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Molecular markers as a tool for participatory cassava breeding

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Abstract. It is of fundamental importance to know the genetic identity of the plants used in the breeding process and in the case of asexually reproduced crops to know to which clone a plant belongs. Since cassava smallscale farmers do not maintain a one-to-one relationship between variety and clone participatory cassava breeding has a problem using farmer's plants. This study uses molecular markers to identify clones popular by small-scale cassava farmers and to describe the impact of genotype by environment interaction (GxE) on farms. Popular clones are particularly important when choosing local parents for crossings. Better knowledge of GxE at the farm level would improve the selection schemes. Eight SSR markers were found to be sufficient to discriminate between clones. A wide diffusion of a clone was used as an estimate of its popularity. Plants were collected from ten districts of Malawi. Most clones were limited in their geographic distribution. A majority was represented by a single plant but a few were found in several districts. Plants of the clones 'gomani' and 'mbundumali', that for decades have been distributed by the national breeding programme, were collected from farmers in three and nine districts, respectively. There was genetic identity between all 'gomani' collected from the farmers and the 'gomani' in the breeding programme. Plants that belonged to the program clone 'mbundumali' had seven variety names among farmers and these varieties also included a fraction of other clones. Consequently farmers can maintain varieties as single clones but mostly molecular markers are needed for identification of a plant's genotype. The study also suggests that the major part of the small-scale farmers' clones is used for breeding the rest for production. The analysis of GxE in farmers' fields showed that interaction occurred within farms for variables related to cultivation activities as well as to natural environmental variation.