Changes in Diversity — Then, Now, and in the Future©

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INTRODUCTION

Biodiversity is a very "new" word that biologists understand and the rest of us are just beginning to. What does biodiversity mean? Biodiversity is the sum total of all the World's life forms, organisms, and genes; it is nature's fail-safe mechanism against extinction. In fact Darwin's Theory of Evolution can be summarised as "survival of the fittest" and presumes a bio-diverse world.

Most of us think of biodiversity in terms of the animals we see and love like the orange-bellied parrot, or plants like the Wollemi pine ignoring insects and microbes that we can't see that, in fact, provide the habitat for those endangered. But our horticultural heritage is under even greater threat as I will explain. In fact, my central theme is that preserving heirloom vegetables represents a preservation of diversity similar to the conservation of species diversity in the wild. Let me give you a little background to our work.

Diggers Seeds began 30 years ago as cottage gardeners growing foxgloves, hollyhocks, and scarlet runner beans. About 20 years ago we created our first vegetable garden inspired by that great Chateau of Villandry in France. Instead of 20,000 m^2 ours was just 200 m^2, but we were approaching vegetables from a flower gardener's perspective.

We are a mail-order catalogue-driven business with six catalogues per year, 60,000 passionate gardeners. We don't sell through the shops — which is why most gardeners don't know of us.

SEED EXPERTS

During the early 1990s I used to rely on so-called "seed experts" for advice about the seeds we packaged and listed. Being naïve I accepted their advice without question until one day I rang to say that our two hybrid tomatoes were so expensive to package — in fact 25 times as much as open-pollinated heirlooms — that I wanted replacements. I was dumbfounded when I was told there were plenty of cheap replacements and I didn't need to buy F_1 hybrids. I had swallowed the myth of hybrid superiority for nearly 10 years! I am familiar with a picture seen in the catalogue of a European seed merchant proclaiming that not only could the fruits withstand the weight of a brick, but you could bounce them off the floor. Another catalogue boasted that F_1 hybrids could survive a bumper-bar crash at up to 7 miles per hour.

SEED SAVERS

At about the same time I used to visit seed trial grounds in Holland, Switzerland, and California, so I made time to call on Seed Savers Exchange in Iowa in 1991. I was completely overwhelmed by the incredible ranges of vegetables; 3000 tomatoe selections (*Solanum lycopersicum*), 2000 beans, 800 lettuce (*Lactuca sativa*), 400 garlic (*Allium sativum*), etc. I decided that this was the most exciting area of horticulture I had ever seen.

I met the Farm Manager, David Cavagnaro who had been working since 6:00 AM detasselling corn because there are very few hours before the female parts are re-

ceptive and 30–40 corns would be contaminated. (Incidentally, the genetic centre for corn is in Mexico, and because Monsanto refuses to label GM corns they have crossed and threatened all the land races). David was a brilliant lecturer and photographer, and he became a close friend. He had given lectures in Australia five times.

AUSTRALIA'S FIRST TOMATO TASTE TEST

David sent 100 different tomatoes (*S. lycopersicum* selections) which we grew at Heronswood, Victoria, and we decided to conduct Australia's first Tomato Taste Test. Australia's top chefs, Stephanie Alexander, Herman Schneider, and others evaluated the selections and they were absolutely gobsmacked by the tastes and the colours as much as we were.

The cultivar Tommy Toe won the taste test. It is a previously unknown cultivar from America testifying how important it is to have seed banks — with the billions spent on molecular biology and plant breeding an unknown cultivar selected by ourselves won through. Kevin Heinz, a famous Victorian horticulturist, later said it was the best tomato he had tasted in 50 years. 'Tigerella', another heirloom cultivar, won our field trial with 20 kilos of fruit per plant.

TOMATO YIELD TRIALS

Dr. Will Trueman, our farm manager, grew the world's most popular hybrid — U.S.A. cultivar Celebrity, 'Tigrella' our heirloom, and compared it with the best standard Australian cultivars 'Grosse Lisse' and Yates hybrid 'Apollo'. The heirloom cultivar, 'Tigerella' yielded 20 kg per plant and the hybrid cultivar, Celebrity, yielded 18.6 kg per plant. If hybrids are so superior, how is it that heirlooms beat the hybrids for taste, for yield, and for length of harvest?

COLOURS OF TOMATOES

Strangely, we have found 10 colours in tomato but the supermarket only lists red and yellow. We have a white cultivars called 'Wapsipinocon' that is as good as 'Tommy Toe', as well as brown, black, purple, green, orange, and ivory. The black cultivar, Black Russian, was given to us by a friend who keeps bees. We passed it on to our American partners and for the first time they had black tomatoes.

The wonderful thing about heirlooms is that each country and culture has its favourites. The Amish have preserved probably the ultimate tomato — a sweet tasting tomato that is firm enough to cook with.

FIVE COLOUR SILVER BEET

Five colour silver beet (*Beta vulgaris* 'Five Color Silverbeet'), which is our best seller, came from Mew Gippsland Seed Farm, Victoria. We introduced this to the United States of America and it became Seed Savers' best seller. The more colourful the vegetable, the higher the level of anti-oxidants so five colour silver beet is better for your diet and it is a show stopper in the garden.

BURPEE'S 1888 ANNUAL CATALOGUE

When I was in the United States of America I came across a facsimile of an 1888 catalogue produced by the leading seed company Burpee. I was fascinated by the older

cultivars, particularly *Phaseolus vulgaris* 'Lazy Housewife's' pole bean. It derived its name, which seems discourteous, from its extreme productiveness, making it easier to gather. A seed-saving friend had just two seeds so we multiplied it out to become our top selling bean. We passed this cultivar back to our U.S.A. partners as well!

TUSCAN KALE

Tuscan kale has the highest level of anti-oxidants of any vegetable. Stephanie Alexander and Maggie Beer who fell in love with it in Italy kept on pestering us for *Brassica oleracea* 'Cavollo Nero', a name we didn't know. This kale is a feature in our restaurant because it makes a fabulous tasting wrap that turns black after cooking, but as gardeners we think it is the most decorative vegetable we list.

SEED PRODUCTION/CLONING

Because we got into heirlooms so early and they became so popular, we didn't have any seed supplies so we had to grow our own seed. This was a huge risk and a fascinating journey. We learned about insect pollination, seed purity, and of course how to separate large batches of seed from pulp. Having created a market, we now had to supply it.

EGGPLANT CULTIVAR LISTADA DI GANDIA

Having found that heirlooms were superior to hybrids in tomatoes we then grew and tested every category — eggplants, cucumbers, pumpkins, lettuce, rockmelons, and watermelons. We have an extraordinarily beautiful eggplant (*Solanum melongena* 'Listada di Gandia') from Italy. I always thought Melbourne was too cold to grow good eggplants but this cultivar is not only productive — it is early — just as quick as an early tomato.

POTATOES

If there is any discussion about bio-diversity, potato is the focal point. The Irish planted one selection, *Solanum tuberosum* 'Lumper', grew well but collapsed during storage from fungal spores which I believe were carried by the wind from Germany. The potato famine started a mass migration and leaves a constant reminder that we need more than one potato in our basket. Incidentally, MacDonald's uses just 'Russet Burbank' — the world's most planted potato, and it requires huge amounts of pesticide to bring it to market. Keep that in mind when you next call in.

THE HEIRLOOM THESIS

Our farm manager, Dr. Will Trueman summarised all his trials in a 500-page thesis which he prepared. It not only dispelled the myth of hybrid superiority but introduced us to an exciting range of the world's most appealing vegetables which we now list in our catalogues and books. But there is no point listing them unless we get people to grow them, so we were able to give sowing dates, harvest days, expected yields — in fact professional information specifically for gardeners. Our latest book, *Grow Your Own Heirloom Vegetables* is a complete summary of all our work and is due for release in July 2008.

Table 1. Collapse of diversity.

	Taxa grown 1900	Today's market	Rescued heirloom taxa
Apples	4,000	5-6	40
Tomatoes	2,500	3-4	80
Potatoes	400	4-5	22
All vegetables	25,000	Approx 100	300

The final part of my presentation addresses my thoughts of the future of biodiversity (see Table 1 for collapse of biodiversity).

I am one of the few that believe we are heading for an ecological catastrophe as a consequence of us doing nothing about climate change. It will astound most people to realise that a visit to the supermarket to buy food is a greater threat to the environment than all the pollution caused by coal-fired power stations. Nearly 30% of the CO_2 in our atmospheres is caused by us not growing our own food.

Non-renewable energy is used to plough the fields, harvest, and process the crop and take it to market. The fertilisers, pesticides, and weed killers used to grow the crop are derived from oil. In fact, 75% of the energy that is used to grow our food occurs once it has left the farm. The kitchen refrigerator uses more energy than the farm tractor. In some areas more energy is used to drive to the supermarket than is used on the farm. Up to 25% of the energy is consumed in wasteful packaging.

MONOCULTURE

The quality of food diminishes proportionally to the time and distance from harvest. Hybrids are bred overseas, use lots of fertilisers and pesticides, and are not adapted to our local conditions. They are high-input varieties that contribute to climate change. The next breeding of genetically modified crops extend the use of fertilisers and pesticides even further.

If we are to solve climate change the quickest and cheapest solution is to start growing our own food. Only 4% of the food we eat comes from our own gardens. If we grow our own food we can cut CO_2 by 28% and that happens from tomorrow — not in 2020. We need to take the attitude that going to a supermarket is worse than turning on a light switch.

THE IMPACT OF MODERN LANDSCAPE GARDENS

Consider the changing design styles becoming increasingly used by landscape designers:

- The designs have plenty of paving so that soil microbes are killed.
- There are no plants to bring CO_2 back to earth.
- There are no food plants.
- So this sort of fashionable garden is an ecological disaster.

AN ECOLOGICAL EXAMINATION OF CUBA

The transition to a sustainable economy has required dramatic changes. Being a communist country and isolated from the U.S.A. and the western world, initially required that Cuba export sugar, citrus, and rice in exchange for oil, tractors, and

fertilisers from Russia. When the U.S.S.R. disintegrated in the 1990s it was unable to provide fuel for its tractors, cars, and power utilities. Cubans immediately began growing food within Havana by occupying disused building sites and today the city of Havana produces 60% of its own food. By recycling its green waste it was able to replace imported fertilisers and within a period of 3–4 years has boosted biological soil activity to a point where 80% of the nation's food is organically grown. If Americans grew their own food and severed their dependence on Middle Eastern oil would they need to fight the war in Iraq and fill the former Cuban jail of Guantanamo Bay with terrorists?

Cuba is the only country that has rejected the globalisation of our food supply and returned to growing their own food. The country is now as energy independent as it is politically independent. Cubans use 25 times fewer pesticides and their CO_2 emissions are 15% of those of either Australia or the U.S.A. Instead of tractors they rely on animals to till the soil, reducing soil compaction and providing invaluable manure to replace imported fertilisers. The quality of food has improved and life expectancy of 77 years is equal to that of North Americans. Instead of eating imported high-fat foods, fresh foods and vegetable diet, combined with greater exercise from gardening and bicycling, has created a state of well-being at a fraction of the price of American health spending.

CONCLUSION

Heirlooms are low input varieties which are bred to be harvested close to market. They adapt to local conditions. With rising temperatures and lower rainfall we need to be growing different strains — to adapt to change.

Solving climate change is not a spectator sport. We need to start growing our own food again. We need selections that are bred for backyard growing and not bred for high input monocultures that use CO_2. That is where heirlooms come in — 25,000 of them to adapt to all the different environments and cultural needs.

These are not nostalgia in edible form — they are selections that have stood the test of time.