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REPORT

Vitamin-less Vegetables

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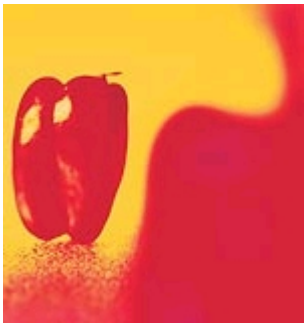


In 2001, we reported on a vitamin drain in America's vegetables ("Vegetables Without Vitamins," *Life Extension*, March 2001). What we found in our unofficial report is now official. The *Journal of the American College of Nutrition* has published new findings from University of Texas researchers showing diminished levels of six nutrients in vegetables and fruits.[1]

According to the new report, levels of calcium, riboflavin, vitamin C, iron, potassium, and protein in vegetables and fruits have significantly declined since 1950. This finding holds up even after making numerous statistical adjustments to account for the losses. The report covers only a few common nutrients; potential declines in lesser-known nutrients like lycopene and zeaxanthin are unknown.

When asked about the apparent drain, commercial plant breeders refuse to comment, but clues have emerged as to why today's vegetables are not what they should be. It has to do with the way commercial growers do business.

FROM FOOD TO COMMODITY

Tomatoes that resemble tennis balls, peppers that taste like small rocks, and big, red, flavorless strawberries are all a result of selective breeding for pith and water (pith is defined as the fibrous part of fruits and vegetables, such as the "netting" around orange sections that is usually discarded). Desirable traits for commercial growers who want produce to ship well, look good, and weigh a lot, but undesirable traits for consumers who buy produce as a source of nutrition. Plant jockeys call it "the dilution effect." More water and pith, less vitamin content.

The transformation of vegetables from food to commodity is well illustrated by the one people love to hate: broccoli. Broccoli is a terrific source of calcium, especially for people who don't drink milk. But the most prized commercial version of broccoli is a heavy, calcium/magnesium-deficient hybrid called "Marathon." In research conducted by the US Department of Agriculture, "Marathon" is consistently about a third lower in calcium and magnesium than are other hybrids. And the hybrids themselves are about 50% lower in calcium than the broccoli listed in the 1998 USDA nutrient database.[2] It has been reported that the calcium and magnesium content in commercially grown broccoli sold in grocery stores can vary twofold.[2]

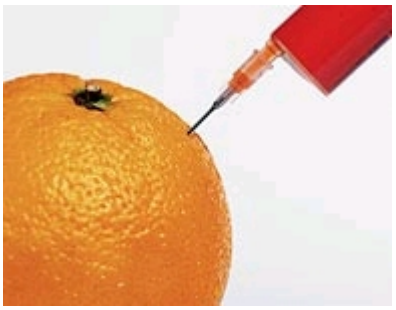
PREMATURELY PICKED PRODUCE

The dilution effect is not the only thing causing problems in nutrient content. Most commercial fruit, including tomatoes, is picked green. Green fruit doesn't have a chance to sun-ripen; it's artificially ripened with ethylene, a natural plant hormone. Ethylene is what causes tomatoes to turn pinkish. Produce deprived of sunlight doesn't have a chance to develop sunlight-related nutrients such as anthocyanins—the flavonoids that make cherries red and grapes purple.[3-5] Anthocyanins are plant sunscreens. When humans ingest them, they provide protection against DNA damage, brain cell deterioration, cancer, and more.[6-8]

Other plant vitamins can also be affected by premature picking. Researchers in Spain conducted an in-depth investigation of cherries ripening and found 14 different stages, during which the fruit turned from green to red.[9] They concluded that for maximum nutrition, cherries should be picked at stage 12, way beyond the stage at which they're harvested green by commercial growers. To illustrate how important the ripening process is, if cherries are picked at stage 8, their vitamin C content is half the amount it is if they're picked at stage 14.[9] Similarly, researchers at Oregon State University who studied blackberries discovered that green ones contain 74 mg of anthocyanins, compared to 317 mg in ripe ones (per 100 grams fresh weight).[3] The same phenomenon occurs in other fruits as well.[5]

Polyphenols likewise have no chance to fully develop when produce is picked green, which is why green-picked produce is so tasteless. Besides having health benefits, polyphenols give produce its flavor.[10] Tomatoes deprived of UVB sunlight can be

drained of carotenoids and possess little antioxidant activity.[11] It's suspected that the lack of folate in grocery store tomatoes is due to their being picked green.[12]



OTHER FACTORS DRAIN NUTRIENTS

Big, green, hybrid, inbred, watery produce is not the whole story, however. There's more. Changing climates, commercial fertilizers, and changes in soil composition have also been identified as reasons for the vitamin drain in commercial produce. Increasing carbon dioxide levels are known to significantly diminish important trace minerals, including zinc.[13]

Synthetic fertilizer is another potential source of vitamin depletion. The vitamin C content of two types of organically grown oranges was higher than that of the same oranges grown with synthetic fertilizer. It's now possible to distinguish an organic orange from a conventionally grown orange by looking at factors related to fertilizer (though the difference is not great).[14] Organically grown fruits and vegetables have been reported to have significantly more antioxidants, polyphenols, and enzymes than commercial produce.[15-19] According to one report, organic fruits themselves have better antioxidant defenses.[16]

The commercial solution to disappearing vitamins is to manipulate vegetables and fruits genetically, inserting foreign genes to force them to produce more nutrients.[20] Tomatoes, for example, have been forced to produce folate through this method. Such "biofortification" causes the tomatoes to produce compounds never before seen in plants.[12] And they end up without PABA, a B-complex coenzyme that makes up part of folate. The solution for that is to douse the plants in PABA to make up for the loss—and on it goes.[12]

THE VALUE OF SUPPLEMENTS

For those who find the new, unregulated world of genetically manipulated, vitamin-less vegetables unpalatable—or find that they don't care to eat vegetables that have absorbed up to 45 times the amount of pesticides in the soil, including DDT (which was banned decades ago but is still with us)[21]—high-quality, standardized supplements are one way of incorporating a standard amount of known nutrients in the diet.

Supplements are not a replacement for food, but they can give the less-than-stellar diet that extra edge. And they work. It has been estimated that a calcium supplement alone could keep more than 100,000 people out of the hospital and save $2.6 billion in medical expenses annually.[22] Calcium is one of the disappearing minerals in vegetables.

If taken long enough, magnesium supplements could halve the number of colon and rectal cancer cases in women.[23] And riboflavin, which has decreased 38% in commercial vegetables since 1950, could prevent a lot of cataracts.[24]

THE CHROMIUM-DEFICIENT WESTERN DIET

Chromium is a trace mineral that is essential for optimal health. Food sources of chromium include brewer's yeast, whole grains, wheat germ, fruit, eggs, meat, and shellfish. Chromium deficiency is widespread in the United States due to mineral-depleted soils and over-reliance on refined and processed foods.[25]

Chromium is an essential component of glucose tolerance factor, which enhances insulin function and is essential for proper carbohydrate metabolism and blood sugar regulation. Insufficient chromium intake is associated with signs and symptoms similar to those seen in people with diabetes and cardiovascular diseases.[26] Chromium helps to promote healthy glucose and lipid levels, even in healthy subjects, and may help promote fat loss and optimal body weight.[26] Chromium supplementation improves serum glucose levels in both type I and type II diabetics.[27] Dietary supplementation with chromium may help fill the void left by mineral-depleted soils and refined foods.

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