

Extending the shelf life of food products containing fruit

How URC® ingredients are key to mitigating moisture transfer by controlling water activity in cereals, baked goods and snacks

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Abstract

Products featuring real fruit appeal strongly to today's health-conscious consumers, but significant technical obstacles have previously limited the use of fruit-based ingredients in many products with a long shelf life. Dry product applications such as biscuits, baked goods, cereals and snacks have been especially problematic.

Solutions based on URC® fruit ingredients from Taura Natural Ingredients sweep away these technical barriers and pave the way for a wide range of new products featuring fruit pieces, flakes and pastes. These can be designed to deliver all the taste, colour and nutritional benefits of fruit inclusions in products with an ambient shelf life of at least 12 months.

Fruit taps into global trend for health & wellness

Health and wellness has been the biggest megatrend in the food industry in recent years and consumer appetite for healthy eating shows no sign of diminishing. Fruit ingredients provide a colourful, tasty and attractive way to tap into this trend and create a 'health halo' around products.

However, in products such as cereals, baked goods and snacks, incorporating fruit has previously presented a significant technical challenge, since introducing any additional moisture poses a threat to the texture and shelf life of the finished product.

Taura Natural Ingredients offers fruit solutions that mitigate moisture transfer in a range of long shelf life dry foods and enable companies to develop products that include a variety of fruit pieces, flakes and pastes. In other words, they enable manufacturers to include fruit in products where it would otherwise be impossible without seriously compromising shelf life.

Taura uses its proprietary Ultra Rapid Concentration (URC®) technology to concentrate fruit purées and blends to below 10% moisture in less than 60 seconds. However, it is not the absolute moisture content that decides whether ingredients can be used successfully in tricky applications. The crucial parameter is water activity (A_w), which is a measure of the ability of water to migrate from a given ingredient into the surrounding food matrix. It is Taura's unique ability to tailor the water activity of its URC® ingredients to each application that opens up a new world of product development opportunities.

Taura's range of URC® ingredients are designed to deliver significant marketing and technical advantages in applications such as:

- Fruit snacks
- Snack bars
- Cereals
- Baked goods
- Biscuits
- Chocolate and other confectionery

What is water activity and why does it matter?

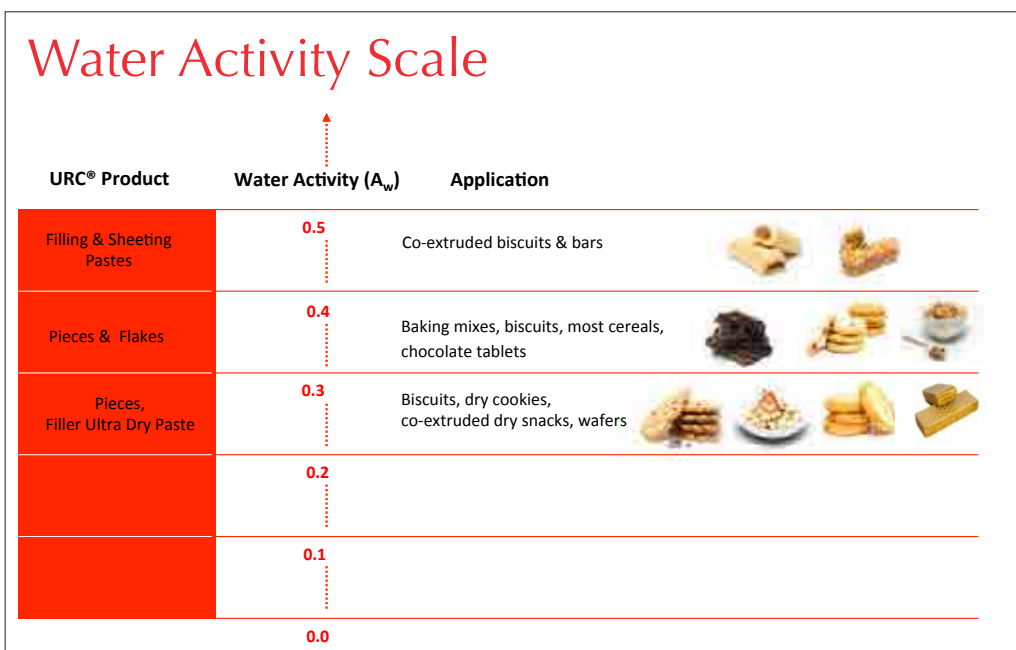
Water is typically bound inside a material by a combination of hydrogen bonds, ionic bonds, dipole-dipole interactions and Van de Waals forces. With such complex forces at work, the absolute amount of water in the system may not relate to the ability of water within a food to escape. As a result, manufacturers require another means to measure the tendency of water to migrate into the surrounding food matrix.

Water activity provides this means. It measures the energy status of the water in a given system. High-energy water is more able to escape than low energy water.

How do we define water activity?

At room temperature, water molecules move from the surface of a food to the atmosphere and back again until they reach equilibrium. The definition of water activity effectively compares the pressure generated by the vapour escaping from the surface of the food (p) with the vapour pressure of pure water under the same conditions (p_0):

$$A_w = p/p_0$$



The reason why water activity is such a critical parameter for food manufacturers varies depending on the application. In cereals, for example, fruit pieces need to exhibit the same water activity as the other components in order to prevent the cereal flakes from going soggy and the fruit pieces turning hard. In baked fruit filled bars, cakes or cookies, the fruit paste must have the same water activity as the surrounding product to prevent moisture and colour leaching into the rest of the bar.

More generally, ensuring that fruit ingredients have the correct water activity can prevent shelf life problems that might otherwise arise in one or more of the following areas:

- **Microbial growth:** Micro-organisms need access to water to grow. Bacteria will not grow if the water activity is below 0.70. Moulds will not grow if the water activity is below 0.60.
- **Physical properties:** Water activity can have a major impact on colour, taste, texture and aroma.
- **Controlling moisture migration:** Water activity is an important tool for controlling water migration in multi-component foods. In other words, achieving the correct level of water activity can prevent soggy biscuits and cereals.
- **Chemical/biochemical reactivity:** Water activity can play a significant role in determining the activity of enzymes and vitamin stability in foods. Water may influence chemical reactivity in different ways. It may act as a solvent or reactant, for instance, or it may change the mobility of a reactant by affecting the viscosity of the system. Water activity therefore influences a range of common chemical processes in foods, including non-enzymatic browning, lipid oxidation, degradation of vitamins and enzymatic reactions, which can all impact on shelf life.



Taura tailors the water activity of fruit ingredients to suit each application

Taura's unique URC® technology uses physical and mechanical forces to remove water from fruit purées and blends. This proprietary process is suitable for heat-sensitive fruits, so the resulting concentrate retains the flavour, colour and nutritional characteristics of the raw materials.

Most importantly, the URC® process can be used effectively to control the water activity of the resulting ingredients. Taura's URC® ingredients exhibit a water activity of between 0.35 and 0.65, in contrast to conventional 'dried' fruit, which has a water activity of about 0.6. In practice, this means that finished foods with URC® inclusions enjoy a shelf life of at least 12 months and that crunchy and crispy foods will maintain their texture – even when they feature soft fruit pieces, layers or fillings.

Taura's ingredients can be formulated to maximise the water binding characteristics for a range of product types and formats. These include ultra-dry pastes that create soft, real fruit fillings with a water activity of just 0.35.

Creating market opportunities

The ability to include meaningful amounts of real fruit creates excellent opportunities for new product development. The URC® process can utilise flavour blends, natural extracts and a range of fortification options. In other words, it enables manufacturers to respond quickly to emerging trends in healthy eating.

Taura's portfolio of ingredients ranges from 100% fruit-derived material with no added sugar to indulgent flavour concepts. With no artificial preservatives, colours or flavours, manufacturers can explore these opportunities without compromising the clean-label credentials of their products.



URC® ingredients also offer a range of technical benefits. They are highly bake-stable, and URC® fruit pieces and pastes feature a pectin gel structure that will not burn or boil-out, so their texture remains soft after cooking. The ingredients also stand up extremely well to physical processing, including pumping, extrusion and filling.

URC® ingredients are very easy to use. They can be stored at ambient temperature, they require no messy preparation and they are free-flowing for straightforward incorporation into the manufacturing process.

Explore a world of new product opportunities

URC® concentrated fruit ingredients from Taura effectively tear down the technical barriers that have prevented manufacturers from developing delicious, long-shelf-life products with the powerful consumer appeal of real fruit.

These solutions offer the flavour, texture and goodness of fruit with less wastage and mess. They are also easy to use in a wide range of commercial applications, where they offer long shelf life and significant taste and texture benefits over dried or candied fruit.

URC® concentrated fruit ingredients are backed by Taura's unrivalled technical expertise and product development support, which is offered to all of the company's customers.

For more information, please contact: service.ap@taurauc.com

About Taura Natural Ingredients

Taura is the leading global concentrated fruit products company, delivering exceptional taste and functionality. Using Ultra Rapid Concentration (URC®) technology, Taura produces fruit pieces, flakes and pastes for a wide range of products, including snacks, baked goods, cereals, chocolate and confectionery. Taura has sales and manufacturing operations in New Zealand (for Asia-Pacific), Belgium (for Europe) and a sales operation in Virginia, USA (for North America). For more information visit www.tauraURC.com.

