprises 85-90% of all root exudates from sorghum; amounts vary 20-fold among genotypes; toxic effects mainly on photosynthesis occur down to 10 micromolar in some species of Digitaria sanguinalis.)


Odasz, A.M. and O. Savolainen. 1996. Genetic variation in populations of the arctic perennial Pedicularis dasyantha (Scrophulariaceae) on Svalbard, Norway. American Journal of Botany 83: 1379-1385. This parasite shows more isozyme genetic variability than the 5 other species reported in this genus but less than other spp. with limited regional distribution. Noted this sp. self-compatible and has long-lived perennial habit.)

Olivier, A. 1995. Le Striga, mauvaise herbe parasite des ciriales africaines: biologie et methodes de lutte. Agronomie 15: 517-525. (General review.)


Orr, J.P. 1996. Nightshade and dodder control in processing tomatoes. Proceedings, Western Society of Weed Science 49: 30-32. (Cuscuta sp. controlled 95% by application of rimsulfuron at cotyledon stage of crop; repeat application gave 100% control season-long.)

Orr, G.L., M.A. Haidar and D.A. Orr. 1996. Smallseed dodder (Cuscuta planiflora) gravitropism in red light and in red plus far-red. Weed Science 44: 795-796. (In 4-hour spells of mixed red/far-red light, some positive gravitropism observed, but negative gravitropism resumed in 4-hour spells of red only.)


Popovic, S. and M. Stjepanovic. 1995. (Production of alfalfa seed is limited by presence of Cuscuta spp.) (in Croatian) Sjemenarstvo 12: 135-149. (Propyzamide as Kerb, 3-4 kg/ha gave best control.)


Pundir, Y. P. S. 1995. Host range of Scurrula pulverulenta (Wall.) G. Don. (Loranthaceae) from Doon Valley and adjacent areas. Indian Journal of Forestry 18: 74-79. (Total hosts recorded in this area now 131 species from 58 genera, 34 plant families.)

Pujadas, A. and A. Lora. 1995. (Orobanchaceae) A. Pujadas (Orobanchaceae), a new species from the southeast Iberian Peninsula.) (in Spanish) Anales de la Sociedad Biogeográfica (3ème série) IV, 83-94. (Commenting on characteristics and distribution of a total 41 species.)

Raynal-Roques, A. 1994. Repartition géographique et spéciation dans le genre Striga (Scrophulariaceae parasites). Memoires de la Societe Biogeographique (3ème serie) IV, 83-94. (Commenting on characteristics and distribution of a total 41 species.)


Rivera, G.L., L. Galetto and L. Bernardello. 1996. Nectar secretion pattern, removal effects, and breeding system of *Ligaria cuneifolia* (Loranthaceae). Canadian Journal of Botany 74: 1996-2001. (From studies of *L. cuneifolia* on *Acacia aroma* in Argentina it is concluded that the reproductive system is 'primarily xenogamous, but reproductive success is related to flower age'.)

Rizzini, C.T. (1995) (Flora of the Serra do Cipo, Minas Gerais: Loranthaceae.) (in Portuguese) Boletin de Botanica, Universidade de Sao Paulo 14: 207-221. (Descriptions of 7 species of *Phoradendron*, 4 of *Struthanthus* and 1 each of *Dendrophthora* and *Psittacanthus*.)


Ruso, J., S. Sukno, J. Dominguez-Gimenez, J. M. Melero-Vara and J. Fernandez-Martinez. 1996. Screening of wild *Helianthus* species and derived lines for resistance to several populations of *Orobanche cernua*. Plant Disease 80: 1165-1169. (All 26 perennial spp. and some of 18 annuals resistant to 'highly virulent' races of *O. cernua*.)


Salonen, V. and S. Puustinen. 1996. Success of a root hemiparasitic plant is influenced by soil quality and by defoliation of its host. Ecology 77: 1290-1293. [Growth of *Rhinanthus serotinus* on *Agrostis capillaris* (in Finland) is reduced in sandy soil, and by partial defoliation of the host.]


Schnell, H., M. Kunisch, M.C. Saxena and J. Sauerborn. 1996. Simulation of the seed bank dynamics of Orobanche crenata Forsk. in some crop rotations common in Northern Syria. Experimental Agriculture 32: 395-403. (Results suggest growing a susceptible crop every third year leads to high infestation, while growing it only every 12 years and replacing otherwise with Vicia villosa ssp. dasycarpa allows only low infestation.)

Seel, W.E. and M.C. Press. 1996. Effects of repeated parasitism by Rhinanthus minor on the growth and photosynthesis of a perennial grass, Poa alpina. New Phytologist 134: 495-502. (Poa alpina infested in first season suffered at least 50% loss of biomass: effects of reinfestation in a second year, or infestation delayed to the second year also studied. Few direct effects on photosynthesis or root:shoot ratio.)


Shan-Ting Chiu. 1996. Notes on the genus Taxillus Van Tieghem (Loranthaceae) in Taiwan. Taiwania 41: 154-167. (Discussing relationship of the genus Taxillus to Scurrula and Loranthus and recording 10 species of Taxillus including one new species, one newly recorded and several previously included in Scurrula.)


Silva, A. and C.M. del Rio. 1996. Effect of the mistletoe Tristerix aphyllus (Loranthaceae) on the reproduction of its cactus host Echinopsis chilensis. Oikos 75: 437-442. (The mistletoe is considered a phloem-tapping parasite with little photosynthetic capacity, hence more damaging to host than most mistletoes.)

Smith, M. C. and M. Webb. 1996. Estimation of the seedbank of Striga spp. (Scrophulariaceae) in Malian fields and the implications for a model of biocontrol of Striga hermonthica. Weed Research 36: 85-92. (New data suggest that Smicronyx spp. could be somewhat more effective than was concluded in the earlier paper by Smith et al., 1993)

Smith, C.E., T. Rutledge, Zeng ZhaoXian, R.C. O'Malley and D.G. Lynn. 1996. A mechanism for inducing plant development: the genesis of a specific inhibitor. Proceedings of the National Academy of Sciences of the United States of America 93: 6986-6991. (Cyclopropyl-p-benzoquinone is shown to be a specific inhibitor of haustorial development.)

Smith, I.M. and A.S. Roy. 1996. Illustrations of Quarantine Pests for Europe. OEFP/EPPO/CABI, 241 pp. (This companion volume to 'Quarantine Pests for Europe' published in 1992, includes illustrations of Arceuthobium douglasii and A. vaginatum ssp. cryptopodium. All non-European species of Arceuthobium are prohibited, the only genus of weeds affected by European regulations.)

Smith, C.E., T. Rutledge, Zeng ZhaoXian, R.C. O'Malley and D.G. Lynn. 1996. A mechanism for inducing plant development: the genesis of a specific inhibitor. Proceedings of the National Academy of Sciences of the United States of America 93: 6986-6991. (Cyclopropyl-p-benzoquinone is shown to be a specific inhibitor of haustorial development.)

Smith, I.M. and A.S. Roy. 1996. Illustrations of Quarantine Pests for Europe. OEFP/EPPO/CABI, 241 pp. (This companion volume to 'Quarantine Pests for Europe' published in 1992, includes illustrations of Arceuthobium douglasii and A. vaginatum ssp. cryptopodium. All non-European species of Arceuthobium are prohibited, the only genus of weeds affected by European regulations.)

Snyder, M. A., B. Fineschi, Y. B. Linhart and R. H. Smith. 1996. Multivariate discriminator of host use by dwarf mistletoe Arceuthobium vaginatum subsp. cryptopodium: inter- and intra-specific comparisons. Journal of Chemical Ecology 22: 295-305. (Parasitism on the primary host, Pinus ponderosa and the occasional host P. contorta is to some degree correlated with chemical charac-
teristics of oleoresins in the host phloem.)

Sproule, A. 1996. Impact of dwarf mistletoe on some aspects of the reproductive biology of jack pine. Forestry Chronicle 72: 303-306. (*Arceuthobium americanum* shown to reduce seed production of *Pinus banksiana* by up to 76%.)

Sproule, A. 1996. Branch age in jack pine at the time of dwarf mistletoe infection. Forestry Chronicle 72: 307. (Studies of *Arceuthobium americanum* on *Pinus banksiana*.)


Stockey, R.A., H. Ko and P. Woltz. 1995. Cuticle micromorphology of *Parasitaxus* de Laubenfels (Podocarpaceae). International Journal of Plant Science 156: 723-730. (Cuticle of *P. ustus* is compared with that of *Falcatifolium taxoides*, the host, and that of other genera, all in Podocarpaceae.)


Striga Newsletters Number 6 (March 1996) and Number 7 (September 1996). FAO/PASCON. (Two further issues of this valuable newsletter, with an abundance of news items on the latest activities of research groups around Africa and elsewhere and extended summaries of selected literature items.)


Taylor, A., J. Martin and W., E. Seel. 1996. Physiology of the parasitic association between maize and witchweed (*Striga hermonthica*): is ABA involved? Journal of Experimental Botany 47: 1057-1065. (Infection by *S. hermonthica* caused drastic reduction in stomatal conductance but increases in ABA in 3 maize varieties were inconsistent.)


Tennakoon, K. U. and J. S. Pate. 1996. Effects of parasitism by a mistletoe on the structure and function of branches of its host. Plant, Cell and Environment 19: 517-528. (Studying the mineral and water relations between *Amyema presii* and *Acacia acuminata* as the distal parts of the host branch atrophy and the proximal parts are enhanced in thickness.)

Tennakoon, K. U. and J. S. Pate. 1996. Heterotrophic gain of carbon from hosts by the xylem-tapping root hemiparasite *Olax phyllanthi* (Olacaceae). Oecologia 105: 369-376. (Results varied depending on the hosts involved: *Portulaca oleracea*, *Amaranthus caudatus* and...
Acacia littorea; parasite growth greatest on the N-fixing Acacia.


Tidwell, T. E. 1996. Index of phanerogamic parasites of California. Parts I and II. California Plant Pest and Disease Report 15(1-2): 23-64 and 15(3-4): 97-139. (This unique compendium of all the parasites in the large and diverse state of California could be a model for other states. All the parasites are listed but there is also what appears to be an exhaustive list of hosts based on information from herbaria, literature and quarantine intercepts the latter seldom being documented.)

Traore, D., C. Vincent and R.K. Stewart. 1996. Life history of Smicronyx guineanus and Sm. umbrinus (Col: Cucur- lionidae) on Striga hermonthica (Sor- phulariaceae). Entomophaga 40: 211-221. (Valuable basic information and means of distinguishing these two species, almost equally frequent in the study area of Burkina Faso.)

Tuquet, C. and G. Salle. 1996. Characteristics of chloroplasts isolated from two mistletoes originating in temperate (Vis- cum album) and tropical (Tapinanthus dodoneifolius) areas. Plant Physiology and Biochemistry 34: 283-292.


Xi Qian. 1996. (Studies of the biological characteristics and control of *Cuscuta chinensis* in soyabean fields in the reclamation area of north Jiangsu.) (in Chinese) Soybean Science 15(1): 62-68. (Good control from dibutilin pre-emergence; linuron, diuron, glyphosate and alachlor also tested.)

Yan, Z. and N. Reid. 1995. Mistletoe (*Amyema miqueli* and *A. pendulum*) seedling establishment on eucalypt hosts in eastern Australia. Journal of Applied Ecology 32: 778-784. (Germination high regardless of host; 5 month survival on dead branches; maximum 60% establishment; much predation by Rosella parrot; desiccation in summer an important mortality factor.)


Zerman, N. and A.R. Saghir. 1995. (The genus Cuscuta in Algeria.) (In Arabic)

Arab Journal of Plant Protection 13(2): 69-75. (12 species reported, including C. campestris, now widespread.)