

NATURAL AMYLASES

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When cooked, the porridges thicken. This thickening leads mothers to add water in order to give them to their young children. This **dilution** makes the porridges very little nutritious and explains some malnutrition. Faced with this problem ⁽²⁾ amylases are a solution because they cause **liquefaction** of thick porridges

Amylases are enzymes that break down starches into various soluble carbohydrates (sugars). Unlike starch, these sugars do not thicken.

Whether added to flour or porridge, amylases make it possible to prepare porridges with a lot of flour and not much water. These "amylased" porridges are fluid or liquid, have high energy density, are quickly and easily digested.

The addition of amylases helps to overcome the deficiency of salivary and pancreatic amylase in young children and malnourished children.

Amylases are present in the plant kingdom, the animal kingdom and the microorganism kingdom. Instead of alpha and beta amylases ⁽²⁾, we distinguish natural amylases (NA) from commercial amylases (CA)

1. Natural Amylases (NA)

- They have a plant or animal origin and therefore also human origin.
- They are common, very cheap or even free
- They can be used at the family or artisanal level.
- They liquefy thick, hot porridges, in very small quantities added after cooking.
- They enable the preparation of Liquefied Concentrated Porridge (LCP) and thus avoid the dilution of thick porridges.
- Healthy older children and adults prefer thicker porridges. They do not add NA to their porridge.

1.1. Natural amylases of plant origin

Amylases from germinated cereals.

Germinated cereal seeds (sorghum, corn, small millet, paddy rice, ...) are very rich in amylases. Dried, powdered and sieved, they constitute the "malt for porridge". Malt keeps very well in a dry place and can therefore be prepared in advance for several months of use. Malt enhances the sweetness of porridges.

Amylases from germinated beans

Germinated beans seeds are also rich in amylases and can also be used as a source of NA.

- Germinated cowpea has the disadvantage of giving a strong raw bean taste to the LCP.
- Mungo bean (*vigna radiata*) ⁽³⁾ sprouts very quickly and can be a quick source of NA to prepare
- Germinated soybean (*glycine max*) will not be used as a source of NA because he contains anti-nutritional factors that make it very indigestible.

Amylases from Sweet potato

The flesh of some sweet potato is rich in amylases. Grated, dried, ground and sieved, sweet potato can also be used as NA to liquefy concentrated porridges with an efficiency close to that of "malt for porridge".

Sweet potato NA liquefies, sweetens and pleasantly flavors porridge. It can therefore be used in communities where malt is a problem.

1.4. Amylases of maturation

Very ripe fruits (Bananas) also contain amylases.

1.2. Natural Amylases of human origin

Breast milk and saliva are very rich in amylases. They are two sources of NA that are easily shared from mother to child. Breast milk and maternal saliva, in very small amounts, quickly liquefy thick porridge.

Natural Amylases of maternal milk.

It is easy to ask the mother to put a few drops of her milk in the thick porridge of her child and to mix with a spoon.

Natural Amylases of saliva

In healthy adults, the breakdown of starches begins in the mouth thanks to salivary amylase. This facilitates the ingestion of foods containing starch (rice, millet, corn, pasta, bread,...). It is also easy to explain to the mother that a little of her saliva on the spoon with which she mixes and gives the porridge will liquefy the porridge.

This contact spoon / porridge which "breaks" the porridge, should be encouraged.

1.3. Other Natural Amylases are known.

Some fresh honeys contain amylases and can be used to liquefy porridges. Some roots, bulbs or leaves contain amylases and are therefore used for the preparation of local beers ⁽³⁾.

2. Commercial amylases.

These are all amylases that can be purchased for use in food or as medicine.

2.1. Amylases in the food industry.

- They are of bacterial or fungal (yeast) origin and are produced in laboratories. The Codex Alimentarius Classifies these amylases as flour treatment agents under the number E1100.
- They are not available locally. They are expensive and very difficult to obtain.
- They are mixed with the flours so that the porridges do not thicken ⁽⁵⁾,
- They have the particularity to resist to cooking,
- They have an extremely powerful liquefying power. This potency requires very precise dosing before mixing with flour and requires high performance mixers to obtain a homogeneous mixture of minute quantities of amylases in large volumes of flour. Therefore, they can only be used under specific conditions,
- As they are incorporated into the flour, the viscosity of the porridge cannot be adapted to the consumer.

2.2. Pharmaceutical amylases

The French pharmacopoeia used to have malt intended to liquefy children's porridges (Maltogil®, Maltea Moser®). This pharmaceutical malt no longer exists.

The amylases used in the treatment of exocrine pancreatic insufficiency are pancreatic extracts of animal origin, available in the form of micro-granules. (Eurobiol®, Creon®).

Amylases used as anti-inflammatory for sore throat are alpha-amylases in syrup form. (Maxilase®).

**Natural Amylases enable the preparation of
Concentrated Liquefied Porridges (CLP)
and to avoid the dramatic dilution of thick porridges.**

Many sources of natural amylases are available at home, enabling the preparation of
« **baby-friendly porridges** » in all circumstances.

Extention of the use of Natural Amylases revolutionizes international Nutritional
Education programs and enable fight child malnutrition with local products.

Footnotes

(1) . This problem is known as Dietary bulk,

(2) From a scientific point of view, there are two main kinds of amylases, α amylase and β amylases.

The α amylase is a digestive enzyme, present in saliva, pancreas, human breast milk. It is also produced when seeds emerge from dormancy (spouting). The α amylase is also obtained from several kinds of fungi, yeasts and bacteria.

The α amylase is said to be liquefying

The β amylases are more specifically plant-based and are found in germinated cereals, germinated legumes, sweet potato, ripening fruits.

The β amylases is said to be saccharifying.

(3) Sprouted mungo bean is sometimes incorrectly called "sprouted soybeans",

(4) "In West Africa, extracts from *Curculigo pilosa*, *Gladiolus klattianus* bulbs or *Boscia senegalensis* leaves naturally store saccharifying enzymes. On the borders of Zaire (DRC) and Zambia, people exploit *amylases from the dried roots of a shrub (Eminia holubii Taub) or the species Rhynchosia insignis and Vigna nuda*. Plants and cassava beers are grouped together under the name *Munkoyo* (vernacular name for plants of the genus *Eminia*). [Plants with amyolytic complexes, Beer Studies 2012-2013].
In Cameroon, the lowland plant *Burnatia eneandra* has been studied for its amylase.

(5) To prevent porridges from thickening during cooking, there are other solutions than adding amylases to the flours : To break down the starch, the Flours can be biscuit-baked, malted or extruded. .