

Potato breeding in hindsight



“In South Africa there are various indigenous fruit crops that are exotic to Europe, yet underdeveloped and not commercially exploited.”

In the 90's the Potato Research Program was one of the strongest in South Africa (PSA) through a voluntary levy on potatoes.

The ARC had always been grateful for the support received from the industry and this relationship should be built on.

In May 2009, PSA informed the ARC that they will no longer be funding the potato breeding program. The program was seen as being in competition with specific role players in the industry that contributed to the voluntary levy.

The effect on the breeding program was severe and the breeding work had to stop for just over two years. If it was not for visionaries within the ARC this program could easily have been stopped for good. To answer the question of whether South Africa needs a potato breeding program one has to look at the history and then project this into the future.

To understand the need for a breeding program one needs to look at examples in history where a breeding program would have made a difference and also where a breeding program made a difference: In the first instance we look at an event that could have been different if there had been a breeding program. This is demonstrated by the “Great Irish Famine” between 1740–41. Approximately 1 million people died and another million emigrated from Ireland, causing this island's population to fall by between 20% and 25%. The cause of this famine was the potato disease known as potato blight. Many people still today refer to the potato as Irish potato. The effects of the famine permanently changed Ireland's demographic, political and cultural landscape. Most of the potatoes grown at the time were from the “Lumper” variety.

Like today, the Irish potato was propagated vegetative and therefore genetically very uniform. Lack of genetic variation in Irish potatoes contributed to the severity of the potato famine. Today we know that relying on crops with low genetic variation will probably lead to disaster.

In the second instance we can look at our own history in South Africa. Potato seed was mainly imported from England and Europe but at the end of the Second World War (1939-1945) seed was in short supply. Dr. Vanderplank started his career in plant pathology in 1941. At this time he

also started the potato breeding program. The program produced a number of varieties that are still grown today. The varieties still grown are BP1, Buffelspoort (PB13) and Vanderplank (VDP). The development of these varieties had a significant influence on the potato industry as we know it today. BP1 alone made up 45% of the potato planting in 1998. The total production of varieties produced by Dr. Vanderplank went as high as 60%.

One could argue if it were not for his efforts in the 1940's and later the potato industry would not have been as vibrant as it is today. Potatoes worldwide rank fourth in importance as field crop but in South Africa it ranks third. In hindsight, do we need a potato breeding program? History has shown us that we cannot afford not to have a potato breeding program. The same arguments are true for maize, wheat and other economically important crops. History has shown that it is dangerous to have single varieties planted on a huge scale such as the Lumper variety in Ireland. Locally we have also seen that BP1 is highly susceptible to common scab. Due to huge plantings in the past, this caused a problem for future potato productions on the same fields with varieties susceptible to common scab.

Fissure scab was first seen on Santana in 2007 (not reported) in the Groblersdal area. At that stage it was identified as growth cracks. Today it is known as fissure scab. This symptom can be produced by specific strains of common scab and/or black scurf. Current research at ARC-VOPI might reclassify the strains of common scab that produce this symptom. The epidemiology at this stage is not fully understood. What is understood is that common scab can remain viable in soils for many years (as seen with BP1). It has also become clear that Mondial is very susceptible to fissure scab. With large areas planted to this variety locally, we can end up with the same experience as with BP1; spreading this pathogen to all production areas in South Africa.

The ARC is well positioned in South Africa with the potato breeding program to make a huge impact in the future. The University of Pretoria predicted the increase of temperatures for a number of the potato production areas for 2040-2049 due to global warming. The Limpopo province is shown here with the increase in the number of days above 35°C for 2040-2049. The current potato varieties will not have high yields under these conditions. The potato breeding program is in a unique position to breed varieties that will be able to perform under these conditions. It is also important to note that the pest and disease complexes will change

as the environment change. The only way to combat this successfully is to remain ahead of the problem and to evaluate under these conditions. Most of the material imported into South Africa comes from Europe.

Although the European programs also evaluate under high temperatures, the pest and disease pressures are far from what are experienced in South Africa. As global warming increases, varieties from these programs will not remain competitive. The locale potato breeding program is the only feasible alternative to address these issues in time. Alternative funding models needs to be secured to ensure the long-term sustainability of this program.

The potato industry's farm gate value today is in the region R5.35 billion. With a 5% market share the use of ARC potato varieties will contribute R0.27 billion to this farm gate value at today's rates. With a target reaching 30% market share in 20 years the ARC varieties will be responsible for R1.61 billion of the industry's value. The ARC varieties, Darius and Mnandi had shown that this was possible, but marketing must be driven by the ARC.

With the current cost of the breeding program being around R4 million/year and the only active breeding program in Africa, this is a program that should rather be improved and utilized not on only in South Africa but also the rest of Africa. *ARC: Econ News, Written by: Flip Steyn, SteynP@arc.agric.za*

