

# COOL COTTON

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Organic cotton and  
climate change

September 2015



The Cottoned On campaign was launched by the Soil Association and the Global Organic Textile Standard (GOTS), the leading standard for organic textile processing.

Consumers, manufacturers, brands and NGOs can sign up here: [www.cottonedon.org](http://www.cottonedon.org)

The Soil Association was founded in 1946 by farmers, scientists, doctors and nutritionists to promote the connection between the health of the soil, food, animals, people and the environment. Today the Soil Association is the UK's leading membership charity campaigning for healthy, humane and sustainable food, farming and land use. To find out more visit [www.soilassociation.org](http://www.soilassociation.org)



# Executive Summary

## Climate change and agriculture

- Climate change is the most urgent global threat we face, and pressure is mounting on governments around the world to commit to robust measures to tackle the crisis.
- Agriculture accounts for around 14% of total global greenhouse gas (GHG) emissions and contributes 52% of the world's methane emissions, and 84% of global nitrous oxide emissions.
- If deforestation through land clearance and conversion of rangeland for agriculture, and trade in agricultural products, is included, this figure rises from 14% of global ghg emissions to between 30-40% – far higher than the global emissions from energy or transport.

## Where does cotton fit in?

- Cotton is an important and heavily traded commodity - a primary raw material in the multi-billion dollar textile market. In 2013/14, 26.2 million tonnes of cotton was produced globally, on around 33.1 million hectares of land.
- Cotton is produced in 100 countries and uses approximately 2.5% of the world's agricultural land. It is estimated that 100 million households, most in some of the world's poorest countries, are dependent on cotton farming.
- Although the manufacture, distribution and consumer-use phases of the lifecycle of a cotton product account for the majority of its total GHG emissions, cotton production is responsible for approximately 12% the total.
- Cotton production uses \$2 billion worth of pesticides each year, and accounts for 16% of global insecticide use – more than any other single crop – a fact which has led to cotton be called the world's 'dirtiest' agricultural commodity. Cotton crops use huge quantities of water, and consumption increases as cotton products move through the textile supply

chain – one tonne of cotton fibre uses 2,120 cubic metres of blue water (fresh ground and surface water – lakes, rivers and aquifers, for example), and it takes an estimated 2,700 litres of water to make just one cotton t-shirt.

- It is estimated the global consumption of cotton releases around 220 million tonnes of CO<sub>2</sub>e and consumes around 4% of the world's nitrogen fertilisers. A Life Cycle Assessment of conventional (non-organic) cotton concluded that 1 tonne of cotton fibre produces 1.8 tonnes of CO<sub>2</sub>e.

## Could organic cotton be a solution?

- Organic cotton occupies 220,765 hectares of land (0.7% of the total area of cotton farming), with a further 37,883 ha in conversion to organic.
- The demand for organic cotton is growing. In 2014, the global market for organic cotton grew by 67% and is now worth an estimated \$15.7 billion. In the UK, sales of Soil Association certified textiles rose 3.4% to £18.6 million in 2014. Global production of organic cotton is estimated to increase by 15-20% in 2014/15.
- A long-term study conducted in India found that yields of organic cotton were just 14% lower than GM cotton (which occupies more than 99% of India's cotton growing area), and that the associated costs of organic were 38% lower, putting organic cotton on par with conventional in terms of profitability.
- Despite these slightly lower yields, income for organic cotton farmers is more stable because organic farming requires greater crop diversity, including food crops in the rotation. Not only are input costs cut, but farmers save on medical bills and food purchases.

## The carbon footprint of organic cotton

- A study of organic cotton in one region of India, commissioned by PUMA (the sports clothing manufacturer), found a 40% reduction in global warming potential, 72% lower primary energy demand, and lower water consumption.
- In 2014 a comprehensive Life Cycle Assessment (LCA) was published by the Textile Exchange, covering global organic cotton production. The study found that organic cotton produced 978kg of CO<sub>2</sub>e per tonne of cotton fibre, a 46% reduction in global warming potential compared to non-organic cotton, slightly higher than the more limited PUMA study.
- The research also found a massive 91% reduction in water consumption – only 180 cubic metres of blue water is consumed per tonne of organic cotton, compared to 2,120 cubic metres in conventional cotton.
- In addition, there was a 62% reduced primary energy demand, 70% less acidification potential, and a 26% reduced eutrophication potential compared to non-organic cotton.

## The future of organic cotton

- This evidence shows that conversion to organic cotton farming will dramatically reduce greenhouse gas emissions, as well as delivering a number of other environmental, human health and social benefits.
- Leading designers, manufacturers and retailers are already supporting the 148,000 organic cotton farmers around the world, and they and others need to do more to grow organic cotton production.
- The fashion and textiles industries should recognise that the pioneers of environmentally sustainable, organic methods are helping to fight climate change, and are setting a standard for all cotton producers.
- Individual consumers can make an impact by choosing organic cotton clothing, bedding and other products – see [www.cottonedon.org/wheretobuy](http://www.cottonedon.org/wheretobuy)



# COOL COTTON

## Organic cotton and climate change

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### Climate Change

Climate change is widely accepted as the most urgent global threat we face, and pressure is mounting on governments around the world to adopt and implement robust measures to tackle the crisis. Effective policy responses require international consensus and agreements, and for most countries, deep and effective cuts of greenhouse gas emissions implemented at a national level. Significantly, in August 2015, Barack Obama committed the United States to ambitious new climate targets, including cutting CO2 emissions by 32% of 2005 levels by 2030. In December 2015, all members of the United Nations will gather in Paris for the 2015 Climate Change Conference, the primary objective of which is to reach a new international agreement to ensure that global warming does not exceed 2 degrees Celsius - the commonly accepted threshold above which the effects of global warming will be irreversible and the de facto target at which the majority of climate policies are aimed at.

Any discussion of climate change necessarily involves an understanding of the significant role of global agriculture as a major source of greenhouse gas (GHG) emissions. Agriculture occupies a unique role in the climate crisis – as a contributor, a victim and, more hopefully, as a source of mitigation.

This report sets out the significant contribution of global agriculture to climate change, focusing on global cotton production. It looks at the scientific evidence of the impact of non-organic (conventional) cotton on global greenhouse gas emissions, as well as its high levels of pesticide use and water consumption. The report then summarises the evidence of the benefits that organic cotton delivers – to the climate, to the environment more generally, and to often poor cotton farmers and their communities.<sup>1</sup>



## The role of intensive agriculture in the climate change crisis

Advances in engineering and biochemistry following the Second World War led to agriculture's heavy reliance on manufactured fertilisers and pesticides, and a subsequent increase in extensive monocultures. This continuing intensification of global agriculture coincided with an enhanced scientific understanding of climate change, and while the evidence of agriculture's contribution to the climate crisis has mounted, little has been done to reverse or slow the massive impact that farming has on global greenhouse gas emissions.

There are a number of reasons for this relative inaction. First, agriculture is unique in the fact that most of its greenhouse gas emissions are not in the form of carbon dioxide (CO<sub>2</sub>) from energy use, unlike most other polluting human activities. Rather, they consist mostly of methane (from cattle, sheep and goats), and nitrous oxide from the manufacture and use of chemical fertilisers. Secondly, and crucially, global agriculture is not formed of a relatively small number of multi-national corporations – instead it consists of millions of small businesses, particularly in developing countries. Agriculture's total greenhouse gas emissions are aggregated from large-scale and small-farmer operations, and it is therefore much more difficult to form an effective, uniform, one-size-fits-all climate policy. Finally, it is important to understand that a drastic reduction in the contribution by global agriculture to climate change will necessarily require an equally drastic change to the way in which food and other raw materials are produced, processed, transported and consumed.

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It is this end stage, of altering consumer demand, habits and expectations, which presents the greatest challenge. With green energy, sustainable sourcing usually does not have any particular bearing on the end product – for instance, a light switch will still work, regardless of whether the electricity that powers it is from coal or solar energy.

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The same, however, cannot be said for sustainable agriculture, where low-input, environmentally sensitive production inevitably has an effect on the availability of the end product. This is particularly true of food, but also applies to textiles, wood and other agricultural goods.

## How does organic farming fit into the climate crisis?

From its inception, the organic movement represented a far-sighted resistance to the dangers of an increasingly intensive agriculture. It was born out of a conscious and deliberate response to the industrialisation of farming, and of an understanding of the risk that these high-input methods posed to the environment, the welfare of farm animals and to human health.

Put simply, organic farming is a holistic method which aims to work with, rather than against, nature and natural processes to build health and fertility across the ecology of the farm. Almost all pesticides and manufactured fertilisers, including all weed killers, are prohibited. Instead crops are fed through the use of nitrogen fixing legumes like red clover and lucerne (alfalfa), and weeds and crop diseases are controlled by methods such as closed systems, crop rotations and green manures – fast-growing plants which limit the growth of weeds, provide cover for bare soils, and improve soil structure and nutrient quality.

## Agriculture as a contributor to climate change

Agriculture accounts for around 14% of total global greenhouse gas (GHG) emissions and contributes to 52% of the world's methane emissions, and 84% of global nitrous oxide emissions.<sup>2</sup> However, this 14% estimate is based only on direct farming practices; if deforestation through land clearance and conversion of rangeland for agriculture, and trade in agricultural products, is taken into account, this overall figure rises to between 30-40% – far higher than the emissions from energy or transport.<sup>3</sup> There is little indication that the pace of agricultural emissions will slow – indeed, it has been predicted that emissions will rise by almost 40% by 2030, due to a growing population and particularly a projected increasing demand for meat-based diets.<sup>4</sup>

The overall impact of global agriculture on climate change is strongly affected by the use of manufactured nitrogen fertilisers. The global warming potential (GWP) of nitrous oxide (the gas emitted by the manufacture and application of synthetic fertilisers) is 300 times the GWP of CO<sub>2</sub>.<sup>5</sup> It has been estimated that fertiliser production alone is responsible for about 1.2% of the total global GHG emissions.<sup>6</sup> Despite the significant contribution of agriculture to global emissions of reactive nitrogen, consumption is predicted to increase to over 200 million tonnes by 2018, a 25% increase from 2008.<sup>7</sup> Evidence also suggests that that poor management of land under nitrogen fertiliser, or over-application of fertiliser over several years can severely inhibit the capacity of soils to sequester atmospheric CO<sub>2</sub> – essentially increasing the emissions burden for which nitrogen fertiliser is responsible.<sup>8</sup>



Despite the steady increase in the reliance of chemical inputs, such as nitrogen fertiliser and mined phosphates, recent years has seen a stagnation of key commodity crop yields and diminishing returns from fertiliser application.<sup>9</sup> The evidence suggests that the so-called Green Revolution of the post-war era is stalling and that the period of rapid yield increases has reached its peak.

## Agriculture as a victim of climate change

The effects of climate change – temperature rises (leading to reduced yields and an increased prevalence of pests and disease), higher levels of precipitation, increased frequency and intensity of storms and other extreme weather patterns, and salinisation of soils and freshwater – all make agriculture extremely vulnerable to climate change, which in turn threatens global food security.

While genetic modified crops are frequently touted as a viable solution to climate change, the numerous assertions made by advocates of GM are increasingly being shown to be problematic. There is significant and growing opposition to GM technology, and mounting evidence and scientific opinion which is contrary to the claims made by the GM industry – including evidence of toxicity, enhanced reliance and application on chemical pesticides and reduced yields.<sup>10,11</sup> One of the simplest of these counter-claims, to say nothing of the social and ethical problems GM crops pose, is the fact that so far every GM crop likely to be available in the next (crucial) two or three decades put forward as a solution to climate change will require application of manufactured nitrogen fertiliser. With GM accounting for some 68% of the world's total cotton output, and bearing in mind the increasing emissions related to cotton cultivation, GM technology is evidently not a panacea – it is simply another facet of the same system of farming which is contributing so significantly to the climate change crisis.<sup>12</sup>

## Can organic agriculture help to combat climate change?

Fortunately, the position of agriculture in the climate change crisis is not without hope, and there are a number of ways by which farming practices can play a central part in the fight against climate change. However, unlocking the potential to offset emissions and protect the environment will require a radical change to the status quo, and a seismic shift in the way we manage our agricultural land and food supply chains.

In contrast to non-organic (conventional) agriculture, organic farming has great potential to offset global warming, through mitigation and sequestration. Mitigation refers to the reduction of greenhouse gases at the point of emission – for example through the obligation on organic farmers to avoid the use of manufactured fertilisers and pesticides. Where conventional farms rely heavily on manufactured nitrogen fertilisers and mined Phosphate, organic systems derive nitrogen from leguminous plants, such as red clover, soybean, and alfalfa, in which bacteria contained in the nodules in the root system produce nitrogen. Research has found that nitrogen input on organic farms is between 34 – 51% lower than in non-organic systems, but with only a 20% lower mean crop yield.<sup>13</sup> Phosphate is largely derived from animal wastes. Pests and crop diseases are effectively deterred on organic farms through a variety of methods, including buffer strips or inter-cropping with plants that deter insect pests, and crop rotations.

While avoiding the use of manufactured nitrogen fertiliser reduces organic farming's GHG emissions, an even greater reduction in climate change impact is available from organic farming's ability to sequester carbon in soils, through increasing soil organic matter. Indeed, 89% of the reduction in greenhouse gas emissions produced by organic farming is due to the offsetting of GHG emissions from the additional carbon stored in organically farmed soils.<sup>14</sup> This is achieved through land management practices such as green manures, returning crop residues to the soil, and the use of nitrogen-fixing legumes – all of which are central to organic agricultural methods. One study found that organic farms sequester up to 450kg more atmospheric carbon per hectare than non-organic farms.<sup>15</sup> In addition, organic farming practices are more resilient, and more likely to be able to withstand the challenges presented by a changing climate, and therefore represent a much longer-term, sustainable and resilient form of farming and food production.<sup>16</sup>

## Cotton

Cotton is an important and heavily traded commodity – a primary raw product in the multi-billion dollar textile market, and central to major global supply chains. In 2013/14, 26.2 million tonnes of cotton was produced globally, on around 33.1 million hectares of land.<sup>17,18</sup> Cotton is produced in 100 countries and occupies approximately 2.5% of the world's agricultural land, making it one of the most significant crops after food grains and soy beans, in terms of area.<sup>19</sup>

The three largest cotton producers are China, India and the United States respectively, with a combined output of over 16.5 million metric tonnes in 2013/14.<sup>20</sup> Production is heavily concentrated in these three countries. Indeed, the combined total output of the remaining seven biggest cotton producing nations (Pakistan, Brazil, Uzbekistan, Australia, Turkey, Turkmenistan and Greece) was 6,624 million tonnes – 343,000 tonnes less than the output of China alone.<sup>21</sup>

## Cotton and climate change

A 2011 report by the Carbon Trust estimated that the global consumption of cotton causes around 220 million tonnes of CO<sub>2</sub> e and consumes around 4% of the world's nitrogen fertilisers.<sup>22,23,24</sup>

One of the most alarming findings by the Carbon Trust's report is that global emissions from cotton production could increase to 300 million tonnes of CO<sub>2</sub>e by 2020 if current practices and rates of growth remain.<sup>25</sup>

Production in developed countries such as the USA and Australia is more mechanised than in developing countries such as India. Greater mechanical input does not necessarily result in higher emissions, primarily due to more careful management of fertiliser and pesticide application. The two biggest cotton producers, China and India, also have the highest carbon intensity per tonne of lint.<sup>26</sup> Similarly, the amount of nitrogen fertiliser applied to cotton crops in China and India is notably higher than in other countries, and despite this increased fertiliser use, there is no corresponding increase in yields, indicating that excess nitrogen fertiliser is being applied. In fact, it is estimated that this over-application of fertiliser could be reduced by up to 70% in some cases.<sup>27</sup>



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A technical paper published by the International Trade Centre (a subsidiary of the World Trade Organisation) estimated that field emissions of nitrous oxide account for 45% of GHG emissions from high-input cotton farming, closely followed by the emissions related to fertiliser and pesticide production (31%). The remaining contributing factors were tillage and planting (3%), applications of fertilisers and pesticides (3%), irrigation pumps (16%) and harvest (excluding ginning and transport) at 16%.<sup>28</sup> These percentages are based on a total emissions output of over 4,000 kg/ CO<sub>2</sub>e per hectare.

In stark contrast, the report calculated that what would probably be an unrealistically low-input system, which could be organic, and included no manufactured fertiliser, as well as no mechanical operations and only rain-fed irrigation, would produce just 150kg CO<sub>2</sub>e per hectare. 100% of these emissions would be nitrous oxide from nitrogen fixed by leguminous plants through naturally occurring processes.

Producing all cotton with such low inputs would probably not be possible, but certainly an organically managed farm would come closest to the example used in the ITC report.

Although the manufacture, distribution and consumer-use phases of the lifecycle of a cotton product account for the majority of its total GHG emissions, cotton production is nevertheless responsible for approximately 12% the total.<sup>29</sup> It is therefore clear that a drastic reduction in the climate change impact at the production stage will have a significant effect in terms of lowering the total emissions associated with a final product. The Global Organic Textile Standard (GOTS), the world's leading certification standard for organic fibres, requires independent certification, of rigorous ecological and social criteria, of the entire textile supply chain.

## The world's dirtiest crop?

A paper published by the Environmental Justice Foundation and the Pesticide Action Network reported that cotton production uses \$2 billion of pesticides each year, and accounts for 16% of global insecticide use – more than any other single crop – a fact which led the report to declare cotton to be the world's 'dirtiest' agricultural commodity.<sup>30</sup> The reliance on pesticides is particularly evident in India – the second largest cotton producing nation, and home to more cotton farmers than any other country – where pesticides applied to cotton account for over half of the total amount applied annually, despite occupying just 5% of agricultural land.<sup>31</sup>

With an estimated 100 million households dependent on cotton farming, the human cost of cotton production is significant.<sup>32</sup> Pesticide use leads to indebtedness, chronic ill-health and even death among cotton farmers in the world's poorest countries. Contamination of water supplies and food chains is also a major concern, and presents a serious environmental and human health risk.

## Cotton, climate and water

It has been estimated that cotton production accounts for 3% of global water consumption for crop production, and that 1kg of cotton fibre will require 10,000 litres of water.<sup>33</sup> Not only are the water demands of cotton crops high, but consumption increases as cotton products move through the textile supply chain – it takes an estimated 2,700 litres of water to make just one cotton t-shirt.<sup>34,35</sup> A report published early in 2014 suggested that the water consumed by India's cotton exports in 2013 could have supplied 85% of the country's 1.24 billion people, of which over 100 million do not have access to safe water, with 100 litres of water every day for a year.<sup>36</sup>

Reliance on chemicals in the cotton production process and water consumption is linked – it has been estimated that up to one fifth of the water consumption related to global consumption of cotton is for the purpose of diluting pollutants.<sup>37</sup>

As the global population expands and the demand on resources increases, competition for clean, safe water on a warming planet will become an increasingly serious concern. The impacts of climate change and the availability of water must therefore be considered together. Indeed, the combined impact of chemical inputs and blue water consumption ('blue water' being fresh ground and surface water – lakes, rivers and aquifers, for example) collectively contribute to and exacerbate the rate of global warming, the disastrous impact of intensive agriculture on the environment and the substantial risks posed to communities.

## Organic cotton

Organic cotton occupies 220,765 hectares of land (0.7% of the total area), with a further 37,883 ha in conversion. The demand for organic cotton is growing, as businesses and consumers become increasingly aware of the ethical and environmental implications of not only our global cotton market, but the textiles market as a whole.<sup>38</sup> In 2014, the global market for organic cotton grew by 67% and is now worth an estimated \$15.7 billion.<sup>39</sup> Global production of organic cotton is estimated to increase by 15 – 20% in 2014/15.<sup>40</sup> In the UK, sales of Soil Association certified textiles rose 3.4% to £18.6 million in 2014.<sup>41</sup>

A long-term study conducted in India found that yields of organic cotton were just 14% lower than GM cotton (which, according to researchers occupies more than 99% of India's cotton growing area), and that the associated costs of organic were 38% lower, putting organic cotton on par with conventional in terms of profitability.<sup>42</sup> In addition, and despite these slightly lower yields, income from organic farming is more stable due to the requirement for greater crop diversity in organic systems. Not only are input costs, medical bills and food purchases reduced, but farmers are able to save or invest their income in a more stable and secure future.<sup>44</sup>



Jörg Böthling, provided by Remei AG

## Climate benefits of organic cotton: the evidence

Given what we understand about the performance of organic agriculture generally in the context of climate change, it is reasonable to assume that organic cotton will perform better than conventionally grown cotton in terms of substantially lower GHG emissions. To date, little empirical research into the relative benefits of organic compared to conventional cotton has been carried out, but the findings from the data that is available are clear: the performance of organic cotton, for the climate and against a range of other indications, is far superior to that of conventionally grown cotton.

In 2014, the global market for organic cotton grew by 67% and is now worth an estimated \$15.7 billion. Global production of organic cotton is estimated to increase by 15 – 20% in 2014/15.

## The PUMA study

The first significant findings of the comparative environmental benefits of organic cotton were reported in research commissioned by PUMA (the sports clothing manufacturer), supported by the Textile Exchange and conducted in collaboration with the PE International.<sup>45</sup> The research established a life cycle analysis (LCA), covering greenhouse gas emissions up to the point that organic cotton leaves the farm, of organic cotton in a specific region in India. The PUMA study found a 40% reduction in global warming potential, 72% lower primary energy demand, and lower (albeit variable, depending on factors such as growing region and irrigation systems) water consumption.<sup>46</sup> The study identified that modifying certain aspects of production, such as

seed variety, till method (reduced or no-till being the most effective in terms of GHG emissions and carbon sequestration potential) and rainwater irrigation had a significant potential further to improve the environmental profile of organic cotton cultivation.<sup>47</sup>

The data that underpinned this PUMA LCA was fed into work done by the UK Government funded waste reduction charity, WRAP, to develop their Sustainable Clothing Action Plan (SCAP). It was an important factor in the development of long-term strategy to minimise emissions and improve sustainability in the textiles market.

## The Textile Exchange Life Cycle Assessment

The dataset used in the PUMA study was relatively small, and focused on just one cotton producing region in India. In order to further fill the gaps in evidence, in 2014 a comprehensive Life Cycle Assessment (LCA) was published by the Textile Exchange, representing global organic cotton production.<sup>48</sup> The performance of organic cotton was measured against the findings of an in-depth, peer-reviewed LCA of conventional cotton, published by Cotton Incorporated in 2012.<sup>49</sup>



People Tree (2015)

### The most significant findings of this Textile Exchange study were:

- 1 46% reduced global warming potential**  
The global warming potential (GWP) of conventionally produced cotton has been calculated to be 1,808kg of CO<sub>2</sub>e per 1 tonne of cotton fibre.<sup>50</sup> This study arrived at a total of just 978kg of CO<sub>2</sub>e per tonne for organic cotton.<sup>51</sup> The significant reduction compared to non-organic cotton production is attributed to the lower inputs required by organic farming, particularly manufactured fertiliser, pesticides and irrigation.
- 2 91% reduced blue water consumption**  
The study found that the global average water use for a tonne of organic cotton fibre is 15,000m<sup>3</sup> – of which almost all (around 95%) is green water (i.e. rainwater or soil moisture). Approximately 97% of this is irrigation; just 3% derives from upstream processes such as producing inputs to the farm and electricity.<sup>52</sup> The blue water consumption of organic cotton therefore amounts to just 180 cubic metres per tonne of cotton, contrasting sharply with the findings in Cotton Incorporated's 2012 LCA of conventional cotton of a total blue water use of 2,120 m<sup>3</sup> per tonne of cotton fibre.<sup>53 54</sup>
- 3 62% reduced primary energy demand**  
Conventional cotton requires 15,000 Mj per tonne of cotton fibre, of which fertiliser production accounts for 37% (followed by post-harvest operations, irrigation and machinery).<sup>55</sup> In contrast, organic cotton has a primary energy demand of approximately 5,800 Mj per tonne.<sup>56</sup> Again, this can be attributed to the absence of manufactured fertilisers which, being derived from petrochemicals, carry a high primary energy demand.<sup>57</sup>

## 4 70% less acidification potential

Acidification is the process in which acid gases are released into the air and re-released by precipitation, which are then absorbed by plants, soils and surface water. The acidification potential of organic cotton was calculated at 5.7kg of SO<sub>2</sub>e (sulphur dioxide equivalent) per tonne.<sup>58</sup> This is compared to 18.7kg of SO<sub>2</sub>e per tonne of conventional cotton.<sup>59</sup> As with GWP, this difference is attributed to lower or avoided inputs of fertilisers and pesticides, as well as less irrigation and use of machinery. The difference in field emissions due to different nutrient levels is also a contributor to the drastic reduction in acidification potential of organic cotton.<sup>60</sup>

While the significant reduction in global warming potential of organic cotton is the most immediately relevant finding in the context of this report, all of these other indicators are of importance in protecting the global environment, and in reducing the multiple harmful effects of conventional agricultural practices

## 5 26% reduced eutrophication potential

Eutrophication is a consequence of soil erosion (caused by poor soil management practices) and describes the enrichment of nutrients in a specific place by fertilisers, waste water and air pollutants. In water systems, eutrophication causes accelerated growth of algae (algal blooms) which reduce the oxygen levels in water and disrupts fragile ecosystems in rivers, lakes and oceans. Terrestrial eutrophication can increase plant susceptibility to pests and disease, as well as an over-enrichment of soil nitrates (which can then end up polluting water sources). Eutrophication potential is measured in phosphate equivalents (PO<sub>4</sub><sup>3-</sup>).

In conventional cotton, eutrophication potential is 3.8kg PO<sub>4</sub><sup>3-</sup> per tonne of cotton fibre.<sup>61</sup> In organic cotton, this figure was reduced to 2.8kg PO<sub>4</sub><sup>3-</sup> per tonne. The eutrophication potential per product unit (i.e. per kg) can be higher in organic systems due to lower yields (the eutrophication potential per area unit is generally always lower due to lower nutrient input). However, the Textile Exchange's study shows the lower eutrophication potential was based on evidence that organic systems employ strong soil protection methods capable of preventing 90% of the soil erosion that would otherwise cause eutrophication.<sup>63</sup>

Based on the Organic Cotton Life Cycle Assessment results, 2013-14 organic cotton harvest of 116,974mt equates to a potential saving of:

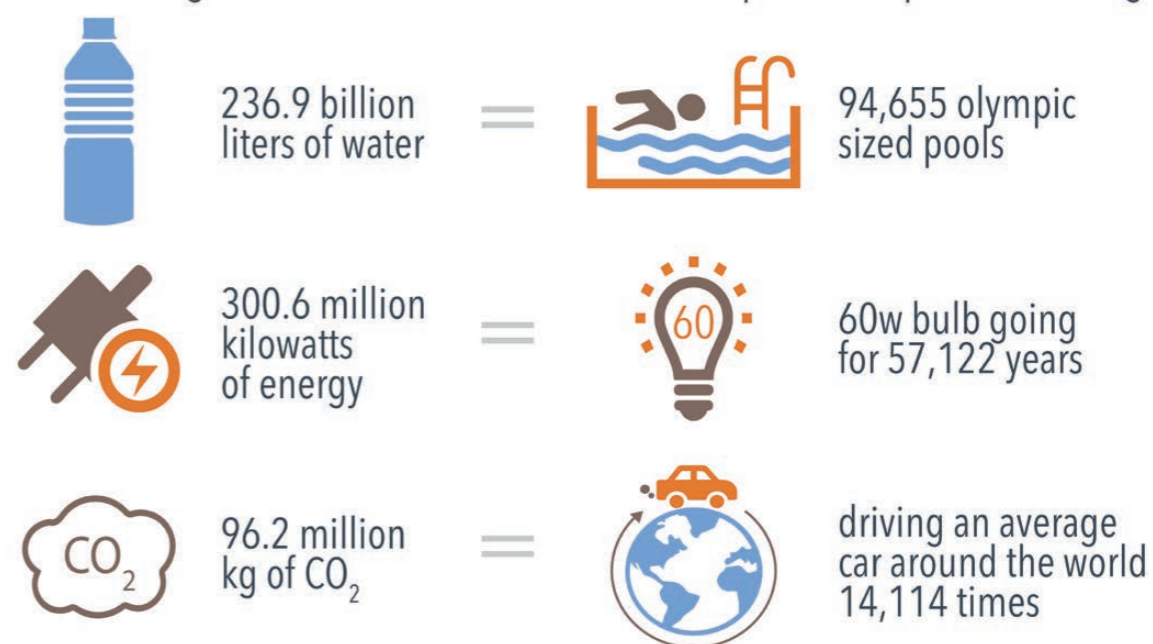


Image from Textile Exchange Organic Cotton Market Report 2014 <sup>63</sup>

## Additional benefits of organic cotton

It is also important to remember that organic methods do not stop at the field gate, and the benefits are not felt only by the farmers and their land. Textile Exchange's LCA led to the development of the Organic Cotton Sustainability Assessment Tool (OC-SAT) – the aim of which was to assess the impacts that organic cotton has beyond the specific criteria in organic standards, in order to gauge the performance of organic cotton, both its benefits and shortcomings, against the organic principles of health, ecology, fairness and care.<sup>64</sup> The tool highlights not only the environmental benefits detailed above, but the substantial economic and social benefits of organic systems. For example, the data collected shows that 100% of organic producer groups grow additional crops, boosting local economies and strengthening food security.<sup>65</sup> A report published by the Soil Association in 2014 illustrated through a number of case studies how organic cotton production increases food security through the enhanced availability, stability, access and utilisation of food crops on organic farms.<sup>66</sup> Given that the developing countries, in which 99% of organic cotton farmers live, are also home to 98% of the world's hungriest people, it is clear that improved methods of cotton production can be a vital way of increasing access to food, not just for farmers, but for whole communities.<sup>67</sup>

The findings of the OC-SAT indicate a greater degree of financial stability and diversity for farmers, greater provision for women and compliance with fair-labour practices. At the same time, it has highlighted specific areas where organic farmers are facing challenges, such as the sourcing suitable (non-GM) seeds (about which a number of producer groups in India and China expressed serious concern), allowing for a more targeted approach to research and policy development.<sup>68</sup>

## Conclusions

Climate change is the most urgent and dangerous threat we face, and is something for which we are all responsible. There is no quick-fix to climate change, and even apparently small actions can contribute significantly both to contributing to or mitigating the effects of global warming, in turn ensuring our long-term food and water security. The quantitative evidence is there to show that organic cotton has a role to play in protecting our environment and limiting the potentially devastating effects of climate change – essential if we are to achieve our climate targets and safeguard our future.

Neither the planet's resources nor the time in which we have to take action are finite. We need to ensure that pressure continues to be applied to global markets, to continue to support the 148,000 farmers already growing organic cotton, to grow the market for organic cotton, and to continue to research, campaign and develop the systems to support and incentivise the millions of others involved in cotton production to adopt organic methods.

Organic cotton production cannot solve all of the many ethical and environmental issues that are so commonplace in the wider textiles market, but, as Simon Ferrigno, a leading cotton sustainability researcher, points out, 'scrutiny provides an impetus for change just as dialogue does' – by exposing, debating and driving change in cotton production, the advocates and pioneers of sustainable, organic methods can set a standard for all cotton producers.<sup>69</sup>

We all have a part to play in the protecting the planet and ourselves from the threat of global warming. Buying sustainable textiles is where consumers have great potential to bring about positive change, by insisting on responsible sourcing, and by buying organic cotton, which guarantees the care and protection of the land and the people who bear the greatest burden for the clothes we wear – see:

[www.cottonedon.org/wheretobuy](http://www.cottonedon.org/wheretobuy)




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