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Sumary

New Records for the Brazilian Cerrado of Leaf Pathogens on *Jatropha curcas*

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Abstract

Jatropha curcas is a euphorbiaceous plant that produces seeds with high oil concentration. The species is being extensively studied by Embrapa in several research centers throughout warmer and drier areas of Brazil to explore its potential as raw material for biodiesel production. In Planaltina, Distrito Federal, leaf spots caused by a cercosporoid hyphomycete and by two different *Colletotrichum* species were observed on jatropha plants located at Embrapa Cerrados. The symptoms and main taxonomical features of these pathogens were here described.

Index terms: *Cercospora*, *Colletotrichum*, Cerrado.

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Novos Relatos de Patógenos Foliares em *Jatropha curcas* Encontrados em Plantios no Cerrado Brasileiro

Resumo

O pinhão-manso (Jatropha curcas) é uma euforbiácea que produz sementes com alta concentração de óleo. A espécie está sendo foco de uma série de estudos pela Embrapa visando explorar seu potencial como fonte para a produção de biodiesel. Manchas foliares, causadas por um fungo hifomiceto cercosporoide e duas espécies diferentes de Colletotrichum foram observadas em plantas de pinhão-manso localizadas na Embrapa Cerrados (Planaltina, DF). Os sintomas e principais características taxonômicas foram aqui descritos. O pinhão-manso ainda é uma planta em processo de domesticação no Brasil, por isso é importante descrever os fungos patogênicos a ele associados, pois podem vir a ser fatores limitantes na produção em larga escala dessa commodity em potencial.

Termos para indexação: Cercospora, Colletotrichum, Cerrado.

Introduction

As a potencial biodiesel source, *Jatropha curcas* L. (Euphorbiaceae) is one of several species being studied in Brazil within a nationwide project to replace fossil fuel (LAVIOLA, DIAS, 2008). Its reported that adult four year-old jatropha trees have the capability to produce a minimum of 2 tons of oil per hectare, keeping this productivity for at least thirty years (CARNIELLI, 2003). Initially, there were very few diseases reported on jatropha plants outside Brazil (HELLER, 1996; SINGH, 1983; PHILIPS, 1975; KAR et al., 1988). But, as field studies were introduced in different regions, such as the brazilian Cerrado, more diseases were described as associated to this crop, for example, rust (ROESE et al., 2008) and oidium (AVELAR et al.; 2007; DIANESE, CARGNIN; 2008). The objective of this work was to report the occurrence of three more pathogens associated with leaf spots on jathopha plants located at Embrapa Cerrados, Planaltina, DF.

Material and Methods

Sampling and morphological studies

Leaves of *J. curcas* showing strong leaf spotting were collected from plants located at Embrapa Cerrados in Planaltina, DF. The sample was dried, numbered and deposited in the Mycological Collection of the Herbarium of the University of Brasília (UB- Col. Micol.). Studies under the stereomicroscope were followed by observations of squash preparations and sections made with a freezing microtome. The morphological features were described, measured, and documented using a Leica DM 2500 microscope coupled with a Leica DFC 490 digital camera connected to a microcomputer. Image capture, editing, and measurements were made with the help of Leica QWin V3 software. In some cases, the samples were stained with lacto-glycerol cotton blue and the slides sealed with nail polish, but most of the photographic work was done without staining using Nomarski optics.

Detached leaf pathogenicity tests

Adult jatropha leaves without disease symptoms or signs of senescence were collected from plants located at Embrapa Cerrados in Planaltina, DF.

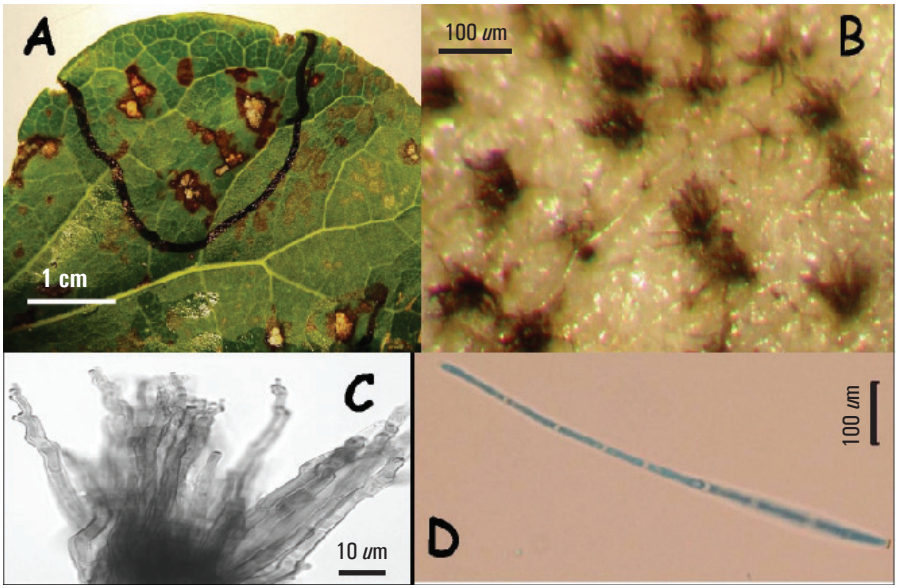
Leaves were rinsed in distilled water and cut to form discs with 4 cm in diameter. The discs were floated, adaxial side up, on 20 ml of sterile distilled water in 100 x 15 mm plastic sterile petri plates. Afterwards, PDA medium discs, with 0,5 cm in diameter, containing mycelium of the targeted pathogens, were placed on top of the leaf discs. The side with the mycelium was placed in direct contact with the plant tissue. Four leaf discs were inoculated with each pathogen, plus a control where PDA medium discs without any mycelium were also placed on four leaf discs. Plates were sealed with parafilm and incubated in 12 h light/12 h dark at 25 ± 2 oC for 10 days.

Results and Discussion

In *J. curcas* two *Cercospora* and one *Pseudocercospora* species are known. The first one to be reported was *Cercospora jatrophae-curcas*, which is actually a *Pseudocercospora* species (*Pseudocercospora jatrophae-curcas* according to Deighton (1976)). The two *Cercospora* species presently known, both showing thickened conidiogenous loci, are *C. jatrophicola* described in Chupp (1954), and *C. jatrophigena* described by Braun (2001). These two species can be easily separated from each other because *C. jatrophicola* shows significantly smaller conidia (2.5–4 x 40–85 against 2.5–5 x 100–300 μm of *C. jatrophigena*) and conidiophores (4–5 x 40–70 against 3–6 x 150–400 μm of *C. jatrophigena*). However, the fungal structures obtained from the leaf lesions clearly showed differences that safely warranties the conclusion that a different *Cercospora* is present, and is characterized as follows: leaf spots consisting of well delimited light brown irregular necrotic spots where fascicles of sympodial well cicatrized conidiophores were found in large numbers yielding simple cylindrical to acicular-obclavate hyaline conidia (Figure 1 A, B and D). The conidiophores, and conidia of this different *Cercospora* species show dimensions in between those of *C. jatrophicola* and *C. jatrophigena* (Table 1). Besides that, the fascicles of this different cerosporoid contain a much larger number of conidiophores, which are strongly geniculated, than both known species, and thus being completely different from both, *C. jatrophicola* and *C. jatrophigena* (Figure 1 B and C).

Generally, species of *Cercospora* were considered to be host specific (CHUPP, 1954) at the level of plant genus or family; this concept has led to the description of a large number of species. But Ellis (1971) and, more recently, Crous and Braun (2003), referred several morphologically indistinguishable *Cercospora* species to the *C. apii* sensu lato complex. Nowadays, for a new *Cercospora* species to be accepted, morphological and molecular data must be analyzed together to distinguish it from *C. apii* sensu lato (GROENEWALD, 2005). So, until the molecular data is available, this new jatropha cercosporoid will be considered part of the *C. apii* sensu lato complex.

All leaf discs inoculated with media containing mycelia belonging to this cercosporoid presented lesions similar to those observed in the field. Also, the cercosporoid was reisolated from these lesions, completing Koch´s postulate.



Photos: Alexei Dianese and José Carmine Dianese

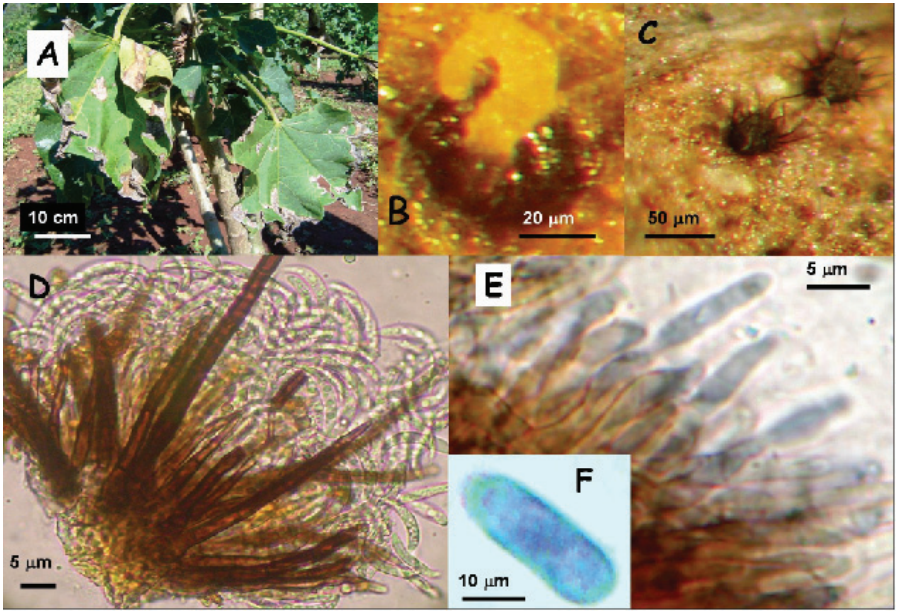
Figure 1. (A) *Symptoms*; (B) *Conidiophore facicles*; (C) *Conidiogenous cells* with thick loci and strongly geniculated; (D) *Conidium*.

Table 1. Conidia and conidiophore measurements of *Cercospora jatrophicola*, *Cercospora jatrophigena* and of the new species of *Cercospora found* on *Jatropha curcas* in Planaltina, DF, Brazil.

Species name	Conidiophore size range (μm)		Conidia size range (μm)		Average size of conidiophore (μm)		Average size of conidia (μm)	
	Length	Width	Length	Width	Length	Width	Length	Width
Cercospora jatrophicola [1]	40–70	4–5	40–85	2–4	-	-	-	-
Cercospora jatrophigena [2]	150–400	3–6	100–300	2,5–5	-	-	-	-
Cercospora sp. (*C. apii* sensu lato) [3]	79–223	3–5	49–272	2–4	132	4	109	3

[1] Measurements taken from Chupp (1954).
[2] Measurements taken from Braun (2001).
[3] Measurement of fifty structures.

Also, depressed yellowish leaf areas containing several acervuli were present on jatropha leaves. Two morphologically distinct Colletotrichum were isolated from these lesions (Figure 2). Furthermore, one is very similar to *C. gloeosporioides* and the other to *C. capsici* as described by Sutton (1980). However, stability of morphological traits is influenced by environmental conditions, making these criteria not always reliable for differentiation among *Colletotrichum* species. Also, there is an overlap of morphological characters and phenotypes that further hampers classification using just traditional identification and characterization. Molecular techniques provide alternative methods for taxonomic studies and are important tools in solving the problems of species delimitation in groups with such complex taxonomy as *Colletotrichum* spp. (MACLEAN et al., 1993). So, until molecular data is provided, it is not possible to confirm that the two *Colletotrichum* isolates belong to different species.



Photos: Alexei Dianese and José Carmine Dianese

Figure 2. (A-F) *A. Symptoms* with lesions by both *Colletotrichum*; (B, E, F) *C. gloeosporioides*: acervulum, conidiogenous cells, conidia and conidium, respectively; (C, D) *C. capsici*: acervulum, conidia and setae.

All leaf discs inoculated with media containing mycelia belonging to these two *Colletotrichum* presented lesions similar to those observed in the field. Also, both were reisolated from these lesions, completing Koch´s postulate.

Conclusion

As *J. curcas* is still a crop under domestication in Brazil, it is important to take note of its associations with pathogenic fungi that may become limiting factors to the future growth of this potential commodity.

References

AVELAR, R. C.; JUNCO, B. B.; CASTRO NETO, P.; FRAGA, A. C. Incidência de oídio (*Oidium heveae*) em acessos do banco de germoplasma de pinhão-manso da UFLA. In: CONGRESSO DA REDE BRASILEIRA DE TECNOLOGIA DE BIODIESEL, 2., 2007, Brasília. **Anais**... Brasília, DF: Ministério da Ciência e Tecnologia, 2007. Disponível em: 'http://www.biodiesel.gov.br/docs/congresso2007/agricultura/52.pdf'. Acesso em: 25 maio 2008.

BRAUN U. Taxonomic notes on some species of the *Cercospora* complex (VII). **Fungal Diversity**, v. 8, p. 41-71, 2001.

CARNIELLI, F. **O combustível do futuro**, 2003. Disponível em: <www.ufmg.br/boletim/bol1413/quarta.shtml> Acesso em: 15 dez 2010.

CHUPP, J. C. **A monograph of the fungus genus *Cercospora***. 1954. 667 f. Tese (Doutorado). Yale University, Ithaca, New York , USA.

CROUS, P. W.; BRAUN, U. *Mycosphaerella* and its anamorphs: 1. Names published in *Cercospora* and *Passalora*. **CBS Biodiversity Series**, v. 1, p. 1-571, 2003.

DEIGHTON, F. C. Studies on *Cercospora* and allied genera. VI. ***Pseudocercospora*** Speg. *Pantospora* Cif. and *Cercoseptoria* Petr. **Mycological Papers**, v. 140, p. 1-168, 1976.

DIANESE, A. C.; CARGNIN, A. **Ocorrência de *oidium* sp. em pinhão-manso (*Jatropha curcas* L.) em Planaltina, DF**. Planaltina, DF: Embrapa Cerrados, 2008. 15 p. (Embrapa Cerrados. Série Documentos, 231).

ELLIS, M. B. ***Dematiaceous Hyphomycetes***. Surrey, UK: Commonwealth Mycological Institute. 1971. 608 p.

GROENEWALD, M.; GROENEWALD, J. Z.; AND CROUS, P. W. Distinct species exist within the *Cercospora apii* morphotype. **Phytopathology**, v. 95, p. 951-959, 2005.

HELLER J. **Physic nut, *Jatropha curcas***: promoting the conservation and use of underutilized and neglected crops. Rome, Italy: International Plant Genetic Resources Institute (IPGRI), 1996. 66 p.

KAR, A. K.; DAS, A. New records of fungi from India. **Indian Phytopathology**, v. 41, p. 505, 1998.

LAVIOLA, B. G.; DIAS, L. A. S. Teor e acúmulo de nutrientes em folhas e frutos de pinhão-manso. **Revista Brasileira de Ciência do Solo**, v. 32, p. 1969-1975, 2008.

MACLEAN, D.J.; BRAITHWAITE, K.S.; MANNERS, J.M. AND IRWING, J.A.G. How do we identify and classify fungal pathogens in the era of DNA analysis? **Advances in Plant Pathology**, v. 10, p. 207-244, 1993.

PHILLIPS, S. A new record of *Pestalotiopsis versicolor* on the leaves of *Jatropha curcas*. **Indian Phytopathology**, v. 28, n. 4, p. 546, 1975.

ROESE, A. D.; AUGUSTO, C. J. S.; GOULART, C. P.; ABRÃO, J. S. **Ocorrência de ferrugem no pinhão-manso, em Mato Grosso do Sul, e efeito de alguns fungicidas no controle da doença**. Dourados, MT: Embrapa Agropecuária Oeste, 2008. 4 p. (Embrapa Agropecuária Oeste. Comunicado Técnico, 145).

SINGH, I.D. New leaf spot diseases of two medicinal plants. **Madras Agricultural Journal**, v. 70, n. 7, p. 490, 1983.

SUTTON, B. C. **The coelomycetes**. Surrey, England: Commonwealth mycological institute. 1980. 696 p.

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