

Edina Trust Bulb Project Extension

Report for Teachers and Project Leaders

The National Museum of Wales (NMW) will produce a paper on the results of the bulbs planted in pots for all schools. This will be distributed to the schools involved and can be accessed via the NMW website.

This paper focuses on the 108 schools which took part in the fourth year of Edina Trust Extension Bulb Project – **which involves individual schools comparing results from bulbs planted in pots with those they planted in the ground.** This year a third of all schools sent their data to the Edina Trust via its Moodle website. This is a big improvement from previous years of the project and the Trust would like to encourage more schools to upload their data in next year’s project. **If any teacher has any suggestions as to what might encourage more schools to do this, please do let us know!**¹

	Schools in Extension Project	Schools in Wales	Schools in Scotland	Schools in England
All Schools	108 (100%)	10	66	32
Schools that provided flowering data on bulbs in the ground. That will be referred in this paper as: <i>“Our 36 special schools”</i>	36 (33%)	1	20	15
Schools that provided flowering data on bulbs in the ground & in pots. That will be referred in this paper as: <i>“Our 28 very special schools”</i>	28 (26%)	1	14	13

Table 1: Data sets for the Edina Trust Bulb Project evaluation

These thirty-six special schools provided data on a total of 493 bulbs that flowered as well as recording a total of 69 bulbs that did not flower before the 24th April deadline!

This is a larger data set to analyse than achieved with the 2013-14 project, but this is still a relatively small percentage of the total daffodil bulbs provided, a massive 4,375! We will use results from this year to assess the hypotheses made during previous years of the project.

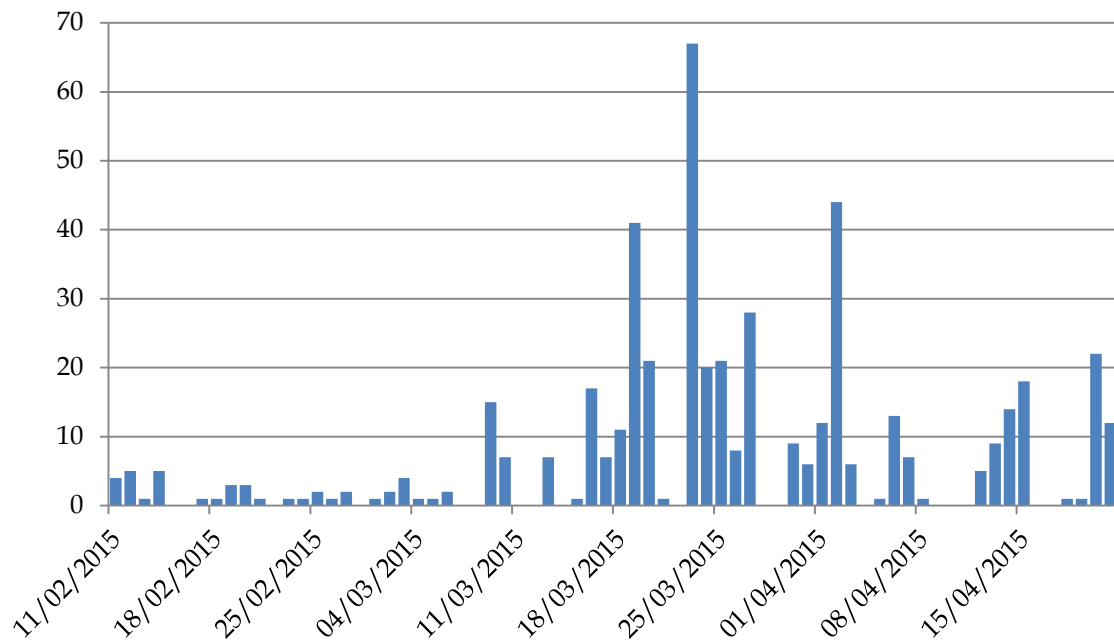
These hypotheses test the impact of temperature and rainfall on:

- i. flowering dates, and
- ii. the heights of the plants at the time of flowering

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i. Difference between flowering dates

Chart 1: Number of Daffodils vs. Date of Flowering in 2014-15



Source information: Chart showing the frequency of daffodils (planted in the ground) flowering between February - April 2015. Includes data from the thirty-six special schools, 493 daffodils in total.

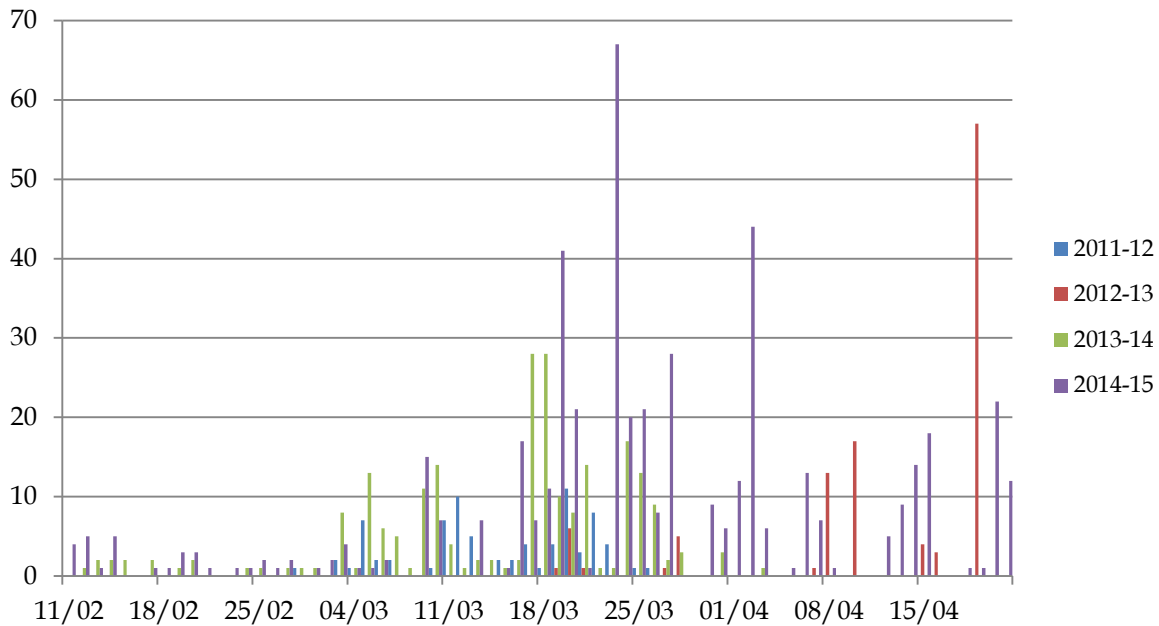
Chart 1 illustrates the wide spread in the date daffodils flowered: from 11th February to 21st April: a spread of 70 days. With the majority of daffodils flowering on the 23rd March 2015.

Below, **Chart 2** includes data from all four years of the Edina Trust Extension project. This chart shows:

- That the majority of daffodils flowered in March during all four years of the Edina Trust extension project, and
- that the flowering dates spanned a longer period in 2014-15 compared with the three previous years, and
- that the flowering of daffodils was delayed in 2012-13 compared with the other three years (due to the widespread snowy & cold weather in February and March 2013)².

² Due to the daffodils flowering over school holidays an average flowering date was predicted - 57 daffodils were recorded as flowering all on the 19th April 2013

Chart 2: Number of Daffodils vs. Date of Flowering



Source information: Chart showing the frequency of daffodils (planted in the ground) flowering on a given date. Includes data from 2011-2015, sixty-eight special schools, 852 daffodils in total.

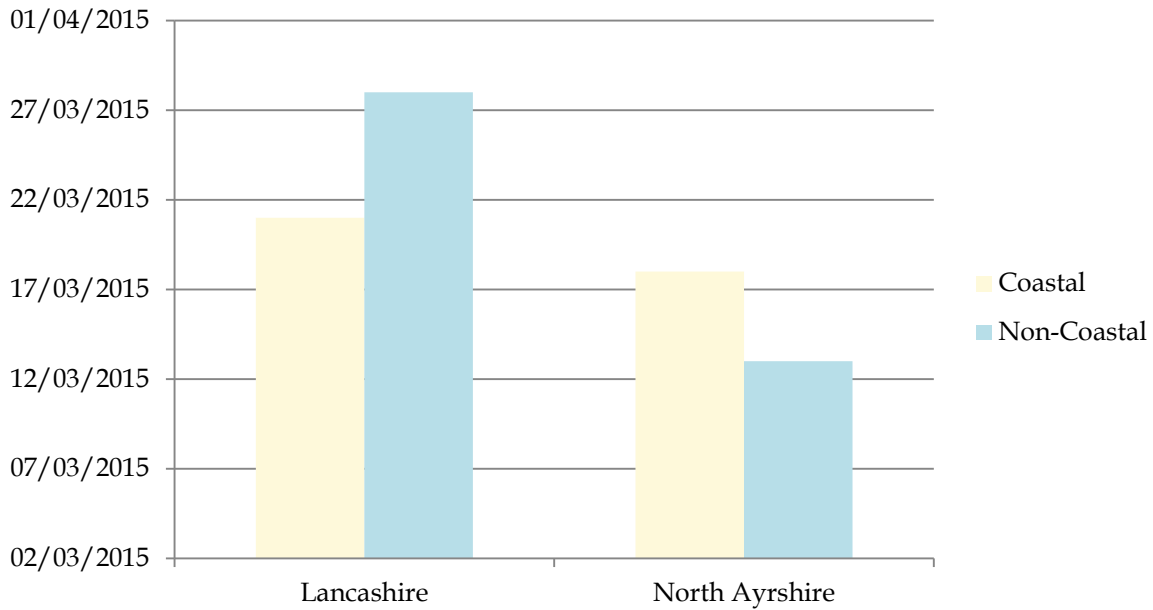
HYPOTHESIS 1: Daffodils in coastal schools³ will flower before those in non-coastal schools. This will be because coastal areas do not experience such cold nights during the winter because the sea acts like a blanket warming up the coast.

Three of the Edina Trust Bulb Project special schools were from coastal areas. One of the coastal schools was from Conwy and we did not receive any local non-coastal data for comparison. The other two coastal schools were from Lancashire and North Ayrshire. **Chart 3** shows that daffodils planted in coastal schools in Lancashire did flower seven days earlier than those planted in non-coastal schools, whereas daffodils planted in coastal schools in North Ayrshire flowered on average five days later than those planted in non-coastal schools.

This means that there is no definitive proof for **HYPOTHESIS 1** which may be because Scottish areas have a colder coastline than those in England. We shall have to see if this follows a similar pattern next year, and may have to alter our first hypothesis to reflect this.

³ Coastal schools were defined as those less than two miles from the coast.

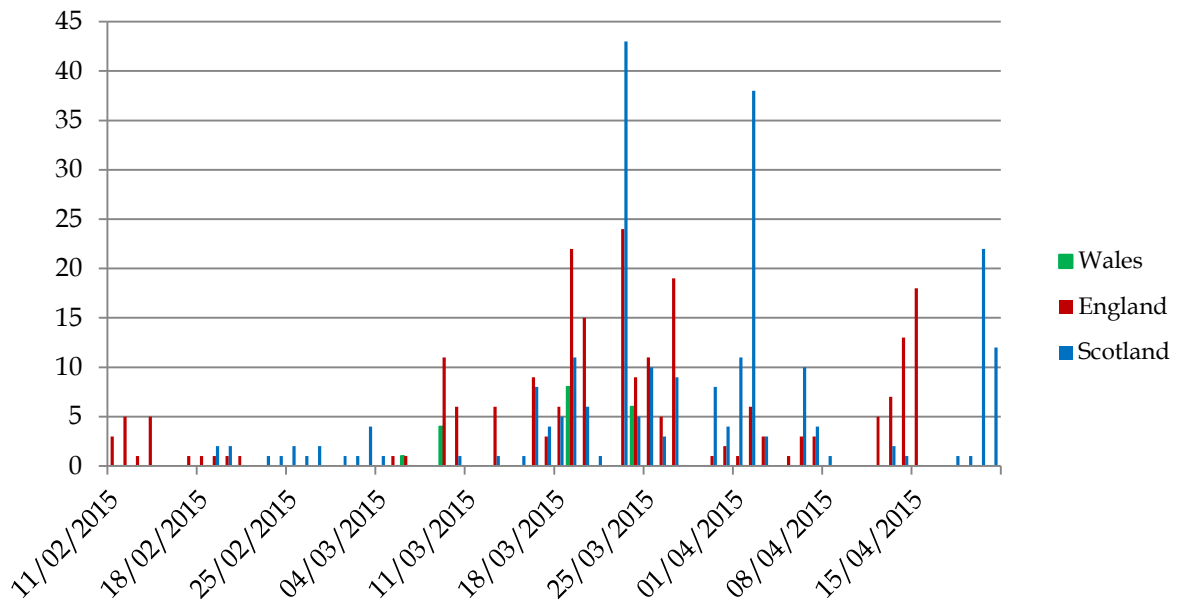
Chart 3: Average Flowering Dates for Coastal vs. Non-Coastal Schools



Source information: Chart showing the average date of daffodils flowering in coastal schools vs. those from the same Local Authority classed as non-coastal schools (planted in the ground only) - 217 daffodils

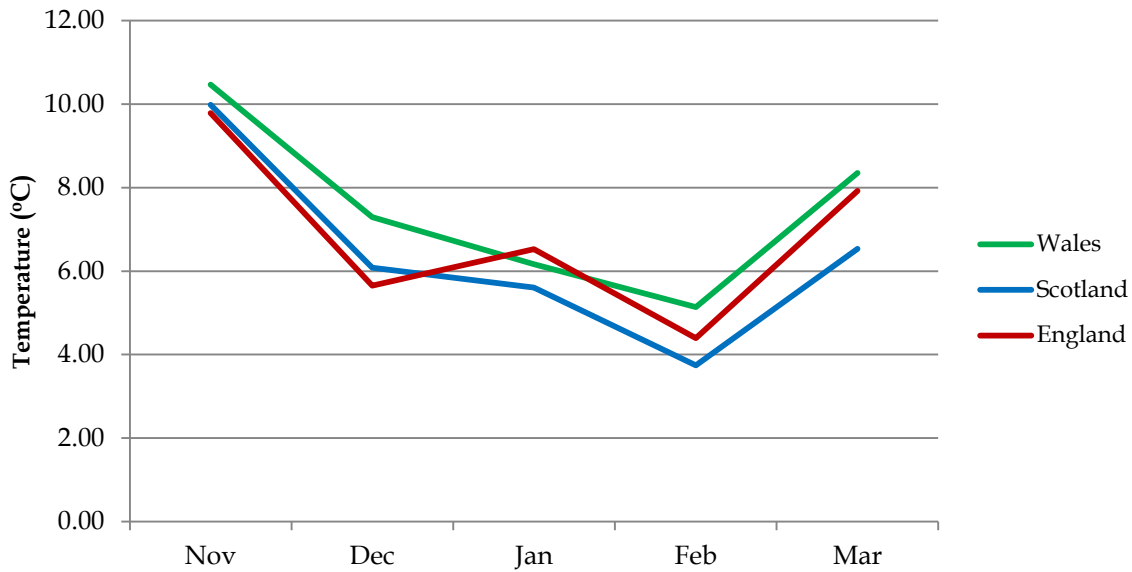
HYPOTHESIS 2: Schools in areas that record higher temperatures during the months of December and January will have earliest flowering daffodils, both in pots and in the ground. The effect of the temperature fluctuation will be more pronounced with the daffodils in pots compared to those in the ground.

Chart 4: Number of Daffodils vs. Date of Flowering - by Country



Source Information: Chart showing the frequency of daffodils (planted in the ground) flowering on a given date, organised by country. Includes data from our thirty-six special schools, 493 daffodils in total.

Graph 1: Monthly Average Temperature (°C) by Country



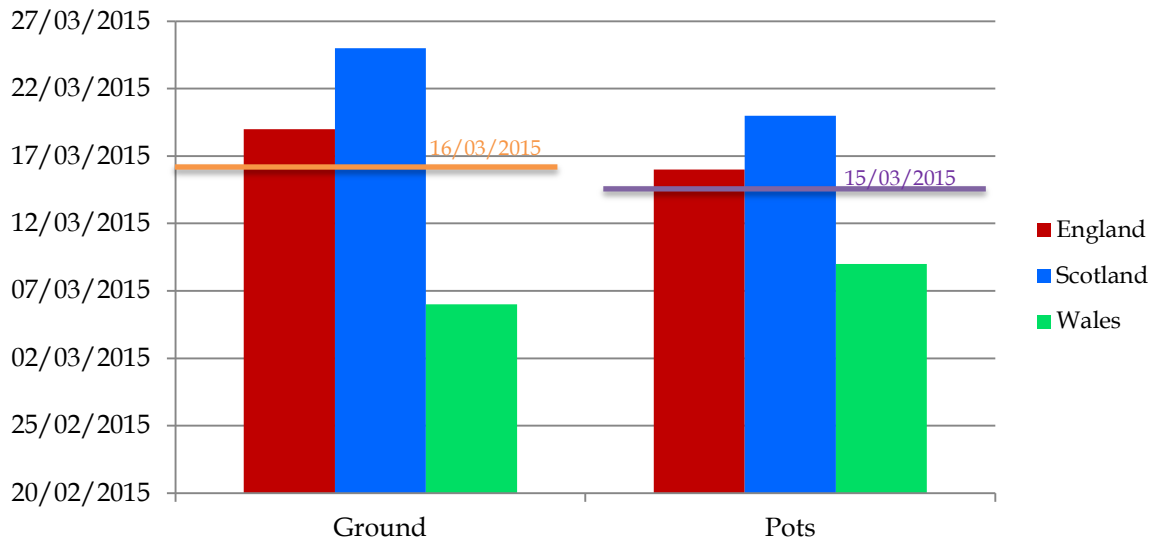
Source information: Graph showing the average monthly temperature, organised by country, using data from our seventy-nine schools that entered weather recordings on the NMW website.

Graph 1 shows that Wales had the highest temperature for the majority of the project in 2014-15, with England being the coldest country in December but the warmest in January.

During December 2014 Wales had the highest average temperature although in January 2015 England had the warmest average temperature. Daffodils planted in Welsh schools were recorded as flowering the latest in the year; this may be due to only one Welsh school completing the Edina Trust extension project, and therefore supply the Trust with only one set of data for this area. English schools' daffodils did flower the earliest but on average Wales was the warmest country throughout the year. It will be interesting to see if this pattern continues with a larger Welsh data set, this is something we hope to obtain with next year's project.

Using **Chart 5** we can see that Welsh schools had the earliest flowering daffodils in pots and the earliest flowering daffodils that were planted straight into the ground. Therefore, for this data set **HYPOTHESIS 2** has been proven. The Welsh data was provided by only one school, it will be interesting to see if this still applies with a larger group of schools in Wales to evaluate.

Chart 5: Average First Flowering Dates of Daffodils Planted in the Ground Compared to those in Pots - by Country



Source information: Chart showing the average flowering date of daffodils planted in the ground and in pots, organised by country. This chart has been created using the data from the twenty-eight very special schools. Horizontal lines are the overall average dates for daffodils in the ground and in pots – revealing only a 1 day difference!

HYPOTHESIS 3: On average, daffodils in pots will flower before those planted in the ground.

The Welsh schools’ daffodils flowered first in the pots and were also the first to flower in the ground, with daffodils planted in England flowering second.

Something which needs to be taken into consideration when viewing the results on *Chart 5* is the difference in planting dates for Scottish, English and Welsh schools; English and Welsh schools planted their bulbs on the 20th October whereas Scottish schools started planting on the 27th October.

If this difference of one week had an effect on the flowering dates of daffodils in Scottish schools it would possibly mean that the Scottish daffodils in the ground may have flowered before those in England, as well as before the average flowering date of the daffodils planted in pots in England. This variation in planting dates is due to the different term times for England, Scotland and Wales and is a variable that cannot be avoided.

Using *Chart 5*, **HYPOTHESIS 3** can be proven as correct for daffodils in Scotland and England. For the one Welsh school for which data was submitted, the daffodils flowered earlier in the ground than those in pots, however it is not possible to conclude from this data that other Welsh schools would have experienced the same growth patterns.

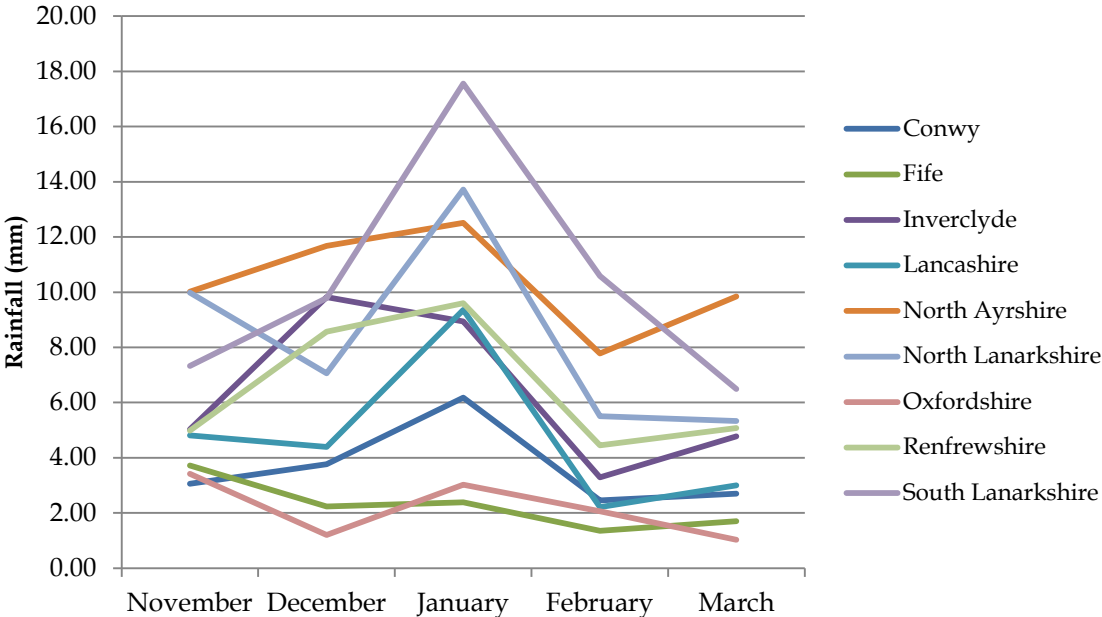
When looking at schools individually the average flowering dates of just under half of the schools follow the trend of the daffodils in pots flowering before the daffodils planted in the ground. With almost a quarter of daffodils in pots and those planted in the ground flowering on the same day.

As shown by the average dates (horizontal lines) on *Chart 5*, the daffodils planted in pots flowered on average only one day before those planted in the ground.

During last year’s project (2013-14) the average flowering dates had a difference of ten days. The average recording for the daffodils planted in the ground was the 18th March and the average for those planted in pots the 8th March. If a larger data set can be obtained during next year’s project it will be interesting to see if results for next year’s Spring Bulbs for Schools project will continue to support this hypothesis.

HYPOTHESIS 4.1: Schools in the area with the highest level of rainfall in the month of January will record taller daffodil flowering heights.

Graph 2: Monthly Average Rainfall (mm) by Area

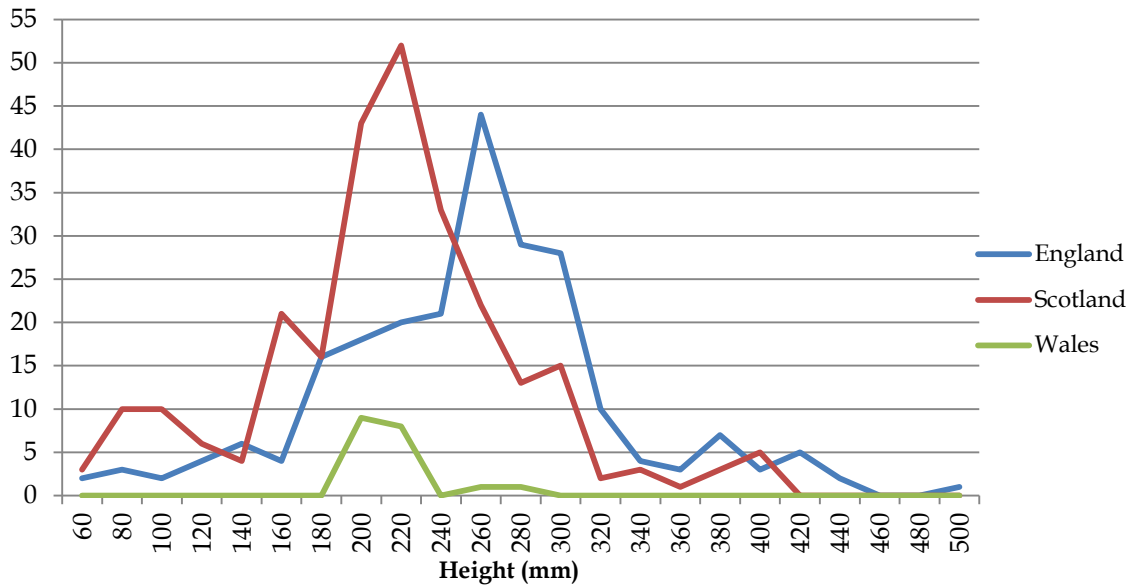


Source information: Graph showing the average monthly rainfall, organised by area. This includes data from the seventy-nine extension project schools that entered weather recordings on the NMW site.

In January South Lanarkshire schools received more rainfall than any other areas; Lancashire and North Ayrshire schools experienced the next highest levels of rainfall.

ii. Height of plants at the time of flowering

Graph 3: Number of Daffodils vs. Height of Daffodils at Flowering (mm) - by Country



Source information: Graph showing the frequency of daffodils (planted in the ground) at given flowering heights, organised by country. Includes data from the twenty-eight special schools - 493 daffodils in total

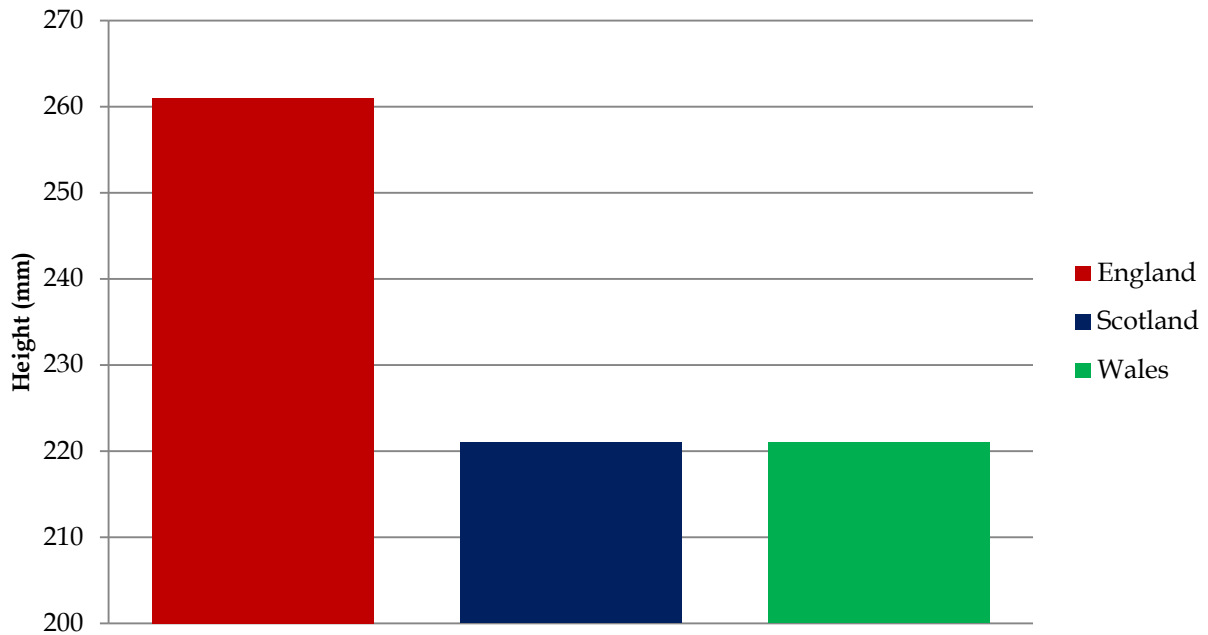
Graph 3 shows that the majority of daffodils in England flowered at a taller height to those in Wales and Scotland, with the graph peaking between the 260-280 mm range. Although there is a larger data range for Scottish daffodils compared to daffodils planted in Wales you can see that the average flowering heights for both Wales and Scotland are around the 200-220mm range.

Using *Graph 2* and *Graph 3* we can test **HYPOTHESIS 4.1**. The country with the tallest recorded daffodils was England, with one reaching as tall as 490mm! South Lanarkshire is in Scotland, and the tallest Scottish daffodil reached 412mm, which is 78mm difference. This disproves the hypothesis that the most rain in January produces the tallest daffodil. Do you think that there is a link between daffodil height and amount of rainfall? This is something we will have to keep a close eye on over the next Spring Bulbs for Schools project.

HYPOTHESIS 5: Schools in areas with higher temperatures during February will record taller daffodil flowering heights.

If we use an average of all daffodils that flowered in each country to test this hypothesis, we can produce a graph like the one below:

Chart 6: Average Height of Daffodils at Flowering (mm) by Country



Source information: Chart showing the average heights of daffodils (planted in the ground), organised by country. Includes data from the twenty-eight special schools - 493 daffodils in total

Using the data shown on *Graph 4* as well as *Chart 6*, we can see that the temperature was higher in Wales than both England and Scotland during the month of February 2015. This disproves **HYPOTHESIS 5** as the English daffodils were the tallest with the Welsh and Scottish daffodils both having an average flowering height of 221mm. In previous years this hypothesis has correlated with the data collected for the Spring Bulbs for Schools project. The more results we obtain the more accurate we can be.

Summary

Well done to our thirty-six special schools, your data has been valuable in looking at the hypotheses put forward from the previous years' projects and we are hoping to engage more schools to participate in next year's Spring Bulbs for Schools and Edina Trust's Bulb Project to help further with the investigation.

Now that we have looked at the effects the weather has on flowering bulbs, it makes us a lot more aware of its effects on our surroundings. We hope that all 108 schools who took part this year enjoyed themselves and learnt something new. We look forward to seeing you next year!

Grace Evans