

# **BEE-FRIENDLY** Retailer Scorecard

Ranking Top U.S. Grocery Stores on Protecting Pollinators from Toxic Pesticides



## ACKNOWLEDGEMENTS

This report was written by Kendra Klein, duputy director of science, Friends of the Earth.



Friends of the Earth United States, founded by David Brower in 1969, is the U.S. voice of the world's largest federation of grassroots environmental groups, with a presence in 75 countries. Friends of the Earth works to defend the environment and champion a more healthy and just world. We have provided crucial leadership in campaigns resulting in landmark environmental laws, precedent-setting legal victories and groundbreaking reforms of domestic and international regulatory, corporate and financial institution policies. Visit www.foe.org to learn more.

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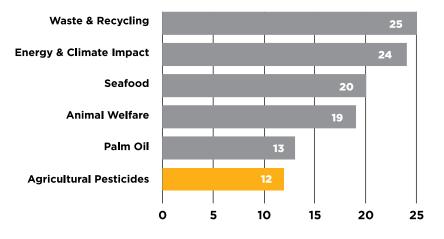


## Putting pesticides on the sustainability agenda for pollinators & the climate

Amid rising concern about an "insect apocalypse" and the decimation of bees and butterflies - the small but mighty pollinators responsible for one in three bites of food we eat - retailers are beginning to step up to address the routine and unnecessary use of toxic pesticides in their supply chains.

## Sustainability policies adopted by 25 leading food retailers

Pesticide reduction to protect biodiversity and human health lags behind other sustainability goals in the food retail sector



A growing body of science shows that agricultural pesticides are one of the main drivers of insect declines worldwide, along with habitat loss and climate change.<sup>12</sup> This is a pressing global issue, as scientists have warned that biodiversity loss is a crisis on par with the climate crisis.<sup>3</sup>

Without pollinators, grocery shelves would run short of a wide assortment of fruits and vegetables, nuts, beans, and delicious favorites like chocolate and coffee. And because bees pollinate alfalfa and other crops eaten by cows, even the dairy and meat shelves would look bare. In fact, 71 of the 100 crops that provide 90% of the world's food are pollinated by bees.<sup>4</sup>

To spur a race to the top, Friends of the Earth created a retailer scorecard to benchmark 25 of the largest U.S. grocery stores on pesticides and pollinator health.<sup>1</sup> In just the past three years, ten major grocery retailers have created pollinator policies that address pesticides, showing important

momentum in the industry. Yet only two — Giant Eagle and Walmart — have made timebound commitments to reduce use of pesticides and increase safer pest management in their food supply chains. The scope and implementation of pesticide policies across the sector fall far short of what is needed to protect pollinator populations. And pollinator protection lags behind other sustainability initiatives in the sector. While 24 of 25 top food retailers have policies related to energy and climate, just twelve have taken steps in the right direction on agricultural pesticides.

The choices these powerful companies make could determine whether bees and butterflies, as well as many other beneficial insects, will exist in the future. Scientists warn of "catastrophic ecosystem collapse" if we don't save these small but important creatures by changing the way we farm.<sup>5</sup> From birds to fish to people, insects are the basis of the food webs that feed us. They are essential to maintaining a livable planet.

<sup>1</sup> Many of the largest grocery retailers in the U.S. are not traditional supermarkets, they include "big box" stores, pharmacies, and discount retailers. Friends of the Earth used the Supermarket News 2021 Top 75 Retailers and Wholesalers report to determine which companies are among the top 25 U.S. grocery retailers.

### **Biodiversity solutions are climate solutions**

It's time for grocery stores to create policies that reflect the urgency of the biodiversity crisis. These pollinator solutions will also be climate solutions. When grocery retailers commit to truly shift their supply chains away from pesticide-intensive agriculture to organic and other science-based ecological farming systems, they will not only protect pollinators, they will reduce their climate impact and help farmers cope with climate change. That's because pesticides -a term that encompasses insecticides, herbicides and fungicides – are a cornerstone of an industrial agricultural system that is decimating biodiversity, producing massive greenhouse gas emissions and destroying the soil and water resources that we need to grow food.<sup>6</sup> Environmental harm caused by industrial farming costs the world \$3 trillion each year according to the United Nations Food and Agriculture Organization.<sup>7</sup>

The energy-intensive process of pesticide manufacturing alone accounts for approximately 10% of the total energy used for growing crops.<sup>8</sup> Therefore, grocery retailers should count pesticide reduction as an important part of their energy and greenhouse gas reduction goals.

Pesticide reduction is also key to regenerative 'carbon farming.' Building healthy soils that can serve as a carbon sink requires reducing pesticide use, as <u>pesticides harm the soil</u> organisms that are central to the process of soil carbon sequestration. One teaspoon of compost-rich organic soil can host as many as 1 billion helpful bacteria from 15,000 species while soils from conventional pesticide-intensive farms contain as little as 100 bacteria.<sup>9</sup> Pesticides harm soil invertebrates in 71% of cases studied according to a recent peer-reviewed meta-review co-authored by Friends of the Earth.<sup>10</sup> Invertebrates play a critical role in converting the carbon in plants into soil organic matter. Friends of the Earth's <u>Pesticides</u> <u>& Soil Health</u> brief and <u>peer-</u> <u>reviewed study</u> on pesticides and soil invertebrates reveal the science on why pesticide reduction is a key part of regenerative agriculture, which can draw carbon down from the atmosphere to the soil.

Building healthy, living soils also helps mitigate the effects of climate change on farmers since healthy soils conserve water and significantly increase farmers' resilience in the face of climate-related droughts and floods.<sup>11,12</sup>

## Grocery stores have a major role to play in moving from pesticideintensive agriculture to the food system of the future

Grocery retailers' ability to continue to source abundant food depends on this shift, and they have the market power to make massive changes in our food system. Together, the 25 companies we evaluated controlled \$1.78 trillion in food and beverage sales in 2021.<sup>13</sup> The top four alone — Walmart, Amazon, Costco and Kroger— controlled \$1.02 trillion.

Grocery stores are also growing their private label brands, which creates more opportunities to directly influence practices in their supply chains. Private label sales now make up 29% of sales in the grocery sector.<sup>14</sup>



### Market leadership is critical because our federal pesticide policy system is broken

U.S. agriculture uses more than 1.1 billion pounds of pesticides annually, representing approximately 15% of total global pesticide usage.<sup>15</sup> The U.S. Environmental Protection Agency (EPA) allows use of many pesticides banned in other countries -72that have been banned in the European Union, 17 in Brazil and 11 in China.<sup>16</sup> Between 2017-2018, the EPA approved over 100 new pesticide products containing ingredients widely deemed to be highly hazardous.<sup>17</sup> And more than 35% of pesticides sold globally are considered "highly hazardous" to pollinators and/or people.<sup>18</sup> Despite a large and growing body of scientific data on the health and environmental damage wrought by pesticides, the U.S. government's food and agriculture policies subsidize pesticide-intensive agriculture to the tune of billions of dollars while ecological farming solutions are woefully underfunded.<sup>19</sup>

## Pesticide policies will help companies meet consumer expectations for safe and sustainable food

In the hypercompetitive food retail market, strong policies to expand organic offerings and phase out toxic pesticides are critical ways for retailers to distinguish themselves from the pack. If retailers want to establish themselves as leaders on health and sustainability, they need to set clear goals to phase out toxic pesticides in their supply chains. According to <u>recent polling</u> by YouGov commissioned by Friends of the Earth, 83% of Americans believe it is important to eliminate pesticides that are harmful to pollinators from agriculture, and 74% believe grocery stores should support efforts to protect pollinators, such as bees and butterflies. 81% want their food to be free of pesticide residues and 67% feel it is important that the grocery store they shop at sells organic food.

## Consumer opinions on pollinators, pesticides and organic food

### **Pollinator Protection**

Agree that it is important to eliminate pesticides that are harmful to pollinators from agriculture.	83%		
Agree that grocery stores should support efforts to protect pollinators.	74%		
Human Health			
Agree that it is important to eliminate pesticides that are harmful to human health from agriculture.	83%		
Want their food to be free of pesticides.	81%		
Shopping Preferences			
Feel it is important that the grocery store they shop at sells organic food.	67%		
More likely to shop at a grocery store that made a formal commitment to eliminate harmful pesticides from its food supply if distance and price were not a factor.	65%		
More likely to shop at a grocery store that made a formal commitment to protect pollinators if	63%		
distance and price were not a factor.			

by Friends of the Earth carried out online June 2nd - 3rd 2021. The figures have been weighted and are representative of all US adults.



## THE PROBLEM

U.S. beekeepers lost over





Ninety percent of wild plants and 75% of all food

last year.

crops depend on pollinators. Of those, bees are nature's best. But 25% of wild bee species have not been seen since the 1990s.<sup>20</sup> And U.S. beekeepers lost over 39% of their colonies in 2020, representing the second highest losses in history.<sup>21</sup> Research shows that 40% of invertebrate pollinators like bees and butterflies face extinction.<sup>22</sup>

Bees are the canaries in the cornfields showing us that U.S. agriculture is on a deadly track. Along with pollinators, pesticides harm a wide range of beneficial insects that allow crops to thrive and that make up the basis of healthy ecosystems. Forty percent of insect species face extinction in coming decades according to a recent meta-analysis, leading the authors to warn of "catastrophic ecosystem collapse" if we don't change the way we farm.<sup>23</sup>

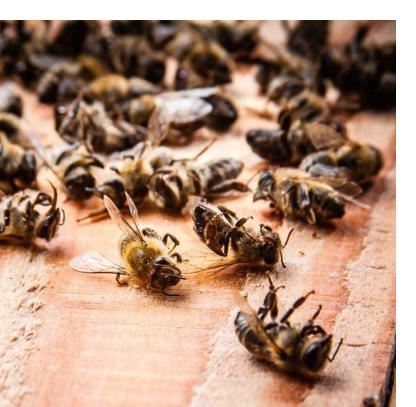


Pesticide exposure is linked to cancers, asthma. neurodevelopmental disorders like autism and ADHD and to adult neurological diseases like Alzheimer's and Parkinson's.<sup>24,25,26,27</sup> Exposure is also associated with endocrine disruption which is linked to a range of health problems including increased risk of obesity, diabetes and reproductive disorders.<sup>28,29</sup> There are more pesticides on our food now than a decade ago, and we can't just wash these pesticides off our food. More than 90% of Americans have detectable pesticides in their bodies, and government testing finds at least 29 different pesticides in the average American.<sup>30,31</sup> Farmworkers can be exposed to pesticides at levels hundreds of times higher than consumers. Farmers, farmworkers and their families have higher rates of acute poisonings, cancers, birth defects, asthma, infertility, autism and other neurological and reproductive problems. 32

> Friends of the Earth's **Toxic Secret** report reveals pesticide residues on store brand cereal, applesauce, produce and beans from four top U.S. grocery retailers: Walmart, Costco, Kroger and Albertsons.

# Pesticide-intensive agriculture is failing to deliver on its primary goal: controlling pests

Since the widespread introduction of synthetic pesticides after World War II, hundreds of insect and weed species have developed resistance.<sup>33</sup> This has created a "pesticide treadmill" in which farmers spray more often and use more toxic pesticides to deal with resistant pests.<sup>34</sup> Despite drastic and costly increases in pesticide use, research shows that farmers are losing more of their crops to pests today than they did in the 1940s.<sup>35,36</sup>



## ECONOMIC RISKS OF PESTICIDE USE & POLLINATOR DECLINES

## Food costs are predicted to increase as pollinator populations decline

Pollinators are a cornerstone of a dependable food supply. They contribute approximately \$34 billion to the U.S. economy and up to \$577 billion to the global economy annually.<sup>37,38</sup> Honey bees alone contribute an estimated \$20 billion to the U.S. economy<sup>39,40</sup> and \$217 billion to the global economy.<sup>41</sup> Pollinator decline presents a material risk for the supply chains of food retailers.<sup>42</sup> Food costs are predicted to rise as managed and wild pollinator populations decline.<sup>43</sup> Research indicates that pollinator loss has already resulted in decreased production of key crops like apples, cherries and tomatoes in the United States.<sup>44</sup>

## Pesticides are costly inputs

U.S. farmers spend approximately \$15 billion on pesticides annually.<sup>45,46</sup> Every year, North American farmers spend approximately \$782 million on neonicotinoids alone — the pesticide class most strongly linked to pollinator declines.<sup>47</sup> These expenditures could be invested in alternative pest management strategies instead.<sup>48</sup>

### Farmers are paying more than ever to hire managed honey bees

Managed honey bees have a value of \$15 to \$20 billion in North American agriculture, and demand for pollinator-dependent crops in the U.S is at an all-time high.<sup>49</sup> However, losses of honey bee colonies since 2004 has left North America with fewer managed pollinators than at any time in the last 50 years, with commercial beekeepers consistently reporting annual losses of 29-45%, far exceeding the historical rate of 10-15%.<sup>50</sup> In 2021, U.S. beekeepers reported 45% losses in the previous year.<sup>51</sup> High colony loss rates require beekeepers to rapidly rebuild their colonies at

substantial expense, which increases the costs of commercial pollination for farmers. For instance, the cost of renting honey bee hives for almond pollination tripled from 2003 to 2009 from approximately \$50 per hive to \$150 - \$175.<sup>52</sup>

## Farmers are increasingly paying for an ecosystem service that wild pollinators could provide for free

The market for managed bees is expanding due to the increasing scarcity of wild pollinators since the 1980's.<sup>53</sup> In other words, growers are increasingly paying costly commercial pollinators for an ecosystem service that wild pollinators could perform for free.<sup>54</sup>

> Declining managed and wild pollinator populations could result in a \$10.5 billion loss to farmers and a \$334 billion loss to the economy including price and household effects.

Worldwide, there are an estimated 20,000 species of bees with approximately 3,600 species native to North America.<sup>55</sup> Native species play a vital role in pollinating agricultural crops in the United States and are often more efficient pollinators than nonnative species, such as honey bees.<sup>56</sup> According to an analysis across five continents, wild bees contributed approximately \$3,251 per hectare of crops including watermelon, tomato, cranberry, and blueberry.<sup>57</sup> Researchers estimate that the countries most impacted by wild pollinator declines are in the global South, particularly Africa.<sup>58</sup>



One analysis estimated that declining managed and wild pollinator populations could result in a \$10.5 billion loss to farmers and a \$334 billion loss to the whole economy including price and household effects.<sup>59</sup>

# Pesticides' harm to beneficial insects results in reduced crop yields

Pesticides often harm or kill neutral or useful organisms in an ecosystem, including pollinators. Thus, pesticides can reduce yields rather than bolster them by harming beneficial insects. As one example, certain pesticides targeted at early-season pests, such as maggots, have been found to increase other pest populations that feed on crops, subsequently reducing yields.<sup>60</sup> Yield reduction associated with pesticide use results in an estimated \$1.4 billion loss in the U.S alone with greater losses at a global level.<sup>61</sup>

# Pesticide use results in weed and insect resistance which increases farmers' costs

Since the widespread introduction of synthetic pesticides to agriculture in the 1950s, approximately 368 weed varieties and over 600 insect species have developed resistance to commonly used pesticides.<sup>62,63</sup> For example, due to widespread use of glyphosate in conjunction with genetically engineered Roundup Ready<sup>™</sup> crops, "superweeds" now plague more than 60 million acres of U.S. farmland.<sup>64</sup>

Weed and insect resistance perpetuates a cycle of pesticide use — 90% of Iowa farmers report feeling that "pest management is a never-ending technology treadmill."<sup>65</sup> As a result, farmers experience an increase in production costs due to more intensive and frequent application of pesticides.<sup>66,67</sup> For example, pesticide costs for Illinois corn farmers rose 67% from 2012 to 2017 largely due to the prevalence of herbicide-resistant weeds, and herbicide costs have more than doubled for most farmers over the past 10 to 15 years.<sup>68, 69</sup>

> Pesticide use is associated with a \$1.4 billion loss in crop yields resulting from harm to beneficial insects.

# Investors recognize the economic importance of pesticide reduction and pollinator protection

In a comprehensive analysis of the issue, global asset manager, Schroders, urges investors to engage with companies to develop plans to halt and reverse pollinator declines given the scope of pollinatordependent products.<sup>70</sup> Some shareholders have prioritized pesticide reduction as a sustainability goal. Shareholder advocacy has resulted in company programs such as McDonald's efforts to reduce pesticide use in its potato supply chain.<sup>71</sup> And in 2018, nearly one third of shareholders called on General Mills to eliminate pesticides like pollinatortoxic neonicotinoids from its supply chain.<sup>72</sup> Such efforts speak to the urgency of pollinator declines and to the growing recognition of concomitant economic risks.

## THE SOLUTION

<u>Decades of research</u> show that we need a rapid shift to ecological agriculture to feed all people sustainability, now and into the future.<sup>73</sup>

A growing body of science shows that farmers who rely on ecological methods for pest management instead of pesticides can outperform their conventional counterparts in terms of yield and profits.<sup>74,75,76,77</sup> Rather than toxic chemicals, these farmers build healthy soils that confer greater pest immunity to plants and increase biodiversity in their farming systems to disrupt the growth of pests and to foster natural predators. This includes crop rotations, cover cropping, composting, reducing tillage and planting habitat for beneficial insects.

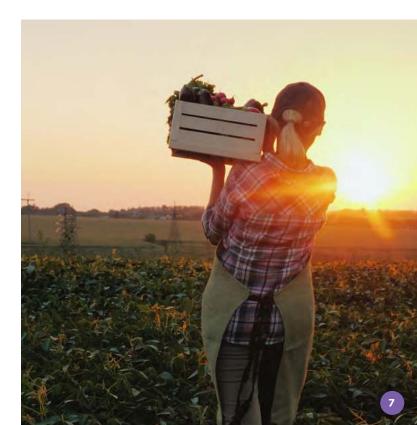
Ecological farming methods reduce risk to pollinators and work in tune with ecological processes in diverse agricultural landscapes.<sup>78</sup> A study conducted on 949 commercial farms in France concluded that reducing pesticide use does not harm profitability or productivity.<sup>79</sup> Another study found that regenerative farming approaches in the U.S. can be up to 78% more profitable than chemical-intensive farm systems.<sup>80</sup> Researchers have found that an abundance and diversity of insects can improve productivity and yield outcomes, according to a global synthesis with 1,475 field sites.<sup>81</sup>

The same science-based ecological farming methods underpin organic agriculture, Integrated Pest Management, and regenerative agriculture. Of these methods, only organic is governed by a robust federal law which prohibits the use of the vast majority of pesticides.

Organic: Organic food is certified through robust standards governed by federal law under the USDA National Organic Program. These standards prohibit most synthetic pesticides, including an estimated 900 pesticides otherwise allowed in agriculture. The standards also prohibit GMOs (genetically modified organisms), synthetic fertilizers, irradiation and sewage sludge. In organic dairy and meat, the use of antibiotics, growth hormones and arsenic-based drugs is strictly prohibited, while over 450 drugs are allowed in non-organic production. The organic standards also require farmers to manage their land in ways that protect soil, water, and biodiversity.

- Integrated Pest Management (IPM): IPM is a pest management framework that minimizes pesticide use and risks by relying on inspection and monitoring to detect and correct conditions that could lead to pest problems; implementing biological, cultural and physical strategies to prevent and suppress pest populations; using chemical controls only as a last resort and when economically justified; and assessing pesticide risks and prioritizing the lowest risk options.
- Regenerative agriculture: Regenerative agriculture uses ecological farming methods to build healthy soil that can sequester carbon and conserve water resources by minimizing soil disturbance and keeping the soil covered; increasing diversity within the faming system; reducing synthetic inputs; and integrating crop and livestock systems when appropriate.

Science shows that farmers who rely on ecological methods for pest management instead of pesticides can outperform their conventional counterparts in terms of yield and profits.



## WHAT CAN RETAILERS DO?

Grocery stores must support the expansion of organic farming in the U.S. and beyond. At the same time, they must support the nonorganic farmers they source from to eliminate toxic pesticides by shifting to ecological farming methods. which reduce the need for pesticides in the first place. If grocery retailers changed their ways, we could eliminate the use of hundreds of millions of pounds of toxic pesticides and rapidly shift to organic and other ecological farming systems. This push for bee-friendly food would be a huge win for pollinators, people and the planet.

#### Friends of the Earth is asking grocery stores to:



## REDUCE PESTICIDES

Establish a pollinator protection policy that includes the phase out of neonicotinoids, glyphosate, organophosphates and other pollinator-toxic pesticides as well as implementation of least-toxic pest management strategies in the company's supply chain.



## GROW ORGANIC

Increase USDA certified organic food and beverages to 15% of overall offerings or sales by 2025, prioritizing U.S. farmers.



### INCREASE TRANSPARENCY

Publicly disclose company policies and progress related to these actions.





Many of the pesticides commonly used in U.S. agriculture are toxic to bees and other beneficial insects. Among the pesticides that are of highest concern are neonicotinoids, glyphosate and organophosphates, including chlorpyrifos.

Since we began using neonicotinoids 25 years ago, U.S. agriculture has become 48 times more toxic to bees and other insects according to a peer-reviewed study co-authored by Friends of the Earth.<sup>82.</sup>

Organophosphates are a heavily used group of insecticides, many of which are highly acutely toxic to bees.<sup>83</sup>

Glyphosate is decimating monarch butterfly populations by destroying the milkweed plants their young depend on.<sup>84</sup> Glyphosate is also linked to declines in bee populations and threatens 93% of endangered species.<sup>85,86</sup>

> U.S. agriculture is 48 times more toxic to bees and other beneficial insects since neonicotinoids were introduced according to a <u>peer-</u> <u>reviewed study</u> authored by Friends of the Earth.

## 🇳 Expand organic offerings

Organic is the gold standard for pesticide reduction. Organic farmers grow abundant food without the use of an estimated 900 pesticide active ingredients allowed in non-organic farming, including neonicotinoids, glyphosate and organophosphates.<sup>87</sup> Research shows that organic benefits pollinators, people and the planet.

- Pollinators: Organic farming can help reverse pollinator declines.<sup>88</sup> Organic farms support up to 50% more pollinating species than pesticide-intensive farms and help other beneficial insects flourish.<sup>89,90,91</sup>
- Health: An organic diet rapidly and dramatically reduces people's exposure to toxic pesticides and protects farmers and farmworkers from exposure.<sup>92,93,94</sup>
- Climate: Organic farming systems conserve water, reduce greenhouse gas emissions, sequester carbon in the soil and increase farmers' resilience in the face of drought and floods.<sup>95,96,97,98</sup>

Pesticide levels in people's bodies dropped up to 95% after just one week on an organic diet according to a **peer-reviewed study** coauthored by Friends of the Earth.



U.S. production of organic crops is not keeping pace with growing consumer demand.<sup>99</sup> The gap is increasingly being filled by tens of millions of dollars' worth of imports.<sup>100</sup> Grocery retailers can help expand organic agriculture in the U.S. by supporting farmers during transition, prioritizing products from domestic organic farmers, and pushing for public policies to advance the U.S. organic sector. This would be a win-win-win: retailers will ensure a steady supply of high-quality organic products, U.S. farmers and local communities will get an economic boost and U.S. agriculture will become more pollinator- and climate-friendly.<sup>101</sup>

## Support non-organic farmers to shift to least-toxic approaches

Pesticide reduction goals in non-organic supply chains must go hand-in-hand with helping farmers to adopt the ecological farming methods that underpin robust integrated pest management and regenerative agriculture systems. These farming methods reduce the overall need for pesticides. Phasing out hazardous pesticides without shifting production practices is likely to result in regrettable substitution: replacing one type of hazardous pesticide with another.



## HOW COMPANIES SHAPE UP

Grocery stores can use their enormous market power to reduce the use of toxic pesticides on farms in the U.S. and around the world and bolster farmers' ability to rapidly transition to organic and ecological farming systems.

To highlight leaders and laggards, Friends of the Earth created a retailer scorecard benchmarking 25 of the largest U.S. grocery stores against four criteria related to pesticide use in their food and beverage supply chains: policies, implementation, transparency and collaboration.<sup>2</sup> Additional points were awarded for companies with complimentary pesticide policies in their home and garden supply chains.

We looked at whether these companies are setting goals to reduce use of key toxic pesticides, what they are doing to increase organic offerings and whether they are taking steps to support non-organic farmers to shift to least-toxic approaches. We also looked at whether they are educating consumers about these issues and if they are using their power to advocate for public policies that shift government support from pesticide-intensive agriculture to organic and ecological farming systems.

### **2022 Highlights**

- Five companies improved their scores this year: Costco moved from a C to C+, CVS from a D- to D+, Dollar Tree added points within the D range, Southeastern Grocers moved from an F to a D, and Walmart from a C+ to a B-.
- Two companies created <u>new policies</u> addressing pesticides in their supply chains — CVS and Southeastern Grocers — making twelve major grocery retailers in all.
- Dollar Tree no longer sells neonicotinoid or glyphosate products, joining six other companies.
- Walmart is tracking use of neonicotinoids and chlorpyrifos in its global fresh produce supply chain via The Sustainability Insight System (THESIS) of The Sustainability Consortium.
- More companies are disclosing organic sales data Whole Foods, Trader Joe's, Ahold Delhaize, Costco, Walmart, CVS and Meijer provided organic sales data publicly or to Friends of the Earth.



2 For the evaluation, we reviewed publicly available information, including company websites, annual reports, SEC filings, corporate social responsibility and sustainability reports, press coverage and industry analyses. We sent a provisional grade and scoresheet to each company by email and gave companies three months to respond with updates and corrections. The following companies responded or were in contact with Friends of the Earth in the past year: Ahold Delhaize, Albertsons, Aldi, Costco, CVS, Dollar Tree, Giant Eagle, Kroger, Meijer, Publix, Rite Aid, Southeastern Grocers, Walgreens, Walmart, Wegmans, and Whole Foods Market.

## **Key Findings**

#### There is growing momentum around addressing pesticide use in the U.S. food retail sector, but stronger leadership is needed to protect pollinators and other biodiversity.

Twelve major grocery retailers have created <u>policies</u> that address toxic pesticides in their supply chains in the past five years with new policies this year from CVS and Southeastern Grocers. Five companies improved their scores this year: Costco moved from a C to C+, CVS from a D- to D+, Dollar Tree added points within the D range, Southeastern Grocers moved from an F to a D, and Walmart from a C+ to a B-. Yet, despite this important momentum, the scope and implementation of pesticide policies across the sector fall far short of what is needed to protect biodiversity.

#### CVS and Southeastern Grocers established new policies this year, making twelve major grocery retailers taking steps to address toxic pesticides in their food supply chains.

With these announcements, 12 of 25 of the largest grocery retailers in the U.S. - Albertsons, Aldi, Costco, CVS, Dollar Tree, Giant Eagle, Kroger, Meijer, Rite Aid, Southeastern Grocers, Target and Walmart - have pollinator health policies. While Giant Eagle and Walmart have made timebound commitments, the other company policies do not include metrics or targets for implementation. They encourage food and beverage suppliers to reduce use of pesticides of concern, including neonicotinoids, organophosphates, and glyphosate, and to shift to least-toxic approaches including integrated pest management and regenerative agriculture. The policies also recognize organic agriculture as protective of pollinator health, and a number of them state the companies' commitments to expand organic offerings.

## Walmart and Giant Eagle have the leading pollinator health policies.

Giant Eagle is the only major food retailer to set a measurable goal for pesticide reduction. The company will require produce growers to eliminate use of nitroguanidine neonicotinoids by 2025 and to avoid replacing them with other concerning chemicals. Giant Eagle is also requiring produce suppliers to adopt ecological farming methods known as integrated pest management (IPM) by 2025 as verified by a vetted list of third-party certifications or by submitting an IPM plan that meets key, stringent criteria set forth by Giant Eagle and which will be reviewed by an external entity. The policy also

	Retailer	Grade	Points
gianteagle	Giant Eagle	в	102
Walmart 🔆	Walmart	B-	94
WHÖLE FOODS	Whole Foods Market	B-	88
	Costco	C+	75.5
<b>CVS</b>	CVS	D+	51.5
	Aldi (US)	D+	47.5
TRADER JOE'S	Trader Joe's	D+	47
meijer	Meijer	D	44.5
	Dollar Tree	D	43
	Rite Aid	D	41
Southeastern Grocers	Southeastern Grocers	D	38
Albertsons	Albertsons	D	36
0	Target	D-	33
Kroger	Kroger	D-	31
	Ahold Delhaize	D-	29.5
Wegmans	Wegmans	F	17
a	Amazon.com	F	15
w	Walgreens	F	15
H·E·B	Н-Е-В		14
BIS	BJ's Wholesale Club	F	14
DOLLAR GENERAL	Dollar General	F	5
HyVee.	Hy-Vee	F	5
ELEVEN	7-Eleven Inc.	F	0
Publix	Publix	F	0
Wakefern	Wakefern Food	F	0

recognizes organic agriculture as protective of pollinator health. Walmart will require that 100% of global fresh produce and floral suppliers adopt IPM as verified by a vetted list of third-party certifications by 2025. The policy also encourages produce suppliers to phase out pollinator-toxic pesticides — nitroguanidine neonicotinoids and chlorpyrifos — and to avoid replacing them with a list of other concerning chemicals, and to annually report pesticide application and biodiversity management. In addition, the policy sets goals around creating and restoring pollinator habitat.

### Major grocery retailers are failing to set measurable goals to reduce toxic pesticide use in their food supply chains.

Only Giant Eagle has set a measurable goal to reduce use of toxic pesticides. To save bees and other beneficial insects, companies must make measurable commitments to phase out pollinatortoxic pesticides immediately.

### Major grocery retailers don't know which pesticides are being used in their supply chains or how much is being used.

Just five companies have taken first steps on pesticide tracking. Walmart encourages fresh produce suppliers to annually report use of nitroguanidine neonicotinoids and chlorpyrifos as well as and biodiversity management. Costco and Whole Foods have pilot-level pesticide tracking programs through their participation in the Equitable Food Initiative. Aldi requires suppliers of key commodities to disclose whether they use chlorpyrifos and neonicotinoids. CVS conducted a pilot pesticide analysis in key own brand commodity chains. These types of initiatives must be scaled industry-wide.

#### Major grocery retailers must step up to support conventional growers to shift to the least-toxic approaches.

Just five companies are taking steps to support conventional growers to shift to least-toxic approaches. Walmart is requiring all its global fresh produce and floral suppliers to adopt ecological farming methods called integrated pest management (IPM) verified by a third-party certification by 2025. Giant Eagle has made a similar commitment for produce suppliers. Meijer is partnering with academic researchers to provide educational opportunities for suppliers to learn about least-toxic pest management strategies. Costco and Whole Foods report having pilot-level programs in place to provide training and other meaningful support to non-organic growers to shift to least-toxic approaches through the Equitable Food Initiative.

# Companies must disclose organic sales data and include organic sales in formal sustainability goals.

Most companies are not disclosing their organic sales data, which makes it difficult to assess their growth and competitive advantage in this marketplace. Only Whole Foods, Trader Joe's, Ahold Delhaize, Costco, Walmart, CVS and Meijer provided organic sales data. Trader Joe's publicly reports that over 20% of overall grocery products sold are organic, and Ahold Delhaize publicly reports that between 3% to 5% of total grocery sales are organic. The following companies reported organic sales data to Friends of the Earth: Whole Foods reports that over 30% of overall sales are organic, Walmart reported organic sales for all grocery, Meijer and Costco reported organic sales for produce and CVS reported organic sales for own brand food and beverages. Only Ahold Delhaize and Aldi include organic sales in company key performance indicators or formal sustainability criteria. None of the companies we evaluated include pesticide reduction in formal sustainability criteria.

### Companies must report organic and "natural" sales separately

Organic is a robust, federally regulated standard that prohibits over 900 pesticides otherwise allowed in agriculture whereas "natural" is not a regulated label claim, has no clear definition, and has no meaning in relation to use of pesticides or other synthetic inputs in farming. We recommend that companies track and report organic and "natural" sales separately to provide more transparency around organic sales data.

### Whole Foods and Trader Joe's are leading major grocery retailers on organic as a percent of overall grocery sales.

It is difficult to compare organic sales between retailers. While some of the largest retailers can claim the highest total organic sales – for example, as of 2015, Costco reportedly surpassed Whole Foods as the largest organic grocer by reaching \$4 billion in annual sales, and Albertsons' house brand O Organics hit \$1 billion in sales in 2018 — in our retailer scorecard we attempted to evaluate the extent to which companies have made organic foods central to their business model by assessing organic as a percent of overall products or sales.

### Independent grocery stores far surpass the largest U.S. food retailers on organic as a percent of overall sales.

In 2020, we conducted a survey of 36 independent food retailers across the country in order to provide insight on companies that have made organic central to their values and business. Ninety four percent of these retailers (34 of 36) report exceeding the benchmark that Friends of the Earth has challenged top grocery retailers to meet: increasing certified organic offerings to 15% of total sales or products. Sixty-four percent (23 of 36) report that over 50% of their total sales are organic. These retailers are leading the way on offering consumers bee-friendly food and are helping to reduce the use of toxic pesticides on farms in the U.S. and beyond.

# Companies must support the expansion of organic agriculture in the U.S

This is critical, as U.S. farmers are currently being left behind as demand for organic food far outstrips supply. Only Whole Foods, Costco, Wegmans, and Giant Co., a subsidiary of Ahold Delhaize, report taking measures to expand U.S. production of organic food. Whole Foods reports the most extensive set of practices supporting U.S. organic growers, including committing to price floors for farmers in transition to organic, providing financial support for organic and family-scale farmers via loans and investing resources in educating suppliers about organic practices and how to transition. Whole Foods was also the only company to report that they advocate for federal policies that support strong organic standards and increased funding for organic research. Costco reports working with U.S. farmers and ranchers to transition land to organic production. Wegmans operates its own researchoriented organic farm to educate farmers about best practices. Giant Co., a subsidiary of Ahold Delhaize, established a partnership with organic pioneer Rodale Institute to support farmers seeking to transition to organic farming and research connecting human health with soil health.

# Twelve companies have pesticide commitments in their home and garden supply chains.

Agriculture accounts for the vast majority of pesticide use, however, companies are also taking important steps to protect the health of pollinators and people in their home and garden supply chains. Five companies have committed to end sales of Roundup and other glyphosate-based pesticides, Ahold Delhaize, Costco, CVS, Dollar Tree, and Giant Eagle. Five are taking action on neonicotinoid products, Costco, CVS, Dollar Tree, and Giant Eagle no longer sell neonic products and Walmart has eliminated almost all garden products containing neonics. Whole Foods and Walgreens report that they never sold garden products containing glyphosate or neonics. In addition, four stores have committed to eliminate the sourcing of plants and/or flowers that have been treated with neonicotinoids, Dollar Tree, Kroger, Giant Eagle and BJ's Wholesale Club, and five have issued statements encouraging live plant and/or flower suppliers to phase out neonicotinoids, Aldi, Costco, Meijer, Southeastern Grocers, and Target.



## CONCLUSION

It is time for grocery retailers to implement policies that reflect the interrelated biodiversity and climate crises we're facing. Pollinators are a cornerstone to a dependable food supply, contributing approximately \$34 billion to the U.S. economy and up to \$577 billion to the global economy annually. However, 40% of insect pollinators, like bees and butterflies, face extinction, and U.S. beekeepers continue to experience record losses of honey bee colonies. A growing body of research shows that agricultural pesticide use is a key threat to pollinator populations.

Pollinator declines present a material risk for the supply chains of food retailers. Food costs are predicted to rise as managed and wild pollinator populations decline. In fact, research indicates that pollinator loss has already resulted in decreased production of key crops like apples and cherries in the United States. Pollinators are responsible for one in three bites of food, without them grocery shelves would run short of a wide assortment of fruits and vegetables, nuts, beans, and delicious favorites like chocolate and coffee. And because bees pollinate alfalfa and other crops eaten by cows, even the dairy and meat shelves would look bare.

To meaningfully address the threat that pesticide pose to pollinators, grocery stores must support the expansion of organic farming in the U.S. and beyond. At the same time, they must support the nonorganic farmers they source from to eliminate use of pollinator-toxic pesticides — including nitroguanidine neonicotinoids, glyphosate, and chlorpyrifos and other organophosphates — by shifting to ecological farming methods, which reduce the need for pesticides in the first place.

These actions will help meet consumer demand for healthy, sustainably-produced food. According to <u>recent polling</u> by YouGov commissioned by Friends of the Earth, 83% of Americans believe it is important to eliminate pesticides that are harmful to pollinators from agriculture and 74% believe grocery stores should support efforts to protect pollinators. 81% want their food to be free of pesticide residues and 67% feel it is important that the grocery store they shop at sells organic food.

When grocery retailers commit to truly shift their supply chains away from pesticide-intensive agriculture to organic and other science-based ecological farming systems, they will not only protect pollinators and other biodiversity, they will reduce their climate impact and help create vital climate solutions. The same pesticides that harm biodiversity above ground also <u>harm the soil</u> organisms that are central to the process of soil carbon sequestration, making pesticide reduction a key intervention for regenerative agriculture. Building healthy soils also helps mitigate the effects of climate change on farmers since healthy soils conserve water and significantly increase farmers' resilience in the face of climate-related droughts and floods.

What's more, eliminating toxic pesticides will help protect human health all along the food supply chain from farmworkers to eaters, as commonly used pesticides are associated with a range of human health problems, including increased risk of cancers, infertility, and neurological problems like ADHD and Parkinson's disease.

Grocery retailers' have the market power to make massive changes in our food system. Together, the 25 companies we evaluated in the <u>Bee-Friendly</u> <u>Retailer Scorecard</u> controlled \$1.78 trillion in food and beverage sales in 2021. Grocery retailers must join a race to the top on pollinator protection and the elimination of toxic pesticides in our food supply. Their actions will create a more regenerative and resilient food system and will meet growing consumer demand for transparency, health and sustainability.



## Endnotes

- 1 Goulson, Dave. 2019. Insect Declines and Why They Matter. Commissioned by the Southwest Wildlife Trusts. <u>https://www.somersetwildlife.org/sites/</u> default/files/2019-11/FULL%20AFI%20REPORT%20WEB1\_1.pdf
- Sánchez-Bayo, F. and Wyckhuys, K.A., 2019. Worldwide decline of the entomofauna: A review of its drivers. Biological conservation, 232, pp.8-27.
   IPBES. 2019. Global Assessment Report on Biodiversity and Ecosystem Services. <u>https://ipbes.net/global-assessment</u>
- 4 United Nations Environment Programme. "Global Honey Bee Colony Disorders and Other Threats to Insect Pollinators." UNEP. UNEP. 2010. Web. https://www.unep.org/resources/report/unep-emerging-issues-global-honey-bee-colony-disorder-and-other-threats-insect
- Sánchez-Bayo, F. and Wyckhuys, K.A., 2019. Worldwide decline of the entomofauna: A review of its drivers. Biological conservation, 232, pp.8-27.
   FAO. 2015. Natural Capital Impacts in Agriculture: Supporting Better Decision Making. UN FAO: Rome, Italy.
- 7 UN Food and Agriculture Organization. 2015. Natural Capital Impacts in Agriculture. <u>http://www.fao.org/fileadmin/templates/nr/sustainability\_path-ways/docs/Natural\_Capital\_Impacts\_in\_Agriculture\_final.pdf</u>
- Pimentel, D., 2006. Impacts of organic farming on the efficiency of energy use in agriculture. An organic center state of science review. pp.1-40..
   Ingham, Elaine. Online. Soil Foodweb Inc. <u>http://www.soilfoodweb.com/Contact.html</u>
- 10 Gunstone, T., Cornelisse, T., Klein, K., Dubey, A., & Donley, N. 2021. Pesticides and Soil Invertebrates: A Hazard Assessment. Frontiers in Environmental Science, 9, 122.
- 11 Rhodes, C.J., 2017. The imperative for regenerative agriculture. Science progress, 100(1), pp.80-129.
- 12 Niles, M. 2008. Sustainable soils: reducing, mitigating, and adapting to climate change with organic agriculture. Sustainable Dev. L. & Pol'y, 9, 19.
- 13 Supermarket News. 2020. Top 50 Retailers and Wholesalers. <u>https://www.supermarketnews.com/retail-financial/meet-2022-top-50-retailers-and-wholesalers/gallery?slide=1</u>
- 14 Tyko, Kelly. 2019. Target launches new Good & Gather food brand Sunday. USA Today. August 19. <u>https://www.usatoday.com/story/money/</u> food/2019/08/19/target-good-gather-new-store-owned-brand-coming-september/1996024001/
- 15 U.S. Environmental Protection Agency. 2017. Pesticide Industry Sales and Usage 2008 2012. January. <u>https://www.epa.gov/pesticides/pesticides-in-</u> <u>dustry-sales-and-usage-2008-2012-market-estimates</u>
- 16 Donley, N., 2019. The USA lags behind other agricultural nations in banning harmful pesticides. Environmental Health, 18(1), p.44.
- 17 Donley, Nathan. 2020. Toxic Hangover: How the EPA is approving new products with dangerous pesticides it committed to phasing out. Center for Biological Diversity. January. <u>https://www.biologicaldiversity.org/campaigns/pesticides\_reduction/pdfs/Toxic-Hangover.pdf</u>
- 18 Dowler, C. 2020. The pesticide giants making billions on toxic and bee-harming chemicals. Unearthed. Retrieved from <a href="https://unearthed.greenpeace.org/2020/02/20/pesticides-croplife-hazardous-bayer-syngenta-health-bees/">https://unearthed.greenpeace.org/2020/02/20/pesticides-croplife-hazardous-bayer-syngenta-health-bees/</a>
- 19 DeLonge, M.S., Miles, A. and Carlisle, L., 2016. Investing in the transition to sustainable agriculture. Environmental Science & Policy, 55, pp.266-273.
- 20 Zattara, E. E., & Aizen, M. A. 2021. Worldwide occurrence records suggest a global decline in bee species richness. One Earth, 4(1), 114-123.
- 21 Bee Informed Partnership. (online). 2020-2021 Managed Colony Loss Report. https://beeinformed.org/2021/06/21/united-states-honey-bee-colony-losses-2020-2021-preliminary-results/
- 22 Gilbert, Natasha 2016. Global biodiversity report warns pollinators are under threat. Nature. February 26. <u>https://www.nature.com/news/global-biodi-versity-report-warns-pollinators-are-under-threat-1.19456</u>
- 23 Sánchez-Bayo, F. and Wyckhuys, K.A., 2019. Worldwide decline of the entomofauna: A review of its drivers. Biological conservation, 232, pp.8-27.
- 24 Gilden, R. C., Huffling, K., & Sattler, B. 2010. Pesticides and health risks. Journal of Obstetric, Gynecologic, & Neonatal Nursing. 39(1), 103-110.
- 25 Bassil, K. L. and Vakil, C., et al.. 2007. Cancer health effects of pesticides: systematic review. Canadian Family Physician. 53(10), 1704-1711.
- 26 Alavanja, M. C., Hoppin, J. A., & Kamel, F. 2004. Health effects of chronic pesticide exposure: cancer and neurotoxicity. Annu. Rev. Public Health. 25, 155-197.
- 27 Eskenazi, B. and Marks, et al. 2007. Organophosphate pesticide exposure and neurodevelopment in young Mexican-American children. Environmental health perspectives. 115(5), 792.
- 28 Mendola, P., Messer, L. C., & Rappazzo, K. 2008. Science linking environmental contaminant exposures with fertility and reproductive health impacts in the adult female. Fertility and sterility. 89(2), e81-e94.
- 29 Holtcamp, W. 2012. Obesogens: an environmental link to obesity. Environmental health perspectives. 120(2), a62.
- 30 CDC. 2018. National Report on Human Exposure to Environmental Chemicals. Online. https://www.cdc.gov/exposurereport/index.html
- U.S. Centers for Disease Control. National Health and Nutrition Examination Survey. Online. <u>https://www.cdc.gov/nchs/nhanes/index.htm</u>
   Misiewicz, Tracy and Jessica Shade. 2018. Organic Agriculture: Reducing occupational
- pesticide exposure in farmers and farmworkers. The Organic Center. September. <u>https://www.organic-center.org/sites/default/files/project/2018/09/</u> <u>Reducing-Occupational-Pesticide-Exposure.pdf</u>
- 33 University of Nebraska-Lincoln Institute of Agriculture and Natural Resources. Weed and Insect Resistance a Growing Problem. Online. https://cropwatch.unl.edu/weed-and-insect-resistance-growing-problem
- 34 Pesticide Action Network. The Pesticide Treadmill. <u>http://www.panna.org/gmos-pesticide-profit/pesticide-treadmill</u>
- 35 KQED. Evolution. Pesticide Library. Online. https://www.pbs.org/wgbh/evolution/library/10/1/1\_101\_02.html#:-:text=Farmers%20in%20the%20U.S.%20 lost.%3A%20the%20best%2Dadapted%20survive.
- 36 Pimentel, D. and Acquay, H. et al. 1992. Environmental and economic costs of pesticide use. BioScience, 42(10), pp.750-760.
- 37 Jordan, Alex, et al. 2021. Economic Dependence and Vulnerability of United States Agricultural Sector on Insect-Mediated Pollination Service. Environmental Science & Technology, 2021
- 38 Gilbert, Natasha. 2016. Global biodiversity report warns pollinators are under threat. Nature. February 26. <u>https://www.nature.com/news/global-biodi-versity-report-warns-pollinators-are-under-threat-1.19456</u>
- 39 Calderone, Nicholas.W. 2012. Insect Pollinated Crops, Insect Pollinators and US Agriculture: Trend Analysis of Aggregate Data for the Period 1992-2009. PLoS ONE. 7(5): e37235. 22 May, 2010. doi:10.1371/journal.pone.0037235
- 40 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). 2016. Press Release: Pollinators Vital to Our Food Supply Under Threat. IPBES Secretariat. 26 February. <u>http://www.ipbes.net/article/press-release-pollinators-vital-our-food-supply-under-threat</u>
- 41 Gallai, Nicola, and Salles et al. 2008. Economic valuation of the vulnerability of world agriculture confronted with pollinator decline." Ecological Economics. 68:810–821. 3 August. http://www1.montpellier.inra.fr/lameta/articles/5.4.2 POLLINATION.pdf
- 42 Native Pollinators. 2021. Center for Biological Diversity. https://www.biologicaldiversity.org/campaigns/native\_pollinators/index.html
- 43 Bedada, A.H., 2020. CAHFS Weekly Topic: Bee decline A great concern for U.S. food security. University of Minnesota: Center for Animal Health and Food Safety. <u>https://cahfs.umn.edu/news/cahfs-weekly-topic-bee-decline-great-concern-us-food-security</u>
- 44 United States Geological Survey. 2021. How many species of native bees are in the United States? (2021). USGS: Science for a Changing World. Retrieved from https://www.usgs.gov/fags/how-many-species-native-bees-are-united-states?qt-news\_science\_products=0#qt-news\_science\_products
  45 Created States 2020. A local of Satisfies of Dativide Like in the US\_base 21 https://www.usgs.gov/fags/how-many-species-native-bees-are-united-states?qt-news\_science\_products=0#qt-news\_science\_products
- 45 Gro Intelligence. 2018. A Look at Fertilizer and Pesticide Use in the U.S. June 11. https://gro-intelligence.com/insights/articles/a-look-at-fertiliz-

er-and-pesticide-use-in-the-us#Pesticides

- 46 USDA. Online. 2021 Farm Sector Income Forecast. <u>https://www.ers.usda.gov/topics/farm-economy/farm-sector-income-finances/farm-sector-income-forecast/</u>
- 47 The Value of Neonicotinoids in North American Agriculture: Estimated Impact of Neonicotinoid Insecticides on Pest Management Practices and Costs for U.S. Corn, Soybean, Wheat, Cotton and Sorghum Farm. 2014. AgInformatics. <u>https://growingmatters.org/wp-content/uploads/2017/04/report-aginfomatics-estimated-impact-of-neonicotinoids-in-ag-2014.pdf</u>
- 48 Wild Bee Conservation. 2021. Xerces Society for Invertebrate Conservation.
- 49 Get the Facts: Economic Value of Beekeeping in California. 2011. Pesticide Action Network : North America.
- 50 Center for Food Safety, Beyond Pesticides, & Pesticide Action Network. (2013). Economic Value of Commercial Beekeeping. . Retrieved from <a href="https://www.beyondpesticides.org/assets/media/documents/pollinators/EconomicValueUpdate.pdf">https://www.beyondpesticides.org/assets/media/documents/pollinators/EconomicValueUpdate.pdf</a>
- 51 Bee Informed Partnership. (online). 2020-2021 Managed Colony Loss Report. <u>https://beeinformed.org/2021/06/21/united-states-honey-bee-colo-ny-losses-2020-2021-preliminary-results/</u>
- 52 Obama White House. 2014. Factsheet: The Economic Challenge Posted by Declining Pollinator Populations. <u>https://obamawhitehouse.archives.gov/</u> the-press-office/2014/06/20/fact-sheet-economic-challenge-posed-declining-pollinator-populations
- 53 Nash, B. J. 2009. Honeybees: Market for pollination services grow. Region Focus. Retrieved from <u>https://www.richmondfed.org/-/media/richmondfedorg/publications/research/econ\_focus/2009/spring/pdf/feature1.pdf</u>
- 54 Finck-Haynes, T., Klein, K., & Davidson, J. 2018. Swarming the Aisles II: Rating top retailers on pesticide reduction and organic food to protect pollinators. N.p.: Friends of the Earth. Retrieved from <u>https://www.richmondfed.org/-/media/richmondfedorg/publications/research/econ\_focus/2009/</u> spring/pdf/feature1.pdf
- 55 Wild Bee Conservation. 2021. Xerces Society for Invertebrate Conservation.
- 56 How many species of native bees are in the United States? (2021). USGS: Science for a Changing World. <u>https://www.usgs.gov/faqs/how-many-species-native-bees-are-united-states?qt-news\_science\_products=0#qt-news\_science\_products</u>
- 57 Kleijn, D., Winfree, R., Bartomeus, I., Carvalheiro, L. G., Henry, M., Isaacs, R., ... & Potts, S. G. 2015. Delivery of crop pollination services is an insufficient argument for wild pollinator conservation. Nature communications, 6(1), 1-9.
- 58 ibid
- 59 Bauer, D. M., & Sue Wing, I. 2010. Economic consequences of pollinator declines: a synthesis. Agricultural and Resource Economics Review, 39(1203-2016-95444), 368-383.
- 60 Penn State. 2014. Insecticides foster 'toxic' slugs, reduce crop yields. ScienceDaily. www.sciencedaily.com/releases/2014/12/141204121436.html
- 61 Pimental, D., & Burgess, M. 2014. Environmental and economic costs of the application of pesticides primarily in the United States. In Integrated pest management pp. 47-71. Springer, Dordrecht.
- 62 University of Nebraska-Lincoln Institute of Agriculture and Natural Resources. Weed and Insect Resistance a Growing Problem. <u>https://cropwatch.unl.</u> edu/weed-and-insect-resistance-growing-problem.
- 63 Buhler, W. Understanding Resistance. 2021. Pesticide Environmental Stewardship. <u>https://pesticidestewardship.org/resistance/understanding-resistance/</u>
- 64 Mortenson, D.A., Egan, J.F., Maxwell, B.D., Ryan, M.R., & Smith, R.G. 2012. Navigating a critical juncture for sustainable weed management. BioScience, 62(1), 75-84
- 65 KQED. Evolution. Pesticide Library. http://www.pbs.org/wgbh/evoltuion/library/10/1/ 101\_02.html
- 66 Pesticide resistance needs attention, large-scale study. 2018..North Carolina State University. <u>https://phys.org/news/2018-05-pesticide-resistance-at-tention-large-scale.html</u>
- 67 Popp, J., Peto, K., & Nagy, J. 2013. Pesticide productivity and food security. A review. Agronomy for sustainable development, 33(1), 243-255.
- 68 Schnitkey, G. 2018. Weekly Farm Economics: Historic Fertilizer, Seed and Chemical Cost with 2019 projections. Department of Agriculture and Consumer Economics, University of Illinois. <u>https://farmdocdaily.illinois.edu/2018/06/historic-fertilizer-seed-and-chemical-costs. Html#:-:text+There%20</u> was%20a%20increase,%247320per%20acre%20in%202017.
- 69 Brown, Claire. 2021. Attack of the Superweeds. New York Times Magazine. August 18. <u>https://www.nytimes.com/2021/08/18/magazine/super-weeds-monsanto.html?referringSource=articleShare</u>
- 70 Stathers, Rick. 2014. "The Bee and the Stockmarket." Schroders. (2014). Web. <u>https://www.schroders.com/en/sysglobalassets/staticfiles/schroders/sites/global/pdf/the\_bee\_and\_the\_stockmarket.pdfhttps://c.na32.content.force.com/servlet/servlet.ImageServer?id=01550000001Fx-SpAAK&oid=00D300000000M2BEAU</u>
- 71 Nason, D. 2020. Shareholders challenge the companies they invest in to promote good in the world. Retrieved from <u>https://www.cnbc.</u> <u>com/2020/11/30/shareholders-challenge-firms-they-invest-in-to-promote-good-in-the-world.html</u>
- 72 Shareholders Urge General Mills to Stop Pesticide Use in Its Supply Chain, Popular Products. (2018). Beyond Pesticides. Retrieved from <a href="https://be-yondpesticides.org/dailynewsblog/2018/10/shareholders-urge-general-mills-to-stop-pesticide-use-in-its-supply-chain-popular-products/">https://be-yondpesticides.org/dailynewsblog/2018/10/shareholders-urge-general-mills-to-stop-pesticide-use-in-its-supply-chain-popular-products/</a>
- 73 Cook, Hamershlag, and Klein. 2016. Farming for the Future: Organic and Agroecological Solutions to Feed the World. Prepared for Friends of the Earth. <u>https://lbps6437gg8c169i0y1drtgz-wpengine.netdna-ssl.com/wp-content/uploads/2017/legacy/FOE\_Farming\_for\_the\_Future\_Final.pdf</u>
- 74 LaCanne, C.E. and Lundgren, J.G., 2018. Regenerative agriculture: merging farming and natural resource conservation profitably. PeerJ, 6, p.e4428.
- 75 Catarino R and Bretagnolle V, et al. 2019. Proceedings of the Royal Society B. Oct 9;286(1912):20191550.
- 76 Heikki M. and Hokkanen, et al. 2017. Long-term yield trends of insect-pollinated crops vary regionally and are linked to neonicotinoid use, landscape complexity and availability of pollinators. Arthropod-Plant Interactions. 11(3): p/ 449-461. 21 April.
- 77 Dainese, M. and Martin et al. 2019. A global synthesis reveals biodiversity-mediated benefits for crop production. bioRxiv, p.554170.
- 78 The importance of bees and other pollinators for food and agriculture. 2018. Food and agriculture organization of the United Nations. Retrieved from http://www.fao.org/3/i9527en/i9527en.pdf
- 79 Lechenet, M., Dessaint, F., Py, G., Makowski, D., & Munier-Jolain, N. (2017). Reducing pesticide use while preserving crop productivity and profitability on arable farms. Nature Plants, 3(3), 1-6.
- 80 LaCanne, C. E., & Lundgren, J. G. 2018. Regenerative agriculture: merging farming and natural resource conservation profitably. PeerJ, 6, e4428.
- 81 Dainese, M., Martin, E. A., Aizen, M. A., Albrecht, M., Bartomeus, I., Bommarco, R., ... & Steffan-Dewenter, I. 2019. A global synthesis reveals biodiversity-mediated benefits for crop production. Science advances, 5(10), eaax0121.
- 82 DiBartolomeis, M., Kegley, S., Mineau, P., Radford, R. and Klein, K., 2019. An assessment of acute insecticide toxicity loading (AITL) of chemical pesticides used on agricultural land in the United States. PloS one, 14(8).
- 83 Friends of the Earth. Online. Pesticides with acute toxicity to pollinators. https://1bps6437gg8c169i0y1drtgz-wpengine.netdna-ssl.com/wp-content/uploads/2020/05/ Pesticides-with-Pollinator-Toxicity\_Final-4-2020.pdf
- 84 Perls, Dana and Tiffany Finck-Haynes. 2014. What the Monarchs are Telling Us. Medium. Online. <u>https://medium.com/foe-us-newsmagazine/what-the-monarchs-are-telling-us-8b20d8b8d467</u>
- 85 Dai, P., Yan, Z., Ma, S., Yang, Y., Wang, Q., Hou, C., Wu, Y., Liu, Y. and Diao, Q., 2018. The herbicide glyphosate negatively affects midgut bacterial com-

munities and survival of honey bee during larvae reared in vitro. Journal of agricultural and food chemistry. 66(29), pp.7786-7793.

- 86 Bloch, Sam. 2020. New EPA Finding: Glyphosate harms 93% of endangered species. The Counter. <u>https://thecounter.org/new-epa-finding-glyphosate-harms-93-percent-endangered-species-esa/</u>
- 87 Pesticide Action Network. Pesticides 101. Online. http://www.panna.org/pesticides-big-picture/pesticides-101
- 88 Carrié, R., Ekroos, J. and Smith, H.G., 2018. Organic farming supports spatiotemporal stability in species richness of bumblebees and butterflies. Biological conservation, 227, pp.48-55.
- 89 University of Oxford. 2014. Organic farms support more species. 4 February. Web. <u>http://www.ox.ac.uk/news/2014-02-04-organic-farms-support-more-species</u>
- 90 Doreen Gabriel and Teja Tscharntke. 2008. Insect pollinated plants benefit from organic farming, Agriculture, Ecosystems & Environment. EL Sevier. Volume 118, Issues 1–4: 43-48. January. <u>http://dx.doi.org/10.1016/j.agee.2006.04.005</u>
- 91 Holzschuh, A., Steffan-Dewenter, I. and Tscharntke, T., 2008. Agricultural landscapes with organic crops support higher pollinator diversity. Oikos, 117(3), pp.354-361.
- 92 Misiewicz, Tracy and Jessica Shade. 2018. Organic Agriculture: Reducing occupational pesticide exposure in farmers and farmworkers. The Organic Center. September. <u>https://www.organic-center.org/organic-agriculture-reducing-occupational-pesticide-exposure-farmers-and-farmworkers-0#:-:text=Consumers%20often%20cite%20reduced%20pesticide,prohibiting%20most%20 toxic%20synthetic%20pesticides.</u>
- 93 Bradman, A., et al., 2015. Effect of organic diet intervention on pesticide exposures in young children living in low-income urban and agricultural communities. Environ Health Perspectives.
- 94 Hyland, C., Bradman, A. et al. 2019. Organic diet intervention significantly reduces urinary pesticide levels in US children and adults. Environmental Research, 171, pp.568-575.
- 95 Ziesemer, Jodi. 2007. Energy Use in Organic Food Systems. UN Food and Agriculture Organization. Rome. <u>http://www.fbae.org/2009/FBAE/website/</u> images/pdf/imporatant-publication/fao-organic-report.pdf
- 96 Niles, M. 2008. Sustainable soils: reducing, mitigating, and adapting to climate change with organic agriculture. Sustainable Dev. L. & Pol'y, 9, 19.
- 97 Lotter, D. W., Seidel, R., & Liebhardt, W. 2003. The performance of organic and conventional cropping systems in an extreme climate year. American Journal of Alternative Agriculture, 18(3), 146-154.
- 98 Borron, S. 2006. Building resilience for an unpredictable future: how organic agriculture can help farmers adapt to climate change. Food and Agriculture Organization of the United Nations, Rome.
- 99 National Organic Coalition. 2016. Expanding Organic Production in the United States: Challenges and Policy Recommendations. November. <u>http://</u> www.nationalorganiccoalition.org/LiteratureRetrieve.aspx?ID=135516
- 100 O'Neil, Colin. 2017. Expanding Opportunities for U.S. Farmers by Supporting Organization Transition. Prepared for Environmental Working Group. March 16. http://www.ewg.org/research/growing-organic-expanding-opportunities-us-farmers-investing-organic-transition#.WeT-dVtSy5s
- 101 Kantor, Sylvia. 2015. Organic agriculture more profitable to farmers. Washington State University News. Washington State University. 1 June. <u>https://news.wsu.edu/2015/06/01/organic-agriculture-more-profitable-to-farmers/</u>

