Growth occurs in "flushes" when each shoot on the tree grows a few fresh new leaves at the same time. The timing and extent of this "flush" growth depends on recent rainfall and the state of the tree.

2.2.6 Major pests and diseases

It is generally agreed that about 30% of the crop is lost to pests and diseases. The main pests and diseases are black pod rot, witches' broom disease, frosty pod rot (*Monilia*), vascular streak dieback disease, swollen shoot virus, capsids, mirids and the cocoa pod borer moth. Squirrels, rats and monkeys can consume significant quantities of ripe pods. Further information is given in Table 2.1.

Table 2.1 Major pests and diseases of cocoa.

Name of pest or disease	Distribution[a]	Symptoms or damage	Control[b]
Black pod rot (*Phytothphora*)	World wide	Fungal attack of mainly the pods causing them to go brown and rot	Sanitation (removal of infected material). Regular frequent harvesting of pods. Application of fungicides
Witches' broom (*Moniliophthora perniciosa*)	South America, Caribbean	Fungal attack causing extra growths or "brooms" to develop from leaf buds. Can also affect flowers and pods	Pruning and sanitation (removal of infected material). Application of fungicides
Frosty pod rot, Monilia (*Moniliophthora roreri*)	Peru, Ecuador, Colombia, Central America including Mexico	Fungal attack of the pods causing them to go brown and rot	Sanitation (removal of infected pods)
Vascular-streak dieback	South-east Asia, Pacific Islands	A fungal attack causing leaf fall and dying back of stems	Regular pruning of infected material. Cover nurseries to prevent infection of young plants
Cocoa swollen shoot virus	West Africa	Swelling or thickening of the shoots. The infected tree frequently dies	Eradication of infected trees
Capsids or mirids	World wide	These insects feed by sucking the sap causing direct damage to plant tissue. In addition, this allows entry by fungi that cause stems and pods to rot.	Application of insecticides
Cocoa pod borer	South-east Asia and Papua New Guinea	The caterpillar of this moth bores into the pods and affects the development of the beans	Regular frequent harvesting of pods, pruning, application of insecticides

[a] Distribution: this lists the growing areas where the pest or disease causes significant losses, it may occur elsewhere.

[b] Control methods are not effective or economic in many cases.

Control of these pests and diseases is achieved by a combination of using appropriate planting material, good agricultural practices, sanitation and careful application of approved pesticides. In some areas, cocoa growing is not viable because of the effects of pests and diseases. Due to the cost of pesticides, many small-holders do not use them.

2.2.7 Flowering and pod development

The flowers develop from flower cushions located on the trunk and branches. They are small, about 15 mm (0.6 in) in diameter (see Figure 2.5). Flowering depends on the environment, the condition of the tree and the variety. Some trees flower almost continuously whereas others have well-defined periods (generally twice a year). The flowers are pollinated by small insects such as midges. Out of thousands of flowers, only small proportions are pollinated and develop into pods.

The small pods are known as cherelles. If there are too many for the tree to support through to maturity, the excess stop growing and die (this is known as cherelle wilt). After 5–6 months the pods are fully developed. They measure between 100 and 350 mm long (4–14 in) and have a wet weight from 200 g

Figure 2.5 Cocoa flowers. Reproduced with permission of Ivan Kashinsky.