BSBI New Year Plant Hunt 2017

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Summary

The BSBI's sixth New Year Plant Hunt (NYPH) was held between 1st and 4th January 2017. Volunteers submitted lists of native and non-native plants found in flower in wild situations during a three-hour walk at sites throughout Britain and Ireland. In 2017, results were submitted for the first time via a smartphone app and online (https://nyph.bsbi.org/). 416 recording groups or individual recorders submitted 460 lists (28 more than in 2016), comprising 7123 records of 492 species. The average number of species recorded was 15.5. This was significantly lower than the averages for 2014-2016 which all exceeded 20 species. The difference, however, was much less marked for non-native species. The rank order of the top five species found in flower were almost identical to previous years (Daisy *Bellis perennis*, 1st; Groundsel *Senecio vulgaris*, 2nd; Dandelion *Taraxacum*, 3rd; Annual meadow-grass *Poa annua*, 4th; Gorse *Ulex europaeus*, 5th). The vast majority of species recorded were flowering late (58%) rather than early (15%) or as would be expected at New Year (11%). These proportions were almost identical when non-native species were excluded or when they were compared to previous years. The lower incidence of flowering in 2017 appears to be the result of lower temperatures in October to December 2016 when compared to the same period in 2013, 2014, 2015, all of which had exceptionally mild weather in many parts of Britain and Ireland during the months preceding the NYPH.

Acknowledgments

We owe a huge debt of gratitude to the 100s of botanists who took part in the NYPH in 2017! We would also like to thank the NYPH 'team' who worked tirelessly to make the project a success, most notably Karolis Kazlauskis (Centre for Ecology and Hydrology) and Tom Humphrey (BSBI Database Officer) for developing and supporting the smartphone app and website; Ryan Clark, Ian Denholm, Richard Mabbutt and Ciara Sugrue for providing support over the busy New Year period; and to BSBI Country Officers Maria Long, Jim McIntosh and Polly Spencer-Vellacott for enthusing recorders so successfully in Ireland (Maria), Scotland (Jim) and Wales (Polly).

Introduction

Since 2012, the Botanical Society of Britain & Ireland (BSBI) has run an annual hunt for plants in flower during a four-day period over the New Year (usually 1st to 4th January). Since the first New Year Plant Hunt (NYPH) was carried out by BSBI members Tim Rich and Sarah Whild in Cardiff in 2012, the scheme has grown rapidly with more than 850 participants taking part at 432 locations in 2016 (Marsh, 2016). FLORON, the Dutch botanical society, have also been running a similar scheme since 2014, largely inspired by the NYPH (Year End Plant Hunt; Sparrius, 2016). Although intended to provide a fun (and competitive) activity for botanists during a quiet period, these surveys also have a serious element. Observations of 'unseasonal' phenological events are being reported from around the globe in response to rising temperatures which are predicted to exceed 2˚C above pre-industrial levels in the coming decades. Citizen science projects such as NYPH are therefore helping to reveal the impacts of these changes, as well as gathering novel information on plant phenology more generally. Through the use of new technologies, such as social media and online apps, the NYPH has also raised the profile of the BSBI and introduced its work to new audiences.

Method

In 2017 volunteers picked a day between 1st and 4th January and recorded all native plants and any naturalised non-natives (but not obviously planted species) that they found in flower on a walk not exceeding 3 hours (excluding breaks and travelling between sites). Recorders were encouraged to restrict their recording to a single area or site but in a few cases multiple sites were visited within the three hour period (for example at stops along a motorway). Recorders were encouraged to check that plants were actually flowering, for example by checking that catkins were open, that grasses had open florets with stigmas or anthers on show etc. Ferns and fern-allies were excluded from lists.

In 2017 the majority of lists were submitted via the NYPH smartphone app or online via the NYPH webpage (https://nyph.bsbi.org/). This substantially increased the efficiency of data entry and reduced errors during data processing. It also made it easier to verify records, as all the records were available to review on iRecord, often with accompanying photographs. Data processing prior to analyses included checking the completeness of lists and that site details were correct, checking doubtful records and that taxa matched those given by Stace (2010), and removing taxa identified to genus only.

For analyses, each species was categorised as native or alien following Preston et al. (2002) and allocated to one of four categories based on flowering phenology (Table 1). The typical flowering months were taken from Clapham *et al.* (1987) in the first instance and Sell & Murrell (1996 *et seq*) for species not covered by Clapham *et al.* Species were then categorised as 'expected' if they flower all year and are therefore expected to be in flower at New Year; flowering 'early' if they typically flower in the spring and complete flowering by summer at the latest; 'late' if flowering extends from the summer into the autumn; and 'early or late' for species with an extended flowering period (spring-autumn) or just flowering in the summer.

Table 1. Categories used to classify species flowering at New Year based on typical flowering phenology.

Phenology	Description
Expected	Flowering all year
Early	Flowering in the spring, many extending into summer
Late	Flowering in the summer and autumn
Early or late	Flowering in the summer or from the spring to the autumn

Results

Number of participants

A total of 416 recording groups, families or individual recorders took part in the NYPH in 2017 compared to 405 in 2016 (Table 2), i.e. an increase of 2.7%. It has not proved possible to give an accurate number of individual participants for 2017 due to limitations with the recording app, which led to many group lists being recorded under one name only. In 2016, however, we were able to record numbers of individual participants and reached a total of 865. We therefore estimate that this year's total is likely to be around 888 (i.e. an increase of 2.7% over last year). Both these figures are underestimates as they exclude recorders who submitted miscellaneous records via social media but chose not to use the app or email a list. This means their records have not been through our verification process and therefore cannot be included in this analysis.

Table 2. The number of groups/individuals participating in the New Year Plant Hunts, 2014-2017.

Groups/Individuals	2014	2015	2016	2017
	70	c.300	405	416

Number of lists

In 2017, 460 lists were submitted - this is a slight increase on the total of 432 recorded in 2016 (Table 3). At the country level, twice as many lists were submitted for Ireland than in 2016 and there was a slight increase in the number of lists recorded in Wales. In comparison, there were slight decreases in Scotland and England. The lists submitted covered 392 hectads (Fig. 1). Although the majority of lists were concentrated in the more populated areas of Britain and Ireland, good numbers were also recorded in remoter regions. Locations surveyed ranged from Donegal to Norfolk, southwest Ireland to northwest Scotland, and included both Orkney and the Channel Isles.

Table 3. The number of lists submitted for the New Year Plant Hunt, 2014-2017.

Lists	2014	2015	2016	2017
England	32	101	297	282
Wales	5	10	19	28
Scotland	10	9	64	43
Ireland	3	21	50	104
Channel Isles	1	2	2	3
Total	51	143	432	460

Number of species

In 2017 the total number of species recorded in flower was 492. This is 119 less than in 2016 (Table 4). As in previous years, this total included a large number of non-native species naturalised in wild locations: in 2017 these comprised 46% of all the species recorded in flower which is comparable, and certainly not significantly different, from the numbers recorded in previous years (40-49%).

Table 4. The number of plant species recorded in flower during the New Year Plant Hunt. The percentages are given in parentheses.

Species	2014	2015	2016	2017
Native	135 (60%)	206 (56%)	313 (51%)	264 (54%)
Alien	89 (40%)	160 (44%)	298 (49%)	228 (46%)
Total	224	366	611	492

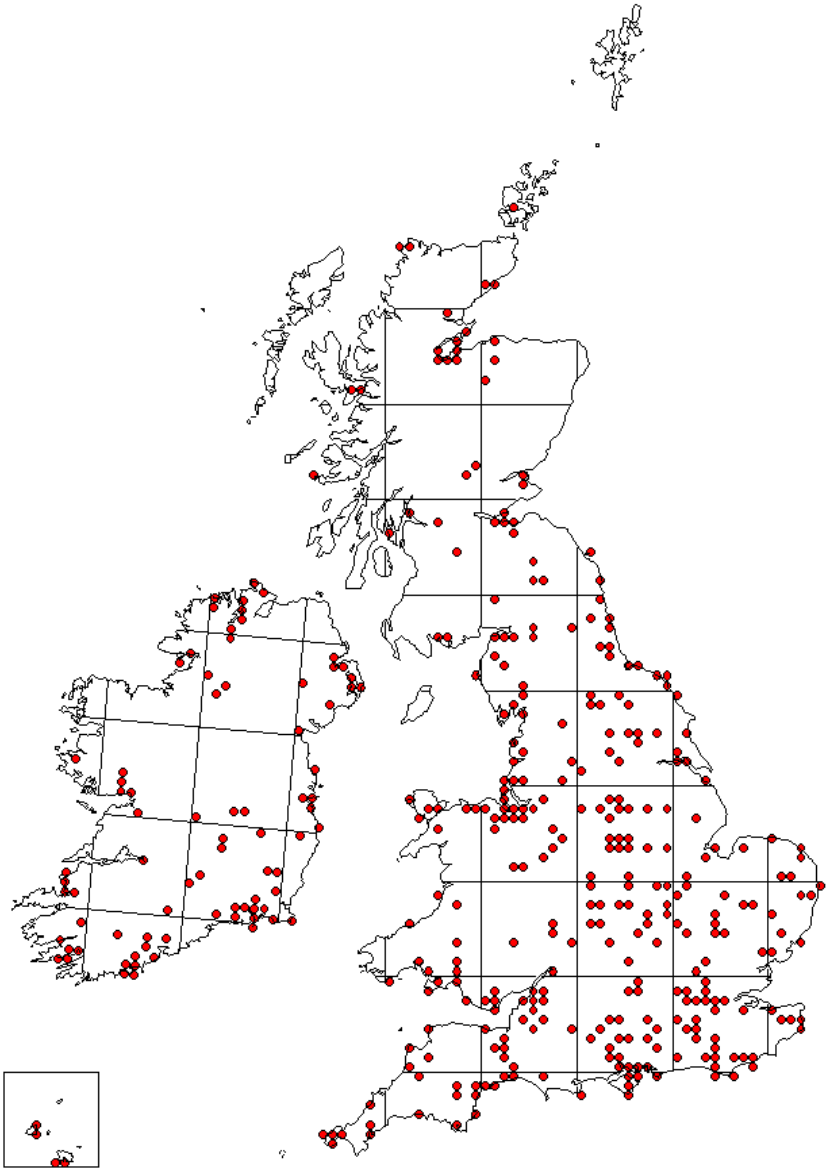

Figure 1. Map showing the distribution of New Year Plant Hunt lists received in 2017.

Number of records

In 2017 the total number of records submitted was 7123 which was substantially less than the 9160 submitted in 2016, despite the increase in the number of lists recorded (Table 5). As in previous years, a much greater proportion of records was for native (63%) rather than non-native taxa (37%).

Table 5. The number of records submitted as part of the New Year Plant Hunts, 2014-2017. The percentages are given in parentheses.

Records	2014	2015	2016	2017
Native	741 (63%)	1874 (65%)	6210 (68%)	4509 (63%)
Alien	432 (37%)	1019 (35%)	2950 (32%)	2614 (37%)
Total	1173	2893	9160	7123

List length

In 2017 the average list length was 15.5 species, or 9.8 for native species and 5.7 for non-natives (Table 6). These figures were significantly lower than in all three previous years (>20 species), although the differences for all species and natives alone were more marked than for non-natives (Table 5; Fig. 2).

Table 6. The average number of species recorded in flower during the New Year Plant Hunt, 2014-2017. The significance of the differences between years was tested using a One-way ANOVA with Tukey's HSD used to test for significant differences between means (means with the same letter are not significantly different from one another).

List length	2014	2015	2016	2017	F-value	P-value
Native	14.5a	13.1a	14.4a	9.8b	16.05	<0.001
Alien	8.5a	7.1a	6.9a	5.7a	3.24	<0.05
Total	23.0a	20.2a	21.2a	15.5b	10.01	<0.001

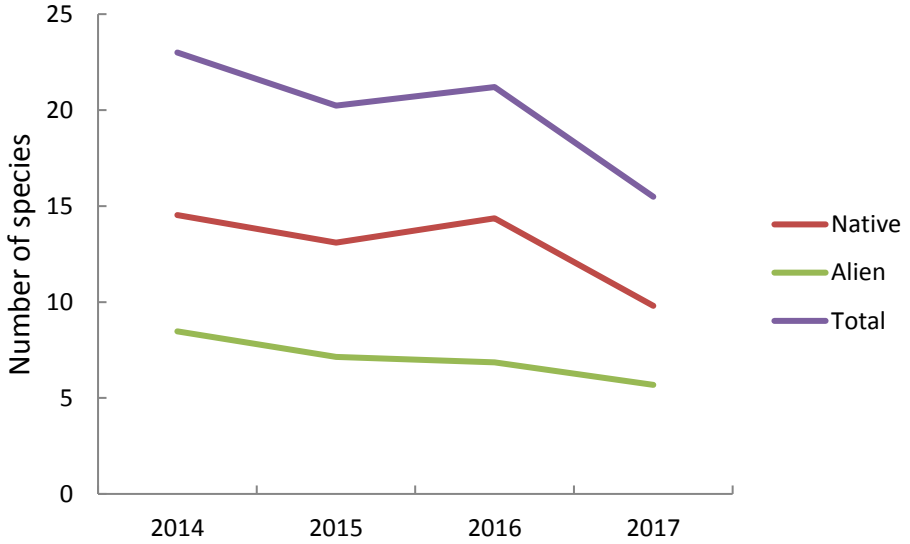

Figure 2. The average number of species recorded in flower at New Year, 2014-2017.

Species rank

In 2017 the species most frequently recorded in flower were Daisy (*Bellis perennis*), Groundsel (*Senecio vulgaris*), Dandelion (*Taraxacum*), Annual Meadow-grass (*Poa annua*) and Gorse (*Ulex europaeus*) (Table 7). For these five species, the rank order was almost identical to previous years. Other species, however, showed a significant increase in flowering when compared to 2016, most notably Chickweed (*Stellaria media*), although these differences were less marked when compared to 2014 and 2015.

Table 7. The top 10 species recorded in flower in 2017 shown in relation to the rank orders in previous years. The change in position from 2016 is shown.

Scientific name	Common name	2014	2015	2016	2017	Diff
Bellis perennis	Daisy	2	1	1	1	=
Senecio vulgaris	Groundsel	1	3	3	2	+1
Taraxacum	Dandelion	3	1	2	3	-1
Poa annua	Annual Meadow-grass	5	4	4	4	=
Ulex europaeus	Gorse	13	5	5	5	=
Capsella bursa-pastoris	Shepherd's-purse	7	6	11	6	+5
Euphorbia peplus	Petty Spurge	7	8	14	7	+7
Stellaria media	Chickweed	6	10	29	8	+19
Lamium purpureum	Red Dead-nettle	9	13	8	9	-1
Veronica persica	Common Speedwell	9	12	22	10	+12

Phenology

Of the species recorded in flower in 2017, 58% were flowering late, whereas only 15% were flowering early and 11% as would be expected at New Year (Fig. 3). In comparison, 16% of species have a long flowering period and therefore it is not possible to say whether a species is flowering early or late at New Year. These figures were scarcely different when non-native species were excluded (Table 8) and were very similar to previous years and there is no evidence to suggest that these proportions have differed significantly over the last four winters.

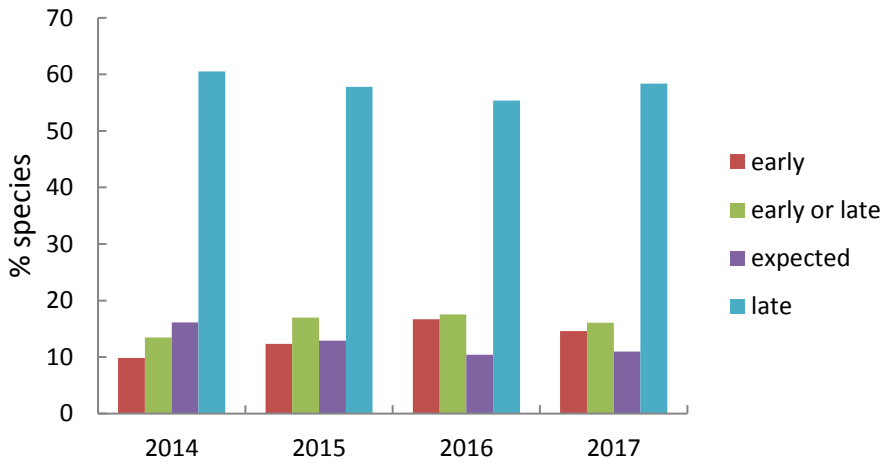

Figure 3. The % of all species recorded at New Year that were flowering early, late or as expected, 2014-2017. Species which typically flower from the spring to autumn are

categorised as 'early or late'. Species that normally flower at New Year are categorised as 'expected'.

Table 8. The % of native species recorded at New Year that were flowering early, late or as expected, 2014-2017. Species which typically flower from the spring to autumn are categorised as 'early or late'. Species that normally flower at New Year are categorised as 'expected'.

Phenology natives (%)	2014	2015	2016	2017
Early	10	12	13	14
Early or late	13	17	17	17
Expected	13	10	6	8
Late	65	61	63	60

Discussion

When compared to the previous years, far fewer species were recorded in flower in 2017 (Fig. 3). This was particularly the case for natives, but less so for non-natives, where the difference across all four years was only marginally significantly different (Table 6). A comparison of the weather data for October to December would suggest that this is largely due to temperature (Fig. 4). These months were exceptionally mild 2013-2015 even when compared to the recent averages (1981-2010), especially 2015 where the December anomaly was +4˚C. In comparison, this period was much colder in 2016, especially November, and the widespread frosts presumably curtailed the flowering of many species.

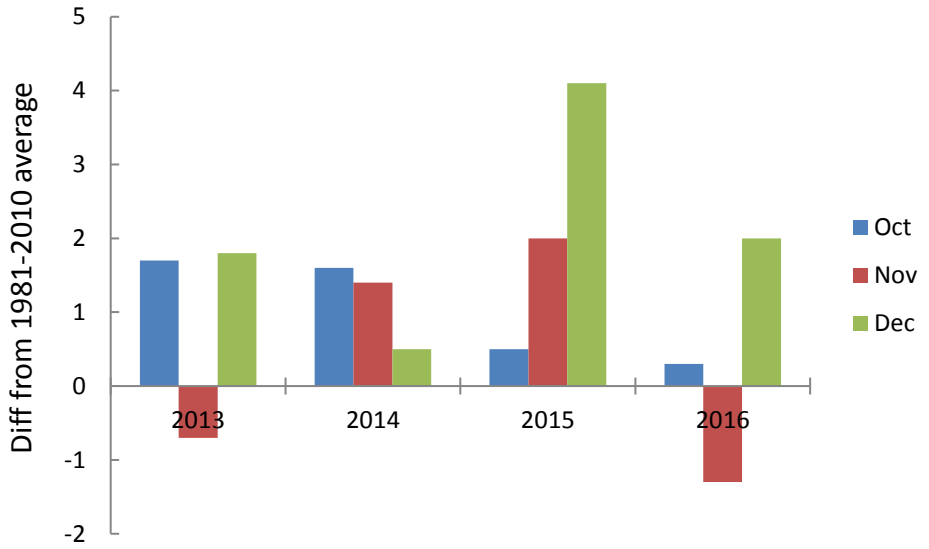

Figure 4. UK mean temperature 1981-2010 anomalies for October to December, 2013-2016. Data from UK Met Office (http://www.metoffice.gov.uk/climate/uk/summaries).

Despite these differences, the NYPH results have consistently shown that far more species are flowering late rather than early at New Year. This largely reflects the smaller number of species that flower early in the year, but also the large number of naturalised non-natives that extend their flowering into the winter months. This may be because they are often exploiting thermophilous (heat-loving) habitats, such as walls and pavements in urban areas,

which maintain temperatures a degree or two above the surrounding countryside, thereby reducing the impacts of winter frosts.

Further work is required before we can be certain about the causes of these unseasonal events and should include attempts to correlate NYPH data with climate data whilst removing the potential confounding effects of latitude and whether lists have been recorded in urban or non-urban areas. We hope to publish a more in-depth analysis of NYPH 2017 results before next year's New Year Plant Hunt and look forward to receiving more data in future years.

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