Poster

Nutritional improvement of Manihot esculenta roots by boosting the lipids storage

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ABSTRACT

Motivation: The human population continues to grow and it is necessary to produce more and better quality food to meet the world population's demand. Genetic engineering opens great possibilities to improve the quantity of available food. The cassava (Manihot esculenta) plant is the basis of food for more than 1 billion people in the world. All plants have genes coding for oil biosynthetic pathways and transcription factors that activate the expression of these genes. If these transcription factors are activated in other tissues, like roots, the conversion of sucrose to oil could increase. In this way, crops that accumulate sugars and starch could become more nutritious (2.2 times more energy than carbohydrates). It has been shown that starch and oil can accumulate in the same cell, as is the case for oats (Ekman et al., 2008). In this project, cassava has been chosen as a model plant because it has a high starch content in their edible roots.

Methods: Two somatic embryos were obtained from mother plants with ecotype 60444. The in-vitro plants will be transformed by the vector via Agrobacterium tumefaciens. The functional annotation of the cassava proteome was carried out using Sma3s (Casimiro-Soriguer et al., 2017). This annotation will allow us to know the function of the protein-coding genes present in cassava. To know those genes involved in the synthesis of fatty acids they must be filtered. The expression of these genes in different tissues was comparated with ArrayExpress. Posible candidates will be examined in order to choose the most suitable ones to be transformed and expressed in the cassava plants.

Results: From 41,381 cassava predicted proteins, 35,889 were scored, meaning Sma3s annotated 86% of the proteome. The list of possible candidates is currently around 600 genes and their expression will checked with public database. In vitro plants are growing and the second phase of the transformation will be begun.

Conclusions: The project will (i) expand knowledge on cassava, particularly on the development of their storage organs, such as roots and seeds, as well as carbohydrate and lipid metabolism, and (ii) develop a cassava crop modification platform using genetic engineering techniques. This work aims to cover two demands of society, try to mitigate hunger, and on the other hand be able to extrapolate the scientific knowledge generated to other crops of interest to cover the current demand for vegetable oil.

REFERENCES

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