Cacao Diseases

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Editors

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A History of Old Enemies and New Encounters

Springer

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Preface

Chocolate! My first memories of chocolate have nothing to do with science, but rather the simple pleasure of eating sweet milk chocolate. It seems chocolate and holidays in the United States have gone hand in hand for many years and I cannot remember a holiday passing in which chocolate was not included. Chocolate cake was a standard for my birthday, chocolate eggs and rabbits were a staple at Easter, chocolate combined with nuts and/or caramel were highly sought on Halloween, and chocolate in just about every form was fair game at Christmas. To be sure, it did not take a holiday to encourage my consumption of chocolate, as I was and still am willing to eat chocolate any day of the year. My love of milk chocolate has not diminished with age. Fortunately my wife, Susan, in whom I always depend, is almost always willing to aid this pseudo dependency by providing me chocolate in some form, chocolate pie, chocolate ice cream, and chocolate delight being my personal favorites.

Although the interaction between man and the cacao tree has continued for at least 3000 years, it is in relatively recent times that chocolate as we generally know it, a sweet/semisweet dessert, has become a global food phenomenon. The extensive global interest in chocolate has coincided with the establishment of organized farms, some large but mostly small, tended by the often overlooked but critically important cacao farmers. Having met some cacao farmers, yet never enough, I have found them to always be keenly interested in the crop they produce, primarily because, in most cases, they depend on it for basic necessities needed for supporting their families and improving their lives. The benefits of chocolate to farmers are not limited to cacao farmers only, since a multitude of other agricultural commodities are incorporated into chocolate dishes/products: peanuts, coconut, various other "nuts" like almonds and my personal favorite pecans, fruits, various flours, fats/oils, and of course sugar, not to mention more unique combinations involving meat products like bacon and spices like pepper. A surprise to me is the common occurrence of farmers having never tasted chocolate made from their own cacao trees. To me this is like a tomato farmer never tasting the tomatoes he grows. The fact is many cacao farmers seldom consume chocolate of any kind. Unfortunately, you cannot pick chocolate bars straight off the tree like a tomato from a vine,

although if that were the case I would probably live in a tropical climate. Fortunately, we have the chocolate industry, employing many people in its many forms, which assembles chocolate products, in their many forms, providing us with the endless pleasure of consuming old and new chocolate products whenever we can create/fabricate a good enough reason to celebrate. To me that means waking up and taking a deep breath or in other words being alive.

Now I realize my exposure to chocolate was not the same as for everyone else in the world. As I have traveled to different countries and learned about their cacao/cocoa cultures, I am still surprised when I find out consumption of chocolate in many countries falls far below that in the United States, not that the United States is the largest consumer. Growing up I had no idea of the history of chocolate, how chocolate was made, where cacao was grown, or of the many problems cacao farmers faced when growing the crop. It seems from the time (perhaps before) a cacao seed is planted in the soil until a mature cacao pod is harvested in the field, the crop is faced with continuing obstacles, some of the most important being the plant diseases we describe in the book. Chocolate may be the "food of the gods," but cacao, the tree whose seeds (cacao beans) are used to make chocolate, is also the food of many pathogens which cause disease and limit its production. Plant diseases cause significant losses almost everywhere cacao is grown and have encouraged the global migration of cacao to the point where most production occurs outside the areas where the crop originated. In these new areas, new plant diseases have emerged and serious crop losses continue to limit supplies of that most precious commodity, the cacao bean. In South America, where cacao evolved, two major pathogens, *Moniliophthora roreri* (frosty pod rot) and *Moniliophthora perniciosa* (witches' broom), severely limit production, each being capable under the right conditions of completely destroying the crop. In west Africa, *Phytophthora megakarya* (black pod rot) and *cacao swollen shoot virus* (CSSV) are serious and expanding threats to production, and in the island nations of southeast Asia, *Ceratobasidium theobromae* (vascular streak dieback) along with *Phytophthora palmivora* (causing the global threat of black pod rot) continually threaten production. This is not meant to underemphasize the many other recognized pathogens of cacao which cause serious losses locally or may have the potential for causing expanding losses in the future.

Globally, cacao researchers have not been standing by allowing these disease threats to continue unchallenged. Scientists are using new and traditional technologies to understand the processes leading to disease in cacao, developing new tools for managing cacao diseases, and selecting cacao trees that continue to yield well despite disease pressures. It should be comforting for the cacao farmer and chocolate consumer to know that, in locations all over the world, scientists are investing their time and efforts combating all of these diseases. Part of the impetus for assembling this book was the recognition that such excellent science is being carried out in these efforts and that assembling much of this information, past and current, into one place would be of value to those interested in cacao, cocoa, and chocolate. Cacao being produced all over the world complicates the sharing of

information between scientists and others interested in the crop. Researchers working in one part of the world are often literally half a world away from other areas where similar research is being carried out. Despite the availability of modern electronic technologies, much research remains out of reach to researchers due to barriers like publishing rights, perceived limitations to local interests, and in some cases a general lack of awareness to look and see what is going on in other areas. An obvious observation derived while editing this book was that a great deal of research is tied up in local institute/agency reports greatly reducing the impact of the research and, in many cases, leading to its loss from the institutional memory of global cacao researchers. This lack of communications of the most basic experimental results limits potential sharing of ideas and their resulting synergies, results in redundancy of effort, and prevents the recognitions of common themes that might accelerate the derivation of solutions to the problems being addressed, global losses to cacao diseases. The many excellent authors associated with this book have done their best to assemble and highlight the current state of knowledge of cacao diseases and their impact on production. Perhaps most importantly, authors have also been encouraged to provide direction, as they see it, to future work sharing their ideas where gaps in our understanding of cacao diseases occur and how the gaps might be filled leading to improved management of cacao disease. It is through these efforts that we hope to maintain and improve cacao production by limiting losses to disease and insure an ample supply in the future for all the world's chocolate fans.

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