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We are pleased to acknowledge that Old Dominion University is once again contributing to the printing and mailing of Haustorium but apart from this modest assistance the newsletter still has no significant source of funding and we need to reduce costs as much as possible. The great bulk of our costs are for mailing. Many readers are already helping us by receiving Haustorium by Email. We believe many others could do so but we do not have their Email addresses. If you are one of those, do please let Chris Parker know (Email address on the last page). Bear in mind that having an electronic version of the newsletter enables you to 'search'. If you cannot receive Email, or for any reason wish strongly to go on receiving hard copy, you will continue to receive by airmail.

Thanks to arrangement with the Institute of Arable Crops Research, Long Ashton Research Station, Bristol, UK, Haustorium will continue to be available on the web site: www.lars.bbsrc.ac.uk/cropenv/haust.htm

SEVENTH INTERNATIONAL PARASITIC WEED SYMPOSIUM

The 7th International Symposium will be held in Nantes, France from 5-8 June, 2001. Although the title refers to 'Weed', all aspects of parasitic plants will, as always, be covered, including academic and non-agricultural topics. Those who have not already received a copy of the second circular for this major meeting should contact Patrick Thalouarn, Laboratoire de Cytopathologie Vegetale, University de Nantes, 2, Rue de la Houssinière, BP 92208, F44322 Nantes, Cedex 3, France. Email patrick.thalouarn@svt.univ-nantes.fr

PARASITIC PLANT MANAGEMENT IN SUSTAINABLE AGRICULTURE

The proposal under this title, for a 5-year 25 million ECU programme to be funded from the COST budget of the European Commission is to be considered shortly by the COST Technical Committee in Vienna. If approved, the project will involve a wide range of research and co-ordination activities across a number of European countries.

STRIGA CONTROL BY INTERCROPPING WITH DESMODIUM SPECIES

Resource-poor cereal farmers in Kenya are testing intercropping and trap cropping strategies to control damage by stem boring larvae of moth species such as the indigenous noctuid Busseola fusca and the introduced pyralid Chilo partellus. They are using two grass species, Sudan grass (Sorghum sudanensis) and Napier grass (Pennisetum purpureum), that act as "traps" by attracting the pests to lay eggs, and two resistant plants, molasses grass (Melinis minutiflora) and the legume silverleaf (Desmodium uncinatum), which repel adult stem borers. This "push-pull" strategy is being developed as part of a collaborative programme between IACR-Rothamsted and the International Centre of Insect Physiology and Ecology (ICIPE) at Nairobi and Mbita Point on the banks of Lake Victoria.

In 1997, it was noticed that maize intercropped with silverleaf (D. uncinatum) or greenleaf (D. intortum) suffered far less Striga hermonthica infestation than maize in monoculture. These trials were repeated, comparing Desmodium species with plants widely recommended as intercropping solutions to Striga problems, for example sunn hemp, Crotolaria spp., soya bean and cowpea. With the conventional intercrops, either Striga infestation was not significantly different from the maize monoculture, as with soya bean, or the Striga rating was only reduced by about 50%, as with sunn hemp and cowpea. However, when maize was intercropped with either of the Desmodium species, the Striga rating was reduced from 2-3 to 0.1 or less. At the same time, there was a statistically significant increase in maize yield of ca. 2 tonnes/hectare.

Desmodium species are nitrogen-fixing legumes and contribute to the nutrition of the crop. If allowed to grow uncontrolled they may compete with the crop, but this can easily be controlled by regular cutting. The mechanism by which these plants, as intercrops, reduce Striga infestation so dramatically is now under investigation, with clear evidence of allelopathic effects. It is now imperative to identify the exact mechanisms by which Desmodium species interfere with Striga development, to ensure that control measures based on these intercropping strategies are robust and reliable and with a view to exploitation in the longer term by means of plant molecular genetics. It can already be seen that D. uncinatum is producing germination stimulation cues in the rhizosphere, and also that there are compounds interfering with haustorial development and colonisation of the maize host.

The intercropping and trap cropping studies are funded by the Gatsby Charitable Foundation, with new support from the Rockefeller Foundation to fund further mode of action studies on the influence of Desmodium species on prevention of Striga development. The chemistry involved will be elucidated in the near future by collaborators from ICIPE and Rothamsted: A. Hassanali, A.M. Hooper, T.M. Khamis, Z.R. Khan, J.A. Pickett and L.J. Wadhams.

John A. Pickett, IACR-Rothamsted, Harpenden, Herts AL5 2JQ, UK.

A NEW VIRULENT RACE OF OROBANCHE CRENATA

Some vetch varieties are known to resist O. crenata. In recent years we have noted a few cases where resistant vetch was attacked by O. crenata. One could ask whether this happened as a result of the loss of resistance in the vetch, or as a result of the appearance of a new Orobanche race that is capable of attacking the resistant varieties. We have confirmed the botanical identity of the Orobanche plants using morphological markers and specific DNA markers that are known to be characteristic of O. crenata. Further, the susceptibility of three vetch varieties was checked in the lab against normal O. crenata populations, and against the crenate broomrape that was collected on resistant vetch. The results were very clear. The two varieties 'sadot' and 'popany' that are commonly known as Orobanche resistant were attacked only by Orobanche developing from the seeds collected in the resistant field, not by the 'ordinary' O. crenata. This is the first recorded evidence of an O. crenata race that overcomes known Orobanche resistance.

Daniel M. Joel and Vitaly H. Portnoy, Newe-Ya'ar Research Center, Israel.

SOUTHERN AFRICA STRIGA WORKING GROUP

Striga researchers from Botswana, Malawi, Mozambique, Tanzania and Zimbabwe met in Dar es Salaam in May, 2000, to establish a Striga Working Group in Southern Africa. Striga infestation is a widespread constraint to cereal productivity in the twelve member states of the Southern Africa Development Community (SADC). The species of economic importance are S. hermonthica which occurs in northern Tanzania, S. asiatica which is distributed through out the SADC region, and S. forbesii which is of local significance in Malawi, Tanzania and Zimbabwe. The meeting, co-ordinated by the SADC/ICRISAT Sorghum and Millet Improvement Program, formulated national action plans for future research and proposed a regional plan involving the working group in a co-ordinated approach to the development, testing and promotion of appropriate Striga management options. It was recognised that considerable progress has been made by individual countries to develop Striga cont rol components and it was agreed that the emphasis should now be on using available technologies on parasite infested land in integrated crop management which is tested and promoted by farmers themselves. Specific topics which still need attention include filling in gaps in knowledge of Striga distribution, and raising awareness further of the importance of the pest at a number of levels of the agricultural community including research managers. Exchange of germplasm and in particular the exposure of farmers to resistant cereal lines needs to be accelerated and attention given to sustainable systems of seed multiplication and distribution. Work is also needed to develop appropriate 'learning tools' which can assist in the dissemination of what tend to be 'knowledge intensive' technologies for Striga management, for example improvement of soil fertility or inter-cropping. Such tools should be aimed at farmers and in-service or college training of extension department or NGO agricultural support s taff. The working group also hopes to establish a bibliography of previous work on Striga in Southern Africa as a resource for researchers in the region. The proceedings of the meeting will be available later in the year.

Charlie R. Riches, Natural Resources Institute, IACR-Long Ashton Research Station, Bristol, BS18 9AF, UK.

STRIGA BIOCONTROL - OBSTACLES OVERCOME?

This is the title of a very encouraging paper presented at the 3rd International Weed Science Congress by Alan K. Watson, Marie Ciotola and Roger R. Maclean. The following is the full abstract (number 371) reproduced with kind permission of the authors, from pp. 176-177 of the Congress Abstracts (see below for a full listing of relevant abstracts, under Proceedings of Meetings.)

'Fusarium oxysporum isolate M12-4A is currently being evaluated for the biological control of Striga hermonthica. In field trials, chlamydospore powder harvested from small-scale fermentors reduced S. hermonthica emergence by 92%. Complete inhibition of S. hermonthica emergence occurred when the chlamydospore powder was added to the soil at sowing and when sorghum seeds coated with chlamydospores were sown. Effective biological control of S. hermonthica was achieved using a simple fermentation system with sorghum straw as the inoculum using arabic gum as the adhesive. This simple delivery system permits a uniform inoculation of the field as well as the proper positioning of the inoculum in the immediate environment of sorghum roots, where S. hermonthica attaches to its host. To facilitate broad usage of F. oxysporum M12-4A for the biocontrol of S. hermonthica, we are promoting an inoculum production strategy based on a cottage industry model that util izes a liquid fermentation process and inexpensive locally available substrates including sorghum straw and arabic gum. To assure quality control, primary inoculum is produced centrally and encapsulated in small gelatin capsules as starter cultures. Each capsule contains 0.001 g of inoculum and a kg box of capsules is sufficient to produce Fusarium inoculum for treating up to 8,000 hectares of land infested with Striga. In the villages traditional cooking pots filled with water and a small amount of ground sorghum straw are sterilized over a fire, allowed to cool, and the starter culture added. The mixture will ferment for 10-14 days, the product is then air-dried and ground, and can be stored for several months. When planting season arrives, the farmers' cereal seeds are coated with a thin film of arabic gum solution and the dry powdered Fusarium inoculum sprinkled onto the seed surface. The biocontrol becomes a 'seed technology'. The farmer plants his seeds and at the same time protects his crop from the ravages of Striga. The application rate of Fusarium is equivalent to approximately 80 grams per hectare. The village-level manufacture of Fusarium will give women in rural communities more economic and social power. The preparation of the dried inoculum both fits into women's traditional sphere of work and provides a new source of income. This year, field testing of the Fusarium-Striga biocontrol process is occurring in six Malian villages. We plan to phase this technology in gradually, from village to village and then from country to country, to include all regions afflicted with Striga.'

WEBSITES

For information on the 7th International Parasitic Weed Symposium at Nantes, 2001 see:

http://www.sciences.univ-nantes.fr/scnat/biologie/GPPV.web

(N.B. not ….biologie/scnat…as indicated in the first circular.)

For information on biology and control of parasitic weeds, and the relevant activities of the University of Hohenheim see: http://www.uni-hohenheim.de/~www380/parasite/start.htm

For IITA Striga Research Methods: a Manual, see: http://www.cgiar.org/iita (N.B. www omitted in last issue.)

For news from Canada of progress with biocontrol techniques for Striga see: http://www.mcgill.ca/media/releases/1999/december/weedkiller/

PROCEEDINGS OF MEETINGS

Breeding for Striga Resistance in Cereals. Proceedings of a Workshop held at IITA, Ibadan, Nigeria, from 18-20 August 1999. 2000. Edited by Haussmann, B.I.G., Hess, D.E., Koyama, M.L., Grivet, L., Rattunde, H.F.W. and Geiger, H.H. Available from Margraf Verlag, P.O. Box 105, 97985 Welkersheim, Germany (Email margraf@ compuserve. com) at DM 50.- per copy.

Contents:

159-171.

Ejeta, G. Molecular mapping of striga resistance genes in sorghum. p. 173.

Melake-Berhan A. et al. Application of molecular markers for mapping striga resistance gene(s) in maize. pp. 175-185.

Grimanelli, D. et al. Identification of genes for tolerance to striga in maize using transposable elements. p. 187.

Kanampiu, F.K. et al. Utilization of herbicide resistance to combat striga in maize. pp. 189-196.

Bennetzen, J.L. et al. The study and engineering of resistance to the parasitic weed striga in rice, sorghum and maize. pp. 197-205.

Gressel J. and Levy, A. Giving Striga hermonthica the DT's. pp. 207-224.

Koyama, M.L. Molecular markers for the study of pathogen variability: implications for breeding resistance to Striga hermonthica. pp. 227-245.

Koyama, M.L. Genetic variability of Striga hermonthica and effect of resistant sorghum cultivars on population dynamics. pp. 247-260.

Singh, B.B. Breeding cowpea varieties with combined resistance to different strains of Striga gesnerioides. pp. 261-270.

Dashiell, K. et al. Breeding for integrated management of Striga hermonthica. pp. 273-281.

Ado, S.G. et al. Breeding maize for tolerance and resistance to striga at the Institute for Agriculture Research Samaru, Nigeria. pp. 285-290.

Alabi, S.O. et al. Reaction of maize varieties to Striga hermonthica and Striga aspera in the Sudan savanna ecology. pp. 291-298.

Ayiecho, P.O. and Nyabundi, J. Field screening of sorghum cultivars for striga resistance. pp. 299-304.

Belete, K. Status of striga research in Ethiopia. pp. 305-306.

Ebiyau, J. et al. Striga research activities in sorghum at Serere Agricultural and Animal Production research Institute (SAARI), Uganda. pp. 307-311.

Kabambe, V.H. et al. Development of maize genotypes resistant or tolerant to Striga asiatica in Malawi. pp. 313-323

Lagoke, S.T.O. et al., Host plant resistance for striga control in sorghum - activities at IAR, Samaru, Nigeria. pp. 325-334.

Mangombe, N. et al. Breeding sorghum for striga resistance in Zimbabwe. p. 335.

Nour Eldin, I. Screening for striga resistance in sorghum in Sudan. p. 337.

Odhiambo G. Striga research activities at KARI, Kenya. p.339.

Ouédraogo, O. et al. Striga research activities in Burkina Faso. p. 341.

Sallah, P.Y.K. et al. Progress in breeding maize for tolerance to Striga hermonthica in Ghana. pp. 343-356.

Future striga research

Application of molecular marker technologies by NARS

List of participants

Group photograph

List of abbreviations

Glossary of genetic terms

(see Haustorium 36, pp. 6-8, for a detailed report of this meeting.)

Striga distribution and management in Tanzania. Proceedings of a stakeholder workshop, Dar es Salaam, September 1999. 2000. Edited by C.R. Riches. Available from Pest Management Dept., Natural Resources Institute, Chatham,

Kent ME4 4TB, UK.

Contents:

XIVth International Plant Protection Congress - Plant Protection towards the Third Millenium: when Chemistry meets Ecology. Jerusalem, July 1999.

Relevant abstracts include:

Joel, D.M. Long-term approach for parasitic weeds control: manipulation of specific developmental mechanisms of the parasite. (p. 44)

Plakhine, D. et al. Effect of imidazolinone herbicides on early development stages of Orobanche aegyptiaca. (p. 126)

Kleifeld, Y. Management and control of Orobanche and Cuscuta. (p. 45)

Antonova, T.S. Review of common traits in sunflower resistance to different pathogens. (p. 45)

Eizenberg, H. et al. Resistance mechanisms of sunflower (Helianthus annus) to Orobanche cumana. (p. 77)

Goldwasser, Y. et al. Anatomical studies of Vicia atropurpurea resistance to Orobanche aegyptiaca. (p. 81)

Ransom, J. Cultural, chemical and biological control of Striga in sustainable agriculture. (p. 45)

Oswald, A. et al. On-farm research and training of farmers' groups on Striga control using a participative approach.

Oswald, A. et al. Crop rotation to reduce Striga and increase overall productivity in maize-based cropping systems. (p. 74)

Odhiambo, G.D. and Ransom, J. Effect of organic and inorganic sources of nitrogen on control of Striga hermonthica and on soil fertility for higher maize productivity in Western Kenya. (p. 73)

Abayo, G.O. et al. Effect of short-term improved fallow on Striga infestation in maize. (p. 103)

Kanampui. F.K. et al. Herbicide seed dressings of corn bearing ALS target-site resistance with ALS-inhibiting herbicides for witchweed control. (p. 122)

Bedi, J.S. et al. Efficacy of a Fusarium oxysporum formulation for the control of Orobanche cumana. (p. 70)

Weinberg, Ts. et al. Response of Cuscuta campestris to herbicide inhibitors of carotenoid biosynthesis. (p. 117)

Nof, E. et al. Biological control of field dodder by a pathogenic fungus. (p. 109)

N.B. Abstracts of these papers are usefully reprinted in Phytoparasitica (2000) 28: 171-177.

Third International Weed Science Congress - IWSC. Foz do Iguassu - June 6 to 11, 2000. Abstracts.

Edited by Anne Légère. 301 pp.

Relevant abstracts include:

(abstract number in brackets)

Goldwasser et al. Control of Orobanche spp. in potato. (278) pp 131-132.

Kanampui et al. Herbicide seed dressing of corn as an appropriate treatment for Striga control while allowing intercropping. (282). pp. 133-134.

Canevari, M. and Colbert, D. Post emergence control of Cuscuta pentagona in alfalfa hay. (288). pp. 136-137.

Kroschel, J. and Klein, O. Natural impact and potential for biological control of two selected antagonists of the parasitic weeds Orobance spp. and Cuscuta spp. (366). p. 174.

Watson, A.K.et al. Striga biocontrol - obstacles overcome. (371). pp. 176-177. (NB. see full abstract above.)

Elzein, A. et al. Effect of storage temperature, granule size, and inoculum type on the viability of Fusarium oxysporum, a pathogen of Striga hermonthica, encapsulated in wheat-kaolin ("Pesta") granules. (377). pp. 179-180.

Braghouthi et al. Effect of bacteria on broomrape seed germination. (385). pp. 183-184.

Riches, C.R. Improved weed management for resource poor farmers: constraints and opportunities. (392). p. 187.

Kroschel, J. Striga: a joint challenge to science, extension and farmers. (395). pp. 188-189.

Eplee, R.E. and Norris, R. Eradication of Striga asiatica from the United States. (442). p. 212.

Labrada, R. An overview of parasitic weed control. (538). p. 260.

Gbèhounou, G. - Striga control by restoring soil fertility. (539). pp. 260-261.

Odhiambo, G.D. Progress on Striga hermonthica control in East Africa. (540) p. 261.

Joel, D.M. Prospects for Orobanche control in the 21st century. (541). pp. 261-262.

Oswald, M. et al. Interaction of plant growth promoting rhizobacteria (PGPR) with maize and Striga hermonthica (Del.) Benth. seeds. (543) p. 262.

Oswald, A. et al. Linking research, extension and farmers: Striga control strategies for western Kenya. (544.) p. 263.

Saghir, A.R. New possibilities for Cuscuta management in some vegetable crops. (545). p. 263.

Babiker, A.G.T. et al. Conditioning, CO2 and GR24 influence ethylene biosynthesis and germination of Striga hermonthica. (546). p. 264.

Ndung'u, D.K. et al. Effect of fodder legumes on stimulation, attachment and emergence of Striga hermonthica on maize. (547). p. 264.

LITERATURE

Abanvou, L. and Doku, E.V. 1998. Heritability of traits associated with striga (Striga hermonthica (Del.) Benth.) resistance in an open-pollinated maize population. African Crop Science Journal 6: 129-135.

Adler, L.S. 2000. Alkaloid uptake increases fitness in a hemi-parasitic plant via reduced herbivory and increased pollination. The American Naturalist 156: 92-99. (Castilleja indivisa grown on near-isogenic lines of Lupinus albus with low and high levels of alkaloid. Presence of lupanine in C. indivisa growing on high-alkaloid L. albus reduced damage from larvae of Junonia coenia and other moth larvae and increased seed set by 50% due to preference of the pollinating humming bird for undamaged plants.)

Aigbokhan, E.I., Berner, D.K., Musselman, L.J. and Mignouna, H.D. 2000. Evaluation of variability in Striga aspera, Striga hermonthica and their hybrids using morphological characters and random amplified polymorphic DNA markers. Weed Research 40: 375-386. (Results confirm that the two species are genetically distinct. Hybrids are morphologically intermediate but closer to the maternal parents genetically. Some evidence for existence of naturally occurring hybrids in Nigeria.)

Albrecht, H., Yoder, J.I. and Phillips, D. 1999. Flavonoids promote haustoria formation in the root parasitie Tryphysaria versicolor. Plant Physiology 119: 585-591.

Amsellem, Z., Zidack, N.K., Quimby, P.C. and Gressel, J. 1999. Longterm dry preservation of viable mycelia of two mycoherbicidal organisms. Crop Protection 18: 643-649. (Studies on Fusarium oxysporum and F. arthosporioides.)

Arditti, J. and Ghani, A.K.A. 2000. Tansley Review No. 110. Numerical and physical properties of orchid seeds and their biological implications. New Phytologist 145: 367-421. (No mention of parasitic plants but the beautiful illustrations show remarkable parallels with Orobanche and Striga in their ornamentation and especially with Alectra in their tubular structure. See also refs to McKendrick et al. in the same issue.)

Babiker, A.G.T., Ma, Y., Sugimoto, Y. and Inanaga, S. 2000. Conditioning period, CO2 and GR24 influence ethylene biosynthesis and germination of Striga hermonthica. Physiologia Plantarum 109: 75-80. (Results are consistent with a model in which conditioning removes a restriction on the ethylene biosynthetic pathway in S. hermonthica seeds: GR24 modulates the key enzymes in ethylene biosynthesis: germination results from joint action of GR24 and the ethylene it induces.)

Barandiarán,, X., Moral, R., Gil, J. and Moreno, M.T. 1999. (The effect of the reduced form of glutathione (GSH) on the germination and growth of Orobanche crenata.) (in Spanish) In: SEMh Congreso Sociedad Española de Malherbología, Actas, Logroño, Spain 1999: 145-149.

Baumgartner, J.R., Al-Khatib, K. and Currie, R.S. 1999. Cross-resistance of imazethapyr-resistant common sunflower (Helianthus annuus) to selected imidazolinone, sulphonylurea and triazolopyrimidine herbicides. Weed Technology 13: 489-493. (Reporting that the naturally occurring imazethapyr resistant sunflower shows high resistance also to imazamox. cf refs to Alonso et al. in Haustorium 35 and Al-Khatab et al. in Haustorium 34.)

Benharrat, H., Delavault, P., Theodet, C., Figureau, C. and Thalouarn, P. 2000. rbcL plastid pseudogene as a tool for Orobanche (subsection Minores) identification. Plant Biology 2(1): 34-39. (Studies of the pseudogene and associated morphological characters lead to a new key for separation of O. hederae, O. minor, O. amethysta and O. loricata.)

Bhan, V.M. and Sushi Kumar. 1998. Weed science research in India. Indian Journal of Agricultural Science 68: 567-582. (Briefly reviews the limited work in India on management of parasitic weeds by solarisation, cultural, chemical and biological control.)

Box, J.D. 2000. Mistletoe Viscum album L. (Loranthaceae) on oaks in Britain. Watsonia 23: 237-256. (Detailed history of V. album records on Quercus spp. in Britain. Currently just 11 examples are known, mainly on Q. robur.)

Briggs, J. 1999. Kissing goodbye to mistletoe? The results of a national survey aimed at discovering whether mistletoe in Britain is in decline. A joint report from Plantlife - The Wild-Plant Conservation Charity and the Botanical Society of the British Isles. Plantlife, London, 20 pp. (A summary will be included in the next issue.)

Bringmann, G., Schlauer, J., Rückert, M., Wiesen, B., Ehrenfeld, K., Proksch, P. and Czygan, F.C. 1999. Host-derived acetogenins involved in the incompatible parasitic relationship between Cuscuta reflexa (Convolvulaceae) and Ancistrocladus heyneanus (Ancistrocladaceae). Plant Biology 1: 581-584. (The naphthoquinone plumbagin demonstrated to be one of the factors involved in dieback of C. reflexa after attachment to A. heyneanus.)

Calladine, A. and Pate, J.S. 2000. Haustorial structure and functioning of the root hemiparasitic tree Nuytsia floribunda (Labill.) R.Br. and water relationships with its hosts. Annals of Botany 85: 723-731. (Describing in new detail the structure and function of the 'cutting device' of L. floribunda and demonstrating uptake of water from the xylem of the host Acacia acuminata.)

Calladine, A., Pate, J.S. and Dixon, K.W. 2000. Haustorial development and growth benefit to seedlings of the root hemiparasitic tree Nuytsia floribunda (Lobill.) R.Br. in association with various hosts. Annals of Botany 85: 733-740. (Over a 12 month period N. floribunda growth was roughly proportional to the number and weight of haustoria developing on roots of a range of 23 woody host species. Some evidence for uptake of N from the nodulated hosts Acacia cyclops and C. acuminata.)

Carsky, R.J., Berner, D.K., Oyewole, B.D., Dashiell, K. and Schulz, S. 2000. Reduction of Striga hermonthica parasitism on maize using soybean rotation. International Journal of Pest Management 46: 115-120. (In 2 out of 3 field trials, soyabean grown in year 1 resulted in 50-70% lower S. hermonthica numbers in maize in year 2 compared with sorghum in year 1. Some evidence for greater effect of soyabean at higher densities and with added P to increase root development but as Striga was allowed to seed in sorghum, exact benefit difficult to judge.)

Caruso, C.M. and Alfaro, M. 2000. Interspecific pollen transfer as a mechanism of competition: effect of Castilleja linariaefolia pollen on seed set of Ipomopsis aggregata. Canadian Journal of Botany 78: 600-606.

Chatterjee, U. and Sanwal, G.G. 1999. Purification and properties of a protein from Lantana camara activating Cuscuta reflexa cellulase. Phytochemistry 52: 361-366.

Chou ChengJen, Ko HauChieh and Len LieChwen. 1999. Flavonoid glycosides from Viscum alniformosanae. Journal of Natural Products 62: 1421-1422. (Two new flavonoid glycosides identified from V. alniformosanae in Taiwan.)

Ciotola, M., Ditommaso, A. and Watson, A.K. 2000. Chlamydospore production, inoculation methods and pathogenicity of Fusarium oxysporum M12-4A, a biocontrol for Striga hermonthica. Biocontrol Science and Technology 10: 129-145. (Reporting studies on production, longevity and germination of F. oxysporum isolate from Mali, as influenced by nutrients, sorghum root exudate, etc. Successful reduction of Striga by use of 0.5-1 g chalmydospore powder per hill.)

Conaghan, J. 1998. Orobanche hederae Duby. in East Donegal (H34). Irish Naturalists' Journal 269(3/4): 136.

Cullings, K. 2000. Reassessment of phylogenetic relationships of some members of the Monotropoideae based on partial 28S ribosomal RNA gene sequencing. Canadian Journal of Botany 78: 1-2. (Reporting results at variance with the author's previous conclusions on the subject.)

Debabrata Das, Ghosh R.B. Avik Dutta and Maji, U.K. 1999. A census on the hosts of Cuscuta reflexa Roxb. in the district of lateritic Bankura, West Bengal. Environment and Ecology 17: 763-764. (Fifteen host species listed.)

Debabrata Das, Ruma Hazra, Avik Dutta and Maji, U.K. 1999. Systematic enumeration and taxonomic survey of host-plants of Cuscuta reflexa Roxb. in Purulia district, West Bengal. Environment and Ecology 17: 479-480. (Of 32 hosts listed from 22 families, most were trees or shrubs and only one a monocot.)

Deeks, S.J., Shamoun, S.F. and Punja, Z.K. 1999. Tissue culture of parasitic flowering plants: methods and applications in agriculture and forestry. In Vitro Cellular Development and Biology - Plant 35: 369-381. (A comprehensive review of the literature covering tissue culture of parasitic plants from 23 genera in 7 families and discussing the potential value of such studies.)

Deliorman, D., Calis, I., Ergun, F. and Tamer, U. 1999. The comparative studies on phenylpropanoid glycosides of Viscum album subspecies by high performance liquid chromatography. Journal of Liquid Chromatography and Related Technologies 22: 3101-3114. (Comparing content of syringin, coniferin and kalopanaxin D in the 3 subspecies album, abietis and austriacum of Viscum albium in Turkey.)

de Luque, A.P., Galindo, J.C.G., Macias, F.A. and Jorrin, N. 2000. Sunflower sesquiterpene lactone models induce Orobanche cumana seed germination. Phytochemistry 58: 45-50. (Parthenolide and a related lactone stimulate germination of O. cumana at 1 mg/l but did not stimulate O. crenata, O. ramosa or O. aegyptiaca.)

Díaz-Sánchez, J., López-Granados, F. and García-Torres, L. 1999. (Absorption and transloaction of propyzamide applied to the crop seed, and of imazapyr and glyphosate applied post-emergence to sunflower, as affected by parasitism of nodding broomrape (Orobanche cumana).) (in Spanish) In: SEMh Congreso Sociedad Española de Malherbología, Actas, Logroño, Spain 1999: 329-333.

Elzein, A.E.M., Kroschel, J., Assefa Admasu and Masresha Fetene. 1999. Preliminary evaluation of Phytomyza orobanchia (Diptera: Agromyzidae) as a controller of Orobanche spp. in Ethiopia. Sinet, an Ethiopian Journal of Science 22(2): 271-282. (At one location, Matima, P. orobanchia found to destroy 81 and 72% of capsules of O. ramosa and O. cernua respectively, on tomato. It was not found at 2 other sites.)

Erenst, M. and Scheffler, A. 1999. Photohaemolytic activity of chlorophyll degradation products in a mistletoe extract. Planta Medica 65: 627-631. (Involving Viscum album.)

Foley, M.J.Y. 2000 A morphological comparison between some British Orobanche species (Orobanchaceae) and their closely-related non-British counterparts from continental Europe: Orobanche reticulata Wallr. s.l. Watsonia 23:

257-267. (Concluding that O. reticulata s.l. from lowland Britain is distinct from, but close to that from continental European mountain areas, and suggesting that the British form be referred to as ssp. procera (Koch) Dostál.)

García, M.A. 1999. Cuscuta subgenus Cuscuta (Convolvulaceae) in Ethiopia, with the description of a new species. Annales Botanici Fennici 36: 165-170. (A study of the Cuscuta spp. in Ethiopia concluded that C. approximata and C. pedicellata do not occur, but a new endemic species C. castroviejoi is described.)

Gebremedhin, W., Goudriaan, J. and Naber, H. 2000. Morphological, phenological and water-use dynamics of sorghum varieties (Sorghum bicolor) under Striga hermonthica infestation. Crop Protection 19: 61-68. ((Detailed comparison of susceptible var. IS9302 and resistant var. SRN39 in pots.)

Goldwasser, Y., Plakhine, D., Kleifeld, Y., Zamski, E. and Rubin, B. 2000. The differential susceptibility of vetch (Vicia spp.) to Orobanche aegyptiaca: anatomical studies. Annals of Botany 85: 257-262. (Germination of O. aegyptiaca and penetration into the cortex occurs in both susceptible V. sativa and resistant V. atropurpurea but in the latter there is no penetration of the endodermis, associated with production of an unidentified secretion.)

Goldwasser, Y., Plakhine, D. and Yoder, J.I. 2000. Arabidopsis thaliana susceptibility to Orobanche spp. Weed Science 48: 342-346. (A. thaliana shown to stimulate germination and support development of O. aegyptiaca, O. ramosa and O. minor but not O. crenata and O. cumana.)

González-Andújar, J.L., Martínez-Cob, A., López-Granados, F. and Garcí a-Torres, L. 1999. (Spatial distribution of crenate broomrape (Orobanche crenata) in faba bean: geostatistical analysis.) (in Spanish) SEMh Congresso 1999: Sociedad Española de Malherbología, Actas, Lagroño, Spain, 1999, pp. 139-143. (Results of spherical modelling revealed an aggregate distribution of O. crenata population with a patch size of 10 m.)

Gowda, B.S., Riopel, J.L. and Timko, M.P. 1999. NRSA-1: a resistance gene homolog expressed in roots of non-host plants following parasitism by Striga asiatica (witchweed). Plant Journal 20: 217-230. (Growth of S. asiatica was blocked in cortex of non-host Tagetes minuta with development of browning and necrosis: this was associated with expression of the nuclear gene NRSA-1 which showed relationship to genes for disease resistance in other species.)

Gworgwor, N.A., Anaso, A.B.J., and Turaki, Z.G. 1998. Integrated cultural practices for Striga control in millet-based cropping systems. In: Emechebe, A.M., Ikwelle, M.C., Ajayi, O., Aminu-Kano, M. and Anaso, A.B.J. (Eds.) Pearl Millet in Nigerian Agriculture: Production, Processing and Research Priorities, pp. 87-97. (Discussing a range of cultural practices.)

Haidar, M.A. and Sidahmed, M.M. 2000. Soil solarization and chicken manure for the control of Orobanche crenata and other weeds in Lebanon. Crop Protection 19: 169-173. (Effect of chicken manure apparently greater than that of solarization on O. crenata on faba bean in pots, but methodology not clear, and fate of faba bean not reported.)

Haussmann, B.I.G., Hess, D.E., Koyama. M.L., Grivet, L., Rattunde, H.F.W. and Geiger, H.H. 2000. Breeding for Striga Resistance in Cereals. Proceedings of a Workshop held at IITA, Ibadan, Nigeria, from 18-20 August 1999. ICRISAT/Margraf Verlag, Germany, 376 pp. (See above for availability and a list of contents, and Haustorium 36 for a detailed report of this meeting.)

Haussmann, B.I.G., Hess, D.E., Welz, H-G. and Geiger, H.H. 2000. Improved methodologies for breeding striga-resistant sorghums. Field Crops Research 66: 195-211. (An extended review article.)

Hess, D.E. and Fernández-Rivera, S. 2000. A note on the chemical composition, intake and digestion of Striga hermonthica herbage by sheep. Weed Research 40: 351-358. (S. hermonthica had relatively high levels of N and P but possible problems from high ash and seed transmission need to be addressed before promoting utilization of hand-pulled plants by sheep.)

Hollier, J. and Briggs, J. 1999. The specialist Hemiptera associated with mistletoe. British Journal of Entomology and Natural History 12: 237-239. (Species collected included the psyllid Psylla visci, the mirid Orthops viscicola and the tortricid Celypha woodiana; also the cimicid Anthocoris visci, a predator feeding only on P. visci.)

Huhta, A-P., Tuomi, J. and Rautio, P. 2000. Cost of apical dominance in two monocarpic herbs, Erysimum strictum and Rhinanthus minor. Canadian Journal of Botany 78: 591-599. (Apical damage had negligible effect on vegetative biomass or fecundity of R. minor.)

IDRC. 2000. Biological warfare. IDRC Annual Report 1998-1999. pp. 36-39. (Giving a very encouraging summary of progress in the use of Fusarium oxysporum for control of Striga hermonthica in Mali, including the production of the inoculum at the village level.)

Ihl, B. and Wiese, K. 2000. (Studies on Cuscuta reflexa Roxb.: VIII. Mechanical induction of haustoria formation in non-twining stems of the parasite.) (in German) Flora (Jena) 195(1): 1-8. (Haustoria could be induced on the sub-apical zone of the stem. The possible involvement of an interaction between IAA and cytokinin is discussed.)

IWSS. 2000. Abstracts, Third International Weed Science Congress - IWSC, Foz do Iguassu, Brazil, 2000. International Weed Science Society. 301 pp. (See above for listing of relevant abstracts.)

Janssen, T. and Wulf, A. 1999. (On the significance of mistletoes for forest protection.) (in German) Mitteilungen aus der Biologischen Bundenstalt für Land- und Forstwirtschaft, Heft 369, 142pp. (Loranthus europaeus is only of importance in parts of Austria; forms of Viscum album are more widespread, the most important being V. album var. abietis. Arceuthobium spp. are of no significance in Europe at present but the extreme damage they cause in N. America fully justifies the current quarantine legislation in Europe.)

Joel, D.M., Aviv, D., Surov, T., Portnoy, T., Goldman-Guez, T. and Gressel, J. 1999. Transformation of crops to herbicide-resistance and their use against parasitic weeds. In: Altman, A. et al., (eds.) Plant Biotechnology and in vitro Biology in the 21st Century. Kluwer Academic Publishers, The Netherlands, pp. 499-502. (Reporting promising control of Orobanche aegyptiaca with asulam applied post-emergence to asulam-resistant potato; also with glyphosate applied as a seed dressing to glyphosate-resistant rapeseed.)

Joel, D.M., Herschenhorn, J., Goldman-Guez, T., Cohen, E., Lovan, Y. and Portnoy, V.H. 2000. Grafted host plants for broomrape (Orobanche spp.) control. Abstracts, Weed Science Society of America, 40: 71-72. (Susceptible sunflower and pepper, grafted onto resistant root-stocks were fully protected.)

Joel, D.M., Plakhine, D., Creanje, P., Dupuis, J.M., Kamodo, J. and Gressel, J. 2000. Broomrape (Orobanche aegyptiaca Pers.) control using asulam-resistant seeds coated with asulam. Abstracts, Weed Science Society of America, 40: 57. (Asulam-resistant tobacco grew normally in Orobanche-infested soil, while unprotected plants died.)

Juan, R., Pastor, J. and Fernández, I. 2000. SEM and light microscope observations on fruit and seeds in Scrophulariaceae from Southwest Spain and their systematic significance. Annals of Botany 86: 323-338. (Includes key for identification to genus level via fruit/seed characteristics. Parasitic genera covered include Bellardia (SEM of seed of B. trixago), Parentucellia, Bartsia, Odontites and Pedicularis.)

Kanampiu, F.K., Friesen, D.K., Ransom, J.K. and Gressdel, J. 2000. Intercropping is not precluded when ALS herbicide-coated corn seed is used for controlling Striga. Abstracts, Weed Science Society of America, 40: 7-8. (No effect on crops planted 15 cm away from maize seed treated with imazapyr or pyrithiobac.)

Karim, S.M.R., Mamun, A.A. and Islam, N. 1999. Agroecology of major crops and their weeds in Bangladesh. Pakistan Journal of Scientific and Industrial Research 42: 295-300. (Striga densiflora and Orobanche indica, 'newly introduced to the country', are severely damaging sugar cane and mustard respectively.)

Karnakowski, W. 1999. (Notifiable weeds and parasitic plant material imported into Poland during 1996-99.) (in Polish) Ochrana Roí lin 44(12): 15, 33. (Summarising interception of notifiable weeds including Cuscuta, Orobanche spp.)

Kasembe, E., Chivinge, O.A., Mariga, I.K. and Mabasa, S. 1999. The effect of time of ridging on witchweeed (Striga asiatica (L.) Kuntze) emergence, density and maize grain yield in the small-holder farming sector of Zimbabwe. Journal of Plant Protection in the Tropics 12: 15-26.

Kebreab, E. and Murdoch, A.J. 1999. Predicting Orobanche seed longevity for better weed management in legumes. Grain Legumes No. 23 - 1st quarter 1999: 8-9. (Longevity of seeds greatly reduced at higher temperatures and/or higher moisture.)

Kebreab, E. and Murdoch, A.J. 2000. The effect of water stress on the temperature range for germination of Orobanche aegyptiaca seeds. Seed Science Research 10: 127-133. (Optimum germination temperature was 17-26oC at high water potential, somewhat lower, 17-20oC with a decrease in water potential.)

Kelly, C.K. and Horning, K. 1999. Aquisition order and resource value in Cuscuta attenuata. Proc. National Academy of Sciences of the United States of America 96: 13219-13222. (C. attenuata shown to grow more vigorously when parasitising more than one host simultaneously.)

Kim, S.K., Akintunde, A.Y. and Walker, P. 1999. Responses of maize inbreds during development of Striga hermonthica infestation. Maydica 44: 333-339. (Pot experiments with massive inoculation of S. hermonthica seeds suggested that 'tolerance' was correlated with tendency to increased root weight in presence of Striga, e.g. in Corn Belt inbred B73 and in inbred Per, based on the perennial Zea diploperennis.)

Kranz, B. 1999. (Importance of organic manure for the germination and development of the parasitic flowering plant Striga hermonthica (Del.) Benth.) (in German) Agroecology No. 2: 130 pp. (A thesis exploring the importance of organic matter in the lower occurrence of S. hermonthica in fertile 'compound' fields compared with less fertile 'bush' fields, and concluding that N is more important than OM in reducing germination of Striga but OM may have other less direct beneficial effects.)

Kuehn, J.J. 1999. (Long term favourable course of a case of centroblastic-centrocytic non-Hodgkin lymphoma under administration of an extract of mistletoe (Viscum album).) (in German) Deutsche Medizinische Wochenschrift 124:

1414-1418. (Treatment with the V. album extract 'Iscador' over a 12 year period held extensive lymphomas in check. Interruption of treatment led to deterioration.)

Ladley, J. J., Kelly, D. and Robertson, A. W. 1997. Explosive flowering, nectar production, breeding systems and pollinators of New Zealand mistletoes (Loranthaceae). New Zealand Journal of Botany 35: 345-360. (The pollination syndromes of 5 species of mistletoe; Alepis flavida, Ileostylus micranthus, Peraxilla colensoi, P. tetrapetala and Tupeia antarctica, are described.)

Ladley, J. J., Kelly, D. and Norton, D. A. 1997. A guide to hand-planting New Zealand mistletoes (Loranthaceae). New Zealand Botanical Society Newsletter, 16-19. (General guide to hand-planting mistletoe seeds.)

Lammi, A., Siikämaki, P. and Salonen, V. 1999. The role of local adaptation in the relationship between an endangered root hemiparasite Euphrasia rostkoviana and its host, Agrostis capillaris. Ecography 22: 145-152. (Little evidence for better performance of E. rostkoviana when parasitising local populations of the host A. capillaris rather than populations from elsewhere.)

Löffler, C., Czygan, F.C. and Proksch, P. 1999. Role of indole-3-acetic acid in the interaction of the phanerogamic parasite Cuscuta and host plants. Plant Biology 1: 613-617. (C. reflexa on tomato causes elongation of cells in host tissue, apparently due to IAA from the parasite, associated with elongation of epithelial cells in parasite haustorial tissue.)

Lu, Y.H., Melero-Vara, J.M., García-Tejada, J.A. and Blanchard, P. 2000. Development of SCAR markers linked to the gene Or5 conferring resistance to broomrape (Orobanche cumana Wallr.) in sunflower. Theoretical and Applied Genetics 100: 625-632. (A contribution to more efficient use of resistance genes in sunflower.)

McKendrick, S.L., Leake, J.R., Taylor, D.L. and Read, D.J. 2000. Symbiotic germination and development of myco-heterotrophic plants in nature: ontogeny of Corallorhiza trifida and characterization of the mycorrhizal fungi. New Phtylogist 145: 523-537.

McKendrick, S.L., Leake, J.R. and Read, D.J. 2000. Symbiotic germination and development of myco-heterotrophic plants in nature: transfer of carbon from ecytomycorrhizal Salix repens and Betula pendula to the orchid Corallorhiza trifida through shared hyphal connections. New Phytologist 145: 539-548. (Two excellent papers challenging the use of the term 'saprophytic' for the orchid C. trifida and confirming the importance of transfer of carbon from the indirect hosts S. repens and B. pendula via ectomycorrhizal fungi. Should we be treating them as parasitic plants?)

Marinescu, A. and Pacureanu-Joita, M. 1998. (Sunflower wild species - sources for resistance to the parasite Orobanche cumana Willd.) (in Romanian) Probleme de Genetica Teoretica si Aplicata 30(1/2): 67-72.

Marler, M., Pedersen, D., Mitchell-Olds, T. and Calaway, R.M. 1999. A polymerase chain reaction method for detecting dwarf mistletoe infection in douglas fir and western larch. Canadian Journal of Forest Research 29: 1317-1321. (A PCR technique described for detecting Arceuthobium douglasii and A. laricis in the tissues of hosts Pseudotsuga menziesii and Larix occidentalis.)

Marshall, K. and Filip, G.M. 1999. The relationship of Douglas-fir dwarf mistletoe (Arceuthobium douglasii) to stand conditions and plant associations in the southern Cascade Mountains, Oregon. Northwest Science 73: 301-311.

Mathiasen, R., Beatty, J. and Melgar, J. 2000. First report of Arceuthobium hondurense on Pinus tecunumannii. Plant Disease 84: 372. (In Honduras.)

Mathiasen, R., Melgar, J., Beatty, J. and Parks, C. 2000. First report of Psittacanthus angustifolius on Pinus oocarpus and Pinus maximinoi. Plant Disease 84: 203. (In Honduras.)Mathiasen, R. Parks, C., Beatty, J and Sesnie, S. 2000. First report of Psittacanthus angustifolius on pines in Mexico and Guatemala. Plant Disease 84: 808. (P. angustifolius recorded on Pinus maximinoi, P. oocarpa and possibly P. tecunumanii, but no damage observed.)

Mathiasen, R., Sesnie, S., Calderon, J. and Soto, A. 1999. First report of golden dwarf mistletoe on Pinus maximinoi. Plant Disease 83: 878. (Arceuthobium aureum ssp. aureum apparently causing witches brooms on P. maximinoi in Guatemala.)

Mauromicale, G., Restuccia, G. and Marchese, M. 2000. Germination response and viability of Orobanche crenata Forsk. seeds subjected to temperature treatment. Australian Journal of Agricultural Research 51: 579-585. (Freshly imbibed seeds exposed to high temperatures - over 40oC - for 12 or 24 hours suffered large reductions in subsequent germination: tetrazolium tests suggested they were mainly dormant up to 65oC but dead above 70oC.)

Mbwaga, A.M., Kaswende, J. and Shayo, E. 2000. A Reference Manual on Striga Distribution and Control in Tanzania. SIDA/FAO - FARMESA Programme, P.O. Box Ilonga, Kilosa, Tanzania. 26 pp. (A very sound, well-illustrated booklet, summarising information on biology and control in clear terms, suitable for other researchers, extension personnel and the more literate farmers.)

Medel, R. 2000. Assessment of parasite mediated selection in a host-parasite system in plants. Ecology 81: 1554-1564. (Spine length shown to be important in susceptibility of individuals of cacti, Echinopsis chilensis and Eulychnia acida to the mistletoe Tristerix aphyllus. The study suggests a possible role for mistletoe attack in selection for spine length in E. chlilensis but not in E. acida.)

Michi, L. Bouillant, M-L., Rohr, R., Sallé, G. and Bally, R. Physiological and cytological studies on the inhibition of Striga seed germination by the plant growth-promoting bacterium Azospirillum brasilense. European Journal of Plant Pathology 106: 347-351.

Morozov, I.V., Foy, C.L. and Westwood, J.H. 2000. Small broomrape (Orobanche minor) and Egyptian broomrape (Orobanche aegyptiaca) parasitization of red clover (Trifolium pratense). Weed Technology 14: 312-320. (Inoculation of T. pratense roots with rhizobacteria increased germination and attachment of O. minor but not of O. aegyptiaca.)

Müller-Schärer, H., Scheepens, P.C. and Greaves, M.P. 2000. Biological control of weeds in European crops: recent achievements and future work. Weed Research 40: 83-98. (Reviewing the activities of a EU-funded working group on biocontrol of Orobanche spp., mainly involving fungi, bacteria and fungal toxins.)

Musselman, L.J. and Vorster, P. 2000. Finding furtive flowers. Plant Talk 21: 38-39. (Describing members of Hydnoraceae - Hydnora spp. in Africa and Psospanche spp. in tropical America - with especially interesting observations on H. triceps seen in Namaqualand for only the second time this century, on its host Euphorbia dregeana.)

Nair, K.K.N., Pandalai, R.C., Bhat, K.V., Mathew, G. and Ali, M.I.M. 1999. Botany, wood characteristics and silvicultural techniques of the indigenous timber species, Grewia tiliaefolia Vahl. Annals of Forestry 7: 212-220. (Frequently attacked by Scurrula parasitica.)

Nandula, V.N., Foy, C.L. and Orcutt, D.M. 1999. Glyphosate for Orobanche aegyptiaca control in Vicia sativa and Brassica napus. Weed Science 47: 486-491. (Studying the translocation and fate of glyphosate selectively controlling O. aegyptiaca in the naturally glyphosate-tolerant V. sativa and genetically engineered glyphosate-resistant B. napus.)

Natilla, A.J. 2000. Ethylene in seed formation and germination. Seed Science Research 10: 111-126. (Includes reference to effects of ethylene on Striga spp.)

Norton, D. A. and Ladley, J. J. 1998. Establishment and early growth of Alepis flavida in relation to Nothofagus solandri branch size. New Zealand Journal of Botany 36: 213-217. (Establishment of Alepis flavida seedlings was found to be better on smaller diameter branches, about 3mm.)

Norton, D. A., Ladley, J. J. and Sparrow, A. D. 1997. Development of non-destructive age indices for three New Zealand Loranthaceae mistletoes. New Zealand Journal of Botany 35: 337-343. (Describes non-destructive methods of aging Alepis flavida, Ileostylus micranthus and Tupeia antarctica.)

Otoidobiga, L.C., Vincent, C. and Stewart, R.K. 1998. Relationship between Smicronyx spp. population and galling of Striga hermonthica (Del.) Benth. Insect Science and its Application 18(3): 197-203. (Smicronyx adults found on Striga aspera before S. hermonthica emergence. Each female galled 12-32 seed pods. Damage normally inadequate but might be enhanced with augmentative techniques.)

Pate, J.S. and Bell, T.L. 2000. Host association of the introduced annual root hemiparasite Parentucellia viscosa in agricultural and bushland settings in Western Australia. Annals of Botany 85: 203-213. (P. viscosa shown to parasitise, and to benefit from, attachment to 10 native taxa as well as 17 introduced taxa; also to be able to continue growth in the absence of a host. Data also provided on carbon isotope discrimination and N metabolism - amino acids in parasite not always comparable to those in the host.)

Press, M.C., Scholes, J.D. and Watling, J.R. 1999. Parasitic plants: physiological and ecological interactions with their hosts. In: Press, M.C., Scholes, J.D. and Barker, M.G.J. (Eds.) Physiological Plant Ecology, 39th Symposium of the British Ecological Society, York, September, 1998. pp. 175-197. (A general review of work on host/parasite interactions at germination and developmental stages, and the role of the parasites at the community level.)

Puustinen, S. and Salonen, V. 1999. The effect of host defoliation on hemiparasitic-host interactions between Rhinanthus serotinus and two Poa species. Canadian Journal of Botany 77: 523-530. (R. serotinus was somewhat reduced when the host P. annua was 100% defoliated but not when the host was P. pratensis. Biomass of undefoliated P. annua was reduced 4 times as much as P. pratensis by R. serotinius infection.)

Puustinen, S. and Salonen, V. 1999. Effects of intensity and duration of infection by a hemi-parasitic plant, Rhinanthus serotinus, on growth and reproduction of a perennial grass, Agrostis capillaris. Ecography 22: 160-168. (Damage to the host A. capillaris by R. serotinus was generally proportional to the number of parasities per host and the length of time attached, over a 2 year period.)

Pywell, R.F., Nowakowski, M., Walker, K.J. and Barrett, D. 1999. A preliminary study of the introduction of Rhinanthus minor into a field margin to control productivity. Aspects of Applied Biology No. 54: 315-320. (Introduction of R. minor reduced productivity of most other species but failed to reduce the total community productivity when R. minor itself was included.)

Rao, P.N. and Basavaraju, G. 1999. Hemi- and holoparasites in species of Cuscuta Linn. a case of adaptive biodiversity. Paper presented at National Symposium on Microbial and Plant Diversity, Hyderabad, India, March 1999. (C. santapui, closely related to, or conspecific with C. reflexa, shows significant photosynthetic ability.)

Regalado, G.G. 1998. (The family Loranthaceae (mistletoes) of the state of Aguascalientes, Mexico.) (in Spanish) Polibotánica No 7: 1-14. (Identification, distribution and host ranges of Phoradendron and Psittacanthus spp. described, the most widespread being Ph. forestierae, on Quercus spp.)

Reid, N. and Smith, M.S. 2000. Population dynamics of an arid zone mistletoe (Amyema preissii, Loranthaceae) and its host Acacia victoriae (Mimosaceae). Australian Journal of Botany 48: 45-58.

Rich, T.C.G. 2000. A reanalysis of the mistletoe (Viscum album L.; Loranthaceae) survey data from the 1970s and 1990s. Watsonia 23: 338-339. (Further to the report by Briggs, 1999 (see above), the author concludes that there is 'no evidence for a decline at a national level for tetrad frequency data'.)

Riches, C.R. 2000. Striga distribution and management in Tanzania. Proceedings of a stakeholder workshop. Dar es Salaam September, 1999. Ilonga Agricultural Research Institute, Tanzania and Natural Resources Institute, UK. 86 pp. (See review of this meeting in Haustorium 36, and list of contents above.)

Robertson, A. W., Kelly, D., Ladley, J. J. and Sparrow, A. D. 1999. Effects of pollinator loss on endemic New Zealand Mistletoes (Loranthaceae). Conservation Biology 13: 499-508. (Describes how low numbers of pollinating honeyeaters leads to lower fruit set in Peraxilla colensoi and P. tetrapetala.)

Sanchez, P.A. 1999. Improved fallows come of age in the tropics. In: Buresh, R.J. and Cooper, P.J.M. (eds.) The science and practice of short-term improved fallows. Selected papers from an International Symposium, Lilongwe, 1997. Agroforestry Systems 47(1/3): 3-12. (Including comment on the value of improved fallows in control of Striga spp.)

Schmidt, K. and Jensen, K. 2000. Genetic structure and AFLP variation of remnant populations in the rare plant Pedicularis palustris (Scrohulariaceae) and its relation to population size and reproductive components. American Journal of Botany 87: 678-689. (Reporting studies in Germany.)

Sillero, J.C., Pérez de Luque, A., Rubiales, D. and Moreno, M.T. 1999. (Effect of the sowing date on Orobanche crenata infection on susceptible or resistant faba bean and vetch varieties.) (in Spanish) In: SEMh Congreso Sociedad Española de Malherbología, Actas, Logroño, Spain 1999: 401-405.

Sillero, J.C., Rubiales, D. and Moreno, M.T. 1999. (Broomrape (Orobanche crenata) resistance in faba bean (Vicia faba). (in Spanish) In: SEMh Congreso Sociedad Española de Malherbología, Actas, Logroño, Spain 1999: 395-399. (Faba bean lines studied for stability of resistance over a range of sites.)

Stein, G.M., Schaller, G., Pfüller, U., Schnietzel, M. and Büssing, A. 1999. Thionins from Viscum album L.: influence of the viscotoxins on the activation of granulocytes. Anticancer Research 19: 1037-1042. (Viscotoxins exerted immunomodulatory effects on human granulocytes which might be of benefit to tumour patients, in addition to their cytotoxic properties.)

Strong, G.L., Bannister, P. and Burrit, D. 2000. Are mistletoes shade plants? CO2 assimilation and chlorophyll fluorescence of temperate mistletoes and their hosts. Annals of Botany 85: 511-519. (Studies in New Zealand of Ileostylis micrantha on nine hosts and Tupeia antarctica on Carpodetus serratus and analysis of the reason for the parasite in all cases having lower CO2 assimilation suggested that the parasites have photosynthetic characteristics of shade plants.)

Taylor, J.E. and Marsden, M.A. 1997. Permanent plots for studying the spread and intensification of larch dwarf mistletoe and the effects of the parasite on growth of infected western larch on the Flathead Indian Reservation, Montana. Results from the 5-year re-measurement. Forest Health Protection Report - Northern Region, USDA Forest Service No. 92-5. 5 pp. (Reporting effects of overstorey removal and pre-commercial thinning on Arceuthobium laricis and Larix occidentalis.)

Traoré, D., Vincent, C. and Stewart, R.K. 1998. Circadian activity of Smicronyx guineanus Voss, a potential biocontrol agent of Striga hermonthica (Del.) Benth. Insect Science and its Application 18(3): 205-210. (Adult weevils mainly active during daytime and spend 85% of time on the upper parts of the plant.)

van der Kooij, T.A.W., Dörr, I. and Krupinska, K. 2000. Molecular, functional and untrastructural characterisation of plastids from six species of the parasitic flowering plant genus Cuscuta. Planta 210:701-707. (Plastids of C. reflexa, C. subinclusa, C. gronovii and C. campestris contained thylakoids and chlorophylls a and b in normal ratio. C. odorata and C. grandiflora contained neither thylakoids nor chlorophyll. Species also varied in relevant plastid genes.)

Westbrooks, R.C. and Eplee, R.E. 2000. Discovery of small broomrape (Orobanche minor) in clover production areas of Oregon. Abstracts, Weed Science Society of America, 40: 130-131. (Two fields infested: implications for the high value clover seed crop discussed.)

Westwood, J.H. and McDowell, J.M. 2000. Egyptian broomrape (Orobanche aegyptiaca Pers.) parasitization of disease resistant mutants of Arabidopsis thaliana. Abstracts, Weed Science Society of America, 40: 35. (Evidence that Orobanche parasitism in A. thaliana does not trigger signal transduction pathways leading to hypersensitive response.)

Yokota, T., Sakai, H., Okuno, K., Yoneyama, K. and Takeuchi, Y. 1998. Alectrol and orobanchol, germination stimulants for Orobanche minor, from its host red clover. Phytochemistry 49: 1967-1973. (An important first report of the stimulant orobanchol, regrettably not noted earlier in Haustorium.)

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