Making soy candles – teacher

Is there a more SoyStainable candle? Are there benefits to a candle that uses a sustainable product?

Background (This info also appears on the student handout.)

The FDA does not require candle makers to list the ingredients of a candle, so a consumer really doesn't know what materials candles are made from unless it is listed on the label. The three major products used for candle making are soy, paraffin, and palm oil. Paraffin is a byproduct of petroleum, a non-renewable resource. According to a study by the South Carolina State University in 2009[3.], the chemicals found in the fumes of paraffin candles are linked to cancer, birth defects, and such respiratory ailments as asthma. According to ehow[2.], wax is extracted or refined from crude oil and boiled for purification. It may be mixed with stearin to help with hardening. When paraffin candles burn, they emit a black soot similar to the chemistry in diesel exhaust.

Palm oil comes from the palm tree which is a renewable resource. Palm oil is one of the most efficient oil-producing plants in the world. Plantations are profitable and provide people with jobs. When it come to the world of sustainable agriculture, however, palm oil does not do very well. According to RSPO[4.] (Roundtable for Sustainable Palm Oil) only 19% of palm trees are grown outside of Malaysia and Indonesia, and those palm fields are causing mass destruction and deforestation.

Soy oil is extracted from soybeans that are grown each year. The oil is hydrogenated to be made into wax. Each soy wax manufacturer may have different ingredients they add to make the wax[2.].

[1.] Crall, Desi (2017). How to make soy wax from soybeans. Retrieved from https://www.ehow.com/how_4423083_make-soy-wax-from-soybeans.html October, 2019.
[2.] Harding, Deborah (n.d.) Facts on paraffin wax. Retrieved from https://www.ehow.com/about_6068059_paraffin-wax.html October, 2019.
[3.] Massoudi, R. (2009). Frequent use of certain candles produces unwanted chemicals. Retrieved from https://www.scsu.edu/news_article.aspx?news_id=832 October, 2019.
[4.] Roundtable on Sustainable Palm Oil https://www.rspo.org

Extension

In addition to completing the candle-making activity below, students might investigate the Roundtable on Sustainable Palm Oil and compare the process of palm oil production to soybean farming in Brazil and the United States.

Here are some videos to get them started:
Palm Oil Plantations
Assignment Asia: Indonesia palm oil plantations
https://www.youtube.com/watch?v=lcrGNJ04VWc
100 Years of Palm Oil Production (in Malaysia): https://www.youtube.com/watch?v=jQAcqkMDKDg
Soybean farming
Illinois Soybean Farm – America's Heartland https://www.youtube.com/watch?time_continue=4&v=3RYY8TbbkYI
Serious Science: Soybean farming https://www.youtube.com/watch?v=VeBrvJNP9z0

Materials (You can purchase most of the materials at https://thecandlemakersstore.com/)

For 6 groups you will need:

18 metal candle wick centering devices (You can instead use a popsicle stick with a hole in the middle.)
soy wax (Golden wax 444 works well) (Need 1.25 pounds to fill 8, 1.5 oz containers)

Soy-stainable

palm wax (Starburst (glass glow) palm wax 2322A works well and is RSPO certified) (Need 1.25 pounds to fill 8, 1.5 oz containers)
parafilm wax (IGI 4630 paraffex (Harmony Blend) works well) (Need 1.25 pounds to fill 8, 1.5 oz containers)
scissors or stainless steel wick trimmers
scent (optional) – 1 oz per pound
18 - wicks (For small containers, CD-10 work well)
18 equal glass or metal containers (the larger container, the more wax needed)
candle thermometer
digital scale (both standard and metric scales)
6 rulers
6 ring stands
lighter or matches
oven glove
6 light meters
18 standard wick stickers
6 straws
3 melting pots (A presto style pot with a spout (easiest to use) or candle pouring pot) (will need a pot of water to place pot in on a hot plate if using this method)

This step should be started before students arrive. Set up three stations, one with each wax type from which students may pour. To get a more accurate measure per candle, use pipette pumps to draw up 40 ml of melted wax of each type to then add to each container.

Place at least 2lb of wax in the melt and melt to the corresponding temperature:

1. Soy: Melt Point: 51.6°C (125°F), Melting Range: 51.6 – 57.2°C (125 – 135°F) and pour. If adding fragrance, add fragrance around 44.3°C (110°F).
2. Palm: Melt Point: 58.9°C (138°F), Melting Range: 65.5-82.5°C (150 - 180°F) and pour. If adding fragrance, add fragrance around 60°C (140°F).
3. Paraffin: Melt Point: 49°C (120°F), Melting Range: 54.4-82.2°C (130 – 180°F) and pour. If adding fragrance, add around 60°C (140°F).