

Indian food in space: DRDO's menu for Gaganyaan astronauts

Gaganyaan astronauts will feast on Indian food, reconstituted for space conditions

By Rekha Dixit

Idli or upma for breakfast. A choice between chicken biryani or vegetarian pulao, with a side of dal and mixed vegetables for lunch. How about a chicken korma and chappati for dinner? Sooji halwa is a good dessert option, and you could nibble on an energy bar when you feel peckish.

Sorry, this is a non-smoking, non-alcohol flight, but you could help yourself to coffee or tea, or a choice of fruit juices. All this, and more, could be available in space through ISRO's Gaganyaan programme.

Gaganyaan is India's first human space flight. Scheduled to take off before 2022, it will offer a gourmet spread of Indian food for its pioneering astronauts courtesy the Defence Research Development Organisation (DRDO), which has been tasked with organising the victuals for the week-long flight.

While DRDO is busy designing menus, its Mysore-based Defence Food Research Laboratory (DFRL) works on adapting a range of packaged food items that it makes for soldiers deployed on harsh missions.

A list of over two dozen items that includes cuisines from across India is being worked on. "We hope to get an initial set of food items ready to be taken off on the first of the three flights," said D. Semwal, DFRL director. Mission Gaganyaan includes a set of three flights; the first two will be unmanned ones, and only the third will have a human crew, of two or three astronauts. Four test pilots of the Indian Air Force have been selected from an initial shortlist of ten for further training for the flight.

While there is a range of space food available, with humans having voyaged for over six decades and many having spent months in space stations like the International Space Station, Gaganyaan is a platform to adapt Indian cuisines, the Indian way, for space flights. "We are keeping our food items mildly spiced, though there will be extra spice sachets for those who want them," Semwal said here in Bengaluru, at the Pride of India exhibition of the 107th Indian Science Congress.

The food packs will be desiccated, requiring reconstitution through the addition of water. In the zero-gravity environment of the space module, water will have to be added within a contained space, so that the droplets do not float all around the spaceship.

The shortlisted food items have been carefully selected. Bread, for instance, is not on the list, because it tends to crumble, and those crumbs can be an annoyance.



Some of the Indian food items being considered to serve as part of the Gaganyaan menu, pending modifications to suit the conditions in space | Rekha Dixit



The drinks will come with special straws that flap back after a sip, so that the droplets from the sachet remain within. A team of 20 scientists at the Mysore laboratory are working on the design of these straws, the sachets, and even the bins in which the food remains can be safely trashed.

The specifications of space food are different from packed army rations. One advantage with a short flight is that the food does not need to last for several weeks. So, it can be packaged in a semi-solid form, and not be entirely dry. On the other hand, the food will have to be reconstituted under pressure. The laboratory wants to meet the NASA standards of food quality and packaging, which are deemed the best in the world for space fare.

An army marches on its stomach—and so do astronauts. Gaganyaan's payload will include 60 kgs of rations in dry weight and another 100 litres of water.

DRDO laboratories are also designing other components of Gaganyaan. The Bangalore-based Defence Bioengineering and Electromedical Laboratory (DEBEL) is working on a Wearable Remote Physiological Monitoring System, commonly known as the Bio Vest. This is actually a belt that the wearer straps onto the body. It is equipped with devices to continuously monitor the basic physiological parameters—heart rate, temperature and oxygen saturation in the blood, known as SPO2. The data will be transmitted wirelessly to earth receiving stations. DEBEL, having already made such devices for soldiers, needs to adapt them for space conditions. The bio vest will weigh less than 250g and will be delivered before December to the Institute of Aviation Medicine.

DEBEL is also designing the Emergency Survival Kit, a case of 18 items required to see the astronauts through for at least 72 hours post landing. It is designed primarily for a sea landing and will meet the requirement of a crew of three. The items include:

Basic survival aids: Water, ration, desalting kit, fishing kit, first aid material, salt and sugar

Signalling and communication aids: A heliograph, distress signal, mini-flare

Floatation and navigation aids: A compass and a three-man raft

Other survival aids: Goggles, shark repellent, Swiss knife, mini-maglite with spare cells, personal locator beacon.

Each of these items is being tested for space conditions.

In the meanwhile, the Aerial Delivery Research and Development Establishment is readying the parachutes that will be required for landing the crew module at the end of the mission. Last month, the establishment celebrated a successful test run of the design of the parachute system. The fabrication and testing of the actual parachutes are now under progress.

Gaganyaan's landing will be coordinated with a set of six parachutes of different sizes and shapes, which will unfurl in pairs to reduce the speed of the module during descent. The smallest parachutes, or pilots, each of a two-metre diameter, will open out first. They will then pull out the drogue or central parachutes, each having a diameter of six metres. Finally, the pair of main parachutes of 31-metre diameter will open up.

The weight of the crew module is around four tonnes, and DRDO has already landed heavier weights—tanks of seven and 16 tonnes—so it is pretty confident of handling the weight. It needs to cater to other requirements, though. The crew module will enter into the atmosphere at supersonic speed; in traditional parachuting, the speeds are sub sonic. The descent also has to be a comfortable one for the men, for which the oscillations have to be minimised, said scientist Sandeep Kumar.

<https://www.theweek.in/news/sci-tech/2020/01/06/indian-food-in-space-drdo-menu-for-gaganyaan-astronauts.html>

गगनयान: अंतरिक्ष यात्रियों को मिलेगा घर का खाना

गर्मागर्म खाने के साथ अंतरिक्ष यात्री स्नैक्स भी खा सकेंगे।

भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो) साल 2021 में अपना पहला मानवयुक्त अंतरिक्ष मिशन गगनयान भेजने वाला है। इसके लिए इसरो ने देशभर से चार लोगों का चुनाव किया है जो इस मिशन के जरिए चांद पर जाएंगे। ये अंतरिक्ष यात्री इस महीने के तीसरे सप्ताह में विशेष प्रशिक्षण के लिए रूस जाने वाले हैं। इसी बीच यह खबर आई है कि इन अंतरिक्ष यात्रियों को अब अंतरिक्ष में भी घर जैसा खाना खाने को मिलेगा। यही नहीं अंतरिक्ष यात्री अपने खाने का चुनाव भी कर सकेंगे यानी वे चुन सकेंगे कि उन्हें शाकाहारी खाना खाना है या फिर मांसाहारी। इसके अलावा अंतरिक्ष यात्री अंतरिक्ष में भी गर्मागर्म खाने का स्वाद ले सकेंगे।

मैसूर में रक्षा खाद्य अनुसंधान प्रयोगशाला (डीएफआरएल) ने इस अंतरिक्ष मिशन के दौरान खाने के लिए 22 तरह के पकवान बनाए हैं। भारतीय अंतरिक्ष यात्री का नाश्ता, दोपहर का भोजन और रात के खाने के मेन्यू में 22 भारतीय व्यंजनों और फलों के रस को शामिल किया गया है। खाने के मेन्यू में शाकाहारी से लेकर मांसहारी और स्नैक्स का विकल्प मौजूद है। खाने में हल्का-फुल्का खाना, ज्यादा ऊर्जा वाला खाना, ड्राई फ्रूट्स और फल भी शामिल हैं।

खाने में दाल, आलू पराठा, पुलाव, बादाम, एग रोल, चिकन रोल, चिकन करी, पालक पनीर, उपमा, इडली, सांभर आदि को मुख्य रूप से शामिल किया गया है। वहीं पेय पदार्थ के रूप में चाय, कॉफी और फ्रूट जूस पाउडर दिए जाएंगे। खाने की इन चीजों को जांच के लिए इसरो भेज दिया गया है। मेनू का परीक्षण आइएएफ के चार प्रशिक्षु अंतरिक्ष यात्रियों पर किया जाएगा। फीडबैक के आधार पर खाने में कुछ बदलाव भी हो सकते हैं। डीएफआरएल के निदेशक डॉ. अनिल दत्त सेमवाल ने इस बारे में जानकारी देते हुए कहा, 'खाने के ये सभी सामान एस्ट्रोनॉट्स खाकर देखेंगे क्योंकि इनका चुनाव इस बात पर भी निर्भर करता है कि उन्हें ये कितने अच्छे लगते हैं। इसरो की एक टीम इनकी जांच करेगी।'

उन्होंने कहा, 'एस्ट्रोनॉट्स के लिए शाकाहारी और मांसाहारी दोनों तरह का खाना बनाया गया है। इन्हें गर्म करके खाया जा सकता है। हम भारतीय गर्म खाना पसंद करते हैं। हम खाना गर्म करने के लिए एक उपकरण भी दे रहे हैं जिसके जरिए लगभग 92 वॉट बिजली से खाना गर्म किया जा सकता है। ये उपकरण खाने को 70 से 75 डिग्री तक गर्म कर सकता है।' अनिल दत्त सेमवाल ने यह भी कहा, 'ये खाना स्वस्थ है और एक साल तक चल सकता है. वे (इसरो) मटन या चिकन चाहते हैं। हमने चिकन करी और बिरयानी दी है। वे बस इसे पैकेट से निकालकर, गर्म करके खा सकते हैं।'

गर्मागर्म खाने के साथ अंतरिक्ष यात्री स्नैक्स भी खा सकेंगे। इसकी जानकारी देते हुए अनिल सेमवाल ने कहा, 'हमने अनानास और कटहल जैसे स्नैक्स भी दिए हैं। यह स्नैक्स के लिए एक बहुत ही स्वस्थ विकल्प है। हम सबकुछ रेडीमेड दे रहे हैं जैसे सांबर के साथ इडली। इसमें आप पानी डालकर खा सकते हैं।' उन्होंने कहा कि हालांकि एक बार पैकेट खुलने के बाद उसे 24 घंटों के अंदर खाना होगा। इस खाने को आधा खाकर नहीं रखा जा सकता।

डीएफआरएल में अंतरिक्ष मिशन के लिए तैयार किया गया हर खाना नासा द्वारा तय कड़े मानदंडों के अनुसार बनाया गया है। जब अंतरिक्ष यात्री खाने के पैकेट खोलते हैं, तो उनके आसपास कोई रोगाणु नहीं होने चाहिए। अंतरिक्ष के खाने के बहुत विशिष्ट मानदंड होते हैं। अंतरिक्ष में उपयोग किए जाने वाले खाद्य पदार्थ उस खाने से काफी अलग होते हैं जिन्हें सियाचिन में सैनिकों को दिया जाता है जो धरती का सबसे ऊंचा युद्ध का मैदान है और जहां पर भारत और पाकिस्तान 1984 में लड़ चुके हैं। डीएफआरएल ने 1984 में अंतरिक्ष मिशन में जाने वाले पहले भारतीय राकेश शर्मा के लिए भी खाना तैयार किया था। अंतरिक्ष यात्रियों के लिए खाना बनाने में इस संस्था को विशेषज्ञता हासिल है।

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Science & tech essential tool for development: Tessa Thomas

Bengaluru: Defence Research and Development Organisation's (DRDO) Aeronautical Systems Director General Tessa Thomas on Sunday said at the Women's Science Congress leg of the 107th Indian Science Congress that science and technology is an essential tool for rapid development.

"Science and technology is the most effective means to enhance growth and socioeconomic development of the country with profound and long term impact for income distribution," Thomas said at the ninth edition of the Women's Science Congress.

Chief guest at the event, Thomas asserted that the role of the technologically educated population in promoting economic development has long been recognised.

Delving into the etymology of the word 'technology', she said the word first occurred in 1829, coined by a person who started a course curriculum bringing together all kinds of arts, crafts and industry and calling it 'technology'.

"There was nobody to pass on their learnings and lessons but with the discovery of fire, survival of human beings enhanced and lead to the introduction of agriculture which in turn transformed the world with newer and newer technologies," said Thomas, who has designed the guidance scheme for long-range missile systems used in all Agni missiles.

Referring to the pace of technological development, Thomas said that nano robots may live inside human bodies to keep us healthy in the future.

Described as the "Missile woman of India", Thomas has contributed immensely to their guidance, control, interal navigation, trajectory simulation and mission design.

She was the project director for Agni-4 missile development.

In 2001, Thomas was awarded with the Agni self-reliance award for designing and developing an energy management guidance scheme for all solid propelled long range systems for the first time.

Several thousand women attended this science congress on Sunday.

Amrutha Baghyanathan, a student from Kochi's Rajagiri College of Social Sciences said that she did not know there was something like a women's science congress.

"We just came to know that there is something for women like this," said the clinical psychology student who attended the congress with a group of her friends.

Deepika Khatiyar, an MSc Physics student from Bhim Rao Amedkar University in Lucknow came to Bengaluru from Uttar Pradesh to attend the women's science congress.

She said: "I have come here to explore more areas related to science and what is going on."

The 107th edition of the Indian Science Congress scheduled from January 3-7 is currently underway at the University of Agricultural Sciences (UAS) in Bengaluru.

<https://www.sify.com/finance/science-tech-essential-tool-for-development-tessy-thomas-news-finance-ubfvGsiieccg.html>