Growing Guide for Green Fingers

Teachers’ Toolkit
We hope you will find this pack useful.

It contains a number of documents designed to help make planting bulbs, sowing seeds and nurturing plants to their full potential a pleasure rather than a chore.

We welcome your feedback to ensure this pack remains up to date and relevant for staff and volunteers responsible for inspiring and supporting school children to become the Green Fingered Gardeners of our future!

This pack is not an exhaustive list of documents.

We hope it may inspire you to explore a wide range of activities with the aim of ‘bringing to life’ life itself, in many fun and engaging ways.
Introduction

There is nothing more satisfying than seeing a seed or bulb that’s been lovingly planted, establish itself as a healthy and mature plant with flowers that give way to further seeds and/or fruit. With appropriate care and attention, and ensuring we provide the essential conditions that most plants need to grow, we can all be Green Fingered Gardeners with very little effort but with great rewards!

It might seem like magic at times and indeed ‘life’ is an amazing process but everything you read about in this pack is easy to achieve. It’s truly not rocket science (unless you’re actually growing Rocket *Eruca sativa*)!

This pack is designed to provide a basis for further study and a source of inspiration to develop exciting new activities based around the subject of bulb and seed growing.

The information is split in to a number of areas for clarity and ease of use.

1) Activity outlines with suggested extensions
2) Worksheet ideas, designed to support engagement and the process of learn in but requiring adaption depending on class age and ability.
3) Web links suggesting places for further research and support material

You will find a table that summarises links between activities and the National Curriculum for Key Stage 1 and 2

We welcome your feedback to ensure this pack remains as up to date and relevant as possible - contact details can be found on the back of the pack folder.

Further information:

There are many useful websites and further resources available online. We particularly recommend the following sources of information:

- [http://www.foodgrowingschools.org/](http://www.foodgrowingschools.org/) First stop advice, support and resources
- [www.rhs.org.uk/learning/education/children.asp](http://www.rhs.org.uk/learning/education/children.asp/) Royal Horticultural Society site including advisory leaflets, posters and teaching resources
- [www.bbc.co.uk/gardening/htbg/](http://www.bbc.co.uk/gardening/htbg/) ‘How to be a gardener’ series

You will can find further information that may be of use to you by visiting:

- [www.royalparks.gsi.gov.uk/](http://www.royalparks.gsi.gov.uk/) The Royal Parks website
Key National Curriculum Links

Summary Activity Links to the National Curriculum KS 1 & 2
Please note this table is intended for guidance only. Teachers may choose to adapt the activities outlined to support the specific needs and abilities of their class.

<table>
<thead>
<tr>
<th>Doc.</th>
<th>Activity Sheet Title</th>
<th>Science</th>
<th>English</th>
<th>Mathematics</th>
<th>Computing</th>
<th>Art</th>
<th>History</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diary of a Green Fingered Gardener</td>
<td>KS 1 &amp; 2</td>
<td>KS 1 &amp; 2</td>
<td>KS 1 &amp; 2</td>
<td>KS 1 &amp; 2</td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Planting bulbs</td>
<td>KS 1 &amp; 2</td>
<td>KS 1 &amp; 2</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3</td>
<td>Structure &amp; role of a plant</td>
<td>KS 1 &amp; 2</td>
<td></td>
<td></td>
<td>KS 1 &amp; 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Myth of Narcissus</td>
<td></td>
<td>KS 2</td>
<td></td>
<td>KS 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sowing seeds</td>
<td>KS 1 &amp; 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Magic Bean</td>
<td>KS 1</td>
<td>KS 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Plants Inspiring Poetry, Music &amp; Art</td>
<td>KS 1 &amp; 2</td>
<td></td>
<td>KS 1 &amp; 2</td>
<td>KS 1 &amp; 2</td>
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</tr>
</tbody>
</table>

Detailed National Curriculum Links

KS 1 Yrs 1 & 2: Science – Working Scientifically

• During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:
  o Asking simple questions and recognising that they can be answered in different ways
  o Observing closely, using simple equipment
  o Performing simple tests
  o Using observations and ideas to suggest answers to questions
  o Gathering and recording data to help in answering questions

KS 1 Yr 1 Science - Plants

• Pupils should be taught to:
  o Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
  o Identify and describe the basic structure of a variety of common flowering plants, including trees

KS 1 Yr 2 Science – Working Scientifically

• During years 3 & 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:
  o Asking relevant questions and using different types of scientific enquiries to answer them
  o Setting up simple practical enquiries, comparative and fair tests
  o Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
  o Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
  o Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
  o Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
  o Identifying differences, similarities or changes related to simple scientific ideas and processes
  o Using straightforward scientific evidence to answer questions or to support their findings
Detailed National Curriculum Links cont.

KS 2 Yr 3 Science - Plants
• Pupils should be taught to:
  o Identify and describe the functions of difference parts of flowering plants: roots, stem/trunk, leaves and flowers
  o Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
  o Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal

KS2 Yr 4 Science – Living things and their habitats
• Pupils should be taught to recognise that environments can change and that this can sometimes pose dangers to living things

KS 1 Yr 1 Mathematics - Measurement
• Pupils should be taught to:
  o Compare, describe and solve practical problems for lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]
  o Measure and begin to record the following:
    □ Lengths and heights
    □ Mass/weight

KS 1 Yr 2 Mathematics - Measurement
• Pupils should be taught to choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (l/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels

KS 2 Yr 3 Mathematics - Measurement
• Pupils should be taught to measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)

KS 2 Yr 4 Mathematics - Statistics
• Pupils should be taught to:
  o Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs
  o Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

KS 1 Yr 1 English - Reading Comprehension
• Pupils should be taught to develop pleasure in reading, motivation to read, vocabulary and understanding by:
  o Listening to and discussing a wide range of poems, stories and non-fiction at a level beyond that at which they can read independently
  o Being encouraged to link what they read or hear read to their own experiences
  o Becoming very familiar with key stories, fairy stories and traditional tales, retelling them and considering their particular characteristics
  o Learning to appreciate rhymes and poems, and recite some by heart

KS 1 Yr 1 English - Composition
• Pupils should be taught to read aloud their writing clearly enough to be heard by their peers and the teacher
KS 1 Yr 2 English - Comprehension
• Pupils should be taught to develop pleasure in reading, motivation to read, vocabulary and understanding by:
  o Listening to, **discussing and expressing views** about a wide range of contemporary and classic poetry, stories and non-fiction at a level beyond that at which they can read independently
  o Becoming increasingly familiar with and retelling a wider range of stories, **fairy stories** and **traditional tales**
  o Continuing to build up a repertoire of **poems learnt by heart**, appreciating these and reciting some, with appropriate intonation to make the meaning clear

KS 1 Yr 2 English - Composition
• Pupils should be taught to develop positive attitudes towards and stamina for writing by:
  o Writing about **real events**
  o Writing poetry
• Pupils should be taught to **read aloud what they have written** with appropriate intonation to make the meaning clear.

KS 2 Yrs 3 & 4 English - Comprehension
• Pupils should be taught to develop positive attitudes to reading and understanding of what they read by:
  o Listening to and **discussing a wide range** of fiction, poetry, plays, non-fiction and **reference books** or textbooks
  o Increasing their familiarity with a wide range of books, including **fairy stories**, **myths, legends**, and retelling some of these orally
  o Preparing **poems** and play scripts to **read aloud** and to perform, showing understanding through **intonation, tone, volume and action**
  o Recognising some different forms of poetry [for example, free verse, narrative poetry]
### Spring Bulbs

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daffodil (Narcissus, variety: Carlton)</td>
<td>1</td>
<td>1~2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>n/a</td>
<td>n/a</td>
<td>7.5 apart</td>
<td>10 deep</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Minature Daffodil (Narcissus, variety: Tête-à-Tête)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>n/a</td>
<td>n/a</td>
<td>7.5 apart</td>
<td>10 deep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyacinth (Hyacinthus)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>n/a</td>
<td>n/a</td>
<td>7.5 apart</td>
<td>10 deep</td>
<td></td>
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</tbody>
</table>

### Summer Seeds - Flowers

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Days from Sowing until Germination</th>
<th>Days from Sowing until Harvest</th>
<th>Spacing (cm) following Transplanting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snapdragon (Antirrhinum)</td>
<td>15</td>
<td>90</td>
<td>30</td>
</tr>
<tr>
<td>Californian Poppy (Eschscholzia)</td>
<td>12</td>
<td>65</td>
<td>15</td>
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<tr>
<td>Candytuft (Iberis)</td>
<td>20</td>
<td>20</td>
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<tr>
<td>Cornflower (Centaurea cyanus)</td>
<td>10 (A)</td>
<td>20 (P)</td>
<td>30</td>
</tr>
<tr>
<td>Cosmea (Cosmos)</td>
<td>6</td>
<td>58</td>
<td>40</td>
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<tr>
<td>Sunflower (Helianthus)</td>
<td>8</td>
<td>80</td>
<td>60</td>
</tr>
</tbody>
</table>

### Summer Seeds - Fruit

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Days from Sowing until Harvest</th>
<th>10</th>
<th>130</th>
<th>45</th>
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</thead>
<tbody>
<tr>
<td>Tomato</td>
<td>10</td>
<td>130</td>
<td>45</td>
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</tbody>
</table>
### Harvest/Flowering Period

#### Planting Outside

<table>
<thead>
<tr>
<th>Plant Names</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
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<tbody>
<tr>
<td>Summer Seeds - Herbs</td>
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<td>Basil</td>
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<td>Chives</td>
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<tr>
<td>Coriander</td>
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<td>Parsley</td>
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<td>Thyme</td>
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<tr>
<td>Summer Seeds - Vegetables</td>
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<td>Beetroot</td>
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<tr>
<td>Summer Carrot</td>
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<tr>
<td>Courgette - Tarmino</td>
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<td></td>
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<tr>
<td>Lettuce</td>
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<tr>
<td>Radish</td>
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<tr>
<td>Runner Bean</td>
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<td></td>
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<tr>
<td>Spinach</td>
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</tbody>
</table>

### Key:
- Numbers indicate planting time in relation to flowering period.
- All figures are an estimate and dependent on local growing conditions.

<table>
<thead>
<tr>
<th>Month</th>
<th>Days from Sowing until Germination</th>
<th>Days from Sowing until Harvest</th>
<th>Spacing (cm) following Transplanting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>42</td>
<td></td>
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<tr>
<td></td>
<td>21</td>
<td>60</td>
<td>20</td>
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<tr>
<td></td>
<td>24</td>
<td>15</td>
<td></td>
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<tr>
<td></td>
<td>20</td>
<td>60</td>
<td>22</td>
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<tr>
<td></td>
<td>15</td>
<td>85</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>240</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>95</td>
<td>100</td>
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<tr>
<td></td>
<td>12</td>
<td>65</td>
<td>30</td>
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<tr>
<td></td>
<td>10</td>
<td>40</td>
<td>5</td>
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<tr>
<td></td>
<td>12</td>
<td>90</td>
<td>5</td>
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<tr>
<td></td>
<td>10</td>
<td>35</td>
<td>5</td>
</tr>
</tbody>
</table>
Completing a ‘Green Fingered Gardener Diary Sheet’

As part of the sowing seeds and planting bulbs activities, pupils can be encouraged to fill out a diary sheet on a regular basis, ideally at least one per week, to monitor the growth and health of their developing seedling or plant.

All pupils will: Learn how to undertake simple measurements and record the results.

Most pupils will: Develop an understanding that plants react to different atmospheric conditions such as the amount of light, water or warmth they receive.

A few pupils will: Learn to use an Excel spreadsheet to undertake analysis and comparison of data collected and subsequently create simple graphs to represent this information in a visually attractive format.

<table>
<thead>
<tr>
<th>Pupil Activity</th>
<th>Learning Outcome</th>
<th>Teacher Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupils observe the conditions surrounding their plant pot and record these in the format provided. Some plants may be grown separately and used as test specimens - exposed to extreme atmospheric conditions that are likely to adversely affect the development and growth of the specimen</td>
<td>Pupils learn to record their results in a scientific format - using the appropriate terminology to describe measurements of temperature, distance and weight and to be consistent with their observations</td>
<td>The teacher provides demonstrations in how to safely and accurately use the relevant equipment such as thermometer, scales and light meter</td>
</tr>
<tr>
<td>Pupils note any unusual developments associated with their plants - aphids, mildew or other diseases on leaves, mishapen growth etc</td>
<td>Pupils gain an understanding that plants can be affected by a number of pests and diseases which in turn have the effect of inhibiting growth or in extreme cases, can kill a plant</td>
<td>The teacher provides optional background information regarding specific pests or diseases such as leaf blight that are witnessed by pupils. Pupils may be encouraged to use their school computers to research such issues and see if there are safe ways to tackle them e.g. a mild soap solution for greenfly</td>
</tr>
</tbody>
</table>
Extension Activity

The data collected in the diary sheets can be collated in to an Excel spreadsheet or Word table. An Excel spreadsheet is preferable as it allows a number of simple mathematical formulas to be easily undertaken e.g. computing the average temperature across the growing period or plotting a graph to examine potential correlations between the speed of growth and parameters such as temperature or moisture level.

Teachers may wish to discuss with older pupils the benefits and drawbacks of using a system of observed light, temperature and soil moisture level verses using scientific instruments to measure the same conditions (qualitative and quantitative data):

- Consistency of measurements – by the same pupil at different times or between different pupils at the same time - measuring their own individual plant and maybe a communal class specimen as a benchmark.
- Accurate data
- Requirement to have/purchase/borrow specialised equipment
- Training to use this equipment

Ideally diary sheets should be completed at regular intervals during the main growing period of the plant. For consistency, it is most valuable if this takes place at a similar time of day and, if weekly, on the same day each week.

5 Diary sheets will provide sufficient data to establish a potential correlation, if such exists between differing parameters and allow a graph or chart to be plotted using the results.
The Diary of a Green-Fingered Gardener

<table>
<thead>
<tr>
<th>Your Name: ......................................................</th>
<th>Date/Time: .......................................</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Level (circle most appropriate)</td>
<td>Date/Time: .......................................</td>
</tr>
<tr>
<td>Dark</td>
<td></td>
</tr>
<tr>
<td>Dim</td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td></td>
</tr>
<tr>
<td>Bright</td>
<td></td>
</tr>
<tr>
<td>Very Bright</td>
<td></td>
</tr>
<tr>
<td>Light level recording: (LUX)</td>
<td></td>
</tr>
<tr>
<td>Temperature (circle most appropriate)</td>
<td></td>
</tr>
<tr>
<td>Cold</td>
<td></td>
</tr>
<tr>
<td>Cool</td>
<td></td>
</tr>
<tr>
<td>Comfortable</td>
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<tr>
<td>Warm</td>
<td></td>
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<tr>
<td>Hot</td>
<td></td>
</tr>
<tr>
<td>Temperature recording: (Celsius)</td>
<td></td>
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<tr>
<td>Soil Moisture Level (before watering)</td>
<td></td>
</tr>
<tr>
<td>Very Wet</td>
<td></td>
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<tr>
<td>Wet</td>
<td></td>
</tr>
<tr>
<td>Damp</td>
<td></td>
</tr>
<tr>
<td>Dry</td>
<td></td>
</tr>
<tr>
<td>Very Dry</td>
<td></td>
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<tr>
<td>Watered Plant? (circle as appropriate)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Plant Measurements (mm/cm)</td>
<td></td>
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<tr>
<td>________</td>
<td></td>
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<tr>
<td>________</td>
<td></td>
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<tr>
<td>Plant Weight (before watering)</td>
<td></td>
</tr>
<tr>
<td>________ (Gramps)</td>
<td></td>
</tr>
<tr>
<td>Plant Weight (after watering)</td>
<td></td>
</tr>
<tr>
<td>________ (Gramps)</td>
<td></td>
</tr>
<tr>
<td>General Observations</td>
<td></td>
</tr>
<tr>
<td>E.g. pests and disease damaging your plant, unusual forms of growth or yellow leaves</td>
<td></td>
</tr>
</tbody>
</table>
Make a sketch of your plant below:

Remember to annotate (label) your drawing with key plant features: stem, leaves, flowers etc. You may wish to also focus on a small part of the plant such as the bud or flower and draw this in more detail. Explain anything that may be forgotten later e.g. colour (particularly important if you are making a pencil sketch)
Planting a Bulb

Bulbs are a clever adaptation of nature that allows plants to survive, hidden beneath the ground during periods of dry, cold or shady conditions.

All pupils will: learn how to plant a bulb successfully and look after the developing plant

Most pupils will: Understand the determining factors that are required to enable the majority of plants to grow successfully

A few pupils will: Appreciate the relationship between a plant and where it grows – introducing the subject of habitats and being able to give some examples of habitats with associated plants

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<tr>
<td>Plant Narcissus/ Daffodil and Hyacinth bulbs ideally using peat-free compost in pots or school grounds (option to use pots from approved LCFS supplier)</td>
<td>Understand the correct method to plant a bulb for maximum growth and identify from where roots and shoots will emerge</td>
<td>Demonstrate correct placement and alignment of bulb. Ask why soil is required beneath the bulb. Depth can affect strength of stem</td>
</tr>
<tr>
<td>Ensure the bulbs remain well watered but not saturated during their growing period</td>
<td>Appreciate why a plant needs water to grow - one of the key ingredients of life on earth. Understand how most plants absorb the water they need - roots.</td>
<td>During the activity, explain that typically 80% to 90% of plant weight is water and 60% of an adult human is water!</td>
</tr>
<tr>
<td>Monitor the growth of the plants and adjust the growing conditions according to the condition of the leaves</td>
<td>Develop observation skills, create tables, use maths equations and use equipment to measure and monitor plant growth</td>
<td>Encourage a diary sheet to be completed on a regular basis. Information from this can then be transferred to a table and then plotted on a graph.</td>
</tr>
</tbody>
</table>

Please note, the instructions that follow are intended to inform teachers prior to pupils undertaking bulb planting. The information should be adapted and disseminated to pupils by the teacher according to age, ability and classroom/school conditions.
Instructions

1) Collect together the items you will need to plant your daffodil or hyacinth bulb:
- Plant pot (which should be at least twice the depth of your bulb and ideally 3 times as deep)
- Bulb
- Peat-free compost
- Watering can
- Tray to stand pot in
- Gardening gloves (please note, an allergic reaction can be experienced when handling Narcissus {Daffodil} and Hyacinth bulbs so gloves should be used at all times)

2) Ensure an area has been prepared in readiness for the planted up pots:
- Ideally bulbs should be exposed to a period of cold prior to planting
- This can be for a period of two or three weeks however do not allow them to freeze
- This mimics the winter period if the bulb is being grown indoors and will trigger growth once the bulb is exposed to warmth
- Please be aware that growth will then take place so be aware of this in relation to the judging period for the spring flowers
- Growth can be slowed again by placing the plants in a cooler area
- The growing area should ideally have a good flow of air and be provided with an even light source – not on a window ledge above a radiator as this can dry the soil out rapidly and the plant may bolt for the light

3) Take the plant pot and fill it one third with compost:

4) Place the bulb with the narrow or pointed end upright:
- There may or may not be some evidence of dried roots at the wider end of the bulb
- Ensure there is at least 2cm of compost underneath the base of the bulb for the roots to grow in to
5) Cover the bulb with compost until the pot is filled to 1cm from the top:
   - This allows watering without the water running off and making a mess

6) Water the pot, ensuring the water doesn’t spill and wash the compost out:
   - An effective but slightly less fun way to water is to place the water in a tray, place the plant pot/s in the tray and allow the water to ‘wick’ or soak up until the compost is saturated then pour excess water away to ensure the bulb does not stay in saturated soil for a long period

7) Place the plant pots in a place that will receive an even distribution of light and warmth, avoiding excessive heat or cold:

8) Monitor the bulbs regularly:
   - Check the soil to ensure it doesn’t dry out
   - Water when necessary.
9) When the bulb begins to shoot and send growth above the soil level, you will know it has germinated successfully:

- Be sure to rotate the pot regularly
- This ensures the developing plant receives an even light distribution and will support a strong, upright stem for the flower

Handy Hints

- If a large quantity of small pots are being planted up by individual class members and they will be left at school, a large seed tray may be the most efficient way to ensure all plants receive sufficient water however this negates the need for individual pupils to assess and water their plant as appropriate. The benefits and negative aspects to this method should be weighed up prior to beginning the exercise.

Extension Activity 1 – Compare a healthy plant with plant specimens under stress

Start by establishing and maintaining a healthy plant with a good balance of soil, water, evenly distributed light and warmth. Under test conditions, expose plants to conditions that may adversely affect their growth and measure the results using a diary sheet:

- Provide the plant with salt rather than fresh water
- Allow the soil to dry out completely for several weeks
- Place in a dark, warm room for several weeks
- Place in a cool, dark place such as fridge for several weeks
- Allow the plant to sit constantly in water so the soil and roots are permanently saturated/waterlogged
- Place in bright conditions but with light coming from one direction only

Questions to consider and answer following investigations:

- What factors have a negative effect on the growth of plants (causing stunted/reduced growth, yellow or browning of leaves etc.) and why do these factors affect plants in this way?
- What can be done to encourage healthy and sustained growth without causing plants to become ‘leggy’ – too tall and weak to stand up without support

Extension Activity 2 – Dissection of daffodil flowers

- Examine the detailed elements that are not normally visible upon inspection. Care should be taken if doing this with Narcissus bulbs and flowers as the sap contains a mild toxin that can irritate if coming in to contact with the skin. Use of vinyl gloves can overcome this or using pictures to show the different stages of dissection. There are many examples on the internet where this has been done and quite effective, annotated 3D pictures have been made:
  
  https://class4bds.files.wordpress.com/2011/03/photo.jpg
The Myth of Narcissus

The naming of plants has long been a subject for discussion, with the Linnaean System established to eliminate confusion. This activity looks at where some of the inspiration for plant names has come from – both common and scientific.

All pupils will: learn that the common daffodil is also known as Narcissus. They will examine the myth of the Greek hunter named Narcissus, the moral of his story and how his name came to represent a human characteristic of vanity today

Most pupils will: think about words and language they might use to describe both the plants they are growing in school and the process they have undertaken to ensure the successful growth of their flowers

A few pupils will: learn that many words we use today originate from other languages or are inspired by people’s names in history and many of these are botanical (relating to plants) in origin

The class examines an abridged version of the Greek myth of Narcissus, a Greek hunter judged to have exceptional beauty, who is led by Nemesis to a pool, falls in love with his reflection and pines away looking at himself.

https://en.wikipedia.org/wiki/Narcissus_(mythology)

The material on offer is wide-ranging. Teachers will need to be selective to ensure the information, language and imagery is appropriate for their relevant age group.

The class is introduced to the etymology of the name Narcissus, the word Narcissism and the history behind someone’s ‘Nemesis’.

Other nomenclature (the choosing of names for things) to investigate: Tête-à-tête – ‘head-to-head’ in French – comes about because the flower heads face each other during normal growth and can be imagined as having a conversation with each other.

The class considers words that describe the Narcissus flower – thinking about practical adjectives (describing words) e.g. colour, shape, size, smell (being aware that some descriptive words may also be regarded as subjective) and subjective adjectives e.g. describe the beauty of the plant/flower, considering how the plant makes them feel and how they have found the process of growing a plant.
During this exercise, opposite words can be compared and contrasted with each other e.g. happy & sad, nice & horrible, pretty/attractive & unappealing/ugly.

Examples of words that may be discussed are:

- Simple colours: Purple, mauve, pink, white, cream, green, yellow (leaves if plant has been grown in low light/poor nutrient/water deprived conditions)
- Open form, compound colours: snow white, dusky pink, sky blue
- Shape/Size: Tall, elongated, upright, floppy, short, stumpy
- Smell: Sweet, scented, sickly, smelly, attractive, nice, horrible, pleasant bouquet
- Appearance: Pretty, lovely, attractive, colourful, bright, dull
- Emotions/feelings: Happy, sad, satisfied, angry, upset or frustrated (if it hasn’t grown), pleased, proud, excited, interested, bored
- Describing the process: Long, frustrating, slow, surprising, satisfying, enjoyable, educational, interesting, fun, challenging, fascinating, boring, wondrous, amazing

**Further studies:**

Pupils may wish to consider other words that have entered everyday usage in the English language that come from other languages or are inspired by people’s names due to their own characteristics. There are other botanically inspired words and expressions such as:

- Shrinking Violet – describing someone who is shy
- Blushing Rose – the colour a person’s cheeks turn when they are embarrassed, mimicking the flower
- Lily white
- Fresh as a Daisy

Can the pupils think of any more, what they mean and from where they might have originated?

How many pupils in the class have botanical names – how many are boys and girls? Some have been mentioned earlier. Others might include:

Jasmine, Camellia, Rosemary, Hyacinth (Hyacinth is now used as a female name now but was once considered a male name):

https://www.disneybaby.com/blog/50-baby-names-inspired-by-flowers/
Sowing the Seed: Growing Summer Plants from Seed

Students will learn how to sow a range of summer flowering plant seed. The end result will be to create a fine summer display for appreciation by students, teachers and visitors to the school. The display will also provide a valuable source of nectar (food) for visiting insects such as butterflies and bees and can also be assessed by a London Children’s Flower Society judge.

**All pupils will:** develop an understanding that seeds need a combination of soil, warmth and moisture to germinate. With the addition of light they grow into healthy plants but each factor may be required to a lesser or greater extent depending on the needs of the individual plant species.

**Most pupils will:** Understand that plants adapt to live in different environments requiring less or more of the factors listed above. These environments are known as habitats or microhabitats.

**A few pupils will:** Appreciate the affects that deprivation or inundation of soil, warmth, moisture and light may have on the developing plants.

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<tr>
<td>Read instructions, research the plant and prepare materials in readiness for sowing seeds</td>
<td>Pupils will gain an understanding of the needs of that plant and adjust the growing conditions accordingly</td>
<td>Provide the pupils with background research to read or access to secure internet connections to undertake their own research</td>
</tr>
<tr>
<td>Follow instructions to sow the plant seeds and water them according to sowing instructions</td>
<td>Pupils’ understanding will be reinforced with practical activity - identifying what the plant will need to grow successfully</td>
<td>Remind pupils why they are doing this and oversee to ensure seeds are planted at an appropriate depth, space apart and watered as required</td>
</tr>
<tr>
<td>Monitor the plant growth, record on the diary form and summarise data in an Excel spreadsheet</td>
<td>Pupils develop observation skills, create tables, use maths equations and use equipment to measure and monitor plant growth</td>
<td>Encourage a diary sheet to be completed on a regular basis. Information from this can then be transferred to a table and then plotted on a graph</td>
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Please note, the instructions that follow are intended to inform teachers prior to pupils undertaking bulb planting. The information should be adapted and disseminated to pupils by the teacher according to age, ability and classroom/school conditions.
Instructions

1) Collect together the items you will need to plant your daffodil or hyacinth bulb:
   - Plant pots or seed tray
   - Seeds
   - Peat-free compost
   - Watering can with fine rose
   - Tray to stand pots in
   - Thin cotton gardening gloves or vinyl gloves (optional as they can make handling the seeds more tricky)

2) Ensure an area has been carefully chosen and prepared in readiness for the planted up pots:
   - Germination will be encouraged by placing the well-watered pots initially in a dark, warm area, away from sources of direct heat such as radiators
   - Plant growth can be slowed by placing the pots in a cooler area – by a north facing window indoors or in the shade if growing outside
   - The growing area should ideally have a good flow of air and be provided with an even light source – ideally not on a window ledge above a radiator as this can dry the soil out rapidly and the plant may bolt for the light. This means the plant grows rapidly towards the single light source but develops insufficient structural strength to stand unsupported
   - If light is strong from one direction, be sure to keep turning the pots to ensure they receive an even distribution

3) Take the plant pot and fill it two-thirds with compost:

4) Follow the instructions on the seed pack as to the exact depth and spacing – this will vary depending on the plant species. As a rule of thumb, larger seeds require more space and individual placement:
   http://clipart-library.com/clipart/pc5rBG4Li.htm
5) **Cover the seeds with a thin layer of compost until the pot is filled to 1cm from the top:**
   - This allows the soil to be moistened without water running off and making a mess

6) **Water the pot, ensuring the water doesn’t spill and wash the compost out:**
   - An effective but slightly less fun way to water is to place the water in a tray, place the plant pot/s in the tray and allow the water to ‘wick’ or soak up until the compost is saturated then pour excess water away to ensure the seeds do not stay in saturated soil for a long period
   - This is particularly valuable for the smallest seeds which can be prone to washing to the surface

7) **Place the plant pots in a place that will receive an even distribution of light and warmth, avoiding excessive heat or cold:**

8) **Monitor the pots regularly:**
   - Check the soil to ensure it doesn’t dry out
   - Water when necessary
   - Placing a clear 2 litre plastic bottle (carefully cut in half) on top of the pot/soil can act like a cloche (mini-greenhouse) and protect the seeds/seedlings during their first few days – maintaining moisture and warmth. This is especially important if the seeds have been planted in soil outside
9) When the seeds begins to shoot (germinate) and send growth above the soil level, you will know your plants are growing successfully:

- Be sure to rotate the pot regularly
- This ensures the developing plants receive an even light distribution and will support strong, upright stems for the flowers

10) Some species will require supports to be added – these will vary in height depending on the species being grown and the eventual height it will reach:

- Support sticks may initially be as short as lolly sticks but birch twigs work well for peas to grow in to
- Runner beans will require longer garden canes or sticks, tied in a wigwam shape and the tops covered to protect people’s eyes

11) Once the seedlings have developed 3 or 4 pairs of leaves, many species will benefit from being planted outside, if an appropriate flowerbed is available in the school grounds – be sure to consider local weather conditions and refer to the chart provided in relation to planting outside for additional guidance:

- Care should be taken not to damage the roots and stems which are very fragile at this stage
- If no outside ground exists, planting in to a larger pot inside will allow the plants to develop a larger root system
The Magic Bean

Pupils read and discuss the story of Jack and the Beanstalk in relation to bean plants that they plant and grow – either in the classroom or grounds of their school.

**All pupils will:** read the story of Jack and the Beanstalk and discuss how realistic the fairy story was. Thinking why such a thing might not be possible.

**Most pupils will:** plant a runner bean or pea seed, look after it and support it to grow to the maximum height possible (species and conditions allowing).

**A few pupils will:** gain an understanding that in many ways the magic of life that allows a tiny seed to grow into a large plant and to produce flowers, seeds and therefore more plants (and sometimes food for humans and other animals) is pretty amazing in its own right.

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<tr>
<td>Pupils read the story of Jack &amp; the Beanstalk, discuss what happened, why were the beans believed to be magic and what happens when things grow?</td>
<td>Pupils gain an appreciation for the wonder of growing a plant from seed and what is required (Other than magic) for this to take place</td>
<td>Support to read the story, images provided to both illustrate the story and demonstrate the growing ability of a bean</td>
</tr>
<tr>
<td>Pupils grow their own bean or observe other plants growing at school and discuss how some plants (such as trees) are much bigger and stronger at supporting a human than others</td>
<td>Pupils consider and broaden their understanding about different plants, how fast and big they grow and what they need to grow, including possible structural support</td>
<td>Provide images or examples of different types of plants - either in the school grounds or on a visit outside the school</td>
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</tbody>
</table>

Runner Bean Seed Sowing –

**KS 1 Years 1 & 2 English Reading Comprehension**

The class are introduced to the ‘magic’ that enables a seed to germinate and grow in to a plant that is many times the original size of the seed.

The teacher reads the whole or excerpts from the fairy tale, ’Jack and the Beanstalk’ and then asks:

- Is the story is believable?
  Avoid lengthy discussion about giants, talking harps etc. and focus on the beanstalk element to the story
- Could a beanstalk grow to be large enough to climb and how long would it take?
  Maybe not a beanstalk but what about other climbing plants? What do they climb on?
• How can we test our theories to see if this is possible?
• Shall we grow our own bean plant and measure it to see how fast and how big it grows?
• Who would like to guess at how fast it will grow?
  Show the class a 30cm ruler & a height chart against the wall
• How long will the bean take to begin to show above the soil (the time taken for it to germinate)?
• How long will the bean plant take to grow 30cm tall from the day of breaking through the soil?
• How tall will it grow eventually?
  Show a children’s height chart or have a wall with markings on it, in front of which the seedling can grow with appropriate support
• What colour will the leaves be?
• What colour will the flowers be?
• How long before we have beans growing on the plant?
• Where do you think runner beans would normally grow? Across the ground? Straight up in the air with no support? In amongst trees or shrubs for support?
• What part of the world did bean plants originate from – the answer to this will vary depending on the species & therefore extra research is required
Children then plant the Runner Bean or Pea seeds according to the instructions on the pack and the associated seed sowing lesson plan
Children might wish to think of some words to say once they have planted the seeds to encourage faster growth towards becoming healthy plants.
What words might they use?
What words are used in spells? Abracadabra, hey presto, alakazam
Words in Harry Potter spells (for pupils old enough to read Harry Potter) often ended with ‘us’, ‘o’ ‘sii’ e.g. Wordus Oftenso Endi!
Words to suggest:
  • Height – tall, tower, high, up, above
  • Movement – run, race, reach, dash
  • Fast – accelerate, swift, speed, zoom
  • Growth – sap, buds, leader, shoots
  • Associations with height – sky, clouds, sun, universe, stars
Discuss what the children could do to help the plants on their way (magic words aside) – provide the seeds/seedlings with warmth, light/sun, moisture/water, soil with good levels of nutrients/plant food
Explain in basic terms that runner beans along with sweet peas and edible peas belong to a very special group of plants (the legumes) that make the soil more fertile (full of food for themselves and other plants) as they grow
Parts of a Plant

Dissecting plants can aid identification of the flower parts and plant structure.

Please note: this activity should only be undertaken following a risk assessment of the equipment to be used and the toxicity of/potential allergic reactions to different plants.

All pupils will: examine a sample flower and use basic equipment to dissect it to display the key plant elements

Most pupils will: undertake an annotated drawing of their dissected plant. Younger pupils may be provided with a pre-drawn worksheet with spaces to complete the appropriate labels

A few pupils will: investigate the reproductive elements of the flower and research the methods of propagation it uses – seed dispersal, tubers, offsets or ‘daughter’ bulbs (baby bulbs that form at the base of the original bulb).

### Pupil Activity

- Pupils dissect a real flower - either in groups or individually depending on age and flower availability
- Pupils create an annotated drawing of their dissected flower

### Learning Outcome

- Pupils learn to identify the different parts of a flower and their role in the process of growth and propagation. They also develop hand to eye coordination with the delicate process of dissection
- Pupils gain skills in scale drawing, observation and learn new terminology

### Teacher Input

- Teacher demonstrates the correct method to dissect a flower, pointing out the key parts as they go.
- The teacher provides support, pre-drawn flower dissection work sheet for younger pupils
Activity Ideas

- Pupils work in small groups or individually depending on available flowers, equipment, supervision and workspace
- Flowers are dissected and the pieces spread on a white sheet or table top for easy observation
- Information to support the activity may be displayed on a whiteboard or interactive whiteboard
- Cress or mustard seeds grown well spaced out on damp kitchen towel or the equivalent will allow pupils to examine the development of an early root system and this only takes a few days to grow

Extension Activity

- Look at the structure and role of a bulb and its roots
- Pupils may wish to create an annotated collage created from the dissected pieces of their flower. An example of such work undertaken by a school group is given below:

Please note, the sap contained in daffodil/narcissus flowers, leaves, stems and bulbs can cause an allergic reaction. This should be considered when undertaking this activity as part of the activity risk assessment – cut bulbs can be contained in sealed bags. Child-sized plastic or vinyl gloves may be worn during the dissection process. Further advice in relation to this is available on the Internet.
Plants Inspiring Poetry, Music & Art

Pupils research and discuss examples of classical literature and music that have been inspired by the plants to support the practical activity of planting, caring for, observing and recording the growth of bulb and seed plants.

All pupils will: discover that plants and flowers have inspired writers, composers and artists for over 2,000 years to produce creative work that has been enjoyed and appreciated by many generations that followed.

Most pupils will: Look at examples of plant/flower inspired work and discuss what they think inspired the artists. Analyse the language, artistic styles or ways in which the artists have described or represented the essential details of the plants.

A few pupils will: create their own artwork, inspired by their research and observational studies of the plants they are growing.

- **Pupil Activity**
  - Pupils read ‘I Wandered Lonely as a Cloud’ or other literary works inspired by plants and discuss the language used and images created in their minds, by the poem
  - Pupils observe their own plants and write a creative piece inspired by leaf and flower colours, flower smells, pollinating insects or other plant related factors

- **Learning Outcome**
  - Pupils develop language skills, learning new descriptive words and gain an appreciation for how poetry and creative writing can ‘paint a picture’ in people’s minds
  - Pupils develop observational skills which are used both to create a structured piece of writing and also benefit as they assess the health and development of their plant

- **Teacher Input**
  - Identify suitable works for the pupils to study. Support them as they analyse the writer’s inspiration, use of analogy and methods of evocation
  - Ask questions to stimulate discussion and focus pupils attention on the flowers and their key characteristics

**Suggestions for activity development:**
- Pupils read the poem to themselves and then take it in turns to read each verse aloud to the class
- Discuss the images the poet is portraying
- Describe and maybe draw the scene as they imagine it, based on Wordsworth’s description
- Where might this poem be set? While the poet’s inspiration was actually Grasmere in the Lake District, Cumbria, it could be many places. What country is particularly associated with daffodils? ([https://www.cummingsstudyguides.net/Guides3/IWandered.html](https://www.cummingsstudyguides.net/Guides3/IWandered.html))
• Without describing the weather in detail, Wordsworth implies certain atmospheric conditions: the breeze causing flower heads to flutter and dance; although the poem is set in daytime, shining stars suggest clear skies; sparkling waves suggest both wind and sunshine is present

• Observe and discuss the rhyming style Wordsworth used

• Pupils consider how the poem makes them feel. Were they relaxed or stimulated? What else relaxes them? Music? Sport? Walking outside? Reading stories? Sculptures in a museum or park?

**Suggested Extension Activities:**

Other plants supplied in bulb or seed form by the London Children’s Flower Society can be researched to discover examples of inspiration by writers, painters, composers and more.

Other works that can be investigated include:

• Narcissus: a classical piece of music composed by Ethelbert Nevin in 1891 (https://en.wikipedia.org/wiki/Narcissus_(music) and used as the basis for The Laughing Song by Joyce Grenfell and Norman Wisdom in 1954 (https://www.youtube.com/watch?v=wBelu7wuY7Q)

• Red Poppy (Californian Poppy seeds supplied which has orange/yellow flowers) – generally a plant steeped in legend surrounding sleep and death that go back to the time of the Ancient Greeks and Romans. There are also links to the Napoleonic Wars of the early 19th Century and the World Wars of the 20th Century due to their habit of growing in disturbed soil following battles (https://en.wikipedia.org/wiki/Poppy)

• Ceramic Poppies: an artistic installation called ‘Blood Swept Lands and Seas of Red’ of 888,246 Ceramic Poppies located temporarily at the Tower of London, each one representing a member of the British military fatality during the First World War (https://www.hrp.org.uk/tower-of-london/history-and-stories/tower-of-london-remembers/#gs.PVi5vVM)

• Sunflowers: one of four paintings of sunflowers dating from August and September 1888. Vincent Van Gogh intended to decorate Gauguin’s room with these paintings in the so-called Yellow House that he rented in Arles in the South of France – pupils could undertake their own version of still life sunflowers or paint the flowers as they are growing, in situ within the school grounds (https://www.nationalgallery.org.uk/paintings/vincent-van-gogh-sunflowers)

• Scarborough Fair: an old song that dates back to the 17th Century, the refrain of which refers to Parsley, Sage, Rosemary and Thyme. These plants are symbols in this context, the song being an ode between a man and a woman, challenging each other to impossible tasks if they are to be reunited in love.
  
  o Parsley was thought to remove bitterness and used as a medicine to neutralise stomach bile. In the song it represents the removal of bitter feelings between the man and his lost love

  o Thyme was a symbol of love and courage. Thyme leaves were sometimes added as embroidered detail on the cloaks of knights by their ladies. The plant was also used to bolster confidence and increase happiness as far back as the times of the Ancient Greeks. (https://en.wikipedia.org/wiki/Scarborough_Fair_(ballad) & http://davesgarden.com-guides/articles/view/4394/)

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I Wandered Lonely as a Cloud
by William Wordsworth

I wandered lonely as a cloud
That floats on high o’er vales and hills,
When all at once I saw a crowd,
A host, of golden daffodils;
Beside the lake, beneath the trees,
Fluttering and dancing in the breeze.

Continuous as the stars that shine
And twinkle on the milky way,
They stretched in never-ending line
Along the margin of a bay:
Ten thousand saw I at a glance,
Tossing their heads in sprightly dance.

The waves beside them danced; but they
Out-did the sparkling waves in glee:
A poet could not but be gay,
In such a jocund company:
I gazed - and gazed - but little thought
What wealth the show to me had brought:

For oft, when on my couch I lie
In vacant or in pensive mood,
They flash upon that inward eye
Which is the bliss of solitude;
And then my heart with pleasure fills,
And dances with the daffodils.

Scarborough Fair (excerpt)
Words by various authors over time

Are you going to Scarborough Fair?
Parsley, sage, rosemary, and thyme;
Remember me to the one who lives there,
For once she was a true love of mine.

Tell her to make me a cambric [fine, dense cloth] shirt,
Parsley, sage, rosemary, and thyme;
Without any seam or needlework,
Then she shall be a true love of mine.
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http://www.londonchildrensflowersociety.org