



WINTER SQUASH

(*Cucurbita pepo*)

No, it isn't salad, but Gathering Together Farm grows, sells, and eats a lot of it—and in at least one variety, there has been a crying need for some restorative attention. Some commercial seed lots are so big that they supply “the industry” for years. If they happen to be a bit off-type or a little weak, they stick around way too long. This can drive a fellow to grow it himself.

7,500 seeds/lb. Packet 80 seeds.

‘Delicata Zeppelin’  Have any other fresh market growers had a dreaded case of “bitter poison Delicatas”? GTF’s padrone, John Eveland, had more than one market customer approach him in autumn of 2000 with terrifying accounts of throat clenching bitterness from a single bite of his perfect Delicata squash. The victims were so emphatic, the threat of legal action so palpable, that John began calling every Delicata source in the country to find out exactly where his seed came from, and to make sure he didn’t plant seed from the same lot again. Turns out, every dealer in the USA had seed from the same field in Colorado, and this huge lot was very slightly contaminated by the bitterness gene found in *C. pepo* gourds. Perhaps one bitter squash in several thousand...What to do?

John had kept his own Delicata seed from 1988 thru 1994 (when he went over to buying commercial seed). We went into the freezer to find his old selection, and used this for stock seed in 2001. We found the fruits longer and more uniform, finer textured, sweeter, and significantly longer keeping than other strains available that year, and again Other local farmers reported the same. We have never had a report of a bitter squash from this line.

This is good Delicata. Rock’n Roll Delicata, in fact.

WS1 \$9 per oz, \$23 per ¼ lb, \$69 per lb.hhh

Horizontal Resistance: An Organic Approach to Selection

There’s more than one way to resist.

Plants have evolved quite a few approaches to keep the infective, nibbling and sucking members of the ecosystem at bay, at least long enough to set seed and assure the next generation. That generation always best represents those whose resistance strategy is the best.

For farm crops and farmers there are two genetic strategies that we have managed to harness in our selective push-back against the environment, its stresses and wild eaters. Resistance against pathogens and parasites may be dependant on a single gene; this is called *vertical resistance* and is caused by a single gene in the plant that disables a single critical gene in the pathogen, protecting the plant from any infection at all. These gene-for-gene relationships provide complete immunity from infection as long as they persist, but once the pathogen evolves around that single genetic block, resistance completely breaks down; the cultivar is now susceptible.

More commonly in nature we find that resistance is based on many genes working together to produce a healthy body, “a good constitution” as John Navazio likes to say. These genes effect everything from pigment expression, to plant architecture, to DNA repair enzymes, and cell wall composition. The more of these beneficial genetic traits that get incorporated into the final cultivar, the more *horizontal resistance* the variety will express against pathogens in general, and against weather-related stress as well. Horizontal resistance is the result of continuous selection in the face of adversity. It is referred to as persistent resistance, because it doesn’t break down due to simple mutations in pathogens.

Where Do New Seeds Come From?

Frank Morton

At one time, seed was like a gift from God; but that was a long time ago.

Then it became a treasure of trade. New seeds from far away...Imagine how that must have stirred the horticultural heart 500 years ago. Then, newly acquired seeds became national assets, jealously held. Mr. Jefferson considered it an act of patriotic quest to add another new crop to the nation's source of wealth, and did his share by smuggling pounds of rice out of Italy, sewn in the lining of his coat; under penalty of hanging, were he caught. His unlawful wares founded the Americas' first rice plantations in South Carolina; not a small consequence for national security in that day.

Seeds became a matter of state and national economics. American expansion into its unplowed treasures of the midwest and California created a huge demand for seed and new genetics to suit new climates, soils, and markets. The Land Grant Universities were largely founded on the principle that they would lead agricultural innovation into new lands, and this meant (in part) the generation and distribution of improved genetics to the new regional farmers. This process of creating specific genetics to suit specific locations approached a sort of acme with midwestern hybrid corn. By 1960, broad areas of the midwest corn belt were being served by "tricity scale" hybrid corn seed producers making on-farm use of university inbred lines to create locally adapted hybrids. Thousands of such breeding lines could be mixed and matched to create F1's with specific adaptations to county scale variations in soils and microclimate. Our GFT farming partner, John Eveland, grew up on an Iowa farm that was an "early adopter" of hybrid technology, and then became one of those hybrid seed producers for its local region.

Between 1970 and 1988, a sea change occurred in seed supply and control. Public breeding programs were cut as private corporate breeding took advantage of advances in hybrid germplasm development, the first Plant Variety Protection Act (PVP), and finally, Utility Patents, to gain proprietary control over seeds. PVP gave breeders their first opportunity to control who could legally sell their finished products, as copyright protects an author's right to control who sells his work. PVP did not prevent the use of a variety for further breeding, nor did it prevent farmers or gardeners from growing their own seed from PVP varieties. Utility Patents, first granted on a lifeform in 1981, were another matter. These true patents were not so much for finished varieties, that is, stable constellations of genes that produce a whole plant; these were patents on genes that could be inserted into any variety, instantly making the background cultivar a new private property. Later, patents would be granted for "traits"; a certain yellow in beans, "heat tolerance" in broccoli.

By 2007, seeds are certainly not a gift of the gods, at least in any legal sense. The new-tech seeds, the products of our latest innovation, are all owned by some entity to some degree. The exception to this are those our gardeners and farming systems are creating and re-creating by selection each year. These are truly the latest in a long process of organic innovations between the earth and sky.



An Organic System of Seed

Frank Morton

What would an organic seed system look like? A system that would supply organic food growers with quality seed at a competitive price, and provide advantageous genetics specifically for organic field conditions; a system that could create its own innovations and bring them to market without cringing behind intellectual property protection, or proprietary hybrid strategies. Can we imagine a seed provisioning process that is borne out of our community and holds our philosophy of self-reliance and ecological integration intact?

We have some advantage as organic seed growers, sellers, and users in being able to imagine a new pattern of seed provisioning based on a look back at how the conventional system evolved and ended up being owned by entities far removed from farming and food. Today's seed giants are famously owned by petrochemical, pharmaceutical, and bioengineering multinationals, whose interest is in using seeds and seed biotechnology to deliver other goods to market--herbicides, fungicides, insecticides and growth regulators, and bioengineered intellectual property in various forms.

One way to ground an organic seed system is to keep its roots in our own community. How about an organic seed supply grown by experienced organic farmers within mature organic farming systems? Seems straightforward, but it likely won't happen without some directed development along the way. It certainly won't be delivered by the seed industry as it exists; highly secretive, proprietary, and bent on market capture and monopoly of genetic innovation. These are "PS (private or proprietary source) systems" that hold their ways and means of innovation closely within their bounds, and lean heavily on every new product to squeeze money from it. This often involves burying the old products that worked perfectly well (maybe better than the new), in order to force dependent growers to buy the new at new higher prices. Commercial growers can usually name several such disappeared varieties. An "OS (open source) system" of seed would better serve the needs of organic farmers because it would function for organic farmers and would be open to innovation, production, and control by organic farmers.

The goals of a community open source seed system would be to increase the genetic diversity and adaptability of seed choices for organic producers. The lack of such choice (in commercial quality and quantity) is clear if you look for open pollinated varieties of cabbage and related coles, spinach, carrots, sweet corn, onions, leeks, melons, and more; these crop species are clearly dominated by hybrid choices. In an organic system of seed, many different OP varieties would reflect regional preferences and ecological fit, soil types, disease prevalence, and market purposes. Only public domain/OP varieties are amenable to regional and climatic adaptation because F1's and PVP varieties are adaptively (legally) dead in the hands of farmers. Any seed system that hopes to fit our diverse organic farmscape will rely on OP's to be the genetic fabric of our innovations.

Sure there would still be a role for hybrids and proprietary varieties, but growers would have choices beyond these, and those would be well-maintained open source choices grown by allies, not the philosophical opposition.

Some seed companies, notably Fedco, High Mowing, and Seeds of Change, have indeed reached out to some organic growers in hopes of educating us in seed production and genetic maintenance, and they provided the first agreements to grow organic seed on contract, getting a lot of small (and novice) seedfolk into the seed production process for the first time. This has had uneven results, but has certainly begun to drive a networking process of grassroots farmer-to-farmer education, and university/extension involvement in organic seed issues.

How many solely organic seed growers with commercial aspirations are there in the US and Canada? A hundred, perhaps two, and only a handful pursuing seed production as their primary employment. With no crop coordination, many of us are growing the same popular varieties, each with a small crop to supply a limited demand for competing commercial outlets. This mirrors the organic produce situation in many places during the 1980's. Around Eugene, OR, small local farmers beat each other into the ground trying to compete for limited buyers in constrained markets. At that time there were few farmers' markets anywhere, so all the produce ended up in the few there were, and prices ended up below the cost of production. Farmers disrespected one another, and started that fatal race to undercut each other in a flawed bid "to capture the market," a concept borrowed from another flawed model. And what a miserable market it was. Stuff did not look good and was not well cared for after harvest. Organic presentation had as far to go as distribution. A hobbyist with other income had a distinct advantage over those who were betting the farm on small farming full time.

What turned this around, making fresh organic produce a seller's market for price and a buyers market for choice and quality (that could suddenly support many small full-time farmers) was a resurgent boom in local farmer's markets, a fresh food fashion fiesta, and the evolution of wholesale distribution systems dedicated to organic only. Many small growers worried expansion of the market would allow big guys to gain sway over their hard won local market shares, but what actually happened was the organic market began to expand at 20% per year, and people everywhere began to ask for it, fresh, 3 times per week. Public markets flourished, and old wholesale systems of produce distribution gave way to the likes of Organically Grown Co-Op, a marketing co-operative borne of grower-members in Oregon and Washington, who gave up undercutting in favor of coordinating who would grow how much of each variety of each crop species for the wholesale market. OGC would send real organic food to places in the Northwest it had never been before. Every new market was an ember of an advancing demand for fresh, regional, organic produce. Eventually, OGC the farmer co-op would go private, becoming Organically Grown Company, owned by its employees and the farmers who invested their miserable "captive markets" for getting their acts together to fulfill more markets and niches than anyone would have imagined for themselves. Now, what flavor organic basil would you like?

The ability to harvest more times per week for fresh markets and in larger amounts for wholesale markets “beyond the valley,” meant produce growers could enlarge into more economical scales of production, could provide full time employment to stable work crews, and generally get better at doing everything they needed for a more professional organic food system. Organic food became more available, polished, and appealing, and more people began to buy it and to prefer it.

Organic seed is on a similar trajectory. I hope that commercial organic farmers have some appreciation for this process of “professionalization” that both organic produce and processed products have gone through. Our community seed movement is going through the same rendering into a reliable industry right now.

IF WE ARE CREATING AN ORGANIC SEED SYSTEM, what makes it so?

What would be different from the conventional system? As I see it, our system would be based around mature organic farming systems, and organic farmers. The process of seed reproduction would always be a selection event. Well-educated organic seed farmers would expect to rogue 10-30% of every crop cycle, in an ongoing process of on-farm selection for vigor and field performance, and the steady accumulation of genes for horizontal resistance. Stock seed, the planting stock for commercial lots, would be the end product of a long process of trialing, selection, and progeny testing.

“Organic breeding” would focus on crop performance in soils maintained with cover crops and compost, with an emphasis on resistance to stress, pests, and disease in parent lines, and trait constellations in the final selections that promote success in real organic systems; weeds, marginal soils, fungal spores, and all. My top five general traits would be; 1) fast germination, 2) seedling vigor, 3) extensive feeder-root system, 4) robust crop canopy, 5) vibrant fresh market presentation. These five traits almost fully capture the genetic mechanisms that underlie horizontal resistance to field stresses, competition, and pathogens; what breeder John Navazio calls “good housekeeping genes.” Many of the genes that provide the plant with good housekeeping also create appealing produce--high levels of antioxidant pigments and vitamins, high dissolved solids, waxy cuticles, upright growth that stays out of the dirt--those “vegetables that smile back at you,” as Dr. Navazio likes to describe it.

An ideal distribution system for this organic seed would successfully link organic produce growers with seed grown on many organic farms in many farming regions in a convenient open source market of well-managed open pollinated varieties. This distribution role could be fulfilled by seed companies, but they often have priorities of their own that interfere with the proper maintenance of old open pollinated varieties (and open source breeding), favoring hybrids or proprietary varieties because of the lock they can provide against competition. If organic farmers want to grow sturdy OP's with an ongoing history of organic field maintenance, we may need to find a way to distribute them, as well as grow and breed them, ourselves.

What a great problem. It will provide a lot of good work.

The Organic Seed Alliance, a non-profit research and education organization in Port Townsend, WA, just may be the social enzyme that brings together the necessary pieces to synthesize a whole system of seed innovation, production and distribution for organic farmers. These are friends, allies, and supporters of us and our kind, and they have been linking together farmers, industry, and ag scientists in an effective model of participatory plant breeding and farmer-to-farmer education in the field. For 7 years OSA's Northwest regional programs have brought together experienced seedsmen with organic farmers who want to learn the art and science of growing ever-better seed. The full results of this effort are still 5 years off, I expect, but such is the nature of seed and crop improvement. Seed is patient, and we need to approach it with patience.

Participatory plant breeding combines the farmer's professional, intuitive, and observational skills with a trained plant breeder's knowledge of breeding systems for different species of crops. From a practical standpoint, breeding lettuce is different from spinach, is different than corn, is different than squash, *et cetera*. There are little tricks and techniques appropriate to each species that really make the process quicker and more sure, and the synergy between a farmer's field sense and a breeder's technical sense can be a potent driver of regional genetic adaptation toward a reliable, marketable, healthy new variety or reselection.

Foundation seed from such collaborations, sponsored and funded by public or private interests, would be valuable assets for an organic seed growers' network, ever looking for something new to grow to keep its new members busy. In turn, this growers' network would provide a continuous stream of new and re-polished seed cultivars to organic farmers supplying the growing demand for organic food--and new produce varieties, in particular. Organic growers appreciate varietal choices and their customers like food diversity; a broadening of our community's innovation resource base would serve both by providing more genetic and regionally adapted seed offerings.

Creating an organic seed system that balances the resource, information, and financial feedbacks of the innovation, production, and market nodes, will be an original accomplishment, if we do it. The system as it exists does not have a dependable way to feed its potential innovation partners with information and cash flow, nor even to reassure its production partners with a steady demand that will evolve better systems and better economic scale. Organic seed users and the market they supply are ultimately the beneficiaries of better genetics and better seed quality, but there is no feedback from the market to the innovation process in the organic seed system at large. This is where I imagine we need to synthesize new processes of interaction and reward; symbiotic exchanges of education, genetic resources, and money. OSA might be that systems builder, a nucleus that helps distribute materials, energy, and control between coevolved organelles.

So, this is what I think an organic seed system *for and by farmers* might look like, well before it actually exists. Like all visions, its an illusion. But like many illusions, including land ownership, it could keep us working with heart the rest of our lives.

