# Image Awareness Wellness Institute

## *Agriculture: Dining on Pesticides?*



1271 High Street, Auburn, CA 95603 • Phone (530) 823-7092 • order line (800) 359-6091
Hours: Tues. – Fri. 10 a.m. – 4 p.m. • E-mail: mail@imageawareness.com web: www.ImageAwareness.com



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## Introduction

Modern agriculture is different from the means of food production which has been practiced by man for thousands of years. There are some wonderful things about modern agriculture, but there are also a few perilous developments.

The previous newsletter focused on the assertion by Don Huber, a retired professor of Agriculture from Purdue University, that the herbicide glyphosate commonly known as Roundup is a chelating agent and can decrease the availability of trace minerals to both plants and animals.

In the previous newsletter I did not address the issue of the toxicity of Roundup Ready products. A number of studies have suggested problems with Roundup Ready soy. In one study 55.3% of the offspring of rats fed GM soy died within 3 weeks while only 9% of non-GM soy controls died. Other studies have suggested liver problems, pancreatic problems and testicular abnormalities. This is important because many individuals paint soy with a black brush when studies suggest soy is harmful. Most of these studies are being conducted with GM soy. Note that GNLD does not use any genetically modified ingredients in any of their products.

This newsletter will focus on the importance of minerals for the health of plants, animals and people. We shall also examine another aspect of genetic modification of our foods, the insertion of pesticides into every cell of crops to protect them from insect attack.

References:


Smith, Jeffrey M., *Genetic Roulette The Documented Health Risks of Genetically Engineered Foods*, Fairfield, IA: Yes books, 2007, 40-49.

Ermakova, Irina, Genetically modified soy leads to the decrease of weight and high mortality of rat pups of the first generation. Preliminary studies, *Ecosinform* 1 (2006):4-9.


## Micronutrients

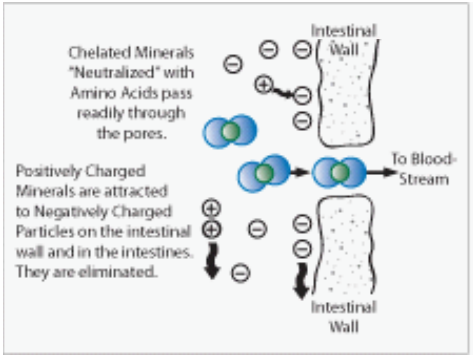
Huber emphasizes the importance of micronutrients which are provided by plants to animals and people. Symptoms of deficiency of trace minerals are often indistinct and ascribed to other factors. Distinct visual symptoms are evident only with severe deficiency conditions.

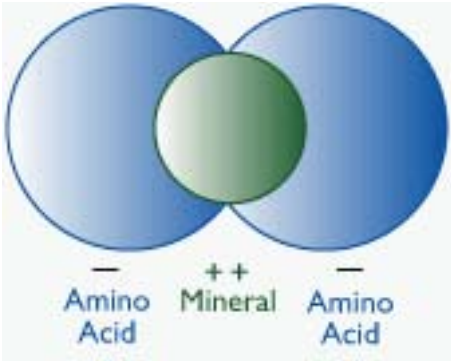
For this reason, many farmers are reluctant to seek to optimize the trace element levels in the soil. This passes through to human nutrition where trace mineral intake is lower than it once was due to mineral depletion of food crops generally. The great nutrition pioneer, Weston Price, found that traditional peoples of his day consumed on the average four times the trace mineral content being consumed by individuals consuming the average modern diet.

One of the best primers on the importance of trace elements in plant, animal and human nutrition is *Metabolic Aspects of Health* by Karl Schutte and John Myers.

Shutte points out that all living organisms are influenced not only by a deficiency of nutrients, but also by excesses and by imbalances. Because plant chemistry is somewhat simpler than that of animals Schutte chose to discuss plant experiments since they are easier to conduct and easier to interpret. He writes, "...plants are more obviously dependent upon the soil for mineral elements than are animals."

Schutte observes that not all nutrient deficiencies in either plants or animals are readily observable. We tend to easily overlook deficiencies which we can not see or easily test. He writes, "The widespread distribution of trace-element deficiencies is not generally recognized, even by many investigators, because too much stress has been laid on visual clinical symptoms, such as chlorosis (yellowing) of the leaves or abnormal growth. These symptoms are of the greatest value in indicating the presence of nutritional deficien-






cies, *but it must be appreciated that not all deficient plants show them*. Deficiencies not acute enough to show visual signs may be severe enough to halve the potential yield. Nieschlag found that application of manganese sulphate to *apparently healthy* potatoes doubled his crop."

REFERENCES:

Huber, Don M., Ag Chemical and Crop Nutrient Interactions—Current Update, Proceedings Fluid Fertilizer Forum, Scottsdale, AZ, February 14-16, 2010. Vol. 27. Fluid Fertilizer Foundation, Manhattan, KS.

Schutte, Karl H., and Myers, John A., *Metabolic Aspects of Health: Nutritional Elements in Health and Disease*,Kentfield, CA: Discovery Press, 1979, 1-2, 51.

## Chelated Minerals

GNLD provides the complete spectrum of minerals in supplement form. Bulk minerals are double chelated. The word chelate means claw. GNLD double wraps minerals with two amino acid molecules to completely neutralize the positive charge on the minerals. Positively charged minerals are poorly absorbed because the lining of the small intestine is negatively charged. Since opposites attract the positively charged minerals are attracted to the lining of the intestine, but absorption is poor. Research has shown that a properly chelated mineral can be absorbed 2-6 fold better than minerals which are not chelated. GNLD provides micronutrients in sea vegetation. Minerals in this form are well absorbed.

Proper chelation is not a simple process. Many products labeled chelated on the market are simply mixtures of amino acids (or other compounds) with minerals. To get a true bond of amino acids to minerals one must vary concentrations, temperature, and pH of the solution. Few manufacturers go to the expense to do this.

Chelated minerals are easier on the digestive tract than other minerals. The body, for example, goes to great length to withhold iron from bacteria, fungi, protozoa, and cancer cells. Mother's milk protects the infant from infection by carefully regulating iron with lactoferrin, a chelating agent.

Chelated iron is less available to pathogens in the digestive tract than is free iron. In addition much smaller quantities are required to address anemia. Chelated minerals in general do not act as free radicals in the manner that nonchelated minerals can.

REFERENCES:

Weinberg, Eugene D., The Iron-Withholding Defense System, *American Society for Microbiology News*, 1993; Vol. 59(11):559-562.

Brock, J.H., Lactoferrin in human milk: its role in iron absorption and protection against enteric infection in the newborn infant, *Archives of Disease in Childhood*, 1980; 55:417-421.

## Plants as Pesticides

*Bacillus thuringiensis (Bt)* is a soil dwelling bacteria commonly used as a biological pesticide in organic gardening. When I first began gardening in my current location, caterpillars dropped out of the oak trees by the thousands. I purchased some of the bacterial pesticide and sprayed it around the yard. The caterpillar infestation was gone within three days. I had no question about the safety of this single application since *Bt* has been used in organic agriculture for decades with no indications of human toxicity.

*B. thuringiensis* was discovered in 1901 by a Japanese biologist. A German scientist isolated the bacteria as a causal factor in disease in caterpillars in 1911. The *B. thuringiensis* is closely related to *B. anthracis*, the bacteria which causes deadly anthrax.

This bacterium produces crystal proteins (Cry proteins) which kill insects. Both the bacteria and Cry toxins have been used as pesticides since the 1920's. Ingested Cry toxins are insoluble and harmless until the toxins are released by the digestive tract. The liberated toxins literally tear apart cell walls and destroy the digestive tract of the insects.

In 1985 Plant Genetic Systems, a Belgian company, pioneered the genetic insertion of Cry toxins into tobacco. In 1995 potato plants were genetically engineered to produce Bt toxin. By 2006 11% of world corn production and 33% of world cotton production incorporated Bt technology. On the positive side, use of other pesticides on these crops dropped dramatically between 1996 and 2005. The photograph on the next page shows peanut leaves extensively damaged by the lesser cornstalk borer larvae on the top. On the bottom the larvae took a few bites of the peanut leaves, crawled off the leaf and died.

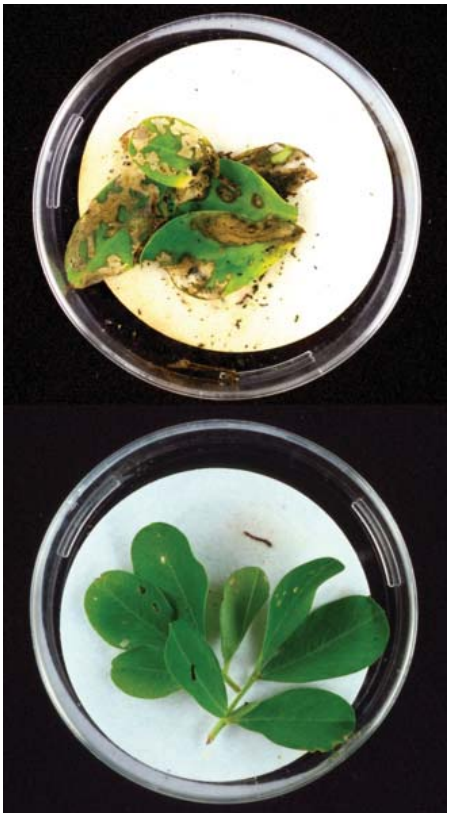
Several questions remain. Do the benefits outweigh the risks? How severe will the effects of Bt toxin be on non-target species of insects? Can Bt toxins have a detrimental effect on human or mammalian cells? What are the implications of spread of the Bt toxin into other crops or contamination of traditional Mexican maize? Could Bt toxin be a factor in colony collapse disorder destroying bees?

REFERENCE:

Tifton, Georgia, A peanut pest showdown, *Agriculture Research*, November 1999.

## Recent Study

A 2012 study found that Bt toxin has a negative impact on human kidney cells. The researchers concluded, "Here we documented that modified Bt toxins are not inert on human cells, but can exert toxicity, at least under certain in vitro conditions. In vivo implications should be now assessed.



Our results raise new questions in the risk assessment of food and feed derived from genetically engineered plants."

The researchers in this study found that 99.9% of GMO's (Genetically Modified Organisms) "can be described as pesticide plants, designed for herbicide tolerance and/or modified insecticide production." They decided to test and see what the effects of combined residues might be.

The researchers explain why they are concerned with Bt toxins despite the fact that they have been safely used as pesticides in a natural form for decades. They write that the engineered plants and their toxins "are truncated, adapted and modified synthetic sequences; consequently their activity is possibly quite different from the natural ones." Bt toxins are claimed to be safe, but prions, hormones and venoms are also proteins and can be dangerous. This is the first study testing Bt toxins on human cells. Kidney cells were chosen because kidney dysfunctions appear to be endpoints of GMO diet effects.

Combination testing of Roundup and Bt toxin found damage to the mitochondria, where energy is produced, and damaged cell membranes.


References:

https://en.wikipedia.org/wiki/Bacillus_thuringiensis

Mesnage, R., Clair, E., et al., Cytotoxicity on human cells of Cry1Ab and Cry1Ac Bt insecticidal toxins alone or with a glyphosate-based herbicide, *Journal of Applied Toxicology*, (wileyonlinelibrary.com) DOI 10.1002/jat.2712.


## The Best Study

The British government initiated a plan to require long-term safety tests of all genetically modified foods in 1996. A research team led by Arpad Pusztai of the prestigious Rowett Institute was given a grant of 1.6 million pounds to develop testing protocols. The first test subject was a potato genetically engineered to contain an insecticide from the snowdrop plant called GNA lectin.

The testing should have been a slam dunk for genetically modified foods. Pusztai and his colleagues had studied GNA lectin for seven years and concluded that it was harmless to rats.

The test looked at 3 groups of rats. One group was fed natural potato, a second group received natural potato with the GNA lectin added, finally, a third group was fed the genetically modified potato which contained the GNA lectin.

The results of this study, the most thorough ever conducted on genetically modified food, were disturbing. Animals fed the natural potato or the natural potato with the GNA lectin added were relatively unaffected.

Rats fed the genetically modified potato manifested abnormalities in as little as ten days. Brain, liver and testicles were generally smaller. The immune system appeared to be damaged and was sluggish. The pancreas and intestines were enlarged and the liver atrophied. The cells of the small and large intestines proliferated and were thicker.

The results suggested that the problem was not the lectin but "the genetic modification process itself." This study raised serious questions about the safety of all GM products on the market.

Pusztai was asked to speak on television and given permission by his director. The institute was besieged by the press. Two days later two phone calls were allegedly placed from the UK prime minister's office. The next day Pusztai was released from his job after 35 years of service and threatened with a lawsuit if he spoke about the project. His 20-member research team was dissolved and the project ended. Remarkably, Pusztai was able to publish some of his findings in the British medical journal *The Lancet*.

Prior to beginning research the Rowett Institute and the UK government had developed contracts to split the royalties when the potato modified with GNA lectin was introduced. The loss of this revenue source may have been partially responsible for the harsh treatment Arpad Pusztai received. This study may also explain why the US government accepted genetically modified foods without testing for safety because the crops were "substantially equivalent" to what was already being grown.


References:

Smith, Jeffrey M., *Genetic Roulette The Documented Health Risks of Genetically Engineered Foods*, Fairfield, IA: Yes books, 2007, 22-23.

Ewen, Stanley W.B, and Pusztai, Arpad, Effect of diets containing genetically modified potatoes expressing Galanthus nivalis lectinon rat small intestine, *The Lancet*, October 16, 1999; 354(9187): 1353-54.


## Other Studies

Other studies have been conducted of foods modified to contain the Bt toxin. Testing of Monsanto's MON 863 *Bt* corn for 90 days led to significant changes in blood cells, liver and kidney. The changes observed would

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WELLNESS INSTITUTE
1271 HIGH STREET, AUBURN, CA 95603
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be characteristic of allergy, anemia, blood pressure problems, and risk for diabetes.

Another study fed mice GM Bt potatoes. The study indicated that Bt toxin could survive digestion and can damage mammalian cells. The mice evidenced significant damage to the lining of the digestive tract.

Agricutural workers in India handling *Bt* cotton began complaining of allergic responses to the cotton while they did not have problems with other varieties of cotton. The workers developed symptoms from mild to severe itching, redness and swelling, and skin eruptions. Excessive tear flow, nasal discharge and sneezing were evident. The sensitivity was so great in some of the workers they had to seek other employment.

In another report 25% of the sheep grazing in *Bt* cotton fields after completion of the harvest died. Sheep are unaffected by normal cotton. Examination of the sheep indicated black patches in the small intestines and other digestive abnormalities.

In 2003 about 100 people living near a *Bt* cornfield while pollen was being shed became ill. Blood tests indicated an antibody response to the Bt toxin. Reactivity included skin sensitivity, respiratory and intestinal reactions.

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Smith, Jeffrey M., *Genetic Roulette The Documented Health Risks of Genetically Engineered Foods*, Fairfield, IA: Yes books, 2007, 24-35.

## CONCLUSION

Health professionals rarely consider the possibility of reactivity to GMO foods when they are evaluating health problems. Exposure is increasing and reactivity with unusual symptoms is possible. The chart on this page shows the five countries that produce 95% of GMO crops: USA, Canada, Brazil, Argentina, and China.

At the present time it is almost impossible to avoid genetically modified foods in the United States due to lack of labeling. Those who wish to avoid GM foods should visit the following web site and download their shopping guide.

http://www.nongmoshoppingguide.com/

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