HAUSTORIUM

Parasitic Plants Newsletter

Official Organ of the International Parasitic Seed Plant Research Group

July 1998 Number 33

HAUSTORIUM IN NEED OF A HOST

Our apologies for the long delay in production of this issue of Haustorium due to sundry logistical difficulties and the fact that there are currently no official funds supporting the newsletter. This issue is being produced in Bristol UK, using some funds left over from an account established following the 4th International Symposium in 1984, when ICARDA generously donated 100 copies of the Proceedings to be sold by the IPSPRG. Those funds have been used periodically to bridge gaps in the funding from other sources and the balance is now sufficient to cover about half the cost of this mailing. Long Ashton Research Station has kindly provided assistance and the balance is being made up by private contributions. We have so far failed to identify a long-term source of funding for the future, and will welcome any suggestions, or financial contributions. The total needed is no more than a few hundred dollars per year, unfortunately too small a sum for most official donors to consider. Just a few generous individual donations could be enough!

Because of the long delay (nearly 12 months since the last issue) there is a heavy Literature section, while the uncertainties over publication have inhibited the canvassing of news items. We very much hope to change the balance towards more news in future issues.

Regrettably, due to loss of material in the mail, it has not been possible to access the most up-to-date mailing list, and this issue is being mailed to those listed in 1994, plus the most recent additions. If you know of colleagues who should have, but have not, received copies please let Chris Parker know.

THE HAUSTORIUM WEB SITE

Thanks to arrangements with the Institute of Arable Crops Reseach, Long Ashton Research Station, Bristol, the new web site is/will be:

www.lars.bbsrc.ac.uk/cropenv/haust.htm

The web site established via www.odu.edu in February 1997 is now closed. Please note that that was based on an early draft of Haustorium 32, and was not updated as intended. This means it did not include the full list of literature citations which appeared in the hard copy sent out in July 1997.

FOURTH INTERNATIONAL WORKSHOP ON

OROBANCHE , ALBENA, BULGARIA, SEPTEMBER 23-26, 1998.

Arrangements for this meeting continue. For more information contact the organisers in Bulgaria at:

Institute for Wheat and Sunflower 'Dobroudja',

near General Toshevo, Bulgaria 9520. Tel: (359)-58-870212 or 58-870204. Fax (359)-58-26364. Email iws@eos.dobrich.acad.bg

OR: Prof Dr Klaus Wegmann, Wladhauserstrasse 37, D-72076 Tubingen, Germany. Tel/Fax: (49)-707164658; email klaus.wegmann@uni-tuebingen.de

SEVENTH INTERNATIONAL PARASITIC WEED SYMPOSIUM

Preliminary arrangements are being made for the Seventh International Parasitic Weed Symposium to be held in Nantes, France, in 2001. If there are comments or suggestions on the format of this event please contact Haustorium editors, or 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

REGIONAL STRIGA AND OROBANCHE WORKSHOPS IN GHANA AND MOROCCO

In collaboration with its national partners from Ghana and Morocco the supra-regional GTZ-project "Ecology and Management of Parasitic Weeds" organised regional workshops in Ghana and Morocco, respectively. The aim of the workshops was to summarise and discuss important results of almost 10 years of interdisciplinary research towards combating parasitic weeds of the genus Striga and Orobanche in Africa and the WANA-region. They were intended to provide a forum for discussion for decision makers, researchers and extension agents interested or already involved in parasitic weed control.

The 1st workshop entitled "Joint action to control Striga in Africa: experiences from Ghana" was organised in close collaboration with the Savanna Agricultural Research Institute (SARI) and the Ghanaian Ministry of Food and Agriculture (MoFA), Tamale. The event took place from 6 to 9 October, 1997, in Sogakope, Ghana, a beautiful location on the Volta river. In total, 45 researchers and extension agents from 11 African countries (Burkina Faso, Cameroon, Ghana, Kenya, Mali, Niger, Nigeria, Tanzania, The Gambia and Togo) participated in the workshop. Thirty five papers were discussed in 5 main sessions, each introduced by a keynote speaker: 1) Analysis of the Striga problem (Dr. Kroschel, GTZ, Germany), 2) Striga biology versus control (Prof. Sauerborn, University of Giessen, Germany), 3) Status quo of Striga control (I) - prevention, mechanical and biological control methods and host plant resistance (Dr. Hess, ICRISAT, Mali), 4) Status quo of Striga control (II) - cultural, chemical and integrated aspects (Dr. Ransom, CIMMYT, Kenya), and 5) Joint action (Dr. Kachelriess, GTZ, Germany).

The importance of an analysis of the Striga problem (in particular, surveying the regional distribution and the severity of infestation, yield loss assessments, assessments on the perception of Striga by farmers and extension staff using questionnaires, the role of women in the control of Striga as well as the economics of Striga control) was discussed as a first step towards future control. Difficulties, which hinder the development of innovations in Striga control from biological and physiological point of views were demonstrated. The status quo of Striga control was critically discussed distinguishing between researchers' "control dreams" and "farmers situation and reality". Finally, "Joint Action" was discussed. Joint efforts and strong linkages between researchers, extension workers and farmers are needed if Striga control is to be successful in farmers' fields. The term "Joint Action" was preferre d to the modern term "Technology Transfer" since there are no indications that Striga will be controlled by a single and/or simple "Technology" in the near future by small scale farmers.

The 2nd workshop was entitled "Joint action to control Orobanche in the WANA-region: Experiences from Morocco". This workshop was organised in collaboration with the Institut National de la Recherche Agronomique (INRA), Meknes, and the Moroccan-German project "Amélioration de la Culture des Légumineuses Alimentaires", Rabat, Morocco. The workshop was held in Rabat from March 30 to 2 April, 1998. Ten countries including Algeria, Chile, Egypt, Germany, India, Israel, Morocco, the Netherlands, Spain and Tunisia were represented by 55 researchers and extension workers. 32 oral papers as well as 4 posters were presented. The structure of the programme was similar to that of the Ghana workshop. Keynotes papers were given on "Orobanche biology versus control" (Dr. ter Borg, Wageningen Agricultural University, the Netherlands), on "Cultural control" (Dr. Linke, Germany), on "Host plant resistance" (Prof. Petzoldt, Fachhochschule Nürtingen, Germany), and on "Chemical control" (Dr. Garcia-Torres, Institute for Sustainable Agriculture, Spain).

An excursion to the Saïs region closed the workshop. During the visit to the Douyet Experimental Station of INRA the biological control of Orobanche crenata using Phytomyza orobanchia in an inundative approach was demonstrated and discussed in detail. Furthermore, herbicide and breeding trials were shown. Finally, the use of a visualised extension programme was demonstrated by extension workers on the spot with a group of farmers. After that, excellent Moroccan hospitality was enjoyed while admiring the wonderful scenery of the Middle Atlas.

The conclusions from the workshop held in Ghana are already compiled. The workshop proceedings will be published in the next few months and can be ordered from Dr. J. Kroschel, University of Hohenheim (380), 70593 Stuttgart, Germany.

J. Kroschel

RHAMPHICARPA FISTULOSA ON RICE IN AFRICA

Rhamphicarpa fistulosa (Hochst.) Benth. is widespread in tropical Africa, occurring on moist soils particularly where there is seasonal flooding. Recently the parasite has been reported to cause serious localised losses in rice in West Africa, namely south-western Guinea and Benin, though it has also been observed in rice from the Casemence, Senegal, and southern Ghana. The distribution of the species in Guinea has been reported by Cisse et al (Sixth International Parasitic Weed Symposium, Cordoba, 1996). Recent observations indicate that the parasite is found in direct seeded rice in rain-fed lowlands and upland areas with high rainfall. Infestations appear to be increasing - in south-west Guinea, infested fields have an average density of 20 plants m-2. Farmers have abandoned fields where infestations are particularly severe as no effective control measures are known for areas where there is no water control. Several years of fallow between rice crops does not prevent seriou s losses in subsequent crops, presumably because the parasite has a wide host range on wild grasses and sedges, and also because of longevity of the seed.

R. fistulosa also occurs on rice planted as an inter-crop with maize in vleis, seasonally flooded valley bottoms in Masvingo Province, southern Zimbabwe. In this system rice is broadcast between maize rows planted on residual moisture in late August and September. The rice crop matures after the maize crop has been harvested in mid-February. By this stage of the season low spots in the vlei, the areas usually selected for rice, may be flooded to a depth of 5-25 cm and it is under these conditions that the parasite appears to thrive and infested rice becomes stunted. As in West Africa farmers know of no control but have observed that if R. fistulosa is present the rice grows better following an application of manure.

Increasing levels of infestation are causing farmers to abandon otherwise productive lowland fields in Kyela District, Southern Tanzania. Called 'mbyoso', which means 'causing to rot', reflecting the damage to rice, the Nyakyusa people in the area identify R. fistulosa as their most serious wetland weed. This is of particular significance as yields of upland rice are in decline due to falling soil fertility and an increased incidence of Striga asiatica.

Rice production in West Africa has increased at an annual rate of 8.5% between 1983-92, a trend which is likely to continue. Much of the increase in production results from expanding the area in production. Low-lying areas are often favoured by farmers as the rice crop is at less risk from drought and the soils are fertile. In some areas intensification of production in these ecologies may be threatened by infestations of Rhamphicarpa. At present however, information about this parasite is very scarce and little is known about its host range or possible control measures.

David E Johnson, Natural Resources Institute, West Africa Rice Development Association, Bouake, Cote D'Ivoire; Charles R Riches, NRI, IACR-Long Ashton Research Station, Bristol, UK; M. Camara, PVI, Conakry, Guinea; and A.M. Mbwaga, Ilonga Agricultural Research and Training Institute, Tanzania.

MISTLETOES ON RUBBER TREES IN NIGERIA

As a result of growing concern over the menace of mistletoes (family Loranthaceae) on rubber trees in Nigeria, and the lack of information on this semi-parasitic plant, its biology was studied. A survey was also conducted to determine the level of Mistletoe infestation in three localities, representative of the three agro-ecological zones (south-east, south-west and south-south) in the Nigerian rubber belt. In addition, preliminary chemical control trials were conducted, since the only means of control currently practised involves pruning infested branches. This, however, is only feasible in very young rubber trees.

Two species of mistletoe were identified, the more common being the yellow-flowered Loranthus incanus Scum. (=Phragmanthera incana (Schum.) Balle), with pink tips to the corolla, encountered in all the infested plots. It flowers up to three times per year but usually twice. The red-flowered Loranthus brunneus Engl. (=Agelanthus brunneus (Engl.) van Tiegh.) has smaller flowers and smaller, narrower leaves, and was rarely seen. L. brunneus flowers once a year. Mistletoe is widespread in the rubber-growing belt and up to 70% of trees in a plot may be infested. The problem is first noticed in the field on trees 3-4 years old; nursery plants are not affected. There is evidence of clonal resistance to the parasite. Also there were differences in mistletoe incidence among rubber clones, based on geographic location. Highest infestation was observed in the south-west zone. This variability seems to be due to climatic and other environmental factors rather than geographic variabil ity in virulence of the parasite. Two translocated herbicides (glyphosate and quizalofop) out of the six chemicals tested, showed some effect, particularly on juvenile mistletoes, when injected at rates of 10 ml per tree. No phytotoxic effects of the tested chemicals were observed on rubber leaves.

E.R. Begho, E.E. Aniamaka and E.O. Imarhiagbe, Rubber Research Institute of Nigeria, P.M.B. 1049, Benin City, Nigeria.

LITERATURE

Abdel-Kader, M.M., R. Isamil Badiaa, M.M. Diab and Hassan, E.A. 1998. Preliminary evaluation of some soilborne fungi parasitising Orobanche crenata in greenhouse. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, pp. 127-132. (Isolates of Alternaria, Fusarium and Trichoderma found to damage young O. crenata, not faba bean.)

Ackroyd, R.D. and J.D. Graves. 1997. The regulation of the water potential gradient in the host and parasite relationship between Sorghum bicolor and Striga hermonthica. Annals of Botany 80: 649-656. (Diversion of resources to the parasite depends on both higher transpiration rate in the parasite and resistance to hydraulic conductivity across the haustorium.)

Aigbokhan, E.I., D.K. Berner and L.J. Musselman. 1998. Reproductive ability of hybrids of Striga aspera and Striga hermonthica. Phytopathology 88: 563-567. (Hybrids were all virulent on maize and mostly fertile. Chromosome numbers of 2n=36 and 38 for S. aspera and S. hermonthica respectively are lower, and closer, than previously reported.)

Aflakpui, G.K.S., P.J. Gregory and R.J. Froud-Williams. 1998. Uptake and partitioning of nitrogen by maize infected by Striga hermonthica. Annals of Botany 81: 287-294. (S. hermonthica reduced shoot growth of maize by about 50% but did not affect root growth. N concentration was higher in infected maize and in S. hermonthica than in uninfected

maize but concentrations and partitioning not significantly affected by a single N application at 9 days after sowing.)

Al-Juboory, B.A. and R.K. Shati. 1996. (Control of dodder (Cuscuta campestris L.) growing on alfalfa.) (in Arabic) Arab Journal of Plant Protection 14(1): 36-40. (Gasoline at 20 l/ha effective in aubergine.)

Anac, D., M. Demirci, H. Demirkan and B. Cokuysal. 1996. Mineral contents of broomrape (Orobanche cernua Loefl.) and infested sunflower varieties. Journal of Turkish Phytopathology 25: 127-131.

Anderson, D.M. and M.L. Cox. 1997. Smicronyx species (Coleoptera: Curculonidae), economically important seed predators of witchweeds Striga spp.) (Scrophulariaceae) in sub-Saharan Africa. Bulletin of Entomological Research 87(1): 3-17. (Confirming the two commonest species in W. Africa as S. umbrinus and S. guineanus and describing a new species, S. dorsomaculatus, associated mainly with stem galls on Striga gesnerioides. Includes keys for adults and larvae and distribution data.)

Arnaud, M.C., P. Thalouarn and A. Fer. 1997. Caract¾ risation des m¾ chanismes impliqu¾ s dans la r¾ esistance de plantes cultiv¾ es ´ deux phan¾ rogames parasites (Cuscuta reflexa et Striga hermonthica). Comptes Rendues du Societ¾ Biologique Francais 192: 101-119.

Ashworth, V.E.M.T. 1997. Transectional anatomy of leaves and young stems of mistletoe genus Phoradendron Nutt. (Viscaceae). (Abstract) American Journal of Botany 84(6): 134.

Bao-Ning, S., Y. Li and J. Zhong-Jian. 1997. Neolignan, Phenylpropanoid and iridoid glycosides from Pedicularis verticillata. Phytochemistry 45: 1271-1273.

Barlow, B.A. 1996. New Malesian species of Viscaceae. Blumea 41: 339-345. (3 new species described - Ginalloa flagellaris, Viscum exile and V. scurruloideum.)

Barnard, E.L. and N.C. Coile. 1996. Black-senna (Seymeria cassioides (J.F Gmel.) Blake): a root parasite of importance to forestry in Florida. Plant Pathology Circular (Gainesville) No 380, 4 pp. (Review of S. cassioides as a root parasite of Pinus spp. Well-timed burning can be useful.)

Batchvarova, R., S. Slavov, V. Valkov, S. Atanassova and A. Atanassov. 1998. Control of Orobanche spp. by herbicides resistant crops: an example with transgenic tobacco. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, pp. 153-154. (Resistance to glufosinate and chlorsulfuron incorporated into tobacco; plants resistant to glufosinate showed cross-resistance to imazethapyr.)

Bedi, J.S., S.P. Kapur and C. Mohan. 1997. Orobanche - a threat to raya and taramira in Punjab. Journal of Research 34: 149-152. (O. aegyptiaca occurring on both Brassica juncea (raya) and Eruca sativa (taramira). Infestation of 183/sq.m causing 28-40% yield reduction in E. sativa.)

Bengaly, M'Pie and T. Defoer. 1997. (Smallholder perception of the importance of problems caused by Striga and its distribution on village hinterlands.) (in French) Agriculture et Développement 13(March 1997): 52-57. (A detailed survey of 4 Striga spp. in 2 regions of S. Mali, in relation to land use, soil type, etc.)

Ben-Hod, G., N.B. Nun, S. Tzaban and A.M. Mayer. 1997. Inhibition of polygalacturonose in Orobanche aegyptiaca. Phytochemistry 45: 1115-1121.

Berner, D.K., F.O. Ikie and E.I. Aigbokhan. 1996. Methods for soil infestation with Striga hermonthica seeds. Agronomy Journal 88: 33-37. (Easiest method involved water as the carrier material.)

Berner, D.K., F.O. Ikie and J.M. Green. 1997. ALS-inhibiting herbicide seed treatments control Striga hermonthica in ALS-modified corn (Zea mays). Weed Technology 11: 704-707. (Treatments with nicosulfuron and imazaquin on seeds of P31801R maize with the XA-17 gene gave selective control of S. hermonthica whose seeds had been placed in the planting hole.)

Bernhard, R.H., J.E. Jensen and C. Andreasen. 1998. Prediction of yield loss caused by Orobanche spp. in carrot and pea crops based on the soil seedbank. Weed Research 38: 191-197. (In Israel, losses due to O. crenata in peas and carrot, and O. aegyptiaca in carrot only, are related to parasite seedbank; a method of predicting losses is proposed.)

Bhellum, B.L. and Rani Mangotra. 1996. Cuscuta campestris Yuncker - a new record for the flora of Jammu and Kashmir State. Indian Journal of Forestry 19(1): 103-104.

Bouillant, M.L.,, L. Miché, O. Ouedrago, G. Alexandre, C. Jacoud, and R. Bally. 1997. Inhibition of Striga seed germination associated with sorghum growth promotion by soil bacteria. Comptes Rendus de l'Académie des Sciences. Série III, Sciences de la Vie 320(2): 159-162. (Two strains of Azospirillum braziliense, isolated from soil in Mali, inhibited germination of S. hermonthica.)

Briggs, J. 1995. Mistletoe - distribution, biology and the national survey. British Wildlife 7(2): 75-82. (A useful review of

V. album in England and Wales. Apple by far the commonest host.)

CAB International. 1998. Fungal pathogens for Striga control. Biocontrol News and Informationa1 19:35N-37N. (A useful review of progress to date, including news of efforts to develop local production of biocontrol materials in West Africa.)

Castejón-Muñoz, M. and L. García-Torres. 1997. (Incidence of infestations by nodding broomrape in sunflower in Andalucia.) (in Spanish) Agricultura, Revista Agropecuaria 66(779): 456-460. (O. cernua affecting 50% of sunflower in Andalucia and increasing in spite of resistant varieties.)

Czerwenska-Wenkstetten, I.M., D.K. Berner, A. Schilder and R. Gretzmacher. 1997. First report and pathogenicity of Myriothecium roridum, Curvularia eragrostidis and C. linata on seeds of Striga hermonthica. Plant Disease 81: 832. (Fungi isolated from seeds of S. hermonthica in Nigeria; M. roridum found to reduce germination by 100%, Curvularia spp. by 48%.)

Cochrane, V. and M.C. Press. 1997. Geographical distribution and aspects of the ecology of the hemiparasitic angiosperm Striga asiatica (L.) Kuntze: a herbarium study. Journal of Tropical Ecology 13: 371-380. (Study revealed wider range of distribution and hosts than previously realised.)

Davies, D.M., J.D. Graves, C.O. Elias and P.J. Williams. 1997. The impact of Rhinanthus spp. on sward productivity and composition: implications for the restoration of species-rich grasslands. Biological Conservation 82: 87-93. (Studies show suppression of productivity of 8-73% by Rhinanthus and reduced proportion of grasses in the sward.)

van Delft, G-J., J.D. Graves, A.H. Fitter and M.A. Pruiksma. 1997. Spatial distribution and population dynamics of Striga hermonthica in naturally infested farm soils. Plant and Soil 195: 1-15. (Seeds of S. hermonthica in soil declined 62% after 1 year of fallow. Numbers emerged tended to decline at seed densities over 100 seeds per kg soil. Total seed production tended to decline at shoot densities over 40/m2. And many other valuable observations.)

DePamphilis, C.W., N.D. Young, and A.D. Wolfe. 1997. Evolution of the plastid gene rps2 in a lineage of hemiparasitic and holoparasitic plants: many losses of photosynthesis and complex patterns of rate variation. Proceedings of the National Academy of Sciences of the United States of America 94: 7367-7372.

Dhanapal, G.N. and P.C. Struik. 1996. Broomrape (Orobanche cernua) control before attachment to host through chemically or biologically manipulating seed germination. Netherlands Journal of Agricultural Science. 44: 279-291. (Germination of O. cernua increased by Vigna radiata and Crotalaria juncea even in the presence of GR24.)

Dhanapal, G.N. and P.C. Struik. 1996. Broomrape control in a cropping system containing bidi tobacco. Journal of Agronomy and Crop Science 177: 225-236. (Crotalaria juncea and Vigna radiata more effective as trap crops for O. cernua than Cajanus cajan, Vigna mungo, peas, sunflower, sesame or soyabean.)

Dhanapal, G.N., P.C. Struik and S.J. ter Borg. 1997. Field observations on interactions between Orobanche cernua Loefl. and bidi tobacco in Nipani, India. Journal of Agronomy and Crop Science 179(2): 83-89. (Damaging effects of O. cernua apparent on tobacco at 50 days after transplanting.)

Dörr, I. 1997. How Striga parasitizes its host: a TEM and SEM study. Annals of Botany 79: 463-472. (Describing the `oscula', a structure by which the haustoria of S. asiatica and S. hermonthica absorb water and nutrients from the xylem vessels of maize and sorghum.)

Du, X.-M., K. Kohinata, T. Kawasaki, Y.-T. Guo and K Mihayara. 1998. Components of the ether -insoluble glycoside-like fraction from Cuscuta chinensis. Phytochemistry 48: 843-850. (Investigating the active ingredients of 'Cuscuta Semen', a traditional Chinese liver and kidney tonic, based ideally on the seeds of C. chinensis, but C. australis and C. japonica now often used because of 'the decline in the production capacity of C. chinensis'.)

Eastabrook, M. and J.I. Yoder. 1998. Plant-plant communication: rhizosphere signaling between parasitic angiosperms and their hosts. Plant Physiology 116: 1-7.

English, T.J., R.S. Norris and A.E. Miller. 1997. Control of clover broomrape (Orobanche minor Sm.) in southwest Georgia pecan groves. Proceedings Southern Weed Science Society 50: 81-82. (O. minor is common in poorly managed pecan groves, though the host is usually herbaceous. Controlled by destruction of weed growth with glyphosate.)

Ergun, F. and D. Deliorman. 1997. (Anataomical studies on Viscum album L.) (in Turkish) Turkish Journal of Biology 21(1): 71-78.

Esilaba, A., Fasil Reda, Tilahun M., J.K. Ransom, Gebremedhin W., Adane T., Ibrahim F. and Gobena A. 1998. Participatory rural appraisal on Striga in the northern Ethiopian highlands. Arem 4: 1-12.

Esilaba, A., Tilahun M., Fasil Reda, J.K. Ransom, Gebremedhin W., Adane T., Ibrahim F. and Gobena A. 1998.

Diagnostic survey on Striga in the northern Ethiopian highlands. Arem 4: 13-27. (90% of farmers in the surveyed area identified Striga as a major constraint and 87% believed it to be increasing. Control methods include hand-pulling, ploughing and farmyard manure.)

Estabrook, E.M. and J.I. Yoder. 1998. Plant-plant communications: rhizosphere signalling between parasitic angiosperms and their hosts. Plant Physiology 116: 1-7. (An in-depth review with emphasis on Scrophulariaceae.)

Faghir, A. and V. Narimani. 1998. Investigation efficacy of propyzamid and imazethapyr for the control of dodder (Cuscuta spp.) and other weeds in East Azarbaidjan - Iran. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, pp. 156-157. (Best treatment for Cuscuta sp. in lucerne was propyzamide 2.5 kg/ha early post-emergence.)

Fahmy, G.M. H. El-Rantawy and M.M.A. El Ghani. 1996. Distribution, host range and biomass of two species of Cistanche and Orobanche cernua parasitising the roots of some Egyptian xerophytes. Journal of Arid Environments 34: 263-276. (C. phelypaea, C. tubulosa and O. cernua recorded from a range of hosts. C. phelypaea especially damaging on Hammada elegans and C. tubuluosa on Anabasis articulata.)

Fasil Reda. 1996. Parasitic weeds research in Ethiopia: a review. In: Rezene Fessehaie (Ed.) Proceedings 1st Annual Conference of the Ethiopian Weed Science Society, Addis Abeba. Arem 1: 31-38.

Fasil Reda. 1997. Integrated cropping systems approach for Striga control in sorghum. Abstracts, Fourth Annual Conference of the Ethiopian Weed Science Society, Addis Abeba 1997.

Feil, P. K. Hummler and S. Kachelreiss. 1997. Development of visual extension material for a Striga control programme in Northern Ghana through action research. European Journal of Agricultural Education and Extension 4(1): 1-16.

Fer, A. and P. Thalouarn. 1997. (Orobanche: a threat to our crops.) (in French) Phytoma 50(499): 34-36. (A general review of biology, important and control.)

Flores, F., M.T. Moreno, A. Martinez and J.I. Cubero. 1996. Genotype-environment interaction in faba bean: comparison of Ammi and principal coordinate models. Field Crops Research 47: 117-127. (Genotypes L1, L2 and VF1071 most resistant to Orobanche crenata but yields variable across environments.)

Friess, H., H.G. Beger, J. Kunz, N. Funk, M. Schilling and M.W. Büchler. 1996. Treatment of advanced pancreatic cancer with mistletoe: results of a pilot trial. Anticancer Research 16: 915-920. (Most of 16 patients treated with 'Eurixor' claimed a positive effect on quality of life.)

Gamboa, M.A. and L.Q. RodrÍ guez. 1997. (Experiences and perspectives of forest management in Costa Rica) (in Spanish) Manejo Integrada de Plagas 45: 34-42. (Including reference to mistletoes.)

García-Torres, L., M. Jurado-Expósito, J. Díaz Sánchez, M. Castejón-Muñoz and F. López-Granados. 1996. (Grow good peas. Control of anthracnose and broomrape. Seed treatment.) (in Spanish) Agricultura, Revista Agropecuaria 65: 755-759. (Including recommendations for control of Orobanche crenata by herbicide.)

García-Torres, L., F. López-Granados, M. Castejón-Muñoz, M. Jurado-Expósito and J. Díaz Sánchez. 1997. (The present state of Orobanche spp. infestations in Andalucia and its management.) (in Spanish) Proc. Sociedad Española de Malherbologia Congresso, Valencia, 1997. Pp. 181-185. (32,000 ha of peas destroyed by O. crenata in in spite of resistant varieties; imazethapyr registered for use pre-emergence in sunflower.)

García-Torres, L., F. López-Granados, M. Jurado-Expósito and J. Díaz Sánchez. 1998. The present state of Orobanche spp. infestations in Andalusia and the prospects for its management. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, pp. 141-145. (O. crenata destroyed 30, 000 ha of peas in 1996; O. cernua affecting 40,000 ha sunflower.)

Geipert, S. 1997. Potentiale und Grenzen der Bekämpfung von Orobanche crenata Forssk. im Acker bohnenbau (Vicia faba L.) Marokkos. PLITS 15(5) 144 p. (New data on extent of Orobanche spp. in Morocco, hosts, yield reductions, control methods, economics, etc.)

Goldwasser, Y., Y. Kleifeld, D. Plakhine and B. Rubin. 1997. Variation in vetch (Vicia spp.) response to Orobanche aegyptiaca. Weed Science 45: 756-762. (V. sativa susceptible; V. atropurpurea resistant, due to necrotic response.)

Gómez, M.A., M.T. Sáenz, M.D. García, M.C. Ahumada and R. de la Puerta. 1997. Cytostatic activity against HEp-2 cells of methanol extracts from Viscum cruciatum Sieber parasitic on Crataegus monogyna Jacq. and two isolated principles. Phytotherapy Research 11: 240-242.

Haidar, M.A., G.L. Orr and P. Westra. 1997. Effects of light and mechanical stimulation on coiling and prehaustoria formation in Cuscuta spp. Weed Research 37: 219-228. (Studies involved a mixture of C. campestris and C. indecora seedlings, exposed to combinations of red, far-red, ultra-violet and blue light, zeatin and mechanical stimulation.)

Haidar, M.A., G.L. Orr and P. Westra. 1998. The response of dodder (Cuscuta spp.) seedlings to phytohormones under various light regimes. Annals of Applied Biology 132: 331-338. (Coiling and pre-haustorium formation, stimulated by zeatin, was synergised by far red light and inhibited by IAA, suggesting phytochrome involvement; ethylene had no effect.)

Hassan, E.A. 1998. Broomrape species in Egypt, a recent survey in relation to geographical distribution. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, p. 155.

Hayashi, S., E. Miyamoto, K. Kudo, K. Kameoka and H. Hanafusa. 1996. Comparison of the volatile components of three mistletoes. Journal of Essential Oil Research 8: 619-626. (Studies on Viscum album var. coloratum from China, V. album from Germany, and Taxillus kaempferi from Japan.)

Herrero Nieto, A., A. Escudero Alcántara and S. Pajarón Sotomayor. 1995. (Floristic notes from the Relumbrar Mountains (Abacete and Ciudad Real.) (in Spanish) Studia Botanica 14: 207-215. (Including information on Cuscuta planiflora.)

Hershenhorn, J, D. Plakhine, Y. Goldwasser, J.H. Westwood, C.L. Foy and Y. Kleifeld. 1998. Effect of sulfonylurea herbicides on Egyptian broomrape (Orobanche aegyptiaca) in tomato (Lycopersicon esculentum) under greenhouse conditions. Weed Technology 12: 115-120. (Comparing the effects of chlorsulfuron and 5 other sulfonylurea herbicides applied in various ways to O. aegyptiaca and tomato in pots, confirming selectivity when applied direct to the soil.)

Hershenhorn, J, D. Plakhine, Y. Goldwasser, J.H. Westwood, C.L. Foy and Y. Kleifeld. 1998. Effect of sulfonylurea herbicides on Egyptian broomrape (Orobanche aegyptiaca) in tomato (Lycopersicon esculentum). Weed Technology 12: 108-114. (Comparing the effects of chlorsulfuron and 6 other sulfonylurea herbicides applied to O. aegyptiaca at various stages in petri dish and polybag.)

Hibberd, J.M., W.P. Quick, M.C. Press and J.D. Scholes. 1998. Can source-sink relations explain responses of tobacco infection by the root hemiparasitic angiosperm Orobanche cernua? Plant, Cell and Environment 21: 333-340. (Tobacco biomass reduced 29% - all accounted for by dry weight of O. cernua. Changes associated with greater specific leaf area and delayed senescence of tobacco leaves.)

Hincha, D.K., U. Pfüller and J.M. Schmidtt. 1997. The concentration of cryoprotective lectins in mistletoe (Viscum album L.) leaves is correlated with leaf frost hardiness. Planta 203: 140-144.

Hoffman, G., C. Diarra, I. Ba and D. Dembele. 1997. (Parasitic plant species of food crops in Africa: biology and impact, study in Mali. 1. Identification and biology of parasitic plants. 2. Impact of parasitic plants based on the results of a study in Mali (1991-1994).) (in French) Agriculture et Développement 13(March 1997): 30-51. (Species recorded in Mali include Buchnera hispida, Alectra vogelii, Rhamphicarpa fistulosa and 8 spp.of Striga. Severity of each species in 7 villages surveyed and linked to cropping practices, field history etc.)

Hoffman, G., P. Marnotte and D. Dembele. 1997. (The use of herbicides to control Striga hermonthica.) (in French) Agriculture et Développement 13(March 1997): 58-62. (2,4-D applied 30 days after sowing maize or sorghum reduces Striga infestation and a second application almost eliminates it.)

Hood, M.E., J.M. Condon, M.P. Timko and J.L. Riopel. 1998. Primary haustorial development of Striga asiatica on host and non-host species. Phytopathology 88: 70-75. (Haustorial development and penetration of cortex occurred on all non-hosts, but further penetration into lettuce, Tagetes erecta and cowpea arrested by necrosis of host cortex tissue.)

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

ICARDA. 1997. Forage legumes resistant to parasitic weeds. ICARDA Annual Report 1996, p. 11. (Vicia narbonensis resistant to O. aegyptiaca but susceptible to O. crenata; V. sativa 1448 resistant to O. crenata; Lathyrus ochrus resistant to both species.)

ICRISAT. 1997. Striga control: a new way forward. ICRISAT Report 199, pp. 42-46. (Emphasising hopes and possible techniques for the control by Fusarium spp., including F. nygamai and F. oxysporum.)

IITA. 1996. Research highlights. International Institute of Tropical Agriculture Annual Report, 1996. p.8. (Research approaches include seed treatment with bacterial isolates and progeny from Zea diploperennis.)

IITA. 1997. Maize wild relatives get a stranglehold on Striga. International Institute of Tropical Agriculture Annual Report, 1997, pp 6-7. (also Research Highlights pp. 58-59.) (Describing use of molecular markers to help in the transfer of resistance from Zea diploperennis to maize. A further new approach is the use of ethylene-producing Pseudomonas spp. to stimulate suicidal germination.)

Jain, R. and C.L. Foy. 1997. Translocation and metabolism of glyphosate in Egyptian broomrape (Orobanche aegyptiaca)-infested tomato (Lycopersicon esculentum) plants. PGRSA Quarterly 25(1): 1-7. (Glyphosate translocated intact to all parts of host and parasite, mostly within the first 3 days; greater accumulation in parasite than in host meristem.)

Jeffree, C.E. and E.P. Jeffree. 1996. Redistribution of the potential geographical ranges of mistletoe and Colorado beetle in Europe in response to the temperature component of climate change. Functional Ecology 10: 562-577. (Projected warming not likely to have substantial impact on distribution of Viscum album.)

Jeschke, W.D., A. Baig and A. Hilpert. 1997. Sink-stimulated photosynthesis, increased transpiration and increased demand-dependent stimulation of nitrate uptake: nitrogen and carbon relations in the parasitic association Cuscuta campestris - Coleus blumei. Journal of Experimental Botany 48: 915-925.

Joel, D.M. 1998. Key developmental processes in parasitic weeds as potential targets for novel control methods. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, pp. 135-140.

Joel, D.M., K. Kleifeld and J. Gressel. 1997. Parasitic weed control using transgenic herbicide-resistant crops. In: R. De Prado, J. Jorrin and L. García-Torres (eds) Weed and Crop Resistance to Herbicides. (Proceedings, International Symposium, Cordoba, 1995) pp. 275-279. (Brief summary of successful results with chlorsulfuron v. Orobanche on tobacco and glyphosate v. Orobanche on rape; moderate success with asulam on tobacco. Caution expressed re development of herbicide tresistance in the parasite.)

Joel, D.M. and V.H. Portnoy. 1998. The angiospermous root parasite Orobanche L. (Orobanchaceae) induces expression of a pathogenesis related (PR) gene in susceptible roots. Annals of Botany 81: 779-781. (Defence reactions detected in transgenic tobacco (with PRB-11 promoter fused to the GUS reporter gene) suggest that the host is not a compatible partner, even though showing normal susceptiblity.)

Joel, D.M., V. Portnoy and N. Katzir. 1996. Identification of single tiny seeds of Orobanche using RAPD analysis. Plant Molecular Biology Reporter 14: 243-248. (Seeds of 5 different Orobanche spp. could be identified.)

Joel, D.M., J.C. Steffens and D.E. Matthews. 1995. Germination of weedy root parasites. In: J. Kigel and G. Galili (eds) Seed Development and Germination. Marcel Dekker, New York. pp. 567-597.

Joller, P.W., J.M. Menrad, T. Schwarz, U. Pfüller, M.J. Parnham, R. Weyhenmeyer and H. Lentzen. 1996. Stimulation of cytokine production via a special standardized mistletoe preparation in an in vitro human skin bioassay. Arzneimittel Forschung 46: 649-653. (Involving the mistletoe - Viscum album preparation Lektinol.)

Jost, A. 1997. Intergrieter Getreideanbau in Nord-Ghana unter besonder Berücksichtung der Striga-problematik. PLITS 15(4) 127 pp. (Problem reduced by use of short-season sorghum varieties. Also seed reserves of S. hermonthica reduced 48% under legume fallows.)

Juan, R., J. Pastor and I. Fernández. 1996. (Observations of fruits and seeds in three species of Odontites Ludwig (Scrophulariaceae).) (in Spanish) Acta Botanica Malacitana No 21: 91-97. (Morphological and anatomical studies showed O. tenuifolia, O. longiflora and O. foliosa could be distinguised by fruit and seed features.)

Jurado-Expósito, M., L. García-Torres, M. Castejón-Muñoz. 1997. Broad bean and lentil seed treatments with imidazolinones for the control of broomrape (Orobanche crenata). Journal of Agricultural Science 129: 307-314. (Selective control achieved with imazethapyr on broad bean and imazapyr on lentil.)

Kabir, M., D. Faure, T. Heulin, W. Achouawk and R. Bally. 1996. Azospirillum populations in soils infested by a parasitic weed (Striga) under sorghum cultivation in Mali, west Africa. European Journal of Soil Biology 32: 157-163.

Katzir, N., V. Portnoy, G. Tzuri, M. Castejón-Muñoz and D.M. Joel. 1996. Use of random amplified polymorphic DNA (RAPD) markers in the study of the parasitic weed Orobanche. Theoretical and Applied Genetics 93: 367-372. (Results support the taxonomic separation of O. ramosa from O. aegyptiaca and of O. cernua from O. cumana.)

Kepczynski, J. and E. Hepczynski. 1997. Ethylene in seed dormancy and germination. Physiologia Plantarum 101: 720-726. (No mention of Striga but a useful review relating mainly to work on Amaranthus caudatus.)

Khalaf, K.A. 1997. Isolation and properties of Orobanche crenata germination stimulants from the root extracts of Vicia faba. Tropical Agriculture 74: 128-131. (At least 3 stimulatory compounds detected in ether extracts of 45-day old roots, but not chemically identified.)

Kim, J.S., H.H. Kwak, B.C. Kim and K.Y. Cho. 1997.

(Study on the biosynthetic characteristics of photosynthetic pigments in dodder (Cuscuta australis R.Br.) plant.) (in Korean) Korean Weed Journal of Weed Science 17: 314-324. (Chlorophyll content only one fiftieth of that in the leaf of Convolvulus arvensis; mainly present near apices; herbicides inhibiting photosynthesis show poor control but paraquat

active.)

Kim, S-K., S.T.O. Lagoke and C. Thé. 1997. Observations on field infection by witchweed (Striga species) on maize in West and Central Africa. International Journal of Pest Management 43: 113-121. (At a range of sites, 5 years of repeated cropping with maize, fertilized with high nitrogen (120 kg N/ha) resulted in striking reductions in levels of S. hermonthica.)

Kim, S-K. and V.O. Adetimirin. 1997. Striga hermonthica seed inoculum rate effect on maize hybrid tolerance and susceptibility expression. Crop Science 37: 1066-1071. (Comparing responses of tolerant (8322-13) and susceptible (8338-1) hybrids to S. hermonthica seed placed in planting hole. At higher rates tolerant showed 25% less emergence and double yield of susceptible. Yields comparable in absence of Striga.)

Kim, S-K., V.O. Adetimirin and A.Y. Akintunde. 1997. Nitrogen effects on Striga hermonthica infestation, grain yield, and agronomic traits of tolerant and susceptible maize hybrids. Crop Science 37: 711-716. (At artificially infested sites, at least 120 kg N/ha required to reduce Striga levels. Yields of `tolerant' hybrids 8322-13 and 8425-8 reduced about 40% by Striga at low N levels but still substantially out-yielded susceptible hybrids.)

Koncalova, M.N. and Z. Kropac. 1996. Host-parasite relationship during the germination phase in Orobanche crenata and O. minor. Presilia 68: 329-339. (Describing the use of an agar medium for germination studies.)

Kovar, P. E.A. Hassan and E. Brabec. 1997. Is Vicia faba population affected by parasitism from Orobanche crenata more than by competition from non-parasitic weeds? Presilia 69:185-190. (In a pot experiment V. faba more damaged by non-parasitic weeds than by O. crenata.)

Kuiper, E. 1997. Comparative studies on the parasitism of Striga aspera and Striga hermonthica on tropical grasses. PhD thesis, Free University, Amsterdam. 144 pp. (A finely produced volume with sections on primary dormancy, germination, genetic variability, host range, resistance and effects on hosts, of the two species. Suggesting a close relationship between the two species, but somewhat different host range, especially in the post-attachment resistance of sorghum to S. aspera. Effects on the host comparable.)

Kutbay, H.G., F. Karaer and M. Kilinc. 1996. The relationships of some nutrients between Cuscuta epithymum (L.) L. var. epithymum and Heliotropium europaeum L. Turkish Journal of Botany 20: 515-518.

Lane, J.A., D.V. Child, T.H.M. Moore, G.M. Arnold and J.A. Bailey. 1997. Phenotypic characterisation of resistance in Zea diploperennis to Striga hermonthica. Maydica 42: 45-51. (10-15% of Z, diploperennis showed failure of normal development of S. hermonthica after mainly normal penetration.)

Lane, J.A., T.H.M. Moore, D.V. Child and J.A. Bailey. 1997. Variation in virulence of Striga gesnerioides on cowpea: new sources of crop resistance. In: Singh, B.B., D.R. Mohan Raj, K.E. Dashiell and L.E.N. Jackai (eds) Advances in Cowpea Research, Proc. 2nd World Cowpea Research Conference, Accra, 1995. pp. 225-230. (A useful review of geographical variation in virulence of S. gesnerioides; cowpea lines 87-2 and APL-1 resist some biotypes but not those from Niger/N. Nigeria.)

Langbehn, A. and H-C. Weber. 1995. (Further observations of growth rates and the development of Viscum album L. (Viscaceae) growing on apple trees (Malus sp.).) (in German) Beiträge zur Biologie der Pflanzen 69(1): 141-154. (After 3 years development as endophytes, female flowers developed after a further 4 years: new shoots also developed from the endophyte about this time.)

Lanini, W.T. and G. Miyao. 1997. Field dodder control with a biocontrol organism and rimsulfuron in tomatoes. Proceedings, Western Society of Weed Science 50: 49. (Alternaria conjuncta/infectoria and Fusarium tricinctum singly or together reduced C. campestris at least 50% when applied on granules pre-emergence, but not as a post-emergence spray. Tomato yields increased from 61 to 83 T/ha. Rimsulfuron 15 g/ha only partially effective. Var. Heinz 9492 50% less attacked than Halley 3155.)

Lechowski, Z. 1996. Gas exchange in leaves of the root hemiparasite Melampyrum arvense L. before and after attachment to the host plant. Biologia Plantarum 38: 85-93. (Net photosynthesis in M. arvense only 15 and 23% of that in host Capsella bursa-pastoris before and after attachment respectively. Chlorophyll contents only 33 and 49% but respiration 1.8 and 2.6 times higher.)

Lechowski, Z. 1996. Abscisic acid content in the root hemiparasite Melampyrum arvense L. before and after attachment to the host plant. Biologia Plantarum 38: 489-494. (ABA levels showed diurnal fluctuation in the host Caspella bursa-pastoris, but remained constant in M. arvense, at a lower level before attachment, at a higher level after.)

Lechowski, Z. and J. Bialczyk. 1996. Cytokinins in the hemi-parasite Melampyrum arvense L. before and after attachment to the host. Biologia Plantarum 38: 481-488. (Levels of cytokinin in parasite xylem sap massively higher after attachment to host Capsella bursa-pastoris.)

Lei, S.A. 1997. Host-parasite relationship between Juniperus osteospermum (Utah juniper) and Phoradendron juniperus (desert mistletoe) in the Mojave Desert. (Abstract) American Journal of Botany 84(6): 104.

Lolas, P. 1996. Sub-group collaborative study on broomrape. 1995-1996 report. Bulletin de'Information - CORESTA 1996(3/4): 47-51. (Reviewing activities relating to Orobanche spp. in tobacco.)

Löffler, C. F.C. Czygan and P. Proksch. 1997. Phenolic constituents as taxonomic markers in the genus Cuscuta (Cuscutaceae). Biochemical Systematics and Ecology 25: 297-303. (Nine species of Cuscuta each showed a characteristic pattern of phenolics which could be used as taxonomic markers.)

López-Granados, F and L. García-Torres. 1997. Modelling the demography of crenate broomrape (Orobanche crenata) as affected by broad bean (Vicia faba) cropping frequency and planting date. Weed Science 45: 261-268.

López-Granados, F., L. García-Torres and J. Díaz Sánchez. 1997. (A bioeconomic model for crenate broomrape (Orobanche crenata) in broad bean (Vicia faba) under different management strategies.) (in Spanish) Proc. Sociedad Española de Malherbologia Congresso, Valencia, 1997. (Suggested best strategy early sowing, mid October, plus herbicide - imazethapyr 75 g/ha pre-emergence and glyphosate 40g/ha post-emergence.)

López-Sáez, J.A. 1996. (Chorology and ecology of Viscum cruciatum Sieber ex Boiss. in the Iberian Peninsula.) (in Spanish) Boletin de Sanidad Vegetal, Plagas 22: 601-611. (Ecology, distribution, biology, hosts etc reviewed: above 800 m V. album predominates.)

Losner-Goshen, D., G. Ben-Hod, A.M. Mayer and D.M. Joel. 1996. Aseptic broomrape infection of tomato root culture. Israel Journal of Plant Sciences 44: 89-94.

Losner-Goshen, D., V.H. Portnoy, A.M. Mayer and D.M. Joel. 1998. Pectolytic activity by the haustoria of the parasitic plant Orobanche L. (Orobanchaceae) in host roots. Annals of Botany 81: 319-326. (Involvement of enzymes in haustorium penetration confirmed by the presence of pectin methylesterase in intrusive cells of O. cumana and O. aegyptiaca and lack of pectin in middle lamellae of adjacent cells of hosts sunflower and tomato respectively.)

Ma YongQing, A.G.T. Babiker, I.A. Ali, Y. Sugimoto and S. Inanaga. 1996. Striga hermonthica (Del.) Benth. germination stimulant(s) from Menispermum dauricum (DC.) root culture. Journal of Agricultural and Food Chemistry 44: 3355-3359. (The root culture technique produced 2-3 highly active stimulant compounds with chromatographic properties different from those of strigol.)

Ma, Y. A.G.T. Babiker, Y. Sugimoto and S. Inanga. 1998. Effect of the medium composition on production of Striga hermonthica (Del.) Benth. germination stimulant(s) by Menispermum dauricum (DC.) root cultures. Journal of Agricultural and Food Chemistry 46: 1587-1592. (Excised roots of M. dauricum grew best and produced best Striga germination when cultured in a modified B5 medium. Such culturing suggested as possible means of producing good quantities of stimulant for analysis.)

Mabasa, S. 1996. Screening sorghum cultivars for resistance to witchweed (Striga asiatica) in Zimbabwe. In: K. Leuschner and C.S. Manthe (eds) Drought-tolerant Crops for Southern Africa. Proceedings of the SADC/ICRISAT regional sorghum and pearl millet workshop, Gaborone, 1994, pp. 201-209. (Vars SAR-29, -33, -35, and -37 supported least S. asiatica but yielded poorly: vars DC-75, SV-1, SV-2 and MMSH-413 showed tolerance.)

Mabsoute, L. and E.M. Saadaoui. 1996. (Overview of research work on parasites of food legumes in Morocco.) (in French) Al Awamia 92: 55-67. (Including observations on Orobanche.)

McPartland, J.M. 1996. A review of Cannabis diseases. Journal of the International Hemp Association 3(1): 19-23. (including Orobanche ramosa.)

Manoharan, M., C.S.S. Vidya and G.L. Sita. 1998. Introduction and expression of marker genes in sandalwood (Santalum album L.) follows Agrobacterium-mediated transformation.??????

Manschadi, A.M., J. Kroschel and J. Sauerborn. 1996. Dry matter production and partitioning in the host-parasite association Vicia faba-Orobanche crenata. Angewandte Botanik 70: 224-229. (Loss of dry weight from the host accounted for fully by dry weight of the parasite: O. crenata at the bud stage prevented seed set in the host.)

Manschadi, A.M., J. Sauerborn, J. Kroschel and M.C. Saxena. 1997. Effect of plant density on grain yield, root-length density and Orobanche crenata infestation in two faba bean genotypes. Weed Research (Oxford) 37: 39-49. (Breeding line 402/29/84 proved highly resistant due to a range of host characters.)

Marko, M.D. and F.R. Stermitz. 1997. Transfer of alkaloids from Delphinium to Castilleja via root parasitism. Norditerpenoid alkaloid analysis by electrospray mass spectrometry. Biochemical Systematics and Ecology 25: 279-285. (The major alkaloids were all transfered from D. occidentale to C. sulphurea.)

Mathiasen, R.L., J.R. Allison and B.W. Geils. 1998. Western dwarf mistletoe parasitising Colorado blue spruce and

Norway spruce in California. Plant Disease 82: 351. (New record for Arceuthobium campylopodium on Picea pungens and second record on P. abies.)

Matthies, D. 1997. Parasite-host interaction in Castilleja and Orthocarpus. Canadian Journal of Botany 75: 1252-1260. (C. integra, C. miniata, C. chromosa (perennials) and O. purpurascens (annual) all facultative but attachment to hosts increased weight by X3-X41. Medicago sativa better host than Lolium perenne. Response of host, in terms damage and root:shoot ratio depended on host/parasite combination.)

Mayer, A.M. and N. Bar Nun. 1997. Germination of Orobanche seeds: some aspects of metabolism during preconditioning. In: R.H. Ellis, M. Black, A.J. Murdoch and H.D. Hong (eds) Basic and Applied Aspects of Seed Biology. Proc., Fifth International Workshop on Seeds, Reading, 1995. Kluwer, Dordrecht. pp. 633-639.

Mayer, M.J., J. Steel, D.V. Child, J.A. Hargreaves and J.A. Bailey. 1997. Early stages of infection of maize (Zea mays) and Pennisetum setosum roots by the parasitic plant Striga hermonthica. European Journal of Plant Pathology 103: 815-827. (In maize, some thickening of endodermal cell walls in response to infection but penetration unhindered. In the resistant species P. setosum endodermal cell walls naturally much thicker, further thickened in response to infection, and rarely penetrated.)

Mbwaga, A.M. 1996. Status of Striga species in Tanzania: occurrence, distribution, and on-farm control packages. In: K. Leuschner and C.S. Manthe (eds) Drought-tolerant Crops for Southern Africa. Proceedings of the SADC/ICRISAT regional sorghum and pearl millet workshop, Gaborone, 1994, pp. 195-200. (In-row mixed cropping with spreading cowpea suppressed Striga and increased cereal yield. 2,4-D twice at 2 kg/ha also effective. Sorghum vars Serena, SAR-29 and Weijita show resistance to S. asiatica and S. forbesii: Serena also least affected by S. hermonthica.)

Mishra, J.S., V.P. Singh and V.M. Bhan. 1996. Response of lentil to date of sowing and weed control in Jabalpur, India. Lens Newsletter 23: 18-23. (Delayed sowing increased incidence of Cuscuta sp.(unspecified) on lentil.)

Monteiro, W.R., M. de M. Castro and M. Venturelli. 1996. Anatomical and histochemical aspects of the primary haustorium of Struthanthus vulgaris Mart. (Loranthaceae). Revista Brasiliera de Botanica 19(1): 25-34.

Muleba, N., J.T. Ouedraogo and J.B. Tignegre. 1997. Cowpea yield losses attributed to Striga infestations. Journal of Agricultural Science 129: 43-48. (Studies in Burkina Faso suggest at least 30% yield loss in susceptible cowpea varieties.)

Mumera, L.M. and F.E. Below. 1996. Genotypic variation in resistance to Striga parasitism of maize. Maydica 41: 255-262. (Suggesting a strong host-plant ear sink to be an important component of resistance.)

Murasheva, V.N. 1996. (Influence of Fusarium oxysporum var. orthoceras (Appel et Wr.) Bilai toxic properties on its vitality in soil and pathogenicity.) (in Russian) Mikalogiya i Fitopatalogiya 29: 53-58. (Three strains of F. oxysporum shown to persist in soil and infect crop species - hence not suitable for use against Orobanche spp.)

Musselman, L.J. 1996. Parasitic weeds in the southern United States. In: Invasion of the South: the Ecological Impact and Control of Exotic Weeds in the Southeastern United States. Symposium, Knoxville, 1996. Castanea 61(3): 271-292.

Nandula, V.K. and C.L. Foy. 1997. Absorption, translocation and fate of 14C-glyphosate in broomrape-infected common vetch (Vicia sativa). Proceedings Southern Weed Science Society 50: 156-157.

Nefkens, G.H.L., J.W.J.F. Thuring, M.F.M. Beenakkers and B. Zwanenburg. 1997. Synthesis of a phthalloylglycine derived strigol analogue and its germination stimulatory activity towards seeds of the parasitic weeds Striga hermonthica and Orobanche crenata. Journal of Agricultural and Food Chemistry 45: 2273-2277. (Describing the synthesis and activity of strigol analogue Nijmegen 1 in racemic and optically active forms.)

Norton, D.A. and M.A. Carpenter. 1998. Mistletoes as parasites: host specificity and speciation. Trends in Ecology & Evolution 13: 101-105. (Discusses evolutionary biology of mistletoes in relation to that of animal parasites.)

Norton, D.A. and N. Reid. 1997. Lessons in ecosystem management from management of threatened and pest loranthaceous mistletoes in New Zealand and Australia. Conservation Biology 11: 759-769.

Olivier, A., J.C. Glaszmann, C. Lanaud and G.D. Leroux. 1998 Population structure, genetic diversity and host specificity of the parasitic weed Striga hermonthica (Scrophulariaceae) in Sahel. Plant Systematics and Evolution 209: 33-45. (Comparison of 14 populations of S. hermonthica from a number of hosts in West Africa, by gel electrophoresis, showed little genetic divergence between populations.)

Omunyin, M.E. and M.N. Wabule. 1996. Occurrence of African mistletoe Erianthemum ulugurense on Toona ciliata and other trees in Kenya. Plant Disease 80: 823. (E. ulugurense observed to cause branch die-back on at least 9 tree species.)

Onder, F., Y. Karsavuran and S. Tezcan. 1995. (Some investigations on heteropteran fauna as potential biocontrol agents for weeds in Turkey.) (in Turkish) Bitki Koruma Bülteni 33(1/2) 15-22. (Listing some insects with potential for biocontrol of parasitic plants.)

Onu, I., P.S. Chindo, A.A. Adeoti and L.J. Bamaiyi. 1996. Preliminary report on the insect pests of Striga species in the Northern Guinea and Sudan Savanna of Nigeria. Journal of Sustainable Agriculture 8(1): 73-78. (Alcidoides marramus, Junonia orythia, Helicoverpa armigera and Smicronyx identified as having most potential as biocontrol agents.)

Oswald, A., G. Abayo, J.K. Ransom, J. Kroschel and J. Sauerborn. 1997. Catch-cropping with Sudan grass - an option for Striga control in subsistence agriculture. The 1997 Brighton Crop Protection Conference - Weeds: 227-232. (Intercropping maize with Sorghum sudanense for 30-50 days reduced maize yields and increased the numbers of S. hermonthica infesting the maize.)

Pageau, K., P. Simier, P. Robins and A. Fer. 1997. Determination of reduced carbon origin in hemiparasitis higher plant (Striga hermonthica (Del.) Benth. by isotopic ratios mass spectrometry (IRMS). Comptes Rendues, 3ème Colloque G¾ n¾ rale de Physiologie V¾ g¾ tale, Toulouse, 1997: 281-282.

Paran, I., D. Gidoni and R. Jacobsohn. 1997. Variation between and within broomrape (Orobanche) species revealed by RAPD markers. Heredity 78(1): 68-74. Taxa studied were O. aegyptiaca, O. mutelii, O. cernua, O. cumana and O. crenata.)

Paré, J., B. Dembélé, A. Ouédraogo, A. Raynal-Roques, C. Tuquet and G. Sallé. 1997. Dynamics of flowering and embryology of Striga hermonthica (Del.) Benth. (Scrophulariaceae): implications for chemical control. International Journal of Pest Management 43: 285-290. (Flowering lasts 21-25 days: hypophysis initiation occurs 7-10 days after flower opening: 2,4-D 120-360 g/ha applied 2-3 times from start of flowering suppresses seed development.)

Pazy, B. and U. Plitmann. 1996. Asynapsis in Cistanche tubulosa (Orobanchaceae). Plant Systematics and Evolution 201: 271-273.

Pérez-Amador, M.C., R. Bernal, D. Amor-Prats and L. Arreola. 1996. Seasonal influence on the biosynthesis of ergoline alkaloids in the genus Cuscuta (Convolvulaceae). Phyton (Buenos Aires) 59: 51-54.

Portnoy, V.H., N. Katzir and D.M. Joel. 1997. Species identification of soil-borne Orobanche seeds by DNA fingerprinting. Pesticide Biochemistry and Physiology 58: 49-54. (Describing a technique by which 4 Orobanche species can be identified from single seeds, alive or dead - amazing!)

Portnoy, V.H., N. Katzir and D.M. Joel. 1998. Use of sequence characterized amplified DNA regions (SCAR) for species identification of soil-borne Orobanche seeds in agricultural fields. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, p. 158. (A brief description of the above.)

Prati, D., D. Matthies and B. Schmid. 1997. Reciprocal parasitization in Rhinanthus serotinus: a model system of physiological integratiuon in clonal plants. Oikos 78: 221-229.

Pujadas-Salvá, A. and Lora-González. 1996. (The genus Orobanche (Orobanchaceae) in the province of Almeria, SE of Spain.) (in Spanish) Acta Botanica Malacitana No 21: 199-220. (A botanical survey recording 16 Orobanche spp. including two new for the province, O. schultzii and O. foetida ssp. broteri.)

Pujadas, A. and P. Thalouarn. 1998. Orobanche cernua Loefl. and O. cumana Wallr. In the Iberian peninsula. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, pp. 159-160. (Describing O. cumana from sunflower, and O. cernua from wild hosts in Compositae, Artemisia spp. and Launaea lanifera (but no Solanaceae), and characters for separating them.)

Pundir, Y.P.S. 1996. Observations on dwarf mistletoe on Himalayan blue pine in Gangotri forest, Uttar Pradesh state hills. World Weeds 3(1/2):1-6. (Infection of Pinus wallichii by Arceuthobium minutissimum averaged 17%).

Pusztai, A., G. Grant, E. Gelensc¾ r, S.W.B. Pfò ller, R. Eifler and S. Bardosz. 1998. Effects of an orally administered mistletoe (type-2 RIP) lectin on growth, body composition, small intestinal structure, and insulin levels in young rats. Journal of Nutritional Biochemistry 9: 31-36.

Rankhelawan, E. and N. Baksh. 1996. Birdvine (Phthirusa adunca) control studies in citrus with urea sprays. Tropical Fruits Newsletter 18: 4-6. (P. adunca selectively controlled for at least 100 days by 20% urea solution applied by mistblower.)

Reiss, G. 1995. Striga gesnerioides parasite on cowpea: mechanisms of infection and resistance. PhD Thesis, IACR/LARS, University of Bristol. 199 pp + refs.

Reiss, G.C. and J.A. Bailey. 1998. Striga gesnerioides parasitising cowpea: development of infection structures and mechanism of penetration. Annals of Botany 81: 431-440. (Penetration appears to involve some softening of the

middle lamella between host cells.)

Ribéreau-Gayon, G., S. Dumont, C. Muller, M.L.Jung, P. Poindron and R. Anton. 1996. Mistletoe lectins I, II and III induce the production of cytokines by cultured human monocytes. Cancer Letters 109: 33-38. (Lectins from Viscum album.)

Robert, S., P. Simier and A. Fer. 1997. Mannitol production: a specific metabolism in Orobanche ramosa, Striga hermonthica and numerous other root-parasitic weeds.). Comptes Rendues, 3ème Colloque G¾ n¾ rale de Physiologie V¾ g¾ tale, Toulouse, 1997, 308-309.

Robinson, R.A. 1997. Host resistance to crop parasities. Integrated Pest Management Reviews 2(3): 103-107. (Review of plant breeding for resistance.)

Rugutt, J.K. and K.J. Rugutt. 1997. Stimulation of Striga hermonthica germination by 11ß, 13-dihydroparthenolide. Journal of Agricultural and Food Chemistry 45: 4845-4849. (A sesquiterpene lactone extracted from Ambrosia artemisifolia apparently as active as strigol.)

Rugkhla, A. and M.G.K. Jones. 1998. Somatic embryogenesis and plantlet formation in Santalum album and S. spicatum. Journal of Experimental Botany 49: 563-571.

Salimi, H. 1998. Possibility of dodder control (Cuscuta planiflora) on alfalfa with glyphosate in Iran. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, p. 161. (Glyphosate 150g/ha twice at 1 week interval gave over 90% control and increased lucerne yield.)

Sandler, H.A., M.J. Else and M. Sutherland. 1997. Application of sand for inhibition of swamp dodder (Cuscuta gronovii) seedling emergence and survival on cranberry (Vaccinium macrocarpon) bogs. Weed Technology 11: 318-323. (At least 2.5 cm of sand needed to reduce infestation.)

Savard, M.E., J.D. Miller, M. Ciotola and A.K. Watson. 1997. Secondary metabolites produced by a strain of Fusarium oxysporum used for Striga control in West Africa. Biocontrol Science and Technology 7: 61-64. (Cultures of F. oxysporum produced only fusaric acid and dehydrofusaric acid.)

Scharpf, R.F., B. Geils, D. Wiens, C. Parker and W. Forstreuter. 1997. Parasitic plants. In: E.M. Hansen and K.J. Lewis (eds) Compendium of Conifer Diseases. APS Press, pp. 36-40. (Listing the main dwarf and leafy mistletoes, and other parasities affecting coniferous forest species worldwide.)

Schmidt, K. 1997. Conceptual GIS derivation and spatial modelling of abiotic covariates influencing maize-Striga dynamics. European Plant Protection Organisation Bulletin 26: 519-535.

Schneider, M.J., J.C. Green and D. McPeak. 1997. Proceroside, an iridoid glucoside from Pedicularis procera. Phytochemistry 46: 1097-1098. (U.S.A.)

Shan-ting Chiu and Wen-Yuan Kao. 1997. Stable carbon isotope ratio in relation to the functional morphology of mistletoe leaves in Taiwan. (Abstract) American Journal of Botany 84(6): 147.

Sharma, R.S., M.L. Kewat and K.K. Jain. 1995. Identification of problematic weeds in Jabalpur region of Madhya Pradesh. Indian Journal of Weed Science 27(1&2): 19-23. (Striga densiflora and S. 'lutea' recorded in minor millets, also in non-cereal crops, presumably on weeds.)

Simier, P., S. Robert and A. Fer. 1998. Mannitol metabolism in darkness in the leaves of the hemiparasitic angiosperm, Thesium humile. Plant Physiology and Biochemistry (Paris) 36: 237-245. (Exposing T. humile and wheat to prolonged darkness confirmed that the parasite utilises mannitol as a respiratory substrate.

Simier, P., S. Robert, K. Pageau, I. Giradeau-Rassinoux and A. Fer. 1998. Particuliarit¾ s physiologiques et m¾ taboliques des phan¾ rogrames parasities: signification biologique et perspectives d'utilization en matière de lutte chimique. Comptes Rendues du Societ¾ Biologique Francais 192: 75-90.

Singh, A. and M. Singh. 1997. Incompatibility of Cuscuta haustoria with the resistant hosts Ipomoea batatas L. and Lycopersicon esculentum Mill. Journal of Plant Physiology 150: 592-596. (Resistance of sweet potato and tomato is attributed to the presence of inhibitors of cell-wall-degrading enzymes in the host tissue.)

Singh, B.B. and A.M. Emechebe. 1997. Advances in research on cowpea Striga and Alectra. In: Singh, B.B., D.R. Mohan Raj, K.E. Dashiell and L.E.N. Jackai (eds) Advances in Cowpea Research, Proc. 2nd World Cowpea Research Conference, Accra, 1995. pp. 215-224. (A useful history of the progress in developing resistant varieties based on cowpea B.301, up to 1995.)

Spiller, H.A., D.B. Willias, S.E. Gorman and J. Sanftleban. Retrospective study of mistletoe ingestion. Journal of Toxicology, Clinical Toxicology 34: 405-408. (Study of 92 cases of accidental poisoning by Phoradendron flavescens

(=P. serotinum), used in traditional medicine as an abortifacient.)

Steele, R., R.E. Williams, J.C. Weatherby, E.D. Reinhardt, J.T. Hoffman and R.W. Thier. 1996. Stand hazard rating for central Idaho forests. General Technical Report - Intermountain Research Station, USDA Forest Service No. INT-GTR-332: 29 pp. (Arceuthobium one of the 11 factors considered in developing a standard hazard rating.)

Stein, G.M. and P.A. Berg. 1996. Evaluation of the stimulatory activity of a fermented mistletoe lectin-1 free mistletoe extract on T-helper cells and monocytes in healthy individuals in vitro. Arzneimittel Forschung 46: 635-639.

Stewart H.M. and J.M. Canne-Hilliker. 1998. Floral development of Agalinis neoscotia (Scrophulariaceae): implications for taxonomy and mating system. International Journal of Plant Sciences 159: 418-439. (A complex of developmental differences are reported to explain differences between Agilinis spp. in respect to autogamy and out-crossing.)

Strykstra, R.J., R.M. Bekker and G.L. Verweij. 1996. Establishment of Rhinanthus angustifolius in a successional hayfield after seed dispersal by mowing machinery. Acta Botanica Neerlandica 45: 557-562.

Surov, T., D. Aviv, R. Aly, D.M. Joel, T. Goldman-Guez and J. Gressel. 1998. Generation of transgenic asulam-resistant potatoes to facilitate eradication of parasitic broomrapes (Orobanche spp.), with the sul gene as the selectable marker. Theoretical and Applied Genetics 96: 132-137. (Potatoes with target-site herbicide resistance were sprayed with asulam post-emergence to give complete selective control of Orobanche.)

Taylor, A. and W.E. Seel. 1998. Do Striga hermonthica-induced changes in soil matric potential cause the reduction in stomatal conductance and growth of infected maize plants? New Phytologist 138: 67-73. (Results suggest that the symptoms induced by the parasite are not primarily due to soil water deficit.).

Tennakoon, K.U. and J.S. Pate. 1997. Xylem fluxes of fixed N through nodules of the legume Acacia littorea and haustoria of an associated N-dependent root hemiparasite Olax phyllanthi. Journal of Experimental Botany 48: 1061-1069.

Tennakoon, K.U., J.S. Pate and B.A. Fineran. 1997. Growth and partitioning of C and fixed N in the shrub legume Acacia littorea in the presence or absence of the root hemiparasite Olax phyllanthi. Journal of Experimental Botany 48: 1047-1060. (In pot culture, without added N, O. phyllanthi reduced host shoot growth, increased root growth. The host lost half its N to the parasite.)

Tennakoon, K.U., J.S. Pate and D. Arthur. 1997. Ecophysiological aspects of the woody root hemiparasite Santalum acuminatum (R.Br.) A.DC. and its common hosts in south Western Australia. Annals of Botany 80: 245-256. (N-fixing legumes (e.g Acacia rostellifera) and Allocasuarina were principal hosts. Interface with the host xylem was largely parenchymatous tissue.)

Tennakoon, K.U., J.S. Pate and G.R. Stewart. 1997. Haustorium-related uptake and metabolism of host xylem solutes by the root hemiparasitic shrub Santalum acuminatum (R.Br.) A.DC. (Santalaceae). Annals of Botany 80: 257-264. (Estimated that at least 70% of N and one third of C requirements obtained from host xylem. The haustorium apparently important in the conversion of N to proline.)

Teryokhin, E. 1997. Weed broomrapes - systematics, ontogenesis, biology and evolution. Aufstieg-Verlag, Germany. (Review to follow in next issue.)

Thalouarn, P., P. Delevault, N. Lusson, N. Russo-Sorel, C. Theodet and H. Benharrat. 1997. Caract¾ risation du g¾ nome plastidial des phan¾ rogames parasites; int¾ rets biologique, g¾ n¾ tiques, taxonomique et appliqu¾ . Comptes Rendues du Societ¾ Biologique Francais 192: 53-73.

Thuring, J.W.J.F., H.H. Bitter, M.M. de Kok, G.H.L. Nefkens and B. Zwanenburg. 1997. N-phthalloylglycine-derived strigol anaologues. Influence of the D-ring on seed germination activity of the parasitic weeds Striga hermonthica and Orobanche crenata. Journal of Agricultural and Food Chemistry 45: 2284-2290. (Concluding that the correct structure of the D ring is essential for full stimulatory activity.)

Thuring, J.W.J.F., G.H.L. Nefkens and B. Zwanenburg. 1997. Synthesis and biological evaluation of the strigol analogue Carba-GR24. Journal of Agricultural and Food Chemistry 45: 1409-1414. (Replacing the vinyl ether oxygen atom by methylene results in loss of activity in both geometrical isomers.)

Thuring, J.W.J.F., G.H.L. Nefkens and B. Zwanenburg. 1997. Asymmetric synthesis of all stereoisomers of the strigol anaologue GR24. Dependence of absolute configuration on stimulatory activity of Striga hermonthica and Orobanche crenata seed germination. Journal of Agricultural and Food Chemistry 45: 2278-2283. (The 4 possible isomers show significant differences in activity.)

Torres, F. and M. Montilla. 1997. (Implantation of the Loranthaceae hemiparasite Phthirusa pyrifolia (H.B.K.) Eichl. In species of a coffee agroecosystem.) (in Spanish) Plantula 1(3): 213-219. (Observations on haustorial characteristics of P. pyrifolia on Coffea arabica and Inga edulis.)

Touré, M., A. Olivier, B.R. Ntare, J.A. Lane and C.A. St-Pierre. 1997. Inheritance of resistance to Striga gesnerioides biotypes from Mali and Niger in cowpea (Vigna unquiculata (L.) Wallp. Euphytica 94: 273-278. (Resistance of cowpea B301 showed single-gene dominance to both biotypes of S. gesnerioides, Suvita-2 single-gene dominance to the Mali strain only, while IT82D-849 showed dominant resistance to the Mali strain but recessive resistance to that from Niger.)

Traor¾ , D., C. Vincent and R.K. Stewart. 1997. (Possibilities for the manipulation of Smicronyx guineanus Voss and S. umbrinus Hustache (Coleoptera:Curculonidae) for biological control of Striga hermonthica (Del.) Benth. (Scrophulariaceae). Quatrième Conf¾ rence Internationale sur les Ravageurs en Agriculture, Montpellier, 1997, volume 2: 649-656. (Both Smicronyx spp. shown to be univoltine. Emergence of adults best after 30-40 mm rain.)

Traor¾ , D., C. Vincent and R.K. Stewart. 1997. Behaviour of Smicronyx guineanus (Coleoptera: Curculonidae), potential biocontrol agent fo Striga hermonthica (Del.) Benth. (Scrophulariaceae). Quatrième Conf¾ rence Internationale sur les Ravageurs en Agriculture, Montpellier, 1997, volume 2: 657-664. (Observations in Burkina Faso on behaviour of adult S. guineanus on Striga plants.)

Uhlich, H., J. Pusch, J, K-J. Barthel. 1995. Die Sommerwurzarten Europas. Gattung Orobanche. Westart Wissenschaften, Magdeberg, Germany. (Review to follow in next issue.)

Urech, K. 1997. Accumulation of arginine in Viscum album L.: seasonal variation and host dependency. Journal of Plant Physiology 151: 1-5. (Concludes that V. album accumulates arginine temporarily when nitrogen is available in host xylem sap.)

Vaknin, Y., Y.Y. Tov and D. Eisikowitch. 1996. Flowering seasonality and flower characteristics of Loranthus acaciae Zucc. (Loranthaceae): implications for advertisement and bird-pollination. Sexual Plant Reproduction 9: 279-285. (Studies conducted in Israel.)

Villiers, E.A. de. 1997. Remove mistletoe from trees. Inligtingsbulletin - Institut vir Tropiese en Subtropise Gewasse No 295: 6-7. (Erianthemum dregei (=Loranthus dregei) increasing on pecan and citrus in South Africa.)

V'lchev, N., D. Bakhariev and S. Masheva. 1995. (Possibilities for the use of chemicals in the control of Orobanchaceae (Orobanche ramosa) in tomato stand.) (in Bulgarian.) Rasteniev'dni Nauki 32(7-8): 62-64. (Glyphosate 150 g/ha controlled O. ramosa and increased yield in spite of phytotoxicity.)

Vouzounis, N.A. 1997. Review for 1996. Agricultural Research Institute, Nicosia, Cyprus. pp. 40-41. (Orobanche well controlled by polyethylene sheeting put down at time of sowing tomato and eggplant. Rimsulfuron showed selectivity in tomato only: imazaquin in both crops.)

Vouzounis, N.A. and P.G. Americanos. 1997. Control of the parasitic weed Cuscuta monogyna in grapevines. Agricultural Research Institute, Nicosia Cyprus, Technical Bulletin 182: 5 pp. (C. monogyna damaging to grapevines and not controlled by direct application of glyphosate or imazaquin; but successfully controlled indirectly by destruction of weed growth with residual herbicides plus glyphosate or paraquat+diquat.)

Wang YouKui, Li XiaoMing, Bai ZhiQiang, Liu XingMing and Lin Hai. 1996) (A preliminary study on forest disease organisms in the Natural Reserve of the Qilan Mountains.) (in Chinese) Journal of Northwest Forestry College 11(1): 40-46. (Some mistletoes mentioned.)

Watling, J.R. and M.C. Press. 1997. How is the relationship between the C4 cereal Sorghum bicolor and the C3 root hemiparasites Striga hermonthica and Striga asiatica affected by elevated CO2? Plant, Cell and Environment 29: 1292-1300. (Double the normal carbon dioxide concentration resulted in lower Striga biomass but little or no impact on the damaging effect on the host.)

Weldeghiorghis, E.K. and A.J. Murdoch. 1997. Towards prediction of the effect of wet dormancy on Orobanche infestation. The 1997 Brighton Crop Protection Conference - Weeds: 677-678. (4-9 days at 20oC were optimal for conditioning seeds of O. aegyptiaca, O. cernua and O. crenata: longer periods at 10-25oC led to secondary dormancy and, at 30oC, to loss of viability.)

Weston L.A., C.I. Nimbal and M.A. Czarnota. 1997. Activity and persistence of sorgoleone, a long-chain hydroquinone produced by Sorghum bicolor. The 1997 Brighton Crop Protection Conference - Weeds: 509-516. (No reference to Striga, but exploring the allelopathic potential of sorgoleone and the similarity of its action to that of some photosynthesis-inhibiting herbicides.)

Westwood, J.H. and C.L. Foy. 1997. Ammonium inhibits parasitism of carrot by Egyptian broomrape (Orobanche aegyptiaca). Proceedings Southern Weed Science Society 50: 146-147. (Ammonium sulphate only selective at 25 mM applied 4-5 weeks after carrot planting.)

de Wit, J.G.M. 1997. Pathogen avirulence and plant resistance: a key role for recognition. Trends in Plant Science 2: 452-458. (No reference to higher plant parasites but useful discussion of the mechanism of the hypersensitive

response.)

Woldewahid, Gebremedhin, Beyenesh Zemichael and Ibrahim Fitiwy. 1998. The status of the Striga problem in Tigray. Arem 4: 28-36. (S. hermonthica apparently expanding its host range in Tigray, Ethiopia, to attack tef, barley and wheat.)

Woldewahid, Gebremedhin, Fasil Reda and Beyenesh Zemichael. Indigenous Striga management systems of farmers in Tigray: an overview. Arem 4: 37-45. (Local methods of rotation, tillage, planting, fertilization etc are partially successful in containing the S. hermonthica problem, but limited by farmers' lack of understanding of Striga biology.)

Yang-Chang Wu, Ya-Chiek Chao, Fang-Rong Chang and Yuan-Yng Chen. 1997. Alkaloids from Cassytha filiformis. Phytochemistry 46: 181-184. (Describing 2 new and 6 already known alkaloids.)

Yeshanew Ashagrie, Alemayehu, P. Ramanagowda and Minale Liben. 1996. Distribution and importance of Cuscuta campestris on noug (Guizotia abyssinica Cass.) in northwestern Ethiopia. In: Rezene Fessehaie (Ed.) Proceedings 1st Annual Conference of the Ethiiopian Weed Science Society Conference, 1993, Addis Abeba. Arem 1: 27-30. (26-90% of fields infested in the Bahir Dar and neighbouring locations sampled.)

Yoneyama, K., Y. Takeuchi, M. Ogasawara, M. Konnai, Y. Sugimoto and T. Sasso. 1998. Cytolenins and fisicoccins stimulate seed germination of Striga hermonthica (Del.) Benth. and Orobanche minor Smith. Journal of Agricultural and Food Chemistry 46: 1583-1586. (Fungal metabolites cytolenin, from Cladosporium sp., and fusicoccin, from Fusicoccum amygdala, stimulate germination of both spp. at 10-5M. Ethylene in involved in germination of Striga but not of Orobanche.)

Young, N.D., K.E. Steiner and C.W. Depamphilis. 1997. A revolutionary view of the parasitic Scrophulariaceae/Orobanchaceae. (Abstract) American Journal of Botany 84(6): 247.

Zaki, M.A., H.S. El Metwaly and R.A. Hassan. 1998. Studies on dodder (Cuscuta spp.) control. Sixth EWRS Mediterranean Symposium, Montpellier, 1998, pp. 147-152. (Phaseolus vulgaris beans resistant to Cuscuta (?)planiflora.)

Zhuk, A.V. 1997. (Haustoria morphogenesis and origin in Cuscuta species (Cuscutaceae).) (in Russian) Botanicheskii Zhurnal 82(5): 1-15. (Observations on several Cuscuta spp. on several hosts convince the author that the haustoria have not evolved from roots.)

HAUSTORIUM 33 has been edited by Chris Parker, 5 Royal York Crescent, Bristol BS8 4JZ, UK (Email chrisparker5@compuserve.com) and Lytton J Musselman, Parasitic Plant Laboratory, Department of Biological Sciences, Old Dominion University, Norfolk Virginia 23529-0266, USA (fax 757 683 5283; Email lmusselm@odu.edu). Send material for publication to either author.

Preparation of this issue and development of the new website have been assisted by John Terry, Tropical Weeds Group, Michail Semenov and others at Long Ashton Research Station, Bristol.