WHEN Prince Charles once claimed that he talked to his plants—and that they responded—critics chalked it up as one more reason why he should never become king. With tongue more firmly in cheek, the prince says that these days he merely “instructs” his leafy subjects. But do they listen to, learn from, or remember his royal commands?

More than a century ago Bengali polymath Sir Jagadish Chandra Bose posited that plants could feel, learn and remember, and more recent studies have confirmed they can store and recall biological data. But research by Monica Gagliano of the University of Western Australia (UWA) and three fellow scientists goes much further. This study, published in *Oecologia*, offers proof that plants not only learn from experience, but remember what they have learned over relatively long periods.

Dr Gagliano and collaborators Michael Renton, Martial Depczynski (all from UWA) and Stefano Mancuso (of Florence University) chose as their subject the herb *Mimosa pudica*, often known as the touch-me-not because its leaves fold swiftly inwards when disturbed—a mechanism designed to defend it against predators. The team devised an apparatus that suspended each potted mimosa on a vertical rail above a foam base, then dropped it 15cm by allowing it to slide down the rail—a significant physical shock, but ultimately not a threat to the plant’s well-being. Their goal was to discover if mimosas could adaptively learn to ignore such stimuli, a process known as habituation. The plants were variously grown in low-light (LL) and high-light (HL) environments, with the expectation that the LL plants would “learn” more quickly given their greater need to keep their leaves open for photosynthesis.
Mimosas subjected to a single drop quickly closed their leaves, and did so again when the experiment was repeated eight hours later—clearly they still considered the experience threatening. A large group of plants was then trained with a series of 60 consecutive drops a few seconds apart, repeated seven times within a single day. These plants habituated rapidly, keeping their leaves open after the first four to six initial drops and, towards the end of the day’s training, not closing their leaves at all (as expected, the LL plants’ leaves re-opened more widely). To ensure that all this was not simply a case of “fall-fatigue,” a different kind of shock (on a 250-rpm “shaker plate”) was administered after the training. The mimosas closed their leaves.

What is most remarkable, however, is that the plants remembered their training. Some mimosas that were subjected to a single series of 60 drops six days later did not close their leaves at all, while those that did react stopped doing so after only two or three drops. A number of plants were then switched from LL to HL (and vice versa), left undisturbed for 28 days, and “re-tested” by being given the full day’s training again. Intriguingly, the HL-to-LL plants not only remembered that the stimulus was harmless, but also opened their leaves more widely, showing that they had adapted what they had learned to their new LL environment. Overall, both groups displayed more pronounced and consistent responses than before, demonstrating that they still recalled what they were taught four weeks earlier.

Dr Gagliano and her colleagues admit that they do not conclusively know how plants—lacking brains or neural tissue—learn and remember. Calcium-based cellular signalling is one possible explanation, as is the processing of information by cells via ion flows—plants have well-established pathways to transmit information via electrical signals.

All of which, particularly when set alongside Dr Gagliano’s recent work showing that plants can “talk” with each other via a kind of nanomechanical acoustic mechanism, suggests that Prince Charles may yet be vindicated.