Pesticide-free Agriculture and Foods Certification, a crucial step for the wider reach of safe and wholesome foods

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The need for certifying pesticide-free agriculture and foods

In recent years, concerns over the use of synthetic chemical pesticides in agriculture have grown significantly, driven by mounting evidence of their adverse effects on human health and the environment. The use of hazardous chemical pesticides in agriculture was one of the pivotal elements of the Green Revolution. Pesticides are used not only in production but also in managing storage pests. In India 54,122.77 metric tonnes of pesticides were consumed during 2023-24, with Uttar Pradesh, Maharashtra, Punjab, Telangana, West Bengal and Haryana leading the usage. Although all pesticides can pose risks, the heightened concern revolves around the severe detrimental effects of highly hazardous pesticides (HHPs). The Indian agricultural sector uses 293 registered pesticides (2021), of which a subset (130) are banned in other global regions. During 2019-2020, of the total quantum of pesticides used, approximately 80% were classified as exhibiting extreme or high levels of toxicity (Ghorband et al. 2025).

The widespread use of synthetic chemical pesticides has had far-reaching and unexpected repercussions in farm ecosystems, human health and the wider environment. It has led to the emergence of pest resistance, secondary pests, and pest resurgence, subsequently causing substantial crop losses and an escalation in production costs (Dhaliwal et al. 2015; Krishnaiah and Varma 2012). Reported instances abound of farmers and agricultural labourers inadvertently exposed to pesticides suffering from dizziness, nausea, vomiting, skin cancers, and, in some tragic cases, even fatalities. Pesticide traces were found even in human blood and mother's milk (Archana D. Dhatrak et al., 2019; Tsering Stobdan et al., 2018). The consumption of foods laden with pesticide residues causes chronic diseases such as nerve disorders, cancer, necrosis, asthma, reproductive disorders, cardiac diseases, diabetes, cellular and DNA damage, immune system suppression, and other intergenerational impacts (Kalyabina et al., 2021; Nocolopoulou-Stamati et al., 2016). Children are particularly vulnerable to these effects due to their higher exposure arising from their small size (on a milligram per kilogram body weight basis), different metabolism, and still developing internal organs (WHO, 2019). Pesticide usage has led to widespread contamination of surface water and groundwater. It also has dire consequences for a wide array of non-target organisms, including earthworms, insects (natural enemies of pests and pollinators), fishes, amphibians, birds, and soil microorganisms (Gill & Garg, 2014). These in turn severely impair critical ecological services like pollination, soil carbon sequestration and nutrient cycling upon which agriculture relies. Pesticides contribute to climate change throughout their lifecycle and even through environmental degradation and disposal (Asha Sharma et al., 2023). Therefore, reduction or elimination of pesticides in agriculture and food systems can by itself significantly benefit farmers, agricultural labourers, consumers and the environment.

While organic farming and natural farming are promoted by the government and many other agencies as a suitable alternative to conventional agriculture, as of March 2020, only 2.78 million hectares of the Net Sown Area (NSA) of 140 million hectares (2%) were under these production methods in India (CEEW, 2021). Conventional farming focused on monocultures and the use of agrochemicals retains its dominance over the agricultural sector. Therefore, there is a need to create many more alternatives to conventional farming that are appropriate for larger sections of farmers and consumers. Pesticide-free agriculture and food systems could be one of the appropriate alternatives for the transformation of

conventional agriculture. Several dispersed multi-scale and community-based initiatives in India over the past three decades, like the agricultural initiatives of Samaj Pragati Sahayog, Madhya Pradesh, and SAMUHA, Karnataka, and the state government-led NPM (Non-Pesticidal Management of Agriculture) project in Andhra Pradesh, indicate that it could be a viable proposition. They have shown that pesticide-free agriculture significantly reduces the cost of cultivation and improves farm incomes without compromising the yield (Karthikeyan and Nivedita, 2020; Saravanan, 2020; Ramanjaneyulu et al., 2009). Further, there is a good number of farmers who have been practising traditional pesticide-free agriculture methods in remote parts of the country who are not recognised for the safe food they supply to a wider society. Another important factor to promote pesticide-free agriculture widely is that the demand for pesticide-free foods in India is expected to grow as part of the health food market, which is growing at a 20% CAGR (Economic Times, 2022). Consumers give paramount importance to pesticide-free attributes and see this as the quintessence of any safe, alternate food category, whether it is organic (Zheng et al., 2022), biodynamic, or residue-free. India can look at the initiatives of the European Union (EU) to promote pesticide-free agriculture across its member countries. Its Farm-to-Fork Strategy aims to achieve a 50% reduction in pesticide use and the associated risks by the year 2030 (European Commission, 2020). Towards this, the EU has facilitated the European Research Alliance "Towards a Chemical Pesticide-Free Agriculture", under which a community of nearly 2,000 scientists from 34 research institutes located in 20 European countries have joined forces (https://www.inrae.fr/en/scientific-collaboration-pesticide-free-agriculture).

But the development of markets for the 'pesticide-free foods' category on a large scale requires creating *'a point of distinction between conventional foods and pesticide-free foods'* in the marketplace. One proven mechanism for achieving this point of distinction is the certification system, as was the case with organic foods.[1] Such a certification can help bolster consumer trust and the social value of pesticide-free foods. It can recognise the farmers who are practising pesticide-free agriculture and create opportunities for them to realise better prices. It can prepare farmers' collectives/organisations to actively engage in burgeoning markets for pesticide-free foods.

While the prevailing certification systems in India do not certify pesticide-free agriculture and foods, some of the notable initiatives outside India are:

- **Green Food Strategy spearheaded by the China Green Food Development Centre**: This one is considered as "one of the most successful eco-labelling programs in the world". This program has led to reduced pesticide use while simultaneously providing a premium price to the farmers (John Paull, 2008). As of 2019, 15,984 green food companies were adhering to 140 environmental and operational Green Food standards and made available 36,345 kinds of food products in the markets. The cultivation area and annual domestic sales (CNY 465.7 billion) of green food accounted for 8.2% of the total farmland area and 9.7% of the gross domestic product (GDP) from agriculture in China (Jiuliang Xu et al., 2020).
- **Non-organic, private-public standard for pesticide-free wheat production by the producer organisation IP-SUISSE in Switzerland** (Niklas Möhring and Robert Finger, 2022).
- **Pesticide Residue Free certification offered by SCS Global in many countries**
- **Pesticide-free certification by the Clean Label Project in the United States**

[1] A voluntary certification system serves as a steadfast guarantee, assuring consumers that a product, individual, or process adheres to specific sustainability and quality standards.

- The "Cultivated without pesticides" and "Without pesticide residue" labels promoted by the Demain la Terre collective, a non-profit association of fruit and vegetable producers.

There is a need to promote such a contextually relevant certification system for pesticide-free agriculture and foods in India.

Experience of N+3F in offering certification for pesticide-free agriculture and foods

Understanding the importance and crucial need for certifying pesticide-free produce, the Nature-Positive Farming and Wholesome Foods Foundation (N+3F) has been developing and promoting pesticide-free agriculture and food certification (PFAFC), one of its kind in India, since 2022. PFAFC offered by N+3F stands as an assurance that crops are cultivated, processed and handled without the use of synthetic chemical pesticides and other harmful chemicals and are GMO-free. Interventions of N+3F in this space are shared below.

a) **Development of Zero-Pesticide Use Agriculture and Foods (ZPUAF) Standards and Operation Systems:** Initially, these standards were developed by the NPM (Non-Pesticidal Management of Agriculture) Network. Subsequently, N+3F refined and expanded these standards. The ZPUAF Standards cover agriculture, livestock, poultry, wild harvesting and food business operations. While it focuses more on avoiding the use of and contamination by synthetic pesticides and unwanted chemicals, it also focuses on 'total system approach', covering soil health and agricultural biodiversity. More details on ZPUAF Standards can be found at www.np3f.in.

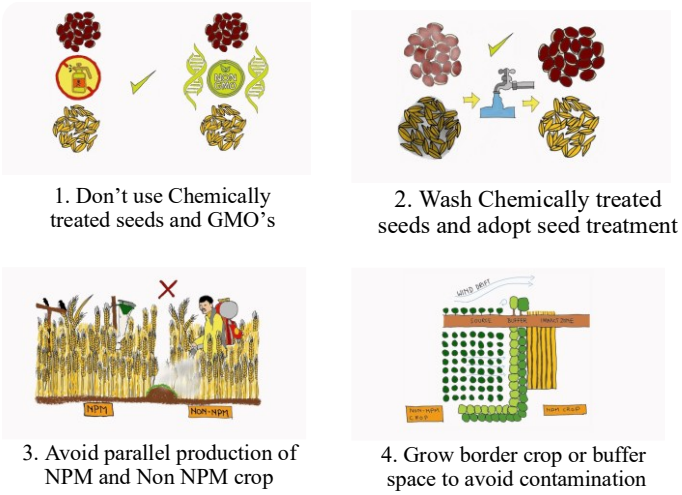

Fig. 1: Pictorial internal pesticide-free standards developed

b) **Capacity Building of the Stakeholders:** N+3F has developed Guidance Manual for Group Certification of pesticide-free agriculture and has been offering customised support to farmers' organisations and NGOs engaged in pesticide-free agriculture to build their capacities to set up an Internal NPM Guarantee System (INGS) and engage in certification. Similarly, crucial

Fig. 2: Partners visit to ICS managed by SAMUHA

support is given to FPOs and food enterprises to develop standard operating procedures (SOPs) for procurement, processing, storage and handling of pesticide-free foods without the use of synthetic chemical pesticides and without contamination or commingling.

c) **Offering Certification:** N+3F has rolled out certification services under ZPUAF Standards for i) Producer organisations (PO) like farmers' groups, cooperatives, and federations, ii) Individual producers, iii) Food business operators who process, dry, freeze, clean, mix, pack, or label pesticide-free products, iv) Traders, wholesalers and retailers who buy and sell pesticide-free products and iv) Other value-chain actors, such as wild collectors, apiculturists, etc.

Fig. 3: Training to office bearers of farmers organisation at SPS location on group certification0

Fig. 4: External inspection of chill farmers in SEWA, Odisha

Fig. 5: External inspection in Safe Harvest Pvt. Ltd

Fig. 6: External inspection of RRPPCL, an FPO located at Madhya Pradesh

PFAFC is a crop-based certification, in contrast to the land-based certification common in organic certification. A salient feature of PFAFC is that it involves no conversion period, while the existing certification systems involve a three-year conversion period. Further, the certification procedures are simplified wherever possible to make them user-friendly.

N+3F has successfully certified pesticide-free agriculture practiced by 15206 small farmers in 26351 acres in 16 locations across Madhya Pradesh, Orissa, and Chhattisgarh associated with eight operators under Group Certification since 2022. It has certified some of these operators for multiple seasons. Crops certified include redgram, wheat, bengalgram, chilli, mustard, paddy, maize, brinjal, finger millet, and onion. In addition to producer organisations, N+3F also certified Safe Harvest Private Limited (SHPL), a leading pan-Indian company marketing pesticide-free foods, and Ram Rahim Pragati Producer Company Limited (RRPPCL), a well-known FPO located in Madhya Pradesh, for two cycles.

Insights and way forward

The major learnings that emerged from this experience are:

1) Pesticide-free certification is an option for any farmers' organisations and NGOs that are engaged in any form of sustainable agriculture and marketing to long-distance markets, whether it is NPM, organic or natural farming.
2) Lab testing of products for pesticide residues, based on the risks identified during the inspection, enhances the rigour of certification.
3) Development and implementation of location-specific ICS norms and procedures and periodical reflection by the operator with the farmers and farmers' organisations helps in continuous learning and fine-tuning, leading to reduction of risks over the crop seasons.
4) Enrolment of 500+ farmers in the group certification initiative decreases the cost of certification per farmer significantly.
5) Integrating the certification initiative as one of the components of a long-term agriculture development program makes it more effective and feasible.
6) Opting for certification under ZPUAF Standards not only helps in improving the trust of the buyers, but it also helps in improving the rigour and quality of the implementation of crop production, storage, processing and handling operations. It institutionalises capacity building of farmers and field staff, leading to continuous improvement of production practices and systems.
7) Setting up and running an ICS is a development investment for the concerned farming community, which will offer returns in terms of development benefits over time. This needs to be kept in mind by the operators and promoting organisations.

Promoting wider adoption of certification for pesticide-free agriculture and foods

The markets for pesticide-free foods in India, though fast-growing, are in their nascent stages. 'Pesticide-free foods' are slowly coming up as a 'food category'. Given the profound public developmental benefits that the wider adoption of pesticide-free agriculture and food systems can result in, including improving the safety, dietary diversity and income of the farming community, protecting and enriching the diversity and multi-functionality of agricultural ecosystems, improving access to safe, diverse and wholesome foods for a large number of consumers and improving human health, the following promotional support by public and private agencies/actors is needed for the wider adoption of pesticide-free certification:

A. Government agencies:

1) Including pesticide-free agriculture under mainstream government programmes of the State and Central governments focused on sustainable agriculture, nutrition and health.
2) Support to farmers' organisations, NGOs and other grassroots agencies for pesticide-free agriculture certification similar to the support offered for organic certification, including building their capacity, setting up ICS, and meeting part of the running cost and certification fee[2].

[2] For example, The Department of Horticulture in Gujarat offers a support of Rs. 5 lakhs for organic certification of a cluster of 50 ha for three years. Spices Board provides assistance to group of farmers, NGOs and Farmers' Co-operative Societies/Associations in acquiring certification for their farms/processing units by meeting 50% cost of the certification subject to a maximum of Rs. 1.00 Lakh and individuals are eligible for 50% of the cost of certification subject to a maximum of Rs. 30,000/-

3) Facilitation of the existing certification agencies to enter into 'pesticide-free certification' space.
4) Setting up accredited labs at the district or sub-state level in strategic locations for making testing of plant samples and foods affordable and in a shorter period of time.
5) Acknowledging the 'pesticide-free food category' by FSSAI and facilitating wider reach through developing appropriate protocols and educating the stakeholders.

B. Support from public research institutions: User-focused research to address key challenges faced by stakeholders engaged in the cultivation, manufacturing and marketing of pesticide-free foods and to develop and pilot standards and protocols for various subsectors. The effort of Punjab Agricultural University in this direction is noteworthy.

Conclusion

The use of synthetic chemical pesticides in agriculture has had far-reaching and unexpected repercussions on human health, the environment and the viability of farming, and the reduction and elimination of pesticides in agriculture and food systems can by itself significantly benefit farmers, agricultural labourers, consumers and the environment. To do it on a scale, there is a need to create many more alternatives to conventional farming besides organic and natural farming. One such alternative that can be promoted in India is 'pesticide-free agriculture and food systems' as the experience of various organisations in the recent past indicates that it can offer considerable livelihood and environmental benefits without compromising on yields. Furthermore, there is a strong case for opting for pesticide-free agriculture, as there is an increasing consumer demand for pesticide-free, safe foods. But scaling up pesticide-free agriculture and the development of markets for the pesticide-free food category requires 'a point of distinction from conventional foods'. Certifying pesticide-free agriculture and foods can play that role of offering the much-needed distinction. In this context, the Pesticide-Free Agriculture and Food Certification (PFAFC) developed and offered by N+3F offers a working model to consider and further build on. The experience of offering PFAFC by N+3F shows that a large number of farmers and other actors in the pesticide-free value chains can be effectively certified, thereby making their contributions to the supply of safe foods to a wider society visible. Such initiatives on certifying pesticide-free agriculture and foods need to be promoted on a large scale with appropriate support and coordinated engagements by the government agencies, research institutions, certification agencies, food enterprises and other stakeholders. Wider adoption of certification for pesticide-free agriculture and foods will increase consumer demand for pesticide-free foods, which in turn will create a market pull on the farmers to adopt pesticide-free agriculture. These developments can result in the wider availability of safe and wholesome foods to larger sections of society, improvement in human health and the reviving of environmental health.