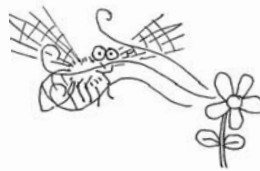


## 12. Scent-sation



<b>Aim</b>	Students identify plants with scent in the school garden. They do research to find out ways to extract selected chemicals to produce scented products (essential oils, mosquito repellent) and how plants benefit by having scents.
<b>Recommended for</b>	Sec 1-3
<b>Subject Links</b>	Chemistry: organic compounds; Biology: pollination
<b>Horticultural Skills</b>	Herbs, spices and/or fragrant plants
<b>Process Skills</b>	Observing, generating
<b>Equipment/Materials</b>	Secateurs (for harvesting plants). Optional: a fragrant flower or a bottle of perfume, 'A Guide to Herbs and Spices' (Singapore Science Centre Guide Book), '1001 Garden Plants in Singapore' (2nd Edition), National Parks Board
<b>Duration</b>	1-2 gardening session/s (1-2 hours)
<b>Preparation</b>	Photocopy the handouts and book the computer room (for web research)
<b>Safety</b>	Look out for students who may be allergic to pollen in the air or plant sap.

### Procedure

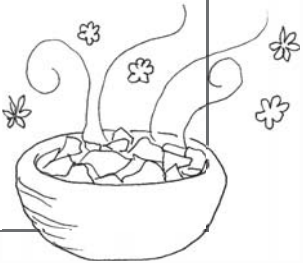
1. Pass a fragrant flower around the class or let students smell some perfume.
2. Distribute the handout, explain the activity and briefly run through the main points on the handout.
3. Students go to the school garden to identify plants with scent in your school garden.
4. Let the students go to the computer room to do their web research. Go through the answers from 2a to 2d in the handout.
5. Guide the students as they select their scented products. Help them obtain the equipment and materials. Guide them as they make their product/s.
6. Give them feedback and help them improve on their 'recipe', if needed.
7. Teams can post pictures of their products on your school's blog or on the NParks Gardening blog 'Young Gardeners' ([http://www.nparks.gov.sg/blogs/young\\_gardeners/](http://www.nparks.gov.sg/blogs/young_gardeners/)).
8. Extension: let the students make suggestions for scented plants to be planted in the school garden. Get them involved in planting and caring for these.



Activity 12



## Debrief

<p><b>Plants that release their scents</b></p> <p><b>Plants and trees with fragrant flowers</b>            Tembusu (<i>Fragrea fragrans</i>)            Frangipani (<i>Plumeria rubra cultivar</i>)            Cape Jasmine (<i>Gardenia jasminoides</i>)            Angelonia (<i>Angelonia salicariaefoli</i>)            Ylang Ylang (<i>Cananga odorata</i>)</p> <p><b>Plants with fruits that give off a smell</b>            Durian (<i>Durio</i> sp.)            Champedak (<i>Artocarpus integer</i>)            Jackfruit (<i>Artocarpus heterophyllus</i>)</p>	<p><b>Plants which have distinct smells in their plant parts</b> (may need to be crushed to smell the scent)</p> <p>Mosquito plant (<i>Citronella</i>)            Lemon grass (<i>Cymbopogon citratus</i>)            Basil (<i>Ocimum basilicum</i>)            Pandan (<i>Pandanus amaryllifolius</i>)            Curry leaf plant (<i>Murraya koenigii</i>)            Mint (<i>Mentha</i> spp.)            Lime (<i>Citrus aurantifolia</i>)            Ginger (<i>Zingiber officinale</i>)</p> 
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- a) **What causes fragrance in plants?**  
 Organic compounds produced in their leaves or flowers (petals) e.g. in Pandan, piperidine-like alkaloids are the compounds which give Pandan its fragrance.
- b) **How does having fragrance benefit plants?**
- Flowers have fragrance – to attract pollinators like moths and bees to help pollinate their flowers.
  - Organic compounds causing fragrance can be found in many parts of plants – bark, fruit and even roots! One main function is to protect the plant from being eaten by animals (especially insects) which will eat and damage the parts. These organic compounds act as toxins or poisons which the animals will avoid.
- c) **How have people used the fragrance in plants?**
- In making scented products like perfumes, essential oils, insect repellents and soaps etc.
  - To flavour food (e.g. fragrant herbs and spices)
  - In aromatherapy (the use of plant extracts to promote health and well-being, alternative medicine)
- d) **Some simple methods of extracting fragrances**
- **Extraction** - commonly used to extract oils from the rinds of citrus. Rinds are squeezed by hand and a sponge is used to collect the essential oils. To make it easier to extract, the rinds are soaked in water and then turned upside down (cells containing the oils will break apart) and the oils will drip down to be soaked up by the sponge.
  - **Cold Pressed** – the plant part is squeezed mechanically to force the oils out. Used for nuts, seeds, rinds of citrus. The extracted oils contain water, the latter of which will evaporate in time, leaving just the essential oils.
  - **Infusion** (solvent-extraction) – the use of water or oil (hot or cold) to extract the compounds from 'damaged' plant parts. E.g. can be used for extracting herbs like rosemary and other compounds e.g. lemon scent.

### Additional information and terminology on fragrance

- What are essential oils? They are any concentrated, hydrophobic liquid containing volatile aroma (fragrant) compounds from plants.
  - Essential oils can be extracted from different parts of plants including leaves, flowers, fruits, bark and even roots.
  - **Other methods of extracting fragrances (not in the scope of this activity):**
    - **Distillation** - the plant material is heated and the volatile fragrant compounds are then separated and condensed (then able separate and be condensed)
    - **Solvent Extraction (alcohol)** – the use of alcohol to extract the organic compounds
- § Ask students to share with the class what they have learnt from this activity. Alternatively, you could ask them to fill in the reflection sheet in Annex 3 and discuss their reflections.

Name : Members of your team : 

## 12. Scent-sation

*Scents or fragrances are very powerful triggers to our human brains. Some smells can be calming (lavender), other invigorating and mind-clearing (lemon and mint). Some of the best fragrances are made by plants. In this activity, you learn how to make your own scented products. While doing so, ponder why plants produce fragrance?*

### Project Objectives

Your Team has to:

- Identify plants with scent in the school garden
- Do research on scented plants and how to extract chemicals from these plants to produce your team's own scented product/s (essential oils, mosquito repellent etc.)

### Duration of activity

1-2 gardening session/s (1-2 hours)

### Suggested Steps

1. Go to your school garden, identify and list the scented plants found there.
2. Go to the computer room to do research on scented plants:
  - a) What causes fragrance in plants?
  - b) How does having fragrance benefit plants?
  - c) How have people used the fragrance in plants?
  - d) Some **simple methods** of extracting fragrances
3. With information from your research and list of plants, brainstorm your team's scented product.
4. Obtain the equipment and 'ingredients' and try making it.
5. Ask your teacher and friends to give comments and feedback on your team's new scented product. Give your product a name!
6. You can post pictures of your products on your school's blog or on the NParks Gardening blog 'Young Gardeners' ([http://www.nparks.gov.sg/blogs/young\\_gardeners/](http://www.nparks.gov.sg/blogs/young_gardeners/)).

#### Equipment/Materials

- Secateurs (for harvesting plants)
- Optional: a fragrant flower or a bottle of perfume, 'A Guide to Herbs and Spices' (Singapore Science Centre Guide Book), '1001 Garden Plants in Singapore' (2nd Edition), National Parks Board



### Tips!

- The scent of plants is strongest in the morning and evening.
- You can refer to the '1001 Garden Plant in Singapore' (2nd Edition), National Parks Board or the NParks website, under 'Plant reference', 'Fragrant Plants' for a list: <http://www.nparks.gov.sg/PlantSubCategory.aspx?id=11>

### Extension

- Make suggestions to add new fragrant plants to your school garden if they cannot be found. Take part in planting and caring for them
- Your team can offer your products as part of Activity 2 – Home Grown Business.