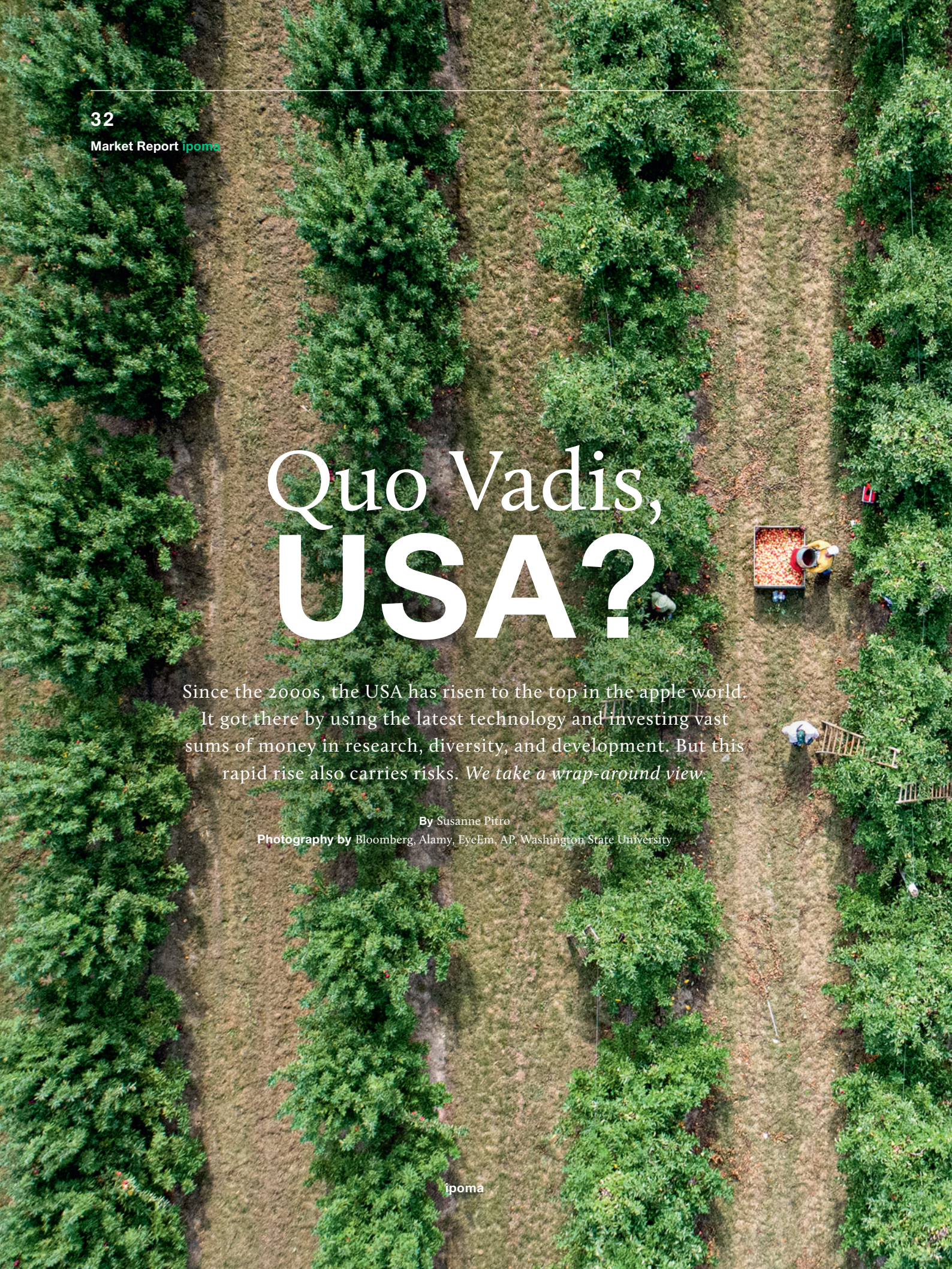


Quo Vadis, USA?

Since the 2000s, the USA has risen to the top in the apple world. It got there by using the latest technology and investing vast sums of money in research, diversity, and development. But this rapid rise also carries risks. *We take a wrap-around view.*

By Susanne Pitro

Photography by Bloomberg, Alamy, EyeEm, AP, Washington State University

Gala harvest in the US state of Michigan. With *private and state capital* in plentiful supply, the US shows the direction the global apple industry's technological journey will take in the future.

“For the past few years, we have increasingly been struggling with climatic anomalies.”

Tim Welsh, *General Manager of Columbia Orchard Management (COM)*

A dry climate with low humidity, little rainfall, and big temperature differences between cold nights and warm days – coupled with fertile, often volcanic soils and no end of water from rivers and lakes. This makes places like Wenatchee Valley, Yakima Valley, Columbia Basin, Lake Chelan, and Okanogan perfect apple growing country. An estimated 3.1 million-plus tons of apples were grown here across more than 70,000 hectares in the 2021/22 harvest year. Two out of every three fruits picked in the USA come from these areas in Washington State, the epicenter of the US apple industry.

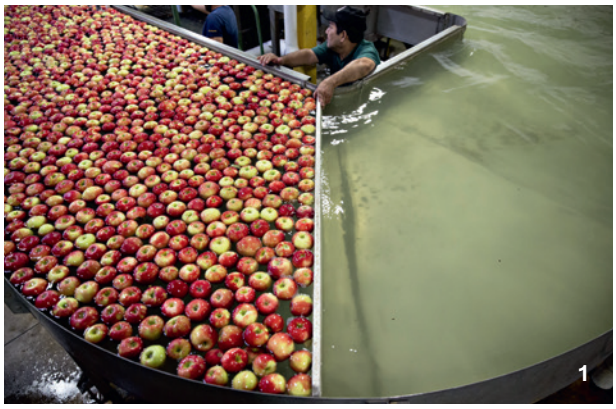
Since the turn of the century, the USA has become one of the big players in the global apple business alongside China. Reason enough to take a closer look at the market giant – perhaps even helping to predict developments in other countries. Most things run smoothly in North America, but as elsewhere there are challenges that can only be resolved with vision and a united approach. “For the past few years, we have increasingly been struggling with climatic anomalies,” says Tim Welsh. The General Manager of Columbia Orchard Management (COM) has worked in the apple industry for 42 years. In summer 2022 he has just come through the coldest spring of his entire career. Slap bang in the middle of the apple blossom season, 30 centimeters of snow fell in Wenatchee and the temperature didn’t rise above 15 °C (or 60 °F) until June. “In 2021, on the other hand, we had had the other extreme: a record heat wave and 44 °C, or 111 °F, in June, which put trees and fruits under extreme stress,” says Welsh.

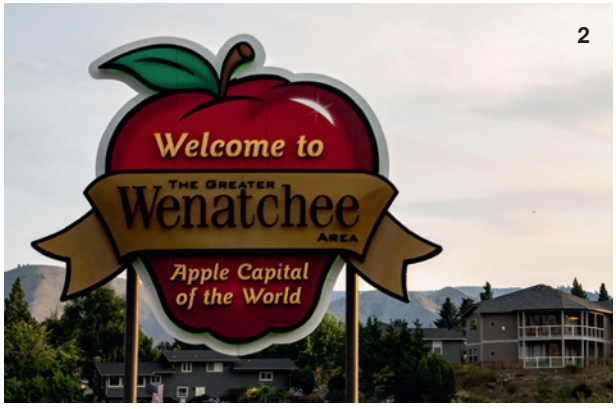
COM is the operating arm of Columbia Fruit Packers, one of the largest marketing organizations for apples and cherries in the USA. And it’s not only weather extremes that are causing stress there: labor shortages are another major headache. The phenomenon of the Great Resignation – record numbers of people leaving their jobs since the Covid-19 pandemic – had already been looming in US apple orchards for some years. Government policies and the pandemic restricted the numbers of immigrant workers entering the country, while “we are losing domestic workers faster than we can replace them,” according to the Industry Outlook 2021 by USApple. The interest group representing the 26,000 US apple growers and 3,700 companies in the apple sector estimates that employment in apple orchards fell by an annual average of 20 percent between 2014 and 2020, while labor costs rose. This

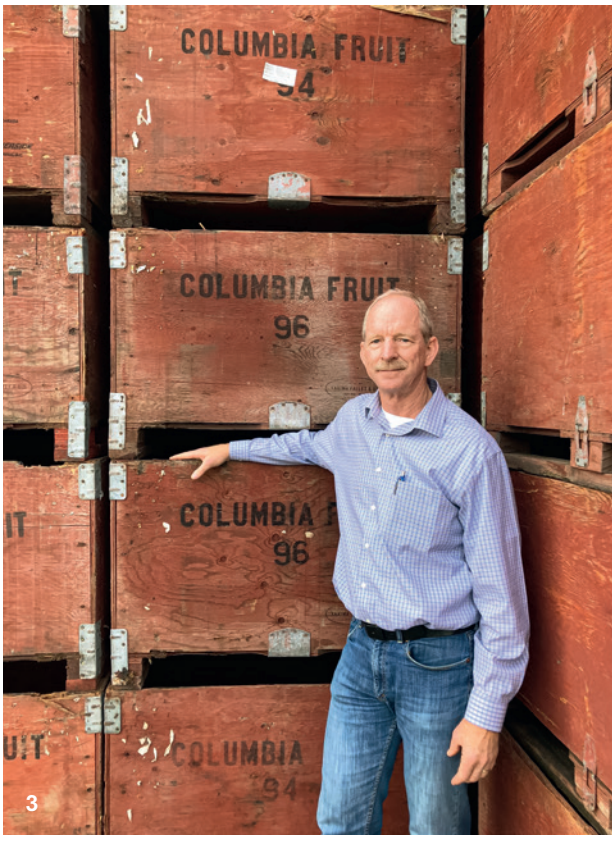
1 + 4 Alongside China, the USA is one of the *big players* in the apple business.

2 Wenatchee is a *stronghold of US apple production*. Two out of every three fruits picked in the USA come from Washington State.

3 *Tim Welsh* is General Manager of Columbia Orchard Management (COM), the operating arm of the largest American apple marketing organization.


1


Welcome to
THE GREATER
Wenatchee
AREA
Apple Capital
of the World
2


COLUMBIA FRUIT
94
COLUMBIA FRUIT
96
COLUMBIA
96
COLUMBIA
94
3


4

1 *Technologies* from all over the world can be trialed at the large, vertically integrated orchards in the US. Currently, researchers are working flat out on harvesting robots.

2 Italian pomologist *Stefano Musacchi* is Endowed Chair at Washington State University.

3 To combat heat damage in *increasingly hot summers*, fine water mists and nets are being tested in Washington's orchards.

is a huge problem to which – like the challenges of climate change – there is only one answer: technology. Or in other words, research into new technologies and varieties.

"It would be presumptuous to say that Washington State leads the world in developing new technologies," Welsh says. "But one thing is certain: no-one involved in developing technology can afford to ignore Washington." Yet for a long time there was very little interest worldwide – including from South Tyrol's apple experts – in what was happening on the other side of the Atlantic. "Fifteen years ago we would not have chosen to spotlight the US apple market at Interpoma," says Walter Guerra, head of the Institute for Fruit Growing and Viticulture at the Laimburg Research Centre. From product range to cultivation technology to marketing, everything in the USA felt old-fashioned in those days. But a lot has happened since then. First and foremost, many small businesses have evolved into large, vertically integrated companies. Technologies from all over the world can be tested on a large scale there. The apple giants also have their own research and development departments.

"Around 80 percent of US apple production is in the hands of eight to ten companies in Washington. And we are talking about groups with plantations in the order of around 2,400 to 4,000 hectares," says Stefano Musacchi. The Italian pomologist is Endowed Chair of Tree Fruit Physiology and Management at Washington State University in Wenatchee. Musacchi began his career at the University of Bologna and dived deeper into the apple business during a stint at the Free University of Bozen-Bolzano in South Tyrol. His reasons for accepting the Chair at Wenatchee in 2013 were mainly due to funding opportunities in the US system. "In just nine years in the USA, I have raised 5.7 million euros in research funding for my program," the pomologist says.

In Washington, one major source of funding for his research comes from the producers themselves. Since the late

2


3

“In just nine years in the USA, I have raised 5.7 million euros in research funding for my program.”

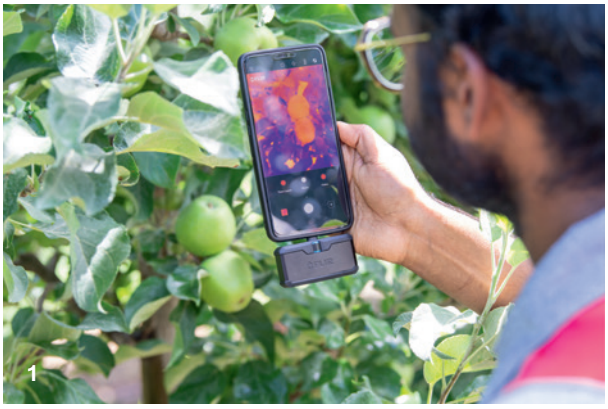
Stefano Musacchi, *pomologist and researcher in Washington State*

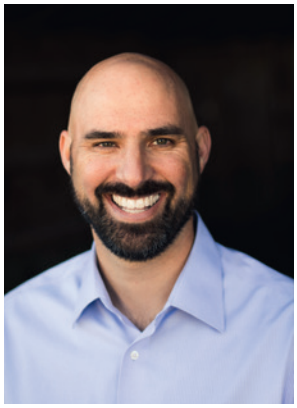
1960s, the Washington Tree Fruit Research Commission has received a very small share of all sales from fruit growing to finance research projects benefiting fruit farms. A ten-member commission, made up of representatives of fruit producers, regularly issues guidelines on what specific research the three to five million dollar budget should be spent on. “As a researcher, it’s then a matter of designing your projects to align as closely as possible with the commission’s goals so that they can be approved,” Musacchi explains. But the funds are also intended as a form of seed capital for larger-scale ideas. “If you look for partners for your subject in other US states, you can put together a more wide-ranging project – as happens with EU projects – and get much more lavishly endowed research funds from the federal government,” the professor says. He has already carried out four such federal research projects himself. “That has a lot of advantages, because in a sense I am multiplying the dollars that are available for my stakeholders’ research.”

With plenty of private and state capital, the US apple industry – and not only in Washington – is demonstrating in many areas where the technological journey will head in the future. Technologies are already available that allow all relevant orchard indicators to be recorded automatically, from tree growth and crop load density to the stress the trees are under. Cornell University’s Geneva rootstock series has been setting new standards for decades, for example in resistance to diseases such as fire blight and in quality traits such as fruit size and hanging density. To combat the increasingly hot summers and associated consequences such as sunburn, many US growers have already gained a lot of experience with nets, but also with fogging systems that envelop the tree canopies in a fine mist of water on hot days to prevent the fruit from overheating.

“A recent survey revealed that there are currently 80 varieties on the market.”

Tom Barnes, *CEO of Category Partners LLC*





But the hottest topic by far is technology that can be used to automate orchard work. “Almost everything I am doing in apple orchards at the moment is geared towards preparing the orchards for automated harvesting,” says Musacchi. All trees must be aligned uniformly so that the fruit can be reached by a robotic arm. “And that arm only has one horizontal movement,” he adds. In other words, while agritech companies are working feverishly on robots equipped with interacting computer eyes, software, and robotic arms that can identify and pick ripe apples without damaging them, the cultivation systems must also be adapted to these new digital harvest assistants.

The motto in Washington’s apple orchards is: 2-D, not 3-D. Narrow, see-through “fruit walls” with short branches are ideal for robotic harvesting. The distribution of the fruits on the tree is also becoming more and more important. Cultivation systems are therefore being adapted accordingly. “We need to facilitate mechanical access while at the same time increasing yields from the new systems,” says COM’s Tim Welsh. “We are achieving 80 to 100 tons per hectare in some cases, but the average is still well below that.” While more and more apple orchards are being irrigated or protected from frost automatically and activities such as spraying, mowing, and tree maintenance are increasingly being done by machines, the big breakthrough in automated harvesting has yet to come. What is more, the bankruptcy of one of the most promising robot producers has also put a major damper on Stefano Musacchi’s hopes of the technology being ready in just a few years from now. “There are a number of question marks at the moment. But there’s absolutely no question that automated harvesting is the future,” he says.

1 The arrival of new *digital harvest assistants* means changes to cultivation systems.

2 + 3 The enormous array of varieties is beginning to overwhelm US consumers, says market research expert *Tom Barnes.*

The US Market in Figures

#1

CONSUMED FRUIT IN THE USA

5,034,875 t

AMOUNT OF APPLES GROWN ANNUALLY IN THE USA
(= 11.1 BILLION POUNDS)

67%

OF CROP IS GROWN FOR FRESH CONSUMPTION.
30% IS USED FOR JUICE AND OTHER PRODUCTS

154,590 ha

TOTAL ACREAGE OF LAND FOR GROWING
APPLES IN THE USA

7,000+

DIFFERENT VARIETIES
GROWN IN THE USA

1 of 4

FRESH US APPLES ARE
PRODUCED FOR EXPORT

6.1 %

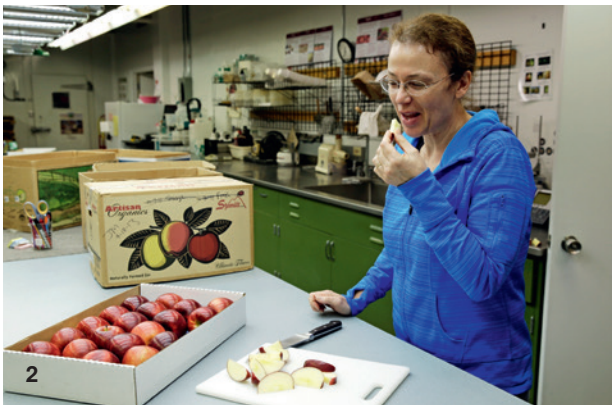
GROWTH FORECAST IN US APPLE
PRODUCTION BY 2025

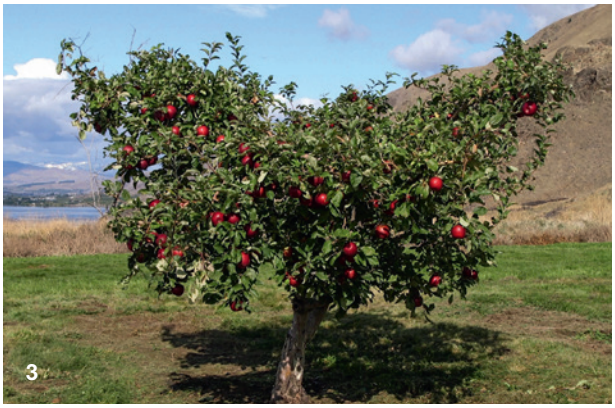
26,000+

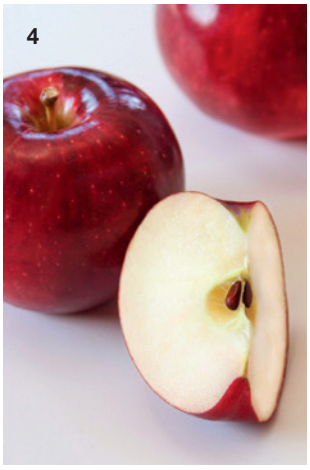
APPLE PRODUCERS IN THE USA. APPLES ARE
GROWN IN ALL 50 US STATES

616.9 M $

TURNOVER IN ORGANIC APPLES IN THE USA
IN 2020 (15.5% OF TOTAL TURNOVER)





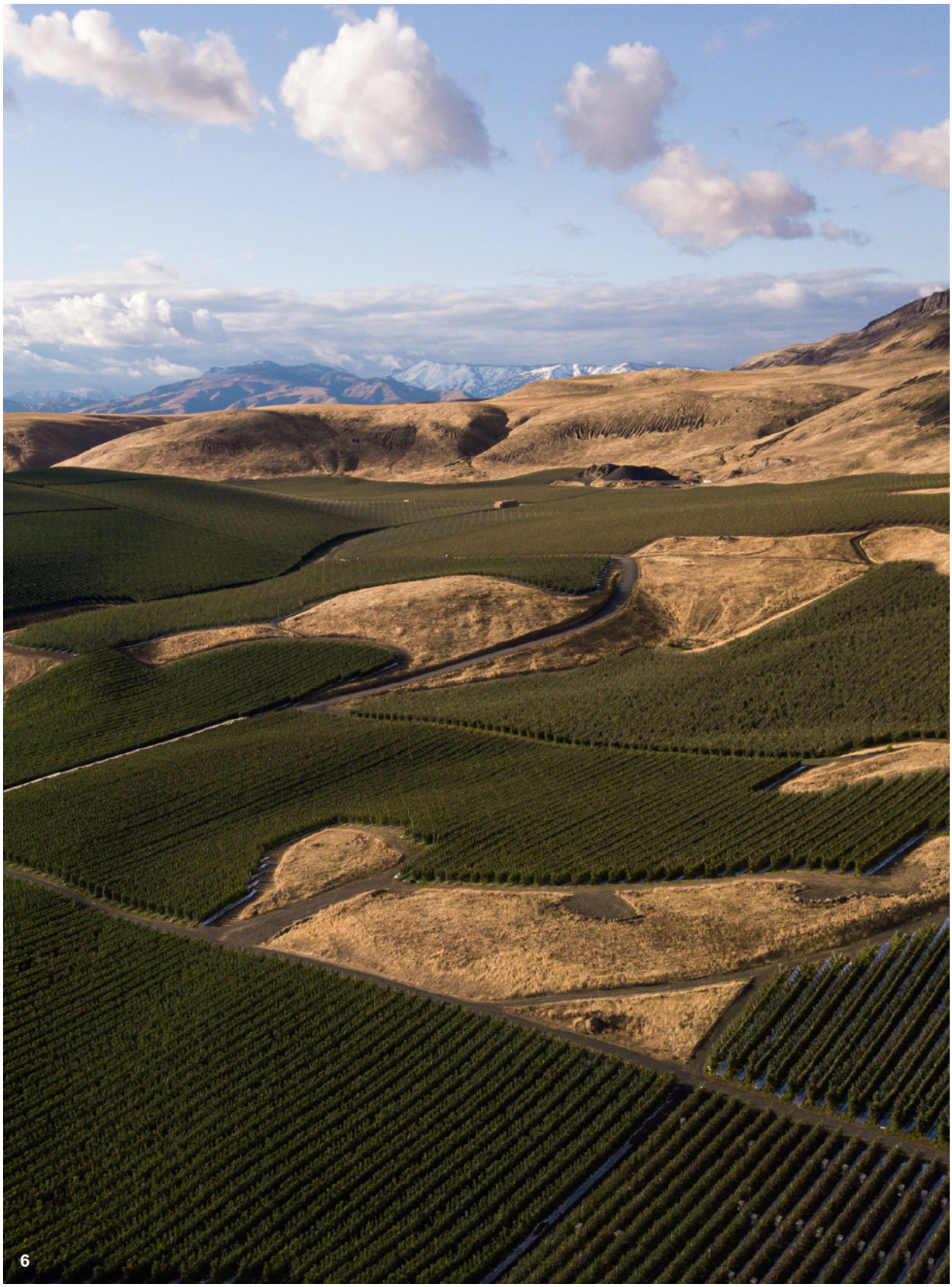


1 *W38 Cosmic Crisp®* is the first variety to be bred in Washington State. The gray layer of kaolin clay protects the fruit from sunburn.

2 + 3 *Kate Evans*, researcher at Washington State University, co-developed the Cosmic Crisp. The mother tree still stands on the university's Wenatchee site.

4 + 5 The cross between Honeycrisp and Enterprise is the most successful *apple newcomer* of all time: just one year after its launch, Cosmic Crisp is the #7 best-selling variety.

6 Since 2017, *14 million* of the new trees have been planted in Washington.



6

The Cosmic Crisp® is an apple that gets everything just right: color, texture, flavor – and storage properties.

What is already a reality, however, is that almost every harvest brings the US consumer an even greater choice of apples. But for Tom Barnes' liking, the range of apple varieties on offer has actually begun to overshoot the mark: "A recent survey revealed that there are currently 80 varieties on the consumer market," says the CEO of data analysis and market research specialists Category Partners LLC. "Consumers are often faced with shelves containing up to 30 different types of apples." And this is in a country where the apple has long been synonymous with Red Delicious. A marketeer like Barnes sees this as a problem: how to communicate the unique selling points of an ever expanding number of premium brands and club varieties? Especially against a backdrop where:

1. with the exception of 2020, annual apple consumption has declined slightly over the past five years;

2. the share of online trade is increasing, with new products more difficult to accommodate; and

3. the rise in inflation as a result of the war in Ukraine has drastically reduced consumers' willingness to buy more expensive apples.

"Influencer marketing still offers some opportunities, but often all you can do now is work along the lines of 'display and pray,'" Barnes says. In other words, put the apples on the shelves and hope they will sell. Nevertheless, he also points out that over at least the past decade, the flavor and quality of apples in the USA have progressed in leaps and bounds.

This is mainly thanks to people like Susan Brown, head of Cornell AgriTech in Geneva, New York; Bruce Barritt and Kate Evans of the Washington State University Tree Fruit Research and Extension Center; and David Bedford of the University of Minnesota's apple breeding program. The latter landed the first real apple hit with the Honeycrisp variety launched in the 1990s. "Super juicy, super crunchy, super tasty: a hot, fantastic apple, but a nightmare for the grower," is how the fruit is often described. Number three in the US market in terms of volume after Gala and Red Delicious, it was the catalyst for a veritable boom in variety development and a constant stream of new flavor highlights with better agronomic behavior. Cornell AgriTech's Susan Brown alone has achieved a number of successes over the past decade, including NY1 SnapDragon™ and NY2 RubyFrost™, as well as Pink Luster (NY 73), Firecracker (NY 109), and the scab-resistant Cordera (NY 56).

But the biggest new release sensation in recent years is undoubtedly W38 Cosmic Crisp®. Bred by Bruce Barritt and Kate Evans of Washington State University, this Honeycrisp/Enterprise cross is an apple that gets everything just right – from color, texture, and flavor to excellent storage properties. Since 2017, 14 million trees have been planted in Washington State, where – alongside South Tyrol – Cosmic Crisp is grown exclusively. Never before in the history of apple growing has a variety spread so rapidly in such a short space of time or has so much marketing effort been expended on an apple. Such hype is clearly not risk-free, but so far, at least, the rising star of the US apple firmament has kept its promises: a year after its market launch, in spring 2022 it already ranked in surveys as the seventh best-selling apple in the USA, with a market share of 2.2 percent. Its price per pound of $2.51 was almost twice as high as that of Red Delicious ($1.34), although it was still below Honeycrisp ($2.63).

One thing is already certain: even though Tom Barnes may be keen to see producers consolidate brands and reduce confusion, Cosmic Crisp won't be the last word in apples on the US market for long. With the country's top breeders having amassed so much knowledge, further innovations will not be long in coming, and not just in terms of flavor. We will also be seeing plenty more on plant diseases and, importantly, greater plant resilience to the effects of climate change, for example. "There are many things we can optimize to make crops more resilient to weather extremes, but the first solution must surely lie in genetics," says Stefano Musacchi. So, *quo vadis*, USA? Towards a future awash with challenges. But the country's apple industry is well prepared for them. **SP**