

# Apple Therapy

How healthy are apples? Can they be used for therapeutic purposes?

In a project entitled *AppleCare*, researchers at the Laimburg Research Center have been working with dermatologists and the University of Innsbruck to find out whether eating apples can alleviate birch pollen allergy.

By Barbara Bachmann

Photography by Patrick Schwienbacher

Irritated, swollen lips, mouth, and tongue. Coughing and sneezing. Burning, watery, puffy eyes. Fatigue and headaches. The symptoms of birch pollen allergy are as varied as they are unpleasant. Appearing most persistently between March and April, they affect about one in five people in Central Europe. And that number is rising.

But that's where the apple comes in, as a team of researchers from the Laimburg Research Center in South Tyrol have found out in a joint study with the South Tyrolean Health Service's Department of Dermatology, the University of Innsbruck's Institute of Organic Chem-

istry, and the Clinic for Dermatology, Venerology, and Allergology at the Medical University of Innsbruck.

"Some fruits – particularly apples, but also peaches and cherries – and vegetables such as carrots, celery, fennel, as well as nuts contain proteins that are related to the birch pollen allergen. So they can also trigger allergy symptoms," says Dr Thomas Letschka, Head of Applied Genomics and Molecular Biology at the Laimburg Research Center in the south of South Tyrol.

It's a Monday morning in late May 2020 and the thermometer outdoors is already

reading 27°C. Indoors, in the cool laboratory, Letschka is talking about the *AppleCare* project, in which he was the scientific lead from January 2017 to December 2019. The interdisciplinary team from Austrian Tyrol and Italian South Tyrol used this similarity between birch pollen and apple proteins to develop a natural immunotherapy for birch pollen allergy.

Allergen immunotherapy works by supplying the body with small doses of the allergenic substance which are gradually increased until the body becomes accustomed to the substance and no longer identifies it as foreign. "A birch

# “Our aim is to boost the appeal of the apple.”

Walter Guerra, *Laimburg Research Center*

pollen allergy can be alleviated by eating apples,” the molecular biologist says. According to Letschka, who is himself an allergy sufferer, the therapy has numerous advantages: “The subjects were able to eat apples again for the first time in years. And they suffered far fewer symptoms of birch pollen allergy the following spring.” Because of the small number of subjects involved, the project should be seen as a preliminary study, he notes, adding that they are planning to extend it to hundreds of people.

With projects such as *AppleCare*, the Laimburg researchers are aiming to scientifically substantiate the well-known adage, “An apple a day keeps the doctor away”. “We are simply not taking the conventional wisdom of apples being healthy as read,” says Walter Guerra, head of the Pomology Research Group at the research center. A lot of research has already been conducted on the apple, but there is still a lot more to be done, especially in respect of health claims.

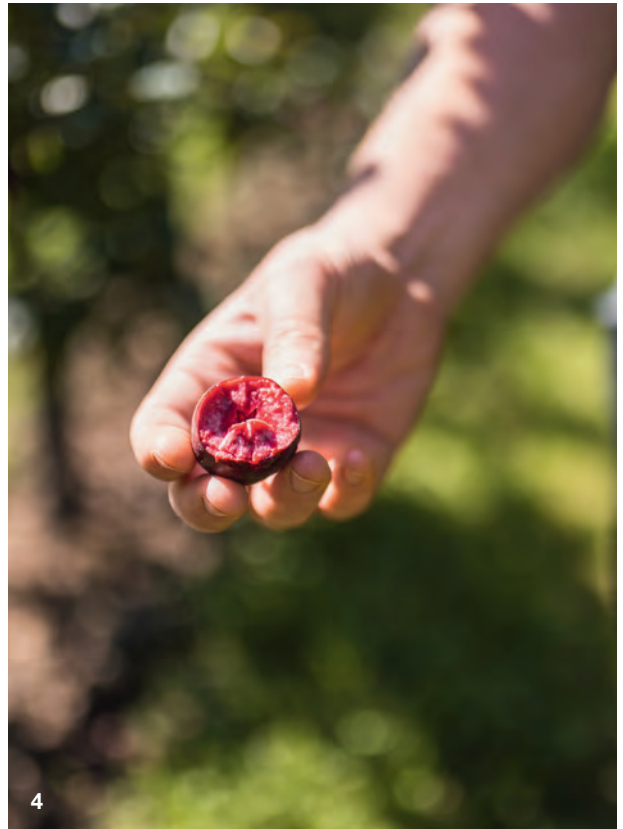
Rich in fiber and vitamin C and with a natural laxative effect, the apple, Guerra says, has become a staple food because of its nutrients, its excellent keeping qualities, and the fact that it can be eaten raw. Apples are consumed in much larger quantities than berries, for example. Average apple consumption in Italy is around 20 kilograms per person per year, although the numbers are tailing off slightly. “We are aiming to maintain or even boost consumption and the appeal of the apple,” he says.

As he talks about the benefits of the apple, Walter Guerra is standing among some of the apple trees in the Laimburg trial orchard. Varieties that are not yet available on the market have been trialed here for the past 40 years. At present they have 300 international varieties, 120 local heirloom varieties, and 100 from the center’s own breeding program, which has been running for 20 years. Breeding is an undertaking that requires a lot of patience. “It takes at least 20 years from pollination of the blossom to the point when the apple is available for consum-

**1** *Walter Guerra*, Head of the Pomology Working Group at the Laimburg Research Center, which for the past 40 years has been testing varieties that are not yet available on the market.

**2+3** *Thomas Letschka*, Head of Applied Genomics and Molecular Biology at the Laimburg Research Center, would love to expand his research to hundreds of people.

**4** With projects such as *AppleCare*, the Laimburg researchers aim to scientifically substantiate the well-known adage, “An apple a day keeps the doctor away”.



# The red-fleshed apple looks like a completely different fruit.

ers to buy,” Guerra says. The Research Center recently submitted two breeding numbers for EU plant variety rights. A Laimburg-bred apple variety could soon be making an appearance on supermarket shelves.

“The apple has a stronger varietal identity than other fruits such as apricots,” the pomologist says. Consumers can generally recognize different varieties. “The fascinating thing about the apple is its great diversity. We can select from it for specific uses, such as apple therapy to alleviate birch pollen allergy.”

The AppleCare project, which was funded by the European Regional Development Fund (ERDF) and the Interreg V-A Italy-Austria program with a total budget of around EUR 800,000, recruited people from Tyrol and South Tyrol with an apple and birch pollen allergy. Skin and allergy tests were carried out on 60 volunteers in hospitals in Bolzano and Innsbruck. Twenty-two finally took part in the one-year apple therapy trial.

Besides recruiting patients, the first steps also involved identifying suitable apple varieties, Thomas Letschka explains. “Altogether we analyzed 23 different apple varieties, including market varieties, old local apples, and some new ones.” After numerous laboratory trials and clinical tests, the researchers settled on three varieties. The first was the red-fleshed variety RM-1, marketed under the brand name Red Moon. Depending on their individual tolerance level, every day for three months the subjects ate anything from a few pieces to a whole apple of this variety, which is classified as very mildly allergenic.

Over the following three months they consumed the moderately allergenic variety Cripps Pink (Pink Lady), well-known for its pink skin and juicy, sweet, slightly acid taste. The third apple was the popular yellow-skinned, sweet, aromatic Golden Delicious. The subjects ate this variety, the most highly allergenic of the three, for the last six months of the trial.

“In the chemical part of the project, the researchers looked at the structure of the allergens,” Thomas Letschka explains. In the molecular biology part, he and his colleagues investigated the apples at the genetic level. “We asked ourselves questions like: What allergens are there in the genetic make-up of the apple and how often are they produced? Are they the same in all varieties? How active are the genes?” Among other things, the researchers discovered that the quantity of allergens is not only determined by the variety but also by how the apple is stored. But the quantity of allergens an apple contains is not the only reason why this fruit can trigger allergic reactions.

The apples the project revealed as being the most easily tolerated and least allergenic are the ones Walter Guerra is standing in front of in the Laimburg trial orchard. The leaves of their trees shimmer with reddish tones. He picks an apple and bites into it. It is not quite ready to be harvested, but you can already see its red flesh. “The red coloration comes from anthocyanins,” Guerra explains. Anthocyanins are regarded as having anti-inflammatory and vasoprotective properties. They bind free radicals and protect the DNA, lipids, and carbohydrates from damage.

A red-fleshed apple is unusual; at first glance a lay person may not even recognize it as an apple. In some countries this variety has been on the market in small quantities for several years now, under the umbrella brands Kissabel, Red Moon, and Red-love. Some retailers would like to market it as a superfood because of its health-promoting properties, which are said to surpass those of a normal apple, Guerra says. Red-fleshed varieties are the new trend in the apple industry. **BB**

In the chemical part of the project, the researchers investigated the structure of the allergens.

