A LIVING COLLECTION OF OLD APPLE VARIETIES

A wealth of apple v

arieties

Apple varieties have been disappearing from the market at an ever-increasing rate since the 1970s, at a risk of unique heritage disappearing with them. More and more of that heritage is now growing and blossoming in the gene bank collection in Randwijk, near Wageningen. ‘Sometimes breeders collect pollen here for cross-breeding. There is always a demand for new flavours, new shapes, and above all new forms of resistance to disease.’

TEXT MARION DE BOO **PHOTOGRAPHY** ERIC SCHOLTEN

Red, green, yellow and orange apples: autumn is a feast for the eyes in the apple orchard at the Centre for Genetic Resources, the Netherlands (CGN) in the Betuwe fruit-farming area. About 200 historical apple varieties have been planted here. There are early and late-ripening varieties with round, oval, flattened or pear-shaped apples. Some are not much bigger than a mandarin, while others are the size of a large grapefruit. The peel can be rough or smooth, sometimes with stripes, spots or rings on it. 'Feel free to taste them,' says the collection manager Willem van Dooijeweert. 'A lot of those old varieties are really very flavoursome. We've even got one that tastes like pineapple.'

TOO SWEET

The first apple in the collection, in the first row of the orchard, is Dijkmanszoet, an attractive apple with a red gloss on it that came originally from the area around the town of Wijk bij Duurstede. This is a well-known old variety that is still grown on a small scale. Van Dooijeweert: 'To the modern consumer, this variety tastes a bit too sweet. Nowadays, there is more call for sharp, crisp apples. But in the past this was a popular apple. It was used to make apple sauce and you could dry the apples. Then they hung on strings above the stove, and later you could soak them in water. My mother and mother-in-law still used to do that. They were delicious with brown beans and bacon.' With its firm flesh, the Dijkmanszoet is also very suitable for use in old-fashioned mashed potato dishes, such as the one known in Dutch as 'hot lightning'.

The eating apple we are familiar with today, *Malus domestica*, is genetically closely related to a variety that grows in the wild in Kazakhstan: *Malus sieversii*. This ancestor reached the Roman Empire via the Silk Road. More and more apple cultivars were created both randomly and through deliberate cross-breeding.

Dutch supermarket shelves nowadays are full of Jonagold and Elstar apples, but over the centuries hundreds of different apple varieties have been grown in the country: eating apples, cooking apples, apples that keep well, apples that are good for making jam or juice, apples that make good brandy or cider, and apples that dry well. Late varieties are often the best for keeping in storage.

A lot of varieties are local to particular districts, where they do well in a particular soil type or microclimate. Friesland, the Betuwe, the Achterhoek – all these regions of the Netherlands have their own varieties. Echtelds Zoet, Gamerse Zure, Groninger Kroon – the names referring to settlements give the apples' origins away.

PRESERVING PLANTS

The CGN, the Dutch gene bank, works on preserving the genetic variety of plants, farm animals and trees. Most plant material is stored as seeds at -20 degrees Celsius, but the apple collection is the exception. Van Dooijeweert: 'Apple trees are cross-pollinators. If you sow a seed, you will never get exactly the same type as the mother tree, just as the brothers and sisters in any family differ from each other and from their parents.' For this reason, the apple genes are stored in the form of trees.

> 'A lot gets sold with the wrong label on it'

The apple collection is located in the grounds of the research station at Randwijk, on the River Linge. Wageningen University & Research is one of the four owners of the research station, where a lot of research is done on cultivation. CGN rents a piece of land

Some old Dutch apple varieties, from left to right: Brabants bellefleur, Groninger kroon, Schone van Boskoop (better known as goudreinet), Ananas reinette, Sterappel

Willem van Dooijeweert, collection manager of the CGN's apple collection in the field lab in Randwijk.

for the apple collection. There are five rows of apple trees, a total of 600 trees of 200 different varieties. Van Dooijeweert: 'To be on the safe side, we have planted three trees of each variety next to each other. If one of the three trees becomes diseased or gets blown down, we can use the other two to breed a new specimen. Then we take a graft, a twig with a couple of buds on it, from which a tree nursery can grow a new sapling in two years. Sometimes breeders also come here to collect pollen for cross-breeding. There is always a demand for new flavours, new shapes and above all, for new forms of resistance to disease. Apple trees are plagued by countless fungi, bacteria and viruses, and more and more people want to eat organic food. Old varieties didn't use to be sprayed and can have resistance to all sorts of diseases, which breeders can cross-breed into new varieties.'

PREMIUMS FOR UPROOTING TREES

In 1976, enthusiasts sounded the alarm because they saw old apple varieties disappearing from the market. These might be varieties that didn't fetch good prices, or were too expensive to maintain. In those years, the government offered premiums for uprooting traditional orchards with larger standard trees to rationalize the apple market. The glut of apples was keeping prices low and growing apples was less and less profitable. Van Dooijeweert: 'That put unique heritage in danger. There was an advert in the farming weekly, *Boerderij*, appealing to farmers to report old apple varieties. After being located temporarily in various orchards, a selection of 80 to 90 old varieties was eventually planted in Randwijk in 1998, and its management was put in the hands of CGN. That was the start of today's collection.'

Willem van Dooijeweert has been the manager and curator of this collection for five years. The main aim is to keep this heritage alive. Requests for the plant material come from pomological societies in which enthusiasts do their best to keep old apple varieties going in places such as estates and castle gardens. Plant material is also supplied to institutes and commercial fruit tree growers who cultivate apples in order to breed new varieties. The main focus in this case is on resistance to disease. Many old varieties were originally grown in traditional orchards with standard apple trees. Sheep or cows used to graze beneath the trees, which were several metres tall and an attractive landscape feature. Many of those old orchards have been dug up because standard apple trees were less profitable and pruning and picking were more difficult. Van Dooijeweert: 'Since the 1960s, fruit farming has been more specialized and fruit farmers switched to small trees. These are much easier to maintain and yields per hectare are much higher. Many old apple varieties turned out not to be suited to this new cultivation method. The yield was lower, or they were prone to disease. That is another reason why many old varieties disappeared from the market.'

In Randwijk, CGN did not opt for standard apple trees. Instead, the historical varieties were grafted onto weak >

More than 600 trees of 200 different old apple varieties have been planted in five rows in the Randwijk field lab.

lower trunks with a small root system. This led to smaller trees that take up much less space and with which you don't wait years for the first harvest. Van Dooijeweert: 'The grafting technique is thousands of years old and was perfected in monasteries in the Middle Ages.'

In 2015, the CGN published an Orange List of all the grains, vegetables and fruit varieties grown in the Netherlands between 1850 and 1940. To draw up this list, the staff combed through old seed catalogues and lists of varieties. The list included 483 old apple varieties, 343 of which were still around in 2015. In order to ensure that no more valuable varieties would be lost, a group of pomologists – enthusiastic apple experts from all over the country – set up the Dutch Fruit Network (NFN) in 2017. The network has 20 members, including pomological societies, individual enthusiasts and the CGN.

The network members have documented about 400 old Dutch apple varieties – all around the country in orchards and on estates, etc – and have set priorities: which varieties are the rarest and in danger of dying out first? These varieties should be prioritized for inclusion in the gene bank in Randwijk.

'That apple collection of CGN's in Randwijk is very valuable to us,' says NFN chair Marcel Rutten. 'You can't find this material anywhere apart from a couple of good collections in the Netherlands, and the gene bank is a very good way of ensuring it is kept safe. The collection is managed professionally, and that is one of the CGN's statutory research tasks. And the trees are checked for diseases twice a year by the Dutch inspection service for horticulture, NAK Tuinbouw. If you request material from this gene bank, you know it will be healthy. And you know exactly what you will get. A lot of mistakes are made in the fruit world, and a lot of material gets sold with the wrong label on it. I recently got a plum that was labelled "double farmers' white", but it is now bearing purple plums.'

REMOVING DUPLICATES

Old varieties sometimes go by dozens of different names, a different one in every district. This causes a lot of confusion. Everyone in the Netherlands knows the goudreinette, for example, but this apple's real name is actually Schone van Boskoop. Rutten: 'In the past three years, NFN members have gone through the CGN collection and removed a lot of duplicates.' To determine old apple varieties, the experts pay attention to the characteristic shapes of the tree, leaves and fruit, and compare these with old illustrations such as those in the standard work from 1758, Knoop's *Pomologia*. Last spring, too, leaf material from 670 trees was sent to an institute that analyses DNA with a view to supporting classifications with molecular research.

Rutten: 'We've got an old standard apple orchard north of Eindhoven, for example, that is now listed as heritage by the municipality. If a tree gets blown down there – and the trees are 120 years old now – we can ask the gene bank for healthy grafting material from an old variety

> ‘Old varieties can be resistant to all sorts of diseases’

that will thrive on sandy Brabant soils. Like the Brabant Bellefleur or the Dirkappel. The latter is extremely rare and next year we hope to add it to the gene bank collection.’

Van Dooijeweert: ‘When the CGN took over the collection five years ago, there were still a lot of foreign varieties in it that can be found in foreign gene banks as well. A field collection is very expensive, so why would we keep these varieties when that is being done well somewhere else? We are working on rationalizing the collection and we now concentrate on purely Dutch heritage, apart from a few wild relatives and a few ancestors of today’s varieties from Kazakhstan. We are starting with the rarest varieties, which are most at risk of dying out. Last autumn, another 30 old Dutch varieties were planted. Members of the NFN are tracking down the old varieties and collecting grafting material from them. All that is voluntary work. If we can get some more land in Randwijk, we also want to plant old pear varieties, to keep that heritage going as well.’ ■

www.wur.eu/applecollection

THE FOUNDER OF POMOLOGY

Johann Hermann Knoop, a horticulturalist who originally came from Germany, is considered the founder of pomology. He was the first person to do highly systematic research into apple and other fruit varieties, which he did on the estate of the Frisian provincial governor stadtholder Johan Willem Friso, near Leeuwarden. He also enjoyed distilling brandy from the apples and was sacked for alcohol abuse around 1749. He then turned to making a living by writing scientific books, first about botany and ornamental gardening, and later about subjects such as mathematics and astronomy. In his *Pomologia* of 1758, he describes and draws more than 100 species of apple that were successful at the time, complete with lists of all the names they go by. The book is still on the market.