

# HAUSTORIUM

## PARASITIC PLANTS

### NEWSLETTER

OLD DOMINION UNIVERSITY

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Plant Research Group. June 1981.

#### Cuscuta compacta on Blueberries in North Carolina

Over the past ~~several~~ years blueberry growers in southeastern North Carolina have reported an increased incidence of dodder (Cuscuta compacta) in their plantings. This is a native species which parasitizes **woody** or semi-woody plants. Extreme cases have resulted in **loss** of bushes in established plantings. The rabbiteye blueberry (Vaccinium ashei) produces basal shoots rather **prolifically** and **is, therefore,** more vulnerable to parasitism by the dodder **as** it offers greater probability of host attachments. Highbush blueberry (V. corymbosum) is **also** attacked.

The mechanism of **invasion** and spread of the dodder in blueberry plantings is unknown. Dodder is observed on adjacent ditchbanks and woodland but its distribution **is** typically scattered throughout blueberry fields and not localized in **areas** adjacent to ditchbanks or woodland. This suggests dissemination by birds or other wildlife.

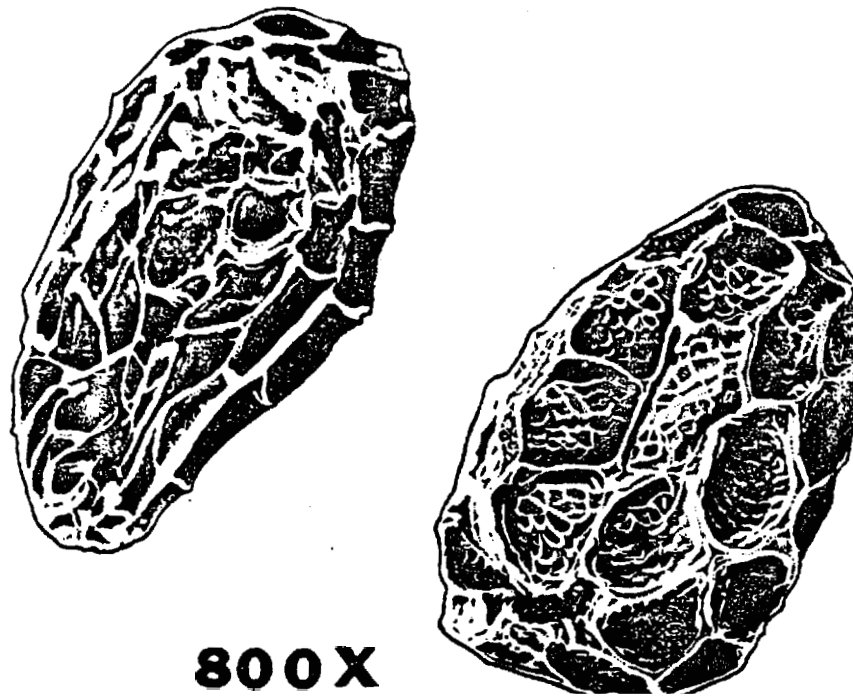
Dodder seed has been observed to germinate throughout the growing season; however, little germination was observed in 1980 at **several** sites infested in 1979. **This** was attributed to the extremely dry conditions which prevailed during the 1980 growing season.

T. J. Monaco and C. M. Mainland, North Carolina State University.

#### Orobanche cumana in China

This broomrape, sometimes known as O. cernua is a parasite of **sunflower** and **other** crops and **is** a serious pest in several areas of China. It reduces **sunflower** yields in direct proportion to the number of parasites attached to a **sunflower** plant as well as to the earliness of the attack. The minute seeds are produced in capsules which split

open when mature and may yield 1200 to 1500 seeds per capsule. A single plant may produce as many as 50000 or more seeds. Young seeds are yellow and become dark brown when ripe. They are irregular in shape but have very distinct reticulations (see drawing based on SEM photos).



Broomrape seeds may be spread long distances by surface water as the rough surface of the seed traps air and causes the seeds to float. Most of the seeds are buried in soil five to 10 cm. They may be dormant for five to 12 years while the land is planted in non-host crops and then germinate only in the close presence of a suitable host root.

Li Yang-han, Nanjing Agricultural College, Nanjing, China.

#### Studies on *Pyralaria* (Santalaceae).

The genus *Pyralaria* consists of two species, *P. edulis*, a small tree of the Himalayas, and *P. pubera*, the well known buffalo nut of the southern Appalachian Mts. A study on the natural history and ecological relations of *P. pubera* was conducted in eastern Kentucky and supplemented by studies in a controlled environment. *Pyralaria pubera* parasitized over sixty woody and herbaceous species including 28 families and 52 genera. Haustoria were less common on hosts grown in the controlled environment. Larger numbers of haustoria were evident in the forest depending on the host and the site. *Pyralaria pubera* is particularly prevalent on sites that have undergone perturbation in the form of logging, fire, windthrow and roadcuts.  
D. J. Leopold, Purdue University.

rch OR Viscum album at the Laboratorium Hiscia, Switzerland

Mistletoes are not only interesting for the botanist and the pathologist, they also represent an important material for the pharmacologist. For the first time in 1920 R. Steiner suggested the use of V. album in cancer treatment. Today remedies extracted from this plant are on the market in Europe and many physicians use them treating their cancer patients.

The oldest and most studied mistletoe remedy is registered under the trade name Iscador and is offered according to the host tree: apple, oak, elm, fir or pine. Apple, fir, and pine mistletoes are common and abundant in nature while native oaks and elms seldom bear V. album in Europe.

One of the main tasks of our research team is to locate and identify for protection the very rare mistletoe bearing oaks and elms along with a study of the natural condition (birds, climate, resistance) which favor or hinder the development of the mistletoe.

Another project concerns the cultivation of the mistletoe on the resistant host species. First results indicated that resistance is mainly genetically controlled and attempts are now in progress to select the most susceptible clones. This part of our research is done in cooperation with foresters who are, of course, also interested in selecting resistant clones.

The purpose of this work is to allow for chemical analysis of the mistletoe extracts and laboratory tests in order to measure their cytostatic and immunostimulant properties to improve upon non-toxic cancer therapy. The Society for Cancer Research (CH-4144, Arlesheim, Switzerland) publishes an annual report concerning our work as well as a bibliography. This report may be obtained without cost.  
G. Grazi, Laboratorium Hiscia.

### Parasites and epiphytes in Argentina

At the present time in Argentina there are not too many parasitic weeds in our crops, but it can be mentioned that Cuscuta indecora Choisy, C. indecora var. longisepala Yuncker and C. suaveolens Seringe. infest alfalfa (Medicago sativa), and occasionally other species such as privet (Ligustrum spp.) and Ambrosia tenuifolia. Many years ago the hemiparasitic Arjona tuberosa Cav. var. tandilensis (O.K.) Dawson (common names "mata trigo" and "Macachin del trigo") was very noxious in wheat crops but good systems for cleaning the seeds caused elimination of this weed.

Besides Arjona there are other species of the Santalaceae which found in our country-Acanthosyris sp., Jodina sp., etc.

In the Loranthaceae there is Ligaria van Tieg. and Psittacanthus cuneifolius (R. et Pav.) Blume but these are of little importance in agriculture.

Work is now in progress on two species of the genus Tillandsia which live as epiphytes on many trees in the La Plata area. These plants are considered by us as true aerial weeds as they caused defoliation and finally the death of the tree. Preliminary studies suggest that the epiphytes produce an inhibitor that causes defoliation.  
F K Claver, Univ Nacional de la Plata

### Cuscuta in Argentina

In Argentina Cuscuta is widely distributed over almost the entire area where alfalfa is grown for seed, from the Province of Chubut to Salta. It is also found in areas where alfalfa is grown for forage. Infestations are lighter because of the frequent mowing.

In the south of the Pcia de Buenos Aires irrigated by the Colorado River where alfalfa has been grown for over 70 years, Cuscuta is a very serious problem. In fact, alfalfa is no longer grown in some parts of this region due to the parasite.

For these reasons alfalfa has been planted in areas that are relatively free of the pest and infestations are controlled as they appear. If the infestation is not serious, it can be controlled by localized application of paraquat 1-2%.

In the case of heavier infestations, we have obtained interesting results with the preemergence herbicides Chlorpropham (CIPC E 50% and G 20%) at rates of 6 kg a.i./ha and pronamide (=propyzamide) (Kerb W, 50% wp) at rates of 2 kg a.i./ha applied overall and incorporated.

At the same time we are trying to instill in the farmers an awareness of the problem by stressing aspects that reduce the spread of the seed, such as cleanliness of irrigation channels and machinery, animals grazed in infested plots and especially the sanitation of harvesting machinery.

The species involved is principally Cuscuta indecora but we suspect that other species may be involved. Host species include fodder crops such as alfalfa and red clover, vegetables such as potato and tomato.

and some seed species as Russian thistle (Salsola kali), Koch scoparia and Chenopodium spp. We have also observed Cuscuta parasitizing fruit trees in the Vallo Medio de Rio Negro.

Seed cleaning in our area involves a separator with velvet-like rollers and/or magnetic separator (Gompper) to remove the parasite from the alfalfa seed. The roller type gives seed that is 95% clean with a minimum of wastage and a yield of three or four bags (50 ea)/hr. The magnetic separator yields seed 99% clean but with considerable wastage. With two cleanings, it reaches a purity of 100%. This is the type of cleaner most used due to its efficiency and yield (8-10 bags/hr).

E. D. Agostino, Inst. Nac. Tec. Agropecuaria, Argentina  
(Letter translated by M. Turton of WRO).

### Third International Symposium on Parasitic Weeds, March 1983

A third symposium on parasitic seed plants is being organized for 1983 tentatively for the month of March. It will be held somewhere in western Europe or in the Mediterranean region at the request of numerous IPSPRG members. Please send suggestions for any aspect of the meeting to Chris Parker or Lytton Musselman.

### Sixth Symposium on Morphology, Anatomy and Systematics

Special sessions on parasitic angiosperms were held at this symposium 9-13 March at the University of Ulm, Ulm, West Germany. The parasitic sessions were organized by Dr Hans Christian Weber of the University of Ulm. IPSPRG was represented by members from five countries. There were four sessions dealing with parasitic angiosperms that include papers on a wide variety of subjects including morphology, floral biology, physiology and taxonomy of mistletoes as well as root parasites. Papers presented at these sessions are scheduled to appear in the German botanical journal Beiträge zur Biologie der Pflanzen.

### Parasitic Weed Problems

Reports of acute parasitic weed problems continue to be brought to the notice of the ODA Tropical Weeds Group at WRO. In recent months these have included accounts of Orobanche problems in eggplant, tomato and tobacco in the state of Orissa, India (from Dr. G. C. Tosh); of O. aegyptiaca and O. ramosa in N. Iraq (Dr. Shaik Mohiddin); of Cuscuta species in soybean in Northeastern China (Mr Yu, Singapore); in Trifolium species in Uruguay (Mrs Amalia Rios de Formoso); and lucerne (alfalfa) in Argentina (Ing. Eduardo dell Agostino).

Orobanche ramosa in Texas

In February 1981, Mr Kevin Nixon and Prof Marshall Johnston of the University of Texas stopped along a hwy in central Texas for lunch and to their surprise found themselves looking down on the first native introduction of branched broomrape reported in the United States in over 50 years! Later excavation revealed that the parasite was attached to a diversity of hosts from eight different families. The source of the infestation and the host range of this strain remain to be determined.

LITERATURE

- Lynn, D. G., J. C. Steffens, V. S. Kamut, D. W. Graden, J. Shabanowitz, J. L. Riopel. 1981. Isolation and characterization of the first host recognition substance for parasitic angiosperms. *J. Am. Chem. Soc.* 103: 1868-70. This is perhaps one of the most significant papers to appear on the biology of parasitic angiosperms since the discovery of synthetic germination stimulants. It describes the characterization of a compound that induces haustoria in parasitic Scrophulariaceae. The compound, termed xenognosin (meaning recognizing strangers), was derived from gum tragacanth.
- Tsivion, Y. 1981. Suppression of axillary buds of its host by parasitising Cuscuta. 1. Competition among sibs and indirect inhibition. *New Phytol.* 87: 91-9. The author reports experiments that confirm the very powerful "sink" effect of C. campestris growing on peas but also suggests a further form of inhibition that does not depend on intact phloem between parasite and the buds that are suppressed. This effect may be due to a xylem transported inhibitor or to some other more complex indirect effect via the root system.
- Hutchinson, J. M. and F. M. Ashton. 1980. Germination of field dodder (Cuscuta campestris). *Weed Science* 28: 330-3. Studies show that dormancy of freshly shed seed depends on an intact seed coat and there is substantial loss of this dormancy within 18 months when exposed to cold conditions. Germination is then maximal at 27-33°C and mainly from the top 3 cm in the soil.
- Tsybul'skaya, G. A. and A. N. Skoklyuk. 1978. Calculating releases of Phytomyza. *Zashchita Rastenii* 11: 49. (in Russian) and G. A. Tsybul'skaya, B. G. Degtyarov, N. A. Fedoryak, and A. N. Skoklyuk. 1978. Determination of the viability of Phytomyza puparia. *ibid.* 5: 29-30. (in Russian). These two papers describe many of the practical methods involved in collecting, rearing, storing and selecting Phytomyza material for least parasitization and greatest effectiveness as a biocontrol agent against Orobanche. New techniques include the use of x-rays to determine the viability of puparia. Why is it only in USSR that Phytomyza is being exploited?
- Carafa, A. M., G. Carratu and G. F. Tucci. 1980. Ecology of parasitic Rhinantheae. Observations on the nutritional physiology of Bellardia trixago (L.) All. cultured in vivo. *Annali dell'Universita' degli Studi di Napoli, Facolta'de Scienze Agrarie della Universita'degli Studi di Napoli, Portici* 14: 25-31. (in Italian). The authors suggest that this less

- well known member of the Rhinanthae is virtually an obligate parasite in that it cannot reach flowering without the benefit of organic nutrients from its hosts.
- Weber, H.-C. 1981. Untersuchungen an parasitischen Scrophulariaceae (Rhinanthoideen) in Kultur. I. Keimung and entwicklungsweise. *Flora* 171: 23-38. This paper is similar in many ways to those of the famous Austrian botanist, E. Heinricher, who contributed so much to our understanding of hemiparasites. Like Heinricher, Weber discusses the growth of several genera of parasitic Scrophulariaceae in culture. The germination and development of six genera of parasitic Scrophulariaceae are described. The author states that all can grow to maturity without hosts but that haustoria do not develop unless another plant is present in the pot.
- Canne, J. M. 1979. A light and scanning electron microscope study of seed morphology in Agalinis (Scrophulariaceae) and its taxonomic significance. *Syst. Bot.* 4: 281-96. The seeds of parasitic Scrophulariaceae are ideal subjects for SEM study and this author uses these criteria for their taxonomic value.
- Weber, H.-C. 1980. Zur evolution des parasitismus bei den Scrophulariaceae und Orobanchaceae. *Pl. Syst. Evol.* 136: 217-32. The author suggests that the specialized parasitic organ of the Orobanchaceae has evolved from small annual root parasites by a tendency to form wart-haustoria in the hypocotylar region. He supports this by pointing out that leaf haustoria occur only in the most advanced members of the family.
- Parker, C. 1980. Parasitic weeds and their control in the tropics. pp. 22-50 in Proc. Conf. at IITA, Ibadan, Nigeria, July 3-7, 1978 "Weeds and their control in the humid and subhumid tropics".
- Musselman, L. J. 1980. The biology of Striga, Orobanche, and other root-parasitic weeds. *Annual Review of Phytopathology* 18: 463-89.

HAUSTORIUM is edited by Chris Parker and Lytton Musselman and is mailed in June and December. We are thankful for the many and diverse contributions to this issue and for the several supportive letters and comments. Unsigned items are by the editors. Please send material for the next (December 1981) issue to either editor by November.

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Table 1

Cuscuta and Viscum species, their hosts, intensity of infestation<sup>1</sup> and location in the middle and northern parts of Jordan

Parasite Generic Name	Host Generic Name	Intensity of Infestation	Location <sup>7</sup>
<u>C. campestris</u> Yunk.	<u>Alhagi maurorum</u> (W) <sup>1</sup>	S <sup>2</sup>	Jordan Valley
	<u>Corchorus olitorius</u> (C) <sup>3</sup>	L <sup>4</sup>	Alroussaifa
	<u>Prosopis frncta</u> (W)	S	Jordan Valley
	<u>Trifolium alixandrinum</u> (C)	L	Zarqa
<u>C. epilinum</u> Whiehl.	<u>Artemisia herba alba</u> (W)	S	Yajouz
	<u>Nicotiana tabacum</u> (C)	L	Greenhouse
<u>C. monogyna</u> Vahl.	<u>Citrus deliciose</u> (C)	L	Kreimeh
	<u>Vitis vinifera</u> (C)	M <sup>5</sup>	Irbid
<u>C. planiflora</u> Ten.	<u>Capparis spinosa</u> (W)	L	Karak
<u>V. cruciatum</u> Sieb.	<u>Amygdalus communis</u> (C)	S	Wadi Shu'aib, Ajlun
	<u>Crataegus azarolus</u> (F) <sup>6</sup>	L	Ajlun
	<u>Olea europea</u> (C)	None/S	Jarash to Ajlun
	<u>Punica granatum</u> (C)	M	Wadi Shu'aib
	<u>Quercus sp.</u> (F)	L	Kufr abil
	<u>Retama raetam</u> (F)	L	Arda Rd.
	<u>Rhamnus palaestina</u> (F)	S	Ajlun to Wadi rumma

<sup>1</sup>W = wild

<sup>2</sup>S = severe

<sup>3</sup>C = cultivated

<sup>4</sup>L = light

<sup>5</sup>M = moderate

<sup>6</sup>F = forest tree

<sup>7</sup>Locations are shown on the attached map.



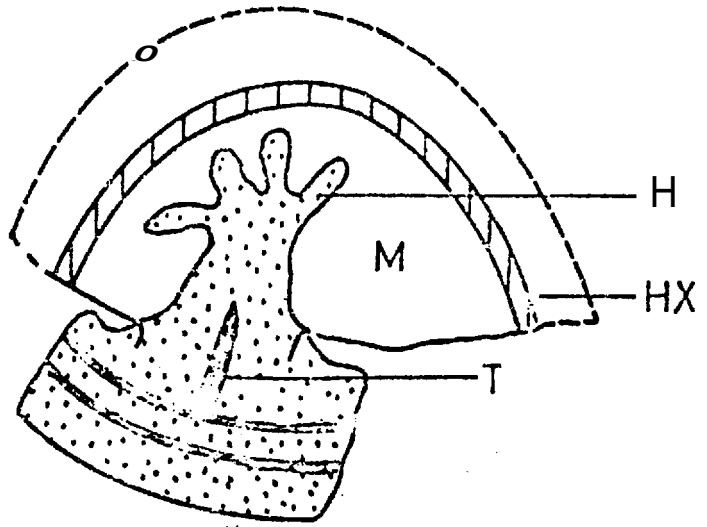


Fig. 3

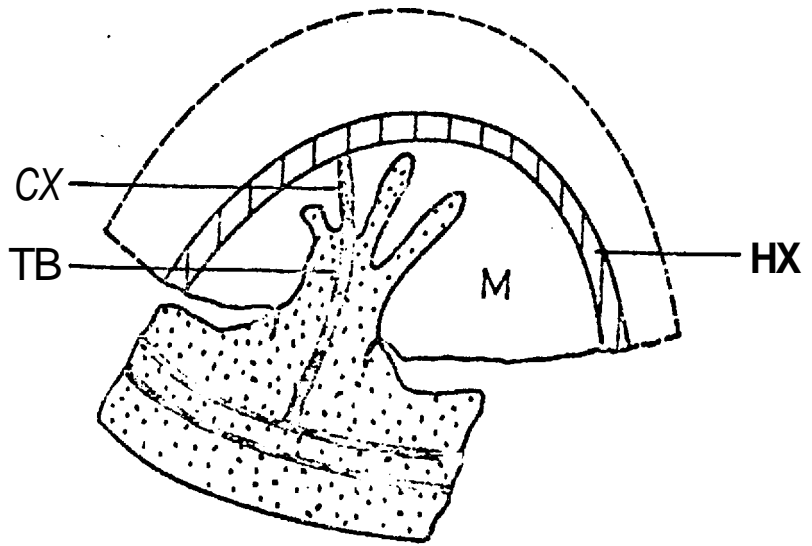


Fig. 4