Carbon Footprint Study of Silk and Fresh Botanicals

An Analysis of the Silk and Fresh Floral Supply Chain Transportation

Conducted by Silkflowers.com
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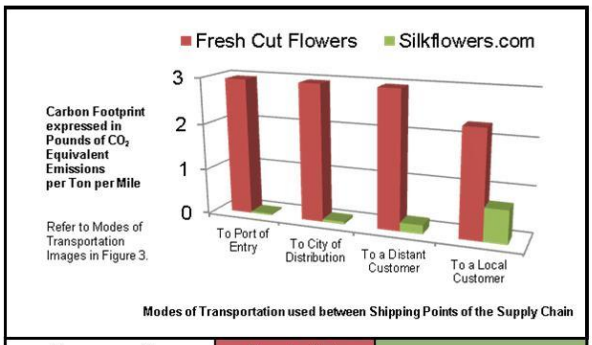
The **carbon footprint** is defined as the amount of carbon dioxide (CO_2) emissions associated with all the activities of a person or entity. It includes direct emissions resulting from combustion of fossil fuels used in manufacturing and transportation, as well as emissions from production of electricity consumed in the process.

It's easy to assume since fresh cut flowers and foliages are natural, they are a "greener" choice than silk flowers and plants. This conclusion was correct in the days when flowers were locally grown in fields and only used indoors during the growing season.

Today, however, it is a dramatically different story. More than 75% of fresh cut flowers used in the U.S. are imported.[1] Most of these enter through the Port of Miami, FL and come from South America.[2] The silk flower and plant components used in Silkflowers.com manufacturing are imported from Asia and mostly enter through the Port of Long Beach, CA. In 2009, the transportation industry as a whole contributed 33% to the total CO_2 emissions resulting from fossil fuel combustion in the United States.[3] Consequently **the carbon footprint resulting from the floral supply chain transportation cannot be ignored.**

Figure 1. Carbon Footprint through the Floral Supply Chain



Compare the Modes of Transportation	Fresh Cut Flowers Require	Silkflowers.com Uses
to Port of Entry	Air Freight	Ocean Freight
to City of Distribution	Air Freight	Rail Freight
to a Distant Customer	Air Freight	Semi Truck Freight
to a Local Customer	Delivery Van	Parcel Truck Freight

Figure 1 shows fresh cut flowers require air freight as their primary mode of transportation compared to Silkflowers.com's use of ocean, rail, and truck freight. The graph illustrates the difference in the resulting carbon footprint relative to those modes of transportation.

1. U.S. Dept. of Agriculture, 2009 Census of Horticulture Specialties; and U.S. Census Bureau, 2009 U.S. Int'l Trade Statistics
2. U.S. Customs and Border Protection; and U.S. Dept. of Agriculture: APHIS
3. U.S. Dept. of Energy and U.S EPA "Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2009"

Figure 2 shows the quantitative differences for a single 10 lb. delivery to various destinations. It also extrapolates the resulting CO_2 emissions for weekly fresh cut flower shipments and live plant service calls over the 7-year-plus life expectancy of quality silk designs. **The differences in the carbon footprints are astounding and demonstrate that silk flowers and plants are clearly the "greenest" choice and the best solution for a more effective sustainability strategy.**

Figure 2. Comparison of CO_2 Emissions (Lbs.) for Equal Shipments to Various U.S. Cities

	Atlanta	Chicago	Dallas	New York	Seattle	Average % Reduction in CO_2 using Silk
Single Silkflowers.com Shipment* (lasts 7+ years)	**2.41**	**2.25**	**2.86**	**2.57**	**4.21**	
Single Fresh Cut Flower Shipment	29.71	38.33	37.20	36.88	64.00	93.06%
Weekly Fresh Cut Flower Shipments (364 deliveries over 7 years)	10,814	13,951	13,542	13,424	23,296	99.98%
Live Plant Service Contract** (364 weekly visits over 7 years)	17,390	17,390	17,390	17,390	17,390	99.98%

* All calculations represent Silkflowers.com supply chain transportation carbon footprint and are not representative to other silk suppliers or the silk industry in general.
** Based on a 40 mile round trip local service call in delivery van with 18MPG rating. Combustion from a single gallon of gasoline produces 21.5 lbs. of CO_2.[3]

A Smaller Carbon Footprint with Silk Flowers

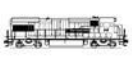
Compare shipments of fresh cut flowers and greenery to those of Silkflowers.com silk botanicals through the floral supply chain. **Factoring in the differences in distances shipped and the modes of transportation used (Figures 1 & 3), Silkflowers.com silk shipments produce on average 93.06% fewer CO_2 emissions per shipment.** Furthermore, consider multiple deliveries of perishable fresh cut flowers and floral arrangements on a recurring basis, 52 times a year to a commercial account. This amounts to a staggering 364 deliveries throughout the 7-year life expectancy of a single shipment of Silkflowers.com silk botanicals. **Opting for the single silk shipment in lieu of weekly fresh botanicals would achieve a massive 99.98% reduction in CO_2 emissions. (Figure 2)**

The Reality of Live Plant Leasing

Apply the data above to live plant leasing and a similar realization occurs. Growers in Florida and California propagate 85% of potted indoor foliage plants sold in the U.S.[4] The carbon footprint resulting from transporting shipments from these states to clients throughout the country is about the same as Silkflowers.com silk shipments. **But it is the service contract with the recurring weekly van trips necessary for the indoor maintenance (watering, fertilizing, pest control, pruning, and replacing) of live plants at the local level that severely impacts the total quantities of CO_2 emissions.** Again, consider the 52 weekly maintenance visits per year that amount to 364 van trips over the 7-year-plus lifespan of a single shipment of Silkflowers.com silk botanicals. **It's very possible to achieve a 99.98% reduction in CO_2 emissions (more than 17,000 lbs.) by using silk trees and plants instead of leasing live plants. (Figure 2)**

4. U.S. Dept. of Agriculture, 2009 Census of Horticulture Specialties

Figure 3. CO_2 Emissions from Modes of Freight Transportation

						
Mode of Freight Transportation	Air	Ocean	Rail	Semi Truck	Parcel Truck	Delivery Van
Lbs. CO_2 Emissions per Ton-Mile[5]	2.956	.032	.058	.191	.711	2.3

5. U.S.EPA "Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2009". (Ton-Mile is a weight and distance unit for 1 ton being transported 1 mile.)

An Even Greater Impact

It's worth emphasizing that this analysis is concerned only with the CO_2 emissions resulting from the various modes of transportation typically used through the floral supply chain. **The effect is additionally compounded by the energy requirements for refrigeration to keep fresh cut flowers and greenery "fresh"; and for heat to keep plants warm in greenhouses during the winter.**

Biodegradability: A Misconception with Fresh Botanicals

Increased demand for products with reduced environmental impact has resulted in growing confusion about that which is "green" and what offers "real environmental value". Some of the confusion and misconception centers on biodegradability and landfills. It seems an obvious conclusion that if an object is natural – such as a fresh cut floral arrangement – it is biodegradable. This is accurate only if it is composted and allowed to react with air, water and microorganisms that break it into components to be made available to the biosphere, in the same way a fallen tree in a forest decomposes, nourishing its surroundings and completing its life cycle.

Because modern landfills are so extremely compacted, natural or organic, "trash" is forced to degrade anaerobically (without oxygen) - if it breaks down at all. In a frequently cited study from the University of Arizona, researchers uncovered 25-year-old hot dogs, corncobs and grapes from a landfill. **When organic "trash" breaks down anaerobically one of the by-products is methane. In 2009, landfills were responsible for 17% of the methane emissions in the U.S.[6] Methane is 21 times more harmful as a greenhouse gas than carbon dioxide.[6]** Many municipalities now collect yard waste separately for community composts to prevent the formation of methane, as well as to preserve critical landfill space needed for other types of municipal waste.

Recall again the 364 deliveries of fresh cut flowers over the 7-year lifespan of a single shipment of silk botanicals. The amount of methane emitted and landfill space consumed by fresh cut flowers and plant waste over the 7 years is disconcerting. Therefore, **if fresh botanicals are not properly degraded by composting, they have greater undesirable effects in landfills than silk flowers and plants, due to their production of harmful methane and their use of landfill space.** Eventually silk botanicals will take up landfill space, just as old clothing or furniture does, but they are biostable, or inert, and will not produce methane.

6. U.S EPA "Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2009"

The 3R's (Reuse, Reduce, Recycle) of Silk Botanicals

Silk flowers and plants may be used, and *reused*, for many years by rotating them to different locations and for seasonal use. Dated designs may be donated to community organizations much the same way as clothing and furnishings are donated; they are a wonderful way to brighten up a room; and their flowers and foliages may be *reused* for creative activities.

Further, **a single shipment of silk botanicals compared to 364 shipments over 7 years of fresh botanicals also represents a considerable *reduction* in packaging materials and resources as well as its 99% *reduction* of CO_2 emissions.** Recycling fresh cut flowers and plant waste by composting or keeping it separate for municipal yard waste collection is not always a convenient or available option, especially for businesses. And while a *recycling* program is not available for artificial plants and flowers, the *recycling* of the packaging from a single silk shipment is far more efficient than that from 364 fresh cut flower shipments.

Bottom Line: Silk Botanicals are the "Greenest" Choice

Fresh cut flowers and live plants are no longer "green" in the office and business environment. **The results of this study prove that silk botanicals provide the "greenest" strategy for indoor use over fresh botanicals. They produce a drastically smaller carbon footprint, have the longest service life, are biostable and use less space in landfills.**