

Frosty Pod Rot

MONILIOPHTHORA RORERI,

FUNGI: BASIDIOMYCOTA: AGARICOMYCETES

INTRODUCTION

Frosty pod rot (FPR) is a disease of cocoa caused by the fungus *Moniliophthora roreri*, which develops only on the pods of *Theobroma* sp. (cocoa) and *Herrania* sp. The disease was originally confined to Central and South America until it was confirmed in Jamaica in August, 2016. FPR can be extremely devastating, leading to 80-90% loss in unmanaged/minimally managed fields. The disease is named “Frosty” due to the development of a mass of white spores on the pod that look like *frosting* on a cake.

DESCRIPTION

The casual fungus only grows on the pods of the susceptible host plant. In the field, the most characteristic stage of infection is the second to last stage where all major symptoms are visible on one pod (Fig. 1).

The major symptoms, developed in sequence, of FPR infection on cocoa pods are: the development of bumps (Fig. 2)/ abnormal swelling of the pods (Fig. 3), premature/irregular ripening of pods, development of dark brown ‘wet’ sunken irregular lesions (Fig. 4), hardening and discolouration of internal flesh and beans/seeds, beans are liquid or jelly internally (Fig. 5), the development of a thick (2 mm - 3 mm) mass of white/cream spores on the lesion and finally the mummification of the pod (Fig. 6). The infected pods are also heavier than healthy pods of the same level of development.

BIOLOGY

The average lifecycle of the fungus is 85-90 days in the host plant pods and is shorter in younger pods. The spores, infectious stage, can survive up to 9 months and are naturally spread by wind, water, animal fur and humans (clothes, shoes, vehicles and tools).

Spores germinate in a water layer (damp conditions) on the host pod. Wetter and humid conditions favour faster germination and development of the fungus. It takes an average of 30 days from infection to the first visible external

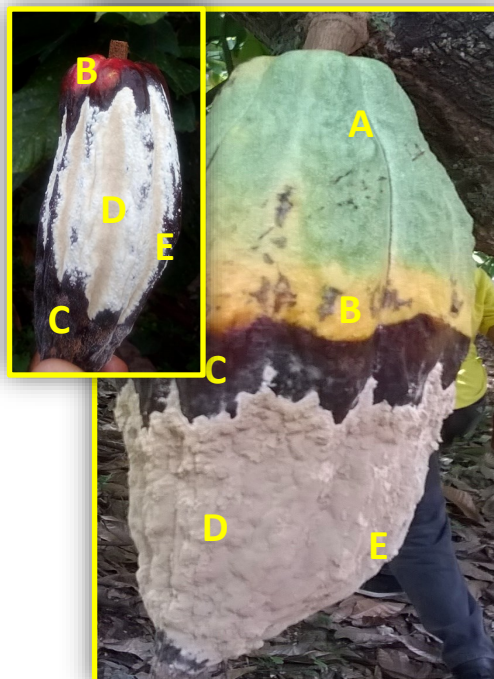


Figure 1: Cocoa pod showing characteristic stage of Frosty Pod Rot of cocoa. A. Part of the original pod remains unchanged, B. Signs of premature ripening (yellow ‘halo’ around lesion), C. Dark-brown, sunken and ‘wet’ lesion D. Mat of spores (white to grey in colour) and E. Bulge in pod (abnormal swelling). Photo , Sheldon Elliott (MICAF) Jamaica



Figure 2: Ripe cocoa pod showing FPR symptoms: bumps and lesions. Photo Sheldon Elliott (MICAF) Jamaica



Figure 3: Cocoa pods infected with FPR showing abnormal swellings Photo Sheldon Elliott (MICAF) Jamaica

BIOLOGY cont'd

symptom (bumps/swelling) and depending on the age of the pod it can take 3 to 8 weeks. From infection, there is internal necrosis causing discoloration, rotting of the pod flesh and drying of internal components. Primarily, the beans of younger (1-2 month old) infected pods are unable to develop and are liquid or 'jelly-filled',

Premature ripening and lesion development occurs in 20 to 50 days after the first external symptom. The lesions develop where the pods "ripened". Spore development follows in 8 to 12 days on the lesions (Refer to Fig. 1). The infected pods then mummify by hardening, shrinking inwards and complete necrosis of pod. Spore production continues on the mummified pods. **Each infected pod can produce seven billion wind-dispersed powder-like spores.**

DAMAGE

FPR directly affects the profitability of cocoa production, as no beans can be harvested from an infected pod. It can cause 30-90% loss in production depending on the prevailing environment conditions and management activities (predominantly field sanitation).

ENTRY PATHWAYS

Spores can travel on cocoa planting material (seeds and plants), pods and non-host produce moved from infected fields. **Human vectoring is the main mode of international spread. Viable spores can travel for up to 9 months on clothes and shoes.**

REFERENCE(S)

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Figure 4: Lesions caused by FPR are irregular in size, quantity and shape and usually develop primarily in the mid-area of the pod.

Photo Sheldon Elliott (MICAF) Jamaica



Figure 5: Internal symptoms of FPR. A. Internal rotting of pod and 'jelly-filled' beans B. Discolouration and C. Rotting and hardening of internal structures and liquid in beans. Photo Sheldon Elliott

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Figure 6: FPR final stage—Mummification of pod. The whole pod hardens, wrinkles and shrinks inwards. Multiple sporulation occurs while the pods is at this stage. Photo Sheldon Elliott

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