Production of glucose syrup from high quality cassava flour, Ghana

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Summary
High quality cassava flour (HQCF) is an attractive alternative to cassava starch that can form the starting point for a cassava-based industry. HQCF production is less capital intensive and requires lower levels of inputs for success, compared to cassava starch. HQCF can be used as an alternative to starch and other imported materials in a range of industries such as adhesives, sugar syrups and industrial alcohol.

Description
Glucose syrup is a concentrated aqueous solution of glucose, maltose and other nutritive saccharides obtained from edible starch. Depending on the proportion of the different sugars in the syrup, it may be specifically called a maltodextrin, high maltose syrup or high dextrose glucose syrup. The type of glucose syrup described here is the high maltose syrup. Although technically incorrect, “Glucose Syrup” is the standard industry term referring to a mixed syrup containing glucose, maltose and a range of maltodextrins of different sizes, i.e. the use of the term is not limited simply to glucose. The industry uses of the term “glucose syrup” is therefore adopted in this record.

1. Glucose syrup from high quality cassava flour

Several industries in Ghana use glucose syrup (mainly imported) in their products. In an attempt to expand existing markets for cassava, technologies were developed to provide a local supply of “glucose syrup” to substitute for the imported product. This technology could yield economic and social benefits to the farmers who produce the cassava, entrepreneurs who produce the syrup, as well as the end-users of the glucose syrup. Some of these benefits would include, foreign exchange savings, improvement in income levels, employment creation, efficient use of natural resources and easy access to an industrial raw material among others. For further details see the TECA record titled “High Quality Cassava Flour”.

High maltose syrup has characteristics such as, low hygroscopicity, low viscosity, high resistance to crystallisation, low sweetness, reduced browning capacity and good heat stability. These properties make it useful in many applications in the food and pharmaceutical industries. In breakfast cereals it is used to improve shelf life, enhance colour, reduce breakage and maintain crispness. It is also used to control crystallisation and sweetness in ice creams and lollies as well as, providing body and
strength to these products. When used in confectionery products it helps to lower the hygroscopicity of the product, controls crystallisation, prevents drying and lowers viscosity. Glucose syrup is also very useful in the manufacture of frozen fruits, liquors and crystallised fruits and in brewing.

An existing Vietnamese technology for glucose syrup production was adapted and modified to enable the production of glucose syrup from high quality cassava flour (HQCF) and rice malts, to provide a local supply source for glucose syrup to substitute for imported products. The technology seeks to provide an easy-to-follow step-by-step process for the production of high maltose syrup. The description also highlights quality control issues, machinery and equipment requirements and potential markets for the product.

2. The importance of quality
This is to ensure that the manufactured products meet the required quality specifications. Before production begins, it is very important to determine the customer’s requirements on quality, and for producers and users to agree a standard for quality of the product.

2.1 Reliability in maintaining quality
When a quality specification has been agreed, it must be maintained at all times. The use of adulterants and short cuts to reduce costs and process times must be avoided.

2.2 Reliability of supply (quantity)
Processors must never promise more than they can produce by the agreed delivery date, as the end user will be planning production on the basis of having the necessary quantities of raw materials.

2.3 Timeliness of delivery
Realistic delivery dates are a must for commercial success.

2.4 Price competitiveness
Industrial users want a local product that is cheaper than the imported alternative. However, reduction in price must not be achieved at the expense of quality. It is vitally important for anyone wishing to market cassava-based products to industry to keep these criteria in mind at all times. Many industries are willing to be tolerant of manufacturer’s difficulties, as long as they are kept fully informed, but are not happy with producers who are found to be unreliable on quality, quantity and timeliness of delivery.

Figure 1. a simple flow chart outlining the steps involved in the production of “Glucose Syrup”

4. Health and safety
- The researchers, their institutions or this website cannot be held responsible
and technologies is the sole responsibility of the user.

5. DFID disclaimer
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7. Further reading

7.1 e-Resources
  • IITA Integrated Cassava Project (ICP) of the International Institute of Tropical Agriculture (IITA) URL.
  • Page on: Cassava Utilization: URL
  • Page on: High Quality Cassava Flour: URL
  • Page on: Glucose Syrup: URL
• Quynh, N.K. and Cecil, J. 1996. Sweetness from starch. A manual for making maltose...
- Contact details for DFID research project teams

8. Agro-ecological zones
- Tropics, warm

9. Objectives fulfilled by the project
9.1 Labour-saving technology (LST)
The technology is less capital intensive and requires low levels of inputs.

9.2 Resource use efficiency
The technology can be used as a good alternative in a range of industries such as starch, adhesives, sugar syrups and industrial alcohol.