

Date Palm Research Center

"Center of Research Excellence"

King Faisal University
Ministry of Higher Education
Kingdom of Saudi Arabia



RESEARCH SUPPORT POLICIES

1429H (2008)

Contents

Definitions

Introduction

Program I: Basic and applied research grants

Program II: Graduate students research grants

Supplement (1): Research priorities of the Center

Supplement (2): Research proposals preparation guidelines

Definitions

Meanings and connotation of words and phrases, wherever they appears in this document, are described in the following list :

Ministry:	The Ministry of Higher Education.
University:	King Faisal University.
Center:	The Date Palm Research Center, an autonomous unit of the university aimed at quality innovative research achievements in a particular area of specialization, capabilities enhancement, research programs support, strive for progress in that area of specialization, and other activities in support of scientific and research areas.
Board of Directors of the Center:	A group of individuals in charge of overseeing the management, administrative and financial aspects of the Center in accordance with specific procedural protocols.
Advisory Committee:	A group of scientifically qualified individuals that provide their opinions as well as their research and scientific expertise to the Center.
Principal Investigator:	A member of the faculty, or equivalents, who acts as a representative for the research team involved and is responsible for the supervision and management of the group.
Co-Investigator:	A member of the faculty or the wisdom, which involved with a group of researchers to complete a study subject.

Arbitrator
Examiner: A member of the faculty or an expert assigned to examine and study a scientific achievement.

Scientific
Research: An achievement based upon recognized scientific principles resulting from individual or joint efforts, or both.

Instruments: Scientific tools with the performance of a specific or multiple technical functions relied upon by a research or the research team, or needed for a certain research issue or result, excluding furniture or office equipment.

Introduction

The Date Palm Research Center at King Faisal University was established in 1402H. This was the embodiment of the importance of palm in Saudi Arabia, which is considered one of the major producers of dates. In Muharram 1428H, the Center was awarded the status of Research Center of Excellence as one of the financially supported research centers by the Ministry of Higher Education. Objectives of the Center are achieved through following main pillars: basic and applied research, holding symposia specialized in date palm, training, and community service, in addition to various scientific and technical activities associated with these pillars. The Center holds good reputation at the local and regional levels through actively participating in the majority of conferences, symposia, workshops and scientific meetings of local and international concerned with date palm.

Vision: The Date Palm Research Center at King Faisal University is determined to pursue the rank of distinguished international research centers with comparable specialization.

Mission: Achievement of quality and innovative research in the areas of palms and dates, strengthening capabilities, supporting research programs, excels in its specialization, and support scientific and research activities in order to enhance performance efficiency in the areas of date palm cultivation and dates processing.

Center Goals and Objectives:

The Date Palm Research Center is an autonomous unit of the university aimed at:

1. Conduct quality research and scientific training of specific and focused areas linked to concurrent problems facing date palm sectors of national importance and strategic dimension.
2. Create appropriate scientific and research environment to enable researchers and graduate students to conduct innovative research and develop advanced techniques to render the Kingdom leadership in the areas covered by the Center.

3. Foster integration and interdependence among researchers and experts of Saudi universities and research centers and the private sector.
4. Promote cooperation in quality research among Saudi universities and research centers and outstanding global research centers related to date palm.
5. Engage in Transferring applied research findings to instructional public bulletins.

Program I: Basic and applied research grants

In harmony with the mission of the Date Palm Research Center to support and encourage scientific research oriented to serve date palm sectors, research priorities has been selected to address some obstacles facing date palm sectors at the Kingdom. The Center will support research according to the following two frameworks:

- Contracted Research Project: The Center will undertake research in an area of particular importance priority specified and objectives set forth by the Center. Local and international experts will be contacted and invited to attend to attend the Center to discuss the best solutions and form work teams and prepare research proposals to achieve those objectives.
- Research Priorities: The Center encourages proposals addressing research topics declared in the Center research priority list (see Supplement No. 1).

The objectives of research conducted at the Date Palm Research Center are:

1. Linking scientific research goals of the University and development plans, away from duplication and repetition of previous studies.
2. Transfer and nationalizing modern technology and participate in its improvement and adaptation to suit local conditions in accord with development purposes.
3. Development of a generation of distinguished Saudi researchers and trained to conduct original high-quality research through the involvement of lecturers, graduate students, and research or teaching assistants in the implementation of scientific research.

4. Dissemination of scientific research results in local and international publishing venues, and providence of documentation means to facilitate researcher's tasks.
5. Cooperation with the commissions, and scientific and research institutions within and outside the Kingdom through research and exchange of knowledge and experiences.
6. Find ways and channels to encourage individuals and institutions to support and finance research projects to enhance the university role.
7. Adoption of the establishment of scientific research chairs in various fields of palm and dates (pests, manufacturing, marketing) to be funded by the private sector.

Article I:

Instructions to submit research proposals: Those wishing to apply for research projects within the Center's budget take into account the following:

- A. Research team members must be majored in the area of the proposed research with experience sufficient to achieve the objectives of the study.
- B. Principal Investigator must be a faculty member of the University. The Board of Directors of the Center holds the rights for exemptions.
- C. Requirements and instructions specified in the instructional manual for preparation and submission of research proposals must be satisfied.
- D. Submissions must include the original, four copies, and an electronic version on a compact disk addressed to the Director of the date Palm Research Center.
- E. Research must be conducted mainly at the Date Palm Research Center facilities.
- F. Proposed research must be original and innovative.

Article II:

Instructions to prepare research proposals: See Supplement No. (2) at the end of this guide.

Article III:

Evaluation of research proposals: Research proposals submitted by the researchers will be subjected to a series of actions summarized as follows:

- A. Preliminary study of the research proposal by specialists within the Center for the nomination of proposals for further peer review.
- B. Selection of three arbitrators.
- C. Receipt of the arbitrators' comments by the Center where specialists will nominate proposal for funding based on arbitrators' comments.
- D. Meeting with Principal Investigator to study the views of the arbitrators and the role of each researcher and the budget.
- E. Revision of the research proposal according to arbitrators' remarks.
- F. Recommendation of the Advisory Committee for the Center to support the proposed research.
- G. Adoption of the research proposal support by the Board of Directors.

Article IV:

Incentives and financial policy:

Spending on research supported by the Date Palm Research Center by funds from the Ministry of Higher Education and other resources available at the Center is executed according to research priorities approved by the Board of Directors of the Center based on the maximum amounts specified below:

- A. The Center is committed to the amounts needed for research requirements as contained in the approved proposed research budget, each year separately.
- B. Amounts are appropriated for the next phase of the project after researchers have met all the financial and technical requirements of the previous phase.
- C. Responsibility of financial and technical research implementation is the burden of the Principal Investigator.
- D. Reward of SR (3000) monthly is allocated to the Principal Investigator, and SR (2000) per month for each Co-Investigator with doctorate degree during the period specified in the original research plan.
- E. Reward of SR (25) per hour at a maximum of SR (1000) per month is allocated to each Research Assistant with Master degree during the period specified in the original research plan.
- F. Reward of SR (20) per hour at a maximum of SR (800) per month is allocated to each Research Assistant with Bachelor degree during the period specified in the original research plan.
- G. Reward of SR (10) per hour at a maximum of SR (400) per month is allocated to each Administrative Assistant during the period specified in the original research plan.
- H. Amounts are appropriated by the consent of the Director of the Center, and the adoption by the Vice President for Scientific Research and Graduate Studies stipulated with a specific beneficiary, affiliation, amounts, primary purpose, and compatibility with the project budget.
- I. Research budget cannot be used for to office furniture, infrastructure or maintenance, and any other expenses not directly related to the proposed research activity.

- J. Principal Investigator is responsible for applying all regulations and instructions concerning the financial aspects as well as the application of the rules and regulations in force, and the governmental purchasing system and other regulations related to the procurement and spending.
- K. Rewards will be disbursed to the research team after submitting the annual technical report for each year. Rewards allocated for the final year will be disbursed after the submission of the final technical report in accordance with the revised observations received from arbitrators.
- L. The Center holds the rights to suspend rewards of researchers (wholly or partially) in the event of late submission exceeding two months. The same applies in the event of late submission of revised final report in accordance with arbitrators' comments.
- M. An honorarium not to exceed SR (1000) is allocated to the each arbitrator of each research proposal or periodic research report.
- N. An honorarium not to exceed SR (2000) is allocated to the each arbitrator of each final project report.
- O. The Board of Directors of the Center holds the rights to increase the rewards and provides additional monetary incentives for distinguished research projects in accordance with regulations approved by the Council.

Article V:

Technical reports:

- A. The Principal Investigator bears responsibility to submit a short technical report on the progress of research work for the first four months after work commencement date, including stage objectives achievements,

obstacles faced, and proposed solutions.

- B. Principal Investigator committed to a comprehensive annual technical report every 12 months, and a final technical report at the end of the work describing achievements in relation to the approved research plan for that period, including results, analysis, and discussion. Reports must be prepared according to instructions of technical reports preparation guidelines and submitted as original plus three copies.
- C. The Center notifies the Principal Investigator of the results of arbitration of technical reports.
- D. Principal Investigator is committed to responding to all comments raised about the report's contents and addressing these comments to achieve the objectives of the research in accordance with the approved plan. The response may be embedded in subsequent reports.
- E. Principal Investigator is committed to return the original and an electronic version of the revised final to the Date Palm Research Center during a period not exceeding one month from receiving the results of the final technical report arbitration.

Article VI:

Financial reports:

- A. The Principal Investigator bears responsibility to submit a periodic financial report every 6 months according to financial report forms adopted by the Center.
- B. The Principal Investigator bears responsibility to submit a final financial report within 30 days after notification acceptance the final technical report (revised).

Article VII:

Unsatisfactory performance of researches:

In the event of default of the research team carrying out the tasks assigned to them or part thereof in the performance of research work without acceptable excuse by the Center, the Director of the Center will report to the Board of Directors of the Center to take the necessary action.

Article VIII:

Suspension or cancellation of financial support:

The Center holds the rights to suspend or revoke financial support for any of the following reasons:

- A. The emergence of fundamental deficiencies and failure to implement the research based on on-site follow-up reports made by the Centers' specialists or the process of evaluation of periodic progress reports.
- B. Changing or adding any researchers without the prior consent of the Center.
- C. Changing or deviating from the research objectives of the research plan without prior approval.
- D. Transfers of research budget items without the approval of the Center.
- E. Delay sending periodic or annual technical and financial reports beyond the periods specified in Article V and VI.
- F. Lack of commitment of Principal Investigator in responding to comments and queries within the prescribed period.
- G. If similar work (in progress or completed) conducted by the research team or one of its members was identified.
- H. If the Center does not receive a convincing written reply from the

Principal Investigator within a maximum period of one month explaining the errors and irregularities and remedy deficiencies in research work, or for not complying with the rules set forth in this document.

- I. If the Principal Investigator fail to take corrective actions as accepted by the Center within 45 days.
- J. During the period of suspension, the Center is not responsible for researchers' rewards or compensation for those rewards. Rewards presume only after lifting the suspension. The research team forfeits the rights for any claims for rewards reimbursement for the suspension period.

Article IX:

Intellectual property rights and scientific publishing:

- A. The beneficiary of the grant is bound to provide the Date Palm Research Center all information about any patentable idea or invention reached through research supported from the Center, or has been reached, within a year of completion, based on studies during the research proposal
- B. The Date Palm Research solely holds the rights to ownership of the invention and the rights granted under patent, with the Center's share of (60%) of the proceeds of sales of intellectual property rights, taking into account the rights of researchers for (40%).

Article X:

Recognition of the support center:

Reference should be made to indicate the support of the Center, in scientific papers or graduate students thesis or other materials based on the search

results, which can be read as follows: "This study has been completed with support from the Date Palm Research Center, King Faisal University, grant number ___".

Article XI:

Ownership of instruments:

- A. Instruments acquired by payments from the Center support are owned by the Center. They will be in custody of the Principal Investigator to be used for the duration of implementing of the research project.
- B. The Center may use instruments for more research funded during the same period.

Article XII:

Tests on the environment:

The research team is committed to instructions, regulations, and circulars for the protection of the environment during research implementation, and in the need to conduct experiments on the environment, a permit should be obtained from the authority to do the work in question.

"The Board of Directors of the Date Palm Research Center holds the rights of interpretation of the regulations mentioned in this release."

Program II: Graduate students research grants

In harmony with the mission of the Date Palm Research Center to support and encourage graduate students to conduct scientific research oriented to serve date palm sectors, research priorities has been selected that are important in addressing some of the obstacles facing date palm sectors at the Kingdom. The

Center urges graduate students to submit research proposals within those priorities (see Supplement No. 1) and to make use of the existing Center infrastructure, according to the following regulations:

Article I:

Instructed to submit research proposals:

Graduate students wishing to submit research proposals within the center's budget are requested to consider the following:

- A. Advisor must have sufficient expertise in the research area to achieve the objectives of the study.
- B. Requirements and instructions specified in the instructional manual for preparation and submission of research proposals must be satisfied.
- C. Submissions must include the original, four copies, and an electronic version on a compact disk addressed to the Director of the Date Palm Research Center.
- D. Proposed budget not to exceed 100 thousand riyals.
- E. Research must be conducted mainly at the Date Palm Research Center facilities.
- F. Proposed duration not to exceed 12 months.

Article II:

Instructions for research proposals preparation:

See Supplement No. (2) at the end of this guide.

Article III:

Assessing research proposals:

Research proposals will be submitted by graduate students to a series of actions summarized in the following:

- A. Preliminary study of the research proposal.
- B. Meeting with Advisor and Graduate Student to discuss any amendments that would enrich the proposed research.
- C. Revision of the research proposal.
- D. Approval of supporting the research proposal by the Board of Directors.

Article IV:

Financial incentives:

Spending on research supported by the Date Palm Research Center by funds from the Ministry of Higher Education and other resources available at the Center is executed according to research priorities approved by the Board of Directors of the Center based on the maximum amounts specified below:

- A. The Center is committed to the amounts needed for research requirements as contained in the approved proposed research budget, each year separately. Amounts are appropriated for the next phase of the project only after fulfilling all the financial and technical requirements of the previous phase.
- B. Responsibility of financial and technical research implementation is the burden of mainly the advisor and the student.
- C. The sum amount of SR (8000) is rewarded to Student from the Kingdom, after submitting final project report.
- D. The sum amount of SR (5000) is rewarded to Advisor after the Student has submitted final project report.
- E. The Center bears the costs round-trip economy class ticket only once,

for students from outside the province Al-Hassa.

- F. Students from outside the Kingdom are rewarded SR (3000) per month, in addition to defraying the cost of round-trip economy class air tickets only once. The Board of Directors of the Center holds the rights to increase reward amount.
- G. The Center may provide adequate housing for the duration of the research, and if unable will provide housing allowance bonus not to exceed 3 months allowance.
- H. Amounts are appropriated by the consent of the Director of the Center, and the adoption by the Vice President for Scientific Research and Graduate Studies stipulated with a specific beneficiary, affiliation, amounts, primary purpose, and compatibility with the project budget.
- I. Research budget cannot be used for to office furniture, infrastructure or maintenance, and any other expenses not directly related to the proposed research activity.
- J. The Student and Advisor are responsible for applying all regulations and instructions concerning the financial aspects as well as the application of the rules and regulations in force, and the governmental purchasing system and other regulations related to the procurement and spending.
- K. The Center holds the rights to suspend rewards for Student or Advisor (wholly or partially) in the event of late final report submission exceeding two months.

Article V:

Technical reports:

- A. The Student bears responsibility to submit a short technical report on the progress of research work for the first four months after work commencement date, including stage objectives achievements, obstacles faced, and proposed solutions.
- B. The Student is committed to a comprehensive a final technical report at the end of the work describing achievements in relation to the approved research plan for that period, including results, analysis, and discussion. Reports must be prepared according to instructions of technical reports preparation guidelines and submitted as original plus three copies.
- C. The Center notifies the Student and Advisor of the results of arbitration of technical reports.
- D. Student and Advisor are committed to respond to all comments raised about the report's contents and addressing these comments to achieve the objectives of the research in accordance with the approved plan. The response may be embedded in subsequent reports.
- E. The Student is committed to return the original and an electronic version of the revised final to the Date Palm Research Center during a period not exceeding one month from receiving the results of the final technical report arbitration.

Article VI:

Financial reports:

The Student and Advisor bear responsibility to submit a periodic financial report every 6 months according to financial report forms adopted by the Center, accompanied with original supportive documents. In addition to a financial report at the end of the year.

Article VII:

Suspension or cancellation of financial support: The Center holds the rights to suspend or revoke financial support for any of the following reasons:

- A. The emergence of fundamental deficiencies and failure to implement the research based on on-site follow-up reports made by the Centers' specialists or the process of evaluation of periodic progress reports.
- B. Delay sending periodic or annual technical and financial reports beyond the periods specified in Article V and VI (Program I) in this guide.
- C. During the period of suspension, the Center is not responsible for rewards or compensation for those rewards.

Article VIII:

Intellectual property rights and scientific publishing:

- A. The beneficiary of the grant is bound to provide the Date Palm Research Center all information about any patentable idea or invention reached through research supported from the Center, or has been reached, within a year of completion, based on studies during the research proposal.
- B. The Date Palm Research solely holds the rights to ownership of the invention and the rights granted under patent, with the Center's share of (60%) of the proceeds of sales of intellectual property rights, taking into account the rights of researchers for (40%).

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Article X:

Ownership of instruments:

A. Instruments acquired by payments from the Center support are owned by the Center. They will be in custody of the Principal Investigator to be used for the duration of implementing of the research project.

B. The Center may use instruments for more research funded during the same period.

Article XI:

Tests on the environment:

The research team is committed to instructions, regulations, and circulars for the protection of the environment during research implementation, and in the need to conduct experiments on the environment, a permit should be obtained from the authority to do the work in question.

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Supplement (1)

Research Priorities of the Center

Administrators of Date Palm Research Center sought to convene a workshop

with the participation of a number of experienced faculty members and researchers in palms and dates from the public and private sectors; in addition to the participation of HE Deputy Ministry of Agriculture and the presence of a representative from the Ministry of Higher Education. This was held on Saturday, 18 1428H. The program consisted of a presentation describing the most important features of the developmental plan that has been submitted to the Ministry of Higher Education in accordance with the standards of a center for excellence. In addition, a lecture by Food and Agriculture Organization expert in Saudi Arabia in which he made a statement to the success factors required for the Center and how to cooperate with similar Centers around the world. The benefit of this workshop was augmented by the presence of some distinguished participants of the Fourth Symposium on Date Palm, which coincided with the workshop. In light of the proposals and recommendations of the experts participating in the workshop, the proposal was accordingly modified and resubmitted to the Ministry of Higher Education.

Consequently, steps were taken to present to the Ministry of Higher Education with a strategic plan for the Date Palm Research Center that ensures adequate performance based on a scientific approach which identifies scientific research priorities and other activities of the Center leading to distinguished status while achieve its objectives. The main research priorities of the Date Palm Research Center relate to addressing the needs of date palm sectors to achieve sustainable development in this field in the Kingdom of Saudi Arabia. Scientific research is the most important long-term objective of the Center where focus at the present time is on research priorities of particular importance. In pursuit of a strategy consistent with research dynamic and global scientific developments, the Board of Directors of the Center will update research priorities periodically as recommended by the Advisory Committee of the Center.

1. Research priorities in pests and diseases control

Date palm is exposed to numerous pests including insects, diseases, and animals. The importance of those pests differs depending on date palm cultivars grown, agricultural practice, and geographical distribution of palm plantations. The red palm weevil is important at all those levels, while palm Dubas may be the most serious pest palm in Yemen and Oman, at the same time it is not widespread in most regions of the Kingdom. Therefore, it may be difficult to

establish research priorities for pest and date palm in general. Because of the locality of the Date Palm Research Center in the governorate of Al-Hassa and proximity to areas of Riyadh and Qassim, focusing will be on palm pests in these areas.

Based on importance, date palm pests can be divided into two groups:

Group I: covers the most important pests including red palm weevil *Rhynchophorus ferrugineus*, dates moth *Ephestia* spp., and the date mite *Oligonychus afrasiaticus*, in addition to Alwijam disease.

Group II: covers long-horn date palm stem borer *Jebusea hammerschmidtii*, Fruit stalk borer *Oryctes* spp., *greater date moth Arenipses sabella*, rodents, wilting diseases, and black scorch disease.

Based on this classification, the Date Palm Research Center has adopted plans for short and medium term focusing on pest mentioned in Group I only. In addition to a long-term plan to complete previous research plan and to include pests in Group II.

Research trends will include:

1. Red palm weevil:
 - A. Studies early detection and diagnosis of injury.
 - B. Environmental and physiological studies.
 - C. Recent trends in the area of pests control.

2. Dates moths:
 - A. Finding safe alternatives to methyl bromide.
 - B. Behavioral studies, environmental studies, and estimation of numerical density during the months of the year.
 - C. Biocontrol, chemical and behavioral control.

3. Dates mites:

- A. Behavioral studies, environmental studies, and estimation of numerical density during the months of the year.
- B. Different control methods, especially Biocontrol.
- C. Evaluation of the most important pesticide and study of mite resistance of those pesticides.

4. Integrated pest management for date palm diseases:

- A. Alwjam caused by Mycoplasma-like organism.
- B. Black scorch disease.
- C. Khias (rotting) of spath or inflorescence rot or Khamaj caused by the fungus *Mauginiella scattae*
- D. Wilt disease caused by fungus *Fusarium oxysporum*

2. Research priorities in the field of economics and marketing of dates

The goal of the economic studies in the field of and palm dates in general is to examine the current status of production of dates in order to identify problems that prevent the maximum economic efficiency. In addition to identify the dimensions, causes, effects and how to overcome those obstacles for the advancement of this important crop that represents the base in the agricultural sector at the Kingdom. Numerous studies related to dates economics have been conducted which can serve as the pillars for initiating another type of economic studies, which is called Applied Economic Studies, according to the developments of the current scarcity of water and the Kingdom's accession to the World Trade Organization, which requires meeting international standards of dates produced. The other trend for Applied Economic Studies is currently focused on the economics of manufacturing and estimating the added value and the feasibility study for the production of secondary products (By-products) in

order to increase the demand for dates generally, fill part of the food gap, and creating future job opportunities in the dates manufacturing sector. In addition to implementation of the policy of import substitution to provide hard currency and raise the standard of living for members of the community.

Therefore, the research priorities in the field of palm and dates economics will focus in the implementation of applied studies related to the production of dates, costs, consumption, and marketing locally and globally, taking into account the economics of secondary products, particularly cellulosic products and waste materials in feed manufacturing. The following research priorities are considered to achieve the mentioned overall objectives:

1. Constraints of production and marketing of the dates and means to overcome them in the Kingdom.
2. Financial and economic feasibility of date production in the light of the Kingdom's accession to the World Trade Organization.
3. Economics of date processing and exploitation by-products of palm.
4. The economics of feed manufacturing using processing waste of dates and seeds.
5. Measuring the administrative and economic efficiency of dates factories at the Kingdom.
6. Economic and environmental impacts of deserted charity farms.
7. The role of cooperatives societies in raising the productivity and efficiency of dates marketing at the Kingdom.
8. Estimating domestic and global demand until year 2020 and export constraints.
9. Low cost of production and identify economical cultivars of Saudi dates.
10. Conduct specialized marketing studies to include major dates importing countries such as European, Asian, , and Arab markets. In addition to determining the absorptive capacity of foreign markets, and take advantage of the bilateral economic agreements with sisterly and friendly countries.
11. Studies focused on the development of marketing channels for dates including electronic commerce.

3. Research priorities in dates manufacturing and post-harvest technologies

There are manufacturing industries that may represent areas of successful investment, but need further research and careful studies to determine the technical and economic feasibility accurately. The area of applied research is considered wide open to develop new manufactured date products and distinguished through the adaptation of technology to obtain final products that are of high marketing value and feasible value-added. The most important research areas in dates manufacturing included, but not limited to:

A) The area of food biotechnology:

- Production of single-cell protein of dates and use in ruminant feed, poultry and fish.
- Alcohol production from dates for medical and industrial use.
- Production of medical compounds from dates.
- Production of enzymes from dates.
- Production of antibiotics from dates.
- Production of flavor compounds from dates.

B) The area of food technology:

- Production of energy beverages from dates.
- Production of carbonated drinks from dates.
- Introduction of dates in children's food.
- Production of liquid sugar from dates.
- Natural vinegar industry from dates.

- Preservation of Rutab by freezing techniques, as well as controlled gaseous atmosphere techniques.
- Find modern techniques as alternatives to methyl bromide fumigation of dates in view of its international prohibition.
- Introduction of dates in the feed industry.

4. Research priorities in the field of date palm biotechnology:

The following are the most important research aspects in date palm biotechnology that the Center is seeking to accomplish:

- Study the effects of nutrients and environmental conditions aimed at reducing the duration of tissue culture stages and enhance efficiency.
- Study the factors affecting synchronization of cellular growth and somatic embryogenesis in date palm.
- Production of synthetic seeds from somatic embryos of date palm.
- Bioreactors of date palm cells and production of natural products.
- In vitro selection of cellular strains resistant to salinity, drought, and major diseases of date palm.
- Using genetic engineering technology to combat the red palm weevil.
- Genomic studies contributing to a genetic map for date palm.

5. Research priorities in the area of agricultural operations

- Water conservation studies under of modern irrigation conditions.

- Study the effects of salt water irrigation date palm productivity.
- Recent trends in organic agriculture and bio-fertilizer in date palm.
- Studies related to the development of date palm mechanical services such as automated pollination, pruning, harvesting, and fertilization.
- Studies related to reducing fruit load using hormonal treatment as well as other compounds.

Supplement (2)

Research Proposals Preparation Guidelines

In effort to facilitate procedures of preparation, submission, and arbitration of, the Date Palm Research Center is requesting research proposals to contain the following components:

1. **Cover page:** The cover page containing the title of the proposed research, which should be brief and identical written in Arabic and English. And that reflect the content of scientific research and the concept of the ordinary reader. The cover page also includes the name of the submitted proposal for the research, address, the names of researchers, public research, flour, which can be identified by reference to the list of areas annexed, and the duration of the implementation of the proposed research, the requested budget. As also includes Key words on research and the beneficiaries of the search results.
2. **Contents of the proposal:** A table of contents of the proposal clarifying

page numbers.

3. **Research abstract (Arabic).**
4. **Research abstract (English).** Abstracts should be prepared according to scientific style, accurate, clear, and comprehensive. Abstract should briefly touch the subject of research, objectives, scientific methods and procedures to be followed in the implementation, most important expected results and benefits. One-page abstract should be submitted in both Arabic and English languages.
5. **Introduction:** Introduction should include a brief background to the problem addressed by the proposed project in terms of importance and the size of the proposed work, the circumstances under which the research is implemented, the expected results and benefits which justify support priority.
6. **Literature Review:** It deals with the references relevant to the proposed topic to help crystallizing the research problem and identify its dimensions. Literature survey should reflect depth of knowledge of the researchers in relation to the proposal subject. When preparing the literary survey, assure taking into account the inclusion of previous or ongoing studies relevant to the subject of the proposed research, taking into account the integration of the literary survey and scientific integrity of the content of the proposal stating previous findings of other researchers and clarifying the sources of such information.
7. **Objectives:** The objectives are of the most important pillars on which the research proposal is erected. The Principal Investigator and researchers ought to precisely and clearly identify objectives in the form of detailed and concise points listed numerically, in accordance with the information contained in the introduction and literature review. Objectives should be formulated in concise words closely linked to the problem addressed by the proposal and the implementation design. An appropriate mechanism for implementing results and recommendations

of the research project.

- 8. Research Design and Methodology:** This section is intended to describe practical steps and procedures to be followed by the research team to implement the study. These steps should be identified and explained in a logical arrangement, to assist arbitration of validity, adequacy, and appropriateness of methods used to achieve research objectives. The research design and methodology may be divided into subsections in accordance with appropriate standards that facilitate the process of organization and consequently follow up, including:
- Research methods and tools that will be used to carry out research identifying treatments and variables including tests data, measurements, surveys, and questionnaires relevant to those variables, in addition to the steps to be followed in the preparation of instruments used for data collection and amendments to ensure achieving the research objectives.
 - A description of the tests, measurements, or methods to be used in the research in details, particularly for novice or improved means. In the case of routine analysis methods or previously published details, it would suffice to refer to relevant references. This include data processing approaches and types of tests for data analysis that are conducted to obtain final results relevant to achieving research objectives and leading to conclusions and recommendations.

9. **Research Management Plan:** Explains the experiences and scientific capacity of each members of the research team in relation to the assigned research tasks individually.
10. **Research Work Plan:** Research activities are divided into tasks and functions of a logical and coherent sequence showing durations of implementation throughout the research project and identifying members of the research team to accomplish each task, using timetables or planning charts. In addition, stating a plan for research follow-up process, through periodic meetings of team members and the dates for submission of periodic technical reports and final report of the research project.
11. **Bibliography:** This section contains a list of all references mentioned in the body of the research proposal, in alphabetical order according to family names of the authors, taking into account the separation of Arab and foreign authorities, or serially numbered according to its first appearance in text, in accordance with one of the acceptable scientific writing styles.
12. **Expected Results and Benefits:** Research proposal should presents a brief account of results expected to emerge, and specifies the fields or sectors that would benefit. In addition to stating an appropriate mechanism for using the results in practical applications.
13. **Existing and anticipated Funding:** The researchers should disclose funds for the research proposal from sources other than the Center. It also should be mentioned existing equipments and instruments at the research implementation site, which can be used by the researchers, particularly those fixtures that have been purchased by the Center for other ongoing or completed research project.
14. **Budget:**
 - **Tabulated budget** is the total proposed budget for the entire period of research and for each year of the project using the

specified form.

- **Detailed budget** should be compatible with the requirements of implementing the research warranting that the various items fully justified. To prepare the budget adhere to the following steps:

- A) Prepare a detailed budget for the proposal to discuss the specific items each year. Identify the required amounts for the components of each budget item and determine the number and qualifications of research assistants, instruments and specifications, equipment, materials and required specifications, scientific trips, if any, destinations and the number of days per trip and number of participants.
- B) Prepare the total budget for the entire period of research in tabulated form and for each year individually in consistent with the detailed budget. Budget items include:
 1. Researchers' rewards determined by the effort in the implementation of the search as contained in the paragraph related to financial incentives incentive in this guide.
 2. Assistant categories including research assistants, laboratory technicians, skilled technicians, university students, graduate students, workers, and administrators. Principal Investigator should determine researcher working hours by (hour/person) and compensation owed to each of them in the detailed budget.
 3. Necessities, including instruments, materials, and equipment mentioned in the research design and methods with full justification explaining the need for the requested items in the implementation of work plan to achieve desired goals. In the event that instruments are available but cannot service the proposed research, reasons should be explained. In the detailed budget, researchers should include a list of required instruments, materials, and equipment along with approximate costs.

4. Traveling includes domestic and international trips. The research team must identify the purpose of the trip and its relationship to the proposed research activities, destination, duration, and projected costs. These costs include travel expenses only, without daily travel allowance.
15. **Approval of the Research Team.**
16. **Approval of Alternative Principal Investigator.**
17. **List Specialists in the Field of Research.** Research team should suggest and append a list of names and addresses of ten specialists in the area of the research proposal capable of evaluating the proposal.
18. **Key Words for the team's research specialties.** Intended to convey the scientific disciplines of the researchers and current research interests.
19. **Curriculum Vitae for the Principal Investigator, Co-Investigators, and Consultants.**

General requirements for the preparation of research proposal.

Researchers wishing to apply for these research grants programs must adhere to the general suggested format and should take into account the following:

Research proposals should be printed on white paper size (A4) on one side of the paper, using the specified forms, and can be submitted in either Arabic or English. Set margins at (2 cm), for Arabic use Arabic Traditional, size 14, for English use Times New Roman, size 12. It is essential to use the specified prepared forms and to review the proposal text linguistically before sending it to the Center.

Terms of submission:

1. The use of approved of forms available on the Center's website.
2. Submit proposal as original (unbound) plus 4 copies, and an electronic version.
3. Submit proposals conforming to the requirements mentioned must be received by the Center in a timely fashion.

Applicants are kindly informed that the Center holds the rights to reject any proposal non compliant with stated requirements or received behind schedule.