

Farming at the Edge of Order and Chaos^[1]

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Springtime serves to remind us of the order and chaos in nature. Nothing is more predictable, certain or orderly than is the changing of seasons. Nothing is more unpredictable, uncertain, or chaotic than is the weather during the changing of seasons. Nature thrives at the edge of order and chaos. A farm is a thing of nature. Like a wild animal, a farm may be trained but is never really domesticated. At times, a farm may seem orderly and under control; at other times, it seems chaotic and uncontrollable.

For centuries, farmers have tried to domesticate their farms, to bring the chaos of nature under control. Farmers wanted to free themselves from the wrath of nature ☹ from the frosts, droughts, floods, hailstorms, and windstorms that could destroy their dreams along with their crops. They wanted to control the pests and diseases that frustrate their attempts to grow the specific things that we humans value most, rather than the diverse things that nature would grow instead.

The industrialization of farming ☹ with its mechanization, hired labor, genetic selection, irrigation, agrochemicals, antibiotics and hormones, and more recently, genetic engineering ☹ is the result of farmers' historical struggle to establish control over the chaos of nature. The success of industrial agriculture is seen in ever-fewer farmers producing ever-larger quantities of agricultural commodities for ever-lower dollar and cent prices. However, the failure of industrialization is seen in the ever-growing ecological and social costs, which are not reflected in food prices but borne by society in general. These growing costs reflect the persistent resistance of nature to farmers' attempts to control.

Nature always has the last word. Crops still freeze because weather is still unpredictable. Irrigation aquifers are depleted as farmers try to produce too much in areas with too little rainfall. As higher levies are built along rivers, floodwaters rise higher, and eventually the larger floods break through. Now with global warming, weather is becoming more volatile, and the rainstorms, hailstorms, windstorms, freezes, and droughts will become even more severe. Now with biotechnology, we can expect super-weeds and super-insects, as nature responds to each new attack. Perhaps even more important are the violations of human nature, as people are treated as unfeeling, uncaring cogs in huge industrial machines. By nature, humans fight back against oppression, whether political or economic in nature. Nature is fighting back against industrialization. Nature thrives at the edge of order and chaos and simply refuses to be domesticated.

A growing body of literature from a wide range of scientific disciplines now indicates that the adaptability and long run effectiveness of any system, meaning its sustainability, can be maintained only at the edge of order and chaos. Only living systems are capable of productivity as well as self-renewal and regeneration, and thus, only living systems are capable of sustainable. Sustainability depends on our willingness and ability to accept and embrace the nature of living things. Sustainable farms, being living systems, depends upon the willingness and ability of farmers to work and live in harmony with nature ☹ at the edge of order and chaos.

Order, knowing what to do and how to do it, arises from experiences in dealing with the same basic problems and opportunities over an extended time period, regardless of whether we are talking about farmers managing pests, people making public policy, or species evolving to fit their ecological niches. We try things, some seem to work, others don't; and so, we learn to do the things that seem to work best. Farmers tried the new chemical and mechanical technologies, some seemed to work, others didn't; they used the ones that worked and discarded the others.

Order works well, as long as the natural and social environment  the source of problems and opportunities  doesn't change too much. We become more effective and efficient as we learn to do things in a more orderly fashion. But, if the environment changes  if we encounter new problems or discover new opportunities  our orderly ways of doing things may no longer be appropriate. We may be very efficient, meaning we do things right, but we may not be effective, meaning we may not do the right things. In addition, orderly processes often become very entrenched and resistant to changes. We know what works, and thus, we aren't going to waste time or money on new, unproven ideas.

Chaos implies an absence of order. In chaos, people go in all different directions and try all sorts of things; there is no common understanding of what they are trying to do or how best to do it. Chaotic farmers try all sorts of things to manage pests, grow crops, and care for livestock with no common understanding of what a farm actually is or what they can expect from it. In a chaotic nature plants, animals, and insects mutate and migrate into new environments and compete for new ecological niches. In a chaotic society, people address new social, ecological, and economic issues in new political environments, following all sorts of new approaches, without a common understanding of what they want to achieve or how to go about it.

Chaos is very inefficient and is only sporadically effective. It's pretty much a hit or miss proposition. But chaos is an essential element of change. Evolution is orderly, but revolution is chaotic. Evolution is capable of finding better ways to do things. Revolution is capable of finding better things to do. In ecological terms, evolution allows organisms to better adapt to their environment while chaotic events can create more-effective organisms and can move existing organisms to new environments where they can be more effective and efficient. And when environments are dramatically altered, survival may well depend upon having a capacity for dramatic, chaotic change.

Of course, chaos can lead to failure and extinction. But so can order. Far more nations, people, and ideas die of atrophy than die from revolution. Both order and chaos are necessary ingredients for long run success  for sustainability. Sustainability can persist only at the edge of order and chaos. At the edge of chaos and order, there is sufficient order to ensure a measure of efficiency but also sufficient chaos to accommodate an ever-changing environment of new challenges and opportunities.

Many farmers today, particularly those on small and medium-sized family farms, seem afraid to abandon the order of conventional, industrial agricultural production, even though the changing environment of agriculture makes their failure virtually certain. Most farms are simply not large enough to compete in today's global economy. Yet, farmers persist in producing and marketing the same old commodities in the same old ways, because it seems more orderly and efficient to do so. Many farmers are even willing to give up control of their farming operations  through comprehensive, corporate contracts  just so they can continue doing the things with which they have become comfortable. Most farmers today resist the uncertainties of the new sustainable farming systems, such as organic production, specialty crops, niche markets, direct marketing to local customers, or working cooperatively with other farmers to access higher-volume food markets. They don't know how to do these things, and too many things are unpredictable, uncontrollable. These new approaches to farming just seem too chaotic.

The agricultural institutions, including agricultural colleges, state and federal departments of agriculture, and most farm organizations, all suffer this same unwillingness to venture out to the edge of chaos. The scientists, bureaucrats, and advocates cling to the false hopes that new biological technologies, information technologies, or global opportunities will somehow allow them to gain control over nature. After all, they have succeeded, academically and economically, by focusing on doing the same things better. Why should they risk failure now by searching for new and better things to do? The politicians and

lobbyists try to create the illusion that fine-tuning failed policies from the past will create successful policies for the future. They have spent many years developing constituencies and political support for an evolutionary approach to public policy. Why should they risk revolution by putting forth new policies that actually might work? Those in positions of power gained their power doing what they have been doing. They are unwilling to risk venturing out to the edge of chaos.

Those farmers who are waiting for things to settle down and become orderly before they venture out onto the frontier of sustainable agriculture will be waiting forever. There is order in sustainable agriculture, but the order is within the chaos. Sustainable farmers must work in harmony with nature and nature is both orderly and chaotic.

When sustainable farmers lose a crop to drought, flood, or frost, they change fields, planting dates, crop rotations, or even change crops. They do what they must to accommodate the nature of their particular farm. When the organic foods market was captured by large, industrial producers, many farmers moved beyond organic to market sustainably grown, local foods. When consumers became concerned about the use of growth hormones, antibiotics, and other confinement livestock feeding practices, sustainable farmers respond with humanely raised, hormone and antibiotic free meats. When sustainable farmers outgrow farmers markets, they start CSAs or begin marketing their best products to local chefs. When CSAs become too large and burdensome, sustainable farmers form multi-farm CSAs, start on-line buying clubs, or form cooperatives to gain access to higher-volume markets. Sustainable farmers thrive on the edge of order of order and chaos.❶

These sustainable farmers are showing the way to the future for the rest of society. To sustain agriculture, to sustain human life on earth, we must all learn to thrive at the edge of order and chaos.

[1] Sustaining People through Agriculture series,❶ Small Farm Today Magazine, Missouri Farm Publications, Clark, MO. May-June 2006.