

Boring botany? Rethinking teaching about plants in schools

How can educators make plants visible in inspiring ways? Dawn Sanders argues for the importance and relevance of plant science and discusses ways the subject can be made to capture and maintain the attention of students, including using botanical gardens as educational resources.

Introduction: the spectacular plant

During September 2004, a crowd of visitors descended on the glasshouses of Cambridge University Botanic Garden, to witness the amazing spectacle of the flowering of the giant Titan Arum (*Amorphophallus titanum*), a monumental plant, which originates from the rainforests of Sumatra. In the five days from the first unfurling of the flower over 10,000 visitors came to view this dramatic event. A web cam on the garden's website allowed

for a wider dissemination of this extraordinary and rarely witnessed occasion. The web cam images attracted over half a million 'hits' and the garden received emails from around the world congratulating it on making this botanical event available to a global audience. What lessons does the gathering of these crowds at the flowering of the Titan Arum offer to teachers struggling to make botany a stimulating and exciting topic? And what exactly is a Titan Arum?

The Titan Arum

The massive 'flower' of the Titan Arum is in fact an *inflorescence* of many thousands of tiny flowers embedded in a cream spike called a *spadix* (Figure 1). Encircling it is a funnel-shaped *spathe*. This structure reaches its zenith for two days before collapsing. During this time, the accompanying stench of rotting flesh is at its peak, usually overnight for approximately 8 hours. The smell is so bad that the Sumatrans call it the '*corpse flower*'. This cadaverous smell is emitted to attract carrion beetles or blowflies to pollinate the tiny flowers on the *spadix* hidden by the *spathe*.



Figure 1 Titan Arum (*Amorphophallus titanum*). (Photograph © Cambridge University Botanic Garden, 2004.)

Plants: the Cinderella organisms of the classroom?

In Britain, Tranter (2004) has recently observed that 'in too many schools, the wealth of living or once-living organisms which pupils are required to study is often reduced to little more than the geranium and the potato' (p. 104). In addition to this absence

of specimens, research has demonstrated that teaching with, and about, plants is considered to be a pedagogical challenge by many biology educators working in today's classrooms. Key messages from this research are:

- the aforementioned reduced repertoire of specimens being used in classrooms and laboratories (see Collins and Price, 1996)
- most children and young people prefer to study animals (see Wandersee, 1986 and Kinchin, 1999).

It has been suggested, however, that: 'plants are generally easier to handle in a classroom situation than animals since they do not bite, run away, or produce odours' (Hershey, 1990, p. 68). In the light of Tranter's (2004) observations and the findings of my recent D.Phil study on botanic gardens as environments for learning (Sanders, 2004), in which the impressions of children from three London primary schools were collected and analysed after several visits to the Chelsea Physic Garden, I would suggest that it is precisely these active, odorous characteristics of plants that excite children. Hence, for example, their identification of carnivorous plants, such as the Venus Fly Trap (*Dionaea muscipula*), as 'killer plants' and *Ginkgo biloba* as 'the big smelly tree' (Sanders, 2004). So how might teachers use this research to inform their teaching?

The American biology educators, Wandersee and Schussler (2001) use the term 'marquee plants' – that is plants that draw attention to themselves and capture the imagination – to describe plants to be used in educational contexts. They suggest that these are plants that:

- attract the public's attention
- during some or all of their life-cycles, are capable of drawing a crowd at a botanic garden
- may serve as a doorway to greater public understanding of plants (Wandersee and Schussler, 2001, p. 3).

They suggest, that by using 'marquee plants', educators will draw attention to plants that have previously been overlooked by teachers and learners alike. By utilising internet facilities to access web cam documentation of the Titan Arum's life-cycle or by taking classes to visit the botanic garden itself to

witness the spectacle, teachers can engage their learners with a dramatic botanical event that will impact on learners' imaginations in ways that a geranium or potato cannot. But since this is a rare occasion, how can teachers make botanical education *regularly* interesting and dynamic?

Which plants?

As noted earlier, a key message from research is that teachers are using a limited repertoire of plants for their teaching. The common mythology surrounding plants is that they are innocuous organisms that do not move or defend themselves. Therefore, one of the challenges for educators is to find plants that are *not* innocuous and/or that demonstrate active characteristics. In my study of 95 key stage 2 pupils (7–11 year olds), I found that year 5 girls found the 'spikiness' of cacti an attractive feature (Figure 2). I also discovered that boys of the same age, and a few girls, were attracted to the active fly-killing abilities of carnivorous plants (Sanders, 2004). But where can teachers find the resources to help them develop a more exciting range of classroom specimens that exhibit these features?



Figure 2 For some year 5 girls the 'spikiness' of cacti is an attractive plant characteristic. (Photograph Microsoft Picture Gallery Educational Software.)

Botanic gardens: an educational resource for schools

There are numerous botanic gardens in the UK, many of which run excellent educational programmes both for primary and secondary schools; these extend from the Eden Project in Cornwall, through to the Royal Botanic Gardens in Edinburgh. Most of these gardens have excellent

websites, where teachers can access information regarding visiting times, extraordinary flowerings and any formal programmes the gardens offer schools. Some of these gardens offer outreach programmes, where their staff will come into your school and work with you.

Horticultural nurseries, too, have educational aspects to their websites and some offer useful publications. For carnivorous plant specimens and growing advice, try the Hampshire Carnivorous Plants website or the excellent South West Carnivorous Plants website called 'Little Shop of Horrors'. For a range of stimulating plant experiments, teachers could log on to the Cambridge-based project 'Science and Plants in Schools' (SAPS). I would particularly recommend their Wild Oats experiment for generating lively class discussions regarding the competitive capabilities of this virulent weed.



'Marquee plants'...draw attention to themselves and capture the imagination

Why is botanical education relevant?

From the moment we wake up in the morning we have a relationship with plants. From the cotton in our clothes, and mint in our toothpaste, to the cereals, fruits and vegetables in our food. A major task for educators is to make these plants visible in inspiring ways. Taking students to witness spectacular flowerings in their local botanic garden can be part of that process.

'Plants = life' and – as Galbraith (2003) has argued – 'understanding and unwrapping this slogan is essential to the modification of human behaviour on this planet in the twenty-first century' (Galbraith, 2003, p. 279). In order to create classroom climates where this statement has real meaning for learners, we need to engage students with the diversity of plant-life existing on this planet. But this is problematic in classrooms where 'boring' plants dominate. Developing stronger partnerships with plant science institutions, such as botanic gardens, could support teachers in using a wider range of specimens in their classroom practice. This pedagogical challenge is not a new one. Indeed, in 1913 the botanical educator Eliza Brightwen was concerned that 'many young people are apt to consider botany a very dry study' (Brightwen, 1913, p. 28).

The following list offers a range of plants, often found in botanic gardens, and the scientific and social contexts in which they can be used in your teaching.

- **Interesting adaptations to diverse environments**, for example, *Dionaea muscipula* Venus' Fly Trap (adapted to low-nutrient bogs), *Platycerium sp.* Stag's Horn Fern (adapted for life in the tree canopy of tropical rainforests), *Lavandula angustifolia* Lavender (adapted for a hot, dry Mediterranean climate).
- **Historical interest**, for example *Chenopodium album* Good King Henry and *Taraxacum officinale* Dandelion, used in Elizabethan salads. *Isatis tinctoria* Woad, used in ancient Britain and in Elizabethan times as a dye plant.
- **Cultural use**, for example, *Phormium tenax* New Zealand Flax, used by Maori people in New Zealand to weave artefacts such as baskets and bags.
- **Recognised as a food plant**, for example, *Oryza sativa* Rice, *Musa velutina* Banana and *Olea europaea* Olive Tree.
- **Used in 'everyday' materials** such as toothpaste (*Mentha x piperata* Mint), as washing implements in the bathroom, for example, *Luffa aegyptiaca* Loofah or to make corks as in *Quercus suber* Cork Oak. Cotton (*Gossypium hirsutum*) used for making clothes.

Making the most of a visit to a botanic garden

Teachers planning to make a visit to a botanic garden might wish to consider the following questions before going.

- Have children any phobias (e.g. soil, insects) that might affect them engaging with the botanic garden experience?
- What activities will be used to prepare children for the visit?
- How will the children follow up on the outing to the botanic garden?
- Is there an education officer at the garden who can help plan and deliver the proposed activities?

In an age where plant and animal diversity is diminishing every day, and the human populace is expanding, providing inspiring environments for botanical learning is a priority, for plants *are* the basis of all life on earth.

Glossary

(See also Hickey and King, 2000.)

Inflorescence the arrangement of flowers on a floral axis; a flower cluster

Spathe a large bract opposite and often enclosing a flower or an inflorescence

Spadix a spike with a fleshy axis

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Related websites

www.littleshopofhorrors.co.uk/customer/home.php

The Little Shop of Horrors is the online store of Southwest Carnivorous Plants, a Chelsea Flower Show Gold Medal winner. It sells a range of plants including those suitable for beginners.

www.saps.plantsci.cam.ac.uk

The Science and Plants for School website has three main aims: to develop new educational resources, to promote exciting teaching of plant science and molecular biology, and to interest young people in plants and molecular biology. The *practical investigations* section provides ideas for investigations and activities with plants.

Publications and resources offers support for teaching about plants in the curriculum through a diverse range of publications – some printed, others on the web. The *Curriculum links* enable teachers to locate what is relevant for each curriculum statement or for each topic.

www.botanic.cam.ac.uk

Information about the Botanic Gardens, Cambridge. An events programme runs throughout the year, offering events, family days and courses for all ages. School and college visits to the garden give students invaluable, first hand experience of the diversity of the world's flora and environments.

www.chelseaphysicgarden.co.uk

The Chelsea Physic Garden hosts school visits – for all key stages. These can be arranged to suit the choice of teacher topics. Through the 'tailor-made' approach, the garden endeavours to provide a unique, valuable and affordable educational experience.

www.rbgekew.org.uk/education/schoolsed.html

The Royal Botanic Gardens, Kew, has details of school visits both to Kew and Wakehurst Place, which hosts the Millennium Seed Bank. There is also information about teacher and student-teacher placements.
