

‘ORGANICALLY GROWN’ SEED – THE COMING CHALLENGE FOR ORGANIC FARMERS

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As American organic farmers move into the new era of the National Organic Program (NOP), one change we will see is the requirement to use ‘organically grown seed.’ Within the NOP standards, there is the provision that if ‘organically grown seed’ is not commercially available, a farmer can plant conventional untreated seed, but that lack of availability must be documented, and theoretically, must be avoided if possible.

Organic seeds do indeed offer a logical way for organic agriculture to complete the circle, and this is attracting attention worldwide as a key component that should be essential to organic farming. However, few farmers would willingly sacrifice quality, vigor, germination rates, uniformity, the selection of certain varieties that buyers demand or certain specific varietal characteristics simply so they can use of organic seed. Many question whether there is capacity of organic seed suppliers to meet the potential demand within the foreseeable future and certifiers are hesitant to require too much, too soon. The organic industry could produce large quantities of good quality organic seed if there was a strong market. This is something that we should be putting significant and cooperative effort into. Unfortunately, at this time, there is not yet the infrastructure and commitment to do this.

According to a survey done by USDA in 1997, the United States had 850,173 acres of certified field crops. Of this, about 43,000 acres were in corn, 82,000 acres were in soybeans, and over 200,000 acres in small

grains. This organic acreage has greatly increased over the past 4 years, perhaps by as much as 20%, so it is a fairly safe estimate that there may be well over a million acres planted to certified organic crops in 2002.

In 2002, there will not be a sufficient supply of certified organic seed for all those acres, and much of what is available is highly regionalized. An isolated farmer who lives where there is little local organic seed produced, or who lives where there is heavy competition for what limited organic seed is available may find it difficult to obtain organic seed economically. For some, organic seed of the varieties the buyers demand simply doesn't exist. For farmers growing organic processing vegetables as we are, usually the processor tells you what variety to grow and provides the seed. It is often hard enough to get seed for the required varieties untreated, much less organic!

ON-FARM SEED PROPAGATION

Many farmers save a portion of their crops for their own seed needs and to sell to neighbors. This is an important source of organic seed that should be increasing with the new regulations. However, there are some important factors that should be considered.

For many organic farmers and certifiers, transitional land is a problem. It is always difficult to decide what farmers should plant on transitional land and how they should prove that there is no co-mingling with

organic crops. What better use of transitional land is there than as a place to grow next year's seed? The plants will be under organic management, and it will allow a farmer to become more self sufficient. When the seed is harvested, cleaned and stored separately for seed, the disposition of the transitional crop is easily documented. However, now it looks as if the NOP term 'organically grown' strictly means 'certified organic' seed, and this therefore could restrict this traditional use of transitionally raised seed.

Plant varieties that are patented or protected under the Plant Variety Protection Act (PVP) may only be propagated and sold only by companies licensed to produce seed of that variety. The Plant Variety Protection Act, enacted in 1970 and amended in 1994, provides legal intellectual property rights protection to developers of new varieties of plants that are sexually (by seed) or tuber-propagated and F1 hybrids, and is administered by USDA. The term of protection is 20 years for most crops and 25 years for trees, shrubs, and vines. Under the 1994 PVP amendment, a farmer is still allowed to save only enough seed of a protected variety for replanting on their own land as long as the seed was originally obtained through the authority of the owner of the PVP. However, a farmer is no longer allowed to save seed to sell to a neighbor as was previously allowed under the "farmer's exception". Additionally, it is illegal for a farmer to sell PVP-protected seed to others as 'VNS' or 'variety not stated' seed, merely not referring to the protected seed name in order to circumvent PVP protection.

This law was challenged in the Supreme Court in *Asgrow vs. Winterboer*, where the Winterboer family had sold 'brown bag' soybean seed grown of several *Asgrow* protected varieties. The Supreme Court

decision stated that amount of saved seed can be no greater than the amount of seed that the grower originally planted to produce the first crop, but that the farmer was permitted to sell some of that saved seed. However, shortly after this decision, the law was amended to essentially remove this farmer exemption by allowing the sale of only those protected varieties that received PVP protection before April 4, 1995. Violators of PVP law can be held liable for triple damages plus costs. For example, a producer buys enough "brown bag" seed to plant 100 acres and then produces 4000 bushels of grain from the planted 'brown bag' seed, the owner of the variety could recover damages of triple the value of the 4000 harvested bushels plus lawyers fees.

Patented seed carries additional restrictions and additional 'teeth' if the patent owner can show that unlicensed seed has been used. Plant patents also prohibit asexual propagation of any plant part, such as by cuttings or in tissue culture. Some newer varieties, especially GM varieties, are patented, though obtaining a Plant Utility Patent is more difficult and more expensive than obtaining PVP protection. It is illegal for farmers to save and replant any patented seed, even on their own land, hence giving 'justification' for Percy Schmeiser-type repercussions.

Once we try to start supplying or sourcing outside our own geographic area, we must consider the cost of moving seed, because most grain seed is heavy and bulky. It costs \$19.22 for standard ground UPS postage alone to ship a bushel of soybeans (60 lb) from New York to Lincoln, NE. This must tacked onto the cost of the seed. Even if the seed producer only charges \$8/bu for the seed, suddenly their customer must pay at least \$30/bu to cover the cost of seed, bags and shipping costs. Commercially available

organic seed is also usually significantly more expensive than the same varieties grown conventionally. USDA has implied that additional cost should not be a reason for a farmer to decide that a product is 'commercially unavailable'. However, what farmer would not take this into consideration if organic seed raises the cost of production significantly?

'ORGANIC ' SHOULD NEVER BE AN EXCUSE FOR POOR OR MEDIOCRE QUALITY

An organic market vegetable grower spoke to me recently at the local farmers market about seed. She had purchased organic seed from a small cottage-industry organic seed operation this year and she complained about the seed envelopes full of trash, poor quality seed and off-types. Although she is strongly committed to the organic philosophy and lifestyle, she said she would much rather buy seed from a bigger company to get consistent high quality and a better selection of varieties.

'Organically grown' seed should be top quality seed, at least as good as what we can get from seed companies, if not better. Bin-run grain out of the field or out of your bin is not the same thing as high quality seed. Unless the organic community develops the regional capacity to clean, condition, store and test seed appropriately and legally, many of us will be using inferior quality seed.

There are both federal and state laws governing the labeling and selling seed when it is sold commercially. As a farmer moves from casual on-farm seed sales to something more commercial, it is critical to know what the law requires. States are responsible for granting licenses to those selling seed, for conducting periodic inspections, and for ensuring all seeds sold

commercially in their state are tested for purity, trueness to variety, noxious weeds and germination. If state seed laboratory tests find the product is misbranded or adulterated, if it fails to meet its label guarantees or contains prohibited or restricted noxious weed seeds, the seedlot can be prohibited from further distribution within the state until it is brought into compliance with the law. Most states maintain a list of minimum germination requirements by crop species, and no seedlot falling below that minimum level can be legally sold. For example, in New York, sweet corn and soybean seed must test 75% germination or above to be legal for sale in that state.

Germination tests are best done by an independent lab even if a farmer is selling seed casually so the buyer knows they are getting quality seed. To be responsible, no one should be selling organic seed that tests below 85-90% germination, certainly not without letting the buyer know before purchase! For a rough estimate of germination, you can count out 100 seeds, roll them up in a paper towel, and keep the towel moist at constant room temperature for about two weeks. After about 5 days, begin counting the number of seeds that have germinated with normal root and shoot emergence. This will give you an estimate of germination but may not give an accurate assessment of plant growth under actual field conditions. After 14 days, the number of seeds that have fully germinated divided by 100 is the % germination. If all the seeds germinate basically at the same time and look the same, then vigor is probably pretty good, but if they germinate sporadically over the two weeks with significant differences in size, there may be a problem with low vigor seed.

Even standard seed test lab germination tests do not fully assess seed vigor. Seed vigor, that is, how well the seedling grows once it germinates, is a characteristic that is not as easily quantified. Seed with low vigor will produce low vigor plants which are slower to germinate, slower to grow, much more susceptible to insect and disease attack (especially seedling rots and seed/seedling insects), are harder to control weeds in, are less resistant to other environmental stresses like drought, and usually yield significantly lower. We organic farmers, who can't rescue disasters with seed treatments and pesticide/herbicide sprays, simply can not afford to use low vigor, inferior quality seed!

Good vigor is quickly lost if seed is poorly handled, improperly stored, exposed to moisture or heat, if the parent plant was weak or stressed during seed development, and as the seed ages. Smaller and lighter weight grain and beans are often lower in vigor. It has been long known that if a seedlot of snap beans is separated by size, the smaller beans will grow into significantly lower yielding, weaker and more disease susceptible plants than the larger beans. Both the tip kernels and the butt kernels on a cob of corn will often have lower vigor than the 'flats' in the middle of the cob. Beans and grain banged up during harvest may look fine on the outside, but have hairline interior cracks that will result in lower vigor. Grain that has started to sprout before harvest is likely to have much reduced germination and vigor when planted. Seeds that are high in oil age more quickly and lose vigor more rapidly than seeds that are low in oil. A farmer must have a way to separate potentially low vigor seed out of a seedlot and DISCARD it. Poor quality seed is the most expensive seed you can buy - it is no bargain!

Fields intended for seed production should be stringently checked for off-types, weak or disease infected plants and to make sure there is no unwanted mixing or segregation. Farmers interested in getting into seed production should check with their state Seed Improvement Association for information about using or producing Foundation, Registered and Certified seed. Once the seed is harvested, there is usually no easy visual way to tell if it is disease-infected, weak or not of the intended variety so seed grade quality control must begin in the field. Machinery that harvests the seed must be clean of previous crops, especially if they are of the same species, and must be set to harvest gently so there is minimal damage during harvest. For fleshy fruits and vegetables, the separation of viable seed from fruit is messy and space/labor-consuming for a relatively low yield of seed. All of this must be taken into consideration as farmers produce more of their own seed.

ON-FARM PLANT BREEDING

For many years, farmers WERE the plant breeders, watching their fields, gardens and fruit trees for unique plants or sports that would offer novel and improved characteristics. Many popular fruit varieties even today, such as Concord grape and Red Delicious apple, were developed by farmers. Unfortunately, much of the incentive and expertise needed for on-farm plant breeding has been lost with the development of hybrid seed and the wide commercial availability of seed and nursery stock. Of course that doesn't mean that on-farm breeding is no longer of value, indeed this is one skill that the organic community in particular needs to reclaim and advance.

On average, using classic plant breeding techniques, plant breeders figure it takes about 8-10 years from the time of making a cross to a finished variety for seed

propagated crops, and about 25 years for woody perennials. And that assumes that 95-99% of the progeny from each cross are discarded as worthless. Most of that time involves very time-consuming evaluation and testing, looking at thousands of individual seedlings to pick the few good ones, and then testing and discarding among those until a very few elite lines are consistently superior.

One way to speed things up may be to select superior types within an already mixed population. Most people know that if they save seed from a hybrid, like corn or tomatoes, the seedlings will segregate the following year and may exhibit a wide range of different characteristics. If a person continuously selects from that segregating population only those plants with certain characteristics, within 5-6 years they should have a fairly stable line. Open pollinated corn may be a good option for some organic farmers who are willing to put the necessary time into developing regional landraces that yield and stand as well as commercial hybrids. It may take a few years to get a OP line that is stable, acceptably high yielding, does not go down before harvest and is widely adapted, but the results and the process, can be quite satisfying. However, it important to realize that there is no guarantee that your own homegrown OP corn is totally non-GMO if your neighbor plants Bt corn.

My husband, Klaas, and I developed clear hilum food grade soybean variety 20 years ago and are still growing it, but because it has a slightly different composition and isn't a Vinton, most buyers don't want it. The variety, which we call 'Boyd', was actually a chance off-type plant that Klaas found growing in a soybean field in 1980. Because the plant was significantly taller, stiffer, with a high yield of pods borne

higher on the plant, he saw at once that this could be an agronomic improvement and saved the plant. The following year he planted the seed from the plant in the garden and selected individuals that looked the same as the original plant. After a couple years of selection, he decided he needed professional plant breeding advice, contacted a plant breeder at Cornell, and ended up marrying her! Keep the expertise in the family, so to speak! On-farm plant breeding can be done, and it often is lots of fun with good results, but it must be looked upon as a long-term proposition (no pun intended!) and it must be recognized upfront that in most cases, very few of the progeny will be consistently better than what you started with.

TAPPING INTO PROFESSIONAL PLANT BREEDING EXPERTISE

There is a significant opportunity, need and urgency for professional plant breeders to develop varieties well suited to organic production. Organic production needs different plant characteristics, such as larger more spreading plants to shade the ground early in the season, plants that grow well without high nitrogen applications, insect and disease resistant plants, non-hybrid, non-GMO varieties etc. Plant breeding facilities select their new varieties under conventional chemical farming conditions, so it is hardly a surprise that many are not ideally suited to organic conditions!

The United States Department of Agriculture maintains an extensive plant resource collection, known as the National Plant Germplasm System (NPGS), which preserves old, wild, and unusual varieties of most annual and perennial crops. USDA makes this material, or 'germplasm', available to anyone worldwide who has use of it. Only limited research has gone into using these varieties for their own sake, they

are used mainly as raw material for plant breeders. Some of this material could be extremely valuable to organic farmers as is, but most of us simply don't know about it. The USDA staff puts enormous effort into characterizing the germplasm for unique genes and traits so a plant breeder in search of a certain plant type or characteristic need only to log onto the database website at the Genetic Resources Information Network (www.ars-grin.gov) to search for what germplasm is available with a particular trait. Farmers too can request samples of the interesting varieties, but there is a limit of a 50 seed sample per person per variety per year. "The germplasm collections provide a valuable resource to increase genetic diversity in cultivated plants", says Kay Simmons, USDA, Agriculture Research Service National Program Staff. "Researchers are finding new genes for food quality, taste and aroma, and identifying germplasm that will enhance nutrition."

The Farmer Cooperative Genome Project ('FCGP' at www.fcgp.org), jointly sponsored by Oregon Tilth and USDA, is a program to encourage gardeners and farmers to participate in plant conservation and develop varieties of plants appropriate for regional conditions. Members work with National Plant Germplasm System staff to grow, describe, and propagate a wide selection of different plant varieties. This provides an valuable opportunity for gardeners and farmers to contribute to important research efforts and also to share in the wealth of seeds available through the NPGS. FCGP participants share valuable descriptive information with other participants and with plant curators and plant breeders worldwide. The FCGP also encourages growers to develop new varieties appropriate to their area, possibly ones with useful resistance to pests and diseases or ones especially well suited to regional

conditions. The FCGP offers information and support for members interested in experimenting with hybridization, population breeding, and selection.

The Alberta Organic Association (AOA) will collaborate with Sharon Rempel to do on-farm field trials of a wide selection of 'heritage' wheat varieties in 2001 and compare them to the performance of 'modern' varieties. Rempel says, "Heritage wheat varieties are a valuable genetic resource for the next Millennium and deserve conservation attention and exploration, especially in organic farming conditions. Although high-input high-output wheat have played a significant role in reducing hunger, the loss of indigenous and heritage varieties is becoming recognized as a serious global biodiversity issue." This is part of a larger project of AOA and other associated groups, the Organic Seed Initiative (members.home.net/oldwheat/orgseed.html), which seeks to identify and propagate seed from varieties well suited to organic agriculture. This project links closely with similar European initiatives (www.biogene.org). The program members feel strongly that by developing varieties that do not require high-input technology such as genetic engineering, nor high inputs for yield and growth, this will develop a more sustainable agricultural system.

Some university plant breeding departments are seeing opportunity in the organic niche and are starting to work toward it. As a group, organic farmers need to cooperate with our university plant breeders to let them know what we need, to participate in field trials on our farms, to encourage their work and provide useful feedback. With the increasing privatization of the seed industry, many university plant breeding programs are looking for a reason to exist and the organic

market can potentially provide this. However, traditional plant breeding is a slow, laborious, space consuming, skillful and expensive process, especially without the option of genetic engineering to accelerate selection for certain traits. Not many scientific articles so essential to university tenure come out of this kind of work, nor is it considered glamorous in today's molecular environment. And, the bottom line, there isn't much private grant or government money available to fund such work. We would hope that no one will be getting patents on the new varieties once they are developed, but without some form of intellectual property protection, it may be difficult for the university to recoup their investment. As organic farmers cooperate with public plant breeding programs to develop suitable new varieties for organic production, it is important for us to understand the practical funding constraints on university research.

SUMMARY

Still the questions remain - What does 'commercially available' mean? What will be considered an 'equivalent variety'? How much effort will be required by the farmer to source such varieties? What kind of documentation will the grower have to show? Perhaps these are questions that just don't have answers right now. As farmers, we don't know what 'commercially available' means, we don't know what is expected of us, we don't know what will be considered 'good enough'. Over the past few weeks, I have received numerous phone calls from organic farmers in New York asking me what they need to use for seed for the small grains they are planting right now. These will be our first crops certified under NOP requirements. It's a tough position for us farmers to be in right now, because we don't know what will be expected of us next year, we are planting crops that will be

harvested under NOP requirements, and we don't fully know what they are.

There is no doubt that we need to work toward developing the capacity for producing organic seed for the organic community. This needs incentive and commitment - and money, with an appropriate phase-in period that may have to be regionally flexible and understanding of all the different realities of 'commercial availability'.

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COMMERCIALY AVAILABLE - What does this mean in the real world? Mary-Howell R. Martens

The National Organic Standards contain the rather vague wording that "The producer must use organically grown seeds, annual seedlings, and planting stock, except that nonorganically produced, untreated seeds and planting stock may be used to produce an organic crop when an equivalent organically produced variety is not commercially available." Many people in the organic community are wondering what exactly is meant by 'commercially available.'

Maury Johnson of NC+ Organics, the industry leader in organic field crop seed production, says that his company will be carrying certified organic corn, soybean, clover and alfalfa seed in 2002. He estimates that they will have enough corn seed to plant approximately 20,000 acres and enough soybean seed to plant 15,000 acres. He figures that this is probably sufficient to plant 10-15% of the total acreage of certified organic corn and soybeans in North America, though not all the NC+ hybrids are widely adapted. While Johnson says that he does not know of any

other seed companies producing organic hybrid corn, there a number of smaller companies are selling organic OP corn seed.

organic seed is not more strongly required for certified organic farmers.

Terry Allan of Johnny's Selected Seeds, a company committed to serving the organic community, says that Johnny's will be offering certified organic seed for 53 vegetable varieties, 36 herbs, and 19 flower varieties, cover crops and sprouting seed in 2001. Says Allan, "Our market is oriented toward fresh market and specialty growers. While some of our vegetable varieties may be suitable for processing, that is not what the vast majority of our customers are doing with the seed they buy from us. Johnny's is continuing to expand our line of organically grown seeds, and is working with breeders and suppliers to keep quality high and prices reasonable. Organic growers need the most vigorous and disease/pest resistant varieties available to succeed, and we are committed to providing them."

Terry Allan also feels that based on the experiences of European seed suppliers, it is clear that loophole in the NOP that allows farmers to use non-organic seed if organic is not commercially available is perhaps the biggest obstacle to increased production of organic seed. Many seed companies in Europe geared up and invested heavily in organic production of their best varieties anticipating the European Union implementation of the REQUIREMENT for certified organic seed. The implementation of this requirement has been pushed back a few times, leaving the seed companies sitting on a lot of seed they can't sell because the price of the organic seed is higher than the non-organic seed. If implementation of the requirement continues to be put off, these companies will get out of the business, which will be a big setback for long-term organic seed availability. She fears this may happen in the United States if