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Innovation Promotion Agency CTI

## CTI Success Story

### The ideal potato for a particular dish

**Consumers get annoyed if potatoes don't cook exactly as stated on the pack. But it is not just the variety, or genotype, that determines whether a potato is firm or floury when cooked: other factors such as the soil, the weather and the fertiliser also play a part. A research project is showing the way forward so that in future the bag will contain exactly what it says on the label.**

The living and working habits of people in our latitudes are changing all the time – and so are their eating and shopping habits. Fewer and fewer people are taking the time to cook a proper meal each day, and knowledge about basic foods and how to prepare them is being lost. Potatoes are a typical example: our grandmothers knew exactly what a "Bintje" or an "Urgenta" were suitable for – today's consumers are no longer familiar with the different varieties.

The major distributors responded to this situation nearly ten years ago by inventing a colour coding system for the packaging of potatoes that was more obvious than the name of the particular variety: green for firm, waxy potatoes, blue for floury ones. Coop also sells a brown coded line (small potatoes particularly suitable for raclette) and a red line (potatoes that produce little acrylamide even with intense heating and are therefore particularly suitable for frying).

#### The contents of the bag should be as promised

However, the distributors frequently face complaints because at least some of the potatoes in a bag do not cook as the consumer expected from the bag label. In fact not all potatoes of a particular variety exhibit the same cooking behaviour. But what is it that determines whether a potato

remains firm or breaks up when cooked? And how can you tell just by looking at a raw potato what it will be like when cooked?

#### Two years of field and laboratory research

This question has been investigated in a project by the CTI, the innovation promotion agency, with scientists from various research institutes working with swisspatat, the Swiss potato industry commission. Over two years the scientists investigated which chemical properties essentially determine the cooking properties, which cultivation methods have a decisive effect on these



**The starch content makes a difference: the variety Lady Felicia with a starch content of 12% (left) and 16% (right). The cooking behaviour varies not just among varieties, but also within the same variety and even the same plant. Photo: SHL**

properties and how the latter can be measured in the raw potato. The measurement methods have to be simple and inexpensive so that they can be applied in the trade.

### **Starch, the determining factor**

As expected, starch proved to be the central factor for determining the cooking properties of a potato: the higher the starch content, the more floury the cooked potato. The values vary according to variety: Charlotte or Victoria potatoes only become floury with a much higher starch content than Agria, Bintje or Lady Felicia. Every variety exhibits its own shallower or steeper linear correlation between starch content and cooking behaviour. The field research, carried out over three growing periods on a total of 65 different plots of land, also showed that the starch content of potatoes of a particular variety can vary greatly within the same plot. Even the different tubers of the same plant exhibit widely varying starch contents. Factors such as storage or tuber size have hardly any effect on the cooking type. Many environmental influences such as soil type, weather and fertilisers have an effect on cooking behaviour in that they alter the starch content.

### **If the variety is known, determining the density is sufficient**

In order to be able to predict how a raw potato will behave when cooked, it is sufficient to know its variety (i.e. its genotype) and its starch content. The starch correlates very closely to the specific weight of a potato, so that the cooking type can be inferred by determining the density provided that the typical correlation between density and cooking behaviour for that variety is known.

It is very easy to measure the density of potatoes by determining their weight in and out of water. If this is done using a 5 kg sample of the potatoes, in practice the average cooking behaviour of a particular quantity of potatoes can be estimated at reasonable cost and they can be designated for their ideal use accordingly.

### **And in future - the "premium potato"?**

To further increase the homogeneity within a bag, the individual tubers must also be sorted by cooking type. Theoretically it would be conceivable to measure the density of each individual potato using light waves close to the infra-red range. This method is currently used, for example, to determine the sugar content of apples, which are allocated to different quality categories on the basis of the results. The project shows that the

development of sorting machines for this purpose would be of great interest to the industry. With generally more expensive vegetables, such methods are already worthwhile – with potatoes they would be conceivable at best only if a type of "premium potato" came onto the market, an expensive potato to meet the highest demands of top chefs. Andreas Allenspach from Migros could certainly see the situation heading this way, whereas Alfred Leder from Coop is rather more critical, since a premium potato could devalue other potatoes still further. Because as swisspatat sees it, the declared aim of the research project is generally to persuade consumers to eat more potatoes again.

The way ahead, in the opinion of everyone involved in the market, leads increasingly towards the potato with a specific cooking behaviour and away from the potato variety. The aim is for every bag to contain exactly the potatoes that are ideal for the recipe printed on the bag: a more homogenous content than at present, but at the same low price as far as possible.

#### **Further information**

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