
SEED DISPERSAL IN MALTESE PLANTS

Edwin Lanfranco

A fixed organism must evolve means of dispersing its offspring in order to survive as a species. Thus plants have devised countless ingenious adaptations for ensuring dissemination of their seeds.

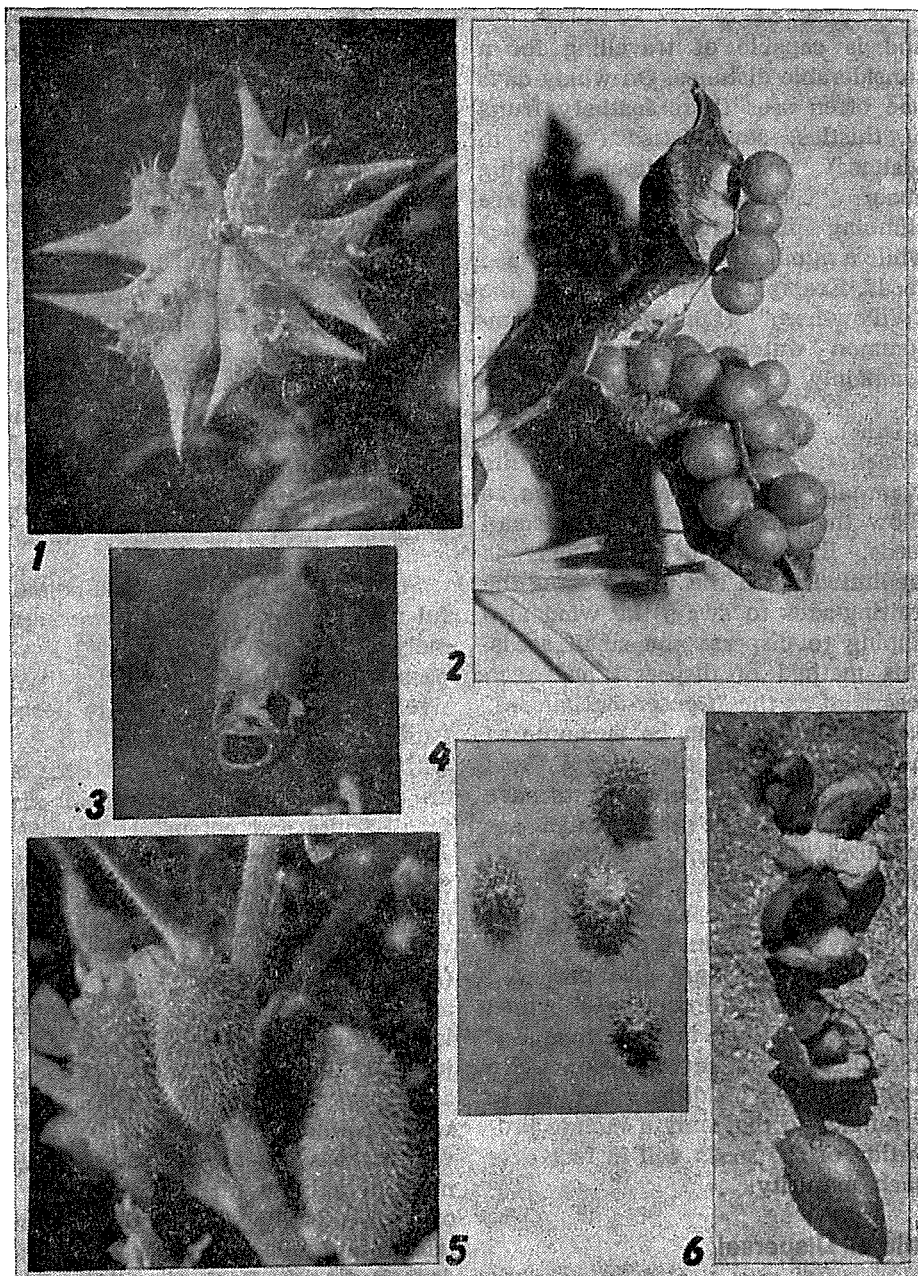
For convenience we can divide the various methods of dispersal into four groups: (1) by wind; (2) by animals; (3) by water and (4) mechanical. It must be kept in mind that while a plant may evolve particular adaptations to favour one of the above methods of dispersal, other agencies may also play a role in distributing the seed. The structure dispersed is the "disseminule": this may consist of just the seed; the fruit containing the seed or any additional structure which accompanies these. In some cases the whole plant may be carried off by the wind! The account which follows is based on plants which grow in Malta.

Wind Dispersal

Many cases of wind dispersal involve the use of disseminules with wing-like extensions. Such winged structures are most common in trees or high climbers. In such cases the disseminules will have a chance to be carried off by the wind for some distance before eventually settling.

Winged fruits are known as "samaras". A common tree bearing samaras is the "Tree of Heaven" (*Ailanthus*) in which the samara is twisted in corkscrew fashion thus causing rotation while it is being carried by currents. Other local trees with winged fruits are the "Elm" (*Ulmus*) and the "Ash" (*Fraxinus*) which, while rare, can both be seen at Buskett. Other plants possess samaroid seeds (winged seeds). Most conifers such as pines and cypresses possess such seeds. The commonly cultivated blue-flowered "Jacaranda" produces big woody fruits which split open to release numerous winged seeds. The common garden climber "Bougainvillea" has brightly coloured bracts (modified leaves associated with flowering shoots) which are wing-like and serve to disperse the fruits to which they are attached.

Low-growing plants often employ plumed disseminules. These tend to be lighter than winged structures so that they may soar up from the plant releasing them when there is sufficient wind. In many of the "Compositae" (Dandelion family), the calyx (group of sepals) grows into a feathery structure. This suspends the fruit, thus acting like a parachute



1. Spiny fruit of Land Caltrops (*Tribulus*). 2. Open capsule of *Iris foetidissima*. 3. Fruit of Snap-dragon 4. Fruits of Medick. 5. Fruits of squirting cucumber. 6. Fruits of *Posidonia*.

and is capable of travelling for a considerable distance. On windy days one often sees these feathery fruits of thistles, sow-thistles ("tief" in Maltese) and dandelions drifting about. "Clematis", a rather rare climbing plant has plumed styles while a number of plants have plumed seeds. Examples of the latter are the "Willow-herb" (*Epilobium*), an uncommon waterside plant and the commonly cultivated "Oleander".

Other herbs have stiff fruiting branches. In such cases the fruits eventually split in various ways to allow the escape of numerous small seeds. Expulsion of the seeds is facilitated when the wind causes the fruiting-axes to sway, the wind also helping to disperse the small seeds. This method of dispersal has been described as the "Censer-mechanism" (jactitation) and can be encountered in such plants as the "Poppy" and the "Snapdragon". Some plants have extremely minute seeds which are produced in enormous numbers. The tiniest seeds are those of the "Orchids" where a single plant may produce literally millions of seeds. Very small seeds are also produced by the parasitic "Broomrapes" which also produce them in huge numbers. Both Orchids and Broomrapes require very particular conditions in order to germinate so that only a minute proportion of the seeds will in fact ever reach maturity.

Animal Dispersal

There are many ways in which

animals can be used as vectors for seed dissemination. Some fruits are furnished with hooks by means of which they can adhere to the fur or feathers (or clothes!) of passing animals. Common examples are the "Wild carrot" which produces a dense head of small hooked fruits and the various species of "Medicago" which have spiral fruits with hooked margins. Some "Buttercups" have tough bristles which are used in the same way. The creeping "Land Caltrops" (*Tribulus*) has spiny fruits which break up into five sections. These stick into the soles of passing animals which thus disperse them.

Some plants have juicy and colourful fruits or seeds. These attract animals to eat them but the seed itself passes unharmed through the digestive tract of the animal. Large fleshy fruits (of the sort we associate with greengrocers and fruit-stalls) are normally dispersed by mammals. Small fruits and colourful seeds are normally dispersed by birds. Thus "pomegranates" split open to reveal numerous juicy bright-red seeds which attract birds. A type of "Iris" (*I. foetidissima*) has fruits which split open into three valves to expose large bright red seeds. Birds often just eat the pulp of the fruit or seed and expectorate the hard parts which contain the embryos. In cases where the seeds are dispersed internally by animals, the digestive juices of the vector may indeed favour germination while the faecal matter deposited with the seed will provide nourishment for the seedling.



Top: Pod with feathery seeds of Oleander (left) and Samara of Elm (right).
Bottom: Feathery fruits of "Sow-Thistle" *Urospermum* (left) and Samarae of *Ailanthus* (right).

Water Dispersal

The most familiar example of water dispersal is that of the coconut with its large hollow seed and woody fruit wall. This can drift about by sea currents to cover distances accounting for its wide distribution on oceanic islands.

A very ingenious method of water dispersal is used by the common "Sea-grass" (*Posidonia oceanica*) which is very common in the Mediterranean. Although it lives in the sea it is in fact a flowering plant. Its dead strap-shaped leaves are cast up in great quantities on our shores. In *Posidonia* the pericarp (fruit-wall) is spongy and when the fruit becomes detached from the parent it floats to the surface. As a result sea currents carry these fruits for considerable distances. The fruit wall eventually splits open and the dense embryo which it contains sinks to the bottom — possibly hundreds of miles away from the parent plant!

Mechanical Dispersal

Many plants have devised means to eject their seeds away without depending on external vectors — though these last may play a part in further dispersing the ejected seeds. A typical example of such mechanical dispersal is the "Squirting Cucumber" (*Echballium*) which is very common in waste places. The fruit-stalk fits like a plug into the fruit.

As it ripens pressure inside the fruit begins to mount while the tissues surrounding the insertion of the fruit-stalk begin to decompose. As a result, a slight disturbance, such as a passing animal may trigger off the explosive mechanism when the decomposed area around the fruit-stalk gives way and the seeds are ejected forcibly together with a quantity of liquid and sticky slime. The seeds may thus stick to passing animals and be further dispersed. It should be pointed out that the liquid ejected can cause considerable irritation to the eyes.

Acanthus is a large herb with big leaves and tall flower spikes, usually found in the shade of trees. The stalks holding the seeds (funicles) inside the fruit are hardened and coiled and in a state of tension. When the fruit opens (during hot days in May and June) the tension on the funicles is released and the seeds are catapulted accompanied by a loud clicking sound to a distance of about 9 metres.

In this account it was only possible to give a general idea of some of the adaptations encountered. Even a short visit to the countryside will reveal numerous other variations on the themes treated here leading to greater appreciation of the ways of plants.

Edwin Lanfranco, B.Sc. Spec. (Lond.), teaches Biology at the Upper Secondary School, Valetta.