

Assessment of genetic improved cassava plants expressing a nutritious storage protein (ASP1) gene



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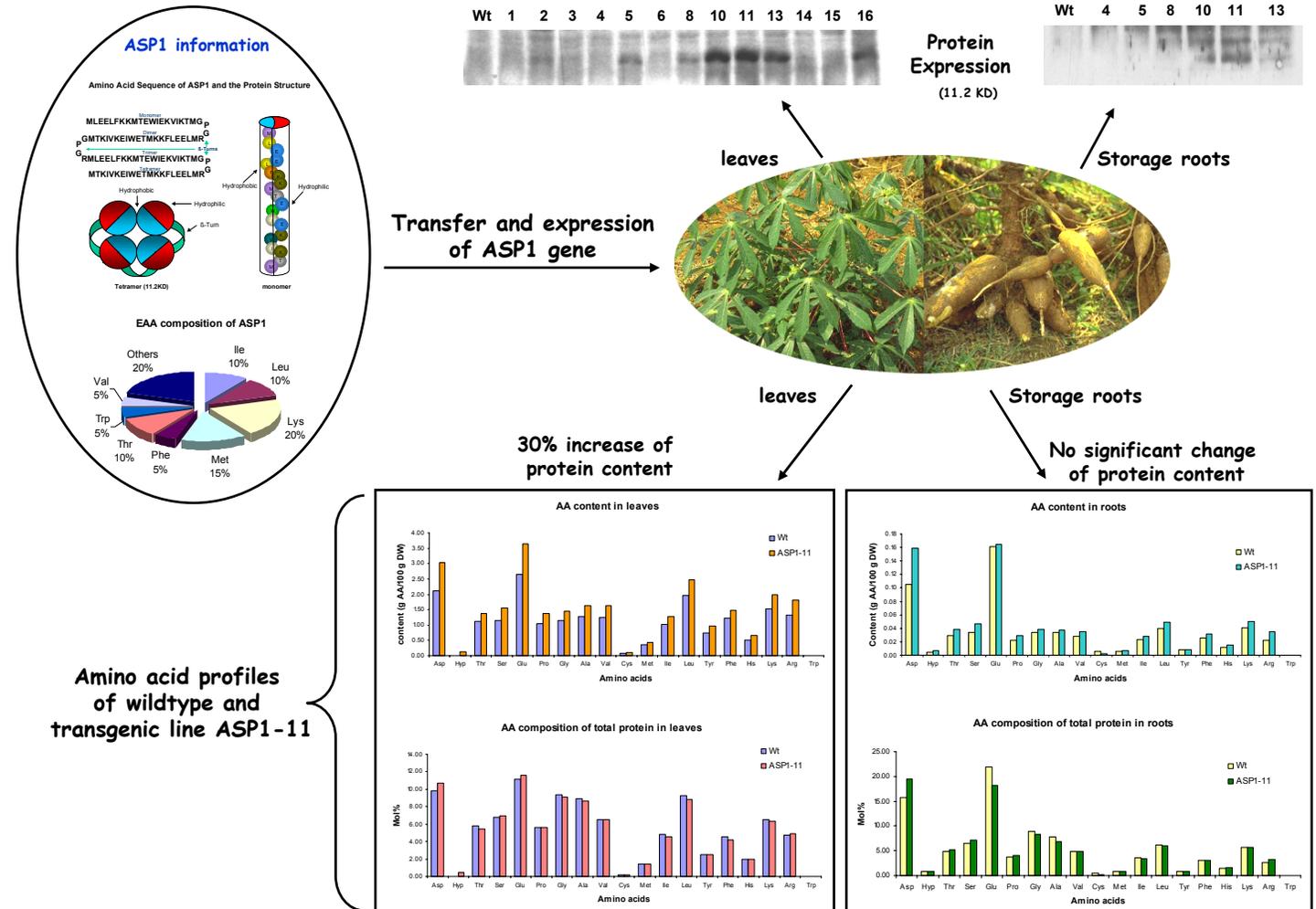
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Introduction:

The starchy roots of cassava provide a food source for approximately 1 billion people worldwide. Although the roots are an excellent source of carbohydrates, cassava lacks protein. Transgene technology offers the opportunity to improve the nutritional value of cassava. Here we report transgenic cassava plants that express an essential amino acid (EAA) rich protein (ASP1) gene controlled by the constitutive promoter CaMV 35S. Our results may give a primary clue to improve the protein content in cassava storage roots and develop new strategies towards the realization of our final goal.

Results and Discussion:



1. The expression of ASP1 can be detected both in the leaves and storage roots of several transgenic lines.
2. There is 30% increase of protein content in the leaves of ASP1-11 compared to wildtype's; however, no significant change in its storage roots.
3. The composition profiles of amino acids were altered both in the leaves and storage roots of transgenic line ASP1-11.

Question: Why did expressing EAA rich protein in cassava not improve its protein content in storage root?

Answer 1: Several key EAAs are deficient in the leaves and storage roots, such as Trp, Met. The low available EAAs may limited the high expression of ASP1 in cassava storage roots.

Answer 2: The activity of CaMV 35S promoter is weak in cassava storage roots.

New strategies:

1. Expression of nutritious storage proteins using cassava storage root specific promoters and specific signal sequences targeting the proteins to storage organelles, plastids and vacuoles.
2. Focuses on the enrichment of essential amino acids in storage roots by modifying amino acid metabolic pathways.