In the second of two articles discussing the limitations of hardiness ratings, GRAHAM RICE compares the RHS system with the North American one.

Whether or not a plant is hardy in our garden is basic to our choice of which plants to grow. But how do we know if an unfamiliar plant is hardy? We can consider related plants with which we are familiar; we can check the climate and situation in which the plant grows in the wild; we can ask friends; we can take the nursery’s advice; we can guess; and we can hope.

But there are a number of systems in the UK and around the world that rate plants according to how hardy they are. At once this raises another important question: what do we mean by ‘hardy’? Usually, we think of plants as hardy if they survive our winters planted outside. But whether or not plants survive the winter also often depends on other factors including drainage, shelter from winds, depth and extent of snow cover, and so on. Many of these are discussed by Kenneth Cox in his accompanying piece (pp114–117).

Most systems in use for assigning hardiness ratings are very basic and only rate tolerance of low winter temperatures, while a few take the other factors into account. Also, in some climates tolerance of summer heat is as important, or more so, than tolerance of winter cold.

We live in a time when plants, their labels and their publicity material travel around the world very quickly. The economics of horticultural publishing often demand that a book be published in many countries around the world. Similarly, the development of the internet and ebooks allows us to find plant information from around the world easily. Unfortunately, quite a number of independent, parochial systems of rating plants for their hardiness have grown up or been adapted in different countries – and most are of little use if you happen to garden somewhere else.

**United Kingdom**

The RHS has a muddled approach. While most other systems are based on tolerance of actual temperatures, the RHS uses an expanded four zone system (H1 to H4, see p116) based on the growing conditions plants require.

This system has few advantages. The original ratings proved too simplistic and had to be augmented with intermediates (e.g. H1–2), and Cox has inspired the use of an additional rating (H5) in Scotland (p117). More crucially, as our climate changes the plants’ ratings must also change. Finally, this system is useless outside the UK; the RHS is the foremost horticultural body in the world, yet in creating this system it ignored everyone else.

However, in many of its books, especially its large encyclopedias, the RHS instead uses the ‘snowflake’ system which is based on temperatures:

- ❋ Half hardy: can withstand temperatures down to 0°C/32°F
- ❡ Frost hardy: can withstand temperatures down to -5°C/23°F
- ❢ Fully hardy: can withstand temperatures down to -15°C/5°F
- ❣ (borderline): also sometimes used.

In some publications this is augmented by an additional rating:

- ❤ Frost tender: plant may be damaged by temperatures below 5°C/41°F. The minimum temperature for cultivation appears after the symbol.

The result is inconsistent and confusing and the RHS will be reviewing the way it rates plants for hardiness.

**Europe**

In the six-volume *European Garden Flora* (Cambridge University Press, 1984–2000), with which the RHS was involved, a different system of H numbers, based on a range of minimum temperatures, is used. Here, for example, H4 indicates plants that are ‘hardy in mild areas; withstands -5 to -10°C minimum’. This includes much, but not all of the UK. Again, this system is augmented, but by two extra ratings based on cultural judgements: G1, for example, indicates plants that ‘need a cool greenhouse even in southern Europe’.
United States
Confusingly, there are four systems although one is dominant. The USDA system of 11 winter hardiness zones based on winter temperatures is the most universally used. Based simply on average lowest winter temperatures, Zone 1, the Arctic, is the coldest while Zone 11, parts of Florida and Hawaii, is the warmest. Each zone is divided into two, a and b, to create boundaries at 5°F intervals. It was first published in 1960 and revised in 1990. In 2002 the American Horticultural Society (AHS) coordinated an update of the hardiness map under contract to the USDA. The USDA rejected the AHS’s draft version of the map in 2003 and since then has itself continued to work on an update. The new USDA version of the map is expected to be released very soon, and will be published as an interactive GIS-based map designed to be web friendly. This is the nearest we have to a universal system, but the big irritation for gardeners outside the US is the use of Fahrenheit when across the rest of the world Celsius is used. Maps based on the USDA’s 11 zones already exist for Europe, Africa, China and other areas.

Based on actual temperatures recorded between 1976 and 2005, the new USDA map utilises data from more weather stations than was the case with the 1990 map, and will also be far more detailed at a local level. It will take into account, for example, the influence of large bodies of water and the presence of cold sheltered valleys. It will also feature three additional zones at the ‘warm end’, Zones 12–14.

In 2006 the National Arbor Day Foundation produced its own update to the USDA map which is similar to the rejected 2003 AHS map. This is not widely used.

The US also has the Sunset system which was discussed by Cox (p119). This is widely used in California and in other frost-free areas in the west including Arizona and New Mexico, but less so farther north and not at all in the east or anywhere else.

Finally, recognising that in many areas tolerance of summer heat is as crucial as tolerance of winter cold, the AHS, in a project led by Dr H Marc Cathey, in 1997 produced a heat zone map and assigned heat zone ratings to plants. This map has not been widely adopted and plans for a possible update to the map have been put on hold since the death of Cathey in 2008.

Canada
In Canada they have a different system, created by Agriculture Canada, which is based on a range of factors including minimum winter temperatures, length of the frost-free period, summer rainfall, maximum temperatures, snow cover, January rainfall and maximum wind speed. The first version of their map appeared in 1967 and it was revised in 2000. Zone 0 is the coldest, Zone 8 is the mildest. The USDA system also covers Canada.

Australia
In Australia a system similar to that created by the USDA is used, though the numbering is different, and here the scarcity of weather stations in many areas inevitably leads to a less accurate map.

A universal system?
Gardeners around the world and the horticultural and horticultural publishing industries would benefit from the adoption of one universal system. The USDA system, with its 5°F bands, should suit most climates. In a step towards a more unified system, the RHS Encyclopedia of Perennials (RHS / Dorling Kindersley 2006) included USDA hardiness zone ratings but this is not being followed up. Cox (p117) writes about his development of a new zone for colder parts of Scotland; in fact the USDA system could be utilised to the same purpose.

But, crucially, with any system must come the recognition that it cannot be more than a guide, it should not be expected to be foolproof. The various climatic and other factors Cox describes are obviously important; the skill of the gardener is also a highly significant factor. Systems such as the RHS H1 to H4 system which depend on assigning ratings according to the methods by which plants are grown are unsatisfactory and, by definition, parochial.

There remains just one final issue: How to decide which hardiness rating is right for each plant – which plants survive where? Agriculture Canada has a scheme which involves gardeners across the country reporting which plants are hardy in their gardens. A simple web-based application, perhaps utilising the RHS Plant Finder database, through which gardeners can report to the RHS which plants are hardy in their own gardens, would not only provide a mass of valuable data but also foster confidence in the system.

Conclusion
The RHS will be re-examining the way it deals with plant hardiness issues. It should take the opportunity not only to create a clear and accessible system for UK gardeners, the better to help us all choose the right plants for our gardens, but to do so in an open collaborative way. This needs an approach that is not blinkered or parochial but is part of an international effort.

GRAHAM RICE is Editor-in-Chief of the RHS Encyclopedia of Perennials