



PESTICIDE USE: IMPACTS AND NATURAL ALTERNATIVES

A PRACTICAL GUIDE FOR FARMERS AND GARDENERS

Understanding how pesticides affect human health, soil life, and biodiversity is essential for building resilient agriculture. This guide explains the risks associated with pesticide use and introduces simple nature-based practices that can help farmers and gardeners reduce chemical dependence while protecting productivity and ecosystems.



WHAT ARE PESTICIDES?

Pesticides are chemical or biological substances used in agriculture to control organisms considered harmful to crops, livestock, or stored products. Their main purpose is to reduce crop losses caused by pests, diseases, and weeds.

However, research shows that pesticide use can have significant unintended consequences. According to international studies summarized in the Pesticide Atlas, pesticides do not remain confined to the target organism. They can spread through soil, water, and air, affecting beneficial organisms, wildlife, and human health.

MAIN TYPES OF PESTICIDES:

Insecticides – designed to kill insects that damage crops

Herbicides – used to control unwanted plants (weeds)

Fungicides – used to prevent or eliminate fungal diseases and molds

Although these substances can improve short-term crop protection, excessive or improper use can disrupt ecological balance and increase long-term dependency on chemical inputs.

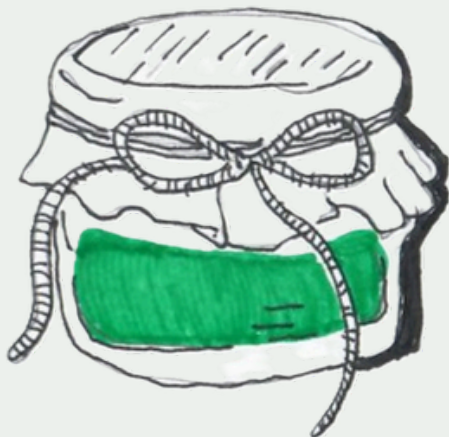
HEALTH RISKS

Pesticides can affect human health in both the short and long term. The severity of effects depends on the type of chemical, level of exposure, and individual sensitivity.

SHORT-TERM (ACUTE) EFFECTS MAY INCLUDE:

- Headaches and dizziness
- Nausea and vomiting
- Skin and eye irritation
- Breathing difficulties
- Fatigue or weakness

These symptoms may occur shortly after exposure, particularly during spraying or improper handling.

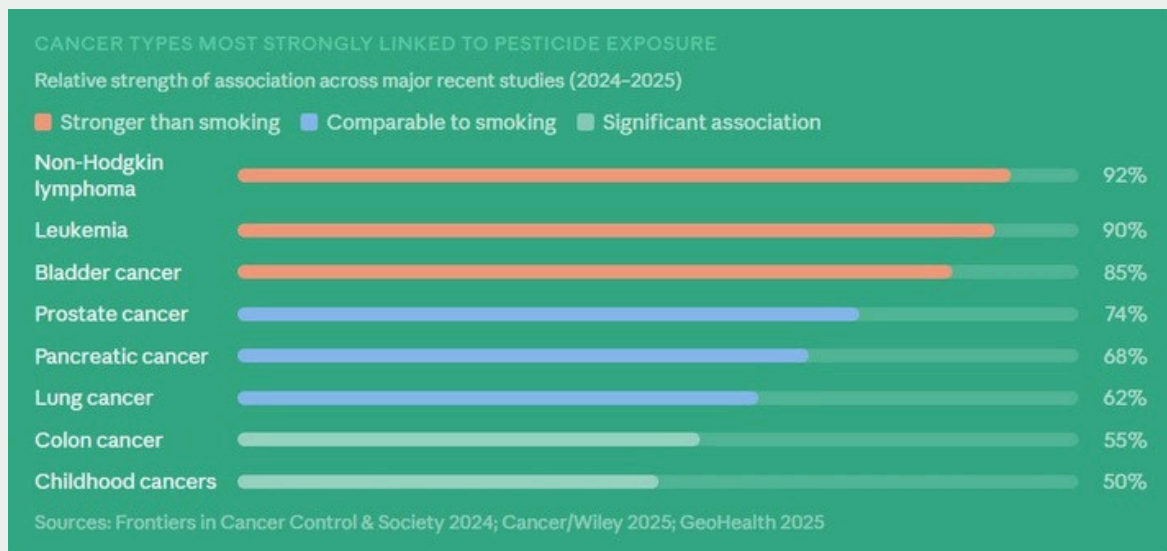


HEALTH RISKS

LONG-TERM EXPOSURE HAS BEEN LINKED TO:

- Hormonal and endocrine disruption
- Developmental problems in children
- Damage to the nervous system
- Liver and kidney disorders
- Different types of Cancer

Led by the independent Ramazzini Institute, the study tested both glyphosate and the representative formulation used in the EU. It shows that long-term exposure to glyphosate and its formulations, even at very low levels equivalent to the EU's Acceptable Daily Intake (ADI), causes early-onset leukemia and other types of tumor (e.g. skin, liver, thyroid, nervous system, ovary, mammary gland, adrenal glands, kidney, urinary bladder, bone, endocrine pancreas, uterus and spleen), providing solid evidence of glyphosate's carcinogenic potential. Pregnant women, children, and agricultural workers are especially vulnerable to pesticide exposure.



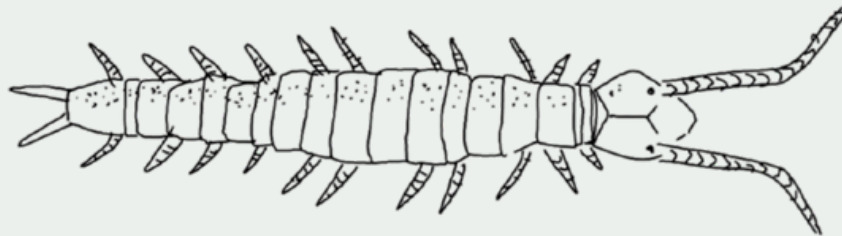
ENVIRONMENTAL HARM

Pesticides do not only affect target pests. Many beneficial organisms are also harmed, including pollinators, soil microorganisms, birds, and aquatic species.

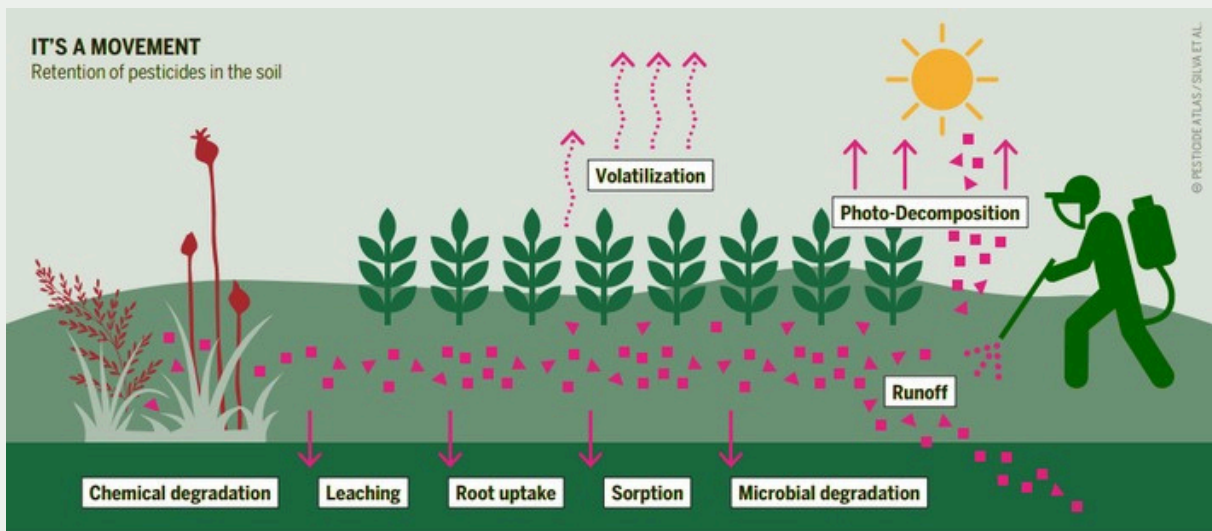
Healthy soils contain billions of microorganisms that regulate nutrient cycles and help plants grow. Chemical pesticides can disrupt these complex biological systems and reduce soil fertility over time.

As a result:

- The diversity of soil life decreases
- Natural pest control mechanisms weaken
- Plants become more dependent on chemical protection
- Soil structure and fertility gradually decline



ENVIRONMENTAL HARM



Another major concern is the decline of pollinators such as bees and butterflies. Certain insecticides—especially neonicotinoids—can affect pollinators even at very low doses, impairing their navigation, reproduction, and survival.

Because of these risks, many scientists emphasize the importance of reducing pesticide dependency and strengthening organic farming systems.




TRANSITIONS TOWARD ALTERNATIVES

Transitioning away from heavy pesticide use does not need to happen overnight. Even small changes in farming practices can significantly reduce risks for people and the environment.

IF CHEMICALS ARE STILL USED:

- Always wear protective equipment such as gloves, masks, and thick clothing
- Avoid spraying near rivers, streams, or wells
- Do not spray during windy conditions
- Store chemicals safely and keep them away from children and animals.
- Carefully read instructions and recommended doses

Reducing pesticide use is also a matter of knowledge sharing. Farmers and gardeners can learn from each other by exchanging experiences about safer and more sustainable methods.



NATURE-BASED ALTERNATIVES

Agriculture can function successfully with fewer chemicals by relying on ecological processes and natural pest control methods.

Many traditional farming techniques help maintain balance between crops, pests, and beneficial organisms.

Natural pest management methods include:

Hand-picking pests early in the morning

Planting different crops together (companion planting)

Encouraging beneficial insects such as ladybirds and lacewings

Preparing natural plant-based extracts and bio-preparations



NATURE-BASED ALTERNATIVES

SOIL ENRICHMENT PREPARATIONS:

- Use of plant-based fertilizers
- Composting organic materials
- Mulching to retain soil moisture
- Crop rotation to prevent pest buildup
- Nettle liquid preparation (natural insect repellent)

Fill a container with fresh nettles and add approximately ten parts water. Stir the mixture daily using a wooden or plastic stick. After natural fermentation (about 7–10 days), when the liquid stops bubbling, the preparation is ready.

Dilute 1 liter of the liquid in 10–15 liters of water and spray on plants as a preventive measure against aphids.

This preparation strengthens plants and can help reduce pest pressure naturally.



HOLISTIC PRACTICES

COMPOSTING AND SOIL HEALTH

Composting transforms plant waste into nutrient-rich soil that improves soil fertility, structure, and biodiversity. Healthy soil is a living ecosystem: it contains vast communities of microorganisms that recycle nutrients, regulate water, and suppress plant diseases. Scientific studies show that pesticides can harm these organisms and disrupt soil functions, reducing plant resilience over time.

- Suitable materials:
- Vegetable and fruit peels
- Tea leaves and coffee grounds
- Weeds*
- Dry leaves and grass
- Grape leaves and hay
- Crushed eggshells

Do not use:

- Meat or fish
- Chemically treated food waste
- Diseased plants
- Plastic, glass, or metal

Turn the compost material once a week to improve aeration. After decomposition, compost can be applied to gardens and fields to strengthen soil life and plant immunity.

*Some weeds are not recommended for compost because they may spread through seeds

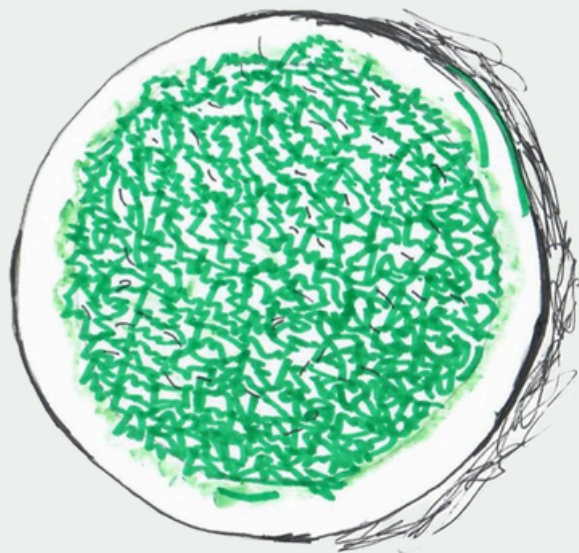


DIVERSITY-BASED CROP MANAGEMENT

Holistic land management focuses on diversity rather than monoculture. Scientific evidence shows that low plant diversity and chemically intensive systems create ideal conditions for pest outbreaks, while diversified systems reduce pest populations and crop damage.

CROP ROTATION

- Year 1 – Leafy crops: Lettuce, spinach, cabbage
- Year 2 – Root crops: Carrot, beetroot, potato
- Year 3 – Fruiting crops: Tomato, cucumber, eggplant, pumpkin
- Year 4 – Legumes (nitrogen-fixing plants): Beans, peas, lentils



DIVERSITY-BASED CROP MANAGEMENT

Legumes enrich the soil with nitrogen. In addition to rotation, intercropping (growing different plants together) supports natural pest control by increasing beneficial insects and strengthening plant resistance. Studies show diversified farms can increase natural enemies of pests and significantly reduce crop damage compared to monocultures.

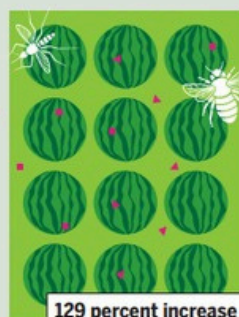
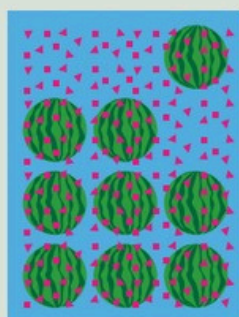
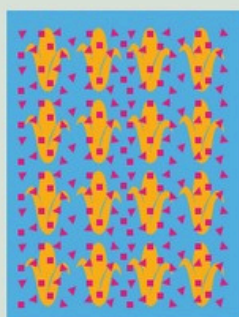
OTHER METHODS

Practical solutions include pheromone traps, biological pest control (beneficial insects), and plant-based extracts. Agroecology research shows that such methods enhance resilience, reduce chemical exposure, and support long-term productivity by working with natural ecosystem processes rather than against them.

LOWER PESTICIDE USE, HIGHER HARVEST YIELDS

Consequences of integrated pest management (IPM) as ecological alternative to conventional pesticide practices

A study from 2021 showed 95 percent lower insecticide use results in...



The UN's Food and Agriculture Organization (FAO) defines **Integrated pest management (IPM)** as approach emphasizing the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms as for example beneficial insects in order to reduce pesticide use

129 percent increase in flower visitation rate by pollinators and **26 percent higher yields**

no negative impact on yields under certain conditions

Heinrich-Böll-Stiftung European Union, Friends of the Earth Europe, Pesticide Action Network Europe & BUND. Pesticide Atlas 2022. <https://eu.boell.org/en/PesticideAtlas-PDF>

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