

LADA™

GARDENING IN SPACE

Caring for green, growing plants offers a psychological lifeline to astronauts and cosmonauts aboard the International Space Station. Surrounded by the cold, dark vacuum of space, space voyagers find more comfort in their cramped quarters when they have the chance to garden, even on a small scale. The psychological effect of raising vegetables on the International Space Station has turned out to be an important aspect of Lada research.

In cooperation with the Russian Institute of Biomedical Problems, Space Dynamics Laboratory developed Lada, a small, low-cost growth chamber, to research plant development and test methods of growing plants aboard the ISS. Named for the ancient Russian goddess of spring, Lada consists of a control module and one or two independent units, which permit separate growth regimens. Within the units, light and moisture are controlled, but the plants share the temperature, air, humidity and, notably, the microgravity of the ISS environment.

Lada uses special rooting systems to redistribute and balance concentrations of water and nutrients that accumulate in the weightless environment of the space station. In microgravity, water is retained around plant roots instead of draining away, as it does in terrestrial gravity. Oxygen then diffuses less easily into the roots, affecting plant growth.

The Lada experiment includes preliminary studies of the health aspect of foods grown in space. Astronauts harvest mizuna grown on the ISS and freeze the leaves. On the ground, scientists check both nutritional value and bacterial counts to determine if the food is safe to eat.

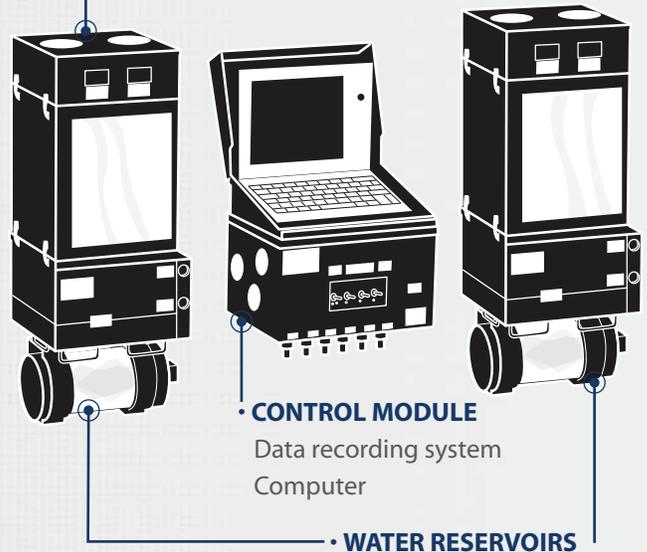


Mizuna is shown growing in the leaf chamber of Lada during an experiment housed in the Zvezda module of the International Space Station. Image courtesy the Russian Institute of Biomedical Problems.

LADA COMPONENTS

- **INDEPENDENT VEGETATION MODULES**

- Compact fluorescent lighting
- Ventilation fans
- Water pumps
- Environmental sensors



- **CONTROL MODULE**

- Data recording system
- Computer

- **WATER RESERVOIRS**



Space Dynamics
LABORATORY
Utah State University Research Foundation

LADA



PLANTS IN SPACE

PEA: Peas are especially appealing to cosmonauts for their delicate blossoms and easily grown fruit. Nine crops of peas have been grown on the ISS between March 2003 and April 2008. Just as Mendel, the father of plant genetics, studied genetic mutations on earth, seed to seed plantings of peas have furthered the understanding of mutation rates in orbit.

MIZUNA: This leafy plant was the first crop grown in Lada on the ISS and, of all the vegetables grown there, has produced the most food for the astronauts and cosmonauts. Native to China, mizuna is in the mustard family and may be cooked or eaten as a salad. Frozen plant samples have been returned to earth and have helped us understand if harmful bacteria found on all plants pose any increased risk to space travelers when food is grown in space.

TOMATO: Lada was home to the first and only tomato plants grown in space, the Micro-Tina dwarf cultivar. Although the seeds germinated, the plants never produced fruit. A second tomato experiment is planned for 2012.

RADISH: Three crops of radish have been grown on ISS in Lada. Radish was chosen to investigate bacterial accumulations in representative edible root crops. Frozen radish samples have been returned to earth and sampled for harmful bacteria.

WHEAT: Super dwarf wheat grew in a Lada module on the ISS during Expedition 22 in 2010.



Space Dynamics
LABORATORY
Utah State University Research Foundation