



— Executive Summary —

US\$ 219 billion risk from pesticides for US food retailers

Financial and environmental risks related to pesticide use on four key crops

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About this report

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Executive Summary

The converging crises of biodiversity loss and climate change are increasingly costly to the global economy. The food sector is among the most vulnerable to the impacts of these crises and is also a major contributor. Pesticides – a term that includes insecticides, herbicides, and fungicides – contribute directly to both crises. They are responsible for widespread harm to biodiversity, including pollinators, which are required to maintain a third of our food supply, and soil organisms, which are central to building healthy soil, sequestering carbon, conserving water, and improving farmers' climate resilience.¹ Moreover, pesticides are derived from fossil fuels, the production and use of which are significant drivers of agriculture-related greenhouse gas emissions.² Pesticides also pose devastating risks to human health along the supply chain, from consumers to the farmers, farmworkers, and rural communities that are on the frontlines of exposure.³

This report investigates US food retailers' financial risks – including operational, financing, and reputation risks – and externalized environmental costs to biodiversity and the climate associated with the use of agricultural pesticides in their supply chains. Given the vulnerability of food production to environmental disruption, these risks are significant not only for the companies themselves but for the US food supply. These findings signal the magnitude of harm associated with pesticide use, but they are a profound underestimate. It is impossible to assess the true scope of the harm wrought by toxic pesticides in our food system. This is partly due to the complex nature of the issue but also due to the inherent limitations of trying to express the intrinsic value of a stable climate, biodiversity, and human life and health purely in terms of economic value.

Our research indicates that the US food retail sector faces up to US\$ 219 billion in financial, climate, and biodiversity risks between now and 2050 from the use of pesticides in the domestic production of just four crops – soy, corn, apples, and almonds (see Table 1). This includes US\$ 4.5 billion in climate damage from the CO₂-equivalent emissions associated with the production and use of pesticides and US\$ 34 billion in biodiversity risks associated with pollinator-harming pesticides.

A value equal to nearly one-third (32%) of US food retailers' current equity – the total value of stock available to shareholders – would be lost if food retailers were held fully accountable for the risks associated with pesticide use in the domestic production of these crops (see Table 2).

The four crops chosen for the analysis are embedded in products that generate an estimated 55% of US food retailers' sales in food. Apples and almonds are among the top crops sold directly to consumers. Corn and soy are the top crops processed into packaged foods (e.g. in the form of corn starch, corn syrup, soy lecithin and oil) and livestock feed for meat, dairy, and eggs.

Putting pesticide reduction on the ESG agenda

The results of our analysis show that to meet their environmental, social, and governance (ESG) goals around biodiversity and climate, food retailers must take immediate action to phase out the use of toxic pesticides in their supply chains. As US food retailers increasingly make bold claims about reducing Scope 3 greenhouse gas emissions and seek to align with global frameworks on biodiversity-related disclosures and targets, pesticide reduction must be a core part of their commitments.

Since 2018, thirteen major US food retailers ranked on Friends of the Earth's *Bee-Friendly Retailer Scorecard* have established policies aimed at reducing toxic pesticides in their supply chains, signaling a significant shift taking place across the sector.⁴ Yet, despite this promising industry trend, efforts fall far short of what is needed to protect pollinators, people, and the planet from toxic pesticides.

Food retailers have enormous market power and influence over the food system. The top six companies, Walmart, Costco, Kroger, Target, Albertsons, and Ahold Delhaize, command an estimated US\$ 628 billion in annual grocery sales, representing 78% of the US\$ 805 billion US food retail sector.¹ Retailers have multiple levers to drive positive change toward a more sustainable, resilient, and economically stable food system – what they choose to ban or place on their shelves, how they shape their own brand product lines, whether they invest in supporting suppliers to shift to ecological farming approaches, and lobbying for policies that support organic and other forms of ecologically regenerative agriculture.

Market leadership is critical considering the failure of the US government to adequately regulate the environmental and health risks of industrial agriculture overall and of pesticides in particular. The US Environmental Protection Agency (EPA), under the influence of the pesticide industry, has regularly failed to follow the best available science and protect people and the environment from toxic pesticides.⁵ US agriculture uses more than 1.1 billion pounds of pesticides annually, representing approximately 15% of total global pesticide usage.⁶ The EPA allows the use of 85 pesticides banned in other countries and continues to approve new pesticide products containing ingredients widely deemed to be highly hazardous.⁷

We recommend three overarching strategies to achieve pesticide reduction in food retailer supply chains:

1. Invest in Integrated Pest Management (IPM) and other ecological approaches in non-organic supply chains

Integrated Pest Management (IPM) is a framework that minimizes pesticide use and risks. Four major US food retailers – Walmart, Kroger, Whole Foods, and Giant Eagle – have established pollinator and biodiversity policies requiring all fresh produce suppliers to adopt IPM practices and verify compliance using a vetted list of third-party certifications.⁸ These are important first steps that should be widely adopted across the sector. Yet IPM alone will not be sufficient to achieve the needed reductions in pesticide use.

2. Increase organic offerings, invest in the expansion of organic supply chains, and recognize organic as regenerative

Organic agriculture is the gold standard for pesticide reduction and is backed by a robust third-party certification governed by US federal law. The organic certification prohibits over 900 synthetic pesticides allowed in conventional agriculture. A growing body of science highlights organic as a leading form of regenerative agriculture for its ability to build healthy soil, conserve water, enhance farmers' resilience to droughts and floods, protect biodiversity, and reduce greenhouse gas emissions.⁹

3. Make agrochemical reduction a central pillar of regenerative agriculture

Many of the largest US food retailers, including Walmart, Costco, Target, and Ahold Delhaize, are investing in 'regenerative agriculture' as a means to achieve climate-related goals.¹⁰ Yet, like the term 'sustainable', regenerative agriculture has no clear definition. While some approaches are robust, others are well-intentioned but lack scientific merit, while others are greenwashing. This report contributes to a strong body of data showing that regenerative agriculture initiatives will fail to accomplish their primary objectives unless they embrace agrochemical reduction as a central tenant. Research shows that pesticides disrupt the soil microbiome and harm soil invertebrates that are central to building healthy soil, sequestering carbon, conserving water, and improving farmers' climate resilience.¹¹ Moreover, as mentioned above, pesticides are petrochemicals contributing to GHG emissions.

¹ Source: Profundo, based on 2022 sales data from Bloomberg, US Census, company annual reports.

Key Findings

This report focuses on the whole US food retail sector, not specific companies. This means that risks and impacts will vary from company to company. Note that the numbers reported in the key findings represent the high-end scenario; for the low-end scenario, see Table 1.

- The US food retail sector faces up US\$ 219 billion in financial, climate, and biodiversity costs and risks for the period 2024-2050 stemming from the use of pesticides in the domestic production of just four crops – soy, corn, apples, and almonds.
- This represents 32% of US food retailers' current equity value. In the high-end scenario, a value equal to nearly one-third of the total stock available to shareholders would be lost if food retailers were held fully accountable for all risks associated with pesticide use in the domestic production of soy, corn, apples, and almonds.
- The use of pollinator-harming pesticides on the four target commodities is associated with biodiversity risk valued at a staggering US\$ 34.3 billion for the US food retail sector between now and 2050. This is a conservative estimate, as it is impossible to account fully for the damage done to ecosystem services and nature's intrinsic value by toxic pesticides.
- Climate damage costs for US food retailer sales of products containing soy, corn, apples, and almonds can be associated with US\$ 4.5 billion for the period 2024-2050. This is based on CO₂ equivalent emissions associated with the production and use of pesticides used on these crops. This is a significant underestimate. It does not account for GHG emissions associated with agricultural production (e.g., fuel for farm machinery and volatilization of applied pesticides, which can create potent GHGs), nor does it account for pesticides' harm to soil ecosystems, which are the basis of soil carbon sequestration as well as farmers' resilience to climate change.
- While the commodity value of the four target crops in this report is approximately 10% of the value of US food retailers' food and beverage revenues, they are embedded in products that generate an estimated 55% of US food retailers' sales in food.
- Pesticides used on these four crops account for approximately 50% (484 million pounds) of all pesticides used in agriculture in the US annually. Soy and corn account for the bulk of the volume, with approximately 465 million pounds or 46% of all pesticides used.
- A significant amount of these pesticides are chemicals classified as highly hazardous to human health and/or the environment. The highly hazardous pesticides applied to corn, soybeans, almonds, and apples account for 29% of total US pesticide use or 293 million pounds annually.
- Neonicotinoids are widely used in the supply chains of US food retailers and are of particular concern. Neonicotinoids are a class of systemic insecticides that are highly persistent in the environment and acutely toxic to insects.
- This report significantly underestimates the true, total harm done by toxic pesticides and the financial and environmental risks associated with that harm.

Table 1 Summary: financial risks of pesticides for US food retailers*

US\$ million	Annual LOW	Long-term value effect** LOW	% of total	Annual HIGH	Long-term value effect** HIGH	% of total
Operational + financing + reputation						
Revenue-at-risk/gross profit-at-risk	1,670	18,537	33%	3,340	37,074	17%
Financing risk	191	2,116	4%	1,525	16,930	8%
Reputation risk		23,747	42%		126,389	58%
External environmental risks						
Climate damage	12	161	0%	335	4,529	2%
Pollinator-harming/ecosystem risk	1,053	11,687	21%	3,090	34,303	16%
Total value-at-risk (US\$ million)	2,925	56,249	100%	8,291	219,224	100%

Source: Profundo, based on data summarized in this report.

Note: * For four commodities: soy, corn, apples, almonds; ** Multi-year risk value until 2050.

Table 2 Total risks versus US food retail sector's gross profit and equity value

US\$ million	Data	Annual LOW	Long-term value effect** LOW	Annual HIGH	Long-term value effect** HIGH
Operational, financing, reputation risk		1,861	44,400	4,865	180,392
External risk – excluding dietary		1,065	11,849	3,426	38,832
Total profit/value-at-risk (US\$ billion)		2,925	56,249	8,291	219,224
Gross profit US food retail sector (2021)	183,300				
Equity value (17 July 2024)	698,733				
Net-debt	76,261				
Enterprise value (EV) US food retail sector	765,993				
Operational/financing/reputation risk as %*					
Total risk as % of gross profit		1.0%		2.7%	
Total DCF value-at-risk as % of equity			6.4%		26.2%
Total DCF value-at-risk as % of EV			5.8%		23.6%
Total net-debt at risk			0.0%		0.0%
Operational/financing/reputation risk + external risk as %*					
Total risk as % of gross profit		1.6%		4.5%	
Total DCF value-at-risk as % of equity			8.2%		31.8%
Total DCF value-at-risk as % of EV			7.3%		28.6%
Total net-debt at risk			0.0%		0.0%

Source: Profundo.

Note: * Means including financing risk and reputation risk, although the annual costs do not include reputation damage. Reputation risk has a longer-term impact and is thus a multi-year 'value' and is compared to the equity and enterprise value; ** Multi-year risk value until 2050.

Conclusion

This report provides insight into the urgent need for US food retailers to address the use of harmful pesticides in their supply chains to respond to the intertwined biodiversity and climate crises we face. To meaningfully address the risks that pesticides pose, food retailers must support the expansion of organic farming in the US and beyond. At the same time, they must support the non-organic growers they source from to eliminate the use of pollinator-harming and highly hazardous pesticides by shifting to ecological farming methods that reduce the need for pesticides in the first place. This analysis also clearly shows that companies must make agrochemical input reduction a central pillar of all 'regenerative' and 'climate-smart' agriculture initiatives. Decades of research show that we need a rapid shift to ecologically regenerative agriculture to feed all people sustainably, now and into the future.¹²

References

- 1 DiBartolomeis, M., Kegley, S., Mineau, P., Radford, R., and K. Klein (2019), "An assessment of acute insecticide toxicity loading (AITL) of chemical pesticides used on agricultural land in the United States", *PLoS one*, 14(8), e0220029;
Sánchez-Bayo, F. and K.A. Wyckhuys (2019), "Worldwide decline of the entomofauna: A review of its drivers", *Biological Conservation*, 232, 8-27;
Puglisi, E. (2012), "Response of microbial organisms (aquatic and terrestrial) to pesticides", *EFSA Supporting Publications*, 9(11), 359E;
Gunstone, T., Cornelisse, T., Klein, K., Dubey, A. and N. Donley (2021), "Pesticides and soil invertebrates: A hazard assessment", *Frontiers in Environmental Science*, 9, 643847.
- 2 Sharma, A., Reeves, M. and C. Washburn (2023), *Pesticides and Climate Change: A Vicious Cycle*, Pesticide Action Network North America.
- 3 Farmworker Justice (2013), *Exposed and Ignored*, Washington D.C., United States: Farmworker Justice;
Gerken, J., Vincent, G.T., Zapata, D., Barron, I.G. and I. Zapata (2024), "Comprehensive assessment of pesticide use patterns and increased cancer risk", *Frontiers in Cancer Control and Society*, 2:1368086, online: <https://www.frontiersin.org/journals/cancer-control-and-society/articles/10.3389/fcacs.2024.1368086/full>, viewed in April 2024;
Ahmad, M. F., Ahmad, F.A., Alsayegh, A.A., Zeyaulah, M., AlShahrani, A.M. et al. (2024), "Pesticides impacts on human health and the environment with their mechanisms of action and possible countermeasures", *Heliyon*.
- 4 Friends of the Earth (n.d.), "Bee-friendly retailer scorecard", online: <https://foe.org/retailer-report-card/>, viewed in November 2024.
- 5 Lerner, S. (2021, June 30), "The department of yes: How pesticides companies corrupted the EPA and poisoned America", *The Intercept*;
Donley, N. (2022), *How the EPA's Lax Regulation of Dangerous Pesticides is Hurting Public Health and the US Economy*, Washington, D.C., United States: The Brookings Institution.
- 6 US Environmental Protection Agency (2017), "Pesticide industry sales and usage 2008 – 2012", online: <https://www.epa.gov/pesticides/pesticides-industry-sales-and-usage-2008-2012-market-estimates>, viewed in April 2024.
- 7 Donley, N. (2019), "The USA lags behind other agricultural nations in banning harmful pesticides", *Environmental Health*, 18(1), p.44;
Donley, N. (2020), *Toxic Hangover: How the EPA is Approving New Products With Dangerous Pesticides It Committed to Phasing Out*, Center for Biological Diversity.
- 8 Friends of the Earth (n.d.), "Retailer commitments", online: <https://foe.org/nursery-retailer-commitments/>, viewed in April 2024.
- 9 Friends of the Earth (n.d.), *Organic is Regenerative*.
- 10 Costco (2023), *Climate Action Plan*;
Walmart (2023, October), "General Mills and Walmart join forces to advance regenerative agriculture", online: <https://corporate.walmart.com/news/2023/10/17/general-mills-and-walmart-join-forces-to-advance-regenerative-agriculture-across-600000-acres-by-2030>, viewed in April 2024;
Target (n.d.), "Responsible resource use", online: <https://corporate.target.com/sustainability-governance/responsible-resource-use>, viewed in April 2024;
Goldschmidt, B. (2024, June 18), "Ahold Delhaize USA taking part in farm-to-shelf regenerative agriculture pilot", online: <https://progressivegrocer.com/ahold-delhaize-usa-taking-part-farm-shelf-regenerative-agriculture-pilot>, viewed in April 2024.
- 11 Puglisi, E. (2012), "Response of microbial organisms (aquatic and terrestrial) to pesticides", *EFSA Supporting Publications*, 9(11), 359E;
Gunstone, T., Cornelisse, T., Klein, K., Dubey, A. and N. Donley (2021), "Pesticides and soil invertebrates: A hazard assessment", *Frontiers in Environmental Science*, 9, 643847.
- 12 Cook, C.D., Hamerschlag, K. and K. Klein (2016), *Farming For the Future: Organic and Agroecological Solutions to Feed the World*, Friends of the Earth.