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## **ORGANICS: YESTERDAY, TODAY AND TOMORROW**

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### **Historical Background**

Ten thousand years ago, in what is now Iran, an astute observation was made. Wild grains discarded in a cleared area gave rise to a high concentration of desirable plants. The realization that intentionally "trampling" seed into the ground exponentially increases the caloric output per acre began a revolution that changed the world. We've been improving on that observation ever since.

The history of agriculture is a trail of technologic, social and economic upheaval. It created new economies and birthed empires as it doomed the hunter gatherer and nomad. Agriculture dramatically changed our landscape and made possible urbanization.

Ironically, where agriculture first proliferated there are no thriving farms. The fertile crescent is no longer fertile. North Africa, once the cereal bowl of the ancient world, is famous for the Sahara Desert. Our forefathers did not understand how tilling the earth and grazing livestock can accelerate erosion and degrade soil.

As technology advanced, we did more in less time and with less labor..... but as in ancient times, with unforeseen costs.

- Animal traction and the plow accelerated erosion.
- Internal combustion engine and tractors increased amount of land susceptible to wind and rain erosion.
- The chemical revolution introduced DDT, organophosphates, and other carcinogenic materials and hormone mimickers from the Arctic to the Antarctica.

Each development improved efficiencies and yields. Each breakthrough had hidden costs creating future problems.

### **State of the Art Organic Research**

Organic agriculture did not exist as a concept in 1900. Encouraging nature to control pests was not the realm of organic farmers and biological control was not considered "fringe" at the turn of the last century. It was state of the art and USDA lead the way.

Between 1899 and 1905, USDA sent entomologists to Australia to collect predator insects. A new pest threatened the growing California citrus industry. A tiny

nondescript scale-like insect in the homoptera family was ruining citrus groves. USDA scientists believed the pest originated in Australia and hoped to find a natural control in its native habitat. Despite slow boats and poor refrigeration several species survived the long journey across the Pacific. One in particular, Coleoptero vidalia thrived on the new pest. It voraciously consumed the tiny citrus scale and reproduced. A branch laden with this new migrant beetle was sent to another infested orchard where it again decimated the pest population and thrived. Coleoptero vidalia quickly became established wherever citrus scale was found. Today, the pest is only seen when broad spectrum pesticides are applied over a large area killing off the little celebrated Australian beetle. Fortunately, it reestablishes itself quickly.

The search for and introduction of beneficial insects to control plant pests was in its infancy. The introduction of the Australian predator demonstrated the strategies effectiveness. Citrus growers liked it because it worked and cost nothing once established.

This was applied farm research at its best. It established a natural control that continues to protect the citrus industry today. It is what organic farmers strive to achieve in their fields.

Why was biological control research curtailed? Why didn't we continue our study of nature and ecosystems to improve the way we manage our farm systems? Part of the answer is new technology offered new promising chemicals that could be sold creating economic incentives for the development of more chemical solutions.

## **The Beginnings of Chemical Agriculture**

Since biblical times farmers were at the mercy of plagues. The chemical revolution of the 40's and 50's promised a change. The search for chemical weapons spawned a new generation of chemicals including DDT. DDT had no clear use until someone realized its potential as an insecticide. Spray it on and watch them die. Farmers were impressed. The new agricultural chemicals were modern, effective and affordable. America's chemical companies churned out the new arsenal that changed how we farm for the next fifty years.

Chemical fertilizers also gained popularity. Agricultural extension workers taught fertilizer (NPK) theory and application techniques as increased yields were demonstrated in field trials and university plots across the country. Unfortunately, the role and importance of soil microbiology to plant development and soil fertility was demoted to academia.

Chemical farming was born with great fanfare. Armies of specialists preached its virtues. Hopes ran high for better yields and miraculous pest controls. At the same time, some growers believed their pest problems were exasperated by the new chemicals as experts recommended more sprays for new pests. The phrase "pesticide treadmill" was coined to describe the cycle of spray, disruption of natural

controls, new pests, spray, disruption of natural controls, new pests, spray.... Some farmers and field workers had allergic reactions. A few abandoned the chemicals and returned to their own search for better ways to farm.

### Yesterday's Organic Farmers

This small group who rejected the new chemicals were considered backwards. They became known as ORGANIC FARMERS as the public awoke to the poisons we unleashed on ourselves.

Rachel Carson's 1960's book Silent Spring birthed the environmental movement. Young and old became concerned with pesticide contamination and wanted food grown without pesticides. By 1980 the organic food industry was established, insignificant in size, but committed.

In the early 80's, organic farmers were a few old time growers and concerned hippies, not part of mainstream agribusiness. These were the growers who supplied the neighborhood-buying coops, health food stores and local farm stands. Demand for organic food grew as more small farms produced food free of chemicals. The emerging market was willing to pay for pesticide free food and considered the upfront cost of organically grown a bargain compared to long-term health risks associated with pesticide residues.

Hard numbers for the organic industry are sketchy and difficult to interpret. Nevertheless, the Natural Foods Merchandiser (NFM) estimated 1981 organic food sales of \$21 million while the Organic Trade Association website notes \$178 million in 1980. In San Francisco, the first wholesale distributor of organically grown food, Veritable Vegetable, was well established as organic farmers formed regional organizations, defined standards, shared ideas and promoted organics.

Those of us with our hands in the dirt wanted information and understanding about organic methods. We devoured old books like Farmers of Forty Centuries by King and read Sir Albert Howard's An Agricultural Testament on soils and composting. We made insect smoothies to spray on tomato plants from which Baccillus thuringiensis was later isolated and incorporated into commercial products including Javelin for worms like cabbage loopers, Novodor for Colorado Potato Beetle and Mosquito BT Dunks. We learned about crop rotations as practiced in ancient times and feeding soils by incorporating legumes such as lupines, peas, vetches, beans and other plants. We paid our own way as we rediscovered good soil husbandry and sought better cultural practices to manage eco-farming systems. At universities we studied soil science, crop production and plant pathology as we plagued professors with questions about the chemical pesticides and fertilizers being taught in the classroom.

By the mid 1980's, the organic market was beyond it's infancy. The Natural Foods Merchandiser reported \$78 million in 1988 sales (271% increase over 1981). There was

a resurgence of small ORGANIC farms and 1990 organic sales reached \$182 million according to NFM.

This small group of dedicated individuals led the way with minimal outside support or funding. We paid for promotions, research, certification and lobbying. In 1990 California passed the California Organic Foods Act. Formulated by farmers, it defined ORGANIC.

## **Organic Farming Today**

In 1995 NFM reported organic market sales at \$402 million, while land in organic production was less than .5% of cultivated farmland.

The public's skyrocketing demand for organic products pressured traditional chain stores to take notice as natural foods retailers nibbled at their high end customer base. Two national chains, Whole Foods and Wild Oats, emerged as dynamic retailer leaders promoting organically grown food. Media coverage, like the Alar apple scare, continued to increase the public's demand for organically grown food and concern for pesticide contamination.

As increasing demand and higher prices attracts more growers, there is a growing need to understand and substantiate organic farming practices. Soil scientists and microbiologists have begun to shed light on the complexity and importance of soil microbiology in organic farming systems as well as measurable advantages over chemical fields. The relationship between soil fertility and European Corn Borer was reported at the (1998) Asilomar Organic Farming Conference (Monterey, CA) substantiating claims of lower pest pressures in organic fields than neighboring conventional producers.

Until 1999 the demand for organic produce regularly outstripped production. Conventional growers, attracted by prices 20% to 100% above conventional markets and growing demand, are converting to organics. Like the Silicon Valley's dot.com race, the Salinas Valley companies are in their own race for organic ground. The profile of the organic farmer is changing from the small family farm to companies that mirror conventional production. The Pavich family has over 1,000 acres of certified organic grapes, Tanimura & Antle, one of California's largest lettuce grower/shippers recently announced the conversion of 1,500 acres to organics and joined Natural Selection Foods. In the fresh produce side of organics, production has surpassed demand in several categories. Banana producers reduced prices to capture market share and expand into conventional markets. Organically grown packaged lettuce is omnipresent competing side-by-side with conventional product. Organically grown snow peas, snap peas and cherry tomatoes have all surpassed the current organic market's winter capacity. Lower prices, especially during the competitive summer months is forcing many small organic growers to rethink their marketing strategy or get out of the game.

Demand and production of organics in other countries is also growing. Europe, particularly Germany, England and the Scandinavian markets have grown quickly and offer export opportunities for US growers. Mexico's department of agriculture, SAGAR (Secretaria de Agricultura), has promoted organic farming for the past three years. At the tip of the Baja California peninsula, Mexico, Del Cabo, an association of over 150 families, ships in excess of 600,000 cases per year while in Mexico's southern state of Chiapas, several thousand small coffee growers export organically grown coffee. Supermarkets in Costa Rica and Argentina sell locally grown organic products as well as imports. Other Latin American and African countries perceive opportunities for small producers to enter the growing global organic market and currently export a wide range of crops including sesame and chocolate.

In California, organic acreage has increased, though the number of growers may be down or holding steady. California data indicates number of organic growers between 1993 and 1994 decreased from 383 to 338 (11.7%) while the acreage increased from 14,900 to 17,100 acres (14.8%) for fruits and vegetables.

On the retail side, conventional chains like Safeway, have introduced organic sections. The Packer, a produce industry newspaper reported in its 1998 Fresh Trends that 26% of shoppers purchased organic produce in the previous six months. A 1997 Hartman and New Hope study reports 46% of USA consumers say they are interested in organic products. A 1997 Health Focus Trend survey reported that 23% of shoppers purchase organic products at least twice a week.

Food Service, especially high end restaurants now offer organic food. The National Restaurant Association says 57% of restaurants with per person charges of more than \$25 use organic products. Swiss Air announced in 1998 it would begin serving organic food to passengers.

### **Organic Farming Tomorrow**

There is no doubt the influence of the mid century chemical revolution is waning. Organic acreage is growing while chemically farmed acreage is relatively static. Prices for organics are decreasing as markets become saturated and more competitive. The one sad note is we will lose some of the small organic growers who formed the backbone of the organic movement for the past 20 years.

Tomorrow will continue to change how we farm. There will be increasing numbers of organic products on supermarket shelves. As in other industries, consolidation and change from small producers to large scale growers seems inevitable as organic production and markets mimic their conventional counterpart. The price differential between organic and conventional will continue to decrease with competition and the availability of new tools for organic producers. Production and demand will continue to race forward, each jockeying for the lead.

Some small actions that will facilitate penetration of organic produce are:

- Change regulations that require retailers to segregate organic and conventional products. Segregation limits merchandisers ability to include organic products in attractive displays. It creates problems displaying products at the correct temperatures. (Organic tomatoes should not be in the same rack and temperature as broccoli.)
- Better retail merchandising. Create prominent organic produce displays instead of relegating organics to the last five feet of the cold rack.

As growers/shippers, we are aware of the retailers need to distinguish organic products from conventional. In response, packaging clearly identifies organically grown products and includes scannable bar codes and/or price lookup numbers programmed into the retailer's database.

Organic growers are developing relationships with retailers as we achieve production levels capable of supplying conventional outlets. Simultaneously, conventional growers who are converting all or part of their acreage to organics will build on their existing relationships and distribution channels.

One of the biggest issues for retailers had been getting enough product. That is changing. The challenge today for growers is to match increasing production with demand (not over produce) as well as meet increasing demand with production (not under produce). The market will painfully shake this out.

Organic production of some crops will be limited and costly. Research needs to focus on problems specific to organic farmers. A few examples include:

- Technology to reduce weed suppression costs. Weed control is expensive for organic growers. Some strategies might include smart cultivating equipment and special plant residues that inhibit weed seed germination.
- Soil disease suppression through management of soil micro flora and fauna. Strategies include identifying and introducing effective biological control organisms, encouraging higher populations of existing beneficial organisms, managing micronutrient levels to favor beneficial and/or discourage pest organisms and finding ways to displace pest organisms by occupying the environmental niche the pest requires to survive throughout its life cycle.
- Insect pest suppression through soil fertility management and an understanding of how and what nutrient relationships influence insect pest populations.
- Management strategies for insect pests that hide from predators within the fruit like pepper weevils and fruit flies.

Government can help by:

- Focusing agricultural research funds and resources to problems identified by organic producers. This will help conventional growers move away from environmentally harmful chemical controls.
- Shifting the cost of organic certification from organic producers who have pioneered farming practices that do not contaminate to manufacturers, sellers and end users of agricultural chemicals not approved for organic production.

Organic growers, handlers and retailers currently pay all certification costs by both private certifiers and government agencies.

Organic food is no longer the domain of the corner health food store. A 1995 Food Marketing Institute report stated 42% of mainstream stores carried organic produce. Clearly labeled certified organic tomatoes, lettuce, carrots and bananas can be found in supermarkets throughout the world. The demand for organic food continues to grow. Certified organic acreage continues to increase. Progressive stores continue to attract more customers with eye-catching point of purchase information that identifies and explains organically grown products.

The chemical revolution of the 40s and 50s that promised a pest free farm was a false dream. We have lost 50 years on a strategy that polluted our bodies and planet from pole to pole with man made chemicals (Read Our Stolen Future by Theo Colborn, John Peterson Myers and Dianne Dumanoski). Our growing understanding of ecology broadened our approaches to pest management. Learning to better manage and work with the complex system of organisms that comprise our farm environment will lead to safe, less expensive, and more effective ways to grow our food.

We farmed with chemicals the past fifty years. The previous 9,050 we farmed organically. Today's management practices were developed by observing not poisoning nature. It is time to refocus our resources on improving what today is called ORGANIC FARMING and tomorrow will be FARMING. Conventional farmers will continue to convert acreage to organic to meet the growing demand. The needs of organic growers today will fuel breakthroughs in soil microbiology, entomology and plant physiology providing new tools and cultural practices that will facilitate organic farming tomorrow.

As we began 10,000 years ago observing a few fallen seeds sprouting into our future harvest, we will continue to find ways to increase yields and manage pests. Understanding the web of life instead of exterminating life is the tomorrow of organics as it offers alternatives and replaces the chemical methods of today.