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Single-use plastic bag can be better for the environment than cotton used 50 times, study finds

The authors said the results applied particularly to Singapore, where plastic waste is unlikely to end up polluting the oceans

By Olivia Rudgard, ENVIRONMENT CORRESPONDENT

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Single-use plastic bags could be better for the environment than cotton totes reused 50 times, a study has found.

Scientists at Nanyang Technological University in Singapore found that in the country's waste system, the water and energy consumption that goes into cotton and paper bags made them worse for the climate than plastic.

The best option was a long-life plastic bag used at least 50 times, followed by the single-use plastic bag and a cotton bag used 50 times, said the study, published in the Journal of Cleaner Production.

Most of Singapore's rubbish is collected from home and incinerated, meaning the risk to the oceans from waste plastic is minimised, the authors said, adding that the conclusions would be different for countries which biodegraded or recycled more of their waste.

The authors added that strict anti-littering measures in Singapore also reduced the likelihood that plastic would find its way into rivers and the ocean, where it is harmful to wildlife.

Lead author Grzegorz Lisak, director of the residues and resource reclamation centre at the Nanyang environment and water institute, said that the relative benefits of single-use plastic bags were "surprising".

The authors examined five varieties of bag, concluding that single-use paper bags were the worst option in terms of global warming impact, with reusable plastic the least detrimental.

Switching to paper or cloth from plastic "would increase the environmental footprint resulting in heightened negative effects such as global warming and eco-toxicity potentials," the study concluded.

Professor Lisak said: "Our main message is that reusable plastic bags are the best option, provided that they are reused many times - over 50 times to be precise.

"However, one surprising conclusion is that, in our model, in a single-use case, plastic bags, if treated properly afterwards, are less environmentally detrimental than the other types of bags in this study."

Professor Pauline Deutz, an expert in circular economies at the University of Hull, who was not involved in the study, said that while some conclusions were specifically applicable to Singapore, it showed the importance of reusing bags as much as possible because of the extra resources used to make them.

"It is how you use the bag that counts more than what the bag is made of," she said, adding that plastic waste was a particular problem in countries without efficient household collection, [where informal rubbish dumps are more common.](#)

The UK [is also incinerating a growing amount of its waste.](#) In the financial year to 2019, 44 per cent of household waste was incinerated, more than the 43 per cent sent to be recycled.

Opponents say the incinerators expel pollutants and carbon dioxide, contributing to global warming, while the incineration industry says it is providing a source of power and an alternative to landfill.

Efforts to stamp out plastic have focused on its catastrophic impact on wildlife, particularly in the oceans.

IN NUMBERS | The plastic problem

150 million tons

The amount of plastic in the world's oceans

5 million tons

The amount of plastic that goes on sale in the UK annually – 48 per cent of that is packaging

550,000 tons

The amount of plastic taken for recycling by local authorities in 2017

4

The number of times you need to reuse a supermarket bag-for-life to equal the carbon footprint of four single-use bags

450 years

The length of time it takes for a plastic bottle to decompose – so if Shakespeare had drunk Evian, the bottle would still be around today

April 2020

The date plastic straws, drinks stirrers and cotton buds were banned in the UK



Plastic accidentally ingested by mammals and seabirds causes starvation, and animals die after becoming entangled in the bags or suffocating on them.

While some countries have banned single-use plastic bags altogether, Singapore has been slow to follow suit.

In August Grace Fu, the country's minister for sustainability and the environment, said it was not "in a hurry" to introduce a ban because it burned the plastic waste for power.

Around the world consumers and policymakers face a complex choice as the carbon footprint of increasingly widespread cotton totes has come under scrutiny.

In 2011 an Environment Agency study found that a cotton bag would have to be used 327 times to match the relatively low carbon footprint of the single-use plastic bag.