

## ABSTRACT

The influence of processing location, growing environment and pollen donor effects on the flavour and quality of selected cacao (*Theobroma cacao* L.) genotypes

Darin Ashram Sukha

This study examined the influence of different processing locations, growing environments and pollen donor effects on the flavour and other quality attributes of cocoa (*Theobroma cacao* L.). These factors were investigated via three experiments. The first two experiments were conducted over three growing seasons and the pollen donor study was conducted over two growing seasons. The first experiment examined the possible influence of three different locations for sweat box fermentations with sun drying, on the flavour of six different cocoa accessions, each harvested from the same field. The second experiment looked at the possible influence of four different growing environments on seven cocoa clones grown in at least two of four locations. The third experiment investigated pollen donor effects on flavour by conducting controlled pollinations with five accessions according to a diallel mating design. Processing location and growing environment effects on the organoleptic attributes of selected cacao genotypes were demonstrated with supporting near infrared reflectance spectroscopy (NIRS) results. Additionally, the strong contribution of cacao genotype to flavour, especially in floral flavour

attributes, was demonstrated. This superseded the combined effects of growing and processing environments in some instances. The results from the pollen donor study failed to detect xenia effects for most of the important flavour attributes viz cocoa flavour, acidity, fruitiness and floral flavour. There were small pollen donor effects on astringency, nutty and 'other' flavours. This contrasted with the strong female parent effects observed for most flavours and bean weight. The organoleptic results further supported the successful application of an optimised assessment protocol for training a sensory panel to systematically investigate some of the factors that can affect final flavour and quality in cocoa. The relative contribution of all elements of the growing and processing environment to final flavour in cocoa permits possible consideration of applying the concept "terroir", already well established for wines, to cocoa.

**Keywords:** *Darin Ashram Sukha; processing location; growing environment; pollen donor; sensory evaluation; cocoa flavour.*