MEMORANDUM OF UNDERSTANDING
Between
UNITED STATES DEPARTMENT OF AGRICULTURE, AGRICULTURAL RESEARCH SERVICE
And
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
For
COOPERATION IN SPACE-RELATED BIOLOGICAL AND ENVIRONMENTAL RESEARCH

I. PURPOSE AND SCOPE

This Memorandum of Understanding (MOU) sets forth a framework of cooperation between the United States Department of Agriculture (USDA), Agricultural Research Service (ARS) and the National Aeronautics and Space Administration (NASA) to encourage:

- Communication and interaction between the USDA/ARS and NASA research communities to facilitate space-related research and to integrate results from that microgravity research into an improved understanding of plant and animal biology and the Earth's environment.
- Exchange of ideas, information, and data arising from their respective research efforts.
- Development of agricultural research approaches and technologies for use on Earth and in space.
- Research in Earth- and space-based facilities that could be on Earth, in space, and/or using space-based remote sensing capabilities:

Of particular interest is the application of the United States (U.S.) portion of the International Space Station (ISS) as a National Laboratory, as established by P.L. 109-155. The designation as a National Laboratory underscores the significance and importance that the U.S. places on the scientific potential of the ISS for research in areas including, but not limited to,

- Basic biological mechanisms in the absence of gravity.
- Plant and animal physiology and metabolism.
- Genetic regulation of plant and animal cell growth and differentiation.
- Plant and animal pathogen infectivity and host immunity.

Each agency has existing programs and resources for facilitating research and technology development. Research facilitated by this MOU will be complementary to studies supported by the USDA/ARS and NASA at the agencies' intramural or extramural laboratories.

In pursuing objectives through this MOU, the USDA/ARS and NASA shall handle their own activities and use their own resources, including the expenditure of their own funds, unless otherwise agreed in specific implementing agreements.

II. AUTHORITY

The USDA/ARS enters into this MOU in accordance with section 1405 of the National Agriculture Research, Extension and Teaching Policy Act of 1977, as amended (7 U.S.C. 3121).

NASA enters into this MOU, pursuant to section 203(c) of the National Aeronautics and Space Act of 1958, as amended [42 U.S.C. 2473 (c)].

The USDA/ARS and NASA may be individually referred to as a "Party" and collectively referred to as the "Parties." Nothing in this MOU alters the statutory authorities of the USDA/ARS or NASA. It is intended to facilitate cooperative efforts for mutual provision of services and support, as well as technical assistance by both agencies in the conduct of research and development of technologies in the area of space-related agricultural, environmental and biological sciences. It does not supersede or void existing agreements between NASA and the USDA/ARS or any of their Institutes or Centers.

III. BACKGROUND

The programmatic strengths of the USDA/ARS and NASA offer opportunities for synergy that can accelerate basic knowledge and technology development that can be applied to plants, animals, and Earth's environment in space and on Earth. For example, NASA enables research in reduced gravity by facilitating access to the unique environment of space and has created systems that are analogous to the space environment. NASA also supports technologies that are not yet available to Earth-based researchers that could contribute greatly to agricultural advances pursued by USDA/ARS investigators. Likewise, the USDA/ARS, with its over 100 research laboratories and centers, is capable of reaching a broad range of basic and applied agricultural researchers whose involvement in space-related projects would create an intellectual environment where unanticipated breakthroughs could occur.

In a report accompanying the National Aeronautics and Space Administration Authorization Act of 2005 (P.L. 109-155), the Senate Committee on Commerce, Science, and Transportation repeatedly emphasized that a primary justification for support of the ISS is its scientific and research potential (Senate Report 109-108). Recognizing that the ISS will be capable of hosting a wide range of scientific research that can only be undertaken in a microgravity environment, the authors of P.L. 109-155 specifically noted that the NASA portfolio should include microgravity research that is not related directly to its human exploration efforts (e.g., growth of molecular crystals, development of cell-based technologies).

When complete, the ISS will provide a unique life sciences laboratory and will be able to facilitate testing of new biosensors and technologies that are useful to agriculture or derived from agricultural materials. It also may promote development of international research collaborations that would improve Earth's environment, quality of life and human nutrition, and well-being around the world with potential fundamental discoveries. The U.S. segment of the ISS will have laboratory space, data processing capabilities, and crew time for experiments conducted on the ISS once it is fully operational in 2011. Because commitment of ISS resources is likely to be made on a first-come, first-serve basis through strategic alliances that will advance research in agriculture, biology and biotechnology, now is an appropriate time for researchers supported by the USDA/ARS to begin proposing studies, conducting preliminary experiments on Earth, and arranging with NASA to have their hypotheses tested on the ISS after its assembly has been completed.

IV. RESPONSIBILITIES

This MOU is intended to provide an enabling mechanism for coordination and cooperation whenever appropriate and mutually beneficial, subject to program priorities and budget constraints.

Within the context of the purpose and scope above, the USDA/ARS agrees to use reasonable efforts to:

- Publicize, to the intramural and extramural communities, the availability of the ISS as a research environment that can accommodate a variety of experimental approaches and can address a vast range of research questions. In the course of its communications with the scientific community, USDA/ARS will note that, with respect to the placement of any article on the ISS, liability is governed by Article 16 of the 1998 ISS Intergovernmental Agreement requiring cross waivers of liability, as implemented by 14 CFR Part 1266. Separate launch services or payload integration agreements, as appropriate, may be required prior to flight.
- Give careful consideration to well-developed applications and activities related to space-related agricultural and biological research that are developed in response to the publicity noted above.

Within the context of the purpose and scope above, NASA agrees to use reasonable efforts to:

- Advise investigators on implementation of USDA/ARS-funded projects that would use the ISS.

Within the context of the purpose and scope above, the USDA/ARS and NASA agree to use reasonable efforts to:

- Encourage space-related agricultural, environmental, and biological research through the exchange of expertise, scientific, and technical information, data, and publications.
- Provide technical expertise for performance, planning, review, or consultation in areas of mutual interest, subject to program priorities and budget constraints.
- Facilitate and enhance research and development activities by either agency.
- Coordinate publicity of mutually reinforcing activities, publications, and research results.
- Include representatives from each agency in workshops, working groups, seminars, and other related activities.

V. RESPONSIBLE OFFICERS /AGENCY CONTACTS

For the USDA Agricultural Research Service:

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VI. FINANCIAL OBLIGATIONS

There will be no transfer of funds or other financial obligations between NASA and USDA/ARS under this Agreement. Each Party will fund its own participation. All activities under or pursuant to this agreement are subject to the availability of

appropriated funds, and no provision herein shall be interpreted to require obligations or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341.

VII. DATA RIGHTS

The Parties agree that the information and data exchanged in furtherance of the activities under this MOU will be exchanged without use and disclosure restrictions unless required by national security regulations or otherwise agreed to by the Parties for specifically identified information or data (*e.g.*, information or data specifically marked with a restrictive notice).

VIII. AMENDMENT AND TERMINATION

The MOU may be amended at any time by the mutual written consent of the agencies. On an annual basis, the Parties will conduct a review of this MOU to evaluate progress and achievement of mutual goals and objectives consistent with the purpose and scope.

Either Party may unilaterally terminate this MOU by providing 90 calendar days written notice to the other Party.

IX. TERM OF AGREEMENT

This MOU will be effective upon the date of the last signature below, and shall remain in effect for five years. At the conclusion of five years, the parties will consider the development of a new agreement.

X. ACCEPTANCE AND APPROVAL OF AUTHORIZING OFFICIALS

Agreed to by:

UNITED STATES DEPARTMENT OF AGRICULTURE

Edward T. Schafer
Secretary

23 July '08
Date

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Michael D. Griffin
Administrator

23 July 2008
Date