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[News](#)
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[Nutrition news](#)
[Magazine](#)
[Image Gallery](#)
[Video](#)
[Briefing Room](#)
[Press Room](#)
[Events](#)
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Cross-section views of healthy cacao pod (top) and a pod ruined by the witches' broom fungus. [Click the images for more information about them.](#)

Cocoa's Two Most Devastating Pathogens Are Close Kin

By [Erin Peabody](#)

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Among certain related fungi, a love for chocolate apparently runs in the family, according to scientists with the [Agricultural Research Service](#). The scientists have found that the two most serious fungi infesting the world's cocoa plants are actually "sisters," taxonomically speaking.

Using DNA analysis, [Cathie Aime](#), a molecular biologist at ARS' [Systematic Botany and Mycology Laboratory](#) in Beltsville, Md., found that the two fungal pathogens causing witches' broom and frosty pod rot are close relatives that really should be classified in the same genus. Wilbert Phillips-Mora of [CATIE](#) in Costa Rica assisted Aime in the research.

Witches' broom, caused by the fungus currently known as *Crinipellis perniciosa*, and frosty pod rot, brought on by *Moniliophthora roreri*, are the two greatest threats to the world's chocolate supply. Despite widespread fungicide applications, these diseases continue to invade new parts of South and Central America, discouraging the mostly small farmers who raise cacao trees.

Despite the pathogens' notoriety, relatively little is known about the two fungi or their life cycles, making the challenge of their control even more difficult.

The witches' broom fungus lives inside the cacao plant, causing it to haphazardly send out deformed, broomlike shoots. Frosty pod looks more like a cottony mold covering the cacao tree's seed-bearing pods.

A colleague of Aime's, Harry Evans of [CABI Bioscience](#) in the United Kingdom, was one of the first mycologists to speculate that the two fungi might be closely related. But at the time, he lacked the molecular tools needed to conclusively determine the organisms' connectedness.

For the current research, Aime sequenced several genes from the two cocoa pathogens. Almost immediately, she could see that witches' broom and frosty pod were both members of the order Agaricales, the mushroom-forming fungi. Further RNA analysis revealed even more detailed evidence pointing to a close, sister-species relationship between the two.

Aime has proposed how to reclassify the two fungi, which, it now appears, share the same ancestor.

[To learn more](#), read the current issue of *Agricultural Research* magazine.

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[\[Top\]](#)

Page Modified: 10/12/2005

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