Introduction
More than 7,000 species of rusts and about 1,450 of smuts are known worldwide (Kirk, 2001; Vánky, 2002). In Cuba, 39 species of smut fungi are known (Piepenbring, 2003) and concerning Cuban Uredinales, about 190 species have been mentioned in literature, notably by Arthur & Johnston (1918), Kreisel (1971), Urban (1973 and 1990), Seidel (1976), Schmiedeknecht (1983 and 1984), and Arnold (1986). For both groups of fungi the studies have been sporadic and mainly conceived as inventories, being scarce those referring to details of taxonomy, systematics, morphology, and ecology of the species. In addition to this, many localities in Cuba have not yet been explored, mainly those in the Eastern region where the highest floristic biodiversity and endemism occur. Therefore, as a result of the present study, an increase in numbers of species of rusts and smut fungi is expected, as well as new hosts and data about the distribution and ecology of the species in Cuba.

OBJECTIVES
- to carry out intensive field work in Cuba with emphasis on poorly explored regions in order to increase the knowledge of the diversity of rusts and smuts including taxonomic and systematic investigation combined with observations on their morphology, ecology and distribution.
- to carry out detailed studies in the genera Sporisorium and Ustilago using traditional methods and electron microscopy, as well as molecular techniques that allow to clarify the delimitation of these genera.
PRELIMINARY RESULTS
First part: Work in Cuba

Field work
During the period August 2004–January 2005 I carried out field work in Cuba. I have collected ca. 153 specimens of rusts (84) and smuts (69) on intensive field trips in Western, Central and Eastern Cuba. The field work was carried out mainly in poorly explored regions of Cuba. The localities visited are mentioned above:
- Biosphere Reserve Guanahacabibes (Pinar del Río province)
- National Park Viñales (Pinar del Río province)
- Natural Reserve San Marcos (Pinar del Río province)
- Protected Area Mil Cumbres (Pinar del Río province)
- Ecological Reserve Los Indios (Isla de la Juventud)
- Estación Experimental de Pastos y Forrajes (Matanzas province)
- Botanical Garden Soledad (Cienfuegos province)
- Floristic Reserve Monte Ramonal (Villa Clara province)
- Ecological Reserve Alturas de Banao (Sancti Spíritus province)
- Topes de Collantes (Sancti Spíritus province)
- National Park Turquino (Santiago de Cuba/Granma provinces)
- Loma El Gigante (Granma province)
- Botanical Garden of Cupainicú (Granma province)
- Pinares de Mayarí (Holguín province)

![Fig. 1. Localities visited during the field work in Cuba.](image)

The collected material was deposited in the mycological section of the herbarium HAJB (Cuban National Botanic Garden), including several species cited for Cuba, which are not
represented at the moment in Cuban herbaria. Notes on ecological aspects and pictures of
the species were taken.
Trips to the field were combined with visits to the following herbaria in the provinces:
- Jardín Botánico de Cienfuegos, Cienfuegos province (AJBC)
- Instituto Superior Pedagógico, Pinar del Río province (HPPR)
- Instituto Superior Pedagógico, Camagüey province (without official Herbarium
  Acronym).
- Instituto de Ecología y Sistemática, Ciudad Habana province (HAC).
- Jardín Botánico de Cupainicú, Granma province (without official Herbarium
  Acronym).

The host plants were determined in the herbarium of the Cuban National Botanic Garden
(HAJB) according to León (1946), Catasús (1997, 2001) and the help from Cuban
botanists.

During the field work it was not possible to find the species *Phakopsora pachyrhizi* on
soybeans, although several fields of soybeans have been visited.

It is particularly relevant to say that during the field work, adverse climatic conditions were
found, because during May 2004 to February 2005 a severe drought affected the eastern and
central regions of the island.

**Second part:**

**Work in Germany**

**University of Frankfurt**

- Bibliographical research

I carried out an exhaustive bibliographical research on rusts and smuts. More than 70
articles were localized and consulted. A checklist of Cuban rusts was compiled, which is
very useful because the information about them is much dispersed.

The checklist contains the following information for each rust species: name of the fungus,
synonyms, types of spores, host plants, family of the host plants, reference of the reports
for the country, citations of original descriptions, distribution in Cuba and herbarium
specimens.

- Herbarium and laboratory work

I carried out a revision and identification of specimens of rusts and smuts taken from
Cuba, and also checking some material from the private collection of M. Piepenbring.

The identification of the species was based on morphological characteristics of sori and
spores using light and scanning electron microscopy (SEM). Drawings and pictures of sori
and teliospores, as well as germination of teliospores of selected species for the observation of basidia were carried out.

23 news records of rust and smut species as well as new host plants for Cuba were found and new localities for known species. A list of Cuban rust and smut fungi and their host plants resulting from this study is attached.

Some Cuban material deposited in the herbaria BPI, JE, M, PRC, and PRM was revised and some species were compared to types of other species by means of herbarium loans. At present a manuscript on new records and hosts of smut fungi from Cuba is in revision process and other article was recently published:


Also a presentation on the diversity of smuts in Cuba was carried out at Botanical Institute of University of Frankfurt.

**Work at the University of Tübingen, Germany**

In order to elucidate the generic position of problematic species and to confirm the identification of doubtful species it is necessary to carry out molecular studies. Therefore, DNA sequence data of selected species are being obtained in collaboration with Dr. Matthias Stoll (Lehrstuhl für Spezielle Botanik & Mykologie at the University of Tübingen). This study is now in progress. Also, some publications about rust and smut fungi that are not accessible in Frankfurt were localized in Tübingen.

**Work at the Instituto de Ecología, A.C., Xalapa, Mexico**

The last two weeks of this project I carried out a revision and identification of specimens of Cuban rusts in collaboration with MSc. Gloria Carrión in the Systematic Mycology Laboratory (Instituto de Ecología, Xalapa, Mexico). The identification of the species was based on morphological characteristics of sori and spores using light microscopy and with the help of specialized literature, more than 20 articles were localized and consulted. In addition a session of field work was carried out during which some species of rusts and other fungi were collected and ecological aspects were observed.
LITERATURE CITED:


List of species

*New record for Cuba
** New host for Cuba
***New host for the species

SMUT FUNGI

*Cintractia axicola* (Berk.) Cornu
On *Fimbristylis complanata* (Retz.) Link
HAJB 9591, 10482

*Cintractia limitata* G.P. Clinton
On Cyperus sp.
HAJB 9612, 10529, 10488

*Leucocintractia leucoderoides* M. Piepenbr. & Begerow
On *Rhynchospora holoschoenoides* (Rich.) Herter
HAJB 9618, 10431, 10489, 10490

*Moesziomyces bullatus* (Schröter) K. Vánky
On *Echinocloa crusgalli* (L.) P. Beauv. **
M. Yemo 529 (HAC)
On *Leersia hexandra* Swartz
Catasús 787 (HAC 36906), Catasús 809 (HAC 31706)

*Mycosyrinx cissi* (DC.) G. Beck
On *Cissus sicyoides* L.
HAJB 10434, 10437, 10499
On *Cissus trifoliata* L.**
HAJB 10320

*Sporisorium andropogonis* (Opiz) K. Vánky
On *Andropogon virginicus* L. **
HAJB 9478

*Sporisorium bicorne* (Henn.) Vánky *
On *Andropogon bicornis* L.
HAJB 9454, 9610, 9614, 9616, 10426, 10429, 10430, 10453, 10454, 10455, 10456, 10459, 10458, 10465, 10472, 10481, 10504, 10522, 10523

*Sporisorium cruentum* (Kühn) K. Vánky
On *Sorghum halepense* (L.) Pers.
HAJB 10436

*Sporisorium culmiperdum* (J. Schröter) Vánky
On Andropogon sp.
HAJB 8873, 10524

*Sporisorium ellisii* (G. Winter) M. Piepenbr. *
On *Andropogon glomeratus* (Walt.) Britton **
HAJB 8718, 8837, 9131, 9476, 9833, 10460

*Sporisorium everhartii* (Ell. & Galloway) M. Piepenbr.
On *Andropogon glomeratus* (Walt.) Britton **
Roman s/n (HAC)

*Sporisorium mesoseti* (Zundel) Vánky
On *Mesosetum loliforme* (Hochst.) Chase **
Acuña 20247 (HAC), Baker 2935 (HAC), Curtiss 396 (HAC), Brother Alain & E.P. Killip 2135 (HAC)

*Sporisorium panic-leucophaei* (Bref.) M. Piepenbr.
On *Digitaria insularis* (L.) Fedde
HAJB 10432, 10464, 10494

*Sporisorium trachypogonicola* Vánky & C. Vánky
On *Trachypogon renvoizei* Catasús
HAJB 9615

*Tilletia ayresii* Berkeley
On *Panicum maximum* Jacq.
HAJB 10452, 10435, 10526

*Trichocintractia utriculicola* (Henn.) M. Piepenbr.
On *Rhynchospora corymbosa* (L.) Britton
HAJB 10433

*Ustanciosporium samanense* (Clf.) M. Piepenbr. & Begerow
On *Rhynchospora fascicularis* (Michx.) Vahl
HAJB 9130

*Ustanciosporium taubertianum* (Henn.) M. Piepenbr. & Begerow
On *Rhynchospora* sp.
HAJB 10528

**Ustilago chrysopogonis** Ahmad *
On *Schizachyrium hirtiflorum* Nees ***
HAJB 9477, 9479

**Ustilago dieteliana** Henn.
On *Tripsacum latifolium* Hitchc.
HAJB 9717

**Ustilago maydis** (DC.) Corda
On *Zea mays* L.
HAJB 10427

**Ustilago trichophora** (Link.) Körn.
On *Echinochloa colona* (L.) Link
HAJB 10428, 10478, 10483

**RUST FUNGI**

*Aecidium tournefortiae* Henn. 0, I
On *Tournefortia bicolor* Sw.
HAJB 8692

*Bubakia erythroxylonis* Cummins
On *Erythroxylum areolatum* L. **
HAJB 9881, 9902, MP 2094
On *Erythroxylum havanense* Jacq.
HAJB 9608

*Coleosporium elephantopodis* Thümen II
On *Elephantopus mollis* H.B.K.
HAJB 10508

*Dasturella divina* (Syd.) Mundk. & Khesw. II
On *Arthrostyletum* sp.
HAJB 10502

*Diabole cubensis* (Arthur & J.R. Johnst.) Arthur III
On *Mimosa pigra* s.l.
HAJB 10520

*Endophyllum circumscriptum* Whetzel & Olive
On *Cissus microcarpa* Vahl
HAJB 10159
On *Cissus sicyoides* L.
MP 3085

*Hemileia vastatrix* Berk. & Broome II
On *Coffea arabica* L.
HAJB 10451, 10467, 10473, 10512

*Puccinia arechavaletae* Speg. II, III
On *Viguiera dentata* S.F. Blake
HAJB 9077
On *Pautina bipinnata* **
HAJB 6274

*Puccinia crassipes* Berk. & M.A. Curtis
On *Ipomoea* sp.
HAJB 9013

*Puccinia heterospora* Berk. & M.A. Curtis III
On *Sida glabra* Nut. **
HAJB 9094
On *Herissantia crispa* (L.) Brizicky **
HAJB 6304

*Puccinia hydrocotyles* (Links) Cooke II
On *Hydrocotyle* sp.
HAJB 10521

*Puccinia lateritia* Berk. & M.A. Curtis III
On *Borreria laevis* Griseb.
HAJB 8625, 10462
On *Borreria* sp. HAJB 10513
Puccinia melampodii Dietel & Holw. III
On Emilia sonchifolia (L.) DC.
HAJB 10449

Puccinia purpurea Cooke II
On Tripsacum latifolium Hitchcock
HAJB 9718

Puccinia psidii G. Winter II
On Syzygium jambos (L.) Alston
HAJB 10441, 10468, 10486, 10509, MP 3038

Puccinia smilacis Schwein. II
On Smilax havanensis Griseb.
HAJB 10532

Puccinia sorghi Schwein. II
On Zea mays L.
HAJB 10442

Puccinia thaliae Dietel
On Canna sp.
HAJB10445, 10487, 10517

Puccinia oahuensis Ellis & Everh. II
On Digitaria insularis (L.) Fedde **
HAJB 10492

Puccinia urbaniana Henn. III
On Stachytarpheta jamaicensis Vahl
HAJB 10439

Puccinia sp. II
On Ruellia tuberosa L. **
HAJB 8828

Puccinia sp. II
On Cyperus sp.
HAJB 10491
On Cyperus odoratus L.
MP 3102

Uredo lycoseridis Kern & Thurst. * II
On Gochnatia montana (Britton) Jervis & Alain ***
HAJB 10496

Uromyces asclepiadis Cooke II, III
On Asclepias curassavica L.
HAJB 10507

Uromyces euphorbiae Cooke & Peck
On Euphorbia heterophylla L.
HAJB 10438, 10447, 10450, 10469

Uromyces scleriae Henn. II, III
On Scleria melaleuca Rchb. **
HAJB 10500, 10514

Uredinales II
On Lasiacis divaricata Hitchcock **
HAJB 10461, 10480, 10518

Uredinales II
On Paspalum fimbriatum H.B.K. **
HAJB 10498

Uredinales II
On Merremia umbellate (L.) Hallier **
HAJB 6565