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HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI 2005–2010

RC-Specific Evaluation of VMPS – Viikki Molecular Plant Sciences

Seppo Saari & Antti Moilanen (Eds.)

Evaluation Panel: Biological, Agricultural and Veterinary Sciences

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University of Helsinki
Administrative Publications 80/15
Evaluations

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Title:
International Evaluation of Research and Doctoral Training at the University of Helsinki 2005–2010 : RC-Specific Evaluation of VMPS – Viikki Molecular Plant Sciences

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Summary:
Researcher Community (RC) was a new concept of the participating unit in the evaluation. Participation in the evaluation was voluntary and the RCs had to choose one of the five characteristic categories to participate.
Evaluation of the Researcher Community was based on the answers to the evaluation questions. In addition a list of publications and other activities were provided by the TUHAT system. The CWTS/Leiden University conducted analyses for 80 RCs and the Helsinki University Library for 66 RCs.
Panellists, 49 and two special experts in five panels evaluated all the evaluation material as a whole and discussed the feedback for RC-specific reports in the panel meetings in Helsinki. The main part of this report is consisted of the feedback which is published as such in the report.
Chapters in the report:
1. Background for the evaluation
2. Evaluation feedback for the Researcher Community
3. List of publications
4. List of activities
5. Bibliometric analyses
The level of the RCs' success can be concluded from the written feedback together with the numeric evaluation of four evaluation questions and the category fitness. More conclusions of the success can be drawn based on the University-level report.

RC-specific information:

Main scientific field of research:
Biological, Agricultural and Veterinary Sciences

Participation category:
1. Research of the participating community represents the international cutting edge in its field

RC's responsible person:
Palva, Tapio

RC-specific keywords:
molecular plant biology genomics systems biology biochemistry developmental biology plant pathology biotechnology forest sciences agriculture

Keywords:
Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community

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Contents

Foreword

The evaluation of research and doctoral training is being carried out in the years 2010–2012 and will end in 2012. The steering group appointed by the Rector in January 2010 set the conditions for participating in the evaluation and prepared the Terms of Reference to present the evaluation procedure and criteria. The publications and other scientific activities included in the evaluation covered the years 2005–2010.

The participating unit in the evaluation was defined as a Researcher Community (RC). To obtain a critical mass with university-level impact, the number of members was set to range from 20 to 120. The RCs were required to contain researchers in all stages of their research career, from doctoral students to principal investigators (PIs). All in all, 136 Researcher Communities participated in this voluntary evaluation, 5857 persons in total, of whom 1131 were principal investigators. PIs were allowed to participate in two communities in certain cases, and 72 of them used this opportunity and participated in two RCs.

This evaluation enabled researchers to define RCs from the "bottom up" and across disciplines. The aim of the evaluation was not to assess individual performance but a community with shared aims and researcher-training activities. The RCs were able to choose among five different categories that characterised the status and main aims of their research. The steering group considered the process of applying to participate in the evaluation to be important, which lead to the establishment of these categories. In addition, providing a service for the RCs to enable them to benchmark their research at the global level was a main goal of the evaluation.

The data for the evaluation consisted of the RCs' answers to evaluation questions on supplied e-forms and a compilation extracted from the TUHAT – Research Information System (RIS) on 12 April 2011. The compilation covered scientific and other publications as well as certain areas of scientific activities. During the process, the RCs were asked to check the list of publications and other scientific activities and make corrections if needed. These TUHAT compilations are public and available on the evaluation project sites of each RC in the TUHAT-RIS.

In addition to the e-form and TUHAT compilation, University of Leiden (CWTS) carried out bibliometric analyses from the articles included in the Web of Science (WoS). This was done on University and RC levels. In cases where the publication forums of the RC were clearly not represented by the WoS data, the Library of the University of Helsinki conducted a separate analysis of the publications. This was done for 66 RCs representing the humanities and social sciences.

The evaluation office also carried out an enquiry targeted to the supervisors and PhD candidates about the organisation of doctoral studies at the University of Helsinki. This and other documents describing the University and the Finnish higher education system were provided to the panellists.

The panel feedback for each RC is unique and presented as an entity. The first collective evaluation reports available for the whole panel were prepared in July–August 2011. The reports were accessible to all panel members via the electronic evaluation platform in August. Scoring from 1 to 5 was used to complement written feedback in association with evaluation questions 1–4 (scientific focus and quality, doctoral training, societal impact, cooperation) and in addition to the category evaluating the fitness for participation in the evaluation. Panellists used the international level as a point of comparison in the evaluation. Scoring was not expected to go along with a preset deviation.

Each of the draft reports were discussed and dealt with by the panel in meetings in Helsinki (from 11 September to 13 September or from 18 September to 20 September 2011). In these meetings the panels also examined the deviations among the scores and finalised the draft reports together.

The current RC-specific report deals shortly with the background of the evaluation and the terms of participation. The main evaluation feedback is provided in the evaluation report, organised according to the evaluation questions. The original material provided by the RCs for the panellists has been attached to these documents.

On behalf of the evaluation steering group and office, I sincerely wish to thank you warmly for your participation in this evaluation. The effort you made in submitting the data to TUHAT-RIS is gratefully acknowledged by the University. We wish that you find this panel feedback useful in many ways. The bibliometric profiles may open a new view on your publication forums and provide a perspective for discussion on your choice of forums. We especially hope that this evaluation report will help you in setting the future goals of your research.

Johanna Björkroth
Vice-Rector
Chair of the Steering Group of the Evaluation

Steering Group of the evaluation

Steering group, nominated by the Rector of the University, was responsible for the planning of the evaluation and its implementation having altogether 22 meetings between February 2010 and March 2012.

Chair

Vice-Rector, professor **Johanna Björkroth**

Vice-Chair

Professor **Marja Airaksinen**

Chief Information Specialist, Dr **Maria Forsman**
Professor **Arto Mustajoki**
University Lecturer, Dr **Kirsi Pyhältö**
Director of Strategic Planning and Development, Dr **Ossi Tuomi**
Doctoral candidate, MSocSc **Jussi Vauhkonen**

Panel members

CHAIR
Professor Ary A. Hoffman
Ecological genetics, evolutionary biology, biodiversity conservation, zoology
University of Melbourne, Australia

VICE-CHAIR
Professor Barbara Koch
Forest Sciences, remote sensing
University of Freiburg, Germany

Professor Per-Anders Hansson
Agricultural engineering, modeling, life cycle analysis, bioenergy
Swedish University of Agricultural Sciences

Professor Danny Huylebroeck
Developmental biology
Katholieke Universiteit Leuven, Belgium

Professor Jonathan King
Virus assembly, protein folding
Massachusetts Institute of Technology MIT, USA

Professor Hannu J.T. Korhonen
Functional foods, dairy technology, milk hygiene
MTT Agrifood Research Finland

Professor Kristiina Kruus
Microbiological biotechnology, microbiological enzymes, applied microbiology
VTT Technical Research Centre of Finland

Professor Joakim Lundeberg
Biochemistry, biotechnology, sequencing, genomics
KTH Royal Institute of Technology, Sweden

Professor Dominiek Maes
Veterinary medicine
Ghent University, Belgium

Professor Olli Saastamoinen
Forest economics and policy
University of Eastern Finland

Professor Kai Simons
Biochemistry, molecular biology, cell biology
Max-Planck-Institute of Molecular Cell Biology and Genetics, Germany

The panel, independently, evaluated all the submitted material and was responsible for the feedback of the RC-specific reports. The panel members were asked to confirm whether they had any conflict of interests with the RCs. If this was the case, the panel members disqualified themselves in discussion and report writing.

Added expertise to the evaluation was contributed by the members from the other panels and by one evaluator outside the panels.

External Expert

Professor Anders Linde
Oral biochemi
Faculty of Odontology
Göteborg University
Sweden

Experts from the Other Panels

Professor Caitlin Buck, from the Panel of Natural Sciences
Professor Ritske Huismans, from the Panel of Natural Sciences
Professor Johanna Ivaska, from the Panel of Medicine, biomedicine and health sciences
Professor Lea Kauppi, from the Panel of Natural Sciences
Professor Holger Stark, from the Panel of Natural Sciences
Professor Peter York, from the Panel of Medicine, biomedicine and health sciences

EVALUATION OFFICE

Dr Seppo Saari, **Doc.**, Senior Adviser in Evaluation, was responsible for the entire evaluation, its planning and implementation and acted as an Editor-in-chief of the reports.

Dr Eeva Sievi, **Doc.,** Adviser, was responsible for the registration and evaluation material compilations for the panellists. She worked in the evaluation office from August 2010 to July 2011.

MSocSc Paula Ranne, Planning Officer, was responsible for organising the panel meetings and all the other practical issues like agreements and fees and editing a part the RC-specific reports. She worked in the evaluation office from March 2011 to January 2012.

Mr Antti Moilanen, Project Secretary, was responsible for editing the reports. He worked in the evaluation office from January 2012 to April 2012.

TUHAT OFFICE

Provision of the publication and other scientific activity data

Mrs Aija Kaitera, Project Manager of TUHAT-RIS served the project ex officio providing the evaluation project with the updated information from TUHAT-RIS. The TUHAT office assisted in mapping the publications with CWTS/University of Leiden.

MA Liisa Ekebom, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation. She also assisted the UH/Library analyses.

BA Liisa Jäppinen, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation.

HELSINKI UNIVERSITY LIBRARY

Provision of the publication analyses

Dr Maria Forsman, Chief Information Specialist in the Helsinki University Library, managed with her 10 colleagues the bibliometric analyses in humanities, social sciences and in other fields of sciences where CWTS analyses were not applicable.

Acronyms and abbreviations applied in the report

External competitive funding

AF – Academy of Finland
TEKES - Finnish Funding Agency for Technology and Innovation
EU - European Union
ERC - European Research Council
International and national foundations
FP7/6 etc. /Framework Programmes/Funding of European Commission

Evaluation marks

Outstanding (5)
Excellent (4)
Very Good (3)
Good (2)
Sufficient (1)

Abbreviations of Bibliometric Indicators

P - Number of publications
TCS – Total number of citations
MCS - Number of citations per publication, excluding self-citations
PNC - Percentage of uncited publications
MNCS - Field-normalized number of citations per publication
MNJS - Field-normalized average journal impact
THCP10 - Field-normalized proportion highly cited publications (top 10%)
INT_COV - Internal coverage, the average amount of references covered by the WoS
WoS – Thomson Reuters Web of Science Databases

Participation category

Category 1. The research of the participating community represents the international cutting edge in its field.
Category 2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.
Category 3. The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.
Category 4. The research of the participating community represents an innovative opening.
Category 5. The research of the participating community has a highly significant societal impact.

Research focus areas of the University of Helsinki

Focus area 1: The basic structure, materials and natural resources of the physical world
Focus area 2: The basic structure of life
Focus area 3: The changing environment – clean water
Focus area 4: The thinking and learning human being
Focus area 5: Welfare and safety
Focus area 6: Clinical research
Focus area 7: Precise reasoning
Focus area 8: Language and culture
Focus area 9: Social justice
Focus area 10: Globalisation and social change

1 Introduction to the Evaluation

1.1 RC-specific evaluation reports

The participants in the evaluation of research and doctoral training were Researcher Communities (hereafter referred to as the RC). The RC refers to the group of researchers who registered together in the evaluation of their research and doctoral training. Preconditions in forming RCs were stated in the Guidelines for the Participating Researcher Communities. The RCs defined themselves whether their compositions should be considered well-established or new.

It is essential to emphasise that the evaluation combines both meta-evaluation[1] and traditional research assessment exercise and its focus is both on the research outcomes and procedures associated with research and doctoral training. The approach to the evaluation is enhancement-led where self-evaluation constituted the main information. The answers to the evaluation questions formed together with the information of publications and other scientific activities an entity that was to be reviewed as a whole.

The present evaluation recognizes and justifies the diversity of research practices and publication traditions. Traditional Research Assessment Exercises do not necessarily value high quality research with low volumes or research distinct from mainstream research. It is challenging to expose the diversity of research to fair comparison. To understand the essence of different research practices and to do justice to their diversity was one of the main challenges of the present evaluation method. Understanding the divergent starting points of the RCs demanded sensitivity from the evaluators.

1.2 Aims and objectives in the evaluation

The aims of the evaluation are as follows:

- to improve the level of research and doctoral training at the University of Helsinki and to raise their international profile in accordance with the University's strategic policies. The improvement of doctoral training should be compared to the University's policy.[2]
- to enhance the research conducted at the University by taking into account the diversity, originality, multidisciplinary nature, success and field-specificity,
- to recognize the conditions and prerequisites under which excellent, original and high-impact research is carried out,
- to offer the academic community the opportunity to receive topical and versatile international peer feedback,
- to better recognize the University's research potential.
- to exploit the University's TUHAT research information system to enable transparency of publishing activities and in the production of reliable, comparable data.

1.3 Evaluation method

The evaluation can be considered as an enhancement-led evaluation. Instead of ranking, the main aim is to provide useful information for the enhancement of research and doctoral training of the participating RCs. The comparison should take into account each field of science and acknowledge their special character.

[1] The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics or comparable analyses.

[2] Policies on doctoral degrees and other postgraduate degrees at the University of Helsinki.

The comparison produced information about the present status and factors that have lead to success. Also challenges in the operations and outcomes were recognized.

The evaluation approach has been designed to recognize better the significance and specific nature of researcher communities and research areas in the multidisciplinary top-level university. Furthermore, one of the aims of the evaluation is to bring to light those evaluation aspects that differ from the prevalent ones. Thus the views of various fields of research can be described and research arising from various starting points understood better. The doctoral training is integrated into the evaluation as a natural component related to research. Operational processes of doctoral training are being examined in the evaluation.

Five stages of the evaluation method were:

1. Registration – Stage 1
2. Self-evaluation – Stage 2
3. TUHAT[3] compilations on publications and other scientific activities[4]
4. External evaluation
5. Public reporting

1.4 Implementation of the external evaluation

Five Evaluation Panels

Five evaluation panels consisted of independent, renowned and highly respected experts. The main domains of the panels are:

1. biological, agricultural and veterinary sciences
2. medicine, biomedicine and health sciences
3. natural sciences
4. humanities
5. social sciences

The University invited 10 renowned scientists to act as chairs or vice-chairs of the five panels based on the suggestions of faculties and independent institutes. Besides leading the work of the panel, an additional role of the chairs was to discuss with other panel chairs in order to adopt a broadly similar approach. The panel chairs and vice-chairs had a pre-meeting on 27 May 2011 in Amsterdam.

The panel compositions were nominated by the Rector of the University 27 April 2011. The participating RCs suggested the panel members. The total number of panel members was 50. The reason for a smaller number of panellists as compared to the previous evaluations was the character of the evaluation as a meta-evaluation. The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics and comparable analyses.

The panel meetings were held in Helsinki:

- On 11–13 September 2011: (1) biological, agricultural and veterinary sciences, (2) medicine, biomedicine and health sciences and (3) natural sciences.
- On 18–20 September 2011: (4) humanities and (5) social sciences.

[3] TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

[4] Supervision of thesis, prizes and awards, editorial work and peer reviews, participation in committees, boards and networks and public appearances.

1.5 Evaluation material

The main material in the evaluation was the RCs' self-evaluations that were qualitative in character and allowed the RCs to choose what was important to mention or emphasise and what was left unmentioned.

The present evaluation is exceptional at least in the Finnish context because it is based on both the evaluation documentation (self-evaluation questions, publications and other scientific activities) and the bibliometric reports. All documents were delivered to the panellists for examination.

Traditional bibliometrics can be reasonably done mainly in medicine, biosciences and natural sciences when using the Web of Science database, for example. Bibliometrics, provided by CWTS/The Centre for Science and Technology Studies, University of Leiden, cover only the publications that include WoS identification in the TUHAT-RIS.

Traditional bibliometrics are seldom relevant in humanities and social sciences because the international comparable databases do not store every type of high quality research publications, such as books and monographs and scientific journals in other languages than English. The Helsinki University Library has done analysis to the RCs, if their publications were not well represented in the Web of Science databases (RCs should have at least 50 publications and internal coverage of publications more than 40%) – it meant 58 RCs. The bibliometric material for the evaluation panels was available in June 2011. The RC-specific bibliometric reports are attached at the end of each report.

The panels were provided with the evaluation material and all other necessary background information, such as the basic information about the University of Helsinki and the Finnish higher education system.

Evaluation material

1. Registration documents of the RCs for the background information
2. Self evaluation material – answers to the evaluation questions
3. Publications and other scientific activities based on the TUHAT RIS:
   - 3.1. statistics of publications
   - 3.2. list of publications
   - 3.3. statistics of other scientific activities
   - 3.4. list of other scientific activities
4. Bibliometrics and comparable analyses:
   - 4.1. Analyses of publications based on the verification of TUHAT-RIS publications with the Web of Science publications (CWTS/University of Leiden)
   - 4.2. Publication statistics analysed by the Helsinki University Library - mainly for humanities and social sciences
5. University level survey on doctoral training (August 2011)
6. University level analysis on publications 2005–2010 (August 2011) provided by CWTS/University of Leiden

Background material

University of Helsinki
- Basic information about the University of the Helsinki
- The structure of doctoral training at the University of Helsinki
- Previous evaluations of research at the University of Helsinki – links to the reports: 1998 and 2005

The Finnish Universities/Research Institutes
- Finnish University system
- Evaluation of the Finnish National Innovation System
- The State and Quality of Scientific Research in Finland. Publication of the Academy of Finland 9/09.

The evaluation panels were provided also with other relevant material on request before the meetings in Helsinki.

1.6 Evaluation questions and material

The participating RCs answered the following evaluation questions which are presented according to the evaluation form. In addition, TUHAT RIS was used to provide the **additional material** as explained. For giving the feedback to the RCs, the panellists received the evaluation feedback form constructed in line with the evaluation questions:

1. Focus and quality of the RC's research

- Description of
  - the RC's research focus.
  - the quality of the RC's research (incl. key research questions and results)
  - the scientific significance of the RC's research in the research field(s)
- Identification of the ways to strengthen the focus and improve the quality of the RC's research

The additional material: TUHAT compilation of the RC's publications, analysis of the RC's publications data (provided by University of Leiden and the Helsinki University Library)
A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

2. Practises and quality of doctoral training

- Organising of the doctoral training in the RC. Description of the RC's principles for:
  - recruitment and selection of doctoral candidates
  - supervision of doctoral candidates
  - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
  - good practises and quality assurance in doctoral training
  - assuring of good career perspectives for the doctoral candidates/fresh doctorates
- Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations
A written feedback from the aspects of: processes and good practices related to leadership and management

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

3. The societal impact of research and doctoral training

- Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
- Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.

The additional material: TUHAT compilation of the RC's other scientific activities.
A written feedback from the aspects of: societal impact, national and international collaboration, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

4. International and national (incl. intersectoral) research collaboration and researcher mobility

- Description of
  - the RC's research collaborations and joint doctoral training activities
  - how the RC has promoted researcher mobility
- Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

A written feedback from the aspects of: scientific quality, national and international collaboration

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

5. Operational conditions

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).
- Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.

A written feedback from the aspects of: processes and good practices related to leadership and management

- Strengths
- Areas of development
- Other remarks
- Recommendations

6. Leadership and management in the researcher community

- Description of
  - the execution and processes of leadership in the RC
  - how the management-related responsibilities and roles are distributed in the RC
  - how the leadership- and management-related processes support
    - high quality research
    - collaboration between principal investigators and other researchers in the RC
    the RC's research focus
    - strengthening of the RC's know-how
- Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes

7. External competitive funding of the RC

- The RCs were asked to provide information of such external competitive funding, where:
  - the funding decisions have been made during 1.1.2005-31.12.2010, and
  - the administrator of the funding is/has been the University of Helsinki
- On the e-form the RCs were asked to provide:

1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation , EU, ERC, foundations, other national funding organisations, other international funding organisations), and
2)The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.
A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness, future significance

- Strengths
- Areas of development
- Other remarks
- Recommendations

8. The RC's strategic action plan for 2011–2013

- RC's description of their future perspectives in relation to research and doctoral training.

A written feedback from the aspects of: scientific quality, scientific significance, societal Impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

- Strengths
- Areas of development

- Other remarks
- Recommendations

9. Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category
A written feedback evaluating the RC's fitness to the chosen participation category
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

10. Short description of how the RC members contributed the compilation of the stage 2 material
Comments on the compilation of evaluation material

11. How the UH's focus areas are presented in the RC's research?
Comments if applicable

12. RC-specific main recommendations based on the previous questions 1–11

13. RC-specific conclusions

1.7 Evaluation criteria

The panellists were expected to give evaluative and analytical feedback to each evaluation question according to their aspects in order to describe and justify the quality of the submitted material. In addition, the evaluation feedback was asked to be pointed out the level of the performance according to the following classifications:

- outstanding (5)
- excellent (4)
- very good (3)
- good (2)
- sufficient (1)

Evaluation according to the criteria was to be made with thorough consideration of the entire evaluation material of the RC in question. Finally, in questions 1-4 and 9, the panellists were expected to classify their written feedback into one of the provided levels (the levels included respective descriptions, 'criteria'). Some panels used decimals in marks. The descriptive level was interpreted according to the integers and not rounding up the decimals by the editors.

Description of criteria levels

Question 1 – FOCUS AND QUALITY OF THE RC'S RESEARCH

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Outstandingly strong research, also from international perspective. Attracts great international interest with a wide impact, including publications in leading journals and/or monographs published by leading international publishing houses. The research has world leading qualities. The research focus, key research questions scientific significance, societal impact and innovativeness are of outstanding quality.

In cases where the research is of a national character and, in the judgement of the evaluators, should remain so, the concepts of "international attention" or "international impact" etc. in the grading criteria above may be replaced by "international comparability".

Operations and procedures are of outstanding quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality.

Excellent quality of procedures and results (4)

Research of excellent quality. Typically published with great impact, also internationally. Without doubt, the research has a leading position in its field in Finland.

Operations and procedures are of excellent quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality.

Very good quality of procedures and results (3)

The research is of such very good quality that it attracts wide national and international attention.

Operations and procedures are of very good quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Good research attracting mainly national attention but possessing international potential, extraordinarily high relevance may motivate good research.

Operations and procedures are of good quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

In some cases the research is insufficient and reports do not gain wide circulation or do not have national or international attention. Research activities should be revised.

Operations and procedures are of sufficient quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 2 – DOCTORAL TRAINING
Question 3 – SOCIETAL IMPACT
Question 4 – COLLABORATION

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Procedures are of outstanding quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality. The procedures and results are regularly evaluated and the feedback has an effect on the planning.

Excellent quality of procedures and results (4)

Procedures are of excellent quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality. The procedures and outcomes are evaluated and the feedback has an effect on the planning.

Very good quality of procedures and results (3)

Procedures are of very good quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and

management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Procedures are of good quality, shared occasionally in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

Procedures are of sufficient quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 9 – CATEGORY

Participation category – fitness for the category chosen

The choice and justification for the chosen category below should be reflected in the RC's responses to the evaluation questions 1–8.

1. *The research of the participating community represents the international cutting edge in its field.*
2. *The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.*
3. *The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.* The research is of high quality and has great significance and impact in its field. However, the generally used research evaluation methods do not necessarily shed sufficient light on the merits of the research.
4. *The research of the participating community represents an innovative opening*. A new opening can be an innovative combination of research fields, or it can be proven to have a special social, national or international demand or other significance. Even if the researcher community in its present composition has yet to obtain proof of international success, its members can produce convincing evidence of the high level of their previous research.
5. *The research of the participating community has a highly significant societal impact.* The participating researcher community is able to justify the high social significance of its research. The research may relate to national legislation, media visibility or participation in social debate, or other activities promoting social development and human welfare. In addition to having societal impact, the research must be of a high standard.

An example of outstanding fitness for category choice (5) [5]

The RC's representation and argumentation for the chosen category were convincing. The RC recognized its real capacity and apparent outcomes in a wider context to the research communities. The specific character of the RC was well-recognized and well stated in the responses. The RC fitted optimally for the category.

- Outstanding (5)
- Excellent (4)
- Very good (3)
- Good (2)
- Sufficient (1)

The above-mentioned definition of outstanding was only an example in order to assist the panellists in the positioning of the classification. There was no exact definition for the category fitness.

[5] The panels discussed the category fitness and made the final conclusions of the interpretation of it.

1.8 Timetable of the evaluation

The main timetable of the evaluation:

1.	Registration	November 2010
2.	Submission of self-evaluation materials	January–February 2011
3.	External peer review	May–September 2011
4.	Published reports	March–April 2012
	- University level public report	
	- RC specific reports	

The entire evaluation was implemented during the university's strategy period 2010–2012. The preliminary results were available for the planning of the following strategy period in late autumn 2011. The evaluation reports will be published in March/April 2012. More detailed time schedule is published in the University report.

1.9 Evaluation feedback – consensus of the entire panel

The panellists evaluated all the RC-specific material before the meetings in Helsinki and mailed the draft reports to the evaluation office. The latest interim versions were on-line available to all the panellists on the Wiki-sites. In September 2011, in Helsinki the panels discussed the material, revised the first draft reports and decided the final numeric evaluation. After the meetings in Helsinki, the panels continued working and finalised the reports before the end of November 2011. The final RC-specific reports are the consensus of the entire panel.

The evaluation reports were written by the panels independently. During the editing process, the evaluation office requested some clarifications from the panels when necessary. The tone and style in the reports were not harmonized in the editing process. All the reports follow the original texts written by the panels as far as it was possible.

The original evaluation material of the RCs, provided for the panellists is attached at the end of the report. It is essential to notice that the exported lists of publications and other scientific activities depend how the data was stored in the TUHAT-RIS by the RCs.

2 Evaluation feedback

2.1 Focus and quality of the RC's research

- *Description of*
  - *the RC's research focus*
  - *the quality of the RC's research (incl. key research questions and results)*
  - *the scientific significance of the RC's research in the research field(s)*
- *Identification of the ways to strengthen the focus and improve the quality of the RC's research*

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness

This RC comprises of 12 PIs and is focused on growth control in plants from the perspective of environment as well as plant development. This group of PIs has been funded from the Academy of Finland as a Centre of Excellence (CoE) for 12 years and is well established at the Viikki Campus. The topics within the CoE cover both basic science and applied plant research. Arabidopsis is among the established model organisms but the RC also covers more novel model organisms such as forest tree, gerbera and strawberry.

In particular, the research focus on wood development, ROS stress, stress signaling and flower development are research highlights and have been published in top journals such as Science, PNAS and Nature. Approximately 110 articles have been published by the PIs during 2005-2010 and importantly the number of citations per publication is high (15.76) and this demonstrates that the research has high impact. The research focus of the group will continue to be interesting for many years ahead given the global issues such as CO2 emission and the need for more efficient use of the biological resources resulting from the increased population. The work on forest trees has additional implications for the Finnish paper and pulp industry.

This RC represents a strong scientific research unit on a significant topic with relevance both nationally and internationally. An upcoming concern is that the funding as CoE ends this year. Furthermore, it could be an important step forward to further integrate Plant Science on the Viikki Campus and to establish the proposed Viikki Plant Science Centre (ViPSC) initiative.

The panel would like to add a note of support for the forest tree investigations, which are underdeveloped in many other national plant biology programs.

Numeric evaluation: 5 (Outstanding)

2.2 Practises and quality of doctoral training

- *Organising of the doctoral training in the RC. Description of the RC's principles for:*
  - *recruitment and selection of doctoral candidates*
  - *supervision of doctoral candidates*
  - *collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes*
  - *good practises and quality assurance in doctoral training*
  - *assuring of good career perspectives for the doctoral candidates/fresh doctorates*
- *Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.*
- *Additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations*

ASPECTS: Processes and good practices related to leadership and management

Doctoral training within the RC appears to be excellent, although some differences exist between the three different graduate schools active within the RC. The Finnish Graduate School in Plant Biology has been a key resource in terms of funding PhD students. Recruitment strategies have generally been broad including advertisement in international press. The selection criteria are based on study merit, motivation and study plan to employ the best students for the next four years. The ambition is to have an international environment already at the PhD student level. Why is this? Indeed, one could as well prefer having national students as a base foundation or at least a healthy balance between national and international students because the national students have an important role to leverage the large amount of foreign postdocs, and teaching and education efforts by the local senior top scientists should also be dedicated to national students in order to motivate them to go into research, perhaps locally, as well. In general, the panel fully understands the ambition to have a more international touch regarding postdocs as these will contribute with their own expertise to the research projects as well.

Once enrolled, the doctoral students have a multitude of possibilities for career development through (mainly short, as it was mentioned) study visits to collaborators (in many different countries), interaction with industry etc. The progress of students is continuously monitored by appropriately selected internal but also external supervisors and at yearly basis a report is submitted covering courses, conferences, manuscripts and research plan, which is followed by face-to-face meeting with PIs/mentors and co-PIs for guidance.

In conclusion, the doctoral training is excellent and includes the necessary sanity checks along the training period. There exist plentiful of chances to interact with other groups both nationally and internationally.

Doctoral training appears vigorous and lively.

Numeric evaluation: 5 (Outstanding)

2.3 The societal impact of research and doctoral training

- *Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).*
- *Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.*
- *Additional material: TUHAT compilation of the RC's other scientific activities.*

ASPECTS: Societal impact, national and international collaboration, innovativeness

The RC is active in plant science, which is a field that has direct connections to society at several levels. The applied side of the research has direct connections to industry and findings could have direct utility. This also links doctoral training to business possibilities in plant science, including giving insight into IP activities and strategies etc. Another side addressing society is the use of GMOs and the RC has an important educational role to explaining risk and possibilities with GMOs and contrasting this with traditional breeding technology. GMOs remain controversial in the common community and this cannot be neglected, and hence the partners within the RC have an important role to play also in this matter. Overall the RC has been active in this area with articles and interviews in public media. One could take use of the University of Helsinki's (UH) PR office in a more extensive manner, benefiting from their experience with outreaching activities but also from media training in important subjects such as GMO.

Several PIs at the RC have also been involved in European efforts (e.g. ESPO) to improve the impact and the visibility of plant science, which includes several hot topics in society such as carbon footprint, deforestration and biofuels.

In summary the RC appears to be excellent in contributing science to the public and private sector. Media training within the doctoral training could also be considered (in particular on the GMO topic) as these people will be ambassadors in society for many years.

Numeric evaluation: 4 (Excellent)

2.4 International and national (incl. intersectoral) research collaboration and researcher mobility

- *Description of*
  - *the RC's research collaborations and joint doctoral training activities*
  - *how the RC has promoted researcher mobility*
- *Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.*

ASPECTS: Scientific quality, national and international collaboration

The RC has had a broad and strong focus on international interactions leading to improved organization of the field especially in Europe, which appears more common in the plant field than for example in the biomedical field. The group has extensively promoted research mobility and training both nationally and internationally. At the national level this has been achieved primarily through the graduate doctoral programs and the CoE. Internationally the collaborations have been established through several different EC grants (although the total reported sum of 1.11 MEUR is rather modest seen the number of integrated projects that have been awarded in the plant field by the EC in the Sixth Framework Programme (FP6), visiting professors and research collaborations worldwide.

A particular interesting concept has been the international joint doctoral program with the German Training Group (University of Freiburg) encompassing short research visits, meetings, symposia and workshops. The outcome of that program appears to be positive as new efforts are planned along the same lines with Sweden and Germany.

In conclusion, the group has an unusual broad international outreach and importantly the RC appears to be involved in further developing these important efforts in order to ensure top-level research. The challenge can be to find funding as many of these initiatives may thus far have been facilitated mainly through soft money in the CoE.

Numeric evaluation: 5 (Outstanding)

2.5 Operational conditions

- *Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).*
- *Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.*

ASPECTS: Processes and good practices related to leadership and management

The pioneering work of the RC in this field has facilitated the establishment, over several years, of an adequate infrastructure for the plant work itself such as green house, growth chambers and field sites. This plant community has also contributed/supported the work to establish more centralized core units in DNA sequencing and microarrays, and more recently metabolomics and imaging, and employed these in their own plant research. Thus the operational infrastructure for the RC appears to be excellent.

The critical mass in plant biology at the Viikki Campus is definitely sufficient (150 researchers and staff, in the excel list there are 86 persons listed – it is not clear how these differences occur). This creates a prosperous environment of sufficient critical mass from undergraduate to graduate training and from junior PhD and more experienced PIs.

The operational challenges are how to use the new technological breakthroughs that will appear. The genomics field is an example of how fast the multiple parallel genomic and transcriptomic sequencing instruments in particular have contributed to new findings, and this RC has nicely demonstrated the use of these technologies. One of the current challenges in life sciences is bioinformatics and the handling of massive parallel data. Recruitment of young PIs in this field should be considered as a top priority. This plant community should also consider a campus strategy (if that does not already exist) for an overarching

bioinformatics core (perhaps with other departments, including the Institute of Biotechnology etc) that includes more advanced analysis and storage/compute power but also a healthy mix between daily routine type of assistance to the individual scientist with more advanced research in bio-informatics itself. In this context it would be useful to know more and understand if Biocentrum Helsinki and Biocenter Finland are providing infrastructure or if this is just a network of competences and/or courses or whether they are just responsible for funding.

It will be important in the future to add to the genomics, physiology and signalling studies a plant structural biology component that can address cellulose, lignin, and other unique plant structural features. Maintaining the coherence developed under the 12 years of CoE support will be very important even if this CoE support is discontinued for some or all teams, and the formation of a Plant Science Center is a sound plan.

2.6 Leadership and management in the researcher community

- *Description of*
  - *the execution and processes of leadership in the RC*
  - *how the management-related responsibilities and roles are distributed in the RC*
  - *how the leadership- and management-related processes support*
    - *high quality research*
    - *collaboration between principal investigators and other researchers in the RC*
    - *the RC's research focus*
    - *strengthening of the RC's know-how*
- *Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes*

ASPECTS: Processes and good practices related to leadership and management

There are several opportunities for scientific interactions via a true forum, including both bottom-up and top-down approaches. Both are necessary for efficient knowledge transfer and to establish new collaborations.

Of particular interest is the bottom-up, for the Viikki Research Groups in Biosciences appears to be a scientific matchmaking of competences for specific research aims. For the senior PIs most of the networks are already existing or at least the PIs knows where to seek the knowledge. For the junior PIs this can be a very useful forum.

The members of the RC are well structured and have several meeting points. The research program in Plant Biology (headed by Professor Palva) offers the forum for interaction between PIs, while the activities of the CoE are monitored by an external scientific advisory board (SAB) with regular assessment exercises. A continuous interaction with the SAB is very positive and can offer also this RC useful input into its research portfolio. In addition, postdocs have their own meetings, and the RC has monthly seminars for their PhD students and a retreat for all researchers every 18 months.

The next level of management and leadership would be to physically locate all plant research at the campus into one facility. Bringing together the committed members of several faculties into one common scientific facility could take UH's plant research into a next phase with even better opportunities to collaborate and make scientific breakthroughs. A similar coordination of research activities was successfully done in Umeå, Sweden (Umeå Plant Science Center) some years ago.

2.7 External competitive funding of the RC

• The RCs were asked to provide information of such external competitive funding, where:
  • the funding decisions have been made during 1.1.2005–31.12.2010, and
  • the administrator of the funding is/has been the University of Helsinki
• On the e-form the RCs were asked to provide:

1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation, EU, ERC, foundations, other national funding organisations, other international funding organizations), and
2) The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.
ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness and future significance

This RC is well funded from a multitude of sources. The 12 PIs have funding from mainly Finnish sources of almost 10 MEUR during 2005-2010 and 1 MEUR from EC, and 2.5 MEUR from other sources such as Biocenter Finland. This is altogether approximately 2.2 MEUR per year but can be judged to be of the low side given the size of this RC/CoE. Over 85 persons are listed in the submitted material (a rough estimation is then that the funding is about 25,000 €/person-year). Staff is however stated in the text to be approx. 150 - clarification would be appreciated on how many of them are funded through external grants, university grants or perhaps not funded (i.e. master thesis students).

The Finnish funding comes from the Academy of Finland and the Finnish Funding Agency for Technology and Innovation (Tekes), the latter being another sign of the industrial aspects of this RC. Funding from the EC programs could potentially be further improved and would support the RC's ambition of internationalization. The 'Other funding' from the Ministry, CIMO, Biocenter, KCL is significant – is this for infrastructure or research?

An uncertainty in funding exists and results from the discontinuation of the CoE – how will this affect the RC?

2.8 The RC's strategic action plan for 2011–2013

• RC's description of their future perspectives in relation to research and doctoral training.
ASPECTS: Scientific quality, scientific significance, societal Impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

The action plan mentions briefly the creation of the Viikki Plant Science Center as a continuation of the present CoE and the collection of all plant research into one physical/administrative unit. We fully support such approach; it can represent a natural 'evolution' of the plant science community at HU.

The CoE has been very useful for establishing collaboration and management routines, yet moving all parts into one center would likely propel research into a new era. The physical closeness of PIs, researchers and staff, is an obvious transition of the CoE and will furthermore assist in attracting international researchers to Finland. A larger unit would also be more competitive for attracting more funds from EC and other international resources.

In addition to establishing a Plant Science Center, it is essential to point out that the access to state-of-the-art core infrastructure (or equivalent outsourcing) will be essential to carry out future research.

2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category.
Category 1. The research of the participating community represents the international cutting edge in its field.

This RC is participating under category 1 'The research of the participating community represents the international cutting edge in its field', which is appropriate. The members have demonstrated excellent research merits and combined in this RC they represent different parts of plant biology. The challenge is to keep this position during the next phase given the funding situation with the CoE.

The proposal to establish a new center of all plant biology research at UH 'under one roof' is the step in the right direction. This will keep the collaborative element intact among the CoE researchers and will also keep research at the forefront, including through attracting more international funding.

Numeric evaluation: 5 (Outstanding)

2.10 Short description of how the RC members contributed the compilation of the stage 2 material

All PIs contributed to the assembly of stage 2 material.

2.11 How the UH's focus areas are presented in the RC's research

Focus area 2: The basic structure of life

The RC activities are in line with the outlined focus areas of UH.

2.12 RC-specific main recommendations

Recommendations include:

1. Establish the Viikki Plant Science Center to assemble all plant biologists at the same center (irrespective of faculty of PIs). The advantages to have all different sub-disciplines from basic to applied plant science co-located are numerous and are in line with the international trend. This is particularly important for the UH community as there is a risk of fragmentation of the research after 12 years of CoE.
2. Make a strategy for bioinformatics, perhaps as an overarching initiative involving not only the plant research teams. Plant research (as well as in many other fields) will most likely continue to expand into -omics technologies as well, and in order to prepare equally well for more advanced studies using in-house or public domain data there needs to be a plan from undergraduate to graduate training that will enable this RC to be a main contributor on the international level. There is already bioinformatics expertise within the RC but much more resources will be needed.

2.13 RC-specific conclusions

This RC represents an impressive scientific research unit combining basic and applied research on plant growth with high impact both nationally and internationally. An important future direction is the focus on forest trees – of key interest for Finnish industry. The panel acknowledges that the years as CoE have been very fruitful and productive in establishing the multidisciplinary plant research at Viikki, and an important step going forward would be to be to physically consolidate all plant science on the Viikki Campus into a single milieu in line with the proposed Viikki Plant Science Centre (ViPSC).

3 Appendices

A. Original evaluation material
    a. Registration material – Stage 1
    b. Answers to evaluation questions – Stage 2
    c. List of publications
    d. List of other scientific activities
B. Bibliometric analyses
    a. Analysis provided by CWTS/University of Leiden
    b. Analysis provided by Helsinki University Library (66 RCs)

International evaluation of research and doctoral training
at the University of Helsinki 2005-2010

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW

NAME OF THE RESEARCHER COMMUNITY:
Viikki Molecular Plant Sciences (VMPS)

LEADER OF THE RESEARCHER COMMUNITY:
Professor Tapio Palva, Department of Biosciences, Faculty of Biological and Environmental Sciences

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW:

- Material submitted by the RC at stages 1 and 2 of the evaluation
  - STAGE 1 material: RC's registration form (incl. list of RC participants in an excel table)
  - STAGE 2 material: RC's answers to evaluation questions
- TUHAT compilations of the RC members' publications 1.1.2005-31.12.2010
- TUHAT compilations of the RC members' other scientific activities 1.1.2005-31.12.2010
- Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010 (analysis carried out by CWTS, Leiden University)

  NB! Since Web of Science(WoS)-based bibliometrics does not provide representative results for most RCs representing humanities, social sciences and computer sciences, the publications of these RCs will be analyzed by the UH Library (results available by the end of June, 2011)

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

1 RESPONSIBLE PERSON

Name: Palva, Tapio

E-mail: tapio.palva@helsinki.fi

Phone: (09) 191 59600

Affiliation: Faculty of Biological & Environmental Sciences, Department of Biosciences

Street address: Viikinkaari 5 D

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Viikki Molecular Plant Sciences

Acronym for the participating RC (max. 10 characters): VMPS

Description of the operational basis in 2005-2010 (eg. research collaboration, joint doctoral training activities) on which the RC was formed (MAX. 2200 characters with spaces): The groups participating in the RC have a long common history of research together. Many of them have taken a central role in the successful Finnish Centre of Excellence program, now ongoing for almost 12 years. They have joint research projects and collaboration along with joint doctoral training of students with University of Helsinki funding. Similarly, on a campus level, there are many collaborative research projects between the RC members. The RC takes an active role in Biocentrum Helsinki and in turn Biocenter Finland. The importance of doctoral training of plant scientists both on campus and on a national scale led to the formation of the Finnish Graduate School in Plant Biology (established in 2006). The foundation of this was greatly influenced by the senior PI members of the RC and all PI members of the RC are affiliated to the doctoral training program and take an active role with teaching and supervision.

3 SCIENTIFIC FIELDS OF THE RC

Main scientific field of the RC's research: biological, agricultural and veterinary sciences

RC's scientific subfield 1: Plant Sciences

RC's scientific subfield 2: Biochemistry and Molecular Biology

RC's scientific subfield 3: Cell Biology

RC's scientific subfield 4: Developmental Biology

Other, if not in the list: Genetics and genomics

4 RC'S PARTICIPATION CATEGORY

Participation category: 1. Research of the participating community represents the international cutting edge in its field

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

Justification for the selected participation category (MAX. 2200 characters with spaces): The Finnish Centre of Excellence in Plant Signal Research (now in its second term) has allowed the RC groups to conduct high impact research on an international level. In all, a total of 12 years of funding from the Academy of Finland for the CoE program has led to long term exciting collaborative research (based on international evaluation). Access to the latest cutting edge technology platforms such as genomics and metabolomics has produced high impact publications in such journals as Nature, Science, PNAS and Plant Cell. Further funding to the participating groups from Biocentrum Helsinki has increased the productivity and competitiveness of the RC in the international arena.

5 DESCRIPTION OF THE RC'S RESEARCH AND DOCTORAL TRAINING

Public description of the RC's research and doctoral training (MAX. 2200 characters with spaces): The Viikki Molecular Plant Science Research Community aims to understand how environmental and developmental cues are integrated in plant growth control. The VMPS RC integrates multidisciplinary research in functional genomics, structural biology and bioinformatics with modern plant physiology, genetics and cell biology to fulfil its aims. To provide the best possible training for future experts the VMPS RC incorporates the top groups/PIs in plant sciences from the Viikki campus. The members of the RC have wide ranging international contacts and collaborators with European, US, Japanese, Chinese, Indian and Australian research groups both on a research level and also in the form of doctoral training. The possibility for doctoral candidates to carry out short research visits abroad in foreign labs is highly encouraged. In addition to general skills including leadership and communication doctoral candidates are trained in most modern biological techniques and approaches including the tools of systems biology such as comparative and functional genomics, bioinformatics, proteomics and metabolomics. Strong emphasis is given to training on different approaches that are needed to understand how plants control their growth, development and survival when facing different environmental challenges and how plants can adapt to such environments and yet achieve optimal production for human needs.

Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): Plant research is focused on the Viikki campus of the University of Helsinki, particularly at the Faculties of Biological & Environmental Sciences and Agriculture & Forestry. Molecular plant science has a high profile within the Department of Biosciences (Faculty of Biological & Environmental Sciences). The Department is the largest unit at the university in terms of both its' research budget and the number of plant science PhDs produced (also the highest in Finland). The Faculty of Agriculture & Forestry prioritises applied plant research activity in addition to molecular sciences which complements the basic research profile of the Faculty of Biological & Environmental Sciences on the Viikki campus. The Viikki campus is the pioneer of plant molecular biology and plant genomics research in Finland. The Centres of Excellence in Plant Signal Research (and its predecessor programme "Plant Molecular Biology and Forest Biotechnology") have been running in Helsinki for almost 12 years, promoting high profile international plant research and long-term collaboration. Researchers on campus are involved in several international programmes in plant genomics, in particular tree genomics along with long-running Tekes projects. Plant biology and plant genomics receives a high profile within the university at both faculties and is strongly supported by the priority areas in the profile and strategy of the University of Helsinki. Cooperation within the Nordic Forestry, Veterinary and Agricultural (NOVA) university network provides international PhD

courses and high quality teaching for all doctoral candidates and PIs from the RC are involved in teaching NOVA courses.

Keywords: molecular plant biology

genomics

systems biology

biochemistry

developmental biology

plant pathology

biotechnology

forest sciences

agriculture

6 QUALITY OF RC'S RESEARCH AND DOCTORAL TRAINING

Justified estimate of the quality of the RC's research and doctoral training at national and international level during 2005-2010 (MAX. 2200 characters with spaces): The research within the RC can be regarded as at the leading edge of international research. This includes extensive networking worldwide but also nationally the RC forms a core of the most advanced experts of plant molecular biology and the PIs possess strong responsibility in educating scientists in the field. Collaboration nationally with various businesses from the plant biotechnology industry ensures that the impact on society of molecular plant biology research is also addressed by the RC. The RC is utilising well established model organisms where in addition to extensive and profound biological knowledge also most modern and multidisciplinary methods are routinely applied. In addition to high impact research using Arabidopsis, the RC has been able to establish internationally recognised new plant models for molecular biological work such as various forest tree species (birch, spruce, pine), gerbera and strawberry. External funding has been significant during the evaluation period (Academy of Finland, Biocentrum Helsinki, TEKES, EU). The RC strongly supports international collaboration and multidisciplinary research training of doctoral candidates to promote their future research careers. Doctoral training within the RC has been organised through three graduate schools. Mainly through the national molecular plant graduate school (FGSPB), but also through the local campus based graduate schools VGSB and GPBM. Active participation in EU Marie Curie Initial Training Networks, COST actions and EPSO (European Plant Science Organisation) also ensures an excellent international infrastructure for PhD students.

Comments on how the RC's scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): The scientific quality and productivity of research from the RC can be assessed by bibliometric methods. Publications from the RC have been published in high quality, high impact factor peer- reviewed journals, with a high impact on the international scientific community (Nature, Science PNAS, Plant Cell etc.). Research in the RC has thus kept pace with international cutting edge research and the high visibility of its publications on an international level has ensured not only continued support and funding but also led to new fruitful international collaborations.

LIST OF RC MEMBERS

NAME OF THE RESEARCHER COMMUNITY:			VMPS		
RC-LEADER			T. Palva		
CATEGORY			1		
	Last name	First name	PI-status (TUHAT, 29.11.2010)	Title of research and teaching personnel	Affiliation
1	Aalto	Markku		University Lecturer	Faculty of Biological and Environmental Sciences, Department of Biosciences
2	Ahlfors	Reetta		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
3	Ainasoja os.Rintala	Miia		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
4	Aswathanarayana Reddy	Ramesha		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
5	Balasubramanian	Umamaheswari		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
6	Besseau	Sébastien		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
7	Blokhina	Olga		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
8	Blomster	Tiina		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
9	Brader	Günter	x	Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
10	Broberg	Martin		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
11	Broholm	Suvi		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
12	Brosché	Mikael	x	Senior Researcher/University Lecturer	Faculty of Biological and Environmental Sciences, Department of Biosciences
13	Campilho	Ana		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
14	Carlsbecker	Annelie		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
15	Chenyi	Gwe Gilbert		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultual Sciences
16	Davidsson	Pär		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
17	Decourteix	Mélanie		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
18	Deng	Xianbao		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultual Sciences
19	Duhazé	Claire		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
20	Eensalu	Eve		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
21	Ehonen	Sanna		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
22	Elomaa	Paula	x	Professor	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
23	Fagerstedt	Kurt	x	Professor	Faculty of Biological and Environmental Sciences, Department of Biosciences
24	Gauthier	Adrien		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
25	He	Xinqiang		Professor	Faculty of Biological and Environmental Sciences, Department of Biosciences
26	Helariutta	Yrjö	x	Professor	Faculty of Biological and Environmental Sciences, Department of Biosciences
27	Helenius	Elina		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
28	Hytönen	Timo	x	Postdoctoral Researcher	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
29	Idänheimo	Niina		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
30	Jaspers	Pinja		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
31	Juntheikki-Palovaara	Inka		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
32	Kangasjärvi	Jaakko	x	Professor	Faculty of Biological and Environmental Sciences, Department of Biosciences
33	Kariola	Tarja		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
34	Keceli	Mehmet Ali		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
35	Kollist	Hannes		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
36	Koskela	Elli		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
37	Kujanpää	Anne		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences

38	Kukkola	Eija		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
39	Kulichikhin	Konstantin		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
40	Kurokura	Takeshi		Postdoctoral Researcher	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
41	Kärkönen	Anna	x	Senior Researcher	Faculty of Agriculture and Forestry, Department of Agricultual Sciences
42	Laitinen	Roosa		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
43	Lampio	Anja		Postdoctoral Researcher	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
44	Lehesranta	Satu		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
45	Li	Jing		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
46	Li	Chunyang		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
47	Li	Jing		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
48	Lim	Kean Jin		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultual Sciences
49	Lindgren	Ove		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
50	Malm	Ursula		Postdoctoral Researcher	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
51	Marjamaa	Kaisa		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
52	Minami	Anzu		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
53	Mouhu	Katriina		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
54	Mähönen	Ari Pekka	x	Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
55	Niemi	Outi		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
56	Nieminen	Kaisa		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
57	Ng	Yan Peng		Postdoctoral Researcher	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
58	Overmyer	Kirk	x	Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
59	Paasela	Tanja		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultual Sciences
60	Palva	Tapio	x	Professor	Faculty of Biological and Environmental Sciences, Department of Biosciences
61	Pennanen	Ville		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
62	Piisilä	Maria		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
63	Pöllänen	Eija		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
64	Raiskila	Sanni		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
65	Rinne	Päivi		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
66	Ruokolainen	Satu		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
67	Ruonala	Raili		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
68	Salojärvi	Jarkko		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
69	Sims-Huopaniemi	Karen		Research Coordinator	Faculty of Biological and Environmental Sciences, Department of Biosciences
70	Sjöblom	Solveig		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
71	Takahashi-Schmidt	Junko		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
72	Teeri	Teemu	x	Professor	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
73	Thitamadee	Siripong		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
74	Tähtiharju	Sari		Postdoctoral Researcher	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
75	Törmäkangas	Kirsi		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
76	Vaahtera	Lauri		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
77	Vahala	Jorma		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
78	Vahisalu	Triin		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences

79	Vainonen	Julia		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
80	van der Schoot	Chris		Professor	Faculty of Biological and Environmental Sciences, Department of Biosciences
81	Warinowski	Tino		Doctoral candidate	Faculty of Agriculture and Forestry, Department of Agricultural Sciences
82	Welling	Annikki		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
83	Virolainen-Arne	Eija		Doctoral candidate	Faculty of Biological and Environmental Sciences, Department of Biosciences
84	Wrzaczek	Michael		Senior Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
85	Zeng	Jun		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences
86	Zhubing	Hu		Postdoctoral Researcher	Faculty of Biological and Environmental Sciences, Department of Biosciences

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

BACKGROUND INFORMATION

Name of the RC's responsible person: Palva, Tapio

E-mail of the RC's responsible person: tapio.palva@helsinki.fi

Name and acronym of the participating RC: Viikki Molecular Plant Sciences, VMPS

The RC's research represents the following key focus area of UH: 2. Elämän perusrakenne – The basic structure of life

Comments for selecting/not selecting the key focus area: Plants and photosynthesis drive and support life on this planet. Plants produce the oxygen we breathe, are the main source of our nutrition, fibre and fuel, and are also a rich source of pharmaceutical and other novel products.

Over the next 50 years the world population will increase to 9 billion and the demand for increased food and fibre along with the requirement for sustainable energy supplies will greatly increase. Meeting the global challenges in plant production presented by population increase, climatic warming and instability and increased atmospheric CO2 levels are central strategy issues addressed by the VMPS RC.

Meeting these challenges requires extensive basic knowledge of plant sciences on genomic, molecular, cellular, physiological and population levels and is essential for developing sustainable agriculture and forestry and breeding of crop species and forest trees better adapted to the changing climate.

The RC's research falls into several of the key focus areas of the UH, giving the RC the unique opportunity to change the lives of millions of people worldwide.

1 FOCUS AND QUALITY OF RC'S RESEARCH (MAX. 8800 CHARACTERS WITH SPACES)

- **Description of the RC's research focus, the quality of the RC's research (incl. key research questions and results) and the scientific significance of the RC's research for the research field(s).**

  The research focus and central aim of the Viikki Molecular Plant Science Research Community is to understand how environmental and developmental cues are integrated in control of plant growth, flowering, defence and secondary metabolism. This is achieved by focusing research on the characterisation of molecular communication involved in signal cascades and understanding the cross-talk between different response pathways in plant cells and tissues. The combination of both basic and applied research and integration of multidisciplinary research such as functional genomics, structural biology and bioinformatics with modern plant physiology, genetics and cell biology allows the RC to conduct high impact research on an international level.

  Key research questions addressed by the RC and the most scientifically important achievements organised by group are outlined below. High impact research using the model organism Arabidopsis has been complemented by research conducted with new internationally recognised plant models such as the tree species birch, spruce, pine, and gerbera and strawberry.

  The focus of research in the Helariutta group is on wood development and cytokinin signalling using both Arabidopsis and tree species (Populus and Betula) as models. Results show that cytokinins are major hormonal regulators required for cambial development. Most recent results published in Nature (2010) show that bidirectional signalling interaction based on microRNA controls xylem development and root cell fate. Together with the Kangasjärvi group, work on tree development and dormancy has revealed the role for ethylene in wood formation and cambial cell division.

Group Kangasjärvi studies plant responses to reactive oxygen species in stress and development using ozone as a tool. Identification of the guard cell anion efflux channel and elucidation of its regulation by apoplastic ROS has been a major important finding for the group. Other recent crucial results have identified a new protein domain in a conserved transcription factor-interacting protein and a new small apoplastic protein involved in control of ROS-induced cell death.

In the Palva group plant stress signalling in response to both biotic and abiotic factors is studied. Currently, the emphasis is on understanding plant innate immunity responses and for this, the bacterial pathogen Pectobacterium and Arabidopsis are used as the model system. Recent results have characterised the central nodes of interaction in plant defence, integrating signals from SA- and JA-mediated pathways. From the bacterial side, novel virulence determinants from Pectobacterium have been identified.

The key research focus of the groups of Teeri and Elomaa is on flower development and secondary metabolism in gerbera, a new emerging model for the large sunflower plant family. The first EST collection in gerbera was established and utilised for microarray analysis of flower development which formed the basis for a general model for MADS protein complex function. Through collaborative projects, gene space sequencing of the gerbera genome was executed and studies on MADS box and TCP domain transcription factors have revealed novel functions for these important regulators of plant development. A large collection of gerbera lines was used to assess the safety of GM plants using metabolic fingerprinting and cytotoxicity assays. No adverse effects were found.

The scientific significance, quality and productivity of the RC's research can be seen firstly from the number of publications in high quality, high impact peer-reviewed important international journals and the high number of cites received (e.g. two of the RC members are the highest ranking Finnish plant scientists in ISI's scientist ranking of plant and animal science 2000-2010) over the evaluation period, and secondly from the continued financial support achieved by all members of the RC. Success in highly competitive external funding has been high and funding has been received from (among others) the EU, Tekes, Academy of Finland, Biocentre Helsinki and Biocentre Finland, University of Helsinki PhD student, post-doc and researcher grants as well as several smaller foundations. Significant research results are achieved through usage of the latest techniques available by using the Viikki campus core facilities, by collaboration with international research groups including the exchange and recruitment of international post-docs with relevant experience in new methodologies and by inviting international experts to visit the Viikki campus.

Research in the RC has thus kept pace with international cutting edge research and the high visibility of its publications on an international level has ensured not only continued support and funding but also led to new fruitful international collaborations.

- **Ways to strengthen the focus and improve the quality of the RC's research.**

The major groups participating in the RC have a long common history of research together. Many of them have taken a central role in the successful Finnish Centre of Excellence program (CoE), now ongoing for almost 12 years. The Viikki campus is a unique working environment within Finland with a strong plant biology community, organised as the Research Program in Plant Biology, with access to state-of-the-art core facilities and infrastructure.

The most urgent measure to improve the future quality of RC's research is the investment into the exit strategy of those groups who have commonly been involved in the CoE over the last 12 years. Common funding will end in 2011, after which all groups will be forced to individually compete for research funds. This will put a strain on the collaborative partnerships which have been very successfully developed during the period of the CoE.

RC-SPECIFIC STAGE 2 MATERIAL

The proposed Viikki Plant Science Centre would represent a unique opportunity for continued collaboration and focus on cutting edge plant research with high quality results.

2 PRACTISES AND QUALITY OF DOCTORAL TRAINING (MAX. 8800 CHARACTERS WITH SPACES)

- How is doctoral training organised in the RC? Description of the RC's principles for recruitment and selection of doctoral candidates, supervision of doctoral candidates, collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes, good practises and quality assurance in doctoral training, and assuring good career perspectives for the doctoral candidates/fresh doctorates.

Doctoral training in the RC is organised mainly through national and local graduate schools, but there are also doctoral candidates who do not have places in this system and are supported by the groups with assistance from departments, faculties, research institutes or private grants. Each doctoral candidate who has been a member of the RC since 2005 has benefited from the excellent national and international connections offered by their supervisors and the campus based research program in plant biology. During 2005 an application for the foundation of a national doctoral training program in plant biology was successfully approved, the Finnish Graduate School in Plant Biology (FGSPB), with 55 doctoral candidate members at present throughout Finland. The senior PIs of the RC were actively involved in the application and along with the other RC members form a core basis of research scientists and teachers for doctoral training in Helsinki. Active participation in EU Marie Curie Initial Training Networks, COST actions and EPSO (European Plant Science Organisation) also ensures an excellent international infrastructure for doctoral candidates.

Recruitment of doctoral candidates within the RC aims to be as international as possible, actively recruiting foreign doctoral candidates and many international doctoral candidates have worked and continue to work in the research groups of the RC. Positions are advertised on an international level using the wide network of contacts of national and international collaborators from the group leaders within the RC, in the local newspapers and distributed via email to all the Finnish universities and research institutes where plant biology research is carried out. Doctoral candidates are evaluated on the quality of their research plan, the feasibility of conducting the research and studies within four years and the study merits of the applicant. Potential candidates are invited for interviews. International and national student applications are subject to the same evaluation and selection criteria.

Doctoral candidates are continuously supervised and supported by their supervisors and a follow-up group, the members of which are chosen in the first year of studies. The PIs and senior researchers of the RC act as both members of follow-up groups and as mentors for doctoral candidates. At the end of each year, doctoral candidates submit a written progress report to the follow-up group members to be assessed at the annual meeting. The report contains information concerning credits achieved, courses taken, attendances at international meetings and courses, publications published and a summary of the progress of research results. Important feedback and guidance towards further research plans and thesis writing is given to the doctoral candidates along with support for the completion of studies within four years. The meeting is also a good forum to address any problems that may have arisen.

Doctoral training within the RC involves a collaborative network of many partners. The graduate school/doctoral program instrument has been central to this collaboration. Since 2006, the national Finnish Graduate School in Plant Biology has supported many of the RC doctoral candidates both financially and in a training capacity with a wide curriculum of modern biological techniques and transferable skills courses. The local campus based graduate schools the Viikki Graduate School in Biosciences (VGSB) and the Graduate Program in Biotechnology and Molecular Biology (GPBM) are also actively involved in doctoral training as are other national graduate schools such as the Graduate School in Forest Sciences (GSForest), the Glycoscience Graduate School (GGS) and the Graduate School in

Environmental Science and Technology (EnSTe). Several inter-faculty doctoral training positions provided by University of Helsinki research foundations allow for non-graduate school doctoral candidates to benefit from the Viikki doctoral training infrastructure. Cooperation within the Nordic Forestry, Veterinary and Agricultural (NOVA) university network provides international PhD courses and high quality teaching for all doctoral candidates and PIs from the RC are involved in teaching NOVA courses.

The doctoral training positions offered within the RC are administered in line with university personnel policy. Feedback from teaching and support is gathered and used to improve the content and quality of doctoral training provided.

Collaboration within the doctoral program between partner universities, research institutes and industry opens up a number of different possibilities to the doctoral candidates for career development, product development and the starting of new businesses. Through the contacts within the RC doctoral candidates are allowed the opportunity to travel and take part in international meetings, improving their networking skills and increasing their possibilities for career planning and employment. Visits to industry and career planning seminars with a relaxed atmosphere provide the doctoral candidates with an overview of working life and the opportunity to speak with researchers at various career stages.

- RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The strengths of the RC's doctoral training lie in the numerous national and international contacts of the RC members. The most recent developments in doctoral training programs (2012 onwards) allow doctoral training in Finland to be evaluated on an international scale. The quality and practises of doctoral training within the RC has over the evaluation period already been subject to international review and evaluation (e.g. the international scientific advisory board of the Finnish CoE) as well as the internationally competitive funding of positions for doctoral candidates.

The challenges which require future development of doctoral training involve the inclusion of all doctoral candidates within doctoral training programs, a higher level of international training courses and the implementation of a mentoring network.

A major threat to doctoral training of plant biologists is however evident from the current plans for reforming doctoral training in Finland. This appears to favour the establishment of large local training programs over network programs.

3 SOCIETAL IMPACT OF RESEARCH AND DOCTORAL TRAINING (MAX. 4400 CHARACTERS WITH SPACES)

- Description of how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).

The key aim of the RC's doctoral training and research is, as a community, to collaborate and develop plant science and its applications and to train future scientists for roles as researchers, in administration and in educational roles such as teachers.

The RC interacts and collaborates with several national public and private sector partners including VTT-Technical Research Centre of Finland; MTT-Agrifood Research Finland; METLA-Finnish Forest Research Centre and the Strategic Excellence Centre Forestcluster Ltd. ensuring that the impact on society of molecular plant biology research is adequately addressed by the RC. All national partners help to actively promote increased contacts with business and industry through the doctoral training, industry visits and the encouragement of doctoral candidates to participate in industrially relevant projects.

Collaboration with Forestcluster Ltd., Nutritech Ltd., SoluCel Ltd., and the crop breeding industry via MTT ensures close contacts with the plant biotechnology industry. This is seen as important considering the impact on society of consumer demands for healthy plant products grown with minimal use of pesticides and with a minimal carbon footprint. The rapid development of biofuels and other "next generation" forms of bioenergy for the future is a critically important global challenge. The European Plant Science Organisation (EPSO) is an independent academic organisation bringing together more than 168 research institutes, departments and universities from 26 European counties. EPSO's mission is to improve the impact and visibility of plant science in Europe. Several PIs from the RC have been very active in EPSO since its establishment in 2000.

Genetically modified organisms (GMOs) have an enormous potential in taking Plant Biology into applications. The opposition, common especially in European society, is not always based on rational thinking. We are among the experts in Finland in this field, as GMOs are routinely used in our research. Furthermore, involvement in traditional plant breeding through teaching and research contacts gives us a standpoint to compare the risks of GMO breeding to the much better accepted crossing-selection breeding. Traditional breeding uses methods that are far from "natural", and the risks of traditional cultivars to human health or the environment are far from non-existent, but still accepted and in control. This comparative view to the GMO discussion has been brought by in several radio, TV, newspaper and magazine interviews, and addressed through our own research where we have compared GMO lines to regular cultivars.

Involvement of the RC in science education has a high societal impact in Finland. This is achieved by taking an active role in secondary school biology education programs, in public and private organisations such as the Finnish science centre Heureka, by writing textbooks and by training university students: undergraduates, master's students and doctoral candidates.

- Ways to strengthen the societal impact of the RC's research and doctoral training.

  The societal impact of the RC's research and doctoral training could be strengthened by encouraging the PIs, post-docs and doctoral candidates to take part in more national and international events where science is popularised. At present, all RC members regularly attend and speak at internationally important scientific meetings, conferences and congresses and contribute to books and other scientific texts. There are fewer cases of popular science publications in newspapers, magazines and on television and these should be encouraged more to alert the public to the importance of plant science on a global scale, and to increase debate and public awareness of GMOs. The campus public relations office is involved in dissemination of results to the general public and this area clearly needs to be developed to ensure that the high impact research results from the RC are made available to the general population outside the scientific and university community.

4 INTERNATIONAL AND NATIONAL (INCL. INTERSECTORAL) RESEARCH COLLABORATION AND RESEARCHER MOBILITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's research collaborations and joint doctoral training activities and how the RC has promoted researcher mobility.

  The research within the RC can be regarded as at the leading edge of international research. Extensive worldwide research networks within European, US, Japanese, Chinese, Indian and Australian research groups encourage strong international links and possibilities for researcher mobility and training. RC members have hosted several international visiting professors during the evaluation period.

  Nationally the RC forms a core of the most advanced experts of plant molecular biology with collaboration connections to all the major universities and research institutes in Finland involved in

molecular plant biology research. Collaboration nationally with various businesses from the plant biotechnology industry ensures that applied plant science opportunities are also addressed. The Centres of Excellence in Plant Signal Research (and its predecessor program "Plant Molecular Biology and Forest Biotechnology") have been running in Helsinki for almost 12 years, promoting high profile international plant research and long-term collaboration. This has led to participation in several international research programs within the EU, ERA-net projects and COST action.

Joint doctoral training activities during the evaluation period have occurred on both an international and national level and have promoted researcher mobility. The Finnish Graduate School in Plant Biology was involved in an 18 month international joint doctoral program with a German Research Training Group from the University of Freiburg (2009-2010). During the course of the collaboration, short research visits by doctoral candidates from both countries took place and several meetings, symposia and workshops were held. The collaboration was highly fruitful and all members of the RC benefitted from the collaboration.

On a national level, collaboration with other doctoral programs on several training courses both in the evaluation period and in the future have allowed doctoral candidates to broaden the scope of their learning. Pooling resources has also allowed for courses to be open for more people and the inclusion of international teachers and speakers has increased the networking possibilities of the RC doctoral candidates' thus promoting researcher mobility. Examples of such collaboration during the evaluation period include the Plant Genomics course (with VGSB – Viikki Graduate School in Biosciences); the Plant Cell Walls course (with GGS – Glycoscience Graduate School and in the future with BioREGS – the Graduate School for Biomass Refining); the Biostatistics course (with VGSB and GPBM); a course on Transcriptomics and Resequencing (with VGSB) and a Bioethics course (with LUOVA).

- RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

  The research strengths of the RC are headed by the wide-reaching international network of contacts and collaborative partners. Through this network, collaborations have been initiated, are active and have proved fruitful. The many partners and their expertise help strengthen the international visibility of the RC's research, allow for new methodologies to be learnt and give researchers the opportunity for mobility within this network.

  The challenges of studying and researching plant science on a global scale are facilitated by the readiness of researchers and doctoral candidates to visit foreign research laboratories for practical training. Increased participation in joint international research programs such as EU, ERA-net and COST should also be encouraged. Online video conferencing is one way forward to bring researchers together for such matters as discussions concerning joint experiments, joint publications and dissemination of results.

  Joint doctoral training on both an international and national level must continue and collaboration with Sweden and Germany will be developed.

5 OPERATIONAL CONDITIONS (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).

  The Viikki campus is the pioneer of plant molecular biology and plant genomics research in Finland. Plant molecular biology and plant genomics receives a high profile within the university and is strongly supported by the priority areas in the profile and strategy of the University of Helsinki as well as those of

the faculties and departments involved. In Viikki plant research is especially strong in plant stress and developmental biology, plant signal research and plant genomics. The Viikki campus is unique in bringing together the study in a cross-disciplinary manner (translational research) of annual model plants, economically important crop plants and also trees. This is fulfilled by the strong and active plant research community (Research Program in Plant Biology) with access to state-of-the-art equipment and the most modern molecular techniques, along with the core facilities and infrastructure as part of Biocentrum Helsinki and Biocenter Finland. This includes DNA sequencing and microarray facilities, metabolomics, electron microscopy and imaging, growth chamber, greenhouse facilities and field sites approved for GMO experiments, and protein chemistry. The community (over 150 research scientists, doctoral candidates and support staff) is responsible for monthly seminars, inviting international speakers to the campus and organising a yearly retreat where the groups can meet and exchange ideas. The Finnish Centre of Excellence in Plant Signal Research spans the two faculty partners of the RC and addresses several of the University research strategy priorities. The RC strongly supports international collaboration and multidisciplinary research training of doctoral candidates to promote their future research careers. All members of the RC take an active role in the teaching and training of both doctoral candidates and undergraduates within the RC and on the Viikki campus. Research-based teaching on both an undergraduate and post-graduate level is undertaken by doctoral candidates, junior group leaders as well as the PIs and offers an excellent platform for members of the RC to become actively involved in research projects which may not directly be related to their own specific research. The teaching duties of younger members of the RC account for less than 5 % of their working time, and teaching responsibilities are spread throughout all members of the RC.

- RC's strengths and challenges related to operational conditions, and the actions planned for their development.

  The operational infrastructure surrounding the RC is excellent and it is hoped that this will be further reinforced by the establishment of the Viikki Plant Science Centre. Challenges for the future include the ability to keep up-to-date with the latest technological developments for modern molecular plant biology. This will involve investment at a University level as well as external funding. During the evaluation period, the RC has shown significant competence in external funding grant applications, both for research grants and competitive personnel positions. (Appendix Figure 1).

  Missing support infrastructure which would benefit the continued excellence of molecular plant biology research on the Viikki campus include enhanced bioinformatics services as well as structural biology services including plant proteomics, increased plant growth facilities and development of tissue culture and tree transformation facilities.

6 LEADERSHIP AND MANAGEMENT IN THE RESEARCHER COMMUNITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the execution and processes of leadership in the RC, how the management-related responsibilities and roles are distributed in the RC and how the leadership- and management-related processes support high quality research, collaboration between principal investigators and other researchers in the RC, the RC's research focus and strengthening of the RC's know-how.

  The members of the RC are all part of the umbrella organisation Viikki Research Groups in Biosciences. This is a bottom-up organisation based on PIs with similar research interests forming joint research programs. They elect among themselves a coordinator for the program that is responsible for the coordination and management of the joint seminars and other meetings and chairs the meetings within each program. The research coordinators in turn coordinate and manage the joint activities of the Viikki Research Groups in Biosciences. The structure and funding of the research groups organisation needs to

be enhanced and strengthened to encourage the PI-based bottom-up structure within the UH as being the first step in independent research career development. Management of individual research groups is the responsibility of the PI.

Members of the RC are part of the Research Program in Plant Biology, coordinated by Tapio Palva (Head of the RC). This brings together almost 150 researchers dedicated to plant research on the Viikki campus from the Faculties of Biological & Environmental Sciences and Agriculture & Forestry as well as from the Institute of Biotechnology. The program aims to encourage collaborative interaction between the PIs and to synergise research, not only in the basic research of plant functions on the molecular and cellular levels and of plant interactions with the biotic and abiotic environment, but also in the biotechnological applications of such research. The program organises monthly seminars for doctoral candidates and post-docs to present their work "Plant Club" and a retreat for all researchers every 18 months.

The Research Program in Plant Biology together with the Finnish Centre of Excellence in Plant Signal Research, act as an important core structure helping to guide the principles of leadership and management within the RC. Central to the CoE management is the Scientific Advisory Board (SAB) consisting of two impartial international advisors. They perform regular assessment and evaluation of the CoE and report to the CoE board. A post-doc forum set-up by members of the CoE allows research discussion, lab methods etc. and any problems to be discussed quickly and easily in an informal manner. This has enabled also the junior scientists and doctoral candidates to take an active role in the management and goals of research conducted.

- RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes.

The strengths brought to the RC from the leadership and management practices within the Research Program in Plant Biology and the Finnish Centre of Excellence in Plant Signal Research will continue to shape the good practises followed by the RC in the future.

PI-driven programs with researchers with joint interests will form the programs in the proposed Viikki Plant Science Centre initiative (ViPSC). The aim of the proposed centre is that all plant science on the campus would be centrally administered and managed resulting in more efficient research and training. At present, members of the RC are separated in different parts of the campus and within different administrative units.

The ViPSC would be headed by a board consisting of research program coordinators. Strategic issues of common interest as well as education would be discussed and decided upon between the coordinators. An international scientific advisory board (SAB) would be in place to evaluate the quality of research and offer constructive support to the board of the ViPSC.

7 EXTERNAL COMPETITIVE FUNDING OF THE RC

- Listing of the RCs external competitive funding, where:
  - the funding decisions have been made during 1.1.2005-31.12.2010, and
  - the administrator of the funding is/has been the University of Helsinki

- Academy of Finland (AF) - total amount of funding (in euros) AF has decided to allocate to the RC members during 1.1.2005-31.12.2010: 7450000

- Finnish Funding Agency for Technology and Innovation (TEKES) - total amount of funding (in euros) TEKES has decided to allocate to the RC members during 1.1.2005-31.12.2010: 2490000

RC-SPECIFIC STAGE 2 MATERIAL

- European Union (EU) - total amount of funding (in euros) EU has decided to allocate to the RC members during 1.1.2005-31.12.2010: 1110000

- European Research Council (ERC) - total amount of funding (in euros) ERC has decided to allocate to the RC members during 1.1.2005-31.12.2010:

- International and national foundations – names of international and national foundations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the foundations: Finnish Cultural Foundation
  - Borisoff Foundation
  - total amount of funding (in euros) from the above-mentioned foundations: 50000

- Other international funding - names of other international funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the funding organizations: Chinese Exchange Council
  - total amount of funding (in euros) from the above-mentioned funding organizations: 140000

- Other national funding (incl. EVO funding and Ministry of Education and Culture funded doctoral programme positions) - names of other national funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the funding organizations: Ministry of Education & Culture
  - Ministry of Agriculture & Forestry
  - CIMO
  - Biocenter Finland
  - KCL
  - total amount of funding (in euros) from the above-mentioned funding organizations: 2480000

8 RC'S STRATEGIC ACTION PLAN FOR 2011–2013 (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's future perspectives in respect to research and doctoral training.

  In the political, financial and public climate it is becoming more and more evident that the ability to apply the basic knowledge of molecular plant sciences to molecular breeding and development of better adapted, more productive plants and novel plant products is essential.

  Creation of the Viikki Plant Science Centre in the near future would greatly increase the impact of research on society, through education and interaction with the public sector. Such a centre would attract more competitive funding allowing the recruitment of international professionals, encouraging early career group leaders to establish groups and allow for dynamic exchange of post-docs and doctoral candidates. Also, increased recruitment of international post-doctoral researchers and the establishment of tenure track positions within molecular plant sciences would greatly help to strengthen the research output of the RC. All plant biologists on the Viikki campus would be housed under one roof. Close interaction and collaboration would not be hampered by different administrative rules and thus an ever higher efficiency and quality of research and in turn high quality publications would be achieved. Core facilities and infrastructure in line with up-to-date technologies would reinforce the collaborative opportunities with Finnish research institutes such as MTT and METLA as well as other international

research groups. Research program coordinators would be able to liaise with their counterparts in research institutes thus facilitating the connections between basic and applied research.

The Viikki Plant Science Centre would play a key role in the development of plant biology doctoral training on the Viikki campus, guaranteeing that all doctoral candidates are included in a program and receive a broad, complete, organised and supported doctoral education.

9 SHORT DESCRIPTION OF HOW THE RC MEMBERS HAVE CONTRIBUTED TO THE COMPILATION OF THE STAGE 2 MATERIALS (MAX. 1100 CHARACTERS WITH SPACES).

The material required for stage 2 of the evaluation has been collated by a coordinator (member of the RC) on behalf of the responsible person of the RC. Each PI has contributed to writing the text, as well as providing their funding details.

Appendix/Palva/VMPS

Stage 2 University Evaluation – Viikki Molecular Plant Sciences Research Community

Responsible person Tapio Palva
Name of the participating RC Viikki Molecular Plant Sciences
Acronym of the participating RC VMPS

Figure 1 – University Funding for the RC

University of Helsinki funding awarded 1.1.2005 - 31.12.2010

Position/Research Funding	Awarded To	Period of Time	Total Funding €
UH PhD positions (x4)	Tapio Palva	2009-2012	480,000
UH Post-Doc	Anthony Bishopp	2007-2009	145,887
UH Post-Doc	Anna Kärkönen	2007-2009	128,304
UH Post-Doc	Tarja Kariola	2007-2009	128,304
UH Post-Doc	Michael Wrzaczek	2008-2010	134,456
Research Funding	Gunter Brader	2008-2010	128,304
Research Funding	Anna Kärkönen	2009-2011	120,000
Research Funding	Timo Hytönen	2010-2012	119,000
Research Funding	Kirk Overmyer	2011-2013	120,000
Research Funding	Ari-Pekka Mähönen	2011-2013	126,000
Research Funding	Mikael Brosché	2010-2012	120,000
Biocentrum Helsinki	Jaakko Kangasjärvi	2005-2010	120,000
Biocentrum Helsinki	Tapio Palva	2005-2010	120,000
Biocentrum Helsinki	Yrjö Helariutta	2005-2010	190,875
Biocentrum Helsinki	Teemu Teeri	2005-2010	155,875
Biocentrum Helsinki	Jing Li	2010-2011	35,000
Biocentrum Helsinki	Ari-Pekka Mähönen	2010-2011	70,000
HERC	Jaakko Kangasjärvi	2006-2009	60,200

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

VMPS/Palva

1 Analysis of publications

- Associated person is one of Markku Aalto , Markku.K.Aalto@helsinki.fi, Reetta Ahlfors , Reetta.Ahlfors@helsinki.fi, Sebastien Besseau , sebastien.besseau@helsinki.fi, Olga Blokhina , Olga.Blokhina@helsinki.fi, Tiina Johanna Blomster , tiina.blomster@helsinki.fi, Gunter Brader , Gunter.Brader@helsinki.fi, Erik Martin Broberg , martin.broberg@helsinki.fi, Suvi Broholm , Suvi.Broholm@helsinki.fi, Mikael Brosche , Mikael.Brosche@helsinki.fi, Gwe Gilbert Chenyi , gilbert.gwe@helsinki.fi, Pär Davidsson , par.davidsson@helsinki.fi, Xianbao Deng , xianbao.deng@helsinki.fi, Eve Eensalu , eve.kaurilind@helsinki.fi, Sanna Ehonen , sanna.ehonen@helsinki.fi, Paula Elomaa , Paula.Elomaa@helsinki.fi, Kurt Fagerstedt , Kurt.Fagerstedt@helsinki.fi, Adrien Gauthier , adrien.gauthier@helsinki.fi, Yrjö Helariutta , Yrjo.Helariutta@helsinki.fi, Elina Helenius , Elina.Helenius@helsinki.fi, Timo Hytönen , Timo.Hytonen@helsinki.fi, Niina Idänheimo , niina.idanheimo@helsinki.fi, Pinja Jaspers , Pinja.Jaspers@helsinki.fi, Inka Juntheikki-Palovaara , Inka.Juntheikki@helsinki.fi, Jaakko Kangasjärvi , Jaakko.Kangasjarvi@helsinki.fi, Tarja Kariola , tarja.kariola@helsinki.fi, Ali Keceli , ali.keceli@helsinki.fi, Hannes Kollist, Elli Koskela , elli.koskela@helsinki.fi, Anne Kujanpää , anne.kujanpaa@helsinki.fi, Eija Kukkola , Eija.Kukkola@helsinki.fi, Anna Kärkönen , anna.karkonen@helsinki.fi, Roosa Anna Emilia Laitinen , Roosa.Laitinen@helsinki.fi, Anja Lampio, Satu Johanna Lehesranta , satu.lehesranta@helsinki.fi, Jing Li , jing.li@helsinki.fi, Jing Li , jing.z.li@helsinki.fi, Kean-Jin Lim , kean-jin.lim@helsinki.fi, Kaisa Marjamaa, Anzu Minami, Katriina Mouhu , Katriina.Mouhu@helsinki.fi, Ari Pekka Mähönen , AriPekka.Mahonen@helsinki.fi, Outi Anneli Niemi , outi.niemi@helsinki.fi, Kaisa Nieminen , Kaisa.Nieminen@helsinki.fi, Yan Peng Ng , Yan.P.Ng@helsinki.fi, Kirk Overmyer , Kirk.Overmyer@helsinki.fi, Tanja Paasela , tanja.paasela@helsinki.fi, E. Tapio Palva , Tapio.Palva@helsinki.fi, Ville Tuomas Pennanen , ville.pennanen@helsinki.fi, Maria Piisilä , Maria.Piisila@helsinki.fi, Eija Katariina Pöllänen, Sanni Raiskila , Sanni.Raiskila@helsinki.fi, Satu Ruokolainen , Satu.Ruokolainen@helsinki.fi, Raili Ruonala , raili.ruonala@helsinki.fi, Jarkko Tapani Salojärvi , jarkko.salojarvi@helsinki.fi , Airi.Palva@helsinki.fi , willem.devos@helsinki.fi, Karen Sims-Huopaniemi , Karen.Sims-Huopaniemi@helsinki.fi, Solveig Sjöblom , solveig.sjoblom@helsinki.fi, Junko Takahashi Schmidt , junko.takahashi-schmidt@helsinki.fi, Teemu Teeri , Teemu.Teeri@helsinki.fi, Sari Tähtiharju , Sari.Tahtiharju@helsinki.fi, Kirsi Törmäkangas, Lauri Vaahtera , lauri.vaahtera@helsinki.fi, Jorma Vahala , Jorma.Vahala@helsinki.fi, Triin Vahisalu , triin.vahisalu@helsinki.fi, Julia Vainonen , julia.vainonen@helsinki.fi, Tino Warinowski , tino.warinowski@helsinki.fi, Annikki Welling , Annikki.Welling@helsinki.fi, Michael Wrzaczek , michael.wrzaczek@helsinki.fi

	Publication year						
Publication type	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total Count 2005 - 2010**
A1 Refereed journal article	18	23	15	16	18	21	111
A2 Review in scientific journal		1		2	1	5	9
A3 Contribution to book/other compilations (refereed)	1	5	3	1	3	3	16
A4 Article in conference publication (refereed)		1	1	1	2		5
B1 Unrefereed journal article		2	1	1		2	6
B2 Contribution to book/other compilations (non-refereed)				1			1
B3 Unrefereed article in conference proceedings	3				2	3	8
C1 Published scientific monograph				2			2
C2 Edited book, compilation, conference proceeding or special issue of journal	1	1				2	4
D1 Article in professional journal				2		4	6
D3 Article in professional conference proceedings					1	4	5
D5 Text book or professional handbook or guidebook or dictionary	1	1	1	1	1	1	6
E1 Popular article, newspaper article	4	3	1	2	1	9	20

2 Listing of publications

A1 Refereed journal article

2005

Brader, G, Sjöblom, S, Hyytiäinen, H, Sims-Huopaniemi, K, Palva, ET **2005**, 'Altering substrate chain length specificity of an acylhomoserine lactone synthase in bacterial communication', **Journal of Biological Chemistry**, vol 280, no. 11, pp. 10403-10409.

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Kukkola, E, Rautio, P, Huttunen, S **2005**, 'Long-term symptoms due to metal and acid precipitation treatments in Scots pine (Pinus sylvestris) needles in the subarctic', **Arctic, Antarctic, and Alpine Research**, vol 37, no. 1, pp. 68-74.

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Li, C, Yang, Y, Junttila, O, Palva, ET **2005**, 'Sexual differences in cold acclimation and freezing tolerance development in sea buckthorn (Hippophae rhamnoides L.) ecotypes', **Plant Science**, vol 168, pp. 1365-1370.

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Ottow, EA, Polle, A, Brosche, MJ, Kangasjärvi, J, Dibrov, P, Zörb, C, Teichmann, T **2005**, 'Molecular characterization of PeNhaD1: the first member of the NhaD Na+/H+ antiporter family of plant origin', **Plant Molecular Biology**, vol 58, no. 1, pp. 75-88.

Ottow, EA, Brinker, M, Teichmann, T, Fritz, E, Kaiser, W, Brosche, M, Kangasjärvi, J, Jiang, X, Polle, A, Brosche, MJ **2005**, 'Populus euphratica displays apoplastic sodium accumulation, osmotic adjustment by decreases in calcium and soluble carbohydrates, and develops leaf succulence under salt stress', **Plant Physiology**, vol 139, pp. 1762-1772.

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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

VMPS/Palva

Joensuu, J, Kotiaho, M, Teeri, T, Valmu, L, Nuutila, AM, Oksman-Caldentey, K, Niklander-Teeri, V **2006**, 'Glycosylated F4 (K88) fimbrial adhesin FaeG expressed in barley endosperm induces ETEC-neutralizing antibodies in mice', **Transgenic Research**, vol 15, no. 3, pp. 359-373.

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RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

VMPS/Palva

2007

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B3 Unrefereed article in conference proceedings

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Ahlfors, R, Kollist, H, Brosche, M, Desikan, R, Kangasjärvi, J **2005**, 'The role of nitric oxide in ozone-induced cell death in Arabidopsis thaliana', in **Air Pollution -Response of Ecosystem and Society (URPO) in Helsinki 14.11.2005**, pp. 33-35 **Report series in aerosol science, no. 77**.

Kollist, H, Mayer, F, Brosche, M, Kangasjärvi, J **2005**, 'Biological diversity of ozone sensitivity among Arabidopsis ecotypes', in **Biosphere-atmosphere studies: Workshop organized by the REBECCA (Responses of boreal ecosystem carbon exchange, in different spatio-temporal scales) and URPO (Urban and Rural Pollution) research consortia, Helsinki 20.4.2007**, pp. 18-20 **Report Series in Aerosol Science, no. 87**.

Kollist, H, Kollist, T, Rasulov, B, Lamminmäki, A, Teittinen, H, Oja, V, Rämmä, H, Huve, K, Kull , O, Moldau, H, Kangasjärvi, J **2005**, 'Construction of a system for monitoring rapid gas-exchange responses to ozone in Arabidopsis', in **Air Pollution -Response of Ecosystem and Society (URPO) in Helsinki 14.11.2005**, pp. 27-32 **Report series in aerosol science, no. 77**.

2009

Laine, A, Juurola, E, Ehonen, S, Tuittila, E **2009**, 'Sphagnum growth processes and their interlinks', in **6th International Symposium on Ecosystem Behaviour: BIOGEOMON 2009 Conference Programme & Abstracts**, pp. 248 **Metlan työraportteja, no. 128**.

Ng, YP, Kalimo, H, Baumann, M **2009**, *Stable expression of mutated and non-mutated mouse NOTCH3 in C2C12 mouse myoblast,*, Journal of the Neurological Sciences 283 ELSEVIER BV.

VMPS/Palva

2010

Kärkönen, A, Seppänen, M, Häggman, H, Manninen, O, Joki-Tokola, E, Virkajärvi, P **2010***, Regulation of cell wall and lignin formation in timothy (Phleum pratense),* **, Paper presented at IX Finnish Symposium on Plant Science, Joensuu**, Finland. 17. - 19. May, 2010..

Kärkönen, A, Seppänen, M, Häggman, H, Manninen, O, Joki-Tokola, E, Virkajärvi, P **2010**, 'Nurmirehu helpommin sulavaksi: sekundaarisoluseinän syntymisen säätely', in **Maataloustieteen päivät 2010: [verkkojulkaisu], Suomen Maataloustieteellisen Seuran julkaisuja, no. 26**.

Rantanen, M, Mouhu, K, Elomaa, P, Hytönen, T, Palonen, P **2010***, Valon spektri säätelee ahomansikan (Fragaria vesca L.) rönsynmuodostusta ja kukintainduktiota,*.

C1 Published scientific monograph

2008

Hytönen, T, Mouhu, K, Koivu, I, Elomaa, P, Junttila, O **2008***, Mansikan kasvunsäätö,* **Julkaisuja / Helsingin yliopisto, soveltavan biologian laitos, no. 36, Helsingin yliopisto, soveltavan biologian laitos, Helsinki**.

Jalonen, P, Valve, H, Kettunen, R, Niemi, K, Kauppila, J, Takala, T, Teeri, T, Haila, Y **2008***, Perunaruttoa kestävän muuntogeenisen perunan hyväksyttävyys: ESGEMO-ohjelman työpaja : raportti ESGEMO-tutkimusohjelman työpajoista 23.8.2006,* **Julkaisuja / Helsingin yliopisto, soveltavan biologian laitos, no. 35, Helsingin yliopisto, soveltavan biologian laitos, Helsinki**.

C2 Edited book, compilation, conference proceeding or special issue of journal

2005

Fagerstedt, K, Ritschkoff, A, Saranpää, P **2005***, Natural variation in lignin amount in Norway spruce: possibilities for modification of lignin to change wood product properties? In: Jalkanen A. and Nygren P. (eds) Sustainable use of renewable natural resources – from principles to practices.,* **University of Helsinki, Department of Forest Ecology**.

2006

Blokhina, O, Fagerstedt, K **2006***, Oxidative stress and antioxidant defenses in plants, Chapter 4 in the book ' Oxidative Stress, Disease and Cancer' Singh, K. (ed.),* **Imperial College Press**.

2010

Blokhina, O, Fagerstedt, K **2010***, Oxygen Deprivation, Metabolic Adaptations and Oxidative Stress. Chapter 7. in the book 'Waterlogging Signalling and Tolerance in Plants, S. Mancuso and S. Shabala (eds.),* **Springer-Verlag**.

Fagerstedt, K **2010***, Programmed Cell Death and Aerenchyma Formation Under Hypoxia. Chapter 6 in the book 'Waterlogging Signaling and Tolerance in Plants' by S. Mancuso and S. Shabala (Eds.),* **Springer-Verlag**.

D1 Article in professional journal

2008

Fagerstedt, K **2008**, 'A book review: Harvinainen tietopaketti suomalaista dendrologiaa.', **Luonnon Tutkija**, vol 2008, no. 4, pp. 125-126.

Ilkka, S, Elomaa, P **2008**, 'GM-koristekasvitutkimuksen merkitys kasvaa', **Puutarha & kauppa**, vol 12, no. 23, pp. 22-23.

2010

Alakukku, L, Teeri, T, Juga, J **2010**, 'HY:n maataloustieteiden laitos - tutkimusta molekyyleistä robotteihin', **Maaseudun tiede**, vol 67, no. 4, pp. 10.

Anttila, U, Elomaa, P, Teeri, T, Hokkanen, H **2010**, 'Karvasaineet karkottavat', **Puutarha & kauppa**, vol 13, no. 22, pp. 20.

Hytönen, T, Palonen, P, Valkonen, J, Laine, A, Elomaa, P, Kärenlampi, S, Kokko, H, Kostamo, K, Karhu, S, Koivisto, A, Tuovinen, T, Uosukainen, M **2010**, 'Uudessa marjahankkeessa kehitetään tunnelituotantoa', **Puutarha & kauppa**, vol 13, no. 23, pp. 22-23.

Rantanen, M, Hytönen, T, Mouhu, K, Palonen, P, Elomaa, P, Pinho, P, Halonen, L **2010**, 'Värillä on väliä - salaatti kasvaa LED-valolla', **Puutarha & kauppa**, vol 13, no. 14/15, pp. 18-19.

D3 Article in professional conference proceedings

2009

Hytönen, T, Palonen, P, Valkonen, J, Laine, A, Elomaa, P, Kärenlampi, S, Kokko, H, Kostamo, K, Kauppinen, H, Koivisto, A, Tuovinen, T, Uosukainen, M, Karhu, S, Hoppula, K **2009**, 'Uusi marja-alan tutkimushanke: Suomalaisen marjantuotannon kilpailukyvyn parantaminen ja kestävä kehittäminen muuttuvassa ilmastossa', in **Kaamosmarjapäivät: Ikaalisten kylpylä, 2.-3.12.2009**.

2010

Anttila, U, Elomaa, P, Hokkanen, H, Teeri, T **2010**, 'Gerberan karvasaineet suojaavat hyönteisherbivorialta', in **Maataloustieteiden päivät 2010: [verkkojulkaisu], Suomen maataloustieteellinen seuran julkaisu, no. 26**.

Hytönen, T, Mouhu, K, Rantanen, M, Elomaa, P **2010**, 'Mansikan kukintageenien identifiointi', in **Maataloustieteiden päivät 2010: [verkkojulkaisu], Suomen maataloustieteellisen seuran julkaisu, no. 26**.

Linden, L, Hauta-aho, L, Juntheikki-Palovaara, I, Temmes, O, Tegel, S **2010**, 'Vanhoja pihasyreeni- ja koristeomenakantoja Helsingin puistoissa', in **Maataloustieteen päivät 2010: [verkkojulkaisu], Suomen Maataloustieteellisen Seuran julkaisuja , no. 26**.

Mouhu, K, Hytönen, T, Elomaa, P **2010**, 'Ahomansikan kukintaan vaikuttavien geenien karaterisointi', in **Maataloustieteiden päivät: [verkkojulkaisu], Suomen maataloustieteellisen seuran julkaisu, no. 26**.

D5 Text book or professional handbook or guidebook or dictionary

2005

Timonen, T, Fagerstedt, K, Pellinen, K, Saranpää, P **2005***, Mikä puu – mistä puusta,* 2. korjatun laitoksen 2. p. edn**, Yliopistopaino kustannus = Helsinki University Press**.

2006

Hannula, P, Somerma, P, Fagerstedt, K, Haahtela, K **2006***, Biologia,* vol. 5, Bioteknologia**, Haahtela-kehitys, Helsinki**.

2007

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2008

Fagerstedt, K, Linden, L, Santanen, A, Väinölä, A **2008***, Kasvioppi: siemenestä satoon,* **Edita, Helsinki**.

2009

Hannula, P, Somerma, P, Fagerstedt, K, Haahtela, K **2009***, Biologia. 4, Ihmisen biologia,* 1 edn**, Haahtela-kehitys, Tampere**.

2010

Hannula, P, Somerma, P, Fagerstedt, K, Haahtela, K **2010***, Biologia 3, Ympäristöekologia,* 1 edn**, Haahtela-kehitys, Tampere**.

E1 Popular article, newspaper article

2005

Fagerstedt, K **2005**, 'Miten puut saavat nostetuksi vettä juurista lehtiin yli 10 metriä?', **Tiede**, vol 2005, no. 4, pp. 65.

Fagerstedt, K **2005**, 'Natural variations in the amount of lignin in Norway spruce: can lignin be modified to change the properties of wood products?', **Sustainable use of renewable natural resources : from principles to practices / editors: Anneli Jalkanen, Pekka Nygren**, pp. 223-229.

Hytönen, T **2005**, 'Kasvunsääteellä satoisampia mansikantaimia', **Puutarha & kauppa**, vol 9, no. 39, pp. 10-11.

Mouhu, K, Koivu, I, Hytönen, T **2005**, 'Kasvun hallinta lisää mansikan satoa', **Puutarha & kauppa**, vol 9, no. 43, pp. 12-13.

2006

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Teeri, T **2006**, 'Gerberasta on löydetty uusia puolustusaineita', **Koetoiminta ja käytäntö**, vol 63, no. 2, pp. 2.

Teeri, T **2006**, 'Gerberasta on löydetty uusia puolustusaineita', **Maaseudun Tulevaisuus**, pp. 2.

2007

Hytönen, T, Höykälä, H **2007**, 'Regalis-tilakokeista hyviä kokemuksia', **Puutarha & kauppa**, vol 11, no. 23, pp. 26-27.

2008

Karhu, S, Hytönen, T, Hietaranta, T **2008**, 'Mansikkaremontti tähtää jatkuvasatoiseen tuotantoon', **Puutarha & kauppa**, vol 12, no. 1, pp. 18-19.

Teeri, T **2008**, 'Menetelmä vai lopputulos?', **Luonnon Tutkija**, vol 112, no. 4, pp. 111.

2009

Teeri, T **2009**, 'Geeniruoan torjuminen Euroopassa ei ole rationaalista', **Duodecim**, vol 125, no. 24, pp. 2697-2703.

2010

Fagerstedt, K **2010**, 'Kuin autot pakkasella', **Viherpiha**, vol 2010, no. 1.

Fagerstedt, K **2010**, 'Miksi puut paukkuvat pakkasella?', **Helsingin Sanomat**, vol 2010.

Fagerstedt, K **2010**, 'Miten jalohortensian kukista saadaan taivaansinisiä?', **Viherpiha**, vol 2010, no. 6.

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Fagerstedt, K **2010**, 'Hormonit hyrräävät myös kasveissa', **Viherpiha**, vol 2010, no. 5.

Fagerstedt, K **2010**, 'Muista tärkeät juurikarvat!', **Viherpiha**, vol 2010, no. 4.

Fagerstedt, K **2010**, 'Kasvit aistivat kevään tulon', **Viherpiha**, vol 2010, no. 2.

Hytönen, T, Seppänen, M, Valkonen, J **2010**, 'Kasvigenomeista käytäntöön', **Maaseudun tiede**, vol 67, no. 4, pp. 10.

Kärkönen, A, Korhonen, P, Pehkonen, T, Väisänen, E, Seppänen, M, Teeri, T, Joki-Tokola, E, Virkajärvi, P, Häggman, H **2010**, 'Ligniini liimaa puissa ja heinissä', **Maaseudun tiede**, vol 67, no. 4, pp. 15.

1 Analysis of activities 2005-2010

- Associated person is one of Markku Aalto , Markku.K.Aalto@helsinki.fi, Reetta Ahlfors, Sebastien Besseau , sebastien.besseau@helsinki.fi, Olga Blokhina , Olga.Blokhina@helsinki.fi, Tiina Johanna Blomster , tiina.blomster@helsinki.fi, Gunter Brader , Gunter.Brader@helsinki.fi, Erik Martin Broberg , martin.broberg@helsinki.fi, Suvi Broholm , Suvi.Broholm@helsinki.fi, Mikael Brosche , Mikael.Brosche@helsinki.fi, Gwe Gilbert Chenyi , gilbert.gwe@helsinki.fi, Pär Davidsson , par.davidsson@helsinki.fi, Xianbao Deng , xianbao.deng@helsinki.fi, Eve Eensalu , eve.kaurilind@helsinki.fi, Sanna Ehonen , sanna.ehonen@helsinki.fi, Paula Elomaa , Paula.Elomaa@helsinki.fi, Kurt Fagerstedt , Kurt.Fagerstedt@helsinki.fi, Adrien Gauthier , adrien.gauthier@helsinki.fi, Yrjö Helariutta , Yrjo.Helariutta@helsinki.fi, Elina Helenius , Elina.Helenius@helsinki.fi, Timo Hytönen , Timo.Hytonen@helsinki.fi, Niina Idänheimo , niina.idanheimo@helsinki.fi, Pinja Jaspers , Pinja.Jaspers@helsinki.fi, Inka Juntheikki-Palovaara , Inka.Juntheikki@helsinki.fi, Jaakko Kangasjärvi , Jaakko.Kangasjarvi@helsinki.fi, Tarja Kariola , tarja.kariola@helsinki.fi, Ali Keceli , ali.keceli@helsinki.fi, Hannes Kollist, Elli Koskela , elli.koskela@helsinki.fi, Anne Kujanpää , anne.kujanpaa@helsinki.fi, Eija Kukkola , Eija.Kukkola@helsinki.fi, Anna Kärkönen , anna.karkonen@helsinki.fi, Roosa Anna Emilia Laitinen , Roosa.Laitinen@helsinki.fi, Anja Lampio, Satu Johanna Lehesranta , satu.lehesranta@helsinki.fi, Jing Li , jing.li@helsinki.fi, Jing Li , jing.z.li@helsinki.fi, Kean-Jin Lim , kean-jin.lim@helsinki.fi, Kaisa Marjamaa, Anzu Minami, Katriina Mouhu , Katriina.Mouhu@helsinki.fi, Ari Pekka Mähönen , AriPekka.Mahonen@helsinki.fi, Outi Anneli Niemi , outi.niemi@helsinki.fi, Kaisa Nieminen , Kaisa.Nieminen@helsinki.fi, Yan Peng Ng , Yan.P.Ng@helsinki.fi, Kirk Overmyer , Kirk.Overmyer@helsinki.fi, Tanja Paasela , tanja.paasela@helsinki.fi, E. Tapio Palva , Tapio.Palva@helsinki.fi, Ville Tuomas Pennanen , ville.pennanen@helsinki.fi, Maria Piisilä , Maria.Piisila@helsinki.fi, Eija Katariina Pöllänen, Sanni Raiskila , Sanni.Raiskila@helsinki.fi, Satu Ruokolainen , Satu.Ruokolainen@helsinki.fi, Raili Ruonala , raili.ruonala@helsinki.fi, Jarkko Tapani Salojärvi , jarkko.salojarvi@helsinki.fi , Airi.Palva@helsinki.fi , willem.devos@helsinki.fi, Karen Sims-Huopaniemi , Karen.Sims-Huopaniemi@helsinki.fi, Solveig Sjöblom , solveig.sjoblom@helsinki.fi, Junko Takahashi Schmidt , junko.takahashi-schmidt@helsinki.fi, Teemu Teeri , Teemu.Teeri@helsinki.fi, Sari Tähtiharju , Sari.Tahtiharju@helsinki.fi, Kirsi Törmäkangas, Lauri Vaahtera , lauri.vaahtera@helsinki.fi, Jorma Vahala , Jorma.Vahala@helsinki.fi, Triin Vahisalu , triin.vahisalu@helsinki.fi, Julia Vainonen , julia.vainonen@helsinki.fi, Tino Warinowski , tino.warinowski@helsinki.fi, Annikki Welling , Annikki.Welling@helsinki.fi, Michael Wrzaczek , michael.wrzaczek@helsinki.fi

Activity type	Count
Supervisor or co-supervisor of doctoral thesis	39
Prizes and awards	8
Editor of research journal	58
Peer review of manuscripts	214
Editor of special theme number	2
Assessment of candidates for academic posts	18
Membership or other role in review committee	7
Membership or other role in research network	6
Membership or other role in national/international committee, council, board	93
Membership or other role in public Finnish or international organization	13
Membership or other role of body in private company/organisation	4
Participation in interview for written media	21
Participation in radio programme	5
Participation in TV programme	4
Participation in interview for web based media	1

2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Olga Blokhina , Olga.Blokhina@helsinki.fi

Supervision of exchange student, Olga Blokhina, 09.2009 → 12.2009, Belgium

Paula Elomaa , Paula.Elomaa@helsinki.fi

PhD thesis supervision; Satu Ruokolainen, Paula Elomaa, 2001 → ..., Finland

PhD thesis supervision; Katriina Mouhu, Paula Elomaa, 2006 → ..., Finland

PhD thesis supervision; Roosa Laitinen, Paula Elomaa, 2006, Finland

PhD thesis supervision; Anna Nukari, Paula Elomaa, 2007 → ..., Finland

PhD thesis supervision; Xianbao Deng, Paula Elomaa, 2008 → ..., Finland

PhD thesis supervision; Elli Koskela, Paula Elomaa, 2009 → ..., Finland

PhD thesis supervision; Marja Rantanen, Paula Elomaa, 2009 → ..., Finland

PhD thesis supervision; Suvi Broholm, Paula Elomaa, 2009, Finland

PhD thesis supervision; Timo Hytönen, Paula Elomaa, 2009, Finland

PhD thesis supervision; Inka Juntheikki-Palovaara, Paula Elomaa, 2010 → ..., Finland

Yrjö Helariutta , Yrjo.Helariutta@helsinki.fi

Supervised doctoral dissertation, Yrjö Helariutta, 2005

Supervised doctoral dissertation, Yrjö Helariutta, 2009, Finland

Timo Hytönen , Timo.Hytonen@helsinki.fi

PhD thesis supervision, Timo Hytönen, 2009 → 2013

Supervision of PhD thesis, Timo Hytönen, 2009 → 2011

Supervision of PhD thesis, Timo Hytönen, 2009 → 2012

Jaakko Kangasjärvi , Jaakko.Kangasjarvi@helsinki.fi

Supervision of doctoral thesis, Jaakko Kangasjärvi, 2000 → 23.05.2008

Supervision of doctoral thesis, Jaakko Kangasjärvi, 01.2002 → 25.04.2008

Supervision of doctoral thesis, Jaakko Kangasjärvi, 03.2003 → ...

Supervision of doctoral thesis, Jaakko Kangasjärvi, 03.2004 → 12.03.2010

Supervision of doctoral thesis, Jaakko Kangasjärvi, 01.01.2006 → 10.09.2010

Supervision of doctoral thesis, Jaakko Kangasjärvi, 09.2006 → ...

Supervision of doctoral thesis, Jaakko Kangasjärvi, 09.2009 → ...

Anna Kärkönen , anna.karkonen@helsinki.fi

PhD student supervision, Gwe Gilbert Chenyi, Anna Kärkönen, 01.09.2008 → ...

Kirk Overmyer , Kirk.Overmyer@helsinki.fi

Thesis supervisor, Kirk Overmyer, 2008 → ..., Finland

Thesis supervisor, Kirk Overmyer, 09.2009 → 09.2011, China

E. Tapio Palva , Tapio.Palva@helsinki.fi

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2002 → 31.12.2005, Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2003 → 31.12.2006, Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2004 → 31.12.2007, Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2005 → ..., Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2006 → ..., Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2006 → ..., Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2006 → 31.12.2009, Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2007 → ..., Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2008 → ..., Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2008 → ..., Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.11.2009 → ..., Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2010 → ..., Finland

Supervision of doctoral thesis, E. Tapio Palva, 01.01.2010 → ..., Finland

Prizes and awards

Yrjö Helariutta , Yrjo.Helariutta@helsinki.fi

European Young Investigator Award (EURYI), Yrjö Helariutta, 2005

EMBO Membership Award, Yrjö Helariutta, 2008

Anna Kärkönen , anna.karkonen@helsinki.fi

Competent Master's Thesis supervisor in 2010, Anna Kärkönen, 2010

Ari Pekka Mähönen , AriPekka.Mahonen@helsinki.fi

The best PhD thesis in the field of developmental biology. Awarded by Finnish Society for Developmental Biology, Ari Pekka Mähönen, 2003 → 2005

The Finnish academy of science award 2006 for outstanding doctoral dissertation (Tiedeakatemian väitöskirjapalkinto), Ari Pekka Mähönen, 2006

The Helsinki University Biomedical Thesis Award. Awarded by Helsinki Biomedical Graduate school, Ari Pekka Mähönen, 2006

The best thesis award, awarded by Viikki Research Group Organization in Molecular Biosciences, Ari Pekka Mähönen, 2006

University of Helsinki award for outstanding doctoral thesis (Helsingin Yliopiston väitöskirjapalkinto), Ari Pekka Mähönen, 2006

Editor of research journal

Paula Elomaa , Paula.Elomaa@helsinki.fi

Agricultural and Food Science, Paula Elomaa, 01.01.2005 → 31.12.2010, Finland

Kurt Fagerstedt , Kurt.Fagerstedt@helsinki.fi

Ecoloji, Kurt Fagerstedt, 10.03.2005 → 31.12.2011, Turkey

Plant Ecology and Diversity, Kurt Fagerstedt, 01.01.2008 → 31.12.2011, United Kingdom

Journal of Integrated Plant Biology, Kurt Fagerstedt, 01.01.2010 → 31.12.2011, China

Yrjö Helariutta , Yrjo.Helariutta@helsinki.fi

Development, Yrjö Helariutta, 01.01.2006 → 31.12.2006

FEBS Letters, Yrjö Helariutta, 01.01.2006 → 31.12.2006

Journal of Experimental Botany, Yrjö Helariutta, 01.01.2006 → 31.12.2006

Journal of Molecular Biology, Yrjö Helariutta, 01.01.2006 → 31.12.2006

PNAS, Yrjö Helariutta, 01.01.2006 → 31.12.2006

Physiologia Plantarum, Yrjö Helariutta, 01.01.2006 → 31.12.2006

Plant Cell, Yrjö Helariutta, 01.01.2006 → 31.12.2006

Plant Cell & Physiology, Yrjö Helariutta, 01.01.2006 → 31.12.2006

Plant Journal, Yrjö Helariutta, 01.01.2006 → 31.12.2006

Plant Physiology, Yrjö Helariutta, 01.01.2006 → 31.12.2006

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Planta, Yrjö Helariutta, 01.01.2006 → 31.12.2006

Plant Cell and Physiology, Yrjö Helariutta, 2008 → ...

Physiologia Plantarum, Yrjö Helariutta, 2009 → ...

Plant Molecular Biology, Yrjö Helariutta, 2009 → ...

Timo Hytönen , Timo.Hytonen@helsinki.fi

Scientia Horticulturae, Timo Hytönen, 01.01.2005 → 31.12.2005, Netherlands

Scientia Horticulturae, Timo Hytönen, 01.01.2008 → 31.12.2008

Jaakko Kangasjärvi , Jaakko.Kangasjarvi@helsinki.fi

Editorial board, Journal of Plant Physiology, Jaakko Kangasjärvi, 01.09.2008 → ..., Germany

Kirk Overmyer , Kirk.Overmyer@helsinki.fi

Plant Physiology and Biochemistry, Kirk Overmyer, 02.2009 → ..., United Kingdom

Teemu Teeri , Teemu.Teeri@helsinki.fi

BMC Genomics, Teemu Teeri, 01.02.2005 → 31.12.2005

FEBS Letters, Teemu Teeri, 10.01.2005 → 24.03.2005

Physiologia Plantarum, Teemu Teeri, 31.03.2005 → 31.12.2005

Phytochemistry, Teemu Teeri, 12.04.2005 → 31.12.2005

Plant Journal, Teemu Teeri, 18.05.2005 → 31.12.2005

Plant Molecular Biology, Teemu Teeri, 01.01.2005 → 31.12.2005

Planta, Teemu Teeri, 27.06.2005 → 31.12.2005

Annals of Botany, Teemu Teeri, 29.12.2006 → 31.12.2006

Plant Cell Reports, Teemu Teeri, 12.11.2006 → 31.12.2006

Plant Cell, Tissue & Organ Culture, Teemu Teeri, 27.04.2006 → 31.12.2006

Plant Physiology, Teemu Teeri, 01.01.2006 → 31.12.2006

Propagation of Ornamental Plants, Teemu Teeri, 18.12.2006 → 31.12.2006

BioEssays, Teemu Teeri, 18.09.2007 → 31.12.2007

Biotechnology Journal, Teemu Teeri, 04.06.2007 → 31.12.2007

Euphytica, Teemu Teeri, 10.07.2007 → 31.12.2007

Journal of Experimental Botany, Teemu Teeri, 28.09.2007 → 31.12.2007

Plant Cell Reports, Teemu Teeri, 02.01.2007 → 10.07.2007

Plant Physiology, Teemu Teeri, 07.02.2007 → 31.12.2007

Trends in Plant Sciences, Teemu Teeri, 28.09.2007 → 31.12.2007

BMC Plant biology, Teemu Teeri, 02.11.2008 → 31.12.2008

Genome Biology, Teemu Teeri, 09.12.2008 → 31.12.2008

Jornal of Experimental Botany, Teemu Teeri, 03.06.2008 → 31.12.2008

Jornal of Experimental Botany, Teemu Teeri, 12.02.2008 → 31.12.2008

Journal of Plant Physiology, Teemu Teeri, 09.07.2008 → 31.12.2008

Plant Physiology, Teemu Teeri, 17.05.2008 → 31.12.2008

Plant Science, Teemu Teeri, 16.10.2008 → 31.12.2008

Planta, Teemu Teeri, 09.06.2008 → 31.12.2008

Tree Physiology, Teemu Teeri, 08.04.2008 → 31.12.2008

Annikki Welling , Annikki.Welling@helsinki.fi

Tree Physiology, Annikki Welling, 26.10.2005 → 31.12.2005

Functional Plant Biology, Annikki Welling, 01.01.2006 → 31.12.2006, Australia

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Assessment of candidates for academic posts

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Professorship for applied biochemistry and molecular biology, Univ. of Helsinki, Paula Elomaa, 2008, Finland

Evaluation of a docentship application, Univ. of Helsinki, Paula Elomaa, 2009, Finland

Professorship for food safety, Univ. of Helsinki, Paula Elomaa, 2009 → 2010

Evaluation of a docentship application, Univ. of Helsinki, Paula Elomaa, 2010, Finland

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Evaluation in filling an associate professor position, Jaakko Kangasjärvi, 2005, Sweden

Evaluation in promotion to professor, Jaakko Kangasjärvi, 2005, Sweden

Evaluation of docent-qualifications, Jaakko Kangasjärvi, 2006, Sweden

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Evaluation of tenure qualifications, Jaakko Kangasjärvi, 2008, Canada

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EU 'Energypoplar'-project review, Jaakko Kangasjärvi, 2010

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Advisory board of Viikki Science library, Paula Elomaa, 2004 → 2009

Chair of Steering committee for major studies in Biology of Plant Production, Paula Elomaa, 2005 → ...

Kasvintuotannon biologian pääainetoimikunta, Paula Elomaa, 01.01.2005 → 31.12.2005, Finland

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Department Board, Department of Applied Biology, Paula Elomaa, 2007 → 2009, Finland

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SPPS/FESPB, Jaakko Kangasjärvi, 01.01.2007 → 31.12.2007

University of Helsinki, Scientific Council, Jaakko Kangasjärvi, 2007 → 2009

ERA-PG (ERA-NET Plant Genomics, Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008

ESF Research Networking Programme European Networking Summer School on Plant Genomics and Bioinformatics (ENSS), Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008

FORMAS, Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008, Sweden

Federation of the European Societies of Plant Biology (FESPB), Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008

Federation of the European Societies of Plant Biology (FESPB) 16th conference, Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008

Member of National Research Council, Jaakko Kangasjärvi, 01.02.2008 → 31.12.2009

SFRR Plant Oxygen Group meeting on reactive oxygen and nitrogen species, Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008

SPPS (Scandinavian Plant Physiology Society), Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008

Scandinavian Plant Physiology Society, President, Jaakko Kangasjärvi, 08.2008 → 08.2011

Suomen Akatemia, bio ja ympäristötieteiden toimikunta, Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008, Finland

Plant Oxygen Club, President, Jaakko Kangasjärvi, 2009 → 2011

'ad hoc' reviewer, Formas, Sweden, Jaakko Kangasjärvi, 2010, Sweden

'ad hoc' reviewer, NSF USA, Jaakko Kangasjärvi, 2010, United States

'ad hoc' reviewer, VR Sweden, Jaakko Kangasjärvi, 2010, Sweden

Körber European Science Award, Jaakko Kangasjärvi, 2010, Germany

Member of National Research Council, Jaakko Kangasjärvi, 01.01.2010 → 31.12.2012

Anna Kärkönen , anna.karkonen@helsinki.fi

Vice representative of Finland in COST Action E50 "Cell wall and macromolecules and reaction wood" workshop, Anna Kärkönen, 2005, Finland

Board member in the Division of Biotechnology of the Association of Finnish Chemical Societes (Suomen kemian seuran biotekniikan jaosto), Anna Kärkönen, 2008 → 2009, Finland

Secretary General, Scandinavian Plant Physiology Society (SPPS), Anna Kärkönen, 08.2008 → …

Kirk Overmyer , Kirk.Overmyer@helsinki.fi

American Society of Plant Biologists, Kirk Overmyer, 1997 → 2009, United States

The Scandinavian Society for Plant Physiology, Kirk Overmyer, 1997 → 2009

The American Phytopathological Society, Kirk Overmyer, 2000 → 2009, United States

International Society for Molecular Plant Microbe Interactions, Kirk Overmyer, 2005 → 2009, United States

European Plant Science Organization, Kirk Overmyer, 2007 → 2009

SPPS Education Committee, Kirk Overmyer, 09.2010 → …, Finland

E. Tapio Palva , Tapio.Palva@helsinki.fi

Member of the Finnish Academy of Science and Letters, E. Tapio Palva, 01.01.1997 → ..., Finland

Soc. Gen. Fennica, E. Tapio Palva, 01.01.1998 → …, Finland

Plant and Microbe Adaptations to Cold/Scientific Commitee, E. Tapio Palva, 16.05.2006 → 20.05.2006, Italy

Teemu Teeri , Teemu.Teeri@helsinki.fi

Vetenskapsrådet, Teemu Teeri, 01.08.2005 → 30.09.2005, Sweden

Forskningsrådet, Teemu Teeri, 22.09.2006 → 31.12.2006, Norway

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Viikin kasvihuoneiden ja koekenttäalueen johtoryhmän jäsen, Jorma Vahala, 01.01.2004 → 31.12.2006, Finland

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membership, Julia Vainonen, 2007 → …

Membership or other role in public Finnish or international organization

Paula Elomaa , Paula.Elomaa@helsinki.fi

MMM:n luonnoksesta asetukseksi kasvinterveyden suojelemiseksi (MMTDK:n lausuntoa valmistelevan työryhmän jäsen), 2008. Lausunto, Paula Elomaa, 01.01.2008 → 31.12.2008, Finland

Viheralan tulevaisuusstrategia (MMTDK:n lausuntoa valmistelevan työryhmän pj.), 2008. Lausunto, Paula Elomaa, 01.01.2008 → 31.12.2008, Finland

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Scandinavian Society of Plant Physiology, Kurt Fagerstedt, 01.01.2005 → 31.12.2005, Denmark

Ylioppilastutkintolautakunta, Kurt Fagerstedt, 01.01.2005 → 31.12.2005, Finland

Botanical Society of Scotland, Kurt Fagerstedt, 2006 → …, United Kingdom

Heureka Tiedekeskuksen tiedeopetuksen neuvottelukunta, Kurt Fagerstedt, 01.01.2006 → 31.12.2006, Finland

Ylioppilastuktintolautakunta, Kurt Fagerstedt, 01.01.2006 → 31.12.2006, Finland

Heureka Tiedekeskuksen tiedeopetuksen neuvottelukunta, Kurt Fagerstedt, 01.01.2008 → 31.12.2008, Finland

Ylioppilastutkintolautakunta, Kurt Fagerstedt, 01.01.2008 → 31.12.2008, Finland

Timo Hytönen , Timo.Hytonen@helsinki.fi

MMM:n rahoittaman "Kasvitautien torjunta endofyyttisten bakteerien avulla" -hankkeen ohjausryhmän jäsen, Timo Hytönen, 01.01.2006 → 31.12.2006

Jaakko Kangasjärvi , Jaakko.Kangasjarvi@helsinki.fi

Suomen Akatemia, Bio- ja ympäristötieteiden toimikunta, Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008, Finland

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membership, Julia Vainonen, 2005 → ...

Membership or other role of body in private company/organisation

Kurt Fagerstedt , Kurt.Fagerstedt@helsinki.fi

Suomen Dendrologian Seura ry., Kurt Fagerstedt, 2003 → 2006, Finland

Kasvitieteellisen Puutarhan Ystävät ry., Kurt Fagerstedt, 18.12.2006 → 31.12.2008, Finland

Kasvitieteellisen Puutarhan Ystävät ry., Kurt Fagerstedt, 18.12.2006 → 31.12.2006, United Kingdom

Jaakko Kangasjärvi , Jaakko.Kangasjarvi@helsinki.fi

SPPS (Scandinavian Plant Physiology Society), Jaakko Kangasjärvi, 01.01.2008 → 31.12.2008

Participation in interview for written media

Paula Elomaa , Paula.Elomaa@helsinki.fi

Interview for written media, Paula Elomaa, 2006, Finland

Interview for written media, Paula Elomaa, 2006, Finland

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Lehtihaastattelu Etelä-Suomen Sanomiin, Kurt Fagerstedt, 28.06.2003 → 31.12.2011, Finland

Lehtihaastattelu Etelä-Suomen Sanomiin, Kurt Fagerstedt, 19.04.2003 → 31.12.2011, Finland

Lehtihaastattelu Etelä-Suomen Sanomiin, Kurt Fagerstedt, 04.01.2003 → 31.12.2011, Finland

Lehtihaastattelu Helsingin Sanomiin, Kurt Fagerstedt, 25.01.2003 → 31.12.2011, Finland

Suomen Mehiläiskasvattajien Seura ry., Kurt Fagerstedt, 12.05.2004 → 31.12.2011, Finland

Tutkittu Juttu, Kurt Fagerstedt, 01.01.2005 → 31.12.2011, Finland

Sofianlehdon Kotipuutarhakoulu, Kurt Fagerstedt, 18.01.2006 → 31.12.2011, United Kingdom

Sofianlehdon Kotipuutarhakoulu, Kurt Fagerstedt, 15.02.2006 → 31.12.2011, United Kingdom

Yrjö Helariutta , Yrjo.Helariutta@helsinki.fi

Helsingin Sanomat, Yrjö Helariutta, 16.12.2000 → 31.12.2011, Finland

Helsingin Sanomat, Yrjö Helariutta, 20.10.2001 → 31.12.2011, United States

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Ympärivuotinen mansikantuotanto -seminaari, Timo Hytönen, 12.12.2002 → 31.12.2011, Canada

Hedelmän- ja marjanviljelijäin liiton Kaamosmarjapäivät Ikaalisten kylpylässä, Timo Hytönen, 17.11.2003 → 31.12.2011, Canada

MMM:n rahoittamien mansikkatutkimusten tutkijaseminaari, Jokioinen, Timo Hytönen, 23.04.2003 → 31.12.2011, Canada

Hedelmän- ja marjanviljelijöiden liiton kaamosmarjapäivät, Timo Hytönen, 28.11.2005 → 31.12.2011, Netherlands

Hedelmän- ja marjanviljelijöiden liiton talviluentopäivät (Viking Linella), Timo Hytönen, 15.03.2005 → 31.12.2011, Netherlands

Jaakko Kangasjärvi , Jaakko.Kangasjarvi@helsinki.fi

Helsingin Sanomat, Jaakko Kangasjärvi, 16.12.2000 → 31.12.2011, Finland

YLE Radiaattori, Jaakko Kangasjärvi, 01.01.2006 → 31.12.2011, Sweden

YLE Tutkittu juttu, Jaakko Kangasjärvi, 01.01.2006 → 31.12.2011, Sweden

Teemu Teeri , Teemu.Teeri@helsinki.fi

Haastattelu Pohjolan Sanomat, Teemu Teeri, 01.10.2008 → 31.12.2011, Finland

Participation in radio programme

Paula Elomaa , Paula.Elomaa@helsinki.fi

Radiohaastattelu, Deutschlandfunk, Paula Elomaa, 19.05.2005 → 31.12.2011, Finland

Kurt Fagerstedt , Kurt.Fagerstedt@helsinki.fi

Radio-ohjelma Ylen Radio 1, Kurt Fagerstedt, 01.01.2006 → 31.12.2011, United Kingdom

Radio-ohjelma Ylen Radio 1, Kurt Fagerstedt, 01.01.2006 → 31.12.2011, United Kingdom

Radio-uutiset Ylen Radio 1, Kurt Fagerstedt, 09.12.2006 → 31.12.2011, United Kingdom

Jorma Vahala , Jorma.Vahala@helsinki.fi

Radio interview, Jorma Vahala, 14.09.2006, Finland

Participation in TV programme

Paula Elomaa , Paula.Elomaa@helsinki.fi

Interview in TV, Paula Elomaa, 12.06.2006, Finland

Kurt Fagerstedt , Kurt.Fagerstedt@helsinki.fi

TV2-uutiset, Kurt Fagerstedt, 01.01.2006 → 31.12.2011, United Kingdom

E. Tapio Palva , Tapio.Palva@helsinki.fi

YLE Prisma discussion program, E. Tapio Palva, 12.12.2009

Jorma Vahala , Jorma.Vahala@helsinki.fi

ETV (Interview in Estonian TV program), Jorma Vahala, 17.10.2008, Estonia

Participation in interview for web based media

Jorma Vahala , Jorma.Vahala@helsinki.fi

Interview by EffTech forest cluster, Jorma Vahala, 15.10.2009, Finland

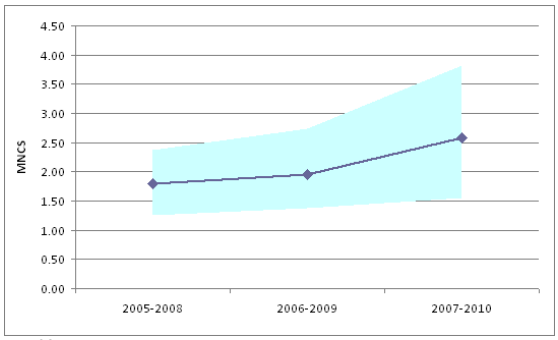
Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010
by CWTS, Leiden University, the Netherlands

Research Group: Palva T

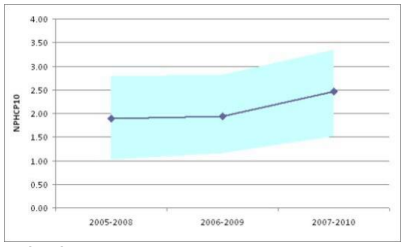
Basic statistics

Number of publications (P)	111
Number of citations (TCS)	1,749
Number of citations per publication (MCS)	15.76
Percentage of uncited publications	16%
Field-normalized number of citations per publication (MNCS)	2.34
Field-normalized average journal impact (MNJS)	1.71
Field-normalized proportion highly cited publications (top 10%)	2.34
Internal coverage	.89

Trend analyses



MNCS



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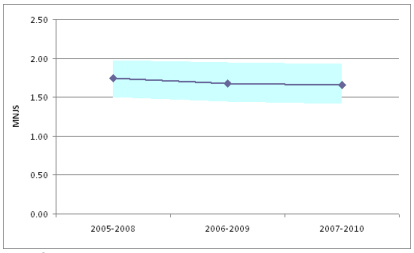
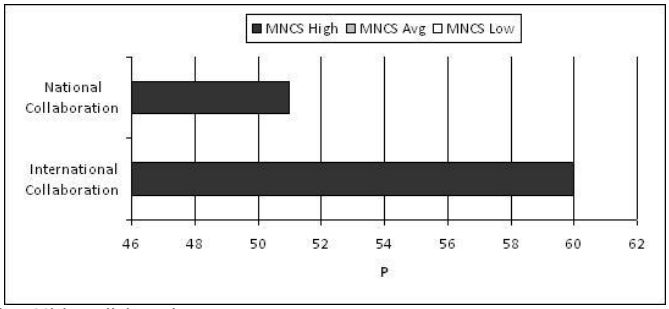


MNJS

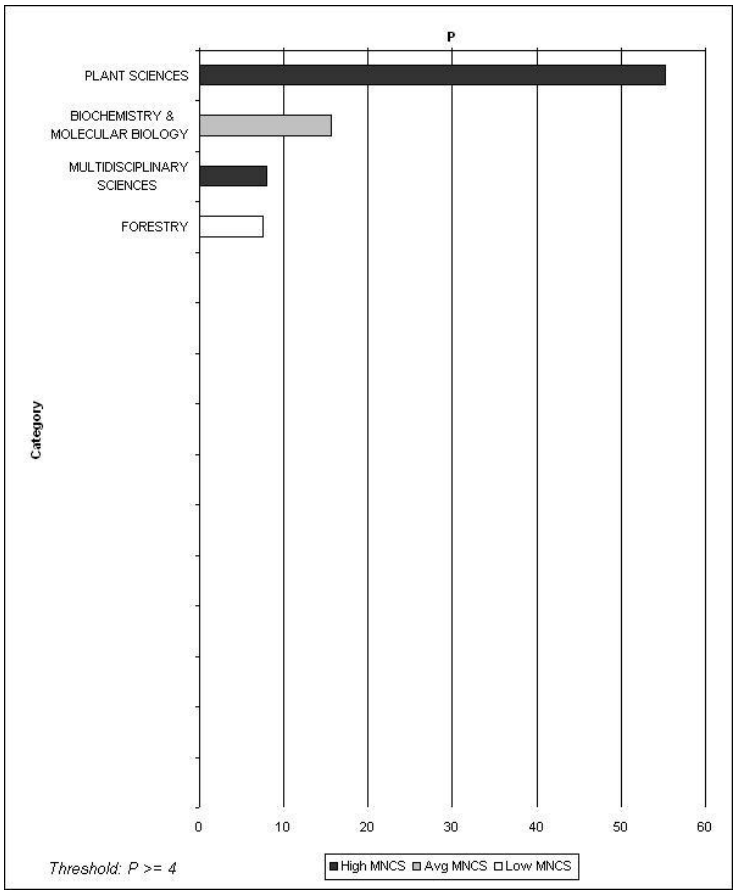
Collaboration



Performance (MNCS) by collaboration type

Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010
by CWTS, Leiden University, the Netherlands

Research profile



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