Strategies for Reducing Pesticides in Agriculture

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IFOAM – Organics International

The only global umbrella body for the organic sector.

People

800 member organizations in over 125 countries worldwide.

2 million certified organic farmers and substantially more uncertified organic farmers.
The IFOAM Definition of Organic Agriculture

Organic agriculture is a production system that sustains the health of soils, ecosystems and people.

It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects.

Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.
Most Organizations & Rural Industries Support Reducing Pesticides

- Why do we need to reduce pesticides if they are safe when used as directed?
- The first step is to look at this issue critically

Pesticide Reduction Strategies

- Introduce IPM systems where aim is reduction and use of least toxic alternatives
- Eco-Function Intensification, where functional biodiversity is integrated into farming systems to replace pesticides – applied agroecological science
Is the current use of Pesticides Safe?

A critical analysis of pesticides and human health based on published peer reviewed science.

All statements cite the published science.
The **Myths** of Safe Pesticides

**MYTH 1: Rigorously Tested “All agriculture poisons are scientifically tested to ensure safe use”**

- Most pesticide formulations sold on the market are deemed safe on the basis of just testing one of the ingredients without testing the whole formulation.
- It is a data-free assumption to assume there is no difference in toxicity between the active ingredient and the whole formulation.
- The limited scientific testing of formulated pesticide products shows that they can be hundreds of times more toxic to humans than the pure single active ingredient.
The Myths of Safe Pesticides

MYTH 1: Rigorously Tested “All agriculture poisons are scientifically tested to ensure safe use”

- The 1400 registered agricultural and veterinary products sold in the USA have **no testing for children’s health, reproductive effects, birth defects, cancer, developmental neurotoxicity, endocrine disruption** and numerous other issues that could be caused by the whole formulation.
The **Myths** of Safe Pesticides

**MYTH 1: Rigorously Tested “All agriculture poisons are scientifically tested to ensure safe use”**

- Multiple pesticides (insecticides, herbicides, fungicides) are approved for each crop
- Many foods have multiple residues
- Most people have multiple residues in their bodies
- No testing of chemical cocktails
- Many mixtures are synergistic 1+1=3 or much more
- Up to 232 chemicals found in placental cord blood
- It is data-free assumption to assume that there are no additive or synergistic toxic effects from cocktails
The Myths of Safe Pesticides

MYTH 1: Rigorously Tested “All agriculture poisons are scientifically tested to ensure safe use”

• The special requirements of the foetus, the newborn, and the growing child in relation to developmental neurotoxicity are also subject to data-free assumptions.

• Currently the pesticide testing used in the regulatory approval processes does not specifically test for the risks particular to these age groups.

• Peer reviewed testing shows that these groups are particularly vulnerable to the smallest amounts of pesticides.
The Myths of Safe Pesticides

MYTH 2: Very Small Amount “The residues are too low to cause any problems”

• The smallest amounts of chemical residues can be harmful.

• Given that there are hundreds of studies showing that many chemicals can be endocrine disruptors and therefore more toxic at lower doses, setting the Average Daily Intake (ADI) on the basis of extrapolating it from testing done at higher doses is a data-free assumption.
MYTH 3: Breakdown “Modern pesticides rapidly biodegrade”

• All synthetic pesticides leave residues in food, that is why Maximum Residue Levels (MRL) and Average Daily Intakes (ADI) are set
• Testing shows that the majority of foods and people have pesticide residues

• Lack of testing for the metabolites formed by pesticides as they degrade
• Limited testing shows that many of them are more toxic and residual than the pesticide itself
The Myths of Safe Pesticides

MYTH 4: Reliable Regulatory Authorities “Trust us — we have it all under control”

- Regulatory authorities are ignoring a large body of peer reviewed science showing the harm of caused by pesticides and are largely basing their decisions on unpublished industry studies.

- The scientific credibility of pesticide regulatory authorities has to be seriously questioned when they are approving the use of pesticides on the basis of data-free assumptions and not on the published peer reviewed science.
The Myths of Safe Pesticides

MYTH 5: Pesticides are Essential to Farming “We will starve to death without pesticides”

- There are many examples where organic systems are getting equal to higher yields than conventional farming
- Most research spent on pesticide based systems
- Less than 0.5% of agricultural research is spent on solutions applicable to organic/agroecological systems
- Agricultural research % of funding needs to be dramatically increased to further improve and scale up these high yielding organic/agroecological systems
- This will benefit all farming systems, not just organic, in achieving high yields without synthetic pesticides
Pesticide Reduction – Integrated Pest Management

**IPM**
One of the most effective methods to reduce pesticides without losing yields

**Pest Thresholds**
The key is monitoring to establish thresholds where pest damage will cause economic levels of damage before spraying

**Research**
Research is critical to determine pest thresholds and the efficacy of pesticides

**Training**
Farmers need to be trained to recognize pests, beneficial and the insects ‘that are just there’, determine thresholds and the most effective pesticides – *how to use safely*
**Monitoring and only spraying hot spots.**

Many sprays are broad spectrum, killing both pest and beneficial species.

Monitor the crop and establish the areas that have the highest numbers of the pest. These areas are the ‘Hot Spots’.

Only spray the hot spots. The beneficials will recolonize the sprayed areas if insecticides are not residual

**Use pest specific techniques**

Biological pesticides such as Bacillus thuringiensis and Metarhizium are usually pest specific and do not harm beneficials – or people.
Examples of effective organic permitted sprays

**Biologicals**
Many people have failures with biologicals, due to not realizing that they are dealing with living organisms rather than a chemical.

Biologicals need to live in suitable conditions to be effective. It is important to understand these requirements.

**Non Toxic Sprays**
Emulsified vegetable oils, light oils
Natural Soap Sprays
Clays, Flour and water

These are effective against most pests
Examples of effective organic permitted sprays

**Toxic Sprays**
Natural pyrethrum - no pest is resistant to it
Spinosad
Eucalyptus Oil
These are broad spectrum and should only be used in hot spots

**Repellents**
Garlic, chili, tea tree oil, lavender oil, citronella, cypress pine oil.
Alternatives to Pesticides Eco-function Intensification

INSECTARIES

- Refuges of flowering plants are known as insectaries
- Many beneficial insects have a range of host plants
- Some useful species such as parasitic wasps, Hoverflies and Lacewings have carnivorous larvae that eat pests however the adult stages live mostly on nectar and pollen from flowers
FLOWERING PLANTS

Flowering plants are encouraged to grow throughout the fields and along the borders.

Nectar and pollen are essential to the adult stage of many beneficial predators.

Research has shown that they breed thousands of beneficial organisms.

Tall flowering plant host more species than short mowed or bare areas.
Eco-function Intensification

Maximises solar capture

Does not compete for sunlight

Fixes nitrogen and soil carbon

Green Manure

Flowers attract beneficial insects

Conserves water and soil

This is an example of good practice in weed management and not a neglected orchard

High Species Biodiversity, Italy
Eco-intensification, Agroecology

Insectaries

Borders of flowers, trees and shrubs create refuges for beneficial insects, birds, lizards, frogs etc.

Small birds eat an enormous amount of insect pests and need shrubs

Provide forage for livestock

Provide biomass for compost

Marginal areas planted with a high diversity of eco functional species, Bhutan
“Push– Pull” for Stemborer and Striga Control

Chemicals (isoflavones) secreted by desmodium roots inhibit attachment of striga to maize roots and cause suicidal germination of striga seed in soil

Source: International Centre of Insect Physiology and Ecology (ICIPE)
Eco-function Intensification
A whole of System’s Approach

Using natural systems to regulate pest outbreaks

push-pull
greater farm productivity with higher corns yields (2 to 10X)
Eco-function Intensification

The desmodium, suppresses weeds (selective allelopathy), adds nitrogen, conserves the soil, repels pests and provides high protein stock feed.
Eco-function Intensification

The Napier grass is a trap for the corn borer. The sharp silica hairs and sticky exudates on the Napier grass kill the stem borer larvae when they hatch, breaking the life cycle and reducing pest numbers.
Push Pull Adapted to New Crops

Intercropping to fix N for free

Desmodium repels pests suppress weeds

Alfalfa hosts beneficial insects

Napier grass traps pests

Chillies grown with desmodium and alfalfa
Push Pull and insectaries in a mango orchard gives total pest control, provide nutrients, feed for stock and biogas. The biogas slurry is composted and used as the only fertilizer. High yields of perfect fruit.
Conclusion

• The first step in pesticide reduction is based on the large body of peer reviewed science showing that the current permitted MRLs are based on outdated science and data-free assumptions.

• There are hundreds of studies showing that the current MRLs are not safe.

• The current body of science is showing massive data gaps that need to be researched before adequate safety can be established.

• Until this is done, pesticide reduction is the best strategy.

• IPM is a proven way of doing this.

• Low and non toxic options can be included in IPM.

• Eco-function Intensification can provide alternatives to pesticides.
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THANK YOU!
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