Diploids, Hybrids, Landraces and Grexes

Alan M. Kapuler PhD, Dylana Kapuler, Mario DiBenedetto, Linda Kapuler

January 31, 2015

In the 1970's, Peace Seeds began purchasing F1 hybrid seeds of tomatoes, growing them out, saving the seeds and repeating the process for more than a decade. In this way Peacevine Cherry Tomato arose from the F1 Sweet 100 Cherry Tomato. This technique is now called 'dehybridizing'.

One must reckon that most diploids are hybrids. Tomatoes are generally diploids. People are diploids. Hence all people are hybrids.

And what is called 'dehybridizing' is genetic, generational selection. If one wants all the plants and their fruits to be the same, ie. homozygous, then it may take many years to achieve.

If you go into a place where wild, native species still exist you can still find bean species. For thousands of years people have been doing this, putting the seeds in their pockets, bringing them back to their communities and planting them for years to come. When we go to native peoples and obtain some of their bean seeds we call them landraces. They come from species and have been domesticated by growouts, selection, human values and attitudes.

Landraces are cultivated wild species.

When we take cultivated varieties of interbreeding plants like kales, peppers, corns which have been grown and selected for a long time into cultivated lines and remix them by growing, flowering and seeding them together, they intercross. This primary genetic mix has a diverse population of hybrid intercrosses depending on the number and fertility of the initial cultivars.

If one saves the seeds from the mixed intercrosses, plants them again and saves the seeds again, one can continue the process for many cycles. The first generation of the crosses is the G1, Generation 1. Then the next cycle and its generation of crosses is G2. With each generation it gets more complex. G1 plants crossing to G4 plants crossing to G3 plants crossing to G2 plants, for example. After many years usually one can open up the genome pool and increase genetic diversity. The original parents and all the generations of their progeny, taken together, is also a grex.

In many ways humanity is also a grex.

In terms of vegetables and popular flowers, grexes are intentional. After having grown and selected vegetables and flowers for several hundred years into discrete, recognizable, homozygous lines ie cultivars or cultivated varieties, humanity has begun to remix them.

It seems that landraces precede most grexes. Good grexes require wide crosses and an abundant mixture of parents reflecting genetic diversity in visible and invisible traits. Landraces came from times when there were fewer genetic mixes since the species that gave rise to them were widely distributed.

Right now one can obtain much more genetic diversity than was possible before Columbus, before computers, before being able to easily travel the world and collect seeds and plants. Now we have huge populations of people growing gardens. At the same time we have industrial and corporate monoculture agriculture. Now genetics and molecular biology have changed our understanding of informational macromolecules, inheritance and genomes.

Grexes are a way we solve the issue of how to adapt our foodplants to our local ecosystems and to the exigencies of radical climate change.

Landraces have some aspects in common with grexes. They are not the same thing. They have very different meanings and relationships.

While the term ‘grex’ comes from the latin for ‘flock’ as Margaret Roach so wisely points out and that it was first applied to the lady slipper orchid *Paphiopedilum delenatii* and its interspecies crosses, a ‘flock’ of birds encompasses the complexity of generation after generation after generation of breeding, all flying in the sky at the same time.

Some years ago, Peace Seeds applied the orchid term for ‘grex’ in a broader way (3 Root Grex Beets, 6 Root Grex Turnips) for what is possible in making multiparent, multihybrid crosses and the complex genomic diversity that arises from them. We need more terms for the mating systems that are seasonal like annual vegetables and for perennials that have overlapping mating that can go on for hundreds of years ie old trees, long lived birds, multigenerational insects and comparable kinds of genomic interactions.