

Mid- to Long-Term Plan of the Japan International Research Center for Agricultural Sciences

March 31, 2016

The Japan International Research Center for Agricultural Sciences (JIRCAS) has been helping improve technologies for agriculture, forestry, and fisheries in tropical and subtropical areas, as well as in other overseas developing regions (hereinafter referred to as “developing regions”), by performing technical trials and research.

During the First Medium-Term Goal period (FY 2001 to 2005), JIRCAS worked on research and development (R&D) for the sustainable development of agriculture, forestry, and fisheries, as well as on the expansion of international research exchanges and networks, taking into account both domestic and overseas situations, such as the adoption of the United Nations Millennium Development Goals¹⁾ for the eradication of poverty and hunger in the world.

During the Second Medium-Term Goal period (FY 2006 to 2010), JIRCAS created a multilateral collaborative research system, promoted collaborative research with world-class research organizations led by the Consultative Group on International Agricultural Research (CGIAR)²⁾, established a dynamic research system, and implemented major research projects. In FY 2008, JIRCAS took over international activities from the dissolved Japan Green Resources Agency and strengthened its field activities.

During the Third Medium-Term Goal period (FY 2011 to 2015), a program/project scheme was developed for three principal research areas: environment and natural resource management; stable food production; and livelihood improvement of the rural population. In addition, flagship projects to which research resources were intensively allocated were set up to promote research. Furthermore, systems were developed to strengthen the process of disseminating research results and ensuring the safe management of experimental materials.

On the basis of the outcomes of JIRCAS’s commitments and in accordance with the Basic Plan for Agriculture, Forestry and Fisheries Research (determined at the meeting of the Agriculture, Forestry and Fisheries Research Council on March 31, 2015), three principal research areas have been identified for the Mid- to Long-Term Goal period, namely: (1) development of agricultural technologies for sustainable management of the environment and natural resources in developing regions; (2) technology development for stable production of agricultural products in the tropics and other adverse environments; and (3) development of high value-adding

technologies and utilization of local resources in developing regions. Resources will be allocated to these research areas on a priority basis, and innovations in research management will be promoted to maximize R&D outcomes. To best understand the needs and seeds of technological development in developing regions and to promote R&D in line with Japan's policy, JIRCAS will strengthen its capability related to the collection, analysis, and dissemination of information on international agriculture, forestry, and fisheries.

Through this series of activities, JIRCAS, as Japan's only research institution mandated to carry out comprehensive international research in agriculture, forestry, and fisheries, is committed to strengthening the framework of collaboration with related organizations and to play a key role in R&D targeting developing regions. In this way, it will help solve global food problems and sophisticate Japan's research in agriculture, forestry, and fishery.

I. Improving the Quality of Operations, Including Maximizing R&D Outcomes

JIRCAS will promote and evaluate the following five operational items as individual segments³⁾:

- i. Promotion of research planning and partnership [1 to 5]
- ii. Development of agricultural technologies for sustainable management of the environment and natural resources in developing regions [6(1); Attachment 1]
- iii. Technology development for stable production of agricultural products in the tropics and other adverse environments [6(1); Attachment 2]
- iv. Development of high value-adding technologies and utilization of local resources in developing regions [6(1); Attachment 3]
- v. Collection, analysis and dissemination of information to understand trends in international agriculture, forestry and fisheries [6(2)]

(Note) Notations within the above square brackets indicate subsections relevant to each item of operation.

<Promotion of research planning and partnership >

1. Promotion of research in line with government policy, and enhancement of the PDCA cycle⁴⁾

(1) Strategic promotion of research in line with government policy

- a) JIRCAS will identify research subjects and research promotion measures and will promote R&D strategically in consideration of the following issues:

the need for technical improvement of agriculture, forestry, and fisheries in developing regions; the international situation; the need to contribute to government policy; the need to sophisticate Japan's research on agriculture, forestry, and fisheries; and ripple effects of R&D outcomes on technological improvement.

- b) If JIRCAS, through its R&D, obtains technology seeds and findings useful to companies and producers in Japan, it will actively provide information and local support toward commercialization.
- c) JIRCAS will manage the progress of research topics by preparing a process sheet stipulating the specific goals of each fiscal year before the start of research.
- d) JIRCAS will evaluate research subjects adequately and rigorously, with the involvement of external experts, in accordance with the progress of the Mid- to Long-Term Plan.
- e) JIRCAS will pursue the approach of selection and concentration of research in light of the results of these evaluations and changes in social circumstances and will review, change, enhance, or terminate research subjects as necessary.

(2) Evaluation of the agency as a whole, and allocation of resources

- a) JIRCAS, as a whole agency, will develop a mechanism to conduct adequate self-evaluation and checking of the state of project management and the progress of research and will strengthen its PDCA cycle by reviewing plans adequately in light of the results of this evaluation and checking. Evaluation will be conducted according to the evaluation items and indexes specified by the Ministry of Agriculture, Forestry, and Fisheries.
- b) On the basis of the evaluation results, JIRCAS will develop and manage a system to allocate research resources such as budget amounts and personnel adequately to promote research activity. Effective incentives will be given to research personnel at the discretion of the President, and the research environment will be improved.
- c) To further promote the Mid- to Long-Term Plan, JIRCAS will make vigorous efforts to obtain external research funds, such as funds for commissioned projects and competitive funds.
- d) The results of evaluations by the competent minister, and other findings, will be reflected adequately in the project management on a timely basis.

2. Promotion and enhancement of collaboration and cooperation between industry, academia, and government

- a) JIRCAS will enhance collaboration and coordination with international organizations, domestic and international research institutes, extension organizations, universities, and private companies and will actively promote the exchange of information and staff.
- b) In accordance with government strategies such as the Global Food Value Chain Strategy⁵⁾ (developed on June 6, 2014 by the Committee for Global Food Value Chain Strategy), JIRCAS will use research networks to strengthen domestic and international collaboration.
- c) JIRCAS will strengthen its cooperation in the use of technology seeds and human resources with such organizations as the National Agriculture and Food Research Organization (NARO) (including sections in charge of international collaboration), the Forestry and Forest Products Research Institute, and the Japan Fisheries Research and Education Agency.
- d) By using the locational advantage of the Tropical Agriculture Research Front, JIRCAS will cooperate in the Genebank Project, NARO and a breeding study conducted by NARO, as well as in research projects conducted by other research organizations, to help advance agriculture, forestry, and fisheries in Japan.

3. Strategic promotion of intellectual property management

(1) Development of basic policy on intellectual property management

The basic policy on intellectual property management to promote the social implementation of R&D outcomes in developing regions will be reviewed in consideration of the Ministry of Agriculture, Forestry, and Fisheries' Intellectual Property Strategy 2020 (issued on May 28, 2015 by the Ministry of Agriculture, Forestry, and Fisheries) and the Policy on Intellectual Property in Research in Agriculture, Forestry, and Fisheries (decreed by the Agriculture, Forestry, and Fisheries Research Council on February 23, 2016).

(2) Promotion of social implementation of R&D outcomes through intellectual property management

- a) A system of intellectual property management applicable to a series of processes from the planning stage of R&D to the stage after the completion of R&D will be developed and managed.
- b) With goals that include using R&D outcomes as global public goods⁶⁾ in

developing regions, JIRCAS will study methods of obtaining the intellectual property rights for, preserving the confidentiality of, and disclosing R&D results; it will also study the policy of licensing. It thus aims to improve the speed of social implementation of research results and will pursue the smooth management of intellectual property.

- c) On the basis of the basic policy on intellectual property management, JIRCAS will take the actions necessary for strategic management of intellectual property.

4. Enhancement of social implementation of R&D outcomes

(1) Publication of R&D outcomes

The outcomes of R&D will be published through research highlights, academic journals, and academic conferences. On such occasions, due consideration will be given to the possibility of obtaining intellectual property rights to research results and the need to preserve confidentiality.

(2) Promotion of technology dissemination

- a) JIRCAS will quickly disseminate research results by converting them into databases and manuals; research results will be presented in forms available to farmers, companies, and extension organizations.
- b) JIRCAS will collaborate with the relevant organizations to disseminate research results in countries and regions where the results may be utilized.

(3) Enhancement of public relations activities

- a) JIRCAS will develop and implement publicity strategies to make its activities known to the public and increase its name recognition in Japan and other countries.
- b) JIRCAS will disseminate information by using various media and opportunities, such as press releases, interviews, publication of journals and email magazines, and participation in external exhibitions.
- c) JIRCAS will effectively disseminate information adapted to research areas and will target end-users through locally held workshops and explanatory meetings.

(4) Interactive communication⁷⁾ with the public

- a) JIRCAS will promote effective, interactive communication by holding symposiums and seminars and arranging educational tours and technical

consultations.

- b) JIRCAS will actively conduct outreach activities such as participating in external exhibitions and science café events and offering visiting lectures, in addition to making its facilities open to the public, in order to gain public feedback and increase public understanding of its activities.
- c) JIRCAS will seek the understanding of residents in the areas targeted by research through cooperation with research partners and local governments in these target areas.

(5) Understanding and publication of mid- to long-term ripple effects of R&D outcomes

- a) JIRCAS will conduct follow-up surveys systematically regarding the main R&D outcomes it has achieved since becoming an incorporated administrative agency. It will publicize the survey results on its web site and by other means.
- b) JIRCAS will disseminate information through its web site and by other means to make it widely known to the public that its R&D outcomes and activities have helped advance agriculture and society in Japan and developing regions.

5. Reinforcement of ties with government departments and other organizations

- a) JIRCAS will closely exchange information with the relevant administrative departments to respond to their needs at various stages, from the design of research to the dissemination and commercialization of research results. JIRCAS will invite the relevant administrative departments to annual meetings to discuss the research results.
- b) On request from administrative departments, JIRCAS will cooperate in conducting emergency operations, holding liaison conferences and symposiums, and dispatching experts.
- c) On request from national and local government, organizations, or universities, JIRCAS will perform analyses and appraisals that require its highly specialized knowledge and are difficult for other bodies to perform.
- d) JIRCAS will welcome participants and trainees from other national research and development agencies, universities, national and public institutions, the private sector, and overseas organizations so as to develop human resources and raise technical standards.
- e) As an organization that performs comprehensive research on agriculture,

forestry, and fisheries, JIRCAS will dispatch its staff to committee meetings and conferences held by related international organizations and academic associations and will cooperate in other activities on request.

<Research work>

6. Promotion of research work (experiments, research, investigations)

(1) Focused areas and direction of research

- a) JIRCAS will focus on the research subjects listed in the Attachment in consideration of the need for technical improvement of agriculture, forestry, and fisheries in developing regions, the international situation, the need to contribute to government policy, the need to sophisticate Japan's research on agriculture, forestry, and fisheries; and ripple effects of R&D outcomes on technological improvement.
- b) JIRCAS will exchange information and develop systems of collaboration with relevant organizations in Japan and abroad and will promote effective international joint research in collaboration with developing regions, developed countries, international research organizations such as CGIAR, private organizations (including NGOs)⁸⁾, and international research networks.
- c) JIRCAS will further strengthen its alliances with other national research and development agencies in the field of agriculture, forestry, and fisheries and will effectively promote collaborative research utilizing research resources owned by the relevant organizations.

(2) Collection, analysis and dissemination of information for grasping trends of international agriculture, forestry and fisheries

- a) To help solve global food and environmental problems, JIRCAS will analyze the current status of food supply and demand, nutritional improvement, and food systems in foreign countries and will forecast the future—and analyze the ripple effects—of research results.
- b) To contribute to agriculture, forestry, and fisheries R&D in developing regions and to Japan's policies, such as the development of a global food value chain, JIRCAS will collaborate with the relevant organizations in Japan and abroad and will dispatch personnel to focus areas. It will collect and organize information and materials related to the international food situation and to agricultural, forestry, and fishery industries and rural areas

in a regular, institutional, and systematic manner, and it will supply this information widely to researchers, administrative agencies, and companies in Japan and abroad.

- c) To strengthen the systematic exchange of information among relevant organizations in Japan, JIRCAS will manage the Japan Forum on International Agricultural Research for Sustainable Development (J-FARD)⁹⁾.
- d) JIRCAS will promote goal-oriented basic research¹⁰⁾ by using Presidential incentive expenses and other means.
- e) In promoting goal-oriented basic research, JIRCAS will, in principle, abide by the Basic Plan for Agriculture, Forestry, and Fisheries Research and will choose research subjects in consideration of the significance and effectiveness of its own involvement. In addition, JIRCAS will focus on the future potential of pioneering research, including the creation of technology seeds leading to innovation and the development of new research areas through the combination of different research disciplines. Furthermore, JIRCAS will evaluate the progress of research and will take the necessary management actions, such as modification of the method of research or termination of research topics.

II. Efficient Business Management

1. Cost reduction

(1) Reduction in costs such as general and administrative expenditures

Administrative operations implemented by operational grants will be reviewed and efficiency will be further promoted. Average annual reduction targets are at least 3% with respect to the previous year for general and administrative expenditures (excluding personnel expenditures), and at least 1% with respect to the previous year for research expenditures.

(2) Streamlining of procurement

- a) JIRCAS will develop a Procurement Streamlining Plan, including quantitative targets and specific indexes, by the end of June each fiscal year. It will implement the plan consistently and will conduct a self-evaluation of the plan's performance at an implementation evaluation session each fiscal year.
- b) JIRCAS will maintain fairness by clarifying the reasons for adopting free contracts (e.g., when only one company can provide a special item) and

- extending unit-price contracts. It will try to procure items for R&D rapidly.
- c) JIRCAS will collaborate with NARO to improve efficiency by conducting joint procurement and sharing tender price information.

2. Review and improvement of efficiency in organization and operations

(1) Restructuring of organization and operations

- a) JIRCAS will review its organization and operations flexibly toward achieving the Mid- to Long-term Goal and strengthening the PDCA cycle.
- b) JIRCAS will promote the computerization of operations by, for example, improving the corporation's information systems. It will improve efficiency by using a TV conference system and Information and Communication Technology (ICT).
- c) Through the above efforts, JIRCAS will optimize personnel arrangement and operations.

(2) Integration of research facilities and equipment (plan of facilities and equipment)

Planned renovation and upgrading of facilities essential to research promotion will be primarily implemented for research facilities and equipment, which are classified into three categories as follows on the basis of their age-related condition and the research prioritization of JIRCAS: facilities that will not be conducive to research promotion without renovation and upgrading; facilities that will hamper the progress of research without renovation owing to their severe age-related condition; and facilities required to be renovated by law or regulations. Increased use of such facilities will be promoted.

Plan of facilities and equipment from FY 2016 to FY 2020

(Unit: million yen)

Details of facilities and equipment	Expected amount	Financial source
Improvement of research facilities		Facility improvement expense subsidies
Improvement of research support facilities		
Improvement of maintenance and operation facilities		
Other improvement of facilities and equipment necessary for the implementation of operations		
Total	274 ± X	

(Note) X: Expenses required for the improvement of facilities and equipment; these expenses will

increase or decrease each year.

III. Budget (Including Estimate of Personnel Expenses), Revenue and Expenditure Plan, and Financing Plan

1. Budget

Budget from FY 2016 to FY 2020

(Unit: million yen)

Category	Promotion of research planning and partnership	Research on environment and natural resource management	Research on stable agricultural production	Research on high value-adding technologies	Information analysis	Total	Whole agency	Total
Revenue								
Operational grants	1,710	3,687	3,551	3,752	754	13,454	3,912	17,366
Facility improvement expense	274	0	0	0	0	274	0	274
subsidies	133	414	719	188	21	1,475	0	1,475
Consignment fees	0	0	0	0	0	0	0	0
Donations	17	0	0	0	0	17	0	17
Miscellaneous revenue								
	2,134	4,101	4,270	3,940	775	15,220	3,912	19,132
Total								
Expenditure								
Operational expenses	1,007	1,577	1,560	1,587	440	6,171	0	6,171
Facility improvement expenses	274	0	0	0	0	274	0	274
Consignment expenses	133	414	719	188	21	1,475	0	1,475
General administrative expenses	0	0	0	0	0	0	520	520
Personnel expenses	731	2,110	1,993	2,165	314	7,313	3,392	10,705
Total	2,145	4,101	4,272	3,940	775	15,233	3,912	19,145

[Rules for the Calculation of Operation Grants]

1. For FY 2016, the following calculation rules shall be adopted.

Operational grants = general administrative expenses for the previous year $\times \alpha \times \gamma$
+ (operational expenses for the previous year $\times \beta \times \gamma$)
+ personnel expenses + δ – miscellaneous revenue

Personnel expenses = basic wages + allowances + overtime work allowances + retirement allowance + welfare benefits

Miscellaneous revenue = estimate of own revenue that might accrue from
administrative affairs and business conducted by using operational grants

α : streamlining coefficient of general administrative expenses (0.97)

β : streamlining coefficient of operation expenses (0.99)

γ : consumer price index (1.000)

δ : Expenses increased or decreased according to the status of operations for FY 2016

2. The following calculation rules shall be adopted for FY 2017 and beyond.

Operation Grants (y) = {A (y-1) \times α \times γ }

+ {B (y-1) \times β \times γ }

+ {Personnel expenses (excluding retirement allowance and welfare benefits) +
retirement allowance + welfare benefits} \pm

δ -miscellaneous revenues

A (y-1): amount equal to general administrative expenses for the preceding year

B (y-1): amount equal to operational expenses for the preceding year

α : streamlining coefficient of general administrative expenses

β : streamlining coefficient of operational expenses

γ : consumer price index

δ : Expenses increased or decreased according to the status of operations for each year

Miscellaneous revenue = estimate of own revenue that might accrue from
administrative affairs and business conducted by using operational
grants

Personnel expenses = (basic wages + allowances + overtime work allowances) \times (1 +
wage revision ratio)

Miscellaneous revenue = (miscellaneous revenue for the preceding year) \times ω - ε

ω : a coefficient representing revenue policy (considering the previous results,
the specific coefficient for the business year shall be determined in the
process of budget formulation for each business year.)

ε : expenses for new operations for which the expected increment in own
revenue is appropriated

(Note) The consumer price index and wage revision ratio shall be growth ratios
considering the operational status provided; however, continuation with the
status quo may be allowed, depending on the operational status.

[Note] Preconditions

1. It is estimated that the streamlining coefficient during the period is 97%

- annually for general administrative expenses and 99% for operational expenses.
2. The growth ratio is estimated to be 0% for both the wage revision ratio and the consumer price index.
 3. The growth ratio is estimated to be 0% for the revenue policy coefficient.
 4. As less than 1 million yen is rounded off, the figures might not match the fractions of the total.

2. Revenue and Expenses Plan

Revenue and Expenses Plan from FY 2016 to FY 2020

(Unit: million yen)

Category	Promotion of research planning and partnership	Research on environment and natural resource management	Research on stable agricultural production	Research on high value-adding technologies	Information analysis	Total	Whole agency	Total
Expenditure	1,732	4,213	4,336	4,026	782	15,089	4,065	19,154
Ordinary expenses	1,732	4,213	4,336	4,026	782	15,089	4,065	19,154
Personnel expenses	731	2,110	1,993	2,165	314	7,313	3,392	10,705
Operational expenses	811	1,525	1,479	1,503	422	5,740	0	5,740
Consignment expenses	133	411	706	186	21	1,457	0	1,457
General administrative expenses	0	0	0	0	0	0	510	510
Depreciation cost	57	167	158	172	25	579	163	742
Financial expenses	0	0	0	0	0	0	0	0
Extraordinary loss	0	0	0	0	0	0	0	0
Revenue	1,732	4,214	4,347	4,026	782	15,101	4,065	19,166
Revenue from operational grants	1,514	3,635	3,470	3,668	736	13,023	3,902	16,925
Miscellaneous revenue	17	0	0	0	0	17	0	17
Consignment revenue	133	414	719	188	21	1,475	0	1,475
Revenue from donations	11	0	2	0	0	13	0	13
Reversal of liabilities in exchange for assets	57	165	156	170	25	573	163	736
Extraordinary profit	0	0	0	0	0	0	0	0
Net profit	0	1	11	0	0	12	0	12
Reversal of reserve brought forward during the	0	1	4	1	0	6	0	6

previous Mid- to Long-term Goal period								
Total profit	0	2	15	1	0	18	0	18

[Note]

1. The Revenue and Expenses Plan was prepared on the basis of the Budget.
2. The retirement allowance of this Agency shall be paid under the “Regulations for the Payment of Retirement Allowance for Officers” and “Regulations for the Payment of Retirement Allowance for Staff.” The total amount is expected to be appropriated from operational grants.
3. The consignment project fees of the Ministry of Agriculture, Forestry and Fisheries and other Ministries were included in consignment revenue.
4. As less than 1 million yen is rounded off, the figures might not match the fractions of the total.

3. Financing Plan

Financing Plan from FY 2016 to FY 2020

(Unit: million yen)

Category	Promotion of research planning and partnership	Research on environment and natural resource management	Research on stable agricultural production	Research on high value-adding technologies	Information analysis	Total	Whole agency	Total
Fund expenditure	2,145	4,101	4,272	3,940	775	15,233	3,912	19,145
Operational	1,675	4,046	4,178	3,854	757	14,510	3,902	18,412
Investment	470	55	94	86	18	723	10	733
Financing	0	0	0	0	0	0	0	0
Money brought forward to the next Mid- to Long-term Goal period	0	0	0	0	0	0	0	0
Fund revenue	2,145	4,101	4,272	3,940	775	15,233	3,912	19,145
From operations	1,860	4,101	4,270	3,940	775	14,946	3,912	18,858
From operational grants	1,710	3,687	3,551	3,752	754	13,454	3,912	17,366
Consignment	133	414	719	188	21	1,475	0	1,475
From donations	0	0	0	0	0	0	0	0
Other	17	0	0	0	0	17	0	17
From investing activities	274	0	0	0	0	274	0	274

From facility improvement expense subsidies	274	0	0	0	0	274	0	274
Other	0	0	0	0	0	0	0	0
Financing	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0
Money carried forward from the previous Mid- to Long-term Goal period	11	0	2	0	0	13	0	13

[Note]

1. The Financing Plan was prepared on the basis of the Budget.
2. The consignment project fees of the Ministry of Agriculture, Forestry and Fisheries and other Ministries were included in consignment revenue.
3. Miscellaneous revenue was included in other revenue as part of revenue from operating activities.
4. As less than 1 million yen is rounded off, the figures might not match the fractions of the total.

4. Securing Own Revenues

- a) JIRCAS will make efforts to secure its own revenue through the acquisition of external research funds, optimization of the burden on beneficiaries, and expansion of patent use fees.
- b) When an increase in its own revenue is expected, JIRCAS will file a request for operational grants in anticipation that it will incur expenses in funding the new operations and will need to use the increase in revenue to fund them; if approved, JIRCAS will carry out the new operations.

5. Disposition of Assets Held

JIRCAS will self-inspect the existing facilities and equipment. It will appropriately dispose of those with a low rate of use after considering any possibility of improvement and confirming that there is no need to continue to possess them.

IV. Upper Limit of Short-term Borrowings

Short-term borrowings for each year during the Fourth Mid- to Long-Term Goal period shall be up to 400 million yen.

Presumed reason: delays in the payment of personnel expenses for general

staff members and delays in the acceptance of operational grants from the state at the beginning of the year.

V. Where there is Unnecessary Property or when Property is Expected to be Unnecessary, Plan to Dispose of the Property

Not applicable

VI. When material property is transferred or is intended to be offered as security

Not applicable

VII. Purpose of Use of a Surplus

To be used to investigate the development of research strategies for agriculture, forestry, and fisheries in developing regions, the improvement of equipment for the use of advanced information technologies, the enhancement of publicity; and the renewal and purchase of research equipment.

VIII. Other Important Matters Concerning Operational Management

1. Enhancement of governance

(1) Development of an internal control system

- a) Under the leadership of the President, the job functions, authority, and responsibilities of directors and staff will be defined. Quick and adequate decision-making and communications shall be facilitated and conducted at meetings of the board of directors and at working meetings.
- b) JIRCAS will clarify its command system and will develop a system for quickly disseminating and implementing its policies and decisions within the corporation.
- c) To prevent improper actions in research, JIRCAS will identify, analyze, evaluate, and adequately respond to factors and risks that can hinder its operations, including incidents stemming from overseas research activities. To this end, JIRCAS will develop a risk management system to prevent the occurrence of risks and to respond adequately to risks once they occur.

(2) Promotion of compliance

- a) JIRCAS will conduct training and education programs to improve the awareness of its directors and staff about legal and ethical compliance with a view to secure public confidence in JIRCAS.
- b) In consideration of governmental guidelines, JIRCAS will develop personnel

education and other systems to prevent improper actions in research.

(3) Promotion of information disclosure

To achieve fair corporation management and gain public confidence in the corporation, JIRCAS will actively promote information disclosure and will respond adequately to requests for information disclosure according to the Act on Access to Information Held by Independent Administrative Agencies (Act No. 140 of 2001) and other legislation.

(4) Enhancement of information security measures

- a) In consideration of the Common Standards of Information Security Measures for Government Agencies, JIRCAS will adequately review its information security policy to strengthen cybersecurity.
- b) JIRCAS will evaluate the state of implementation of information security measures and will use the evaluation results to improve the measures.
- c) JIRCAS will adequately manage the personal and technical information that it possesses.

(5) Promotion of Environmental Measures and Safety Management

- a) JIRCAS will use its chemicals management system to ensure adequate management of chemical substances.
- b) Through education and training on the proper procurement and management of biological materials, JIRCAS will improve its personnel's awareness and ensure adequate management of biological materials that are subject to legal control.
- c) JIRCAS will reduce the amount of energy consumed by the corporation. It will ensure that staff are well informed about adequate waste handling and that the entire corporation commits to recycling.
- d) JIRCAS will conduct education, training, and monitoring, including workplace patrols, to improve personnel awareness of safety and health. It will also pursue thorough management of the working environment. JIRCAS will use examples of unsafe incidents and other measures to prevent accidents.
- e) JIRCAS will improve its personnel's awareness of disaster prevention and will install and manage the necessary equipment. It will also develop an emergency response system.

2. Recruitment and development of researchers

(1) Implementation of human resource development program

- a) To foster the development of research managers and personnel who support research and conduct technology transfer, JIRCAS will review its human resource development program and will take action according to the results of the review.
- b) JIRCAS will develop a career path¹¹⁾ to systematically foster the development of personnel who support research and conduct technology transfer.
- c) JIRCAS will improve its personnel's qualifications by promoting personal exchanges with government departments, holding training sessions to strengthen the knowledge and skills of personnel, and utilizing training sessions held by external organizations.

(2) Planning personnel affairs

- a) JIRCAS will allocate personnel flexibly and adequately to conduct its operations steadily, focusing on particular fields as necessary.
- b) JIRCAS will recruit the human resources needed to conduct its operations by using various systems such as a cross-appointment system¹²⁾, a fixed-term tenure-track system, a reemployment system, and employment through public offering.
- c) JIRCAS will actively employ women and young personnel and will pursue gender equality by promoting women to executive positions and improving work-life balance.

(3) Improvement of personnel evaluation system

- a) JIRCAS will prepare relevant rules and a performance evaluation manual; it will manage a fair and transparent performance/competence evaluation system and will adequately feed the results of personnel evaluation into staff working conditions.
- b) JIRCAS will evaluate the performance of research personnel from multiple perspectives, including research achievements, social implementation of research results, and contribution to management operations.

(4) Improvement of the reward and salary system

- a) JIRCAS shall determine the rewards and salaries of its directors and staff in consideration of the salary levels of national public officers and private

companies.

- b) JIRCAS will introduce a flexible reward and salary system that can accommodate various employment systems, including a cross-appointment system.
- c) To improve and ensure transparency and accountability, JIRCAS will disclose the results of salary verification and the efforts being made regarding salaries.

3. Business management prescribed by order of the competent ministry

The reserve carried forward from the previous Mid- to Long-term Goal period shall be appropriated as expenses to depreciate the tangible fixed assets carried forward to the Fourth Mid- to Long-term Goal period after acquisition of the assets with JIRCAS's own revenue source during the Third Medium-term Goal period.

See Section II, 2 (2) for the plan of facilities and equipment, and Section VIII, 2 (2) for the plan of personnel affairs.

[Attachment] Directions related to research and investigations

The following research work will be conducted by the end of FY 2020.

1. Development of agricultural technologies for sustainable management of the environment and natural resources in developing regions

To cope with increasingly serious global problems such as climate change and environmental degradation, which affect Japan substantially, JIRCAS will develop technologies in cooperation with local research organizations. It will disseminate and establish technologies through verification tests in farm fields and collaboration with local extension organizations. These works will be implemented in developing regions, mainly in Asia and Africa. More specifically, the following priority research projects will be carried out.

To reduce greenhouse gas emissions in agriculture, JIRCAS will develop a water-saving irrigation method and a system to reduce methane generation through integration of cropping and livestock farming and will evaluate its carbon budget. JIRCAS will also address the issues of flooding and other extreme phenomena and climate change, including warming, and will develop technologies to mitigate the damage associated with such issues. [Importance: high]¹

In river basins where precipitation is unstable and vegetation is being degraded, and in areas where soil degradation and other soil problems are becoming serious, JIRCAS will develop technologies to sustain stable crop yields from the perspectives of breeding, cultivation, and soil and water control and will present a model for technological dissemination.

For the effective use of nitrogen fertilizer and the reduction of nitrous oxide emissions from agricultural land, JIRCAS will develop breeding materials utilizing the biological nitrification inhibition function.

2. Technology development for stable production of agricultural products in the tropics and other adverse environments

To enhance food production and improve nutritional status in Africa and other parts of the world, JIRCAS will conduct technological development and verification trials in cooperation with local organizations and will prepare manuals and commentary articles in tropical areas and other developing regions where potential crop productivity is not fully exploited owing to adverse conditions such as droughts and low fertility. In addition, JIRCAS will promptly disseminate the technologies it develops to breeders, government departments, and farmers. More specifically, the

following priority research projects will be carried out.

In Africa, JIRCAS will develop technologies to utilize the diversity of food crop genetic resources; crop breeding materials of high productivity adapted to the planting environment and those materials adapted to local preferences; and crop production and livestock raising technologies that effectively utilize organic materials, water, and other local resources. [Importance: high]²

JIRCAS will develop basic technologies for producing high-yield crops adaptable to adverse conditions such as low fertility, drought, and salt damage. It will also develop pioneering breeding materials, as well as technologies for their evaluation and utilization in the field in developing regions.

To control migratory plant pests and transboundary diseases that can spread and invade Japan, JIRCAS will work on pest control based on the epidemiology of migratory pests and vectors, and will develop technologies to prevent their invasion and spread. In addition, JIRCAS will develop disease-resistant varieties by using the research networks it has developed.

3. Development of high value-adding technologies and utilization of local resources in developing regions

In Asian areas where development needs are increasing along with economic growth, JIRCAS will use diverse regional resources and will develop new high value-adding technologies. In this way, it will support rural development by pursuing environmentally friendly and sustainable agriculture, forestry, and fisheries; help increase the incomes of farmers in developing regions; and contribute to the Global Food Value Chain Strategy promoted by Japan. More specifically, the following priority research projects will be carried out.

To secure high-quality products and develop food value chains, JIRCAS will develop a way of evaluating potential high value-added products of agriculture, forestry, and fisheries and will develop the processing and distribution technologies needed to add high value. In addition, JIRCAS will work on enhancing value addition by clarifying consumer needs and improving distribution systems. [Importance: high]³

To establish agriculture, forestry, and fisheries in a sustainable, resource-recycling way, JIRCAS will develop technologies for saccharification from unused biomass resources such as agricultural waste and will promote their advanced use. JIRCAS will also develop technologies for the sustainable production and use of diverse resources to produce high value-added products in semi-mountainous areas. It will develop technologies for the development and maintenance of forest resources,

technologies for the production of high value-added wood products, and technologies for improving the productivity of forest plantations in harmony with ecosystems. Moreover, JIRCAS will develop efficient aquaculture technologies and will utilize aquatic resources in harmony with ecosystems with the aim of sustainable consumption of aquatic resources.

In these efforts, JIRCAS will use international research networks, collaborate with Japanese and local private sectors, and promote systematization and transfer of technologies. Furthermore, JIRCAS will prepare technical manuals and exhibit technologies for dissemination among farmers and will provide information for technology transfer to local processors and distributors.

<Descriptions of importance>

- ¹ [Importance: high] According to the Fifth Assessment Report of the IPCC¹³⁾, adaptation to climate change may exceed a limit in the future, and a combination of effective adaptation measures and mitigation measures will promote a resilient society and sustainable development. In this regard, it is very important to take action in developing regions, where agriculture contributes to a large proportion of the economy.
- ² [Importance: high] As it was proposed in the sustainable development goals (SDGs)¹⁴⁾, namely to “end hunger, achieve food security and improved nutrition, and promote sustainable agriculture,” it is very important to solve the food problems in Africa, where large populations are deficient in nutrients and agricultural productivity is low.
- ³ [Importance: high] Because the Global Food Value Chain Strategy indicates that we need to develop a food value chain that adds high value in agriculture, forestry, and fisheries, it is very important to help increase farmers’ incomes through this effort.

Glossary for the Mid- to Long-Term Plan of JIRCAS

No.	Term	Meaning
1)	UN Millennium Development Goals	Common goals of international society that should be achieved in eight development fields by 2015 and that are based on the United Nations Millennium Declaration adopted at the United Nations Millennium Summit (September 2000).
2)	Consultative Group on International Agricultural Research (CGIAR)	CGIAR is an international council established in 1971 to improve human welfare by increasing food production in developing countries and improving production in agriculture, forestry, and fisheries in a sustainable manner by providing long-term, systematic support to research on international agriculture, forestry, and fisheries.
3)	Segment	A unit for which consistent managerial responsibility can be maintained, at least in terms of goals and evaluation, while ensuring adherence to the perspective of internal corporation management and conformity with financial accounting.
4)	PDCA cycle	A method of improving operations continuously by repeating the four steps of “plan,” “do,” “check,” and “act.”
5)	Global Food Value Chain Strategy	A strategy for collaboration among industry, academia, and government for developing a food value chain from production to processing, distribution, and consumption. It is aimed at promoting overseas expansion and growth of the Japanese food industry, improving circumstances for the export of food-related infrastructure and Japanese food, and achieving economic growth in developing countries through economic cooperation.
6)	Global public goods	Research results beneficial to the entire world, transcending national and regional borders.
7)	Interactive communication	Bidirectional communication, including explaining research results to the public in easy-to-understand terms and listening sincerely to the public about their expectations and anxieties. This is aimed at facilitating subsequent R&D and commercialization processes.
8)	NGO (non-governmental organization)	A non-governmental, non-profit organization that works on global issues such as those related to development, poverty, peace, humanity, and the environment on a voluntary basis.
9)	Japan Forum on International Agricultural Research for Sustainable	A forum established in 2004 to exchange information and coordinate and collaborate in agriculture, forestry, and fisheries in developing countries.

	Development (J-FARD)	
10)	Goal-oriented basic research	Basic research with a view to developing technology seeds that will lead to future innovation. For example, researchers' novel ideas and the results of pure basic research may lead to technological innovation and creation of new businesses in the agricultural, forestry, fisheries, and food industries.
11)	Career path	A sequence or scheme of jobs that individuals should experience, or abilities they should acquire, before reaching their final positions.
12)	Cross-appointment system	A system that allows researchers to sign an employment contract with more than one university, public research institution, or private company and work under the responsibility of each organization.
13)	Intergovernmental Panel on Climate Change (IPCC)	An organization established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) with the aim of providing comprehensive evaluations of human-induced climate change, its potential impacts, and options for adaptation and mitigation from the scientific, technical and socioeconomic perspectives.
14)	Sustainable development goals (SDGs)	Seventeen goals with 169 targets proposed in "Transforming our World: the 2030 Agenda for Sustainable Development," adopted by the United Nations Sustainable Development Summit (September 25–27, 2015).