Roses are dead, lovers are blue

The climate threat to Valentine's Day roses

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Cover photo by Vadim Sadovski[1]

Contents

Summary

February 14th: the day lovers traditionally celebrate their affection, and clichéd gifts of chocolate and roses abound. It is estimated that over 80 million stems of roses are sold globally for Valentine's Day[2]. Red is the most popular color, followed by white and yellow[3]. However climate change poses a threat to these romantic blooms, as well as those grown in British gardens.

Roses have certain conditions in which they thrive. The climate-change induced tendency for extreme temperatures, and more drastic changes to rainfall patterns, leading to flooding or drought, or both, create conditions that are far from ideal for rose cultivation. Rose growing can be water-intensive. In already water-constrained areas, changing climatic conditions may make rose growing unsustainable, especially compared with other demands for water, including for drinking.

Climate changes, including increased temperatures and greater humidity, can create ideal conditions for pests, including fungal diseases, that affect rose bush productivity. While the international rose trade may be affected by climate impacts, UK gardeners will also feel climate change impacts on their own rose bushes. The fungal diseases that plague commercial growers are also present in UK gardens due to mild wet Springs. Some rose varieties have already been removed from the market because of their lack of resistance to these diseases.

To minimize the impacts of climate change on rose growers and their workers, and the romantics whose blooms they provide, it is imperative that the global community treat the climate crisis as a crisis. There is no excuse for putting off policies for rapid and radical action, as it is the total *cumulative* emissions that will determine whether the internationally-agreed, and scientifically-imperative, goal of limiting global average temperature increases to 1.5°C will be achieved. This will require a rapid transformation of the energy sector from fossil fuels to renewable energy and conserving and restoring lost and degraded ecosystems.

This report examines the climate threats posed to rose growing in the UK and abroad, including a case study from a Kenyan rose grower - the people most likely to suffer if these climate impacts are not addressed.

"Climate change has significant impacts on rose cultivation around the world. The effects of rising temperatures, changing precipitation patterns, and increased pest and disease pressure can lead to heat stress, reduced flower quality, disrupted flowering seasons, and damage to rose plants."

- Charles Shi, Botanical Horticulturist at Kew Gardens

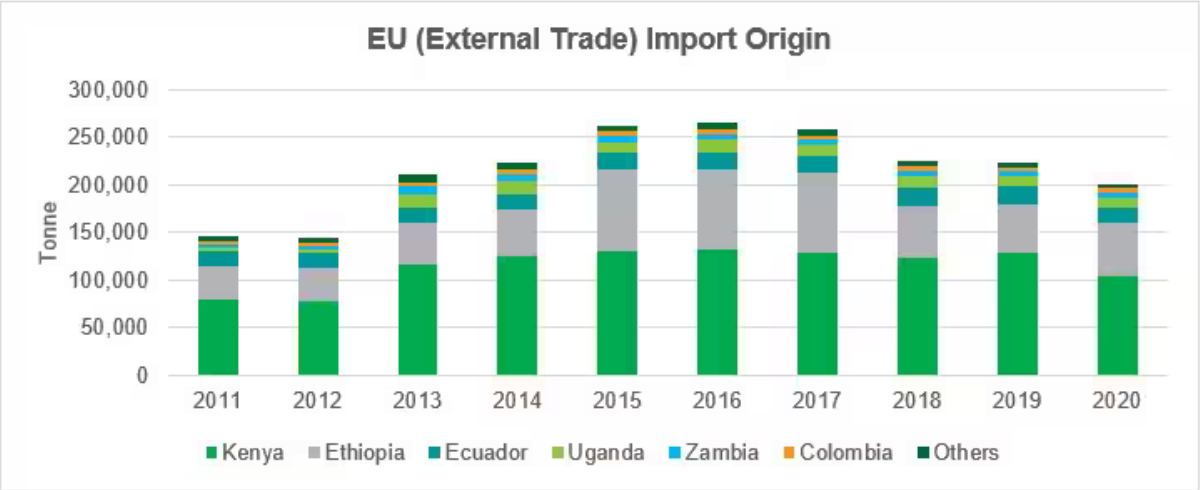
The global rose market

The UK is the fourth biggest market, accounting for 7.53% of global annual imports of the flowers at US$249 million in value. This places it after the US (19.6%, US$645 million), Netherlands (16.2%, US$536 million) and Germany (12.5%, US$413 million).[4]

While somewhere in the region of 2500 tonnes of roses are sold each month in the UK (rough average for the period 2017-2020), Valentine's Day means that there is a spike in February imports to an average of around 3250 tonnes.

While the US and European countries provide a mixed import market, the number of countries exporting roses is dominated by five countries: the Netherlands, Ecuador, Kenya, Colombia and Ethiopia[5]. There is a geographic logic to the coupling of exporters and importers. Colombia and Ecuador respectively supply 65% and 32% of US rose imports. African countries are the major suppliers for the European market, with Kenya being the largest supplier, but with Ethiopia increasing market share, even at Kenya's expense[6].

The oil crisis in the 1970s made the case for European heated greenhouses less compelling and so much rose production ultimately moved to Africa, and similarly, Latin American growers and US buyers developed trading relationships. The areas of high latitude and cool nights but with long hours of year-round daytime sunshine in these new growing regions were perfect for year-round production of the roses, while cheaper labor was good for the importers[7].



This chart shows how East Africa is the origin for most roses imported into Europe[8]

The geographical footprint of the Fairtrade certified flowers overlaps, but is not identical to the global market profile. Kenya, Ethiopia, Ecuador and Uganda make up 99% of this more socially and environmentally sustainable certification standard[9]. A study for Fairtrade found that 69% of flower workers on East African Fairtrade certified farms were better paid than their non-Fairtrade counterparts and also benefit from additional funds to support education, health and water infrastructure[10]. During the pandemic, Fairtrade

Foundation worked with more than 50,000 workers in Kenya and Ethiopia to provide financial support when work dried up[11]. Fairtrade flowers, however, only make up about 5% of UK flower sales. In 2022, sales volumes of Fairtrade flowers in the UK grew by 8 percent.[12]

Producing countries

Kenya

Kenya is the major exporting country to UK and EU markets, with 19.1% of the global market, bringing in US$630 million in 2021[13]. Cut flowers are the country's second biggest export after tea, accounting for around 1% of GDP and bringing employment for over 100,000 workers directly[14], with more jobs indirectly created by the industry. Hours can be long – up to 16 hours a day – which is especially tough for women who make up around 60-70% of the laborers, with the maternity and childcare responsibilities often falling to them[15].

Kenya is the largest source of Fairtrade flowers, including roses. Fairtrade farms employ around 71,000 people, or around nearly half of the ~150,000 flower workers in the country[16]. Kenya was badly hit by COVID-19: the Kenya Flower Council reported that growers were losing US$ 2.3 million per day[17] and the roses were simply cut to rot: air transport connectivity reductions[18], coupled with lock-down induced decreased demand, meant that different links of the supply chain were not in place to link supply to remaining demand. Tens of thousands of workers were sent home - wages make up 45% of a flower farm's costs – but the low-paid nature of the work meant that many workers did not have savings to be able to have a safety net for food, or, vital in a pandemic, healthcare. The Fairtrade Foundation worked to support tens of thousands of flower workers through this time. The markets were volatile during COVID because of the on-and-off again nature of the lockdowns: by July 2020, Kenya's flower markets were operating at 85% of the levels before the first lockdown[19]. In 2021, there were signs of positive growth in the markets again, but in 2022, the war in Ukraine has meant that the Netherlands has restricted exports to Russia, including roses imported and reexported out of the flower auction houses. High inflation and weakness of the Euro against the dollar have meant that the rose export market remains difficult for Kenya compared to the rosier years before COVID-19[20].

The Netherlands

The Netherlands represents 33.9% of global rose exports, including re-exports, with a value of US$1.12 billion in 2021[21]. As well as being a major producer and exporter in its own right, the Netherlands is also an important importer of roses, being the biggest export market for Kenya and third for Ecuador[22]. This is because the Netherlands plays host to the biggest flower auction market in the world, with around 120 million flowers traded per day[23].

Ecuador

Ecuador is the second largest stem rose producer, with 21.2% of the global market, worth US$700 million in 2021[24]. Its three biggest markets are the US, Russia and the Netherlands[25]. It has been a volatile few years for Ecuadorian growers. In August 2020, after the first wave of COVID-19 lockdowns, flower sales had only rebounded to 70% the normal rate, but helped to that level by Mother's Day demand after even deeper dips in March and April. By then, 10,000 jobs had been cut and the flower industry as a whole suffered more than $130 million in lost earnings. This is because Ecuador has made a niche in conference and wedding flowers,

neither of which had rebounded after the first lockdown[26]. By 2021, the Agriculture Ministry had granted 46 ten-year licenses for hemp production for various products, with at least one farm partially replacing their rose bushes with hemp to produce cannabinoid products for medical purposes, to hedge against future such market disruptions[27]. By 2022, the war in Ukraine had meant that Russia's share of the Ecuadorian flower market fell from 20% to 10%, a loss of valuable export income. Internal matters then flared, as protests against the rising cost of living led to even bigger losses for the flower industry than COVID had caused, with flowers being actively targeted by protesters[28]. Criminal gang violence has been an additional challenge for the country in 2024[29].

Colombia

Colombia's flower market blossomed as a result of the US seeking to support other revenue generators for the country in an effort to supplant the cocaine trade: a 1991 Act lifted duties on Andean products from Colombia, Ecuador, Bolivia and Peru, which removed a ~6% import duty on Colombian roses into the US market[30].

Colombia is now a major rose exporter, with exports in 2021 valued at US$410 million, representing 12.4% of the global market[31]. In 2018, six billion stems of flowers went to 90 countries[32]. As in Kenya, women make up a sizable proportion of the 130,000 flower producing workforce, with this the largest source of employment for them[33], but there are reported issues in the industry of sexual harassment, long hours and pesticide exposure[34]. Repetitive strain injuries are reportedly common[35].

Colombia's flower growers appear to have weathered the pandemic better than their Ecuadorean neighbors and their conference and wedding markets: Colombian markets include the less rarified supermarkets, which were better placed to make sales, as people in lockdown wanted to beautify their surroundings when they were in lockdowns. Colombia's August 2020 rebound took it to 90% of its normal export levels, compared to Ecuador's 70% at the same time. By late 2021, Colombia's flower exports were only down 4% on baseline levels[36].

Ethiopia

Ethiopia is a newer and smaller market, but with 5.06% of the market share, worth US$176 million in 2021[37]. After the first rose farm was founded in 2000, the government began to support the rose-growing industry in 2002 through access to land, tax incentives and long-term financing, and the sector grew such that the cluster of different growers were able to negotiate collectively for air fares and chemicals and market collectively, through a trading company owned by the rose farm owners, in overseas markets[38]. The flower industry has created directly and indirectly 20,000 jobs[39], and flowers are now second only to coffee as Ethiopia's biggest export, worth 14.1% of the country's export earnings[40].

The largest rose grower in the world is an Ethiopian company, Sher Ethiopia. which has approximately 12,500 employees across three farms and transports 2.5-4 million roses per day to Addis Ababa airport[41]. It is also the largest Fairtrade rose producer in the world.

Climate change impact on rose production

Like all plants, roses have preferred growing conditions. They optimally grow in temperatures around 15-24ºC: temperatures too cold can lead to slower growth, while temperatures above this can scorch the leaves and stress the plant. Both affect flowering. They generally like to grow where they can receive at least six hours of sunlight a day[42]. They also like free-draining soil that does not dry out[43].

Climate change is affecting commercial rose growing countries, as conditions are starting to become less salubrious for the plants. Future impacts will, of course, be dependent on how quickly the global community, and particularly developed countries, reduce their emissions. Countries must strengthen their national climate pledges, known as Nationally Determined Contributions (NDCs) on a regular, five-year cycle. Most submitted their initial commitments in 2015 and updated them by 2021. A new, stronger round of NDCs is due in 2025.

East Africa: Kenya and Ethiopia

Climate models have a high confidence that East Africa will continue to see temperature increases, both during the daytime and nighttime. Extreme temperatures are expected to get both hotter and more frequent, something that might take roses out of their preferred temperature ranges. The models are less clear on future precipitation trends, but droughts from 2020-2022 were found by an attribution study to have been, conservatively, 100 times more likely to have been made stronger and more likely because of climate change[44]. Roses do not like to dry out.

Case Study: Patrick Mbugua, General Manager, Wildfire Flowers, Kenya

"I am very concerned about the impact of climate on rose growing in Kenya. We've seen increased disease pressure due to unusual weather patterns – sometimes we have excessive hot weather which sees a jump in the number of pests, and other times unusually low temperatures which increases fungal infections, reducing yields. Another example is availability of not enough water for irrigation – while this has not yet affected us since our source of water from Lake Naivasha has been very stable the last 10 years, it is a concern that with climate change such a source could be threatened.

"It is paramount for governments to have clear policy regarding reducing emissions and developing other interventions that can help with climate change. Governments must especially safeguard local economies and social well being from the impacts of emissions. It is vital that the voices of the global south are heard at the international level. The global south emits far less than the

global north but we are paying a lot more in terms of the effects on the environment, poor climate and the negative impact on economic growth.

"The Kenya Flower Council has done a lot in lobbying our concerns to the government where we need interventions especially in policy or legislation. It also does a lot of training to create awareness to growers and their employees on the impacts of climate change and what interventions are available. It also monitors growers environmental impact, social ethics and fair labour practices through its Floricultural Ornamental Social Sustainability certification.

"We practice regenerative agriculture and have a circular economy as much as we can. All our green waste is turned into compost which we use back in our growing. We have break crops to help regenerate the soil in our hypericum section and also make biochar which we incorporate into the compost. This helps in soil sequestration of carbon. We also have rainwater harvesting from all our greenhouses and recycle irrigation water after treating it in our new ultrafiltration unit. We use integrated pest management to reduce usage of chemicals and even when we have to use them, we only use Class 3 and Class 4 chemicals and not more than nine active ingredients."

The Netherlands

The Netherlands is the biggest producer, has already experienced average temperature increases of 1.7°C since 1900 and rain fall has stayed overall fairly constant overall, but falling in shorter periods with greater intensity, and this can increase coastal erosion in a low-lying country already vulnerable to sea level rise and flooding[45]. There is also a risk of lack of water in the summer months[46]. The additional heat may help roses producers cut energy costs in heated greenhouses, but the winter flooding risk may not favor bushes that like "free draining soil" nor the summer droughts soil that "does not dry out".

North-Eastern South America: Ecuador and Colombia

In Ecuador and Colombia, roses tend to be grown in high-altitude Paramo ecosystems, with cooler temperatures and good rainfall; Colombia additionally has suitable regions near its Caribbean coast[47]. As the climate changes, temperature increases are expected to be highest in the Andean regions, including the Paramo, and extreme temperatures (number of days above 35°C) are projected to rise significantly, within concomitant significant impacts on people, ecosystems and agriculture[48]. Glacier retreat is a major issue in the tropical Andes, with at least 30% of their area lost between 1990 and 2020: this risks water scarcity for the populations[49], and a water-intensive industry, such as rose growing, would need to be looked at carefully for its sustainability in the region, especially if in competition with drinking water.

Climate change impacts for UK rose gardeners

It is not only imported roses impacted by climate change: UK gardeners are also likely to see impacts on their roses because of the changing climate.

On average, plants in the UK now start to flower about a month earlier than would have been seen as recently as the mid-1980s. This is likely related to increased average temperatures across January to April, as flowering is less sensitive to the amount of rainfall[50].

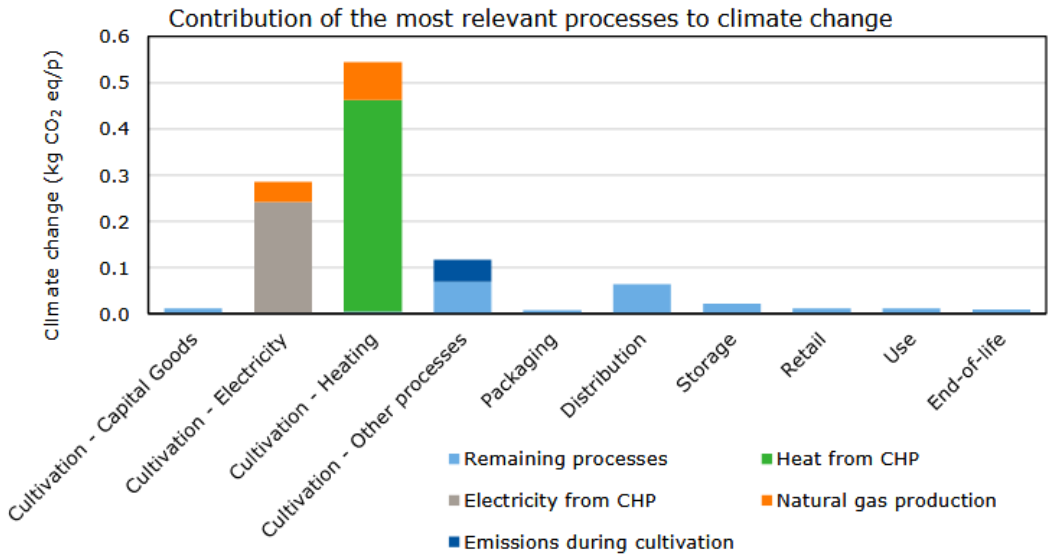
Rainfall is an issue for roses, however, as fungal diseases such as rose black spot and powdery mildew thrive in mild wet springs. A bad case of powdery mildew can cause a bud not to open properly and repeated heavy infection can damage the plant's very vigor[51]. Black spot is the most serious disease of roses, however, as it infects leaves making them drop, greatly reducing the vigor of the plant[52].

Many cultivars of roses have disappeared because of black spot disease, although breeders seek to develop disease resistant varieties[53]. Popular varieties, such as David Austin's award-winning Shropshire Lad, are already being withdrawn from sale, as they lack resilience to pests, such as aphids, and diseases that are evolving with the changing climate conditions[54]. If the plant can avoid diseases, continuous or repeat flowering varieties, such as hybrid tea and floribunda roses, may flower for longer in warmer conditions, provided sufficient water is available[55]. This is not always a given, in the increasing summer heat caused by climate change[56].

Climate cost of importing roses

Our fondness for presenting cut roses to our loved ones also has an impact on the climate.

For roses grown in the Netherlands, the heating and electricity needed to cultivate roses accounts for 76% of the climate impact of a stem rose[57]. Natural gas is used to heat the greenhouses in which Dutch roses are grown: the greenhouse horticultural sector, as a whole, accounts for 9% of the country's gas consumption[58]. While burning natural gas turns it into carbon dioxide, fugitive emissions can mean leakage of methane, which has a global warming potential over 80 times that of carbon dioxide[59]. Some waste industrial CO_2 is also used, such that this use of the gas means that less is emitted than without it being used[60], but it then is a revenue stream that supports the fossil fuel industry at a time when it needs to be being phased out.



Contribution of the most relevant processes to at least 80% of the climate change impact of one 70 cm stem rose grown in a Dutch greenhouse.[61]

The energy costs of growing roses in a temperate climate should be set against the advantages of growing in warmer climes. However, 'warmer climes' are not where the major rose markets are, and emissions related to their transport become more of an issue. Roses, like other flowers, are typically transported by air[62]. through a 'cold chain' of refrigerated facilities on farms, lorries, planes, and boats, a because they are perishable[63] Although the greenhouses in the tropics don't require heating and the non-renewable energy demand in Kenya is 6.5 times lower than the demand in the Netherlands[64], this cooling requires energy.

The balance for climate impacts is clear: research conducted for the Fairtrade Foundation indicated that "greenhouse gas emissions of Fairtrade roses transported by plane from Kenya to Switzerland are still 2.9 times lower than emissions for Dutch roses, while for ship transport the difference increases to 21 times lower for Fairtrade Kenyan roses.[65]. The Netherlands' installations of more sustainable forms of energy may cause this differential to decrease through time.

Recommendations

Cut emissions and accelerate the transition from dirty to clean energy

- The extreme weather that threatens our roses, and the livelihoods of their growers, will only get worse if carbon emissions continue to rise. Developed countries at COP28 in Dubai committed to transition away from fossil fuels in this decade but Governments, including that of the UK, are handing out licenses to drill for new oil and gas, directly undermining the COP28 agreement. They must stop and urgently invest in the clean, affordable, renewable energy.

Increase in climate finance to boost adaptation

- There is a major need for more climate finance, especially finance addressing the needs of people having to adapt to the impacts of the climate crisis. Rose growers and others who rely on a stable climate for their livelihoods need support to diversify their income, develop more resilient varieties of plant and help them adjust to a climate that they have done little to distort.

Make polluters pay to provide funds for loss and damage

- This year's COP29 in Baku will see climate finance as its primary focus, with nations negotiating a new long term finance goal for people suffering from climate breakdown. The time has come for polluters to start paying the bill for their actions and being forced to take responsibility for the mess they have caused. The vast profits of fossil fuel companies should be taxed and that revenue fed into the Loss and Damage Fund to assist people that have lost the most to climate change.

Endnotes

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