Nutrient Depletion of our Foods

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November 9, 2009

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"Nations endure only as long as their topsoil."

~Henry Cantwell Wallace

The calculus is simple: plants can't make minerals, and without minerals vitamins don't work.

We are made of the stuff of the earth. Consequently, if the minerals are not in the soil, they are not in the plants grown in the soil; and if they are not in the plants grown in the soil, they are *not* in our bodies. As such, it is not surprising that any depletion in the mineral and nutrient content of our soils reflects an increase in nutritionally related diseases in both animal and human populations.

> *The alarming fact is that foods—fruits, vegetables and grains—now being raised on millions of acres of land that no longer contain enough of certain needed nutrients, are starving us—no matter how much we eat of them.*
>
> *~ U.S. Senate Document 264*

The remarkable thing about the preceding declaration is that it was issued in 1936—over 73 years ago. Since that time, the United States and other industrialized nations have been losing arable land at an unprecedented rate. Today in the U.S., topsoil is eroding at a rate ten times faster than the rate of replenishment, not bad considering that countries such as Africa, India and China are experiencing erosion rates 30 to 40 times the replenishment rate. Today, estimates place the chronological reserves of our global topsoil at less than 50 years —and as the topsoil goes, so go the nutrients.[1]

Findings released at the 1992 RIO Earth Summit confirm that mineral depletion of our global topsoil reserve is rampant. At the time, U.S. and Canadian agricultural soils had lost 85% of their mineral content. Asian and South American soils were down 76% while throughout Africa, Europe and Australia, soils were depleted by 74%, 72% and 55% respectively.[1] Tragically, there has been precious little done to forestall the inevitable exhaustion of these precious mineral stores.

In March, 2006, the United Nations recognized a new kind of malnutrition—*multiple micronutrient depletion*. According to Catherine Bertini, Chair of the UN Standing Committee on Nutrition, the overweight are *just* as malnourished as the starving. In essence, it is not the *quantity* of food that is at issue—it is the *quality*.[2]

Modern Agriculture Impoverishes our Soils

The earth's arable soils are a wafer-thin envelope of mineral-containing carbonaceous materials. They are about 95% mineral content, once you remove the water and airspaces. Soils buffer and filter water and airborne pollutants, store critical moisture and important minerals and micronutrients, and are essential reservoirs for carbon dioxide and methane. Soil degradation is one of the largest threats to the long-term environmental sustainability of our planet.

Soil depletion was well understood in primitive societies, which would migrate every few years to new lands or would replenish the soils with organic wastes. In our recent history, the western migration of Europeans to the New World witnessed families moving every few years as their dry land farming practices repeatedly "played out" the soil. The first sign of nutrient exhaustion did not come from crop failure, but appeared as increased sickness and disease among both the animals and humans who relied upon the land.[3] Those who did not leave their farms observed inevitable declines in crop production, followed by outright collapse of the land, as was witnessed in the great dust bowl formations of the 1930s.

Today, we have nowhere else to go. With the landmasses of the great continents now overtaken by a crush of humanity, we can no longer simply pick up and leave for "greener pastures." We must make do with what we have—soil erosion, contamination with industrial pollutants, and depletion of our limited mineral resources is global.[4-11] Nevertheless, modern agricultural practices continue to consume water, fuel and topsoil at unsustainable rates, seemingly oblivious to nature's inviolate dictate to give back to the earth what we have taken. Instead of replenishing, modern agriculture truncates nature's nutrient and hydrologic cycles. Both crops and livestock deplete our soils by removal of the minerals and nutrients contained in the produce sold. Once shipped to outside markets, the resulting deficiencies are seldom reconciled. There is little recognition of the need to rebuild the essential elements removed from this natural cycle.

Impoverished soils, impoverished crops

The depletion of the nutrient content of our soils, through unsustainable agricultural practices, results in the inevitable loss of nutrient value in our crops. Historical data shows the average mineral content of vegetables grown in U.S. soils has dropped precipitously over the last century.[1] Research published in the *Journal of the American College of Nutrition* in 2004 found significant declines in the mineral and vitamin content of 43 garden crops grown in U.S. markets.[12] As well, an investigative report published by Life Extension Foundation demonstrated that the vitamin and mineral content of several foods dropped dramatically between 1963 and 2000. Collard greens showed a 62% loss of vitamin C, a 41% loss of vitamin A and a 29% loss of calcium. Potassium and magnesium were down 52% and 84% respectively. Cauliflower had lost almost one-half of its vitamin C, thiamine and riboflavin, and most of the calcium in commercial pineapples had disappeared. According to the report, when asked to explain the precipitous drop in the calcium content observed in commercial corn, the U.S. Department of Agriculture replied that the 78% loss was not significant because "no one eats corn for calcium," adding that the nutritional content of produce is not as important as appearance and yield.[13]

The U.S. data corroborate findings for vegetable crops grown between 1940 and 2002 in Great Britain, which show mineral losses ranging from 15% to 62% for common minerals and trace elements.[2] Moreover, in an earlier study, the same authors also found detrimental changes in the natural ratio of minerals, such as calcium and magnesium, in the foods tested.[14] Similarly, a Canadian study found dramatic declines in the nutrient content of produce grown over a 50 year interval to 1999. During that time, the average Canadian spud lost 57% of its vitamin C and iron, 28% of its calcium, 50% of its riboflavin and 18% of its niacin. The story was the same for all 25 fruits and vegetables analyzed. The Canadian data showed that nearly 80% of the foods tested showed large drops in their calcium and iron content, three-quarters showed significant decreases in vitamin A, one-half lost vitamin C and riboflavin and one-third lost thiamine.[15]

Selective breeding of new crop varieties that place a premium on yield, appearance and other commercially desirable characteristics has also been attributed to the depletion of the nutritional value of our foods.[16] Dr. Phil Warman of Nova Scotia's Agricultural College argues that the emphasis on appearance, storability, and yield—with little or no emphasis on nutritional content—has added considerably to the overall nutrient depletion of our food supply. The U.S. Department of Agriculture standards for fruits and vegetables are limited to size, shape and color—they do not even consider nutritional value.[1] With standards like these, it is not surprising that you have to eat eight oranges today to get the same amount of vitamin A your grandparents got from a single orange.[15]

How nutrients are removed from soils

Erosion of topsoil by wind and water is accelerated by overcultivating, overgrazing and destruction of natural ground cover. The loss of organic matter results in a concurrent loss of nitrogen, minerals, and trace elements and reduces the ability of soil to hold moisture and support the growth of healthy plants. The nutrient demands from high-yield crops place a further burden on the limited nutritional capacity of our soils. For example, in 1930 an acre of land would yield about 50 bushels of corn. By 1960, yields had reached 200 bushels per acre—far beyond the capacity of the soil to sustain itself.[17]

Erosion, in combination with high-yield nutrient extraction, also depletes the soil of its alkalizing minerals (calcium, potassium and magnesium). This loss of natural buffering capacity results in the release of acids from natural clay deposits and the soil becomes increasingly acidic. Conversely, over-irrigation with hard (alkaline) water causes some soils to leach important minerals while accumulating others (such as calcium). As a result, the soil becomes too alkaline to sustain crop growth.

It is true that nitrate, phosphate and potassium (NPK) fertilizers, first introduced in the early 1900s, significantly increase crop yield, but they do so at great expense. Over-use of these chemical fertilizers has been found to *accelerate* the depletion of these vital micronutrients and trace elements and reduce their bioavailability to plants.[18] NPK fertilizers will gradually reduce soil pH, rendering the soils too acidic to support beneficial bacteria and fungi. These symbiotic organisms assist the plant in absorbing nutrients from the soil. Once gone, uptake of micronutrients by plants is significantly impaired.[19] Moreover, in acidic soils, NPK application has been found to bind soil-based selenium, making it unavailable for root absorption.[20]

Application of NPK fertilizers to replenish the major growth-promoting nutrients fails to address the concurrent losses of micronutrients and trace elements (such as copper, zinc and molybdenum) that occur in intensively cultivated soils. According to Dr. William Albrecht of the University of Missouri, the use of NPK fertilizers means malnutrition, attack by insects, bacteria and fungi, weed takeover, and crop loss in dry weather.[21] Albrecht contends that the use of chemical fertilizers to chase yield actually weakens the crop, making it *more* susceptible to pests and disease. Consequently, the commercial farmer has no choice but to rely on harmful chemical pesticides to protect his crop and his investment.

Nutrient depletion forces pesticide abuse

The weakening of both our soils and crops through the indiscriminate practices of commercial agriculture creates an overwhelming dependence on the use of pesticides and herbicides in order to maintain crop yield. These extremely toxic organochlorine (OC) and organophopshorus (OP) derivatives kill our soils by slaughtering the symbiotic bacteria and fungi that promote nutrient uptake in plants. They also inactivate critical enzyme systems within the plant roots that are involved in mineral absorption,[19] and they destroy the soil micro-organisms needed to create the organic-mineral complexes that naturally replenish the soil.[18]

To make matters worse, these environmental poisons end up on our dinner table.

Dr. Jerome Weisner, Science Advisor for President John F. Kennedy, said in 1963: "The use of pesticides is far more dangerous than radioactive fallout." Unfortunately, he underestimated their potential. While potentially lethal, most radioactive fallout eventually decays to background levels. Pesticides, on the other hand, are *persistent* environmental toxins that accumulate and concentrate along the food chain, building up in the fatty tissues of the body. All of us carry a lifetime body burden of these environmental poisons and suffer their cumulative effects.

The evidence is unassailable: human exposure to pesticides is ubiquitous and occurs most commonly through the food we eat.[22-46] What is at dispute is whether low levels of exposures can cause harm. Some studies refute the claim that environmental exposure to pesticide residues is harmful.[47-49] Other studies provide startling evidence that pesticides can elicit harmful biological effects—sometimes at exquisitely low levels[24, 25, 43, 50]—as a result of chronic environmental exposures.[26, 37, 51, 52]

Harmful synergistic effects from combinations of pesticides and chemical agents can occur at levels of environmental exposure.[37, 53] In some cases, pesticide "cocktails" have been found to elicit toxic effects at levels significantly *below* those expressed by the individual chemicals.[54-57] In one study, a cocktail of aldicarb, atrazine and nitrate, in the same order of magnitude to that found in groundwater across the United States, induced endocrine, immune and behavioral changes at doses that could not be observed for the single compounds at the same concentrations.[56]

While the industry continues to claim that pesticides and herbicides are safe and effective, a recent study suggests that women with breast cancer are five to nine times more likely to have significant levels of pesticide residues in their blood.[58] As well, pesticides and herbicides have been linked to a wide range of human health effects, including immune suppression, hormone disruption, diminished intelligence, reproductive abnormalities, neurological and behavioral disorders, and cancer.[51, 52] They are also potent endocrine hormone disruptors and can be passed easily through the placenta to the unborn infant, which is extremely vulnerable to toxins that disrupt the developmental process.[59-62] Children are particularly susceptible to pesticides because of a higher level of food intake for their body weight and a still-maturing immune system.

No matter how conscientious we may be, we are constantly exposed—through the foods we eat, the water we drink, and the air we breathe—to environmental levels of these toxins that may manifest in subtle or profound ways. That is why it is exceedingly important to protect yourself and your children, as much as you can, by choosing sensible dietary alternatives to commercially processed foods—the principal source of pesticide exposure.

Organic Agriculture Improves Nutrient Content

For the vast majority of human history, agriculture used organic growing practices. It was only during the last 100 years that the use of synthetic chemicals was introduced to the food supply. Organic foods grown today are subject to stringent production standards. Under organic production, the use of conventional non-organic chemicals is greatly restricted. If livestock are involved, they must be reared without the use of antibiotics or growth hormones, and animals must be fed a healthy diet. In most countries, organic crops must not be genetically modified. Since the early 1990s, organic food production has grown about 20% a year, far ahead of the rest of the food industry. In both developed and developing nations organic agriculture now accounts for 1–2% of global food production.[63]

The natural mulching and cultivation techniques employed through organic gardening feed the soil rather than the plant by returning many of the nutrients lost through plant growth and by encouraging the growth of beneficial fungi, nitrogen-fixing bacteria, and other beneficial micro-organisms. Healthy *living* soil, in turn, promotes the symbiosis of plants with these soil microbes, thereby enhancing the transfer of essential nutrients into the plants. In contrast to conventional agriculture, organic agriculture *embraces* the natural replenishing cycles of nature.

Consumers who wish to minimize their pesticide exposure from conventional foods can do so confidently by purchasing organically grown produce and meats, or by adopting organic agricultural practices for their own food supply. An organic diet is beneficial in a number of ways:

- It significantly reduces the number of harmful synthetic chemicals ingested;
- It avoids the use of genetically modified plants that are bred for yield rather than nutrition;
- It reduces exposure to harmful food additives and colorings;
- It increases the intake of beneficial nutrients.

In a 2003 exposure study in the Seattle area, children two-to-four years of age who consumed organically grown fruits and vegetables had urine levels of pesticides six times lower than children who consumed conventionally grown foods. According to the authors of the study, the consumption of organic fruits, vegetables, and juices can reduce children's exposure levels from *above* to *below* the U.S. Environmental Protection Agency's current guidelines, thereby shifting exposures from a range of *uncertain* risk to a range of *negligible* risk.[64]

While no systematic or clinical studies on the safety of genetically modified (GMO) foods currently exist, adverse microscopic and molecular effects in different organs and tissues have been reported.[65] Some investigations reveal evidence of harm from the consumption of such foods, although the mechanism remains to be explained.[66] The results of most studies indicate that GMO foods may cause hepatic, pancreatic, renal, or reproductive effects and may alter haematological, biochemical, and immunologic parameters.[67] Because genetic-modification techniques alter specific proteins expressed by a plant, focus has now turned to evidence that certain GMO foods may elicit harmful allergic responses in sensitive individuals.[68-70]

Over 300 food additives, including aspartame, phosphoric acid, monosodium glutamate and trans-hydrogenated fats, and various preservatives, stabilizers, artificial sweeteners and colorings, are allowed in conventional foods. Conversely, artificial sweeteners, colorings and most chemical additives are banned in certified organically grown foods. Food colorings have been shown to have a wide range of harmful effects. Tartrazine (Yellow E102), for example, has been linked to severe allergic response, headaches, asthma, growth retardation and hyperactivity disorder in children.[71, 72]

There is a growing body of evidence confirming the health promoting effects of organically grown foods. Some studies reveal that organic crops are higher in vitamin C, iron, natural sugars, magnesium and phosphorus, and lower in harmful nitrates than conventional crops.[73, 74] An independent review, published in the *Journal of Complimentary Medicine*, found that organic crops had markedly higher levels of nutrients for all 21 nutrients evaluated than did conventionally grown produce. Organically grown spinach, lettuce, cabbage and potatoes expressed particularly high levels of minerals.[74]

Research conducted by the University of California, Davis, shows that organically grown tomatoes and peppers have higher levels of flavonoids and vitamin C than conventionally grown tomatoes.[75] The health promoting effects of these secondary plant metabolites, manufactured by the plant to protect it from the oxidative damage of solar radiation, are well established. High intensity conventional agricultural practices appear to disrupt the natural production of these plant metabolites, leading to a loss of flavonoid content in conventional crops. Conversely, organic practices are shown to stimulate the plants' oxidative defense mechanisms, leading to enhanced production of these important phytonutrients.[76] It is precisely because organic crops are not protected by pesticides that their fruits contain higher levels of flavonoids and polyphenols than conventional fruits—including up to 50% more antioxidants.[76-78]

One caution regarding the consumption of organic foods, particularly lettuce, is the evidence of contamination with *E coli* bacteria and other pathogens from unwashed fruits and vegetables. Under-washed organic produce is more apt to harbour these unwanted guests than conventionally grown foods.[79, 80]

Nutrient Depletion through Food Preparation

Nutrient depletion of foods also occurs through the harvesting, storing and transport to markets that may be half a world away. To reduce damage and facilitate transport, produce (particularly fruits) are often picked green, interrupting the natural maturation cycle; they are then ripened artificially upon reaching destination, thus further reducing the nutritional value of the food. Despite the dwindling nutrient content of foodstuffs by the time they reach the pantry, it is in the final preparation for the dinner table where considerably greater nutrient diminution occurs. The amount of this loss depends upon the way foods are prepared and the method of cooking, if any.

In food preparation, the greater the surface area to volume ratio, the greater will be the nutrient depletion. For example, thin slicing of carrots, (particularly if done on the diagonal) maximizes this ratio, exposing a large area of the carrot to the depleting effects of oxygen and to the leaching effects of the cooking medium. Foods prepared in this manner may look appealing, but they have sacrificed much of their antioxidant and mineral content through the preparation process. Cubing the fruit or vegetable, or simply serving it whole, will minimize surface exposure and preserve greater nutrient content.

Thiamine is the nutrient most susceptible to thermal degradation in meats, and vitamin C is the most heat labile nutrient in produce. Consequently, they are generally used as an indicator of overall nutrient depletion. Nutrients are lost from foods because of their unavoidable exposure to light, heat, oxygen, and changes in acidity (pH). Cooking methods that minimize these effects will provide the greatest nutritional value at the dinner table.

Storage of Foods

Freezing appears to be the most desirable method of long-term storage, as opposed to nutrient depleting practices of canning, dehydration and salting. The ideal temperature for freezing is -18°C. At this temperature, nutrient loss, as measured by thiamine (meats) and vitamin C (produce), degrades slowly over time. It is important to use moisture-proof bags or containers as foods will dehydrate even though frozen, leading to considerable antioxidant depletion. Packaging foods in airproof containers will also limit antioxidant loss caused by contact with oxygen. When preparing foods for freezing, use the largest cuts possible, or freeze the food whole to reduce nutrient degradation due to surface area exposure.[81]

Refrigeration of fruits and vegetables is necessary to preserve nutritional value once the produce has ripened. Placing these foods in a crisper and using moisture-proof bags will help preserve moisture content. Avoid dehydration of your produce, whether refrigerating or freezing; the process of dehydration can lead to extensive losses of certain phytonutrients.[82] Even with these precautions, fresh fruits will deteriorate rapidly and should be frozen to preserve nutritional value if not used within a few days.

Cooking Methodologies

Preserving nutritional content appears to vary with cooking methodology, food type, and nutrient.[83, 84] Although there is no hard-and-fast rule, the consensus of the research indicates that microwave cooking, baking, and steaming are the *least* destructive processes and preserve the *greatest* nutritional content of foods. On the other hand, boiling (while preserving the antioxidant content of certain phytonutrients)[84] is generally the *worst* method for preserving water-soluble vitamins and minerals, which are quickly leached out of the food.[85, 86] This section briefly outlines four cooking methodologies—boiling, steaming, frying and microwave cooking—and provides a relative comparison of each.

Boiling

Those cooking methods that make use of water, such as boiling, scalding and blanching (with the exception of steaming), are generally associated with the greatest nutrient losses in both meats and vegetables.[87] Boiling has been shown to reduce folic acid content by over 50% in spinach and 56% in broccoli, in contrast to steaming, which showed no significant decrease in folate levels.[88] In another study, vitamin C losses from broccoli due to boiling exceeded 30% as opposed to about 20% for steaming and less than 10% for microwaving.[89] One study investigating the retention of several B-complex vitamins showed that boiling and deep-frying were the most aggressive of all cooking methods in depleting vitamin content. Boiling, more so than deep frying, also dramatically reduces overall mineral content.[90]

The combination of boiling and stir-frying, a popular method of food preparation in Asian cultures, leads to dramatic losses of chlorohpyll, soluble proteins and sugars, vitamin C and glucosinolates in vegetables.[91] These losses occur mainly from the leaching of the nutrients into the water, rather than their wholesale destruction.[92] The addition of a small amount of salt as well as reducing the volume of cooking water have been shown to reduce the degree of leaching.[93] Rather than total immersion in water, it is better to boil foods in a shallow layer of water in order to reduce leaching. Also, rather than discarding the cooking juices, reclaim the nutrients by using the liquid for the preparation of broths or gravies.

Steaming

While there is conflicting evidence regarding the stability of vitamin C during steaming,[84, 94] most studies report that steaming provides good retention of both vitamins and minerals in various food types. Recent studies confirm that steaming, microwaving and stir-frying for short durations are best at preserving the health promoting factors (glucosinolates and isothiocyanates) found in vegetables of the Brassica family (broccoli, Brussels sprouts, cauliflower and cabbage).[95-97] In a study using twelve types of vegetables, steaming and roasting bested several other cooking methods in preserving B-complex vitamins.[98]

Of all cooking methods, steaming appears to be one of the best for nutrient retention in vegetables. Both nutrient content and presentation are optimized when the vegetable is not immersed in the water and when exposure time is minimized.

Frying

In a study of nutrient loss in 20 vegetables using different cooking methods, microwave cooking and baking best preserved antioxidant status, whereas pressure cooking and boiling showed the greatest losses. Frying of vegetables occupied an intermediate position with respect to preserving antioxidant content.[99, 100] Frying appears to have little effect on mineral content, nor does it appear to cause significant loss of phytonutrients.[101, 102] Some studies show fried foods to be a good source of vitamin E;[103] other studies show that frying does not affect the flavonoid content of certain vegetables.[104] However, frying does appear to be destructive of overall antioxidant activity, more so than either sautéing (quickly frying with little fat) or baking.[105] Similar to boiling, frying can cause significant nutrient loss of the health promoting glucosinolates and B-complex vitamins found in Brassica and other vegetables.[96, 98]As well, deep frying has been found to incur severe denaturation of proteins in some vegetables.[106]

Frying has little apparent impact on the protein or mineral content of meats,[107] and similar to roasting, is credited with removing over 50% of carcinogenic polychlorinated biphenyls from fish during the cooking process.[108] One recent study showed that frying, baking, broiling and microwaving, reduced the level of organochlorines (DDT derivatives and PCBs) found in fish by as much as 68%.[109] Another study showed that roasting meat in its own fat is preferable to deep-frying as it reduces the formation of harmful trans-fats.[110]

Heterocyclic amines (HAs) are genotoxic compounds formed when meats are cooked at high temperatures, particularly when pan frying and barbecuing. These compounds pose a significant carcinogenic risk; it is not known if there is, in fact, any level of exposure that can be considered safe. Interestingly, a very recent analysis of HAs from six commercial burger outlets in California revealed high levels of these compounds in all samples, which reached over 1,000 nannograms per entrée.[111] It has been found that the use of red wine marinades while frying fish and poultry can significantly reduce the formation of these genotoxic amines, formed during cooking process.[112, 113] As well, the addition of a small amount of carbohydrate (potato starch or potato flour) to hamburger meat has been found to reduce formation of damaging HAs created during the barbeque process.[110] Caution should be used if frying with margarine as opposed to better cooking oils, such as canola, soy and olive oil. Steaks fried in margarine were shown to create high levels of mutagenic aldehydes.[114]

Microwaving

While there has been controversy about the effects of microwaves on food quality and safety, overall, there are only slight differences between microwave and conventional cooking with respect to vitamin and mineral retention.[115] There is evidence that microwaving can reduce carotenoids in some foods;[116] other studies confirm that microwaving preserves bioflavonoid content and appears to be the most effective method for cooking legumes.[117,118] Some studies suggest that vitamin C is not stable under microwave conditions;[119] other research confirms that the preservation of the B-complex vitamins, vitamin C, and flavonoids may reflect the amount of water and power used in the cooking process.[104, 120] In one particular study, broccoli cooked by microwave was shown to preserve over 90% of its vitamin C and *all* of its health promoting sulforaphane content.[94] Other investigations confirm that reducing both water use and cooking time optimize the nutritional content of foods cooked by microwave.[97, 121] An analysis of the preservation of antioxidant activity for 20 different vegetables concluded that microwave cooking, along with grilling and baking, was the preferred method to optimize nutritional value.[99]

Concern has been expressed about the potential generation of mutagenic compounds from microwave cooking; however, a review of the literature finds little support for this argument.[122-126] In fact, the evidence suggests that microwaves *do not* change the nutritional content of foods or create carcinogens, as can occur in conventional cooking, presumably because the foods are not heated beyond the boiling point of water.[127] Several studies report that cooking with microwaves allows foods to maintain more of the nutrient content because the vitamins and minerals are not leached out as with conventional cooking.[128-130] In fact, cooking of meats in a microwave (in particular, smoked and preserved meats, such as bacon) avoids the creation of carcinogenic heterocyclic amines (HCAs) and N-nitrosamines (NNAs) that is known to occur in conventional cooking.[131-136]

Conclusions

The conveniences of modern living incur many trade-offs when it comes to eating a healthy diet. Most of us are simply unaware of our level of exposure to persistent environmental toxins through the foods we place daily on our table. Nor do we fully appreciate the degree to which the nutritional value of our food supply has been bludgeoned by our over-reliance on commercial, chemically based agriculture. The fact is, without fortified cereals, most of us would not even come close to meeting our daily nutritional requirements for vitamins, minerals and trace elements. Less than one-third of North Americans eat the minimum recommended five servings of fruits and vegetables every day. Now we find that even if a person accidentally *does* eat a vegetable, it doesn't have nearly the nutrition that nature intended.

What's a mother to do?

To start with, we can begin to identify those foods most highly exposed to chemical fertilizers and choose, instead, to supplement our diets with organically grown alternatives. We can learn how to grow our own produce on family owned or community garden plots and use organic growing techniques, such as composting and feeding the soil, to replenish the nutrients. If we can't grow our own gardens, we can choose to support local farmers and agriculturalists, encouraging the growth of a local organic farming culture, and we can support organic growers the world over with the purchase power of our consumer dollar. In the home, we can learn to adapt culinary and cooking techniques that *optimize*, rather than *compromise*, the nutritional value of the foods we purchase.

Finally, we can learn to stop treating vegetables as a side dish and understand that optimal nutritional intake is our best defense against illness and disease.

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