INTRODUCTION

Food, Annual Crops & the Fate of Civilization

HUMAN beings eat food. This may sound like a silly statement to make right at the start because this fact is so obviously true to our existence that it's a given. However, it is because this statement is such a "second nature" occurrence that humankind has become blind to most of the processes by which we obtain our food. Although the requirement for food is a given for people to live, it is *not* a given that we all have sufficient food for health and well-being. It is also *not* a given that we have access to the kind of food that promotes health and well-being. One of the interesting and eye-opening realities about industrialized nations today is that the major causes of disease are too much food, and too much of the wrong kinds of food, not a lack of food.

How our food is produced is too often overlooked in the quest to get it into our mouths. In the majority of cases around the globe today, most people derive the bulk of their calories as a direct result of "annual" agriculture. The majority of the carbohydrates, proteins and oils that feed humanity are derived from annual plants; plants that grow for one season. These grow fast and produce a prodigious quantity of seeds, then die. The rice in our bowl, the wheat in our bread, our breakfast cereals, noodles in our soup, corn in our tortillas are all the seeds from annual plants. The grains, which are annual grasses, are the high carbohydrate "energy" foods in our diet.

The legumes, (beans, peas, lentils, and soy, for example), are the high-protein counterparts to the grains. Together, the grains and the legumes can constitute a complete human ration with enough body building materials to grow and be healthy, and also have enough energy to be active and fit.

The oils in our diet are essential as well because they provide concentrated calories, but mostly because they are essential for carrying the fat-soluble vitamins that would otherwise be unavailable to us with a grain and legume

diet. Most of our oils also come from annual crops. Corn oil, sunflower oil, canola oil, safflower oil and others, are all annual crops that are grown for one season, with their seeds harvested and pressed for oil. "Presscake" from the oil extraction process is a concentrated protein source which is used in energy bars and supplements, but mostly it is used as feed for livestock.

Annual crops, by their nature, require exposed soil to grow. In the natural scheme of things, annual plants are some of the first plants to colonize a site after a disturbance. Perhaps a flood has left some silt on a floodplain, or perhaps a landslide has left an exposed bank of earth. Fire, animal trampling and wallowing, catastrophic wind events, or erosion, all expose bare earth to the elements. No matter where on earth one may be, nature is constantly at work doing its best to cover the exposed earth with vegetation. Mount St. Helens in Skamania County in Washington state erupted catastrophically in 1980 creating an area of 230 square miles of exposed rock and volcanic debris. A mere 30 years later nature has reclaimed the blast area and covered most of it with a diversity of plant life. The first plants to colonize the areas of exposed soil, are typically annual plants.

Annual plants are characterized by several distinguishing features that have made them a very useful choice as foodstuffs. First is their annual nature. A person can throw some seeds on a patch of exposed soil and within a few months they will be able to harvest an abundance of high-energy seeds. A second distinguishing feature of annual plants is that the seeds tend to store incredibly well. Wheat, rice and corn all can be stored for years and will still sprout when given the proper light, moisture, soil and temperature conditions for growth. When seeds will no longer germinate (are no longer viable) because they have lost critical internal moisture, their carbohydrates and proteins are still useable as food. Annual plants are unique because they are typically opportunists. They will grow in a wide range of habitats in a wide range of soil and moisture conditions, all of which are useful characteristics for food plants.

Since the annual plants are the staple foods that we eat, and necessity drives us to continue to eat, it is easy to assume that "this is the way things have to be" and that "this is the way things have always been." Neither of these statements are true. In fact, in the history of humankind, reliance upon a diet of annual plant seeds for food is a relatively new phenomenon. Human cultures have only relied upon annual plant seeds as their staple food crops for around 10,000 years, which is coincidently the time that is commonly referred to as the dawn of "civilization." Our reliance upon annual crops has come to define "civilization." Annual crops have been the crops that

produced in such rapid abundance that much of the population could be "liberated" from the task of food acquisition. The abundant yield of annual plants allowed for some people to specialize as the farmers, freeing up others to become builders, crafts and trades people. Grains could be easily stored and delivered to one location enabling the growth of larger, permanent settlements. Cities are a direct result of annual agriculture.

The main characteristic of the annual plant that is one of its strengths as a food plant, is also its biggest weakness. The annual plant only lives for one growing season. The plant growing fast for a single season culminates its life with an even faster death. Once the seeds have ripened, the plant dies. This characteristic means that the crop must be planted again the next year. Planting an annual seed also requires disturbing the soil. These two factors of annual plants are the cause of a perpetual treadmill of endless toil for humans, their beasts of burden, their machinery and the entire social and economic system that keeps it all going. Plowing, planting, weeding, harvesting, and processing are tasks that occur every year and have occurred every year since the dawn of civilization. With the adoption of annual crops as the staple foods in our diet, humankind has indeed lived the biblical curse,

> By the sweat of your brow you will eat your food until you return to the ground, since from it you were taken; for dust you are and to dust you will return.
>
> *Genesis 3:19*

In addition to the curse of ceaseless labor, the adoption of annual plants as staple food crops have carried with them another curse. Every human society that has relied on annual crops as staple foods in their diet has collapsed. Every single one. Every human society from the temperate zone to the tropics that has relied on annuals to feed itself, is now gone. And the rich, abundant ecosystems where their temporary societies once flourished have been rendered into dust.

The complexities of how each one of these societies has disappeared are too detailed and numerous to list here. Religion, politics, war, disease, economic inequity, and invasion have all played a role in the various collapsed societies, but the one thing they have all had in common is the reliance on annual crops as their food. How could this be a cause of collapse?

Remember that annual plants require exposed soil to grow. In order to grow annual plants, one must eradicate the perennial vegetative cover first in

order to expose the soil for the planting of annual seeds. In many locations this means plowing up a perennial grassland in order to plant wheat or corn. In other places it means first eradicating a forest, then plowing the soil to plant annual crops. The growing of annual crops requires the eradication of an intact, perennial ecosystem in order to grow seeds. Tilling the soil exposes it to the elements. Exposed soil blows away in the wind. Its organic matter and minerals are oxidized by the sun rendering them useless for plant fertility needs. Tilling dries out the soil helping to stimulate drought conditions. Tilled soil is exposed to the rain and when uncovered washes away in muddy streams with every storm. Little by little precious fertile soil vanishes until all that remains is the bleached skeleton of the planet.

In any one year these soil losses may not be noticeable. You or I can still grow a wheat crop this year even though we lost some soil last year. The reduction in soil fertility and depth of our topsoil may not be noticeable even in one lifetime, but over decades and centuries the cumulative loss of topsoil means a loss of nutrition for the people living off that land. Loss of nutrition also goes with decreased yields. Decreased yields and nutrition lead to hunger, disease, social strife and eventually collapse. Mesopotamia, Egypt, Persia, India, China, Greece, Rome, North Africa, Central and South America are all scattered with the ruins of collapsed civilizations. These were cultures that relied upon annual crops as their staple foods. Cultures that had systematically eradicated their own healthy, life-supporting perennial ecosystems in order to grow a handful of hard, dry seeds.

Our own modern culture is on the same trajectory as these ancient civilizations. Our fossil-fueled farm equipment and our chemical fertilizers have allowed us to do the work of destroying ecosystems faster than any other culture to date. In less than 400 years, the North American continent has changed from a "wilderness" of health, vitality and abundance to a near ecological corpse. Vast herds of bison are all but extinct. Passenger pigeons, once abundant in flocks that would take three days to fly overhead *are* extinct, as are the mastodons, mammoths, giant armadillos, ground sloths, giraffes, and North American camels. Rivers that once teemed with billions of pounds of salmon and twelve-foot-long sturgeon, and ocean fisheries teeming with life at all levels of the food chain, have all been degraded to the point where government officials tell us that eating more than one or two servings per week will put us at risk of mercury poisoning. And that poisonous fish carries a hefty price tag at the store, too.

Our culture, worldwide, has the power to utterly destroy the entire life

support system upon which it depends. The simple act of eating is the keystone of this fact. By relying on annual plants for our staple foods we, by the billions, are causing hundreds of millions of acres of land to be plowed or sprayed with herbicides in order to receive the seeds of annual grains and legumes. Hundreds of millions of acres of forest, savanna and prairie have been eradicated already and more is cleared each year, to make way for annual plants. At this scale, ecosystem destruction has immense consequences. Hydrological cycles in the soil and on the land have been altered. With less moisture being transpired into the atmosphere by perennial vegetation, rainfall patterns are changed. Forests and prairies no longer inhale carbon dioxide from the atmosphere to give us back life-giving oxygen. Increased atmospheric carbon dioxide precedes an increase in the number and intensity of tornadoes, floods, hurricanes, record-breaking heat, drought and is blamed for the melting of the polar ice caps.

Some people argue that the changes we have created are "natural" and "normal" fluctuations in the conditions of earth. Of those who observe the link between human activity and the health of the biosphere, some argue that we have already changed the earth's living conditions to the point that we no longer inhabit the same planet as our parents. Many believe that it is too late for humanity to change its direction and hence to change the pattern of ecosystem destruction that threatens us all. Polluted air, poisonous groundwater, and toxic soil serve no one but the despoilers who profited from their destruction. Their comeuppance will no doubt take them by surprise as it takes the rest of us down with them.

This book is being presented as an alternative to the agriculture system of eradication. This book is being presented as one of the many necessary solutions to many of the world's problems. In addition to being an "interesting theory" this book is based on real-world practice. The systems described in this book *work!* It is absolutely possible for human beings to produce their staple foods using perennial, agricultural ecosystems that actually improve the quality of the environment. This can be done on a backyard scale, it can be done on the farm and ranch scale, and is needed on a global scale — without a minute to lose.

While producing an abundance of food for humankind, these systems remove carbon dioxide from the atmosphere, purify water, increase the depth and fertility of topsoil, provide wildlife habitat and create incredible beauty which is increasingly necessary in our "modern" world of concrete, steel, plastic and glass.

In this book I do not propose that we all go back to living in mud huts or living like pre-civilized cultures. I propose that our modern culture adopts a new approach of how we obtains our carbohydrates, proteins and oils — our staple food crops. In the chapters to follow I will explain how humankind can achieve all of the benefits of natural, perennial ecosystems. This can be done by creating agricultural ecosystems that imitate natural systems in form and function while still providing for our human needs.

> Now, we face the challenge to design and manage cropping systems that can reverse local problems of acidification, catchment-wide problems of salinization and nature conservation, global problems of population pressure and climate change, and assure food safety. The solution to this more complex challenge is made further difficult by the dramatic change in the profitability of farming that remains in continuing decline. Salary earners have largely kept pace with the increasing price of food but the returns to farming have not. Rather, those farmers that have survived have done so by expanding the scale of their operations and becoming more efficient. There is concern of insufficient investment to maintain the resource base of agriculture at a time when there is increasing concentration of profit higher in the food chain.
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> Cropping Systems for Enduring Productivity *by David Connor, Joint Centre for Crop Innovation, University of Melbourne, Australia.*

CHAPTER 1

The Perennial Agriculture Vision

I stood on a ridge in southwest Wisconsin looking into the sharp, dry winds and watched the clouds of dust rise up in the afternoon heat above a small metallic swarm of combine harvesters. As far as the eye could see the landscape was the same — parched, compacted soil, lifeless as pavement with row upon endless row of corn stubble. To the horizon in the west, to the north, and to the east, nothing could be seen but barren, dusty, corn stubble. Aside from the combines, the scene was as lifeless as the moon. In fact it could have been on the moon with the same driver of the spacecraft safely ensconced in a climate-controlled life support machine, complete with GPS satellite guidance system and cell phone communication. The only birds I saw in this barren, dusty "moonscape" were turkey vultures circling high overhead, possibly hoping that the combine had spit out a crushed rat, one of the few creatures able to thrive in a desert of corn.

Here I was standing in the midwestern United States, the self-proclaimed breadbasket of the world, and what did I see? Instead of a landscape teeming with life and overflowing with bounty, I saw dust and stubble. Here where there once was life in abundance, springs gushing out from every hillside, passenger pigeons in flocks so large they blotted out the sun, beaver so thick in every stream that the valleys were a crazy-quilt of their handiwork, there was now only #2 yellow dent corn, bristly tan corn stubble, and the hard packed crust of what was once some of the most fertile soil on earth.

As a child I had been taught that the story of America was the story of progress. Once upon a time our ancestors came to this land and wrestled an existence from the cruel taskmaster called the "wilderness." They lived lives of squalor and sacrificed much in their lives so that we might live "better" than they did and so that we might enjoy more material things. My European