

imparting astringency in the mouth and for the antioxidant health benefits associated with cocoa (see Chapter 22). Their levels drop significantly during fermentation and drying. The anthocyanins (a type of flavonoid) are rapidly hydrolysed to cyanidins and sugars by glycosidase enzymes. This accounts for the bleaching or lightening of the colour of the purple cotyledons in Forastero cocoa. Other enzymes (polyphenol oxidases) convert another type of flavonoid, the flavanols [comprised mainly of (–)-epicatechin] to quinones. Proteins and peptides complex with the polyphenolic compounds to give the brown or brown/purple coloration that is typical in fermented dried cocoa beans. Another important group of compounds is the Maillard reaction precursors. These are formed from the storage proteins and sucrose. Sucrose is converted by invertase into reducing sugars. The storage proteins are hydrolysed by peptidase enzymes into oligopeptides and amino acids. These cocoa flavour precursors are involved in Maillard reactions during roasting of the cocoa beans to form cocoa flavour compounds.

2.3.4 Drying

When fermentation is finished, the beans are removed from the heap or box for drying. In areas where the weather is comparatively dry at harvest time, the beans are dried in the sun by being spread out during the day in layers about 100mm (4 in) thick on mats, trays or a terrace on the ground. Sun drying is environmentally friendly, low cost and produces beans of good quality. In West Africa, the beans are spread on any suitable horizontal surface (e.g. a concrete terrace or polythene sheet – see Figure 2.11). The preferred method, which is common in Ghana, is to spread the beans on mats made of split bamboo, which are placed on wooden frames at waist height (see Figure 2.12). The mats can be rolled up to protect the beans when it rains. They have several advantages: the air circulation is improved, it is easier to sort the beans and remove defectives and foreign materials, and there is less risk of contamination compared with beans being dried at ground level. In all cases the beans are raked over at intervals, heaped up and protected at night or when it rains. In Central and South America, a common method is to spread the beans on a floor or platform, with a roof on wheels that can be pushed back over the floor at night or when it rains. Alternatively, the platforms themselves are arranged on wheels so that several can be run under a single roof, one above the other to save space. It usually takes about a week of sunny weather to dry down to the 7 or 8% moisture content needed to prevent mould growth during storage.

Where the weather is less dry and sunny at harvest time, improved methods of solar drying or artificial drying are adopted. Various low technology solar drying systems have been developed. These generally involve the use of a transparent plastic tent or roof over the cocoa and sometimes additional solar energy collectors. In on-farm trials, some of these systems have proved to be very efficient and effective.



Figure 2.11 Cocoa beans drying on tarpaulin on the ground. Reproduced with permission of Fabien Coutel.



Figure 2.12 Drying cocoa beans on table. Reproduced with permission of Ivan Kashinsky.