



A sustainable future for cocoa

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Theobroma cacao means food of the gods. It is also the botanical name for the cocoa tree, a much-revered crop for thousands of years. Satisfying the world's growing appetite for chocolate is an interesting case study in the development of sustainable agriculture.

Nowadays over 20 million people world-wide depend directly on cocoa cultivation for their livelihood. Almost 90% of cocoa production comes from smallholdings of under 5 hectares. Use of fertilisers is limited but that of insecticides and fungicides is required due to the prevalence of pests and diseases. It is estimated that around 30% of the cocoa crop world-wide is lost to pest and disease attack. Chemical treatment is however not always possible, due either to the nature of the pests or because the chemicals are too expensive for most farmers. The use of chemicals should in any case be minimised to reduce environmental pollution and health risks to farmers.

Another challenge for cocoa cultivation is the increasing scarcity of suitable growing areas. Increased global cocoa production from 1.5 million tons in 1984 to 2.7 million tons in 1998 was almost entirely due to an increase in production area, whereas productivity remained low. New production zones were mostly set up on cleared forestland, which is becoming increasingly scarce. Meanwhile, many of the traditional production areas have old poor yielding trees that it would be wise to replace.

In-built resistance

Research organisations and the cocoa using industry are seeking solutions to these problems. With the predicted continuing predominance of small cocoa farmers, it is impractical to introduce technological changes that depend on significant increases in financial inputs, certainly so in times of depressed cocoa prices. The introduction and use of more productive varieties resistant to pests and diseases is therefore one of the most cost-effective and environmentally friendly innovations that can be proposed to overcome cocoa production constraints. Cocoa trees with effective built-in resistance to most diseases and pests are not yet available, although significant genetic potential for resistance is

generally found in cultivated plants.

Teaming up

There are several international programmes aimed at the development of these improved and sustainable methods of cocoa production. Research organisations in France, Britain and the US have a common overall objective but specialise each in specific aspects.

In recent years new techniques have been developed which may eventually make significant contributions to the creation of improved varieties resulting in higher yields. Collections of cocoa plant material, such as in Trinidad, have been established and since the late 1970's, there have been systematic efforts to analyse the plant material, mainly by observing morphological traits.

The development of DNA marker technology revolutionises this practice, allowing the genetic diversity in these collections to be better understood. In addition to understanding biodiversity, these techniques can also be used to identify characteristics in individual trees that have increased resistance to diseases. As an example, a collaborative project between research institutes in France and producing countries is identifying trees that have increased resistance to black pod, a major fungal disease of cocoa. These trees can then be used in conventional breeding programmes, or clonally propagated, getting higher yielding trees to the farmers, to give them a more sustainable future.

Integrating all these new developments into a modern cocoa-breeding programme will be a major contribution to improving cocoa production.