



IN SEARCH OF WILD SPINACH

Popeye in the Caucasus



Chris Kik, who works at the Wageningen gene bank, travelled through the southern Caucasus to collect wild spinach seed. Plant breeders eagerly awaited his return; they are desperate for fresh genes to develop new spinach varieties. TEXT RIK NIJLAND PHOTOGRAPHY GUY ACKERMANS

Here, put your hand in here!' Chris Kik holds open a grubby linen sachet and nods encouragingly. 'Then you'll feel the difference.' And indeed: 'ouch'. 'Our spinach has round seeds; the seeds of this wild species have big spikes on them. You can't miss them, especially when you're picking the plants.'

In the drying room of the Centre for Genetic Resources the Netherlands (CGN), part of Wageningen UR, which could be considered the gateway to the Wageningen gene bank, the latest acquisitions have just been brought in: eight grey crates containing 53 sachets filled with withered and crushed plant specimens. This is the tangible evidence that Kik, chief curator of the gene bank, brought back at the beginning of July from his quest for wild spinach. The journey took him through Azerbaijan, Georgia and Armenia. It was a one-man expedition, with a rucksack, a half-empty Samsonite suitcase that got filled to

bursting with specimen bags, and a pile of official papers to convince customs officials of his good intentions. In each country he had help from a local colleague.

NOT A SINGLE PLANT

'Perhaps it doesn't seem like much for a journey that took over a month, but I can assure you we worked hard for long hours, at temperatures of up to 35 degrees', Kik recounts. 'These wild spinach plants are pretty easy to miss. They don't have conspicuous flowers or anything, and goat and sheep like to graze on them. On top of that, some local people eat large quantities of the wild spinach, as it's the first spring vegetable for them. At one point in Georgia I hadn't found a single plant for six days. And that is enough to get you down.'

The seeds he collected will soon find their way to research and breeding programmes, Kik expects. 'The genetic base of the modern >



CHRIS KIK,
head curator of the CGN's
gene bank

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agricultural and horticultural varieties is not very broad. Every now and then we need new input from wild relatives – for research and to develop new varieties that are suited to different growing conditions, or that can offer resistance to new diseases. This is important to ensure food security. Gene banks are the obvious intermediaries for this, Kik says. They collect, propagate and distribute planting material for agricultural and horticultural purposes. At the same time they preserve biodiversity and ensure the survival of locally grown varieties in their deep freeze storerooms. Wageningen focuses on vegetable crops, explains the curator. These are badly underrepresented in the 1400 gene banks of the world. Only seven per cent of the stored seed is vegetable seed, and staple food crops such as

grains and legumes make up the majority of the collections. ‘There’s an economic reason for this specialization too’, Kik explains. ‘In the last twenty years the Netherlands has become a major player in the vegetable crop breeding world.’

FRESH GENES NEEDED

The breeding companies badly need new genetic material for spinach, and especially from the two wild relatives as these probably have interesting genetic traits. The cousins of the spinach we are familiar with are found in different regions: one is found in the area that Kik visited in the southern Caucasus; the other is found in central Asia, in Uzbekistan and Tajikistan. Kik made a trip to that part of the world in 2008 to enlarge his gene bank collec-

tion. Two spinach expeditions in three years? Kik: ‘Seed companies were insisting. The amount of planting material of these wild varieties worldwide is very limited. The number of accessions and locations where seed can be found – you can count them on your fingers.’ Meanwhile there is an urgent need for fresh genes, for example to fight downy mildew, a fungus that attacks spinach leaves and which is constantly mutating. Kik: ‘I expect that the material we collected will also be useful for developing drought- and salt-tolerant varieties. The southern Caucasus has a semi-arid climate.’

The wildlife in that area is also different, the researcher noticed. There are wolves, for example – ‘fantastic to see’ – but there are also snakes. ‘On the first day in Azerbaijan, as I

got out of the car, my local partner, Vahid Farzaliyev, warned me: “Chris, watch out!” And sure enough, there were two scary, poisonous snakes eyeing us. Before we started the trip Vahid had shrugged his shoulders nonchalantly when I asked if we could expect problems from snakes. Maybe he didn’t understand the question properly in English. I later learnt that there are 21 species in the area, of which four are poisonous. If I had known that, I’d have taken antidote along with me. Now I spent four weeks moving somewhat nervously through the low vegetation; you’re hours away from habitation.’

CONSULTING THE LOCALS

Kik enlisted the help of the local population to track down spinach plants. When he found a location with a plentiful supply of spinach plants – ‘It’s not the idea to cause local extinction’ – he would put about fifty samples of plants with seed into a plastic bag. Kik also determined the GPS coordinates and made a brief description of the conditions where he had found the sample. Back in his hotel room or his overnight accommodation in private homes, he transferred his harvest into the linen travel sachets.

The 53 samples that he brought back to the Netherlands are not all wild spinach; 14 sachets contain ‘ordinary’ domestic spinach that farmers in the Caucasus have grown and bred for generations in their vegetable gardens. These plants are well adjusted to local conditions and also deserve a place in the gene bank because of their unusual genetic combinations, according to Kik.

‘These kinds of local varieties are starting to die out in the Caucasus too. Whenever you go into a bazaar, you see seed packets from the big Dutch seed companies. And that’s a strange paradox of course. On the one hand the seed companies are dependent on genetic variation, and on the other hand the new varieties they come up with are squeezing out the local varieties.’

Right now, Kik’s 53 new sachets are waiting

for the long process to start. It’ll be another ten to fifteen years before we are serving up spinach with Caucasian genes. For the time being the seeds collected still have to dry out for another couple of months at 15 degrees Celsius and a relative humidity of 15 percent. After that the CGN will divide the yield among the seed breeding companies that helped finance the expedition, and these will develop planting material and multiply the seed. The companies will keep a large part of their yields for themselves. The rest is sealed in strong aluminium foil – protected with card to prevent the spines from piercing the foil – and stored in airtight packets of fifty to a hundred seeds at a temperature of minus 18 degrees in one of the cold storage facilities in Wageningen. A small proportion is also sent to the international gene depot on Spitsbergen, to spread the risk of a power failure or other catastrophe.

Companies and universities, as well as institutes that conserve old vegetable varieties, can request genetic material free of charge from the gene bank once the three-year embargo has expired. This gives the seed companies that have invested a head start. ‘We already receive about 385 requests for spinach every year; that’s an awful lot for such a small collection, but altogether we actually deal with over five thousand requests per year’, Kik says. ‘That makes us one of the most frequently consulted gene banks in the world.’

Wouldn’t seed companies be better off organizing an expedition themselves? Then they wouldn’t have to share the fruits with their competitors. ‘That would be possible, but international agreements, such as the CBD (Convention on Biodiversity, 1992) and the IT (International Treaty, 2001) complicate matters. Gene banks are there to ensure that the necessary biodiversity is made available to third parties. Companies that go it alone run the risk of being accused of bio-piracy, and that’s a risk they are reluctant to take.’ The countries of origin are not left empty handed, Kik continues. ‘The regenerated

planting material is distributed among the parties so that gene banks also get their fair share, and we pay the local staff who help a good salary. And in the countries where we work, there’s usually a lot of interest in setting up research with ‘Wageningen’ or sending a researcher or student to us. And, wherever possible, we try to fulfil people’s wishes.’ Info: chris.kik@wur.nl ■

MALE AND FEMALE PLANTS

Spinach (*Spinacia oleracea*) is a species that originated in Asia and is no longer found in the wild. The plant was introduced in Europe in the 12th century, initially as a laxative. Two close relatives are still found in the wild: *Spinacia tetandra*, in the southern part of the Caucasus, and *Spinacia turkestanica* in Central Asia. All three species are dioecious: the male plants die as soon as they have produced pollen and the female plants form the new seeds.



PHOTO ORI FRAGMAN-SAPIR, JERUSALEM BOTANICAL GARDENS