

BREEDING FOR PROTEIN ENHANCEMENT IN CASSAVA

N. Hrishi and J.S. Jos*

SUMMARY

An intraspecific cross in *Manihot esculenta* between a Madagascar clone and a clone from Malaysia has a protein content of 7.9% but a low yield potential. In interspecific crosses between *M. saxicola* and *M. esculenta* there was a higher protein content in the roots of seedlings than in the parents, but the protein content reverted to normal levels in the clonal offspring of the hybrid seedlings. Tetraploids were produced from Malayan 4 and the protein content of these was increased by 42% over the level in the diploid and this was stable under vegetative propagation. Mutation breeding is also being undertaken.

RESUME

Un croisement intraspécifique dans *Manihot esculenta* entre un clone malgache et un clone de Malaisie a une teneur en protéine de 7.9%, mais le potentiel de rendement est bas. Dans des croisements interspécifiques entre *M. saxicola* et *M. esculenta*, la teneur en protéine est plus élevée dans les racines et les plantules que dans les parents, mais la teneur en protéine redevient normale dans les descendants des plantules hybrides. Des tétraploïdes ont été créés à partir du Malayan 4 avec un accroissement de 42% de leur teneur en protéine au dessus du niveau observé dans le diploïde; l'enrichissement acquis s'est maintenu lors de la multiplication végétative. La sélection de mutations est également en cours.

RESUMEN

El contenido de proteína de una cruce intraespecífica en *Manihot esculenta* es de 7.9%, pero su rendimiento potencial es bajo. En cruces interespecíficas entre *M. saxicola* y *M. esculenta*, hubo un contenido más alto de proteína en las raíces de la progenie que en los padres; revirtiendo, sin embargo, a niveles normales en la progenie clonal de los híbridos. Se produjeron tetraploides a partir de Malayan 4, con un contenido de proteína incrementado en un 42% sobre el nivel encontrado en los diploides y estable bajo propagación vegetativa. Se intenta también la hibridación por mutaciones.

INTRODUCTION

The diet in the developing regions in the world is deficient in protein. It is desirable to develop strains of food crops having higher protein content, as one means of combating malnutrition. Cassava (*Manihot esculenta*) is biologically a highly efficient producer of calories, and if it could be made a more efficient producer of protein, it could make a greater contribution to nutrition in the tropics.

Protein malnutrition is prevalent particularly among low-income families where cassava is an important food. In cultivars presently grown the tubers generally contain about 1.8% protein (Coursey and Haynes⁴), and the protein is also poor in essential amino-acids, and especially in the sulphur-containing amino-acids (Jones⁷).

We have attempted to improve the protein content of cassava through conventional breeding methods involving selection and hybridization at both intra- and inter-specific level. Breeding by induced polyploidy and mutation have also been found to hold promise. We present the results obtained so far and discuss the future approach to the enhancement of protein in cassava.

RESULTS AND DISCUSSION

Germplasm evaluation

The total germplasm collection of clones comprises about 1,400 entries, of which 250 are exotics. Screening for quality characteristics did not reveal any significant variability in protein content of the tubers. This supports the findings of Bolhuis². However, a clone recently received from Colombia has been claimed to contain about 8% protein and this is being multiplied.

Intervarietal hybridization

Though a break-through has been achieved in yield (Magoon *et al.*¹⁰) by hybridization, quality im-

*Central Tuber Crops Research Institute, Trivandrum, India.