

Development of Innovative Trait of Thai Waxy-Starch Cassava Variety for Industrial Uses and Export

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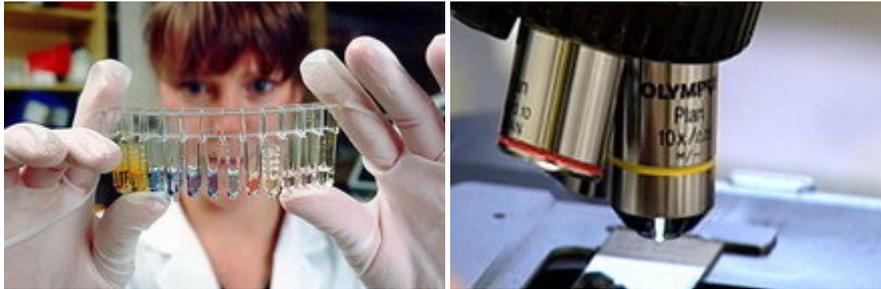
Thailand has achieved world leadership in the tapioca starch industry as a result of collective development of technology and accumulated know-how in tapioca covering all the upstream and downstream areas, and the sustained efforts of the involved parties including technologists, growers and processors. The recent energy crisis and Thailand national policy to search for alternative sources of energy, especially bio-energy, presents a new opportunity for tapioca, to which Thailand opts to move forward. Nevertheless, starch still remains important and will be even more predominant if Thailand can develop specialty traits in tapioca, for specific applications. This follows the successful development of waxy cornstarch (Amylose-free starch), in many countries, which obtains 2 - 3 times as much of the value of regular cornstarch.

In response to the demand for specialty traits, the scientists in CIAT (Center Internacional de Agricultura Tropical) initiated a program to develop the waxy tapioca using conventional plant breeding methods that include germplasm collection, crossbreeding and selection. They have successfully obtained the genotypes that express the specific traits required. The achievement caught the attention of all interested parties. This breakthrough is set to drive change throughout the entire industry from farm production to product development. It offers the new dimension and a golden opportunity for Thailand tapioca starch industry.

The Signification of Specialty Tapioca

CIAT started the tapioca breeding program in March 2006, inducing the mutants by self-crossing the selected genotypes, and successfully derived 2 mutants that possess unprecedented traits. One was the waxy or amylose-free. Another, just the opposite, had twice as much amylose content as regular tapioca. Both traits have significant commercial value. Waxy, 100% amylopectin, is used in many applications in foods and cosmetics that require high paste stability or low retrogradation. On the other hand, High-amylose is processed into resistant starches which are used in some other applications especially those related to health. It is of interest to have these traits present in tapioca. It is well known that waxy cornstarch is required in many applications, and it can not be substituted by modified starches that are derived from regular tapioca. Currently the interested firms are those who pioneer the development of innovative products through physical and chemical modification processes such as Corn Products (US), AVEBE (Europe) and National Starch (US and Europe). Therefore, the above initiative is remarkable. It is proactive and responsive to the market need. It offers the opportunity, the new dimension, and bright future of tapioca starch industry.

Since both discovered traits are present in the clones that are inferior in agronomical performance, and yet to be developed as commercial varieties, it is necessary to upgrade by crossing them with the commercial varieties or those elites that possess high-yield potential and agronomically desired characteristics in order to obtain the commercially valuable hybrids. The development will add value to tapioca and strengthen the tapioca starch industry especially in major exporting countries. CIAT sought to collaborate with those countries, and Thailand was quickly identified as one of the key candidates. It was a great opportunity for Thai Cassava Consortium (TCC), the group of those experts in government and private sectors as well as industrialists, to work on this proactive program and contribute the economy especially in the export sector.



Strategy on High-Value Tapioca Development

After this spectacular discovery, CIAT approached the research institutes in Latin America and Asia, where tapioca research and industry are relatively solid and more advanced. It proposed to Thailand a 5-year program to develop waxy tapioca specifically for Thailand. The program required involvement from various parties to financially sponsor and carry out the field work.

The objective of this collaboration is to develop the waxy tapioca that adapts well in the growing condition of Thailand. Firstly CIAT will make a crossbreeding between the waxy mutant and Thailand's elites or commercial varieties. The derived hybrids will be heterozygous that possess the recessive waxy mutation. Secondly, those first-generation hybrids will be crossed randomly among themselves. The derived seeds from the second crossing will be sent to Thailand. It is expected that 25% of them will be homozygous recessive mutations which express the waxy trait. Kasetsart University will run the field test and select the good performing clones in order to develop further commercial varieties.

Benefits to Thailand

Waxy tapioca crop will create a competitive edge for the industry. Unlike high starch content varieties that give good performance in many uses, waxy varieties give outstanding results in specific applications. Waxy will generate economical value to the country, or the firm, that owns the registered variety. As the owner, Thailand starch industry will gain many advantages, and the country will be able to further grow the export of innovative products.

CIAT was in need of financial contribution for further research and development of this innovation, and an overseas private firm did show willingness to sponsor it. By that time Thailand considered that: The success of the program would be of great interest to the country; The development of the new variety to serve the requirement of end users was the innovation that would enhance the competitive edge of Thailand beyond its competitors; The ownership of the registered variety would allow Thailand to better manage the new tapioca resource i.e. it could freely develop, sell and distribute the materials as desired; It

was also possible to further develop the varieties that are adapted to neighbours and others Asian countries for commercial use; If Thailand failed to collaborate with CIAT in this project, the right ownership could fall into hands of another country or other private firm, and it would be the great loss for Thailand; In broader scope, considering Thailand's potential and capability to progress the technology, the project offered the headway for Thailand to assure its leadership position of Asia and of the world.

For the sake of the national interest and in order to lift up the potential of Thailand tapioca industry, the Executive Board of Thailand Tapioca Development Institute Foundation therefore decided to sponsor the program.

Up to this time the first analysis of starch sample from the mutant of CIAT confirmed the waxy trait. Around the middle of 2009, the first batch of the hybrid seeds will be brought in and be propagated in Thailand. This CIAT-collaboration project is the key that will lead Thailand to a stronger and firmer position in the competitive environment of the global starch market.



Author :

Dr. Sutkhet Nakasathien

Department of Agronomy, Faculty of Agriculture, Kasetsart University

Complied :

Mr. Charae Chutharatkul

President and Director, Thai Tapioca Development Institute

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