

"In vivo" methodology for mutation induction in banana, cultivar "Maça"

The "Maça" cultivar is a banana of high acceptability in the south west of Brazil. However, it is very susceptible to several diseases. Due to the difficulties in the application of the traditional plant breeding methods, the Radiation Genetics Section of CENA is utilising the "in vivo" and the "in vitro" mutation breeding approach. The "in vivo" methodology is based on the work of HAMILTON [1]. This method is being utilised in Brazil for rapid banana propagation.

Rhizomes (20 cm diameter) were obtained from young field grown plants before flower differentiation. In these rhizomes, only 5-6 leaf sheaths were retained, the others being removed. The rhizomes were maintained in a greenhouse in boxes with vermiculite, covered with plastic. After one week, all leaf sheaths were removed, until the exposure of the meristematic apex with about 2 mm size. This apex was cut off with a scalpel and a cross shaped cut (2,5 cm) was made. This stimulates the development of lateral buds. After four months, the meristematic apices of these new buds were cut off in the same way and immediately the rhizomes were irradiated with gamma rays. Around the eliminated lateral buds callus developed and new lateral buds were formed. The LD₅₀ in relation to the number of these new buds produced was around 30 Gy. According to the author of the original method, from the callus one can obtain axillary or adventitious buds. In the early stages it is possible, based on the shape, to distinguish both types. The advantage of utilising adventitious buds originating from only one cell to avoid chimerism, is well known in mutation breeding. However, it is not certain whether this is the case in the present method.

After detachment from rhizomes and rooting in soil, plants with 15-20 cm height were inoculated with Fusarium oxysporum f.sp. cubense. After 3 weeks the plants showed symptoms of the Panamá disease and screening could be done at this stage. The total time between the removal of rhizomes from the field and the development of the new young plants was about 8.5 months. However, this time can be reduced if a temperature controlled greenhouse is used. This method seems suitable for mutation breeding of banana.

REFERENCE

- [1] HAMILTON, K.S., Reproduction of banana from adventitious buds. Tropical Agriculture (1968), 69-73.

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"In vitro" mutation breeding methodology for Fusarium wilt resistance in banana

Besides "in vivo" methods, the Radiation Genetics Section of CENA/USP is also using "in vitro" methods for mutation breeding to obtain resistance to Panamá disease caused by Fusarium oxysporum f.sp. cubense in the banana cultivar "Maça".

A protocol has been established for the "in vitro" development of shoot tips, obtained from plants in the field or already cultivated under "in vitro" conditions. For both cases, only one culture medium was used