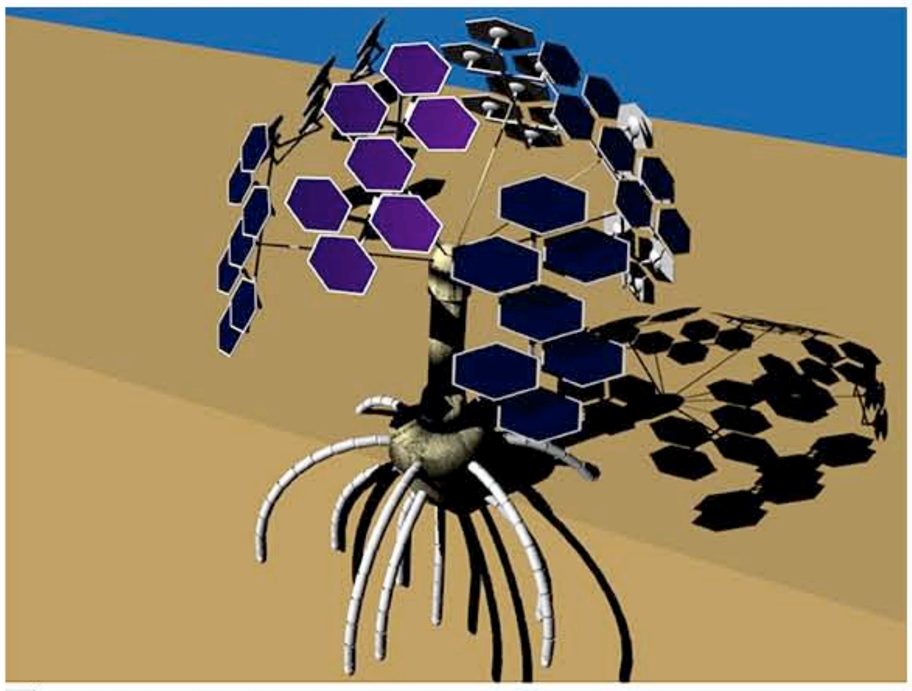
« Back to Article

Smarty Plants: Inside the World's Only Plant-Intelligence Lab

By Nicole Martinelli 10.30.07 | 12:00 AM



The "plantoid" is a concept robot for exploring Mars. Its roots would explore the soil, while power and telecommunications are provided by the main stem and the solar "leaves."
Image: Courtesy International Laboratory of Plant Neurobiology

SESTO FIORENTINO, Italy -- Professor Stefano Mancuso knows it isn't easy being green: He runs the world's only laboratory dedicated to plant intelligence.

At the International Laboratory of Plant Neurobiology (LINV), about seven miles outside Florence, Italy, Mancuso and his team of nine work to debunk the myth that plants are low-life. Research at the modern building combines physiology, ecology and molecular biology.

"If you define intelligence as the capacity to solve problems, plants have a lot to teach us," says Mancuso, dressed in harmonizing shades of his favorite color: green. "Not only are they 'smart' in how they grow, adapt and thrive, they do it without neuroses. Intelligence isn't only about having a brain."

Plants have never been given their due in the order of things; they've usually been dismissed as mere vegetables. But there's a growing body of research showing that plants have a lot to contribute in fields as disparate as robotics and telecommunications. For instance, current projects at the LINV include a plant-inspired robot in development for the European Space Agency. The "plantoid" might be used to explore the Martian soil by dropping mechanical "pods" capable of communicating with a central "stem," which would send data back to Earth.

The idea that plants are more than hanging decor at the dentist's office is not new. Charles Darwin published *The Power of Movement in Plants* -- on phototropism and vine behavior -- in 1880, but the concept of plant intelligence has been slow to creep into the general consciousness.

At the root of the problem: assuming that plants have, or should have, human-like feelings in order to be considered intelligent life forms, Mancuso says.

Professor Mancuso blends in with the greenery. He touches a formerly neglected office plant.

Photo: Nicole Martinelli

After the folksy 1970s hit book and stop-motion film *The Secret Life of Plants*, which maintained, sans serious research, that greenery had feelings and emotions, the scientific community has avoided talking about smarty plants.

So while there has been a bumper crop of studies demonstrating that green matter can be nearly as sophisticated as gray matter -- especially when it comes to signaling and response systems, few talk about intelligence.

To christen the lab in 2004, Mancuso decided to use the controversial term "plant neurobiology" to reinforce the idea that plants have biochemistry, cell biology and electrophysiology similar to the human nervous system. But although LINV is part of the University of Florence -- where Mancuso teaches horticulture -- funds for this fertile field of research weren't forthcoming.

Studies at LINV were eventually given lymph -- 1 million euro so far, with about 500,000 euro to come -- from the Ente Cassa di Risparmio di Firenze, a bank foundation that mainly supports cultural events and art restorations.

What convinced them to provide seed money?

"Looking beyond the name at the research," says Paolo Blasi, a physics professor at the university who's on LINV's board of directors. "It sounds almost like a pseudoscientific field, but now even skeptics are convinced because of the validity of the work."

In addition to studies on the effects of music on vineyards, the center's researchers have also published papers on gravity sensing, plant synapses and long-distance signal transmission in trees. One important offshoot of the research activity is an international symposium on plant neurobiology. Next year's meeting will be held in Japan.

Leopold Summerer, advanced-concepts team coordinator at the European Space Agency, remembers that the term "plant intelligence" raised a few eyebrows when collaboration with the lab was proposed -- even on a multidisciplinary think-tank team that's used to pondering ideas out of left field. Nonetheless, Summerer says plant research may provide important ideas.

"Biometrics can provide some of the most inspiring resources for us," he says. "Solutions found by nature that might not seem related to real engineering problems at first sight actually are related and give technical solutions."

Radical as the LINV sounds, if it weren't for a lone sugarcane stalk perched on a cabinet, the lab looks like any other.

While white-coated researcher Luciana Renna patiently tests for DNA markers, molecular biologist Giovanni Stefano analyzes data on two computer monitors around the corner.

During a visit to the lab's two greenhouses -- where research is being conducted on the effects of light on olive trees and reactions in Venus flytraps and the *Mimosa pudica* -- Mancuso points out a few neglected office plants sent there for a little TLC.

Mancuso, however, is no plant-whisperer. Under-tended plants are a long way from understanding sweet nothings spoken softly to them, he explains.

"Plants communicate via chemical substances," Mancuso says. "They have a specific and fairly extensive vocabulary to convey alarms, health and a host of other things. We just have sound waves broken down into various languages, I don't see how we could bridge the gap."