

**Moving Away from Toxic AgroChemicals
to
Safe Alternatives
for
Weed and Pest Management**

New UN report says pesticides are not needed to feed the world



UN Human Rights Council

- A new report presented to the UN Human Rights Council on March 8, 2017 is severely critical of the global corporations that manufacture pesticides, accusing them of the "systematic denial of harms", "aggressive, unethical marketing tactics" and heavy lobbying of governments which has "obstructed reforms and paralyzed global pesticide restrictions".

UN Human Rights Council

- Further, pesticides have "catastrophic impacts on the environment, human health and society as a whole", including an estimated 200,000 deaths a year from acute poisoning. Its authors said: "It is time to create a global process to transition toward safer and healthier food and agricultural production."

Industry Says Its Products Are Vital

The pesticide industry markets \$50 billion a year in chemicals they say are vital to ensure sufficient food supplies.

Hilar Elver, UN special rapporteur on the right to food responds:

"It is a myth. Using more pesticides is nothing to do with getting rid of hunger. According to the UN Food and Agriculture Organization (FAO), we are able to feed 9 billion people today. Production is definitely increasing, but the problem is poverty, inequality and distribution."

Prologue

Our Challenge:

1. If we are to rebuild our soils for optimum production of healthy and complete nutrient foods, and
2. If we are to protect our water resources in light of changing global climate patterns,

The Proposed Solution:

It is urgent that we, as a global farming community, move to implement farming systems

1. That do not focus on synthetic agrochemicals, shown by independent researchers to have long-term toxic consequences in the food chain,
2. But focus on the use and intensification of biological components, well documented as to results in natural eco systems and more recently by research scientists.

A Road Map to Agro Ecoclogy

Let's outline a path for producers
to jump off the agro-chemical treadmill
and into a different way of producing.

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**Glyphosate
Active Ingredient
in “RoundUp” and
Many Other Herbicides
Is Banned in 19 Countries**

Glyphosate May Soon Be Banned in Belize

A presentation of scientific published, peer-reviewed documents in support of a petition by civil society to ban the chemical glyphosate was made on 30 August 2016 to the Belize Pesticide Control Board Registration Committee.

**Weed Management
Without
Glyphosate
Trade Name “Round Up”**

Roundup Safety Claims Disputed*

“It is commonly believed that Roundup is among the safest pesticides. ... Despite its reputation, *Roundup was by far the most toxic among the herbicides and insecticides tested*. This inconsistency between scientific fact and industrial claim may be attributed to huge economic interests, which have been found to falsify health risk assessments and *delay health policy decisions*.”

*R. Mesnage et al., Biomed Research International, Volume 2014 (2014), Article ID 179691

How Glyphosate Kills the Host Plant and Damages the Soil

1. GLYPHOSATE

- Inhibits enzyme EPSPS in Shikimate Pathway that produce 3 essential amino acids:
 - Phenylalanine, tyrosine and tryptophan
 - Building blocks of all proteins
 - Inhibition of protein synthesis leads to cell death
- Glyphosate is taken up systemically
 - Roots to leaves
 - Due to high solubility
- ALL plants, fungi, bacteria have Shikimate Pathway
- Animals do not have Shikimate Pathway
- Animals depend on diet for 3 aromatic amino acids

2. GLYPHOSATE

- Disrupts biochemical and physiological functions
- Strongly chelates (ties up) micronutrients
 - Manganese, iron , zinc, cobalt, selenium, magnesium, copper, nickel, boron
 - Due to high solubility
- Manganese is co-factor in 25 plant enzymes
- Chelation results in deficiencies in crop s

3. GLYPHOSATE

- Annihilates beneficial micro organisms in soil
 - *Pseudomonas* and *Bacillus*
 - Compromises plant's immune system
 - Weakens plant defenses against disease
- Promotes colonies of disease-causing soil pathogens such as fusarium
 - As much as 500% increase in fusarium root infection*
 - Produce toxins that transfer to food
 - Toxins linked to plague epidemics' of medieval Europe **

*Robert Kremer, USDA

** UNFAO

4. GLYPHOSATE

- Changes the makeup of the soil
 - Pathogens cause plants to release sugars
 - Results in changes of soil pH
 - About 20 percent of the glyphosate migrates out of the plant's roots and into the surrounding soil
 - Can tie up minerals for as long a 28 years

5. GLYPHOSATE

- Compromises crop production
 - Changes in soil pH
 - Interferes with photosynthesis
 - Shortens root systems
 - Reduces water use efficiency (Climate change ramifications)
- More than 40 crop diseases increase with use of glyphosate *
 - Due to weakened plants
 - Due to increased pathogens

*Dr. Don Huber, Professor Emeritus, Purdue University

Studies show that glyphosate pollutes the soil and produces nutrient deficient food.

The following charts prepared by Ekar et al show the reduction of nutrient uptake by plants in the presence of glyphosate (orange bars) compared to the level of minerals in the healthy plant (green bars).

This chart shows three important minerals needed for the health of our bodies:
IRON (Fe), MANGANESE(Mn), ZINC (Zn)

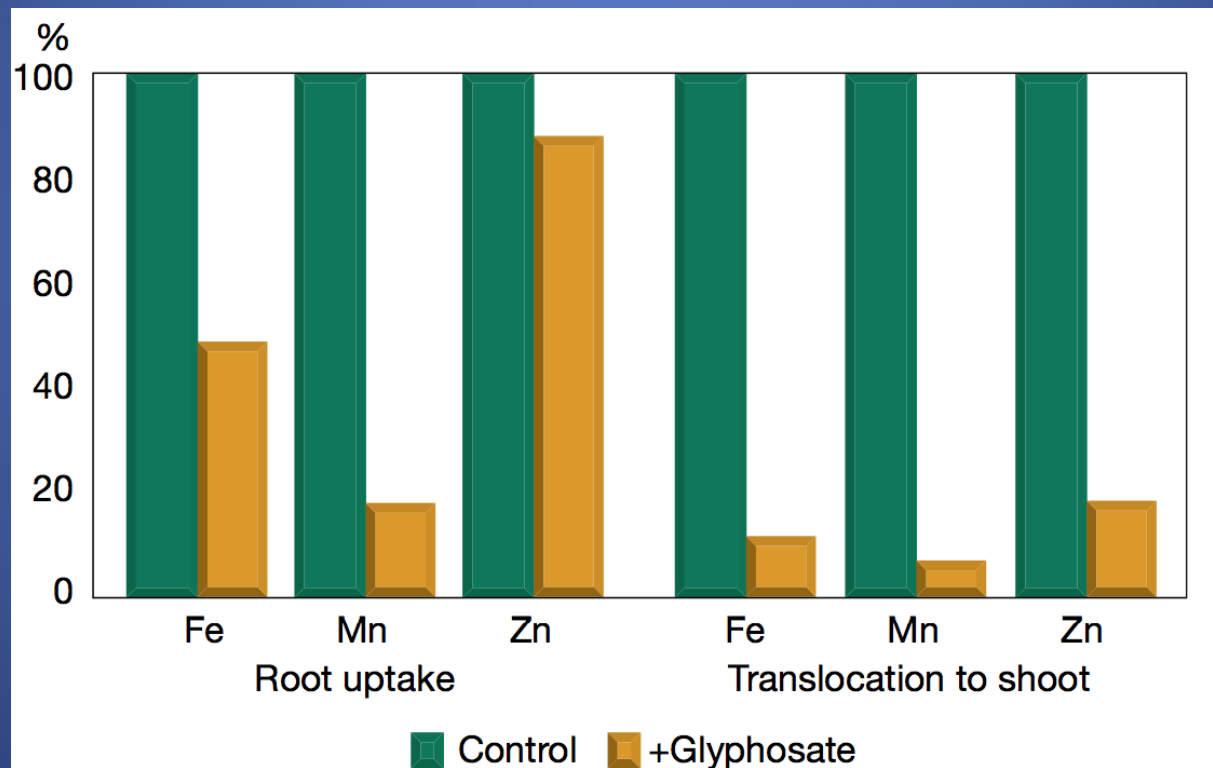


Figure 1. Effect of glyphosate* on nutrient uptake and translocation by “non-target” plants, Eker, et al. 2006. (* 2.5% of recommended herbicidal rate of glyphosate.)

The **GREEN** bars show a HEALTHY PLANT. The **GREEN** bars show the amount of minerals the roots of the healthy plant can take up into their stems and leaves IF THE SOIL IS NOT CONTAMINATED WITH GLYPHOSATE.

That amount is 100%.

100% means the plant uptakes as much as the plant needs.

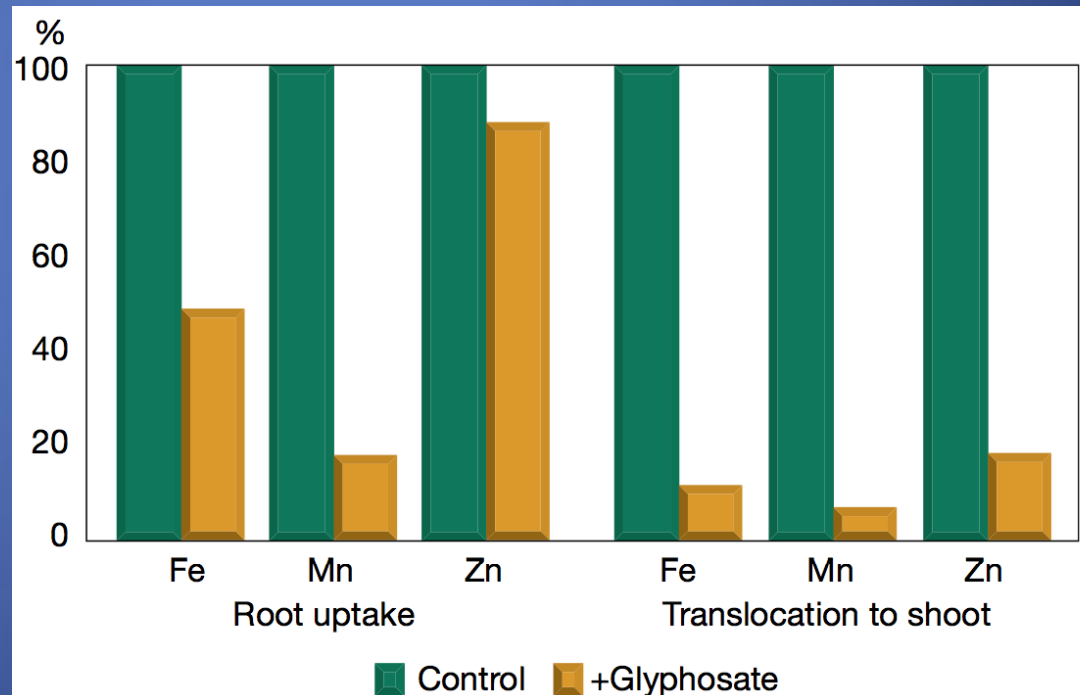
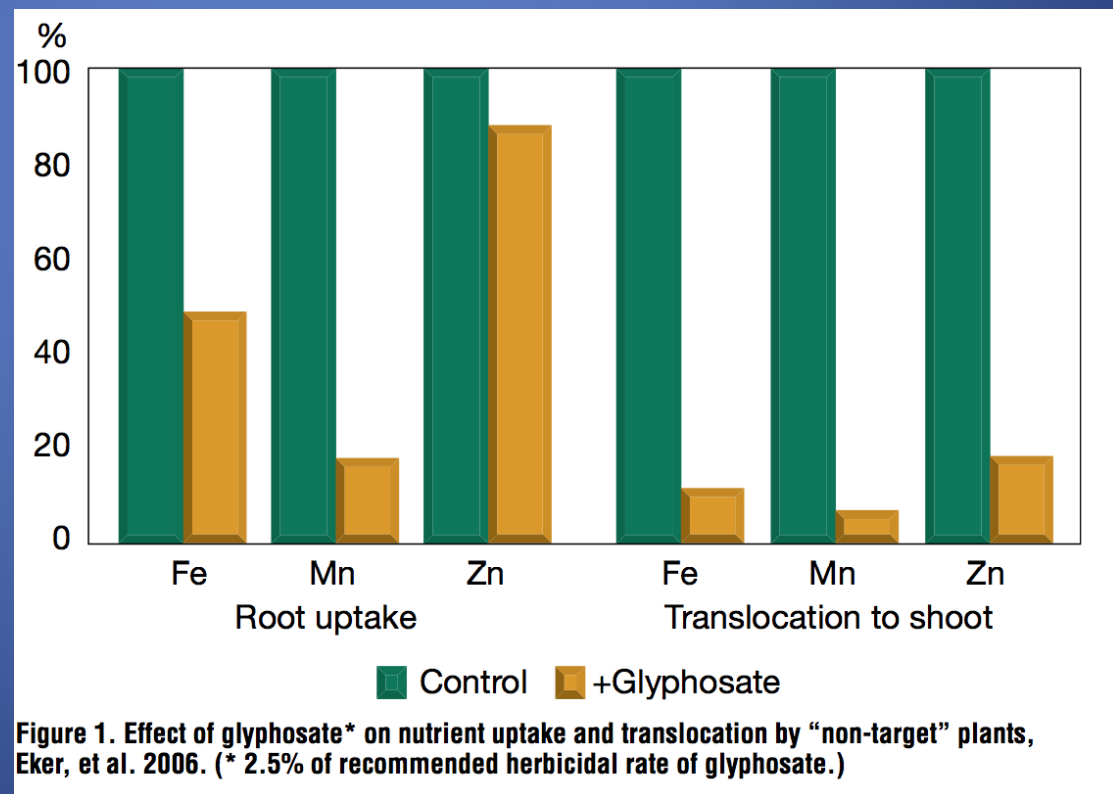


Figure 1. Effect of glyphosate* on nutrient uptake and translocation by “non-target” plants, Eker, et al. 2006. (* 2.5% of recommended herbicidal rate of glyphosate.)

The **ORANGE** bars show a DEFICIENT PLANT that is planted in SOIL CONTAMINATED WITH GLYPHOSATE. The **ORANGE** bars on the **left** show that the ROOTS of the DEBILITATED PLANT can only take from the contaminated soil less the ONE HALF (1/2) of what the plant needs. **But the plant suffers more.**

The **ORANGE** bars on the **right** show that the roots send even less minerals to their leaves.



Benefits of Weed Control without Glyphosate

For all users:

gardeners, household, landscape maintenance

- 1. Increased soil fertility**
- 2. Increased soil moisture capacity**
- 3. Reduced costs of maintenance**
- 4. Elimination of health risks**

For the farmer:

- 1. Increased productivity**
- 2. Increased profitability**

Small Commercial Hand-Cultivated Farming

**Casual Applications:
Household / Gardens
Public Areas**

Household Options

Readily Available Nonconventional Substances

- Acetic acid – Vinegar
- Orange oil
- Boiling water
- Table salt (only when you want to sterilize the soil)
- Herbals – e.g. Bird pepper

Small Gardening Options

Readily Available Nonconventional Methods

- Sheet mulching and green mulching
- Plant desirable plants where 'weeds' emerge
- Hoeing, cultivation and hand weeding
- Planting more densely eliminates 'weeds'
- "Bt" (*Bacillus thuringiensis*) – Used as pesticide

Landscape Grounds Maintenance

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Landscape Grounds Maintenance

Educational Programs Available in Ecologically Sounds Gardening and Maintenance

1. Weed Management Program - Central Farm Research – Gary Ramirez, Director
2. Master Gardener Program – Belize Botanic Gardens – Judy duPlooy, Director

Biological Pesticides Commonly Used

Can be applied to small and large scale operations
Including citrus, banana, corn, beans, vegetable crops

1. **Neem oil/tea** (*Neem tree*)
2. **Bird pepper solution** (*chile soap water*)
3. **“Bt”** (*Bacillus thuringiensis*) *Naturally occurring bacterium*
4. **EM** (*Effective micro organisms*)(*Lactobacillus as in yogurt*)
5. **Pest repelling plants** (*marigold, guava, others*)

Plant Health

Healthy Plants Resist Disease and Pests

Non-chemical amendments available in Belize

- A. Biochar
- B. Humate
- C. Minerals
- D. Microorganisms

Large Commercial Mechanized Farming

Conventional Chemical Substitutions

Registered at PCB

Perhaps as toxic as glyphosate, but readily available.

- 2.4.D (Broad leaf)
- Tordon (Broad leaf and hard stem)
- Atrazine (pre-emergent)(grass and broad leaf)
- Prowl (pre-emergent)

Plant Health

Healthy Plants Resist Disease and Pests

Many banana and citrus plantations in Belize are turning to non-chemical amendments to recover their orchards from recent devastating diseases: Fusarium in banana and Huanglongbing in citrus.

Biochar - Humate - Mined minerals

ALL LOCALLY AVAILABLE

Mike Benetti, Iguana Creek

Plant Health

Healthy Plants Resist Disease and Pests

**And coming soon to Belize commercial sector
from Agribest Mexico.**

**A complete biodynamic integrated system of nutrients,
pest and vegetation management**

- **Field tested on 33 commercial crops in Mexico.**
- **Top winner of prestigious *Cleantech Challenge Mexico* for sustainable technologies**

Agro-Base Thiessen Liquid Fertilizer, Spanish Lookout

Soil Regeneration and Remediation of Glyphosate

- **Phyto-Microbial Degradation of Glyphosate:**
- ***A. Pseudomonas aeruginosa* and *Bacillus megaterium* was shown to degrade glyphosate in 5 days in laboratory conditions.**
- **B. Selected bacterial strains *Achromobacter sp.* Kg 16 (VKM B-2534D) and *Ochrobactrum anthropi* GPK 3 (VKM B-2554D) were used for the aerobic degradation of glyphosate.**
- **C. Industrial Hemp *Cannabis sativa* for phytoremediation of soil, weed management, and natural fertilizer.**

Industrial Hemp - Legal Decontaminates and Restores Soil

- **Industrial hemp is NOT the drug 'marijuana'.**

Single Convention Treaty

Article 28: CONTROL OF CANNABIS

Paragraphs 1 and 2

- 1. If a Party permits the cultivation of the cannabis plant for the production of cannabis or cannabis resin, it shall apply thereto the system of controls as provided in article 23 respecting the control of the opium poppy.**
- 2. This Convention shall not apply to the cultivation of the cannabis plant exclusively for industrial purposes (fibre and seed) or horticultural purposes.**

Industrial hemp is # 1 on the list for cost effective weed suppression applied to large farms

- Industrial hemp is an ancient grass growing to 20 feet in one season.
- Farmer can have 3 crops per year.
- Industrial hemp is probably the longest cultivated weed suppression strategy used globally for thousands of years before the advent of chemical technology, back into the time of the Egyptians.
- It is being used successfully today.

Industrial hemp is # 1 on the list for cost effective weed suppression applied to large farms

Industrial hemp grows so densely that sunlight cannot get in to nurture weeds.

- "Hemp has been recommended as a weed control crop. Its dense, tall growth helps to kill out many common weeds. The noxious bindweed, a member of the morning glory family is checked to some extent by hemp." --B. B. Robinson, Hemp, USDA Agric Bull #1453, 1943
- "Very few of the common weeds troublesome on the farm can survive the dense shade of a good crop of hemp...In one 4-acre field in Vernon County, Wis., where Canada thistles were very thick, fully 95 per cent of the thistles were killed...." --Lyster Dewey, Hemp. USDA 1901

Industrial hemp is # 1 on the list for soil regeneration and remediation of glyphosate.

And more benefits:

- **One of the fastest soil building crops known**
- **Requires no fertilizers, herbicides or pesticides**
- **Can be cultivated on any size farm**
- **Uses conventional methods of cultivation**
- **Removes contaminants (chemical, heavy metals and radioactive materials) from soils**

Industrial hemp is # 1 on the list for cost effectiveness and rapid results.

- Cultivated from seed which is moderate in price
- Can be ploughed under for organic material
- Can be chopped for mulch
- Increases water-holding capacity of soil
- Releases beneficial micro organisms to the soil
- Restores soil aeration and texture
- Highly effective in crop rotation for soil rebuilding

Puts your soil back in production quickly and economically

Bio Intensification Systems Coming to Belize

Use and intensification of biological components

How this works:

Crops are combined so that the presence of crop either attracts or repels the pest of the other crop. Thus Push_Pull

Most famous of these systems is used in Africa called Push-Pull Maize used by over 110,000 small hand farmers. The legume planted between the corn rows repels the corn borer/moth, and the napier grass on the margin of the field attracts the same pest away from the corn. The grass is eventually used to feed their small herds of cattle.

Alternate Biological Farming Systems

Long term objective for sustainable and regenerative farming lies in bio intensification methods.

There is also Push-Pull Citrus utilized in Vietnam where there is little evidence of 'greening disease' --Huanglongbing.

Achieving Increased Profitability with Alternatives to Poisonous Agro Chemicals

- **Farmer has eliminated costly agro chemicals and fertilizers.**
- **Alternatives enrich the soil requiring less organic nutrients over time to enrich and maintain the soil.**
- **Alternatives to poisonous chemicals mean less health risk for farmers and consumers, eliminating need for health care costs and medicines, and loss of work time.**
- **Thirty years of comparative studies at Rodale Institute (Iowa, USA) has established significant economic advantages to farming without chemicals. www.rodaleinstitute.org**

Two Key Factors Result in Higher Yields with Ecological Farming

1. Higher humus content of soil:

- Humus is one of the most important factors of soil organic matter.
- Humus gives the soil stability and holds many of the nutrients.

2. Better absorption of rain:

- Humus holds up to 30 times its weight in water.
- Soil doesn't erode in heavy rain as it does in conventional farming.
- There is less runoff due to higher levels of organic carbon and to the porous structure of the soil .
- Rodale Institute 10 -year trials show that organic manure and organic legume system treatments improve the soil's water-holding capacity, infiltration rate, and water-capture efficiency.
- Rodale corn crops averaged a 13% higher water content than convention system soil and 7 % higher in soybean plots.

Surviving Climate Change with Higher Yields

A Road Map to Agro Ecology

For more details on the methods of use and preparation of these cited alternatives to glyphosate and other agro chemicals, please go to

[www. Ban-glyphosate.com/](http://www.Ban-glyphosate.com/)

Jump off the agro-chemical treadmill and into a different way of producing !

Thank You