

The N2Africa formula works (almost) everywhere

Ten years ago, WUR professor Ken Giller got a lot of money from the Gates Foundation to develop legumes such as beans, chickpeas and soya for small African farmers. The project has now been completed. He reached about 600,000 farmers and improved their harvests in almost all cases.

text Albert Sikkema *photos* Georgina Smith CIAT, Ken Giller





Over the past 10 years, project teams in 11 African countries tested ways of cultivating legumes for African food production. This project, N2Africa, not only supplied legume seed but also the bacteria that bring about nitrogen fixing in symbiosis with these plants. In addition, it supplied the fertilizer phosphate. A cocktail of seed, inoculants and artificial fertilizers has brought bigger yields and incomes to half a million African farmers. And yet Ken Giller, the founding father of N2Africa, is reluctant to call it a success.

ROLLING OUT THE FORMULA

After 10 years, the Wageningen professor of Plant Production Systems still isn't sure why some African farmers didn't get better harvests with the N2Africa treatment. Giller: 'We had a formula: leguminous vegetables plus *Rhizobium* bacteria fix nitrogen from the air, giving you a natural fertilizer. Together with fertilizers such as phosphate and potassium, this ensures a good yield. We had successfully tested this for the project in small-scale experiments, and then we rolled it out in Africa in N2Africa. But it didn't work everywhere.'

COCKTAIL

Giller's group planted trial plots everywhere with four sections: one for vegetables alone, one with vegetables and inoculants, one with vegetables and artificial fertilizer, and one with all the relevant inputs. The outcomes were extremely varied. In broad lines, the trial plots with all the inputs produced the highest yields. But something odd happened too. 'In theory, you get the biggest increase in yield on the plots with low soil fertility, where the yield gap – the difference between the actual and the potential yield – is biggest. But that is not what came out of our tests.'

After extensive analysis, the researchers found two more causes of the variation. Firstly, the variation in yield

N2AFRICA IN A NUTSHELL

- N2Africa was a research and development project by the Plant Production Systems chair group that aimed to increase the yields and incomes of African farmers. It ran from 2009 to 2019 and reached 600,000 farmers in 11 countries.
- With the sum of 52 million dollars, the highest amount of research funding to date for WUR, the Bill and Melinda Gates Foundation was the main donor.
- The project introduced farmers to nitrogen-fixing crops such as beans, chickpeas and soya. These crops fix nitrogen from the air in symbiosis with soil bacteria. N2Africa produced the inoculants for these bacteria.
- N2Africa first researched the need for vegetables, the climate and the soils in the 11 African countries, and sought collaboration with dozens of local partners to improve the vegetable supply.
- The main bottleneck was the poor agricultural infrastructure. The vegetable seeds, inoculants and artificial fertilizer that the project supplied and tested were not widely available in rural Africa. And sales outlets for the vegetables were poorly developed.
- N2Africa was a collaboration between Wageningen University and numerous African partners, with the Wageningen alumni network playing an important role. Five of the 11 project coordinators in Africa were WUR alumni.

▼ Ken Giller



More information

<https://magazines.wur.nl/n2africa/welcome/>



▲ Roots of leguminous vegetables form nodules that are full of rhizobia.

turned out to be related to the way the plot had been treated in the past. This meant some fields had more micronutrients, potassium and magnesium available than others, and that influences the yield too. Secondly, the cocktail of good seeds, inoculants and phosphorus didn't work at all on about 10 per cent of the plots. 'Some soils were so exhausted that nothing would grow on them,' says Giller.

MAGIC BLACK POWDER

But most of the farmers did benefit from the N2Africa formula. Many African farmers had never worked with the inoculants for nitrogen fixing before, and talked about a 'magic black powder'. They combined the inoculants with new fertilizers for vegetables that N2Africa developed with artificial fertilizer producers. Together with good management – good seed, early sowing, weeding – this produced distinctly higher yields and incomes.

IMPACT

The funding from the Gates Foundation has stopped now, so N2Africa is over. But in a way, it is not, says Giller. 'If it is good, a crop or a practice spreads among the farmers.' He points to research by the Knowledge, Technology and Innovation chair group on the distribution of new seed in Africa. If a farmer gets hold of better seed, he passes it on to an average of 4.5 other

'If it is good, a crop or a practice spreads among the farmers'

farmers. 'Based on the 600,000 farmers we reached directly, the N2Africa method could reach up to 2.5 million African farmers.' And to add to that, says Giller, N2Africa worked with 30 to 40 local partners in every country, including national research centres, radio stations, and seed and artificial fertilizer producers. Those partners might continue to spread N2Africa's methods. 'If we want to measure the impact, we should take another look in five years' time.'

TAKING STOCK

So what has N2Africa done for the farmers? It's hard to say, says Giller. 'You can look at the farmers' incomes, but we can't influence food prices. Soya prices went down on the world market in recent years, so companies dumped soya in Africa and African farmers got less for their crops. We are talking to policymakers in Tanzania and Ethiopia about how they could promote local soya production. Currently, a lot of soya is imported from Argentina as chickenfeed. We are looking to set up a regional supply chain for soya and talking to the feed providers about the quality and price they want. In that regard, we are still working on N2Africa.' 

'N2AFRICA'S CLAIMS ARE TRUE'

The Institute of Development Studies (IDS) in the UK has evaluated the claims made by the N2Africa project. On the basis of interviews with small-scale African farmers, the IDS assessed whether they had benefitted from the project. The evaluation report, published on 9 December, concentrated on the activities in Ethiopia and Ghana. The IDS reported that N2Africa made a relevant contribution to expanding soya cultivation in northern Ghana by providing technical improvements for soya cultivation. The project only played a small role in the expansion of soya cultivation in Ghana, however, said IDS. In Ethiopia, N2Africa made a key contribution to the production and supply of inoculants and to making farmers more aware of these nitrogen-fixing bacteria. The one minus point here was that the project only managed to reach a small segment of the potential market in Ethiopia.



▲ Women winnowing soybeans in North Kivu, DR Congo.