



Starch identification supported by expert system Determinator

L.W.D. van Raamsdonk, W. Hekman, V. Pinckaers, J. Vliege, S.M. van Ruth

Introduction

Starch is a natural product with a very wide occurrence. Basically every plant stores energy resulting from photosynthesis in the form of polysaccharides, which are recognisable as starch grains. In certain occasions these grains are an abundant part of seeds, e.g. cereals. In some other plant species other parts such as tubers are the main compartment for storage (e.g. potato, yam).

The use of starch is very widespread. At first, starch in a native or modified form is used in all kinds of meals and food products, such as soups, gravies, desserts, bakery products, processed meats, ice creams, beverages and syrups, animal feeds, etc. Besides a major food and feed ingredient, starch whether native or processed is an important material for industrial or home maintenance processes, such as use as adhesive (wall paper), textile finishing (stiffing), paper ingredient, gum, etc.

Starch Identification System

A Starch Identification System (version 3.0) was developed in order to pinpoint starch varieties in food, feed and other products. The system assists in the identification as well as in the recognition of several modifications of starch, primarily but not exclusively applied as part of food and feed. Light microscopy was selected as principal method.

All major staple foods were included along with a range of modified starch types. More than 50 types were described and illustrated with approx. 380 images. Determinator¹ was chosen as platform. The knowledge included can be assessed in different ways, including browse, overview, filter and select options and several identification tools. Manuals and procedures were included.

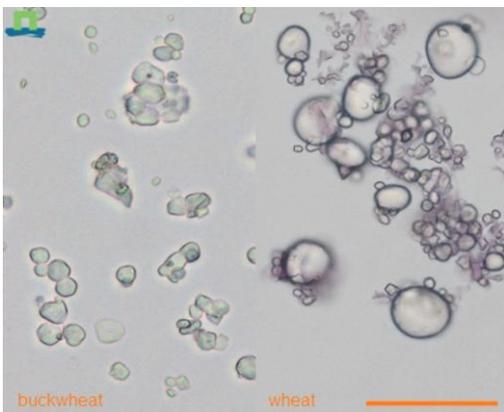


Figure 1 – Buckwheat and wheat starch grains. The bar in the right bottom corner is 50 µm.

Identity and authentication

Flour of wheat and relatives can cause a serious allergy reaction for some people. Products can be investigated for the presence of starch of these sources (Figure 1). Unwanted adulteration of e.g. spices with starch can be assessed easily.

Starch can be used for a large range of purposes, provided that a type of modification is applied. Modified starches (Figure 2) in general have increased value and it is therefore necessary to control the quality of these products. Genetically modified plant varieties are being developed and accepted for application in the starch industry. Some of these varieties with restricted use can be identified visually.

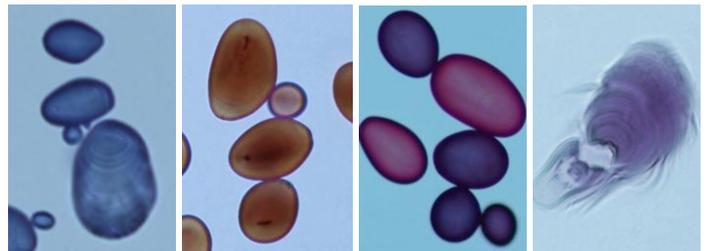


Figure 2 – Modified starch grains of potato, from left to right: native, waxy, esterised (mixed with native), dextrin. Lugol staining.

Feed formulations can be monitored using starch as guiding ingredient (Figure 3). Label control fits in the requirements of EU Directive 2002/2/EC and Regulation (EC) 767/2009.

Conclusions

Identification of starch as ingredient is important for a range of purposes. The Starch Identification System as implemented in the platform Determinator is helpful in this respect since it allows consistent identification of starch in a large variety of products.

Further documentation and downloads at: www.determinator.wur.nl.

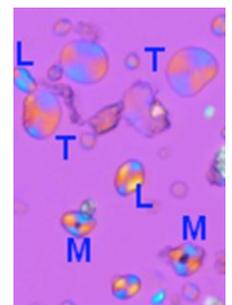


Figure 3 – Triticale (T), Leguminosae (L) and Maize (M) as ingredients in a feed. Polarised light.

¹: L.W.D. van Raamsdonk, M. Uiterwijk, 2011. Determinator: platform for development and presentation of expert systems. RIKILT / Alterra, Wageningen UR, the Netherlands.