

## 23.5 Roasting of cocoa beans

Roasting is the process where precursors developed during fermentation are turned into chocolate flavour through a selected heating process (see Chapters 2 and 3). This step of chocolate manufacturing is critical to the final chocolate quality. Recipes are selected based on the origin of the bean and how low or high a roast is needed. Goals in roasting are to obtain a clean, even roast with good flavour development and sufficient lowering of microbiological counts using a validated roaster. A validated roaster will ensure the required log kill specific to the roaster, plant and or regulatory requirement. Low, medium and high roasts can be developed by adjusting time, temperature and humidity in the roasting process.

A low roast will produce mild flavours and lighter colours, a high roast will produce stronger flavours and darker colours. The degree of roast chosen depends on the final flavour desired. The chocolate manufacturer can blend beans or blend chocolate liquors to make their final chocolate (Figure 23.3). More than 400 volatile compounds have been found in cocoa following fermentation, drying, roasting and conching (see Chapter 8). During the roasting process (typically from 120 to 200 °C) several reactions occur. These include Maillard or non-enzymatic browning reactions between reducing sugars and amino acids. Some flavour elements in a chocolate are: (i) highly volatile compounds contributing sour notes, (ii) moderately volatile compounds contributing roasted or flowery notes and (iii) compounds of low volatility



Figure 23.3 Bulk unloading of cocoa beans at factory.

contributing milky and caramel notes. The ensemble of all of these flavour components produces unique chocolate flavour (see Chapter 8).

In a cocoa bean processing facility, modern technology today transports the cocoa beans to the selected roasters to begin the process. There are several types of roasting processes; the two most common methods of roasting are “whole bean” roasting or “nib” roasting (see Chapter 3).

### 23.5.1 Whole bean roasting

Whole bean roasting takes place typically on a fluidised bed or chamber at a specific temperature and dwell time. The bean flow rate, depth of beans being roasted and internal bean temperature are critical variables to optimise. De-bacterialisation through condensation is a method to pretreat whole beans prior to roasting to improve the reduction of bacteria and prepare the cocoa bean for shell removal (Figure 23.4). The moisture content is reduced from about 7% to slightly less than 2%. As the moisture is driven off, the temperature of the bean mass slowly rises. Flavour development is said to occur between 110 and 140°C. Bean roasting allows for variety in the degree of roast and development of flavour but, due to variability in bean size, it can be difficult to



Figure 23.4 Debacterialisation system in whole bean roasting.