HAUSTORIUM

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● ● SIXTH INTERNATIONAL PARASITIC WEED SYMPOSIUM CORDOBA, SPAIN 16-18 APRIL 1996 † FINAL ANNOUNCEMENT †

The organizing committee of the symposium met in Cordoba in October to review papers and plan the sessions. Over 140 papers have been accepted for the symposium. There will be workshops on biocontrol; molecular techniques in parasitic plant research; and integrated management of parasitic weeds. The venue of the meeting is in a former palace that has been converted to a modern conference center retaining the charming ambience of ancient Spain. Early registration is advised especially to garner hotel rooms at a specially reduced rate. For further information contact:

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● BOOK REVIEW: EUROPEAN BROOMRAPES

Orobanche. The European Species. A Field Guide. 1. Central and Northern Europe. C. A. J. Kreutz, 1995. 159 pp. ISBN 90-74508-05-7. Price Deutchmark 59.00 (excluding postage). Available from Natuurhistorisch Genootschap in Limburg, Postbus 882, NL-6200 AW Maastricht, The Netherlands.

This beautiful volume, A4 in format and bilingual throughout in English and German, covers 26 Orobanche species. Each species has a page devoted to description plus comments on flowering time, habitat, hosts, distribution and nomenclature, a page with excellent line drawings of the complete flower and a cutaway to show stamens and ovary, combined with a distribution map covering all of Europe and some of W. Asia and N. Africa. There are also 2 pages of superb colour photographs, one full-page of the whole plant and four quarter-pages showing more detail. In addition there is an extended introductory section with general observations on systematics, taxonomy, nomenclature, biology, ecology, host range, agricultural significance and some brief comment (a little inadequate) on control, There is an illustrated glossary of the important morphological features (in Dutch as well as English and German) and a diagnostic key to the species. Finally there are a substantial bibliography and indices to the species as known in Latin, English, German and Dutch.

Arrangement of species is mainly alphabetical by specific name, but the sections Trionychon (4 spp.) and Orobanche (22 spp.) are treated separately, so at first it is puzzling not to find *O. ramosa* after *O.* picridis. Orobanche *cumana* is treated separately from *O.* cernua but there is no excessive tendency to splitting and with the benefit of the plates it is possible to be persuaded that most, if not all the taxa dealt with deserve specific status. A second volume dealing with species of Southern Europe is planned.

The author and publishers are to be congratulated on the production of a volume well worthy to join Johann Visser's 'South African Parasitic Flowering Plants' on the shelves of all dedicated students of parasitic angiosperms.

C. Parker

PUBLISHED BY OLD DOMINION UNIVERSITY

• OBITUARY: W. G. H. EDWARDS

We are sad to record the death earlier this year of Professor Bill Edwards who was instrumental in setting up the very first International Parasitic Weed Symposium in Malta in 1973. At that time he was Professor of Chemistry in the Royal University of Malta and responsible for a British Overseas Development- funded project on ***Orobanche crenata*** in fababeans. One of the main objectives was to identify the germination stimulant from the host. This proved and continues to prove elusive, but the project threw valuable light on other aspects of the biology and control of the weed while related work in UK led to the discovery of the selectivity of glyphosate against ***O. crenata*** in fababean. After leaving Malta in 1975 he became Visiting Professor at Royal Holloway College, London University, before joining the Gezira University at Wad Medani in Sudan as Professor of Chemistry from 1979 to 1984. Here he continued to encourage and contribute to local work on parasitic weeds, notably ***Striga hermonthica,*** up to his retirement in 1984. Those who knew him will remember his warm geniality and infectious enthusiasm.

• SCROPHULARIACEAE ON THE INTERNET!

The British Museum of Natural History has a Gopher site for Scrophulariaceae. The address is (gopher://157.140.2.2:70/00/botany/ scroph) or via the web (http://www.nhm.ac.uk/). There are plans to expand coverage of different aspects of the family. For further information, contact Dr David Sutton, email address: d.sutton @ nhm.ac.uk.

• WHITEVILLE PARASITE LAB CLOSED

For almost four decades, the U S Department of Agriculture witchweed laboratory near Whiteville, North Carolina was a leading facility in the development of novel control methods for parasitic weeds. In addition, a great deal of basic research was either done at Whiteville or in collaborative efforts with universities and government agencies around the world. During the summer of 1995 the witchweed laboratory was permanently closed. The number of employees was drastically reduced and the skeleton staff moved to Oxford, North Carolina. The new address is: USDA/APHIS/PPQ, Oxford Plant Protection Center, 901 Hillsboro Street, Oxford, North Carolina, 27565. Fax number: 919 693 3870.

• BRISTOL *STRIGA* WORKSHOP

The EU-sponsored Workshop, 30 May-2 June 1995, was the first to concentrate solely on the mechanisms of infection of Striga and ***Orobanche*** and crop resistance. It also aimed to assess the relevance of such studies to the development of control measures. The conference was organised by John Bailey and Athene Lane, with assistance from Drs Kroschel, Pieterse, Salle and Prof. Zwanenburg. The Workshop was held in the Victorian mansion of Burwalls which overlooks the Bristol suspension bridge. The setting, beautiful grounds, and congenial staff undeniably added to the success of the meeting.

There were over 40 participants who all presented papers or posters which reported many new advances. The chemistry of gemination stimulants is now well understood for Striga (but not ***Orobanche),*** and related chemical analogues have been synthesized (Butler, Zwanenburg). The description of the infection process is well established for both parasite genera. Emphasis was placed on the early events that determine the attachment of parasite seedlings to host roots and the role of primary and secondary parasite haustoria (Heide-Jorgensen, Riopel, Reiss).

Examples of highly effective resistance to ***Striga*** have been identified in cowpea, sorghum and upland rice (Ejeta, Lane, Riches, Singh). Several mechanisms of resistance were described for ***Orobanche*** and ***Striga*** species (Dorr, Joel, Lane, Timko, Verkleij). It was notable that resistance was expressed in many different crops and their relatives after an initially successful infection. The expression of resistance was described in some detail, but the actual mechanisms of resistance are unknown. The only exceptions are the low-stimulant sorghums (Butler) and the phytoalexins associated with the resistance of sunflowers to ***Orobanche*** (Wegmann).

Parasitic plants show great variability, and it was agreed that deployment of a new resistant variety will only be successful if there is an understanding of variability in parasite pathogenicity. However, apart from *S. **hermonthica*** and *S. **gesnerioides*** there has been no detailed characterization of parasite variability. The existence of variety-specific races is now well documented in *S. **gesnerioides*** and their distribution in W. Africa has been mapped (Lane). Some molecular analyses were reported for *S. **hermonthica*** (Koya-

ma, Hess), and mentioned in discussion for O. *cernua* and *O.ramosa* (Joel).

Another important new aspect were the molecular initiatives. One report was that the infection of maize roots by S. hermonthica suppresses the normal host stress response genes (Mayer). The expression of genes in tobacco plants was also shown to be modulated by parasite infection (Thalouarn). Genes were activated during formation of *S. asiatica* haustoria, and pathogenesis related proteins were expressed during infection of host roots by Orobanche (Timko, Joel). The SRN39 gene for the low-stimulant type of resistance in sorghum has been mapped through analysis of recombinant inbred lines developed at Purdue University (Ejeta).

In addition, a visit to Long Ashton Research Station by the Workshop participants provided an opportunity to view the Institute Strigu research programme and an excellent forum for informal discussions. Participants saw examples of resistance of cereals and sorghum to *Striga* and the methods used for assessing the nature of resistance and the extent of variability of Striga species.

J. A. Lane, IACR-Long Ashton Research Station, Department of Agricultural Sciences, University of Bristol, Long Ashton, Bristol, BS18 9AF, UK.

● LITERATURE

Abbasher, A. A., J. Kroschel and J. Sauerborn. 1995. Microorganisms of *Striga hermonthica* in northern Ghana and approaches to their use as biocontrol agents. Biocontrol Science and Technology 5: 157-161. (Thirteen species isolated. *Fusarium* spp. commonest and present in 90% of Strigu samples.)

Abu Sbaih, H. A., D. M. Keith-Lucas, S. L. Jury and A. S. Tubaileh. 1993. Pollen morphology of the genus Orobanche L. (Orobanchaceae). Botanical Journal of the Linnean Society 116: 305-313. (Differences described between 6 main groups within the genus but not between closely related species.)

Afifi, M. S., M. F. Lahloub, S. A. El-Khayaat, C. G. Anklin, H. Ruegger and O. Sticher. 1993. Crenatoside: a novel phenylpropanoid glycoside from Orobanche *crenata*. Planta Medica 59: 359-362.

Alfarhan, A.H. 1994. Taxonomic revision of the genus Cuscuta L. in Saudi Arabia. Arab Gulf Journal of Scientific Research 12: 99- 107.

Anonymous. 1994. Institute of Plant Protection Scientific Activities 1988- 1998. Special Publication No 255. Dept. of Scientific Publication, The Volcani Center, Bet Dagan, Israel. 468 pp. (In pp. 359-398 the Dept. of Weed Science reports on a wide range of studies on Orobunche, mostly now published elsewhere: also one report on excellent selective control of *Cuscuta campestris* in chickpea using prodiamine before dodder germination • much more effective than propyzamide.)

Ansari, A. A., P. G. Diwakar and P. Dwarakan. 1994. Studies on parasitic angiosperms of Shevaroy and Kalli Hills. (India) Journal of Economic and Taxonomic Botany 18: 297-300. (Including descriptions of 1 sp. in Balanophoraceae, 12 spp. in Loranthaceae and 2 Cuscuta spp.)

Aparicio, A., M. J. Gallego and C. Vasquez. 1995. Reproductive biology of *Viscum cruciatum* (Viscaceae) in Southern Spain. International Journal of Plant Sciences 156: 42-49.

Atokple, I. D. K., B. B. Singh and A. M. Emechebe. 1995. Genetics of resistance to Strigu and *Alectra* in cowpea. Journal of Heredity 86: 45-49. (Confirming that the Striga-resistance genes in B.301 and IT82D-849 are allelic or very closely linked, while that in Suvita-2 is at a different locus. Alectra-resistance is associated with two non-allelic dominant genes in B.301 and with a further non-allelic gene in IT81D-994.)

Atokple, I. D. K., B. B. Singh and A. M. Emechebe. 1995. Independent inheritance of Striga and Alectra resistance in cowpea genotype B301. IITA Research 10: 6-8. [Slightly modified from Crop Science (1994) 33: 714-715.]

Bagonneaud-Berthome, V., M. C. Arnaud and A. Fer. 1995. A new experimental approach to the chemical control of Strigu using simplified models in vitro. Weed Research 35: 25-32.

Bakop, A., M. Fari, O. Toldi and M. Lados. 1995. Plant regeneration from seedling-derived callus of dodder (Cuscuta *trifolii* Bab. et Giggs). Plant Science 109: 95-101.

Baumel, P., L. Witte, F. C. Czygan and P. Proksch. 1994. Transfer of quinolizidine alkaloids from various host plants of the Fabaceae to parasitizing Cuscutu species. Biochemical Systematics and Ecology 22: 647-656.

Ben-Hod, G., D. Losner, D. M. Joel and A. M. Mayer. 1993. Pectin methylesterase in calli and germinating seeds of Orobanche aegyptiaca. Phytochemistry 32: 1399-1402.

Beniwal, S. P. S., B. Bayaa, S. Weigand, K. Makkouk and M. C. Saxena. **1993.** Field Guide to Lentil Disease and Insect Pests. ICARDA, Aleppo, Syria. **107** pp. (Including reference to ***Orobanche*** spp.)

Berner, D. K., K. F. Cardwell, B. O. Faturoti, F. O. Ikie and O. A. Williams. **1995.** Relative roles of wind, crop seeds, and cattle in the dispersal of ***Striga*** species. IITA Research **10: 1-6.** [Slightly modified from Plant Disease **(1994) 78:402-406.]**

Berner, D. K., J. G. **King** and B. B. Singh. **1995.** ***Striga*** research and control - a perspective from Africa. Plant Disease **79: 652-660.** (A well-illustrated general review with some emphasis on recent IITA work, including promising results from transplanting sorghum.)

Calvin, C. L. and C. A. Wilson. **1995.** Relationship of the mistletoe ***Phoradendron macrophyllum*** (Viscaceae) to the wood of its host. International Association of Wood Anatomists Journal **16(1): 33-45.** (Parenchyma contacts predominate at the interface of host and parasite. Direct tracheary contacts were more abundant in latewood **than** in earlywood.)

Cardwell, K. F. and J. A. Lane. **1995.** Effect of **soils,** cropping system and host phenotype **on** incidence and severity of ***Striga gesnerioides*** on cowpea in West Africa. Agriculture, Ecosystems and Environment **53: 253-262.** (Found to be associated mainly with sandy soils; but apparently absent where cotton rotated with cowpea.)

Ciotola, M., A. K. Watson and S. G. Hallett. **1995.** Discovery of an isolate of ***Fusarium oxysporum*** with potential to control ***Striga hermonthica*** in Africa. Weed Research **35: 303-309.** (Successful in pot tests and not pathogenic to sorghum.)

Cross, G. B. and **T.** C. Clark. **1995.** Clover broomrape ***(Orobanche*** minor Sm.) eradication effort in North Carolina. WSSA Abstracts, **1995** Meeting of Weed Science Society of America. p. **34.**

Dawoud, D. A. **1995.** Autecological studies **on** phytoparasites of the genera ***Alectra, Orobanche*** and ***Striga*** with special reference to their early developmental stages. PLITS **13(1). 112** pp.

De Bock, F., A. Fer and G. **Marigo. 1995.** Effect **of** fusicoccin on sucrose exchanges between a host, ***Pelargonium zonale*** and a higher parasitic plant, ***Cuscuta reflexa.*** Australian Journal of Plant Physiology **22: 553-559.**

Debrah, S. K. **1994.** Socio-economic constraints to the adoption of weed control techniques: the case of ***Striga*** control in the West African semi-arid tropics. International Journal of Pest Management **40: 153-158.**

Diana, G. and F. Castelli. **1994.** (Adversities to the tobacco crop : plants.) (In Italian) Informatore Fitopatalogico **44(6): 11-17.** ***(Orobanche*** and ***Cuscuta*** noted as damaging weeds of tobacco in Italy.)

Doerr, I. and R. Kollman. **1995.** Symplastic sieve element continuity between ***Orobanche*** and its host. Botanica Acta **108: 47-55.** (A superb demonstration of sieve pores between cells of host and parasite - ***Vicia narbonensis*** and ***O. crenata*** - involving the highest quality electron microscopy and a method for distinguishing the cells of each species.)

Elliott, P. **C.,** R. N. Clarisse, R. Beby and H. R. Josue. **1993.** Weeds in rice in Madagascar. International Rice Research Notes. **18(1): 53-54.** (***Striga asiatica*** important in middle west of the island.)

Else, M. J. and **S.** Butkewich. **1995.** Potential of ethephon as a post-emergence herbicide for control of dodder ***(Cuscuta gronovii*** Willd.) in cranberries. WSSA Abstracts, **1995** Meeting of Weed Science Society of America. p. **97.**

English, T. J. **1994.** Advances in witchweed control technology. In: Proc. Southern Weed Science Society, Dallas, Texas, **1994.** p. **177.**

English, T. J., R. E. Eplee and R. S. **Norris. 1995.** Successful witchweed eradication strategies employed in North and South Carolina. WSSA Abstracts, **1995** Meeting of Weed Science Society of America. p. **35.**

Furuhashi, K., M. Kanno and **T.** Morita. **1995.** Photocontrol of parasitism in a parasitic flowering plant, ***Cuscutajaponica*** Choisy, cultured in vitro. Plant and Cell Physiology **36: 533-536.** [Far-red light induced mutual (within species) parasitism and self- parasitism (within plant). Neither observed under white (fluorescent) or red light or in darkness. Blue light caused twining but very little haustorial development.]

Gal'vidis, I. **1993.** [Biological features of great dodder ***(Cuscuta europaea*** L.) in eastern Lithuania.] (In Russian) Ekologija **3: 65- 69. (34** host species recorded ***among*** which ***Urtica dioica*** is one the most favoured.)

Goldwasser, **Y., Y.** Kleifeld, D. Plakhine and B. Rubin. **1995.** Variation in vetch (***Vicia*** spp.) resistance to Egyptian broomrape ***(Orobanche aegyptiaca*** Pers.) WSSA Abstracts, **1995** Meeting of Weed Science Society of America. p. **84.**

Gomez, J. M. 1994. Importance of direct and indirect effects in the interaction between a parasitic angiosperm (*Cuscuta epithymum*) and its host plant (*Hormathophylla spinosa*). *Oikos:* 71: 97-106. (Noting only sporadic infestation and no significant effects on fruit or seed yield of the host, but some reduction in numbers and diversity of pollinators visiting the infected host.)

Grabias, B., S. Ofterdinger, L. Swiatek and A. Kurowska. 1993. Iridoid glycosides from *Lathraea squamaria*. Phytochemistry 32: 1489-1491. (Mentions incidentally that L. *squamaria* is used in Poland to treat epilepsy.)

Gressel, J. 1993. Advances in achieving the needs for biotechnologically derived herbicide resistant crops. Plant Breeding Reviews 11: 155-198. (Including reference to use of the technique in the control of parasitic plants.)

Guven, A. and I. Turkan. 1994. (The physiological and biochemical basis of growth and development of parasitic angiosperms.) (In Turkish) Ege Univertesi Ziraat Fakultesi Dergisi 31: 319-326.

Heide-Jorgensen, H. S. and J. Kuijt. 1995. The haustorium of the root parasite *Tryphysaria* (Scrophulariaceae) with special reference to the xylem bridge ultrastructure. American Journal of Botany 82: 782-797.

Hibberd, J. M., W. P. Quick, M. C. Press and J. D. Scholes. 1995. Photosynthetic regulation in cowpea parasitised by *Striga gesnerioides*. Abstract. Journal of Experimental Botany 46: 55. (Initial increase in photosynthesis in infected cowpea tentatively attributed to reduced *sink* restriction, while the later reduction may be due to loss of N to the parasite.)

Hiremath, S. P., S. Badami, H. K. S. Swamy, S. B. Patil and R. L. Londonkar. 1994. Antifertility activity of *Striga orobanchoides*. Biological and Pharmaceutical Bulletin 17: 1029-1031.

Jeschke, W. D., N. Rath, P. Baumel, F. C. Cyzgan and P. Proksch. 1994. Modelling the flow and partitioning of carbon and nitrogen in the holoparasite *Cuscuta reflexa* Roxb. and its host *Lupinus albus* L. I. Methods for estimating net flows. Journal of Experimental Botany 45: 791-800.

Joel, D. M., Y. Kleifeld, D. Losner-Goshen, G. Herzlinger and J. Gressel. 1995. Transgenic crops against parasites. Nature 374: 220-221. [Reporting successful selective control of *Orobanche* aegyptiaca by herbicides in crops with target-site resistance (glyphosate in oilseed rape, chlorsulfuron and asulam in tobacco) but not with glufosinate in tomato with metabolic resistance.]

Karunaichamy, K. S. T. K., K. Paliwal and K. Natarajan. 1993. Diurnal course of leaf gas exchange of mistletoe (*Dendrophthoe falcata*) and its host (*Azadirachta indica*) in a semi-arid region of Southern India. Proceedings, Indian National Science Academy Part B, Biological Sciences 59: 505-510.

Kelly, C. K. 1994. On the economics of plant growth: stolon length and ramet initiation in the parasitic clonal plant *Cuscuta europaea*. Evolutionary Ecology *8:* 459-470, (Stolon diameter negatively correlated with ramet initiation which was in turn greater under resource-poor conditions.)

Kelly, C. K. 1995. Thoughts on clonal integration: facing the evolutionary context. Evolutionary Biology 9: 575-585. (Includes reference to earlier work on *Cuscuta.)*

Kraus, R., P. Trimborn and H. Ziegler. 1995. *Tristerix aphyllus*, a holoparasitic Loranthacea [sic]. Natuurwissenschaften 82: 150-151.

Kreuz, C. A. J. 1995. *Orobanche*. The European Broomrape Species: 1. Central and Northern Europe. Natuurhistorisch Genootschaap in Limburg, Maastricht, The Netherlands. 159 pp. (See review elsewhere in this newsletter.)

Kumar, R. M. and S. M. Kondap. 1993. Response of green gram and black gram cultivars to *Cuscuta* infestation. Indian Journal of Plant Protection 21: 167-171. (Cv M2 of *Vigna radiata* and cv T9 of V. *mungo* less attacked than others.)

Kuoh, C. S. and G. I. Liao. 1993. Flower initiation and development in *Cuscuta australis* R. Br. (Convolvulaceae). Taiwania 38: 99-108.

Lagoke, S. T. O. and R. Hoevers, editors. 1995. *Striga* Newsletter. Number 5. 26 pages. (This excellent, comprehensive newsletter deserves wide circulation. It contains news of *Striga* meetings, national programs, networking, and a very helpful section entitled 'Scientific News'. This section has helpful abstracts of published work but, more helpfully, original reports of research. The newsletter is printed in color, attractive, and well edited. For information on how to receive the *Striga* Newsletter, contact: FAO Regional Office for Africa, Post Office Box 1628, Accra, GHANA.)

Lagoke, S. T. O., R. Hoevers, S. S. M'Boob and R. Traboulsi. 1994. Improving *Striga* Management in Africa, Proceedings, 2nd General Workshop of the Pan- African *Striga* Control Network (PASCON), Nairobi, 1991. FAO, (address above). 234 pp. (Including country reports and recommendations as well as 27 technical papers.)

Lal, R. J. **1994.** ***Orobanche cernua*** Loefl. (broomrape) on tobacco in India - a critical appraisal. Agricultural Reviews **(Karnal) 15(1): 31-42.**

Lanini, W. T. and G. Miyao. **1994.** Influence of rotation and management on the density of field dodder (***Cuscuta campestris).*** In: **1994** Research Progress Report, Western Society of Weed Science. p. **VII-2.** (Serious infestations noted in tomato and safflower, but apparently controlled by preventing seeding in two successive seasons.)

Lanini, W. T. and G. Miyao. **1994.** Dodder (***Cuscuta campestris)*** biology and management in tomatoes. Proceedings, Western Society of Weed Science **47: 59.** (***Cuscuta campestris*** increasing as a problem in tomato in California; at harvest a single ***Cuscuta*** plant covers an average **3** m of crop row in which yields are reduced **27%.)**

Lehman, P. S. (Compiler) **1994.** Nematology. Triology Technical Report **33(5):** 7. (Reporting the occurrence of ***Meloidogyne javanica*** on roots of ***Striga gesnerioides*** in Florida, USA.)

Lehtonen, P. **P. 1995.** The National Environmental Policy Act and permits for noxious and parasitic plants. WSSA Abstracts, **1995** Meeting of Weed Science Society of America. p. **106.**

Logan, D. C. and G. R. Stewart. **1995.** Thidiazuron stimulates germination and ethylene production in ***Striga hermonthica*** - comparison with the effects of **GR-24,** ethylene and **1-**aminocyclopropane-**1**-carboxylic acid. Seed Science Research **5: 99-108.** (Thidiazuron is shown to act in the same way as **GR-24** and natural stimulant in stimulating ACC synthase activity and hence ethylene synthesis and germination, **also** in stimulating oxygen uptake in conditioned seeds.)

Matthies, D. **1995.** Parasitic and competitive interac-. tions between the hemiparasites ***Rhinanthus serotinus*** and ***Odontites rubra*** and their host ***Medicago sativa.*** Journal of Ecology **83: 245-251.** (Including the unexpected observation that host root:shoot ratio was reduced by the parasites.

Miller, A. **E.** and R. G. Westbrooks. **1995.** ***Orobanche*** minor Smith survey and eradication in South Georgia. WSSA Abstracts, **1995** Meeting of Weed Science Society of America. p. **34.**

Naidoo, **L.** A. C., S. E. Drewes, F. E. Drewes, J. van Staden and M. E. **Aken. 1994.** When is a parasite no longer a parasite? The case of ***Sarcophyte sanguinea*** and exocarpic acid. South African Journal of Science **90: 359-360.** [Noting that exocarpic acid from **S.** ***sanguinea*** (Balanophoraceae), as well as inhibiting some bacteria, in keeping with its use in traditional medicine, also stimulated initiation and elongation of roots of the host ***Acacia*** karoo.]

Nandula, V. K., **C.** L. Foy and J. H. Westwood. **1995.** Effects of adjuvants, germination stimulants and nutrients on germination of ***Orobanche*** spp. In: Proc. Northeastern Weed Science Society, Boston, Mass., **1995.** p. **32.**

Olaniyan, G. **O.** and G. A. Iwo. **1993.** Field evaluation of sorghum varieties for reactions to witchweed ***Striga hermonthica*** (Del.) Benth. in Nigeria. Agricultura Tropica et Subtropica. **26: 79-84.** (Among sorghum varieties tested, ICSV **1001** BF and **1007** BF were 'immune' and the local check Fara fara was 'tolerant'.)

Pirani, V., G. Capriotti, A. del Gatto and M. Tiberi. **1993.** (Sowing date, anti-cryptogam treatments, ***Orobanche*** damage and losses at harvesting in *dry* pea crops.) (In Italian) Informatore Agrario **49(41): 30-37.** (Early planting and suitable rotation helped to reduce infestation and damage from undefined ***Orobanche*** sp.)

Popp, M. **1993.** Ecological aspects of nitrogen nutrition. Progress in Botany **54: 448-460.** (Including some specific reference to parasitic plants.)

Proctor, G. **1993.** IIRB weed control study group - Italy. British Sugar Beet Review **61: 12-14.** (***Cuscuta campestris*** recorded as a weed of sugarbeet in Italy.)

Qasem, J. R. and M. A. Kasrawi. **1995.** Variation of resistance to broomrape ***(Orobanche ramosa)*** in tomatoes. Euphytica **81: 109-114. (25** tomato varieties and one wild type compared; wide range in numbers of parasite attaching or emerging, but low correlation with damage caused.)

Raju, **C.** A., **G.** V. G. Krishna Murty, K. Hagarajan and **M.** S. Chari. **1995.** A new disease of *Orobanche* ***cernua*** parasitising tobacco, caused by ***Sclerotium rolfsii.*** Phytoparasitica **23: 235-237.**

Ransom, J. K. and G. D. **Odhiambo. 1995.** Effect of corn (Zea ***mays)*** genotypes which **vary** in **maturi**ty length on ***Striga hermonthica*** parasitism. Weed Technology **9: 63-67.** (Early-maturing varieties generally support less emerged *Striga* and may outyield longer-season types.)

Ransom, J. **K., G.** D. **Odhiambo** and J. Gressel. **1995.** Seed dressing maize with imidazolinone herbicides to control ***Striga hermonthica*** (Del.) Benth. WSSA Abstracts, **1995** Meeting of Weed Science Society of America. p. **5.** (Using herbicide-resistant maize.)

Reid, **N., Z.** G. Yan and J. Fittler. **1994.** Impact of mistletoes (***Amyema miquelii***) on host ***(Eucalyptus blakelyi*** and ***Eucalytpus melliodora***) survival

and growth in temperate Australia. Forest Ecology and Management **70: 55-65.** (Thorough pruning of parasite from individual trees in matched pairs resulted in **22-24%** increase in foliage and **49-55%** increase in radial growth after **33** months.)

Richter, A., M. Popp, R. Mensen, G. R. Stewart and D. J. van Willert. **1995.** Heterotrophic carbon gain of the parasitic angiosperm ***Tapinanthus oleifolius***. Australian Journal of Plant Physiology **22: 537-544.** (Results suggest ***T. oleifolius*** obtains **55-80%** of its **C** from hosts ***Acacia nebrownii*** and ***Euphorbia virosa.)***

Rennenberg, H., R. Scupp and **A, Schneider. 1994.** Thiol composition of a xylem- tapping mistletoe and the xylem sap of its hosts. Phytochemistry **37: 975-977.** (Observations from ***Viscum album*** on ***Betula, Malus***, etc.)

Sanjay Mishra and G. G. Sanwal. **1994.** Effect of ***Cuscuta*** infection on chloroplast lipid composition of ***Brassica*** leaves. European Journal of Plant Pathology **100: 61-70.**

Schnell, H., K-H. Linke and J. Sauerborn. **1994.** Trap cropping and its effect on yield and *Orobanche crenata* Forssk. infestation on following pea (***Pisum sativum*** L.) crop. Tropical Science **34: 306-314.** (In a pot experiment **14** crops averaged **31%** reduction in ***O. crenata*** seed; faba bean best at **47%** v. fallow **10%;** peas yielded best after ***Trifolium alexandrinum.***)

Schrader-Fischer, G. and K. Apel. **1993.** The anticyclic timing of leaf senescence in the parasitic plant ***Viscum album*** is closely correlated with the selective degradation of sulfur- rich viscotoxins. Plant Physiology **101: 745-749.** (Recording the disappearance of the mRNA for viscotoxin and breakdown of this one protein during senescence. Other proteins are lost at abscission.)

Schrader-Fischer, G. and K. Apel. **1993.** cDNA-derived identification of novel **thionin** precursors in ***Viscum album*** that contain highly divergent **thionin** domains but conserved **signal** and acidic polypeptide domains. Plant Molecular Biology **23: 1233-1242.**

Seel, W. **E.** and M. C. Press. **1994.** Influence of the host on three sub-arctic **annual** facultative root hemiparasites. 11. Gas exchange characteristics and resource use-efficiency. New Phytologist **127: 37-44.** ***(Rhinanthus minor, Euphrasia frigida*** and ***Melampyrum silvaticum*** showed highest photosynthesis on legume host and least when unattached. Carbon, nitrogen and water relations were **all** highly host dependent.)

Sibony, **M.,** E. Lior, A. Fischler and B. Rubin. **1995.** Resistance of ***Amaranthus*** spp., horseweed (***Conyza canadensis***) and field dodder ***(Cuscuta campestris***) to acetolactate synthase (ALS) inhibitors. WSSA Abstracts, **1995** Meeting of Weed Science Society of America. p. **87.** (Populations of **C.** ***campestris*** in Israel show resistance to sulfonylurea herbicides.)

Sissoko, M. **1994.** (Integrated control of enemies of millet in the Banamba zone of Mali.) (in French) Sahel PV Info **60: 15-19.** (Includes reference to ***Striga hermonthica.)***

Smith, L. H., A. J. Keys and M. C. W. Evans. **1995.** ***Striga hermonthica*** decreases photosynthesis in ***Zea mays*** through effects on leaf cell structure. Journal of Experimental Botany **46: 759-765.** (Increase in permeability of cell walls in the bundle sheath lead to leakage of carbon dioxide and decreased effectiveness of **C4** photosynthesis.)

Srivastava, S., A. Nighojkar and A. Kumar. **1995.** Purification and characterization of starch phosphorylase from ***Cuscuta reflexa*** fdaments. Phytochemistry **39: 1001-1005.**

Subramaniam, K., Jamuna Ranie, B. R. Srinivasa, A. **M.** Sinha and **S.** Mahadevan. **1994.** Cloning and sequence of a cDNA encoding a novel hybrid proline-rich protein associated with cytokinin-induced haustoria formation in ***Cuscuta reflexa.*** Gene **141: 207-210.**

Takeuchi, **Y. 1994.** Biology of parasitic weeds and their control. (in Japanese). Journal of Pesticide Science **19(4): 183-195.**

Taleb, A. and J. Maillet. **1994.** Mauvaise herbes des cereales de la Chaouia (Maroc). I. Aspect floristique. Weed Research **34: 345-352.** (Includes reference to ***Orobanche cernua, O. crenata*** and ***Thesium humilie.***)

Taylor, A. and W. **E.** Seel. **1995.** Physiology of the parasitic association between maize and witchweed (***Striga hermonthica).*** Abstract. Journal of Experimental Botany **46: 54.** (ABA shown to be higher in infected than uninfected host leaves. Levels much higher **still** in *Striga* shoots.)

Thalouarn, P. C. Theodet, **N.** Russo and P. Delavault. **1994.** The reduced plastid genome of a non-photosynthetic angiosperm ***Orobanche hederae*** has retained the *rbcL* gene. Plant Physiology and Biochemistry (Paris) **32: 233-242.**

Turkan, I. and A. Guven. **1994.** (Water relations, mineral nutrition and carbon assimilation of parasitic angiosperms.) (In Turkish) Ege Univertesi Ziraat Fakultesi Dergisi **31: 311-318.**

Wanek, W. and A. Richter. 1993. L-iditol: NAD'5-oxidoreductase in *Viscum album:* utilization of host-derived sorbitol. Plant Physiology and Biochemistry (Paris) 31: 205-211.

Weber, G., K. Elemo, S. T. O. Lagoke. 1995. Weed communities in intensified cereal-based cropping systems of the northern Guinea savanna. Weed Research 35: 167-178. (Noting that ***Striga hermonthica*** occurred in 47.5% of all the fields surveyed in Katsina and Kaduna States of N. Nigeria. There was some apparent association of *S. hermonthica* with ***Acalypha, Alysicarpus*** and ***Porphyrostemma*** spp.)

Weber, G., K. Elemo, S. T. O. Lagoke, A. Awad and S. Oikeh. 1995. Population dynamics and determinants of ***Striga hermonthica*** on maize and sorghum in savanna farming systems. Crop Protection 14: 283-290. (A valuable ***summary*** of in-depth surveys, including the observation that while intensive maize helps to suppress ***Striga,*** extensive maize crop management contributes to ***Striga*** increase.)

Weber, H. C. 1993. (Observations on the establishment and growth rates in the first stages of development of ***Viscum album*** L. (Viscaceae).) (In German) Beitrage zur Biologie der Pflanzen 67: 319-331. (Observations over a 6-year period of widely varying growth patterns.)

Whiteley, A., M. Grant and N. Simpson. 1995. ***Lathraea clandestina*** - digging deeper. The New Plantsman 2: 89-91. (Noting a range of hosts in U.K. and providing hints on propagation.)

Whitney, P. J. 1995. Broomrape and beans. Biologist 42: 162-164.

Yan, Z. 1993. Germination and seedling development of two mistletoes, ***Amyema preissii*** and ***Lysiana exocarpi;*** host specificity and mistletoe-host compatibility. Australian Journal of Ecology 18: 419-429. (Seeds of both species germinated normally on any host but subsequent development was unsatisfactory on non-preferred hosts due to unidentified incompatibility.)

Zaki, M. and J. Kuijt. 1995. Ultrastructural studies on the embryo sac of ***Viscum minimum.*** I. Megasporogenesis. Protoplasma 185: 93-105.

Zhiqian, L. 1994. (Mechanism of action of glyphosate on dodder control). (In Chinese) Acta Phytolacica Sinica 21: 369-372.

Zopfi, H. J. 1993. Ecotypic variation in ***Rhinanthus alectrolophus*** (Scrophulariaceae) in relation to grassland management. II. The genotypic bases of seasonal ecotypes. Flora (Jena) 188: 153-173.

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