Some flowers have learned to bounce back after injury

April 8 2020

Credit: CC0 Public Domain

Some flowers have a remarkable and previously unknown ability to

bounce back after injury, according to a new study.

Some injured flowers bent and twisted themselves back into the best possible position to ensure successful reproduction within 10-48 hours of being knocked over, for example, by falling branches or being walked on.

The reproduction of many flowers (and survival of populations) depends on the perfect alignment of their sexual organs and nectar tubes in order for a visiting insect to pollinate them.

But some are better at recovering their alignment after an injury than others.

Professor of Ecology and Evolution Scott Armbruster, at the University of Portsmouth, published his findings in *New Phytologist*.

He said: "Mechanical accidents happen to plants fairly often and can, in some cases, stop the plant from being able to attract pollinating insects and so, make seeds. Making seeds and propagating is a flower's main purpose, so injuries which threaten that pose a huge problem."

The study found that bilaterally symmetrical flowers—those in which the left and right sides mirror each other, such as snapdragon, orchid, and sweet pea—can almost always restore their 'correct' orientation by moving individual flower stems or even moving the stalk that supports a cluster of flowers.

In some cases, bilaterally symmetrical flowers can accurately re-position their stigma—a sexual organ—after injury.

Plants' movement after an injury isn't only about making seeds; these plants were seen to bend or twist to make sure their leaves were again

facing the Sun, necessary for photosynthesis, the process by which a plant produces its food.

Radially symmetrical flowers, star-shaped flowers, such as petunia, buttercup, and wild rose—lacked this ability and their stems rarely recovered after an injury.

Nearly all (95 per cent) of bilaterally symmetrical flowers examined moved after injury to restore the plant's ability to attract pollinators, while just four per cent of radially symmetrical flowers examined had moved post-injury. This is probably because floral orientation is usually more important for the efficient pollination of bilaterally symmetrical flowers than radially symmetrical ones.

"This little-known aspect of plant evolution is fascinating and tells us much more than we previously knew about how plants behaviourally adapt to changes in their environment, including mechanical accidents," Professor Armbruster said.

Professor Armbruster and his collaborator Nathan Muchhala (University of Missouri, St. Louis) studied 23 native and cultivated flower species in Australia, South America, North America and the UK.

They found four mechanisms involved, sometimes separately, sometimes all at once, in an injured flower reorienting itself:

- Bending of the main supporting stalk of a cluster of flowers;
- Bending of individual flower stalks (more likely in long stems);
- Rotation of individual flower stalks (more likely in short stems);
- Twisting or bending the flower's sexual organs.

The younger the plant part, the faster it managed to bend, meaning stalks supporting individual flowers at the end of a cluster were more easily

moved, than the stronger and older stalks supporting an entire cluster.

"Because the outlook is grave for plant species which don't allow pollinating insects in or which have lost the connection between nectar and its sexual organs, we expected plants might have found a way around this, if, for example, they are hit by high winds or falling branches," Professor Armbruster said.

"What we found, in a haphazard sample of plants, was that bilaterally symmetrical flowers were able to use up to four methods of restoring their chances of being pollinated almost to pre-injury levels.

"This ability is, I'd argue, an under-appreciated behaviour worthy of closer scrutiny."

More information: W. Scott Armbruster et al, Floral reorientation: the restoration of pollination accuracy after accidents, *New Phytologist* (2020). DOI: 10.1111/nph.16482

Provided by University of Portsmouth