HAUSTORIUM

Parasitic Plants Newsletter

Official Organ of the International Parasitic Seed Plant Research Group

May 1997 .... Number 32

• • 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 home page. 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: ljm100f@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-

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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 horticulturalists.

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 ***Strobilunthes*** 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 bilabiate 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 sysymposium 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 ***Orobanche 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. *ramosalaegyptiaca*** 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,*** tuberisation 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 longterm 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
USA

● TWO EXCELLENT NEW BOOKS ON PARASITIC PLANTS

Dwarf Mistletoes: Biology, Pathology, and Systematics. 1996. F. G. Hawksworth and D. Wiens. Agriculture Handbook 709. United States Department of Agriculture, Forest Service. Washington, D.C. xiv + 410. Cost not given.

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)

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Parasitic Plants. 1995. Edited by Malcom Press and Jonathan Graves. Chapman and Hall, London. xii + 292. Cost: L45.

"...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 Flower 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 initative. 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.

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Dabrowski, Z. T. and A. Hamdoun (Eds). 1995. Report on the First National Workshop on Control Methods of Broomrape, ***Orobanche*** in Sudan. ICIPE Science Press, Nairobi. 58 pp. (Including 9 papers and a summary of discussions among 42 participants meeting in August 1995. Main species in Sudan is O. ***ramosa*** along Nile and Red Sea and other hot spots, on tomato, potato; also some O. ***cernua*** and ***O. minor*** along coast. Preliminary work with solarization shows promise.)

Deacon, J. W. 1996. Ecological implications of recognition events in the pre-infection stages of root pathogens. New Phytologist 133: 135-145. (Mainly on fungi but including reference to ***Striga*** and ***Orobanche.)***

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.]

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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.)

Diarra, C., M. Ciotola, S.G. Hallett, D.E. Hess and A.K. Watson. 1996. Mass production of ***Fusarium oxysporum*** (M12-4A), a biological control agent for ***Striga hermonthica.*** In: V.C. Moran and J.H. J. Hoffman (Eds), Proceedings, 9th International Symposium on Biological Control of Weeds, Stellenbosch, 1996. pp. 149-152.

Dini, I., C. Iodice and E. Ramundo. 1995. Phenolic metabolites from ***Orobanche speciosa.*** Planta Medica 61: 389-390. (Relating to the uses of ***O. crenata*** in folk medicine - anti-inflammatory, anti-microbial and cicatrizing.)

Dominguez, 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.**)

Dominguez, J., J.M. Melero-Vara, J. Ruso, J. Miller and J.M. Fernandez- Martinez. 1996. Screening for resistance to broomrape ***(Orobanche cernua)*** in cultivated sunflower. Plant Breeding 115: 201-202. (240 crop lines tested, of which 10 resistant.)

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.)

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Filep, G. M., J. J. Colbert, C. A. Parks and K. W. Seidel. 1995. Effects of thinning on growth and vigor of ***Larix occidentalis*** infected with ***Arceuthobium laricis*** in Oregon. In: Ecology and Management of ***Larix*** Forests: a look ahead. Proceedings of an International Symposium, Whitefish, Montana, 1992. USDA Forest Service General Technical Report-Intermountain Research Station No INT-GTR-319. pp. 307-309.

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Fineran, B.A. 1996. Flange-type parenchyma cells: occurrence and structure in the haustorium of the dwarf mistletoe ***Korthalsella.*** Protoplasma 194: 40- 53. (Involving ***K. lindsayi,*** K. ***salicornioides*** and ***K. clavata.)***

Fischer, E. 1996. A revision of the genus ***Alectra*** Thunberg (Scrophulariaceae) in Madagascar, with a description of ***Pseudemelasma,*** gen. nov. Bulletin du Musee Nationale de l'Histoire Naturelle, Paris 4e siries 18, section B, Adansonia (1-2): 45-65. (Five species recognised:

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

Fischer, E. 1996. ***Sieversandreas,*** a new monotypic genus of Scophulariaceae-Gerardieae from Madagascar. Bulletin du Musie Nationale de l'Histoire Naturelle, Paris 4e siries 18, section B, Adansonia (3-4): 213-217. (Related to ***Sopubia*** and presumably hemi-parasitic?)

Fischer, E. 1997. Notulae ad Floram Germanicum 11. Typifications of Linnean names of Scrophulariaceae occurring in Germany. Feddes Repertorium 108: 111-117.

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Forstreuter, W., C. Beyer and H. C. Weber. 1995. (Comparative investigation of haustoria of the Loranthaceae.) (in German) Feddes Repertorium 106: 439-444. (Development and structure of haustoria described for the root-parasitic ***Atkinsonia ligustrina, Gaiadendron punctatum*** and ***Nuytsia floribunda*** 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.)***

Frick, E., D. Frahne, K. Wegmann. 1996. Biochemical synthesis of 2,6-dimethoxy-para- benzoaquinone, a haustorial stimulant of ***Striga asiatica*** (L.) Kuntze. Natural Products Letters 9: 153-159.

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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.)

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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 postemergence in sunflower ***(Helianthus annuus***) for broomrape ***(Orobanche cernua)*** 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 Congress of the Spanish Weed Science Society, Huesca, Spain, 1995. pp. 369-372. [Soaking crop seed in 1-5% herbicide product for 3-5 minutes gives promising results in faba bean and pea (with imazethapyr), 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*** *annuus)* for broomrape *(Orobanche cernua)* control.] (in Spanish) In: Proceedings **1995** Congress of the Spanish Weed Science Society, Huesca, Spain, **1995.** pp. **303-306.** (Imazapyr at **10-15** g/ha at **12-14** leaf stage selective against *O. cernua* just emerging; later treatment more damaging.)

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Gbehounou, G., A.H. Pieterse and J.C. Verkleij. **1996.** The decrease in seed germination of *Striga hermonthica* in Benin in the course of the rainy season is due to dying off process. Experientia **52: 264-267.** (At a site 70 km N. of Parakou, viability of seeds declined rapidly during wet season and prevention of new seeding for **2** seasons should result in dramatic decrease of the problem.)

Georgieva, I. G. and H. G. Bozoukov. **1995.** Study on the properties of some pesticides to stimulate germination of the broomrape *(Orobanche* spp.) seeds. Bulgarian Journal of Agricultural Science **1(1): 13-17.** (Among **52** fungicides, herbicides and insecticides tested, active compounds included thiophanate-methyl, endosulfan, thiofanox and vernolate.)

Goldwasser, Y. **1995.** Spinach *(Spinacia oleracea* var. Attica) as a host of Egyptian broomrape *(Orobanche aegyptiaca).* Phytoparasitica **23: 357-358.**

Goldwasser, Y., Y. Kleifeld, S. Golan, A. Barguti and B. Rubin. **1995.** Dissipation of metham-sodium from soil and its effect on the control of *Orobanche aegyptiaca.* Weed Research **35: 445-452.**

Gomes, S. **1996.** (Cape Verde Flora. Vascular Plants. Orobanchaceae.) (in Portugese) Flora de Cabo Verde No **82. 7** pp. (Including description and illustrations of *Cistanche phelypaea.)*

Gomez, M.A., M.T. Saenz, M.D. Garcia, R. de la Puerta and M.C. Ahumada. **1996.** Effect of methanolic extract of parasitic *Viscum cruciatum* Sieber on mitosis in *Allium cepa* L. Cytobios **85(340): 59-63.**

Goncalves, M. L. **1995.** (Cape Verde Flora. Vascular plants. **73.** Cuscutaceae.) (in Portuguese). Flora de Cabo Verde No **73, 9** pp. (Describing *Cuscuta planiflora* vars. *approximata* and *planijlora* and *C. umbellata.)*

Gressel, J., L. Segel and J. K. Ransom. **1996.** Managing the delay of evolution of herbicide resistance in parasitic weeds. International Journal of Pest Management **42: 113-129.** (With suitable care and roguing, it is estimated that resistance to imidazolinone and sulfonylurea herbicides should be delayed for at least **6-8** seasons.)

Gurney, A. L., M. C. Press and J. K. Ransom. **1995.** The parasitic angiosperm *Striga hermonthica* can reduce photosynthesis ofits 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.)

Haidar, M. A., W. Bibi and N. Abdel-Khalek. **1995.** Effect of wheat and barley residues on branched broomrape *(Orobanche ramosa)* growth and development in potatoes. Proceedings, Brighton Crop Protection Conference - Weeds, Brighton, **1995.** pp. **871-876.** (Rates of **6,000-12,000** kg straw/ha, preferably incorporated, reduced O. *ramosa* emergence by at least 50% and increased potato yield in some cases.)

Haigh, S.L. **1996.** Saltcedar (*Tamarix ramosissima),* **an** uncommon host for the desert mistletoe *(Phoradendron californicum).* Great Basin Naturalist **56(2): 186-187.**

Hajta, T., K. Hostanska, J. Fischer and H. Lentzen. **1996.** Investigation of cellular parameters to establish the response of a biomodulator: galactoside-specific lectin from *Viscum album* plant extract. Phytomedicine **3: 129-137.** (The lectin showed to increase the priming of polymorphonuclear leukocytes in humans.)

Haynes, A.R., N.C. Coile and T.S. Schubert. 1996. Comparison of two parasitic vines: dodder ***(Cuscuta)*** and woe vine ***(Cassytha).*** Botany Circular (Gainesville) No 30. 3 pp.

Hall, J. P. 1996. Forest insect and disease conditions in Canada 1994. 112 pp. (Including mistletoes.)

Harten, A. van. 1996. ***Sitobion loranthi,*** a new aphid from Angola living on mistletoes (Homoptera: Aphididae). Entomologische Berichten 56: 76-79. (A new species occurring on several species of Loranthaceae in Angola.)

Haynes, S. C., W. L. MacDonald and L. J. Musselman. 1996. Oilnut parasitism of firs. U. S. Department of Agriculture, Forest Service, Northeastern Area, Southern Region. NA-PR-03-96. (A pest alert poster for oilnut, ***Pyrularia pubera,*** Santalaceae, that attacks ***Abies balsamea*** and ***A. fraseri*** grown as Christmas trees in the Appalachian Mountains of West Virginia.)

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.)

Hibberd, J. M., W. P. Quick, M. C. Press and J. D. Scholes. 1995. Carbon fixation, partitioning and growth of cowpea parasitized by ***Striga gesnerioides.*** In: Physiological responses of plants to pathogens, Dundee, 1995. Aspects of Applied Biology 42: 117-124.

Hibberd, J. M., W. P. Quick, M. C. Press and J. D. Scholes. 1996. The influence of the parasitic angiosperm ***Striga gesnerioides*** on the growth and photosynthesis of its host ***Vigna unguiculata.*** Journal of Experimental Botany 47: 507-512. ***(Striga gesnerioides*** causes no change in root:shoot ratio and inconsistent effects on photosynthesis. The main damage appears to result from its strength as a sink.)

Hillocks, R.J., J.W.M. Logan, C.R. Riches, A. Russell-Smith and L.J. Shaxson. 1996. Soil pests in traditional farming systems in sub-Saharan Africa - a review. Part 2. Management strategies. International Journal of Pest Management 42: 253-265. (Including discussion of host resistance and cultural methods for control of ***Striga*** and ***Alectra*** spp.)

Hoffman, G., C. Diarra and D. Dembele. 1994. ***Striga asiatica,*** new pest of maize in Mali. FAO Plant Protection Bulletin 42: 214-215. (First report of S. ***asiatica*** on crops in Mali.)

Hunt, R.S., J.N. Owens and R.B. Smith. 1996. Penetration of western hemlock, ***Tsuga heterophylla*** by the dwarf mistletoe, ***Arceuthobium tsugense,*** and the development of the parasite cortical system. Canadian Journal of Plant Pathology 18: 342-346.

Igbinnosa, I., K. F. Cardwell and S. N. C. Okonkwo. 1996. The effect of nitrogen on the growth and development of giant witchweed, ***Striga hermonthica*** Benth.: effect on cultured germinated seedlings in host absence. European Journal of Plant Pathology 102(1): 77-86. (In general nitrate enhanced seedling growth, while ammonium and urea suppressed it.)

Igbinnosa, I. and P. A. Thalouarn. 1996. Nitrogen assimilation enzyme activities in witchweed ***(Striga)*** in hosts presence and absence. Weed Science 44: 224-232.

Jeschke, W. D., P. Baumel and N. Rath. 1995. Partitioning of nutrients in the ***Cuscuta rejlexa-Lupinus albus*** association. Aspects of Applied Biology 42: 71-79.

Jeschke, W.R. and A. Hilpert. 1997. Sink-stimulated photosynthesis and sink-dependent increase in nitrate uptake: nitrogen and carbon relations of the parasitic association ***Cuscuta reflexa* - *Ricinus communis.*** Plant, Cell and Environment *20:* 47-56. (Exploring the relatively mild damage caused to the host in this combination, and the important role of N.)

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.)

Kadas, I., G. Arvai, K. Miklo, G. Horvath, L. Toke, G. Toth, A. Szollosy and M. Bihari. 1996. Novel approach to the potent germination stimulant strigol and its analogues. Journal of Environmental Science and Health. Part B, Pesticides, Food Contaminants, and Agricultural Wastes 31: 561- 566.

Kamlesh Mathur, R.B. Gurjar and K. Chitle. 1995. Onion and garlic - two new hosts of dodder. Indian Journal of Mycology and Plant Pathology 25:335. (Occurrence of unspecified ***Cuscuta*** in Rajhastan, India.)

Khalid, A.N. and S.H. Iqbal. 1996. Mycotrophy in a vascular stem parasite ***Cuscuta reflexa.*** Mycorrhiza 6(1): 69-71. (AM-inoculated plants of C. ***reflexa*** showed increased biomass and longevity.)

Kim, S.K. and V.O. Adetimirin. 1997. Responses of tolerant and susceptible maize varieties to timing and rate of nitrogen and ***Striga hermonthica*** infestation. Agronomy Journal 89: 38-44. [Yields of 8322-1 (tolerant) much greater than those of 8338-1 (susceptible) under high artificial infestation: benefits of N greatest at *2* weeks after planting.]

Kim, PyoungSu and Ahn WonYung 1996. Analysis of chemical constituents of saccharides and triterpenoids in the Korean native mistletoes. II Screening the extractives of Korean camellia mistletoe ***(Pseudixusjaponicus*** for cytotoxicity. Mogjae Gonghak = Journal of Korean Weed Science and Technology 24(1): 87-94.

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.)

Kuijt, J. 1996. Cataphylls and taxonomy in ***Phoradendron*** and ***Dendrophthora*** (Viscaceae). Acta Botanica Neerlandica 45: 263-277.

Kuijt, J. and E.A. Kellogg. 1996. Miscellaneous mistletoe notes, 20-36. Novon 6(1): 33-35. (Describing 11 new spp.; 4 ***Dendrophthora,*** 6 ***Phoradendron*** and 1 ***Psittacanthus*** and several new combinations in ***Dendrophthora*** and ***Phthirusa.)***

Kunjo, E.M. (1996) Practical results of ***Striga*** research in the Gambia. In: H. Brown, G.W. Cussans, M.D. Devine, S.O. Duke, C. Fernandez-Quintanilla, A. Helweg, R. Labrada, M. Landes, P. Kudsk and S.C. Streibig (Eds.) Proceedings, 2nd International Weed Control Congress, Copenhagen, Denmark, 1996, pp. 685-686.

Killick, J. 1996. Mistletoe in Oxfordshire. Botanical Society of the British Isles News 72: 42-43. (Noting some association of ***Viscum album*** with chalk soils, urban areas and river valleys. See also Showler, 1996.)

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.)

King, S. B. and S. Z. Mukuru. 1995. An overview of sorghum, finger millet and pearl millet in eastern Africa with special attention to diseases. In: Daniel, D. L. (ed.) Breeding for disease resistance with emphasis on durability. Proceedings of a regional workshop for eastern, central and southern Africa, Njoro, Kenya, 1994. pp. 24-34. (Work on ***Striga*** resistance is mentioned.)

Kutbay, H. G., F. Karaer and M. Kilinc. 1996. Nutrient relationships of ***Cuscuta epithymum*** var. ***epithymum.*** In: H. Brown, G. W. Cussans, M. D. Devine, S. O. Duke, C. Fernandez-Quintanilla, A. Helweg, R. Labrada, M. Landes, P. Kudsk and S. C. Streibeig (Eds.) Proceedings, 2nd International Weed Control Congress, Copenhagen, Denmark, 1996, pp. 91-94. (On host ***Heliotropium europaeum*** in Turkey; discusses active v. passive uptake theories.)

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.)

Ladley, J.J. and D. Kelly. 1996. Dispersal, germination and survival of New Zealand mistletoes (Loranthaceae): dependence on birds. New Zealand Journal of Ecology 20(1): 69-79. (Observations on the role of bellbirds, silvereyes and tui in the dispersal of ***Alepis flavida, Peraxilla tetrapetala, Ileostylis micranthus*** and ***Tupeia antarctica.)***

Lagoke, S. and R. Hoevers, editors. 1995. ***Striga*** Newsletter. Number 5. 26 pages.

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.)

Lagoke, S.J.O., R. Labrada, S.S. M'Boob and L. van der Straten. 1996. ***Striga*** problem and its control in Africa south of the Sahara. In: H. Brown, G.W. Cussans, M.D. Devine, S.O. Duke, C. Fernandez-Quintanilla, A. Helweg, R. Labrada, M. Landes, P. Kudsk and S.C. Streibig (Eds.) Proceedings, 2nd International Weed Control Congress, Copenhagen, Denmark, 1996, pp. 761. (Outlining the activities of PASCON.)

Lane, J. A., T. H. M. Moore, D. V. Child and K. F. Cardwell. 1996. Characterization of virulence and geographical distribution of ***Striga gesnerioides*** on cowpea in West Africa. Plant Disease 80: 299-301. (Five races differentiated on the basis of their virulence on 5 descriminator varieties.)

Larson, D.L. 1996. Seed dispersal by specialist versus generalist foragers: the plant's perspective. Oikos 76(1): 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.)

Lechowski, Z. 1996. Gas exchange in leaves of the root hemiparasite ***Melampyrum arvense*** L. before and after attachment to the host. Physiologia Plantarum 38: 85-93. [Net photosynthesis on a leaf area basis is low-15 and 23% of that in the host *(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. Stomata1 response to exogenous cytokinin treatment of the hemiparasite ***Melampyrum arvense*** L. before and after attachment to the host. Biologia Plantarum 39: 13-21. (Before attachment to host, cytokinin increased stomata1 aperture: after attachment, parasite insensitive to additional cytokinin and/or K.)

Lehtila, K. and K. Syrjanen. 1995. Compensatory responses of two ***Melampyrum*** species after damage. Functional Ecology 9: 511-517. (Studies on ***M.pratense*** and M. ***sylvaticum*** in Finland.)

Lobin, W. and B. Dull. 1996. [The genus ***Cistanche*** (Orobanchaceae) on the Cape Verde Islands with consideration of the species on the West African continent.] (In German) Willdenowia 25: 583-594. (All material from Cape Verde and Senegal designated ***C. phelypaea;*** delimitation from ***C. tubulosa*** and 2 other spp. outlined.)

Lock, G. M. and M. C. Press. 1995. Effects of elevated C02 on ***Agrostis capillaris*** infected with the hemiparasite ***Rhinanthus minor.*** In: Physiological responses of plants to pathogens, Dundee, 1995. Aspects of Applied Biology 42: 155-159.

Loffler, C., A. Sahm, V. Wray, F. C. Czygan and P. Proksch. 1995. Soluble phenolic constituents from ***Cuscuta reflexa*** and ***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.)

Lopez-Granados, F. and L. Garcia-Torres. 1996. Effects of environmental factors on dormancy and germination of crenate broomrape ***(Orobanche crenata).*** Weed Science 44: 284-289.

Lusson, **N.,** P. Delavault and P. Thalouarn. 1995. The plastid rp120 gene from ***Lathraea clandestina*** (holoparasite) is conserved in a functional form. Comptes Rendus de l'Academie des Sciences. Serie III, Sciences de la Vie 318: 659-664. (Comparisons also with ***Melampyrum pratense, Epifagus*** and ***Digitalis purpurea.)***

Mansuetus, S.B.A. 1995. Sorghum diseases in Tanzania. African Crop Science Journal 3:203-207. ***(Striga*** included with 22 diseases as major constraints on sorghum production in Tanzania.)

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 ***Phoradendron juniperum*** on ***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 ***Tristerix aphyllus*** with ***Mimus thenca*** (the Chilean mockingbird), and the cactus hosts ***Echinopsis chilensis*** and ***Eulychnia acida*** in Chile.)

Martinez del Rio, C., A. Silva, R. Medel and M. Hourdequin. 1996. Seed dispersers as disease vectors: bird transmission of mistletoe seeds to plant hosts. Ecology 77: 912-921. (see Martinez et al., 1995.)

Marvier, M. A. 1996. Parasitic plant host interactions: plant performance and indirect effects on parasite-feeding herbivores. Ecology 77: 1398-1409. (Reporting varying interactions of ***Castilleja wightii*** with hosts ***Lupinus arboreus, Artemisi pycnocephala*** and ***Eriophyllum staechadifolium*** and the survival of aphid ***Nearctaphis bachena.)***

Maschadi, A.M., J. Sauerborn, J. Kroschel and M.C. Saxena. 1997. Effect of plant density on grain yield, root-length density and ***Orobanche crenata*** infestation 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. Beatty and C. M. Hildebrand. 1995. First report of larch dwarf mistletoe on Pacific silver fir and on mountain hemlock in the Cascade Mountains, WA. Plant Disease 79: 1249. ***(Arceuthobium larcis*** on ***Abies amabilis*** in Washington State, USA.)

Mathiasen, R.L., J.T. Hoffman, **J.C.** Guyon and **L.L.** Wadleigh. 1996. Comparison of two roadside survey procedures for dwarf mistletoes on the Sawtooth National Forest, Idaho. Great Basin Naturalist 56(2): 129-134. (Concludes that roadside-plot and transect-plot surveys give similar results for ***Arceuthobium americanum*** and ***A. douglasii*** in ***Pinus contorta*** and ***pseudotsuga menziesii*** respectively.)

Mathiasen, J. S., B. W. Geils, C. E. Carson and F. G. Hawksworth. 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 erroneus, the host being re-identified as ***L. occidentalis.)***

Mathiasen, **J.** S. Beatty and C. M. Hildebrand. 1996. First report of lodgepole dwarf mistletoe on subalpine fir. Plant Disease 80: 342. ***(Arceuthobium americanum*** on ***Abies lasiocarpa*** var. ***lasiocarpa*** in Washington State, USA.)

Matthies, D. 1995. Host parasite relations in the root hemiparasite ***Melampyrum aruense.*** Flora 190: 383-394.

Matthies, D. 1995. Parasitic and competitive interactions between the hemiparasites ***Rhinanthus serotinus*** and ***Odontites rubra*** and their host ***Medicago sativa. Journal of Ecology 83: 245-251.***

Matthies, D. 1996. Interactions between the root hemiparasite ***Melampyrum aruense*** and mixtures of host plants: heterotrophic benefit and parasite-mediated competition. Oikos 75(1): 118-124. (Host damage and growth of parasite greatest on ***Medicago satiua,*** less on ***Linum usitatissimum*** and ***Lolium perennans.***)

Mburu, C. 1995. Research in production constraints of sorghum in Kenya. In: Daniel, D. L. (ed.) Breeding for disease resistance with emphasis on durability. Proceedings of a regional workshop for eastern, central and southern Africa, Njoro, Kenya, 1994. pp. 74-80. (Including ***Striga*** as a notable constraint.)

Mertzig, **C.** and S. Prien. 1996. (Occurrence of pine mistletoe in forest stands in Niederlausitz.) (in German) AFZ/Der Walt, Allgemneine 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.)

Meti, 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.)

Mishra, S. and G. G. Sanwal. 1995. Changes in lipid composition of ***Brassica siliquae*** upon infection by ***Cuscuta.*** Journal of Plant Physiology 146:303-306.

Molotkovskii, Yu. I. and A. A. Konnov. 1995. Some characteristics of the growth and water exchange in juniper affected by a plant parasite, ***Arceuthobium oxycedri*** (DC.) M.B. Russian Journal of Ecology 26:296-299. (Transpiration rate of ***A. oxycedri*** higher than that of hosts ***Juniperus turkestanica*** and ***J. semiglobosa.)***

Moore, T. H. M., J. A. Lane, D. V. Child, G. M. Arnold, **J.** A. Bailey and G. Hoffmann. 1995. New sources of resistance of cowpea ***(Vigna unguiculata)*** to ***Striga gesnerioides,*** a parasitic angiosperm. Euphytica 84: 165-174. (Reporting the identification of 2 lines of cowpea, APL-1 and 87-2, with resistance to S. ***gesnerioides*** in most W. African countries, but not to ***Alectra.)***

Musselman, L. J. **1996.** Parasitic weeds in the Southeastern United States. Castanea 61(3): 271-292. (A review of the distribution, ecology, and host range of native and introduced parasites as well as a discussion of potential new problems.)

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.)

Nandula, V. K., C. L. Foy and J. H. Westwood. **1995.** Effect of adjuvants, germination stimulants and nutrients on germination of ***Orobanche*** spp. Proceedings Northeastern Weed Science Society **49: 32.**

Nandula, V. K. and C. L. Foy. **1996.** Analysis of total amino acids in Egyptian broomrape ***(Orobanche aegyptiaca)*** and a host (carrot). Proceedings, Southern Weed Science Society **49: 154.**

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.)***

Norton, D. A., R. J. Hobbs and L. Atkins. **1995.** Fragmentation, disturbance and plant distribution: mistletoes in woodland remnants in the Western Australian wheatbelt. Conservation Biology **9: 426-438.** (Concerning the distribution of ***Amyema miquelii*** in ***Eucalyptus salmonophloia*** woodland.)

Nun, N. B., G. Ben-Hod, E. Lavi and A. M. Mayer, **1996.** Purification of a pectin methylesterase from ***Orobanche aegyptiaca.*** Phytochemistry 41: **403-406.**

Odasz, A.M. and O. Savolainen. **1996.** Genetic variation in populations of the arctic perennial ***Pedicularis dasyantha*** (Scrophulariaceae) on Svalberd, 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.)

Olivier, A. **1996.** La relation entre le Striga hermonthica et ses hotes: une synthese. Canadian Journal of Botany **74: 1119-1137.** (Another 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.)

Overton, J.McC. **1996.** Spatial autocorrelation and dispersal in mistletoes: field and simulation results. Vegetatio 125(1): **83-98.** (Studies of ***Phrygilanthus (= Notanthera) sonorae*** and ***Phoradendron californicum*** on ***Bursera microphylla*** and ***Cercidium microphyllum*** in Mexico.)

Pazy, B., U. Plitmann and O. Cohen. **1996.** Bimodal karyotype **in** ***Cynomorium coccineum*** L. and its systematic implications. Botanical Journal of the Linnean Society **120: 279-281.** (Chromosome number $2n = 28$; results support separation of Cynomoriaceae from Balanophoraceae.)

Pennings, S. C. and R. M. Callaway. **1996.** Impact of a parasitic plant **on** the structure and dynamics of salt marsh vegetation. Ecology **77: 1410-1419.** (Reporting that ***Cuscuta salina*** prefers host ***Salicornia virginica*** over ***Limonium californicum*** etc.)

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.)

Popp, M., R. Mensen, A. Richter, H. Buschmann and D. J. von Willert. 1995. Solutes and succulence in southern African mistletoes. Trees: Structure and Function 9: 303-310. (Studies on ***Tapinanthus oleifolius*** and ***Viscum rotundifolium*** on various hosts in Namibia. Succulence of older leaves a mechanism for diluting excess sodium?)

Press, M. C. 1995. How do the parasitic weeds ***Striga*** and ***Orobanche*** influence host carbon relations? In: Physiological responses of plants to pathogens, Dundee, 1995. Aspects of Applied Biology 42: 63-70. (Discussing the relative importance of i. transfer of carbon, ii. change in host architecture and iii reduced photosynthesis.)

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. ***(Orobanche almeriensis*** A. Pujadas (Orobanchaceae), a new species from the southeast Iberian Peninsula.) (in Spanish) Anales del Jardin Botanico de Madrid 53(1): 47-53.

Pundir, Y.P.S. 1995. Two new hosts of ***Dendrophthoe falcata*** (L.f.) Ettingh (Loranthaceae). World Weeds 2: 1-2. ***(Terminalia alata*** and ***Bauhinia uahlii.)***

Pundir, Y.P.S. 1995. ***Scurrula parasitica*** L. (Loranthaceae), a new record for Garhwal and Kumaon Himalaya. World Weeds 2: 59-60. (On ***Quercus leucotrichophora*** and hyperparasitising ***Taxillus vestitus*** on the same host.)

Pundir, Y.P.S. 1995. Observations on the witches-broom formations in ***Scurrula pulverulenta*** (Wall.) G.Don (Loranthaceae). World Weeds 2: 63-68. (Brooms caused by insect ***Sumatrophis*** sp.)

Pundir, Y.P.S. 1995. Is ***Dendrophthoe falcata*** (L.f.) Ettingh (Loranthaceae) ascending in Garhwal Himalaya. World Weeds 3: 145-146. (On ***Quercus himalayana*** at 2410 m.)

Ramlan, M. F. and J. D. Graves. 1996. Estimation of the sensitivity to photoinhibition in ***Striga*** hermonthica-infected sorghum. Journal of Experimental Botany 47: 71-78. (Results indicate that Striga-infested plants suffered from photoinhibition due to damage to electron-transport/photophosphorylation processes.)

Ransom, J. K. 1996. Integrated management of ***Striga*** spp. in the agriculture of sub-Saharan Africa. In: H. Brown, G. W. Cussans, M. D. Devine, S. O. Duke, C. Fernandez-Quintanilla, A. Helweg, R. Labrada, M. Landes, P. Ludsk and S. C. Streibeig (Eds.) Proceedings, 2nd International Weed Control Congress, Copenhagen, Denmark, 1996, pp. 623-628. (A useful review of the potential IPM components and their combination for ***Striga*** control.)

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

Reichmann, S., J. Kroschel and J. Sauerborn. 1995. Distribution and infestation of ***Striga*** species in Shinyanga region of Tanzania and evaluation of control methods. Proceedings, Brighton Crop Protection Conference-Weeds, Brighton, 1995. pp. 151-156. (Over ***50%*** of fields were infested with S. ***hermonthica*** and 24% with S. ***asiatica. Striga passargei*** and ***S. densijlora*** also recorded. Farmers were generally unaware of the parasitic nature and seed propagation of ***Striga.)***

Reid, N., M. S. Smith and **Yan** ZhaoGui. 1995. Ecology and population biology of mistletoes. In: Lowman, M. D. and N. M. Nadkarni (Eds) Forest Canopies, Academic Press San Diego California. pp. 285-310. (A review based mainly on Australian mistletoes.)

Reiss, G., R. J. Pring, J. A. Lane and J. A. Bailey. 1995. ***Striga gesnerioides:*** mechanisms of infection and resistance. In: Physiological responses of plants to pathogens, Dundee, 1995. Aspects of Applied Biology 42: 301-306. (On the resistant B301, hyaline tissue failed to develop; a cytokinin helped initiate parasite growth but this factor could not explain continued failure to develop.)

Rhui-cheng, F., L. J. Musselman and U. Plitmann. 1995. ***Cuscuta.*** pp 322-325 in Zheng-yi, W. and P. H. Raven, Editors. Flora of China. Volume 16. Gentianaceae through Boraginaceae. Beijing: Science Press and St. Louis: Missouri Botanical Garden. (Eleven species are recorded including ***C. campestris.)***

Ribereau-Gayon, G., M. L. Jung, J. P. Beck and R. Anton. 1995. Effect of fetal calf serum on the cytotoxic activity of mistletoe ***(Viscum album*** L.) lectins in cell culture. Phytotherapy Research 9: 336-339.

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 Portugese) 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.)***

Rugutt, J.K., J.K. Rugutt, R.J. Irani, N.H. Fischer, D.K. Berner and T.D. McCarley. 1996. GC/MS evaluation of compounds in dry and conditioned ***Striga*** species seeds. Journal of Agricultural and Food Chemistry 44: 3977-3982.

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.)***

Sahm, A., H. Pfanz, M. Grunsfelder, F. C. Czygan and P. Proksch. 1995. Anatomy and phenylpropanoid metabolism in the incompatible interaction of ***Lycopersicon esculentum*** and ***Cuscuta reflexa.*** Botanica Acta 108: 358-364. (Demonstrating collapse of cells and development of lignified and suberized cell walls, along with accumulation of soluble phenolic compounds and stimulation of peroxidases.)

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.]

Sarpe, N., I. Moga, M. Pocacaen, I. Lungulescu, C. Roibu and G. H. Buroi. 1996. Control of annual weeds, ***Elymus repens*** and ***Cuscuta*** species in alfalfa crops. In: H. Brown, G. W. Cussans, M. D. Devine, S. O. Duke, C. Fernandez-Quintanilla, A. Helweg, R. Labrada, M. Landes, P. Kudsk and S. C. Streibeig (Eds.) Proceedings, 2nd International Weed Control Congress, Copenhagen, Denmark, 1996, pp 1065-1069. (Imazethapyr showing promise for ***Cuscuta*** control at 100 g/ha pre- or post-emergence.)

Sauerborn, J., I. Dorr, A. Abbasher, H. Thomas, and J. Kroschel. 1996. Electron Microscopic Analysis of the Penetration Process of ***Fusarium nygamai,*** a Hyperparasite of ***Striga hermonthica.*** Biological Control 7: 53-59.

Sauerborn, J. and J. Kroschel. 1996. Underrated methods of weed control, and their use in the agriculture of developing countries. In: H. Brown, G. W. Cussans, M. D. Devine, S. O. Duke, C. Fernandez-Quintanilla, A. Helweg, R. Labrada, M. Landes, P. Kudsk and S. C. Streibeig (Eds.) Proceedings, 2nd International Weed Control Congress, Copenhagen, Denmark, 1996, pp. 611-621. (Includes reference to ***Striga*** and other parasitic weeds.)

Schaller, G., K. Urech and M. Giannattasio. 1996. Cytotoxicity of different viscotoxins and extracts from the European subspecies of ***Viscum album*** L. Phytotherapy Research 10: 473-477.

Schmitz, U. and R. Lvsch. 1995. (Occurrence and plant sociology of ***Cuscuta*** species in the riverside vegetation of the lower Rhine area.) (in German) Tuexenia No 15, pp. 373-385. ***(Cuscuta lupuliformis*** and ***C. europaea*** common, ***C. gronovii*** rare.)

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 re-infestation in a second year, or infestation delayed to the second year also studied. Few direct effects on photosynthesis or root:shoot ratio.)

Serafini, M., A. di Fabbio, S. Foddai, M. Bollero and F. Poli 1995. The occurrence of phenylpropanoid glycosides in Italian ***Orobanche*** spp. Biochemical Systematics and Ecology 23: 855-858.

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.)***

Shivamurthy, G.R. 1996. The floral biology and pollination in ***Balanophora fungosa.*** Journal Swamy Botany 13: 19-22.

Showler, A. 1996. Mistletoe in Berkshire and Buckinghamshire. Botanical Society of the British Isles News 73: 31-32. (Noting some association of ***Viscum album*** with river valleys and water, also with old estates.)

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. OEEP/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. ***cryptopodum:*** 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 characteristics 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.)***

Stewart, H. M., S. C. Stewart and J. M. Canne-Hilliker. 1996. Mixed mating system in ***Agalinis neoscotica*** (Scrophulariaceae) with bud pollination and delayed pollen germination. International Journal of Plant Science 157: 501-508.

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.)

Stoffel, B., J. Beuth and G. Pulverer. 1996. Effect of immunomodulation with galactoside-specific mistletoe lectin on experimental listeriosis. Zentralblatt fur Bacteriologie 284: 439-442.

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.)

Suwa, H., Y. Suzuki, Zhang YunHui, N. Murofushi and Y. Takeuchi. 1995. Endogenous gibberellins in ***Aeginetia indica,*** a parasitic plant, and its host, ***Miscanthus sinensis.*** Bioscience, Biotechnology and Biochemistry 59: 1712-1715.

Tada, Y., M. Sugai and K. Furuhashi. 1996. Haustoria of ***Cuscuta japonica,*** a holoparasitic flowering plant, are induced by the cooperative effects of far-red light and tactile stimuli. Plant and Cell Physiology 37: 1049-1053.

Takeuchi, Y., K. Yoenyama, M. Ogasawara, Y. Omigami, M. Konnai, T. Takematsu and A.D. Worsham. 1995. Effect of brassinosteroids on seed germination of weeds. Proceedings, 15th Asian-Pacific Weed Science Society, Tsukuba, Japan, 1995. pp. 781-786. (Brassinosteroids reduced time needed for conditioning, and increased germination of ***Orobanche minor;*** and increased germination of ***Aeginetia indica,*** a parasite of upland rice in Japan.)

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.)

Taylor, J. E. 1995. Western larch dwarf mistletoe and ecosystem management. In: Ecology and Management of ***Larix*** Forests: a look ahead. Proceedings of an International Symposium, Whitefish, Montana, 1992. USDA Forest Service General Technical Report - Intermountain Research Station No INT-GTR-319. pp. 310-313. (Commenting that, in the context of ecosystem management, larch dwarf mistletoe should be valued as an individual biological species and recognized as a functional component of western larch forest ecosystems.)

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 preissii*** 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.)***

Teryokhin, E. S. 1996. Weed Broomrapes. Systematics, Ontogenesis, Biology, Evolution. Afsteig-Verlag, Beyreuth Germany*

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