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 84 schools which took part in the third year of Edina Trust Extension Bulb Project – **which is about individual schools comparing results from bulbs planted in pots with those they planted in the ground**. Once again, only one in five schools sent their data to the Edina Trust via its Moodle website. 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	84 (100%)	5	21	58
Schools that provided flowering data on bulbs in the ground: *"Our 17 special schools"*	17 (20%)	1	4	12
Schools that provided flowering data on bulbs in the ground & in pots: *"Our 12 **very** special schools"*	12 (14%)	1	4	7

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

Two of our seventeen special schools were from coastal areas. These seventeen schools provided data on a total of 226 bulbs that flowered as well as recording a total of 46 bulbs that did not flower before the deadline!

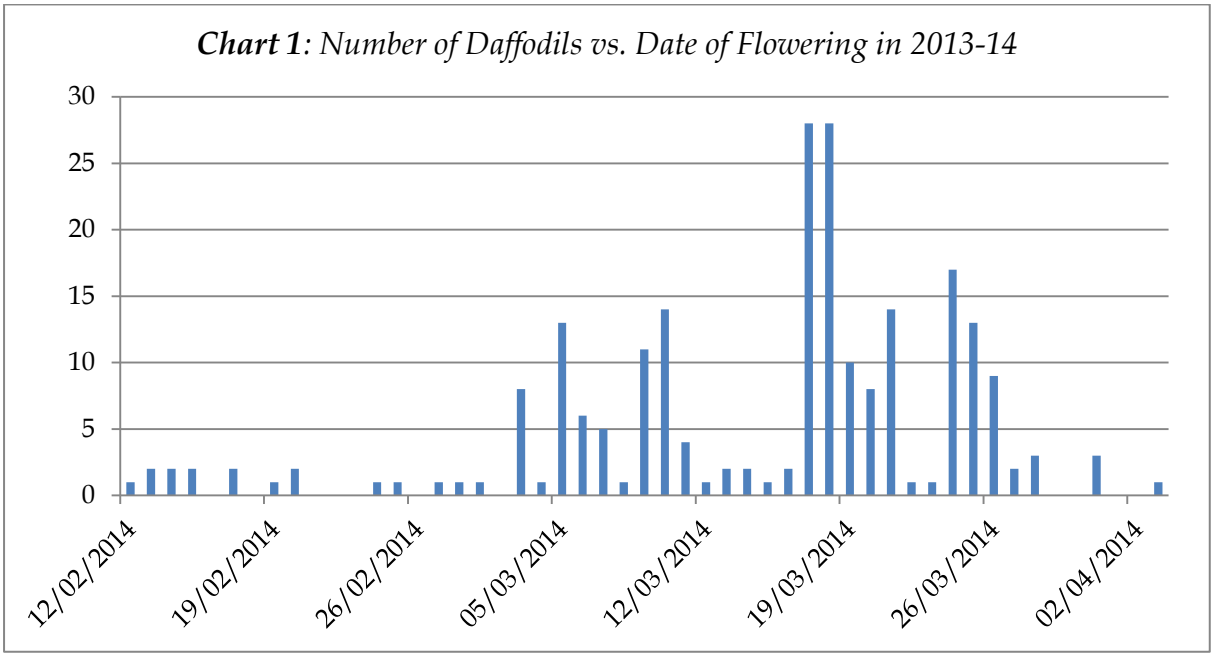
This is a larger data set to analyse than the 2012-13 project, but this is still a relatively small percentage of the total daffodil bulbs provided! We will use results from this year to assess the hypotheses made during the pilot year of the project, and the additional hypothesis from the 2012-13 project.

These hypotheses are to test the impact of temperature and rainfall on:

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

[1] email:grace.evans@edinatrust.org.uk

i. Difference between flowering dates



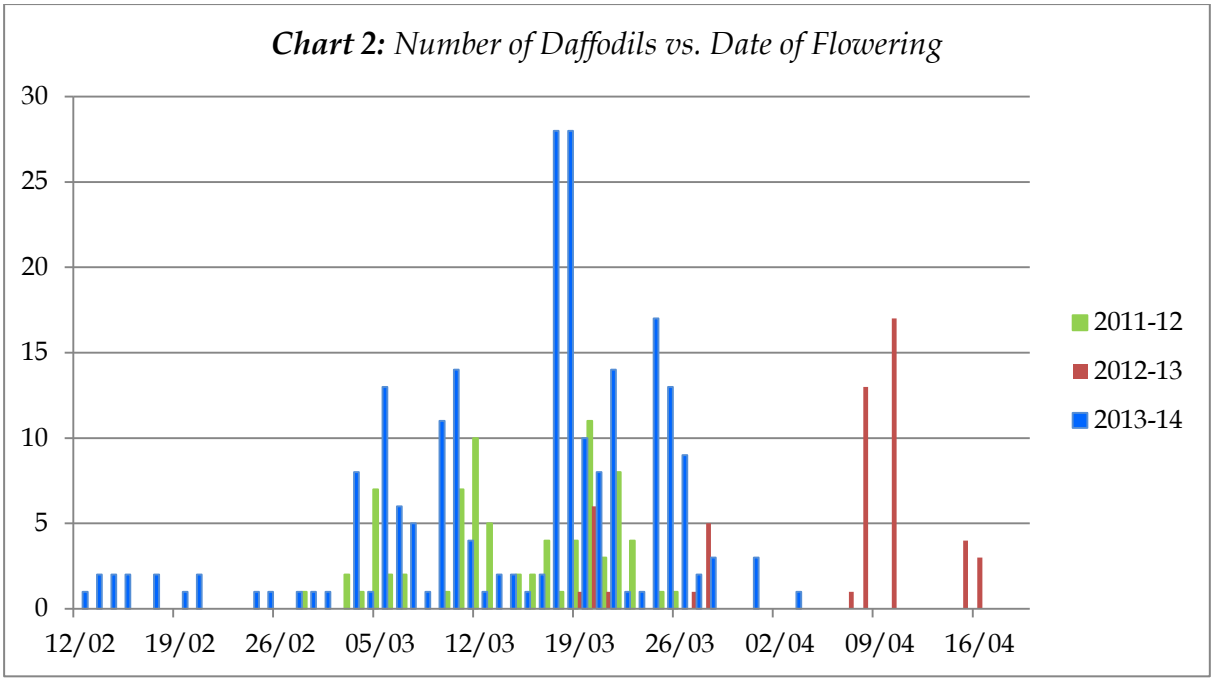
Source information: Chart showing the frequency of daffodils (planted in the ground) flowering on a given date. Includes data from the seventeen special schools, 226 daffodils in total.

Chart 1 illustrates the wide spread in the date daffodils flowered: from 12th February to 2nd April: a spread of 50 days (the 46 bulbs which were reported as not having flowered by the 2nd April were omitted from this chart).

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

- That the flowering dates spanned a longer period in 2013-14 compared with the two previous years, and
- that the flowering of daffodils was delayed in 2012-13 compared with the other two years (due to the widespread snowy & cold weather in February and March 2013) [2].

[2] An anomalous result from 2012-13 is not included. 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



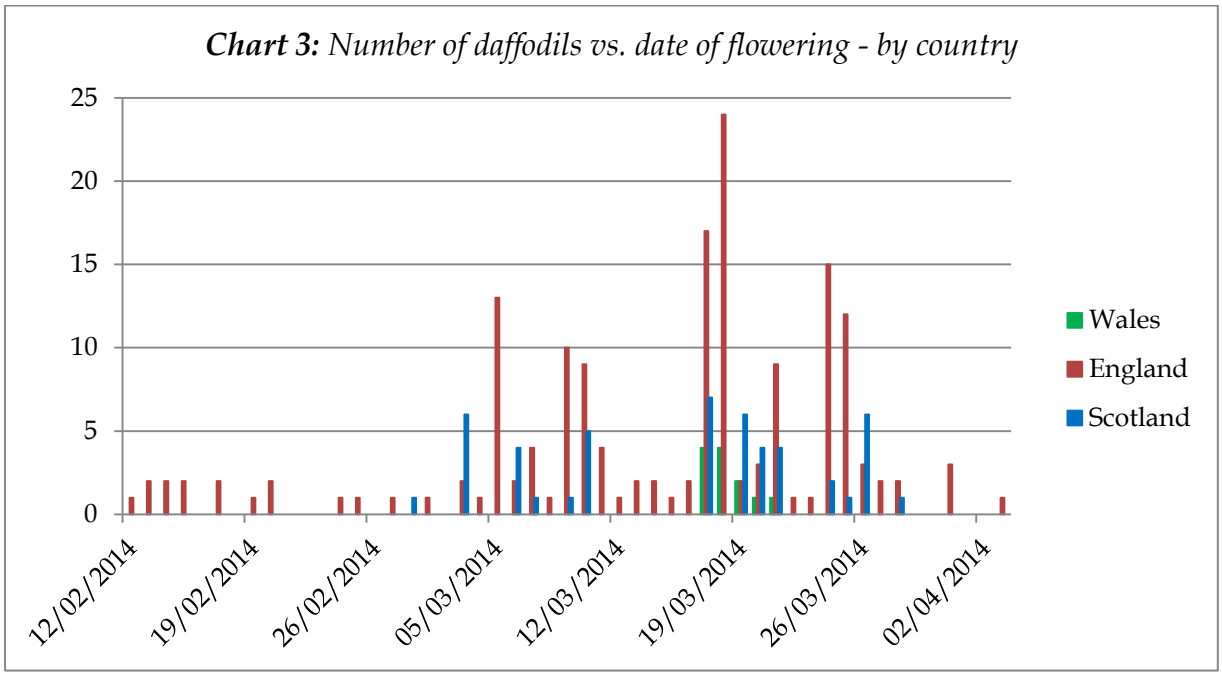
Source information: Chart showing the frequency of daffodils (planted in the ground) flowering on a given date. Includes data from 2011-2014, thirty special schools, 357 daffodils in total.

HYPOTHESIS 1: Daffodils in coastal schools[3] 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.

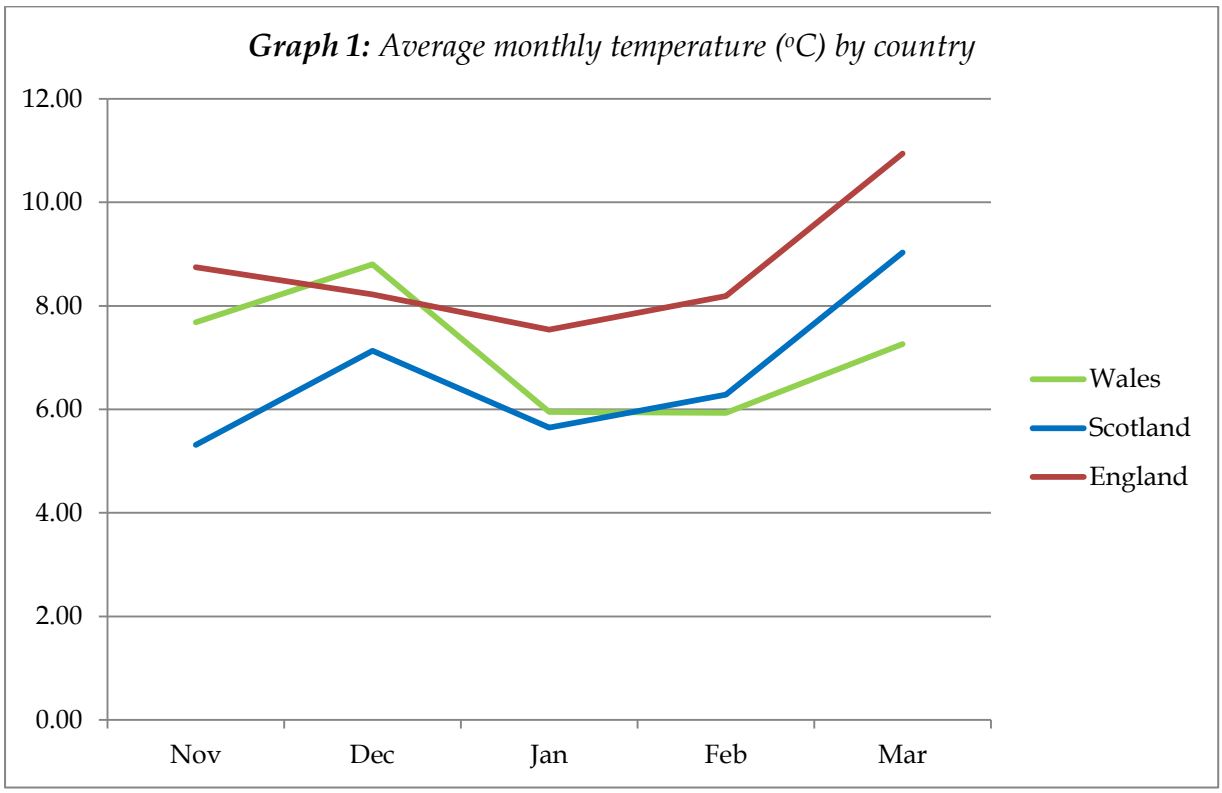
Two of the Edina Trust Bulb Project special schools were from coastal areas. Unfortunately, no data was received from local schools inland from the coast. So, HYPOTHESIS 1 could not be tested. We must therefore wait for another year and hope we obtain data to test this hypothesis!

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

HYPOTHESIS 2: Schools in regions 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.



Source Information: Chart showing the frequency of daffodils (planted in the ground) flowering on a given date, organised by country. Includes data from our seventeen special schools, 226 daffodils in total.



Source information: Graph showing the average monthly temperature, organised by area, using data from our seventeen special schools.

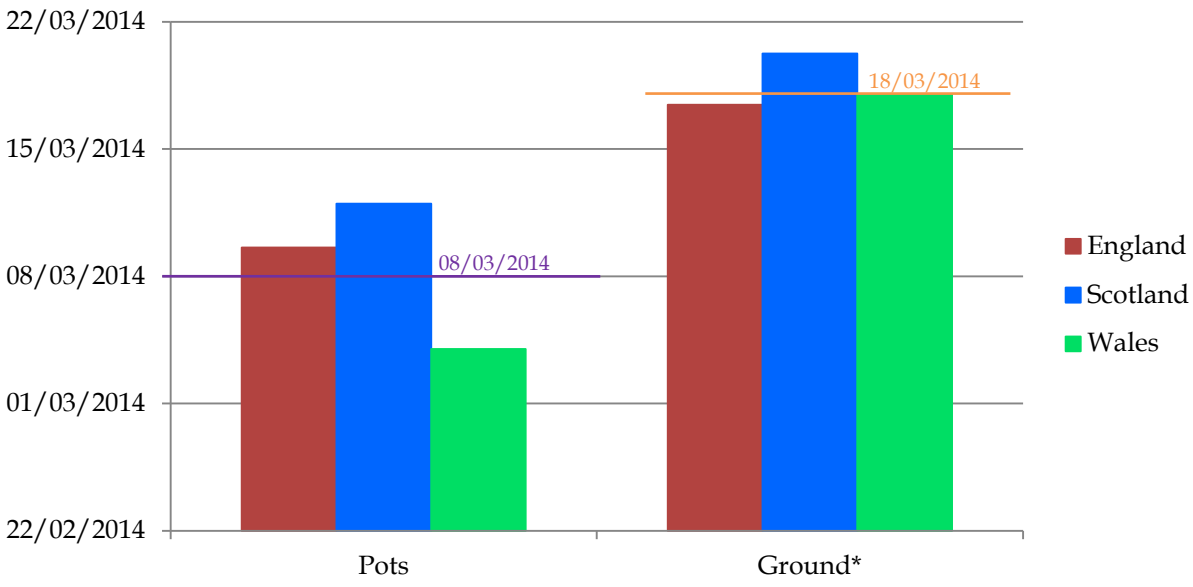
Graph 1 shows that England had the highest temperature for the majority of the project in 2013-14, with Wales being the warmest country in December and the coldest in March.

During December 2013 Wales had the highest average temperature although in January 2014 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 the smaller available data set for Welsh schools completing the Edina Trust extension project. English schools' daffodils did flower the earliest and on average England was the warmest country throughout the year.

Using ***Chart 4*** we can see that Welsh schools had the earliest flowering daffodils in pots, with Scotland just piping England to having the earliest flowering daffodils that were planting straight into the ground. Therefore **HYPOTHESIS 2** is disproven using this data set. Scotland had the latest flowering daffodils in the pots and the Welsh daffodils in the ground also flowered the latest, with English daffodils snuggly in the middle on both sets of data.

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

Chart 4: *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. Chart has been created using the data from the twelve very special schools. Horizontal lines are the overall average dates for daffodils in the ground and in pots – revealing a 10 day difference!

The Welsh schools' daffodils flowered first in the pots whilst English schools' daffodils were the first to flower in the ground.

Something which needs to be taken into consideration when viewing the results on ***Chart 4*** is the difference in planting dates for Scottish, English and Welsh schools; English and Welsh

schools planted their bulbs on the 21st October whereas Scottish schools started planting on the 25th October.

If this difference of four days had an effect on the flowering dates of daffodil in Scottish schools it would possibly mean that the Scottish daffodils in the ground may have flowered first as the Scottish schools expected average date for flowering would be before that of the English and Welsh schools in the pots, and before the average flowering date of the daffodils in England planted in the pots. This variation in planting dates is due to the different term times for Scotland and England and cannot be avoided.

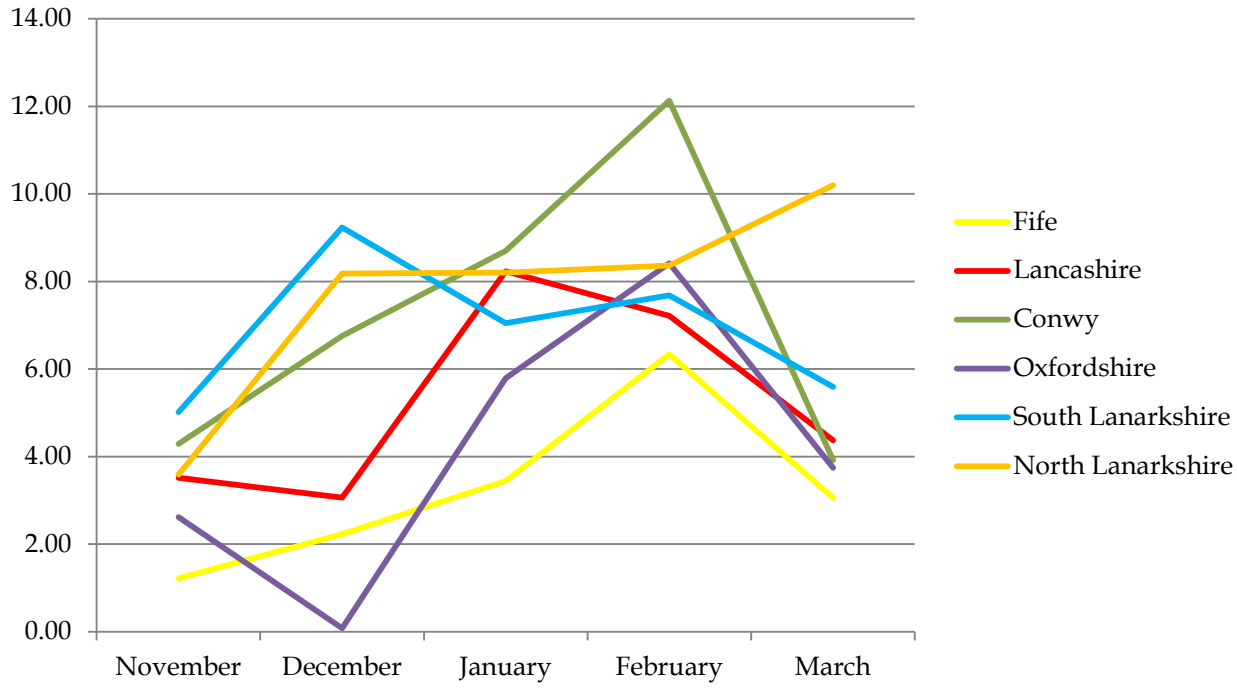
Using ***Chart 4***, **HYPOTHESIS 3** can be proven as correct for all countries. When looking at schools individually all schools' average flowering dates follow the trend of the daffodils in pots flowering before the daffodils planted in the ground. This ranges from a minimum difference of two days to a maximum of fourteen days.

As shown by the average dates (horizontal lines) on ***Chart 4***, the daffodils planted in pots flowered on average ten days before those planted in the ground.

During the 2012-13 Spring Bulbs for Schools project the average flowering dates for daffodils planted in the ground was the 11th April and the average for those planted in pots the 4th April. This is over a month later than the bulbs planted in 2013-14, and is probably due to the heavy snow fall that fell in Spring 2013. It will be interesting to see if results for next year's Spring Bulbs for Schools project will continue to support this hypothesis once a larger data set has been obtained.

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

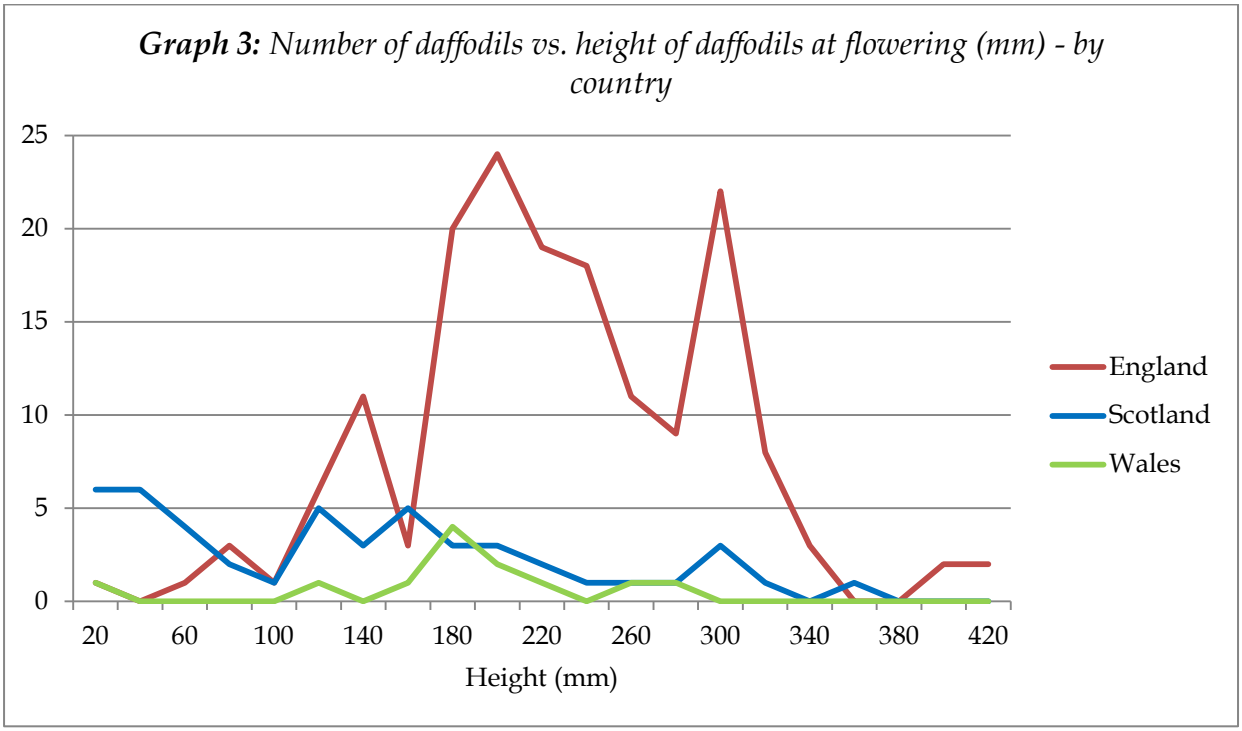
Graph 2: *Monthly average rainfall (mm) by region*



Source information: Graph showing the average monthly rainfall, organised by region. Includes data from the 60 extension project schools that entered weather recordings on the NMW site.

In January Conwy schools received more rainfall than any other areas; this was followed closely by North Lanarkshire and Lancashire.

ii. Height of plants at the time of flowering



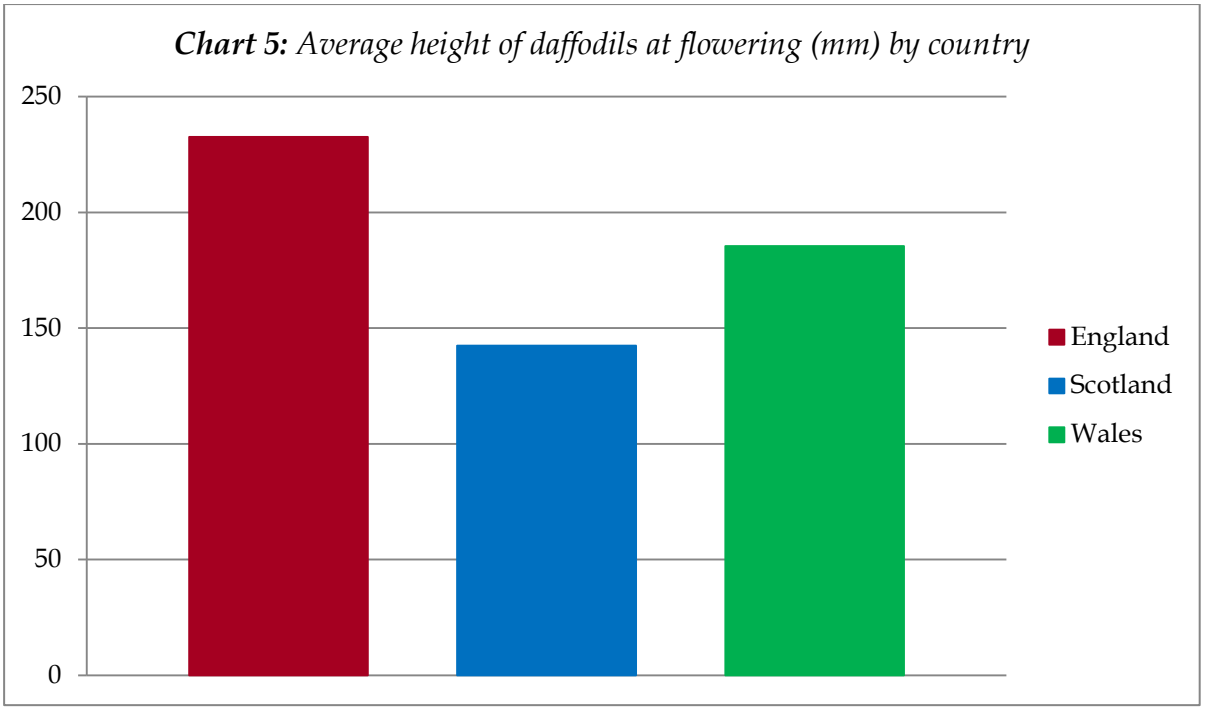
Source information: Graph showing the frequency of daffodils (planted in the ground) at a given flowering height, organised by country. Includes data from the seventeen special schools - 224 daffodils in total.

From the graph above it shows that the majority of daffodils in Scotland flowered at a smaller height to those in Wales and England, with it peaking between the 20-60 mm range. Although there is a larger data range for English daffodils you can see that the average flowering height for both Wales and England is around the 180mm range.

Using ***Graph 2*** and ***Graph 3*** we can analyse **HYPOTHESIS 4.1**. The country with the tallest recorded daffodils was England, with a few reaching as tall as 420mm! Conwy is in Wales, and their tallest daffodil reached 280mm, which is a total of 140mm 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 Bulb Project.

HYPOTHESIS 5: Schools in regions 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:



Source information: Chart showing the average heights of daffodils (planted in the ground), organised by country. Includes data from the seventeen special schools. 224 daffodils in total.

Using the date shown on ***Graph 4*** as well as ***Chart 5***, we can see that the temperature was in fact over 2°C higher in England than either Wales or Scotland during the month of February 2014. This correlates with **HYPOTHESIS 5** in that the English daffodil were also the tallest with the Welsh daffodils coming second on both daffodil flowering height and also second warmest temperature during February. It will be interesting to see if this hypothesis is proven next year also. The more results we obtain the more accurate we can be.

Summary

Well done to our seventeen special schools, your data has been valuable in looking at the hypotheses put forward from the previous years' projects and we are looking forward to seeing more schools 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 84 schools who took part this year enjoyed themselves and learnt something new. We look forward to seeing you next year!

Grace Evans
27th May 2014