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SECOND INTERNATIONAL SYMPOSIUM ON PARASITIC WEEDS

This second international symposium on parasitic weeds was held from 16-19 July at North Carolina State University and sponsored by Old Dominion University, Norfolk, Virginia, N.C. State University, and the USDA Animal and Plant Health Inspection Service. There were three full days of sessions and a one-day (very wet) field trip. Unlike the first symposium in Malta in 1973, it was not held under the auspices of the European Weed Research Society, but many of the same workers were involved and about 85 participants from over 20 different countries enjoyed a very fruitful meeting in a similarly informal atmosphere.

Forest parasites were the topic of several papers and there were good descriptions by F. G. Hawksworth of the problem of dwarf mistletoes (Arceuthobium spp) in North America and by L. J. Musselman of a range of root parasites in Southern U.S.A., particularly Seymeria cassioides (J. F. Gmelin) Blake a member of the Scrophulariaceae causing significant problems in young pine plantings. From Australia, D. M. Calder described a number of bird-pollinated Amyema species (Loranthaceae). P. R. Atsatt discussed the various theories which attempt to explain the apparent mimicry of host foliage shapes by mistletoes and made a convincing case for selection through the feeding habits of birds. A short paper was also presented by Mrs. E. Wilkinson on the only known parasitie gymnosperm, Parasitaxis ustus (Viell.) de Laubenfels of family Podocarpaceae, which is only known from New Caledonia and whose parasitic nature (on other trees of the same family) was only discovered in recent years.

G. C. Salle described detailed anatomical studies which help to show exactly how the endophytic system in Viscum album L. achieves direct contact with host xylem tissues. Comparable studies with Cuscuta campestris Yuncker, by Y. Tsivion revealed a recognition phenomenon which causes differentiation of elongated "hyphal" cells into vascular elements on contact with host xylem. Mary Schlater described the anatomy of Epifagus virginiana (L.) Bart, a North American endemic of the Orobanchaceae, and its specialized "splash cup" for seed dispersal.

Other papers on Cuscuta included one by P. Wolswinkel giving his latest interpretation of the remarkable physiological sink effect created by the haustorium of Cuscuta on its hosts. He has now been able to demonstrate pronounced enhancement of phloem unloading of potassium ions and of sugars at the point of attachment. J. H. Dawson discussed control of Cuscuta by chlorpropham, while A. Gimesi described control by diquat, chlorthal-dimethyl and a new proprietary mixture containing pendimethalin, linuron and diuron.

The very Cuscuta-like Cassytha filiformis L. was described by C. R. Werth. This parasite of tropical coastal areas belongs to the Lauraceae but is similar to Cuscuta in its

morphology and biology occasionally causing economic damage to trees and shrubs in the [redacted]ibbean and elsewhere.

Striga received more attention than other parasitic groups, there being several papers dealing particularly with its complex germination requirements. D. C. Reid and C. Parker showed that S. hermonthica (Del.) Benth. requires a lower pre-conditioning temperature than S. asiatica. A. I. Hsaio discussed the importance of different degrees of wetness during pre-conditioning and A. D. Pavlista showed how fungal contamination could seriously interfere. Perhaps the most interesting and unexpected results, reported by both Hsaio and Pavlista, were those showing that exposure of Striga seeds to the natural stimulant strigol or the synthetic analogue **GR7** during the preconditioning period tended to reduce rather than increase eventual germination.

The damaging effect of S. hermonthica on sorghum was shown by D. S. H. Drennan and S. O. El Hiweris to be associated with dramatic changes in the balance of growth regulators in xylem sap. Gibberellins and cytokinins were both reduced drastically, while inhibitors such as ABA and farnesol were somewhat increased. Comparable changes could also be induced by drought stress but it is not clear how Striga attack brings about these changes.

The specificity of different strains of S. asiatica (L.) Kuntze and S. hermonthica for particular host species was described by C. Parker and by B. Lakshmi and Jayachandra. This specificity is based, in at least some cases, on germination response to different stimulant substances, but in S. gesnerioides (Willd.) Vatke there appears to be some other mechanism involved in the pronounced specificity of different strains for cowpea [Vigna unguiculata (L.)] Walp. aggreg, tobacco (Nicotiana tabacum L.) and certain wild legumes. The new occurrence of S. gesnerioides in Florida, U.S.A. was described by L. Herbaugh. The main [redacted]t there is hairy indigo (Indigofera hirsuta (L.). It has not so far been found to attack more important crops but testing is still in progress.

Control of Striga with the help of germination stimulants was the subject of two papers by J. E. A. Ogborn and R. A. Mansfield. They have demonstrated the effectiveness in the field of ethephon and two strigol analogs **GR7** and **GR45** and suggest ways in which their use might be integrated into a Striga control program. R. E. Eplee in describing the Striga eradication campaign in North and South Carolina laid emphasis on the useful contribution of ethylene in reducing Striga seed in the soil, while M. A. Langston described the way in which herbicides contribute to long-term control by preventing growth of alternate host grasses, especially Digitaria sanguinalis (L.) Scop. in rotational broad-leaved crops. The value of nitrogen in reducing Striga infestation was emphasized in a paper by N. T. Yaduraju and M. M. Hosmani.

An interesting new field is the exploration of the "haustorial factor" which is apparently responsible for initiation of the haustorium after contact between parasite and host root. J. L. Riopel described studies in which seedlings of Agalinis purpurea (L.) Raf. developed haustoria when exposed to root exudates of Lespedeza sericea (Thunb.) Miq. or to a gum tragacanth preparation. A great many compounds have been eliminated as possible active substances and while there is some evidence for phenolic substances being involved the precise structure has yet to be identified.

Other papers relating to Striga or other Scrophulariaceae included a biochemical study of the haustorim of S. hermonthica by A. T. Ba and a study of floral variation and pollination mechanisms in Rhinanthus species by M. M. Kwak.

Thesium humile Vahl. (Santalaceae) was the subject of two papers by M. A. Abou-Raya who described the germination requirements of the unusual mucilaginous seeds.

The remaining papers dealt with Orobanche species. The distribution and importance or Orobanche species in Jordan was described by B. E. Abu-Irmaileh and the history of sporadic occurrence of O. minor Sm. in U.S.A. was summarized by C. C. Frost.

P. J. Whitney discussed some aspects of germination behavior in O. crcnata Forsk. especially the tendency to higher germination with more dilute root exudates. He presented evidence to show that this was attributable to separate inhibitory substances rather than supra-optimal levels of stimulant. A short paper by L. D. Chun and others suggested for the first time that Orobanche (in this case O. ramosa L.) may after all respond to ethylene. A paper by M. T. Moreno and others presented by J. I. Cubero emphasized the high levels of meiotic abnormalities in O. crenata which would be expected to result in great variability and hance perhaps ability to overcome host-plant resistance mechanisms. Some variations in distribution and virulence of O. ramosa in California were shown by A. H. Gold to be due to fungal attack but it seemed unlikely that the Rhizoctonia sp. concerned would be sufficiently selective for use for biological control. A similar conclusion was reached by Y. B. Palled and M. M. Hosmani in relation to several insects attacking O. cernua Loefl. in India.

Miss U. Schmitt described a survey which revealed the great importance of O. crenata in Morocco, where broad beans are seriously affected and the crop can no longer be grown in some areas. K. Schlüter, however, reported very promising results from extensive trials with glyphosate for selective control of this problem in Morocco. Even severe infestations were completely controlled by two applications of 60 g.a.i./ha in the early stages of parasite development. K. Petzoldt, having found a correlation of O. crenata attachment with rhizobial nodules suggested a fungicidal seed-dressing and nitrogen fertilizer (calcium namide) as further components of an integrated control approach. B. E. Abu-Irmaileh was also able to show a reduction of O. ramosa on tomato with high levels of nitrogen fertilizer.

Other promising approaches to control of Orobanche to be reported were the use of synthetic strigol analogues (including GR7) for artificial germination by A. R. Saghir and the selection of resistant broad bean and lentil varieties, by F. Basler.

The symposium ended with a field trip to visit two centers of Striga research, the USDA Witchweed Test Farm at Dillon, S. Carolina, and the Witchweed Methods Development Center at Whiteville, N. Carolina. Participants were able to see the very comprehensive work at Dillon with herbicides, ethylene and maize varieties, while at Whiteville they were shown work confirming that S. asiatica also requires a "haustorial factor" in the same way as Agalinis species. This report will also appear in PANS.

Proceedings of the Symposium (296 pages + 53 pp. supplement) are available at U.S. $5.00 + $1.00 postage each from Prof. A. D. Worsham, Crop Science Department, Box 5155, North Carolina State University, Raleigh, North Carolina 27607 U.S.A. Make checks payable, in U.S. dollars, to North Carolina State University.

C. Parker

International Parasitic Seed Plant Research Group (IPSPRG).

A special session was held at the symposium (see above) to consider formation of a . earch group composed of anyone with an interest in parasitic seed plants. There was unanimous consent that such a group would serve a useful purpose for the exchange of i· rmation, vehicle of communication to government and other agencies, and planning of

future meetings. The exact structure and functions of the group are not yet fully defined. bership consists of those receiving HAUSTORIUM. In a way it is a successor to the European Weed Research Council Research Group on Parasitic Weeds that flourished in the early '70s but went dormant some years ago. It had served a useful purpose but could not legitimately concern itself with the most important parasitic genus of all: Striga.

The IPSPRG will have an advisory committee composed of about ten individuals representing a broad scope of organisms, approaches, and geographical distribution. Mr. Chris Parker was elected chairman of the group and Lytton Musselman secretary. Replies from all those asked to serve on the committee have not been received but should be in time for inclusion in the December issue of HAUSTORIUM. This newsletter will serve as the official organ of the IPSPRG.

L. Musselman
C. Parker

IPSPRG Members Invited to Participate in the 13th International Botanical Congress

At the recent symposium in North Carolina I raised the matter of the 13th International Botanical Congress which will be held in Sydney, Australia from 21–28 August, 1981. Several colleagues at the Raleigh meeting indicated interest in a Congress Symposium on parasitic flowering plants, and I have discussed this possibility with the organizers, who would be happy to have'such a topic included in one of the sections, possibly Developmental Botany. I have given some thought to a suitable theme, and several possibilities seem worthy of further consideration. For the three I have suggested I have provided a title and a brief explanation of content, and I would be very interested to have your comments and any alternative suggestions you may wish to make.

Topic 1: Parasitic Seed Plants--the Haustorium
To include a general paper on the structure and function of the haustorium, followed by specific papers (invited or contributed).

Topic 2: Parasitic Seed Plants--Floral Biology and Reproduction
To include a general paper on the reproductive strategies of parasitic plants, followed by specific papers covering research into the floral biology and seed production of the various families which have been investigated.

Topic 3: Parasitic Seed Plants--the Life Style
To include a general paper on the nature and evolution of the parasitic way of life in seed plants, followed by specific research papers on assimilate translocation and water relations, including information on fine structure and physiology of the host/parasite interface as well as these aspects of the parasite alone.

No doubt there are other themes which could be suggested, but the foregoing are sufficient to give some idea of what might be done. I should very much welcome suggestions on these ideas or any other comments you would care to make. I am particularly anxious to hear from colleagues who may wish to provide a contributed paper. If you are interested please contact me at: School of Botany, University of Melbourne, Parkville, Victoria 3052, Australia.

Malcolm Calder

Samaru Striga Research

The Institute for Agricultural Research at Samaru in Northern Nigeria has a comprehensive integrated program of research on Striga hermonthica, S. gesneroides and a few other related root parasites.

The world collection of maize and sorghum cultivars which are stored at the station have been screened for field resistance by the Plant Pathology and Plant Breeding departments while the screening of cowpeas is still in progress. Useful genetic resistance has been identified in a range of sorghum and cowpea varieties which are already agronomically adapted for immediate use in the savanna environment.

Agronomic studies by the Weed Science Section have developed herbicidal and cultural control techniques which can be used by African subsistance farmers. From 1977-9 the section has been field testing the "strigol analogs" synthesized by Sussex University.

The conclusive results of these studies (breeding for resistance and cultural control) now make it possible to produce simple "integrated control" packages combining resistant or tolerant cultivars with the appropriate agronomic measures. The very exciting levels of activity and persistence discovered in the strigol analogs against S. hermonthica promise a substantial reduction in the economic damage caused by this species in cereal crops in the near future.

J. E. A. Ogborn

Index of Parasitic Seed Plant Research

One of the topics mentioned at the **IPSPRG** organizational meeting in Raleigh was the production of an index of workers and their research specialties. The green form attached to this issue is for that purpose. Please fill it out completely and return to the address on the form as soon as possible. From this a computerized file will be prepared for distribution to all who request it. This file will also allow for the search of specific topics, e.g., species of parasites, host plants, control, etc., that can be easily retrieved upon request.

L. Musselman

Alectra: A Pest in Botswana

Our work here involves testing animal drawn tillage systems under subsistance farming conditions aiming to increase crop production over that achieved by traditional methods of broadcasting and ploughing under crop seed mixtures. Farmers participating in the project grow sorghum, maize, sunflower and cowpeas. While patches of Striga asiatica are found in many sorghum crops, it is Alectra vogelii, called here cowpea witchweed, which is proving to be a major problem. Total crop failure caused by this parasite has occurred in a number of cowpea fields where a good plant stand had been established.

C. R. Riches

A New Striaa Problem in Ethiopia

Striga latericea Vatke has recently been implicated as a serious pest in some ·ar cane plantings near Addis Ababa. It is a robust striga and has pinkish-orange ..rollas. This is apparently the first time it has been reported to damage a crop.

T. Feredegn

Literature

Russell, G. E. Plant breeding for pest and disease resistance. Buttersworth, London. 495pp. This volume contains a separate chapter (Chapter 12) on parasitic weeds dealing largely with Cuscuta, Orobanche, and Striga. The author presents a succinct review of the literature and points to the need of understanding genetic variation in parasitic weeds.

L. Musselman

Requests for Previous Issues

Sorry, our supply of both prior issues is exhausted!

Material for HAUSTORIUM is to be sent to either of the editors. Readers are urged to submit any items that may be of interest.

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