

All You Ever wanted to know about Phenology

The study of the timing of recurring life cycle events in plants and animals is called Phenology. Bud burst in trees, arrival of migratory birds and emergence of insects in Spring are examples of phenological events. Athur Stelfox initiated phenological records in Ireland in 1927. These early reports can be found in the Irish Naturalists Journal. A more systematic approach began in the 1960's where phenological gardens were established in Valentia, in Kerry, J.F.K. Park in Wexford, Botanic Gardens in Glasnevin and Johnstown Castle in Wexford. As a result of this initiative we now have almost 50 years of data for approximately nine cultivars of trees and shrubs. These records are part of an International Phenological Network. Here key events such as leaf unfolding, beginning of flowering and leaf fall are recorded. Data from 21 European countries indicates that 75% of Spring and Summer phenological events occurred earlier in 2000 than in 1971. This change was driven primarily by rising temperature.

While it may not be surprising that rising Spring temperatures have had impacts, it is important to gather evidence of precise changes and to know what the implications are for ecosystems. In 2006 a study from 21 European countries used more than 100,000 Spring phenological records to demonstrate climate change effects on European ecosystems. Irish records suggest that Beech leaf unfolding occurs nearly three weeks earlier in 2008 than in the 1970's. This appears to be a good thing as longer growing season implies greater growth and carbon capture. However in years where late Spring frosts occur these tender young leaves will be more susceptible to damage. Later leaf fall is much less obvious from records as it is thought that day length is a stronger environmental cue than temperature in timing of this event.

Appearance and flight time of a range of moths and other insects and arrival of some Spring bird migrants and departure of Winter visitors are also recorded for Irish Phenological Records. Warmer June temperatures have resulted in earlier emergence of several common moth species. Insects are particularly sensitive to temperature for growth and development. At warmer temperatures extra generations can be produced in a given year and this has huge implications in terms of availability of food to the birds or animals that feed on them. Where the insects are pests of crops it has an economic impact. Numerous but not all, aquatic and terrestrial birds are arriving several weeks earlier. In a recent report it was found that from 1969 to 1999 the common cuckoo and sedge warbler were actually arriving later. Whooper swan arrival and departure dates are available from Kilcolman Nature Reserve in Cork since 1972. Whooper swans are now departing earlier in Spring than in 1972. Warmer soil temperatures in February trigger early grass growth and once the swans have gained enough condition from eating this grass they are ready to go.

Oak leaf emergence and caterpillar emergence are both responding to rising temperature at the same rate. Migrant birds feed on caterpillars. The birds also arrive early but not early enough to benefit from the peak in abundance of their food. This results in a reduction in number of bird chicks that the food source can sustain. The worry is that mismatch in phenology may become more important in the future.

The Environmental Protection Agency (E.P.A.) funded a major phenological study in 2007. Funding became available for the establishment of the Nature Watch website in 2010. This allowed citizens to contribute to phenological observations. Unfortunately this has been discontinued as funding ended. The BSBI (Botanical Society of British Isles) has continued to collect data from the public who can submit records on wild plants in flower over the New Year period.

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