



Virginia Commonwealth University  
VCU Scholars Compass

---

Biology and Medicine Through Mathematics  
Conference

---

## Designing optimal treatment strategies for controlling Cocoa black pod disease

Bismark Oduro  
*California University of Pennsylvania, [oduro@calu.edu](mailto:oduro@calu.edu)*

Follow this and additional works at: <https://scholarscompass.vcu.edu/bamm>



Part of the [Life Sciences Commons](#), and the [Physical Sciences and Mathematics Commons](#)

---

<https://scholarscompass.vcu.edu/bamm/2020/talk/25>

This Event is brought to you for free and open access by the Dept. of Mathematics and Applied Mathematics at VCU Scholars Compass. It has been accepted for inclusion in Biology and Medicine Through Mathematics Conference by an authorized administrator of VCU Scholars Compass. For more information, please contact [libcompass@vcu.edu](mailto:libcompass@vcu.edu).

Black pod disease is caused by fungi of the species *Phytophthora palmivora* or *Phytophthora megakarya*. The disease causes darkening of affected areas of cocoa trees and or fruits, and leads to a significant reduction in crop yields and decreases the lifespan of the plant. We present a differential Equation model with variable population size to assess the impact of fungicide treatment on the dynamics of the black pod disease. We analyze the existence of equilibrium points and their stability, simulate the model using data on reported black pod cases from Ghana. In addition, we show the existence of a *dual-rate effect*, when such an effect is present, it would then be more cost-effective in the long run to treat at the higher rate, as long as it is feasible to pay a higher cost over an initial period. This will give a lower level of prevalence in the long run than for the lower rate at the same long-term cost.