

Integrated Pest Management and Natural Farming Solutions

Increasing Agriculture's Productivity and Resilience

The Rainforest Alliance is creating a more sustainable world by using social and market forces to protect nature and improve the lives of farmers and forest communities.



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INTRODUCTION

Pests are a constant threat for farmers. They can reduce the yield or quality of a crop, or in the worst cases wipe it out altogether. For farmers who already struggle to achieve a sustainable livelihood, this can be devastating, which is why the first reaction of most farmers worldwide is to use pesticides¹ to eliminate pests, or even as a prevention method.

It is estimated that every year between 20 and 40 percent of global crop production is lost to pests². Each year, plant diseases cost the global economy around US\$220 billion, and insect pests around US\$70 billion³.

Consequently, the quantity of pesticides used worldwide has risen 50-fold since 1950⁴. Approximately 3.5 billion kg of pesticides are applied globally each year⁵, with no significant decrease in crop losses recorded. Among these pesticides, many are classified as “highly hazardous”, and can pose serious human health problems in both the short and the long term. Effects of pesticides on the **environment** are also serious. Impacts include biodiversity loss, as well as soil degradation and pollution. Certain pesticides can persist in the environment for decades, and pose a threat to the entire ecological system on which food production depends.

For all these reasons, the assumption made by many farmers that pesticide use leads to higher productivity and profitability is not so clear-cut. Research shows that pesticide use could be cut by 40 percent without effects on productivity⁶. Generalizations in this regard are difficult, but there is a consensus among researchers that increasing pesticide use does not necessarily increase productivity and profitability.

A practical and very often a cost-effective answer to reduce the reliance on pesticides and its negative consequences is integrated pest management (IPM).

IPM is an **ecosystem approach** to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides. It is defined by the Food and Agriculture Organization (FAO) as “the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment.”⁷



A farm in Waslala, Nicaragua supporting a wide variety of productive species which includes citrus, banana, mango, cacao, coffee as well as laurel tree for timber and Inga for firewood. Such complex agro-ecosystems deliver services like pollination and natural pest control.

IPM AT THE RAINFOREST ALLIANCE

Agriculture is one of the main factors causing environmental degradation, loss of natural habitats and biodiversity, soil degradation such as erosion, and depletion and pollution of natural water resources. As a result, the Rainforest Alliance considers IPM to be a vital component of a sustainable or regenerative agricultural sector.

For the Rainforest Alliance, managing pests, diseases, and weeds is part of climate-smart and a holistic approach to ecosystem management⁸, where we aim at a substantial reduction of the use of pesticides by strengthening and balancing the functions of the agro-ecosystem. The Rainforest Alliance believes that pesticide use can be decreased by implementing alternative practices based on risk assessments and an intensified knowledge of the ecosystem—a holistic approach. We aim to achieve a change in mindset that first looks at the environmental and social components of managing pests, and sees external inputs such as pesticides as a last resort (Figure 1).

Our approach is based on harnessing the inherent strengths within agro-ecosystems to bring pest populations down to acceptable levels, rather than trying to eradicate them. The choice of control methods⁹ is made bearing in mind costs and benefits, as well as ecological and social aspects. The long-term conservation of the ecosystem and its services, and people’s well being, are the ultimate priorities.

The Rainforest Alliance puts this into practice through an IPM system where the first approach to controlling pests is based on prevention, focusing on building a resilient crop and farm capable of withstanding pest infestations, before pesticides should be considered.

Next come non-chemical control options such as cultural control (e.g., crop sanitation or hand weeding), and physical or biological control (e.g., natural enemies). Only when these methods have been exhausted should farmers consider selective use of low-toxicity chemical pesticides, with strict risk-mitigation measures, and based on safe, controlled, and appropriate use to control specific pests in a specific situation.

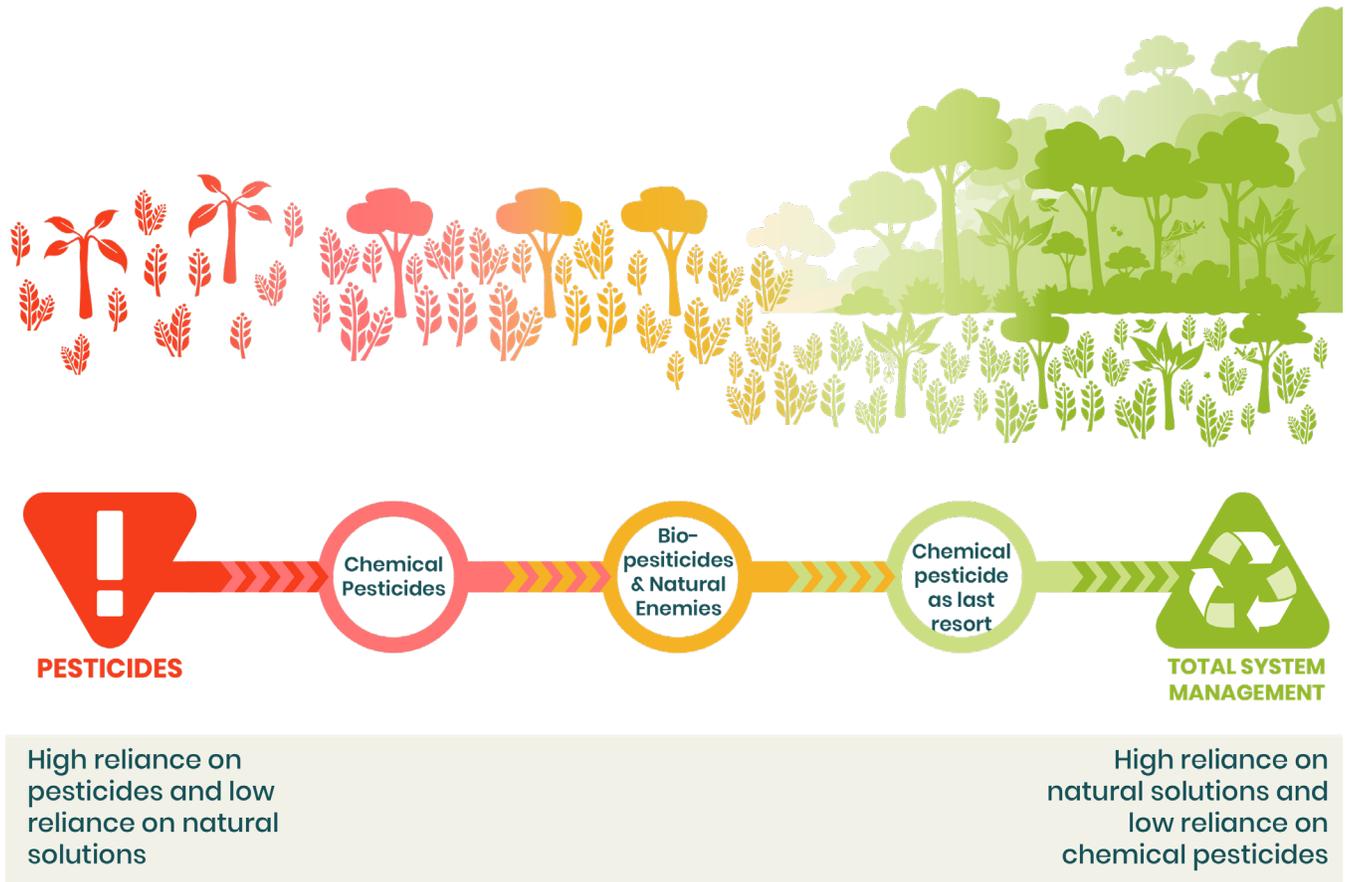


Figure 1. A holistic approach that prioritizes the environmental and social components of pest management and sees external inputs as a last resort.

(Source: adapted from Fig. 1 of Lewis et al., 1997.¹⁰)

We believe that pesticide stewardship is largely the responsibility of the producers and distributors of pesticides, who should inform farmers on their safe use, and have systems in place for collection of empty pesticide containers and disposal of old and obsolete active ingredients.

The Rainforest Alliance supports pesticide waste policies that are based on the Extended Producer Responsibility approach¹¹. The Organisation for Economic Co-operation and Development (OECD) has developed guidance on this policy approach, and several governments have included it in their waste policies. It places on producers significant responsibility—financial and physical—for the treatment and disposal of post-consumer products.

In the absence of effective policies in a country, the Rainforest Alliance monitors the collection of pesticide containers and of old and obsolete active ingredients, and makes any observed problems known to governments and pesticide companies for them to work towards a solution.

IMPORTANCE OF LOCAL CONTEXT AND KNOWLEDGE

IPM adoption is context-specific, as farmers have different needs depending on their specific reality. IPM interventions recommended to farmers often come across as top-down, without assessing the farmer's own context—such as labor availability, economic resources, and literacy. Our aim is to understand local contexts and harness local knowledge, taking success stories from producers and the literature, validating those practices, and then scaling them up.

In line with the holistic approach, we aim to identify the constraints to adopting IPM and to support farmers to overcome them, by sharing knowledge about more sustainable pest control and regenerative agriculture practices, and by providing alternatives to pest control in line with local realities, rather than merely lists of prohibited pesticides.

TRAINING AND SUPPORTIVE POLICIES FOR SUSTAINABLE PEST MANAGEMENT

Offering comprehensive training to farmers on IPM and pesticide risk reduction is of utmost importance and urgency. The success of IPM training, particularly via Farmer Field Schools¹², has been widely demonstrated. This participatory training and extension method conveys the effectiveness, profitability and environmental protection gains of adopting IPM.

But soon after training ends, smallholder farmers tend to return to intensive use of highly hazardous pesticides. Many farmers still consider IPM to be time-consuming and complex, while cheap pesticides represent an insurance policy.

Some of the most important reasons for IPM “drop-out” in the global south include “weak adoption incentives” and “pesticide industry interference”¹³.

Concurrently with training in sustainable pest and pesticide management, policies need to be developed to strengthen in-country regulations for the use and distribution of pesticides, and to enhance the capacity to enforce these regulations. So far, the most common interventions have been not to encourage IPM, but to limit, severely restrict, or ban the use of certain pesticides.

At national policy level, a combination of promoting safer control alternatives and restricting the use of highly hazardous pesticides is essential to reduce the negative impact of pesticides on human and environmental health.

THE RAINFOREST ALLIANCE'S IPM STRATEGY

The goal of the Rainforest Alliance's IPM strategy is to guide farms in developing robust plans to control pests naturally (with pesticides used as a last resort) and to improve ecosystem resilience. We are working to change our approach from generalized and prescriptive (top-down) to more context-specific and farmer-driven, supported by tailored training and other resources.

To make this transition, the Rainforest Alliance has designed a strategy to gain a better understanding of what limits and facilitates successful IPM adoption and implementation by farmers; to know what successful IPM looks like; and to understand what baselines we can use to measure improvements. This knowledge/understanding lies primarily with farmers.

Our IPM strategy has four main components.

- 1. IPM knowledge bank:** creating the necessary information and knowledge pool to make informed decisions regarding IPM and pesticide use in order to support farmers in their journey towards more regenerative agriculture and pest control.
- 2. Tailored IPM solutions:** using the knowledge bank to create tailored IPM solutions in specific sectors and locations.
- 3. Training and capacity building:** applying the Farmer Field School model¹⁴ to promote experimentation, demonstration, and exchange of experiences among farmers, which will be key for IPM adoption.
- 4. Advocacy:** lobbying and advocating for shared responsibility in IPM and pesticide use (see the following section on shared responsibility).



Pheromone traps to control coffee berry borer in Peru.



Shade trees help to prevent pests and diseases on crops by providing the right micro climate.



Mechanical pest control: sticky traps on tea plantation in China.

GLOBAL CONTEXT AND SHARED RESPONSIBILITY—A CALL FOR ACTION

The global community spends millions of dollars a year on pests due to costly control measures and production losses. The economic impact of pesticides in non-target species (including humans) has been estimated at approximately US\$8 billion annually in developing countries¹⁵. Effective pest management is not just the responsibility of producers, but is a joint responsibility for all, including the food industry, companies, governments, and communities, as well as farmers.

Everyone in the food supply chain has a responsibility to contribute to the uptake of IPM and the reduction of pesticide use by building their knowledge about pests, responding to pest management issues and strategies, and undertaking the necessary measures to prevent the introduction and spread of pests, diseases, and weeds.

Pesticide producers are responsible for providing sound information to farmers on handling and applying pesticides responsibly, for example by using pesticides only as a last resort, and preventing overuse. They also need to ensure that everywhere their pesticides are sold, there is a proper system in place for the collection of empty containers and old or obsolete active ingredients.

Companies in the food industry are responsible for promoting IPM implementation by supporting their upstream suppliers to design and distribute resources about GAP for producers, and by investing in industry-wide pest management activities. They can also provide funding and human resources to support the delivery of IPM-related research to increase the knowledge base, and to promote awareness-raising activities among stakeholders.

Traders that distribute pesticides to farmers could be involved in promoting and supporting the distribution only of approved pesticides, and in ensuring responsible use, including responsible final disposal of pesticide containers. Such companies are well positioned to design and distribute resources about GAP. They should refrain from selling prohibited products, and eliminate manipulative pricing practices and input loan systems that promote pesticide use.

Retailers in the food industry can use their power and influence to lobby and advocate with governments and the pesticide industry to consider changes that promote responsible production, manufacturing, and use. They could implement a credible monitoring procedure through direct engagement with trade unions, labor rights groups, and environmental NGOs to influence changes in the way pesticides are manufactured and exported to developing countries. They could also provide funding and human resources to support the delivery of IPM-related research to increase the knowledge base and awareness-raising activities among stakeholders. Retailers are also well placed to support supply chain companies in origin countries to design and distribute resources about GAP to producers, and to ensure that the farmers' cost of production is reimbursed through a fair price paid to them. Adequate product prices can substantially boost investment in IPM.

Governments of producer (origin) countries could regulate the import, availability, distribution, and use of pesticides nationally. They could also take on a broader role as communicators, educators, facilitators, coordinators, assessors, and protectors of human lives and the environment. This involves having the resources for communication and education activities; working with industry and communities on surveillance, management, eradication, and control activities; undertaking critical risk assessments and analyses; and implementing preventive measures and emergency response activities.

On the other hand, **governments in consuming countries** must prohibit the manufacture, not just the use, of highly hazardous pesticides (as defined by FAO)⁶; and must forbid the export of locally banned pesticides to countries with weaker regulatory frameworks.

Not-for-profit, research, and community organizations have an important role in promoting the responsible use of pesticides by providing funding, human resources, the delivery of IPM-related research, field programs, and communication and awareness-raising activities.

CONCLUSION—A CHANGE IN MINDSET IS NEEDED

To achieve long-lasting and truly sustainable pest control that benefits people and planet, and also increases profit, we need to focus on improving agro-ecosystem resilience. This requires a thorough understanding of the factors that contribute to resilience on the farm—good soil health, biodiversity conservation, proper management of microclimatic conditions, and careful monitoring of pests and diseases.

The Rainforest Alliance’s IPM strategy involves deploying its IPM knowledge bank to create context-specific solutions; promoting participatory IPM training via effective methods such as Farmer Field Schools; and lobbying and advocating for shared responsibility in pesticide use. We believe that a sound understanding of local conditions and contexts, combined with solid IPM strategies, can result in a cleaner environment and healthier people—as well as increased profit for farmers. All actors in the food supply chain—producers, processors, pesticide distributors, extensionists and trainers, exporting and importing companies, food retailers, governments of both producing and consuming countries, research institutions, and not-for-profit and community organizations—have a shared responsibility to contribute to making resilient, sustainable, and safe food production a reality.



Ladybird beetle (coccinellid) predator.



*Adult of *Chrysoperla externa*, a predator.*



A spider preying on a caterpillar pest.

Photos: Dirceu Gassen

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Cover photo: A 'Zone For Birds' sign at Finca El Platanillo's organic lot. Rainforest Alliance certified farms protect endangered species with wildlife corridors. These corridors minimize human-wildlife conflict, conserve the ecosystem and broader landscape of the rainforest.

Photo: Creagh Cross

