



Portulaca pilosa

The secret life of succulents

Geetha Iyer

A biology class in a lecture mode can sometimes result in conclusions that may contribute to wrong or incomplete knowledge being created. I realized this when I was showing a child of class 6 a lemon tree and the thorns in them. There was an immediate reaction, "I thought thorns were present only in plants in deserts or in plants which do not have leaves." Her teacher had perhaps failed to clarify in her lecture that thorns are not always reduced leaves. Misconceptions like this are galore while learning about plants. One such example is the topic of this article – plants that are generally referred to as succulents. I specifically recall that in my college, I was taught that succulents can be found only in places where water availability is low, and deserts given as an example of the habitat. It is precisely this, the habit of giving just one or one kind of example to explain concepts that leads to wrong associations, establishing wrong knowledge in the mind. I learned how misleading that statement was only years later when I started to take my students on field trips to teach biology.

Succulents is a term that describes plants which have developed the ability to store water in their tissues, to be used during conditions of water scarcity. It is no doubt true that succulents are more common in regions that are hot, arid, or dry, but they may also be found in forests and wet areas, hills and high altitude regions, and even in cold environments. This plant *Portulaca pilosa* shown above was growing inside the forests of Western Ghats. What about xerophytes? Are they succulents? They also grow in dry arid habitats!

Not all xerophytes are succulents; so again room for misconceptions. Questions are rarely raised, right kind of questions seldom asked, and examples provided are not familiar and lack in diversity. For e.g., a question such as, "Are succulents xerophytes?" can throw up a lot of examples for discussions, resulting in clarifications. There are similarities and differences between succulents and xerophytes. Succulents are among the most interesting ones to study and easy to grow to be a subject of study for a science project.

There are more than 60 families that have succulent plant species. This article focusses on plant species belonging to the Family Euphorbiaceae. According to N.P. Balakrishnan and T. Chakrabarty – Family Euphorbiaceae is a complex heterogeneous family consisting of about 322 genera and 8900 species in



Photo courtesy: Wikipedia

Pedilanthus tithymaloides

the world. In India, this family is represented by 73 genera and 410 species. Species belonging to genera *Euphorbia*, *Jatropha* and *Pedilanthus* are plants that may be seen even in our gardens. A group of commonly seen

plants that are often mistaken for the cactus belong to the genus *Euphorbia*. There is an interesting anecdote about this name. This name *Euphorbia* was suggested by King Juba II of Mauretania (ca. 50 BC – 19 AD). The plant with its fleshy latex containing tissues reminded the learned King (a botanist of great repute) of the plump appearance of his Greek physician whose name was Euphorbus. He named the plant after the physician.

E susan, a rare and endemic plant, was discovered inside the forests of Kalakad Mundanturai Tiger reserve. This plant is found nowhere else in the world. Rapid habitat destruction has resulted in the continuous decline of this rare species.

The genus *Euphorbia* include species that are diverse in their habits. Some are stem succulents, some are shrubs, while several species are trees. Many of the *Euphorbia* species have spines, resembling Family Cactaceae at a first glance. Trying to identify whether the thorny succulent belongs to Family Euphorbiaceae or Cactaceae can be an interesting classroom activity.



Photos: Geetha Iyer

Euphorbia susan

For the middle school classroom



Cereus sp



Euphorbia susan



Opuntia monacantha



E antiquorum



1. Provide students with printed images of the two sets of plants given here. If an actual plant such as *Opuntia* or other cactus and any thorny *Euphorbia* can be obtained then the students may be allowed to observe the actual specimen for the activity.
2. Provide this information sheet: All cacti species will have a structure called areoles which are not present in any other plant. They are present on the stem like a thick patch, arranged either in a linear fashion or in geometric patterns all over the plant body. Both flowers and spines/thorns arise from areoles only in cactus species. The spines/thorns are either single or present in groups. In *Euphorbia*, spines are always found in pairs and arise directly from the stem. The spines are modified leaves in cacti whereas they are modified stipules in *Euphorbia*. Flowers in cacti are single, bright, and large where as in *Euphorbia* they are small and are found on a special type of inflorescence called cyathium. What appears as colourful flowers are actually specialized structures called bracts. Euphorbia have thick milky latex that oozes out when the stem is cut. In most cacti (with a few exceptions) the fluid that comes out is watery. Care should be taken that the latex from the Euphorbia does not get into your eyes or mouth.
3. Ask students to observe the specimens carefully and justify whether they are cacti or not. Encourage discussion to know whether connections through observations have been made. Plant the specimen in the school garden and encourage students to look after them.

Not all of them are thorny, however and among the genus *Euphorbia*, there are several species that do not sport spines at all. Members of this family contain



Euphorbia nivulia

within their stems milky sap which maybe latex or irritating toxins whose chemical composition, depending on the species, could be diterpene esters, alkaloids, glycosides, and ricin-type protein toxins.

Phyllanthus emblica or the famous gooseberry is a member of this family and its medicinal values are well-known. Most species of this genus *Phyllanthus*

are used in medicinal preparation and *Phyllanthus niruri* or keezhanelli is often used in the treatment of liver ailments especially for jaundice.

Jatropha is another genus with commercial potential. Many species occurring in the wild are yet to be exploited fully. *J curcas* has been widely grown for the oil from its seeds which is considered to be a good biofuel.

J maheshwarii, an endemic species found in the southern parts of India, holds potential pharmacological benefits that are yet to be exploited. Rural folks along



Jatropha maheshwarii, Euphorbiaceae

the south eastern coasts of India use its leaves and stems to address problems related to skin and teeth. Scientific studies have shown that the stem extract is effective against infection by *Staphylococcus aureus*.



Jatropha podagrica

Jatropha podagrica is an ornamental plant native to South America but found in many gardens in our country. It is known by several fancy names, one of them being Buddha's belly. Its profile is interesting. The thick swollen stem and the bright red flowers help identify this plant. All parts of this plant are poisonous.

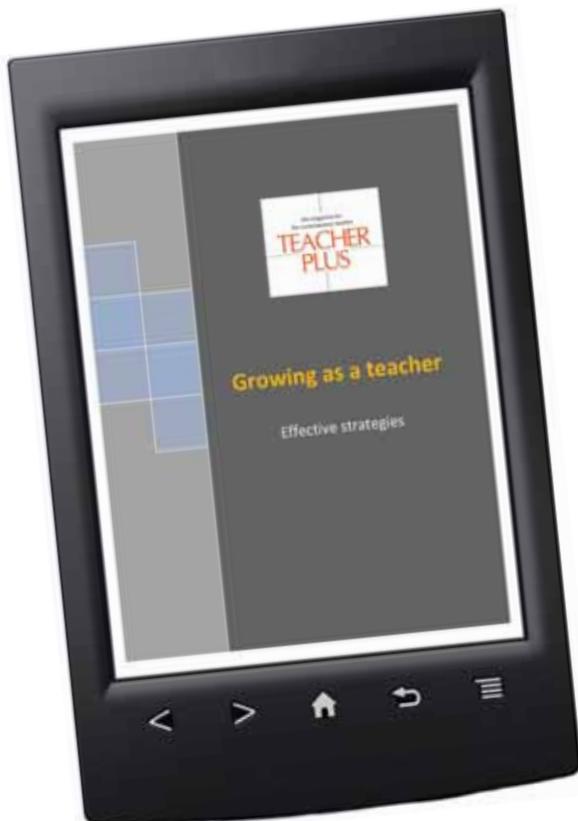
No description of the family Euphorbiaceae will be complete without mentioning that the castor oil plant *Ricinus communis* that is so valued for its medicinal properties is also its member. It's also a food plant for the common castor butterfly.

Succulent *Euphorbias* are easy to grow as they do not have to be watered regularly and can grow in any kind of soil although composted soil will encourage good growth and flowering. They do require warmth and exposure to full or partial sunlight. There are several other families that have succulent plants. For e.g., *Aloe vera* is a succulent as also *Portulaca pilosa* shown at the very beginning of this article but neither of them belong to Family Euphorbiaceae.

References

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