

A Japanese biotechnology company offers a novel neutron-beam-based mutation breeding technology for efficient development of plant and microbial strains

Summary

| Profile type | Company's country | POD reference |
|---|--|------------------------|
| Technology offer | Japan | TOJP20250805004 |
| Profile status | Type of partnership | Targeted countries |
| PUBLISHED | Commercial agreement with technical assistance Research and development cooperation agreement | • World |
| Contact Person | Term of validity | Last update |
| <u>Alessandro Perna</u> | 5 Aug 2025 5 Aug 2026 | 5 Aug 2025 |

General Information

Short summary

This Japanese company developed a novel neutron-beam-based mutation breeding technology for plant and microbial strains. It is a highly efficient, non-GMO approach to developing biological strains and varieties. By inducing genetic mutations through neutron irradiation, it enables the generation of diverse variants more rapidly than conventional methods. The company is seeking joint research cooperation with relevant EU partners.

Full description

This technology concerns an innovative mutation breeding method using neutron beams, developed by a private company based in Japan. The company supports the development of biological resources for the agriculture, biotechnology, and food industries. Since this is a non-GMO (Genetically Modified Organism) technology, it offers high regulatory compatibility for various industrial uses of biological resources, making it well-suited for global applications.

The company is seeking international cooperation under the following two types of partnership:

1. Research or Technical Cooperation Agreement

Joint research and development with partner companies or research institutions is envisaged. Areas of collaboration

may include target selection of new plant or microbial species, development of screening protocols, and analysis of metabolic profiles, covering both pre- and post-breeding evaluation systems.

2. Commercial Agreement with Technical Assistance

To facilitate dissemination of the technology in Europe, the company is open to partnerships with agents or breeding service providers. Technical support can be offered in areas such as explanation of the technology during product development, trade shows, or promotional events, as well as contract-based mutation induction using neutron beams and joint implementation of breeding projects.

These cooperation types have been considered because the technology is adaptable both as a transferable research tool at the R&D stage and as a commercial mutation induction service. This flexibility allows for tailored collaboration models according to the partner's development stage or operational focus.

This proposal is not intended as a sales promotion for a specific market, but rather to establish a foundation for the dissemination of the technology and to support international research and commercial collaboration.

By offering these advantages, the technology enables the development of new biological resources in domains that are difficult to address with conventional breeding approaches, thereby contributing to the advancement of sustainable agriculture and industrial biotechnology.

The company has successfully established a technique for inducing mutations using neutron radiation. Currently, they are actively implementing this technology in various fields of bio resource utilisation, with a focus on demonstrating its practical value through real-world applications. The company has received service orders from companies in Denmark and Israel.

Advantages and innovations

The neutron beam mutation breeding technology offers a highly efficient, non-GMO approach to developing biological strains and varieties. By inducing genetic mutations through neutron irradiation, it enables the generation of diverse variants more rapidly than conventional methods such as chemical mutagenesis or gamma-ray exposure. Breeding time can be shortened to one-third to one-sixth of the conventional period.

The technology uniformly irradiates entire biological materials, such as plant seeds and microbial cultures, improving mutation consistency.

It provides several key innovations and economic advantages:

- **High Mutation Efficiency**

Neutron beams induce mutations at rates dozens to hundreds of times greater than gamma rays or X-rays. This accelerates the creation of diverse mutant pools and increases the chances of identifying beneficial traits.

- **High Genomic Stability**

Unlike chemical mutagens, neutron beams create a wide range of mutations—including SNPs, deletions, and insertions—while maintaining relatively low levels of lethal damage. This improves organism survival and ensures greater genetic stability.

- **Broad Applicability**

Neutron irradiation can be applied to a variety of organisms, from seeds to polyploid crops like wheat and microorganisms in liquid culture. This makes it valuable across agriculture, food, biofuels, and pharmaceuticals.

- **Reduced Time and Cost**

Breeding that usually takes 3–5 years can be completed in about 1–2 years. This accelerates R&D, shortens the path to commercialization, and enables quicker patenting and market launch.

- **Support for Local Innovation**

Accessible to regional institutes and companies, the technology allows the development of local crop varieties and bio-based materials, contributing to regional revitalization and innovation.

The neutron beam mutation breeding is a fast, versatile, and regulatory-friendly method for modern biological development that meets evolving environmental and industrial demand.

Technical specification or expertise sought

Stage of development

Already on the market

Sustainable Development goals

• Goal 12: Responsible Consumption and Production

IPR Status

IPR granted

IPR Notes

The technology has been granted patents in Japan and the United States. In the European Union, a PCT application has been filed; however, the patent has not yet been granted.

Partner Sought

Expected role of the partner

The potential partners are expected to engage in activities such as contract-based irradiation projects, collaborative promotion, and local deployment of the technology, based on clearly defined roles tailored to the specific objectives of the partnership.

A) Research or Technical Cooperation Agreement

Partners for joint research are expected to be institutions or companies engaged in the development or functional enhancement of plants and microorganisms. Specifically:

- Agricultural or horticultural research institutes and universities: To collaborate in building screening protocols, conducting phenotypic evaluations, and managing cultivation trials after mutation induction.
- Biotechnology companies (e.g., microbial applications, fermentation, pharmaceuticals): To screen and analyse industrially useful microbial strains and conduct applied research for commercialization.
- Bioenergy-related research institutions and universities: To engage in the development and evaluation of bioresources such as microorganisms or algae for petroleum-alternative energy (e.g., biofuels or biogas), including performance analysis and scale-up studies of mutant strains.

These partners are expected to cooperate in selecting target species, designing mutant evaluation strategies, and developing analytical methods for phenotypic and genotypic traits.

B) Commercial Agreement with Technical Assistance

Commercial partners are expected to include the following:

- Seed or plant breeding companies: To outsource neutron beam-based mutation breeding services and handle downstream activities such as variety registration and sales.
- Manufacturers of fermented foods, biofuels, and alternative proteins: To engage in joint projects for microbial strain improvement aligned with their product development needs.
- Companies producing energy from biological resources (e.g., biogas, bioethanol, synthetic fuels): To implement collaborative projects aimed at developing high-performance bioenergy-producing organisms such as high-yield yeast or high-biomass algae through neutron-induced mutation breeding.
- Regional innovation hubs or technology parks: To support the dissemination and application of the technology within Europe, including facilitating joint projects and technical promotion.

Type of partnership

Type and size of the partner

Commercial agreement with technical assistance

- SME 50 - 249

Research and development cooperation agreement

- R&D Institution
- Big company
- SME 11-49

Dissemination

Technology keywords

- 07001010 - Micro- and Nanotechnology related to agriculture

Targeted countries

- World

Market keywords

- 04001001 - Agricultural genetic engineering applications

Sector groups involved