Chocolate: Fat Bloom During Storage

The Influence of Structural Elements

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The most common appearance of fat bloom is as a whitish haze that initially forms on the surface of chocolate. However, fat bloom also can take various other forms, from surface to internal structures, that impact both visual appearance and textural attributes of the chocolate. Fat bloom is not limited to chocolate as it also occurs in other fats, including compound coatings; however, the mechanisms of fat bloom in these products may very well be different than in chocolate.

There are, in fact, a wide variety of circumstances that can lead to bloom formation in chocolate. Many researchers have studied fat bloom in chocolate. From these references we can compile a list of different circumstances that lead to bloom formation.

Improper Tempering

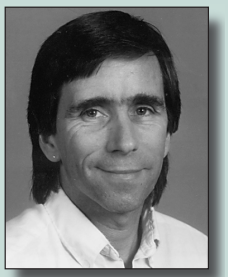
One of the most critical steps in chocolate making is tempering, which involves crystallization of cocoa butter into the desired size, shape, number and polymorphic form of cocoa butter. Cocoa butter, as with many fats, exhibits the ability to take on several different crystalline lattice structures (or polymorphs). Different polymorphic forms have been identified for cocoa butter, but it is thought that well-tempered chocolate has cocoa butter in a stable β-V form. Actually, this is not the most stable polymorph identified for cocoa butter (there is a more stable β-VI polymorph that forms slowly over time), but since the β-V polymorph has reasonably long stability (6–12 months or longer) it is suitable for commercial chocolate manufacture. Improper tempering, or formation of polymorphs with lower stability (e.g., the β′-IV form), can lead to bloom formation as the cocoa butter slowly converts from a less stable polymorph to a more stable form. It is this polymorphic transformation that we think leads to visual bloom formation.

Melting and Recooling of Chocolate

Melting chocolate destroys the stable polymorphic crystals developed during

Hartel is a professor of food engineering at the University of Wisconsin. In the past he has been a research associate at the University of Arizona and at Michigan State University. Hartel's teaching interests include food engineering and food processing.

Hartel has been honored with the the W. Cruess Teaching Award by the Institute of Food Technologists.



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