


Populations: diversity in plant breeding



ORC Wakelyns Population is a diverse population of wheat suited to organic and low-input farming systems. Integration across the supply chain is creating market opportunities for its grain and several farmers are successfully growing it across the country. Learn more and get involved...

What is a population?

Populations contain a large amount of variation in their genes and their traits. Individual plants across the crop are different whilst in standard pure line varieties individuals are almost identical (as you can see when you look at a field of monoculture wheat). Populations can be developed in different ways and have various features, but diversity is key.

Why diversity?

Diversity increases the potential of populations to respond and adapt to unpredictable environments. There are positive correlations between diversity and stability, and between diversity and productivity. We need diversity simultaneously in our systems through rotations, integration of crops and livestock and inter-cropping. We also need it within crops, which can be through mixtures of varieties or by using populations.

Climate change and unpredictable performance of cereal crops in farming is of increasing concern. This is aggravated by an almost universal use of genetically uniform varieties. These can be convenient when drilling, harvesting and marketing, but are also tied into corporate sales of varieties and inputs, loss of diversity and increased fossil fuel usage.

The diversity within a population means that it has increased capacity to respond to environmental fluctuations. Different individuals in the crop can **complement** each other - one tall, one short etc - but also **compensate** whereby if one fails there are others to take its place. We would also expect the populations to gradually **change** as the best performing types become more prevalent in the specific conditions where they are reproduced, e.g. organic crop management or the soil on the farm on which they are grown, depending on the environmental pressures faced by the crop.

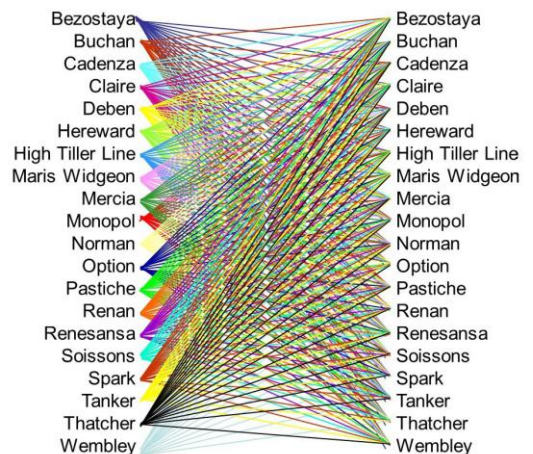
Why evolutionary breeding?

ORC Wakelyns Population was grown on organic farms from the initial stages of its development, and therefore has got to know these conditions. ORC has completed a range of experimental analyses that support its resilience in variable organic systems. Most pure line varieties have been developed for high-input conditions and are not well adapted to such variation: you must successfully match the variety to the farm to maximise performance.

Historically, landraces were used to match crops to local environmental conditions over time. Now, populations are being generated to create plant diversity anew, specify the genetic material that is incorporated, e.g. to match a certain end-use, and encourage evolutionary responses.

ORC Wakelyns Population

This population was created in 2002 by crossing 20 different varieties with each other and mixing all the progeny. The parent varieties were selected to combine both yield and quality traits (leading to the nickname 'YQ'). It underwent a number of seasons of multiplication and in field natural selection on organic farms before it was launched for commercial sale in 2015.



The 20 parents and over 190 crosses that make up ORC Wakelyns Population

Qualities of ORC Wakelyns Population

- Resilience to extreme and unpredictable stresses
- Comparable yields to benchmark varieties in organic conditions
- Successful initiatives baking with the grain
- Suitable as an animal feed

Where to buy ORC Wakelyns Population and what to do with the grain?

In March 2014 the EU law was changed to allow a trial period for marketing populations that do not fit the normal seed and variety rules and regulations. Within this framework, we are now marketing seed with Walnes Seeds (contact: Andrew Cooper, <http://www.walnesseeds.com/>). Walnes seed are also partners in an initiative, with Hodmedod's and Organic Arable, to enable milling of small quantities of grain via creating local networks with smaller mills and producers. This can provide alternative routes to market for niche products such as ORC Wakelyns Population grain.



Please support our work! We hope to continue our research and development into the potential of populations. Please **contact us** to learn more and consider **donating online**. Next steps include the development of populations in different crops and for different, more specific, end-uses.