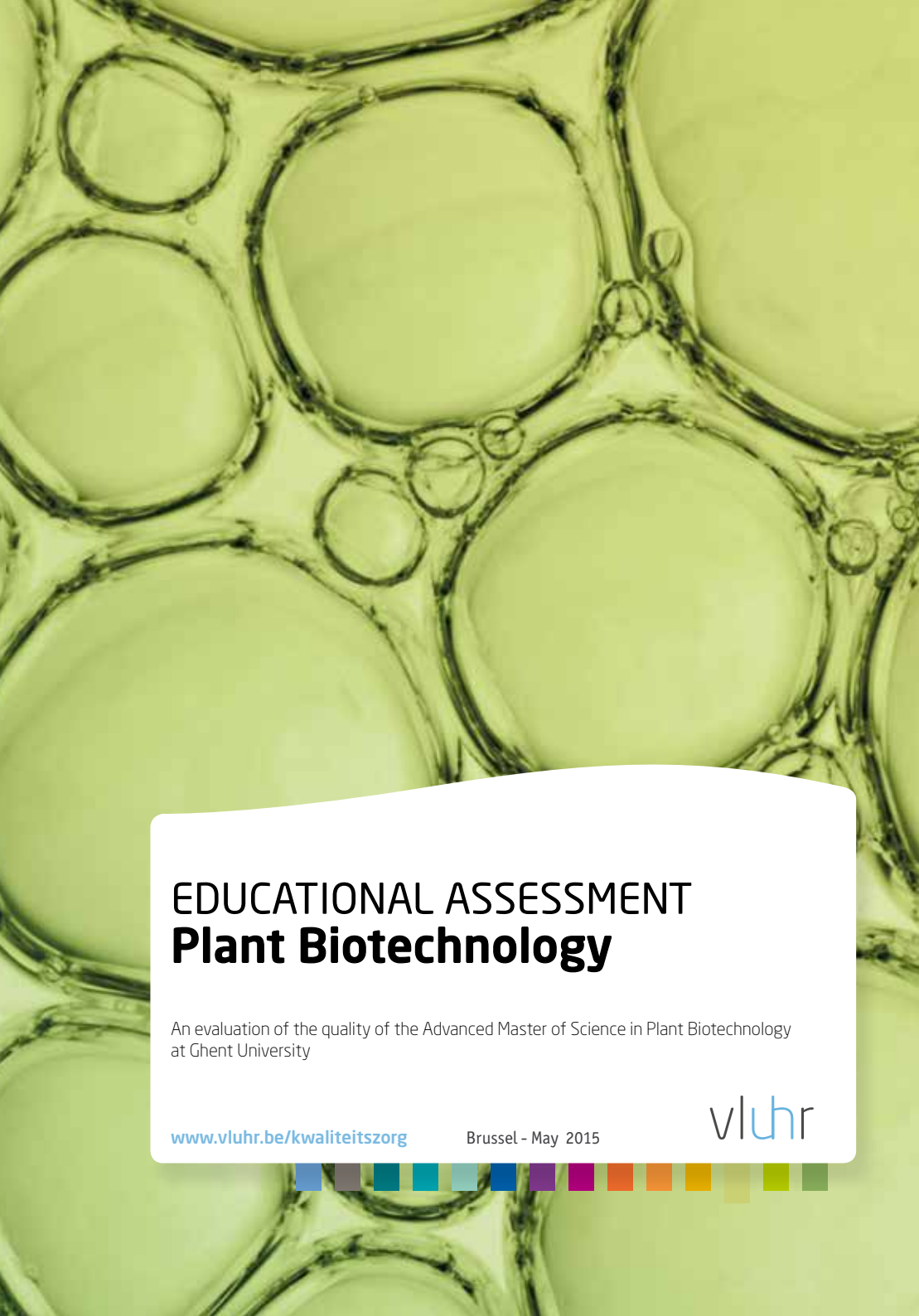

EDUCATIONAL ASSESSMENT
Plant Biotechnology

An evaluation of the quality of the Advanced Master of Science in Plant Biotechnology at Ghent University

www.vluhr.be/kwaliteitszorg

Brussel - May 2015

vluhr

EDUCATIONAL ASSESSMENT
PLANT BIOTECHNOLOGY

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PREFACE BY THE CHAIR OF THE VLUHR QA BOARD

In this report, the assessment panel Plant Biotechnology announces its findings with regard to the Master of Science in Plant Biotechnology at Ghent University. This study programme was assessed in the autumn of 2014 on behalf of the Flemish Higher Education Council (VLUHR). The assessment procedure is part of the VLUHR activities in the area of external quality assurance in Flemish higher education.

The assessment report is first of all intended for the study programme involved and primarily aimed at quality maintenance and improvement. In addition, the report intends to provide objective information to the outside world about the quality of the evaluated study programme. For this reason, the report is posted on the VLUHR website.

This assessment report provides a snapshot of the study programme and is only one phase in the process of ongoing concern for educational quality. After a short period of time the study programme may already have changed and improved significantly, partly in response to the results of internal educational evaluations by the institution itself, or in response to recommendations by the assessment panel.

I would like to sincerely thank the chairman and the members of the assessment panel for the time they have invested and for the high level of expertise and dedication with which they have performed their task. This assessment has only been made possible thanks to the efforts of all those involved within the institution in the preparation and implementation of the assessment site visit.

I hope the positive comments formulated by the assessment panel and the recommendations for further improvement provide justification for their efforts and encouragement for the further development of the study programme.

Nik Heerens
Chair VLUHR QA Board

PREFACE BY THE CHAIR OF THE ASSESSMENT COMMITTEE

The committee has assessed, in November 2014, the Advanced Master of Sciences in Plant Biotechnology of the University of Ghent. The programme received an initial accreditation in 2011 and this was the first assessment by an international peer review panel.

This Master program is special as it is tightly linked to state of the art plant research. Ghent University has a long standing tradition in fundamental plant research and this has been combined with an open mind for innovative applications. This has led to a unique combination of academic research and enterprises that translate this into applications. This provides a strong environment for the Advanced Master of Sciences in Plant Biotechnology.

The panel likes to thank Sofie Goormachtig and colleagues for the interactions and information provided in the report and during the visit. The interviews and discussions were held in an open atmosphere and really led to a valuable exchange of ideas contributed to a better impression of the strong quality elements of the programme. We conclude that the programme management team may be proud of what has been accomplished since period the PBT programme has been initiated.

As chairman I would like to take this opportunity to thank the members of the assessment committee for their constructive and professional way of operating by which the assessment became a good team effort and an agreeable experience. The assessment committee is very grateful to Els van Zele. She has been a great support to the assessment committee her commitment facilitated the achievement of our assessment tasks. For the final steps in the completion of the report we like to thank Marleen Bronders.

Prof Ton Bisseling
Chairman of the assessment committee
for the advanced Master in Plant Biotechnology

KEY FIGURES[1]

Part I	Time schedule of the site visit
Part II	List of programme-specific learning outcomes related to the validated discipline-specific learning outcomes drafted according to the VLUHR-manual
Part III	Schematic overview of the curriculum, stating the number of credits available for each part of the study programme
Part IV	Staff numbers, measured in FTEs, divided by category of post
Part V	Intake data, student progression data and total student numbers
Part VI	The length of study until receiving the qualification for each intake cohort and the average study duration for each graduating cohort
Part VII	Summary of the most important activities of the study programme in relation to internationalisation, in accordance with the vision of the study programme, with as a minimum mobility on the basis of internationally accepted definitions

1 See www.vluhr.be/kwaliteitszorg

SECTION 1
General Section

PART I
Educational assessment Plant Biotechnology

1 INTRODUCTION

In this report, the assessment panel Plant Biotechnology reports on its findings concerning the Master of Science in Plant Biotechnology at Ghent University, which was evaluated in Autumn 2014, on behalf of the Flemish Higher Education Council (VLUHR).

This initiative is part of the activities of the VLUHR in the area of external quality assurance and ensures that the Flemish universities, university colleges and other statutory registered higher education institutions are complying with the relevant decree obligations.

2 THE STUDY PROGRAMME INVOLVED

In accordance with its mission, the assessment panel visited

– Ghent University (UGent)
  - Master of Science in Plant Biotechnology from 12th till 14th November 2014.

3 THE ASSESSMENT PANEL

3.1. Composition of the assessment panel

The composition of the assessment panel Plant Biotechnology was ratified on January 8, February 14 and April 25, 2014 by the VLUHR Quality Assurance Board. The composition of the panel received a positive advice from NVAO on August 4, 2014. The assessment panel was established by the Quality Assurance Board in its decision, dated September 3, 2014.

The assessment panel had the following composition:

- Chairman of the assessment panel:
  - **Prof. dr. Ton Bisseling**, Professor in Molecular Biology, Laboratory of Molecular Biology, Wageningen

- Other panel members:
  - **Dr. Steven Vandenabeele**, Research Project Manager, Rice, CropDesign N.V (discipline expert)
  - **Dr. Cis Van Den Bogaert**, Head Departement of Education, Universiteit Antwerpen (educational expert)
  - **Mrs. Eva Goudsmit**, student MSc in Plant Biotechnology, Wageningen Universiteit (student member)

Mrs. dr. ir. E. Van Zele, staff member of the Quality Assurance Unit of the Flemish Higher Education Council (VLUHR), was the project manager of this educational assessment and acted as the secretary of the assessment panel. As of March 2015 Mrs. Marleen Bronders took over the task.

The brief curriculum vitae of the members of the assessment panel are listed in Appendix 1.

3.2 Task description

The assessment panel is expected:
- to express substantiated and well-founded opinions on the study programme, using the assessment framework;
- to make recommendations so that quality improvements can be made where possible;
- to inform society at large of its findings.

3.3 Method

3.3.1 Preparation

In order to prepare for the assessment of the study programme, the institution was asked to write an extensive self-evaluation report. The Quality Assurance Unit of VLUHR has made available an assessment protocol for this purpose, which describes in detail the expectations regarding the content of the self-evaluation report. The self-evaluation report follows the accreditation framework.

The assessment panel received the self-evaluation report several months before the assessment site visit, allowing for adequate time to carefully study this document and to thoroughly prepare for the assessment site visit. The members of the assessment panel were also asked to read a set of recent Master's theses for the study programme before the site visit took place.

The assessment panel held its preparatory meeting on September 11, 2014. At this point, the panel members were already in possession of the assessment protocol and the self-evaluation report. During the preparatory meeting, the panel members were given further information about the assessment process and they made specific preparations for the forthcoming assessment visit. Special attention was paid to the uniform implementation of the accreditation framework and the assessment protocol. Furthermore, the time schedule for the assessment visit was prepared (see Appendices Key figures) and an initial discussion concerning the self-evaluation report was held.

3.3.2 On-site visit

During the on-site visit the assessment panel interviewed all parties directly involved in the study programme. The panel spoke with those responsible for the study programme, the students, the teaching staff, educational support staff, alumni and representatives from the professional field. The conversations and interviews with all stakeholders were held in an open mind and have been illuminating. They were a helpful supplement to the self-evaluation report.

In addition the panel visited the programme-specific infrastructure facilities (including the library, laboratories, computer facilities). Finally, there was a counselling hour during which the assessment panel could

invite persons from the study programme or individuals could be heard in confidence.

The institution was also asked to provide a wide variety of documents, available during the assessment site visit. During the assessment site visit, sufficient time was scheduled to give the assessment panel the opportunity to study these documents thoroughly. The documents made available to the assessment panel included minutes of discussions in relevant bodies, a selection of study materials (courses, handbooks and syllabuses), indications of staff competences, testing and assessment assignments. Also an additional number of recently handed in Master's theses was made available for inspection. When the assessment panel deemed it necessary to obtain additional information in order to support its evaluation, this information was requested during the assessment site visit.

At the end of each on-site visit, and following internal debate by the assessment panel, the provisional findings were presented by the panel.

3.3.3 Reporting

As the last step in the assessment process, the assessment panel compiled its findings, conclusions and recommendations into the present report. The panel's recommendations are summarised in a separate list at the end of the report.

The study programme director was given the opportunity to reply to this draft report. The assessment panel considered this response.

PART II
Table with scores

The following table represents the assessment scores of the assessment panel on the three generic quality standards set out in the assessment framework.

For each generic quality standard (GQS) the panel expresses a considered and substantiated opinion, according to a four-point scale: satisfactory, good, excellent or unsatisfactory. The panel also expresses a final opinion on the quality of the programme as a whole, also according to a four-point scale: satisfactory, good, excellent or unsatisfactory.

In the report of the study programme the assessment panel makes clear how it has reached its opinion. The table and the scores assigned ought to be read and interpreted in connection to the text in the report. Any interpretation based solely on the scores in the table, is unjust towards the study programme and passes over the assignment of this external assessment exercise.

Explanation of the scores of the **generic quality standard**:

Satisfactory (S)	The study programme meets the generic quality standards.
Good (G)	The study programme systematically exceeds the generic quality standards.
Excellent (E)	The study programme achieves well above the generic quality standards and serves as an (inter) national example.
Unsatisfactory (U)	The generic quality standard is unsatisfactory.

Rules applicable to the final **opinion**:

Satisfactory (S)	The final opinion on a programme is 'satisfactory' if the programme meets all generic quality standards.
Good (G)	The final opinion on a programme is 'good' if at least two generic quality standards are additionally assessed as 'good', including in every case the third one: final outcomes achieved.
Excellent (E)	The final opinion on a programme is 'excellent' if at least two generic quality standards are additionally assessed as 'excellent', including in every case the third one: final outcomes achieved.
Unsatisfactory (U)	The final opinion on a programme – or a mode of study – is 'unsatisfactory' if all generic quality standards are assessed as 'unsatisfactory'.
Satisfactory for a limited period (S')	The final opinion on a programme – or a mode of study – is 'satisfactory for a limited period' , i.e. shorter than the accreditation period, if, on a first assessment, one or two generic quality standards are assessed as 'unsatisfactory'.

	GQS 1 Targeted outcome level	GQS 2 Learning process	GQS 3 Outcome level achieved	Final opinion
Master of Science in Plant Biotechnology	S	E	S	S

SECTION 2

Report of the study programme

GHENT UNIVERSITY
Advanced Master of Science in Plant Biotechnology (PBT)

SUMMARY OF THE ASSESSMENT REPORT
Advanced Master of Science in Plant Biotechnology (PBT)
Ghent University

From 12–14 November 2014, the Advanced Master of Science in Plant Biotechnology (PBT) at Ghent University has been evaluated in the framework of an educational assessment by a peer review panel of independent experts. In this summary, which describes a snapshot, the main findings of the panel are listed.

Profile of the programme

The Advanced Master of Science in Plant Biotechnology (PBT) is organized by the Faculty of Sciences of Ghent University. The programme was first organised in 2012–2013 and offers Masters a one-year advanced education in plant biotechnology. PBT aspires to immerse students in 'state-of-the-art' molecular plant biotechnology and various related technologies whilst also addressing practical applicability of the knowledge adhered. The programme aims at preparing its graduates to conduct independent academic research, often starting with a PhD research track in a plant biotechnological laboratory, to start a professional career in a plant biotechnological company or to take up a policy-related position in a governmental organisation.

In 2012–2013 there were 4 students, in 2013–2014 5 students and in 2014–2015 9 students registered in the programme.

Programme

The PBT curriculum (60 ECTS in one year) comprises compulsory core courses (30 ECTS), electives (6 ECTS) and the Master thesis (24 ECTS). The compulsory courses cover all aspects of modern plant biotechnology related to state-of-the-art technologies, plant growth and development, abiotic stress and biotic interactions, IP and safety regulation. The courses comprise three distinct pillars: 'technologies', 'research disciplines' and 'application'. The electives (6 ECTS) add an element of choice to the programme or are used to remedy shortcomings in the student's prior knowledge. The Master thesis is the cornerstone of the PBT programme that allows the student to orient about half of the programme towards his or her particular interest, providing a certain degree of orientation or preference and specialisation in the programme.

The PBT programme is of high quality. The very tight link between teaching and academic research is a very strong asset of the program. The content of the curriculum is very comprehensive. All key elements and advanced knowledge aspects related to the study of plant biotechnology are covered. Therefore, the programme is very well suited to offer graduates, who might want to re-orient themselves towards 'plants' after a broader master in biology/biotechnology, the opportunity to catch up on all crucial elements in the course of one year. The learning curves throughout the courses are well considered, the overall build-up of the programme - including the horizontal and vertical coherence - is safeguarded and there is good attention for integration of knowledge covered in different courses. The programme uses a variety of teaching methods, including numerous student-activating teaching methods. Most lectures are supplemented with examples, demonstrations, discussions, micro-teaching, problem solving sessions, lab work and students' self-study activities with the use of multimedia. The lectures introduce the crucial knowledge; examples demonstrate that theory and lab work is used to support the hands-on approach towards exploring sciences. The study materials have a very good quality and are up-to-date. The courses are documented and accommodated with good quality reference materials and comprehensive study materials, demonstrating a strong focus on recent developments in the related discipline. There is ample attention for innovative, cutting-edge technology in the programme. The learning environment MINERVA is used by the lecturers. The facilities and research environment are adequate and of high quality. The computer and library facilities are fine.

The Master thesis is an ambitious, individual research project. The Master thesis research is strongly related to ongoing research in one of the associated research groups or a plant biotechnological research institution or firm. The thesis research is similar to the future employment of the alumnus, as it covers all elements of the academic research cycle, situated in a research environment.

PBT is by nature an international programme. The majority of the student population is international, bringing opportunities to learn in an international environment to the classroom. The international dimension is apparent from the dynamic exchange of ideas amongst the students from various countries and the lecturers, bringing in international expertise. The programme benefits from the students' different background and the prominent cultural diversity.

Evaluation and testing

The programme uses formative and summative evaluation, with a well-balanced mix of examination forms. The programme communicates clearly about the examination requirements in the teaching and examination regulations. Careful attention is paid to the introduction and description of the examination types, because the international students are often not acquainted with the Western evaluation tradition.

The examination questions are sensible and the evaluation of the Master thesis is thorough and significant. The Master's theses are of a high scientific level and often lead to a scientific publication.

After the examinations, a feedback week is scheduled. Students can contact the lecturers about their results and ask for feedback. For several courses, feedback is provided on MINERVA. Students can also make an appointment with the lecturer to discuss the examination results and see the examination copy.

Services and student guidance

The programme is strongly supported by an excellent staff with an impressive track record for research and strong commitment for education and the student's learning. There is a good group dynamic amongst the lecturers and students form a coherent group. The student guidance and tutoring, process-wise and content-wise, is well arranged. There is an open-door policy, a strong administrative support and personal contact of the

staff with the students. The programme coordinator and ombudsperson function properly and the support services are targeted and efficient in referring students to the appropriate service when necessary.

Study success and professional opportunities

The study efficiency is good. Virtually every Master's student obtains his degree within one academic year. Drop-out only seldom occurs. Students do not need additional time to finish their Master thesis.

As for research positions in industry in general a PhD is required, most PBT alumni enter PhD research or aspire to do so. Some find employment as a well-qualified technical employee in an international plant biotechnological enterprise. The PBT degree most probably will be an asset, compared to a Master's degree in a related discipline.

PROGRAMME REPORT
Advanced Master of Science in Plant Biotechnology
Ghent University

Preface

This report concerns the Advanced Master, the *Master of Science in Plant Biotechnology (PBT)* organised by Ghent University (shortened to UGent). The assessment panel (further referred to as the panel) visited the study programme from the 12th till the 14th November 2014.

The panel assesses the study programme on the basis of the three generic quality standards (GQS's) of the VLUHR programme assessment framework. This framework is designed to fulfil the accreditation requirements, applied by the NVAO. For each generic quality standard the panel gives a weighted and motivated judgement on a four-point scale: **unsatisfactory, satisfactory, good or excellent**. In assessing the generic quality assurance, the concept of '*generic quality*' indicates that the GQS is in place and that the programme – or a specific mode of the programme – meets the quality level that can reasonably be expected, from an international perspective, of a Master's programme in higher education. The score **satisfactory** points out that the programme meets the generic quality because it demonstrates an acceptable level for the particular GQS. If the study programme scores **good** then the programme systematically exceeds the generic quality for that standard. When the programme scores **excellent**, it achieves well above the generic quality for the particular GQS and serves as an (inter) national example. The score **unsatisfactory** indicates that the programme does not attain the generic quality for that particular GQS.

The panel's opinions are supported by facts and analyses. The panel makes clear how it has reached its opinion. The panel also expresses a final opinion on the quality of the programme as a whole, also according to the same four-point scale.

The panel assesses the quality of the programme as it has been established at the time of the site visit. The panel has based its judgement on the self-evaluation report and the information that arose from the interviews with the programme management, with lecturers, students, representatives of the professional field, alumni and personnel responsible at programme level for internal quality assurance, internationalization, study guidance and student tutoring. The panel has also examined the course materials, Master theses, test- and evaluation assignments and standard answering

formats, and relevant reports available. For the student success rate, the panel called on the data provided by the study programme. The panel has also visited the educational facilities such as classrooms, laboratories and library during the site visit at the university.

In addition to the judgement the panel also formulates recommendations with respect to quality improvement. In this manner, the panel wants to contribute to improving the quality of the programme. The recommendations are included in the relevant sections of the respective generic quality standard. At the end of the report an overview is made of improvement suggestions.

Context of the study programme

The *Master of Science in Plant Biotechnology* (hereafter referred to as *PBT*) is an **advanced Master of Science programme**, organised by the Faculty of Sciences of Ghent University. The programme has a strong link with the research conducted at the *Flemish Institute for Biotechnology (VIB)* at Ghent University. UGent and VIB have a long standing tradition of converting basic plant science into successful industrial entities, *e.g. Plant Genetics Systems (now Bayer CropSciences), CropDesign (now BASF Plant Sciences), DevGen and more recently Agrosavfe*. These are biotech research institutions located at the Ardoyen campus, Zwijnaarde. PBT is embedded in an environment renowned as 'top science and industrial entrepreneurship' where fundamental research is translated into applications, which enables the transfer of knowledge from plant models to crops.

The **discipline** of 'Plant Biotechnology' has become a worldwide research activity, whose breakthrough results initiate a growing branch in industry. Plant biotechnology studies biological processes in plants at cellular and sub-cellular but also at organismal level and entails the development of new technologies and innovative applications suitable for amongst others food production, bio-energy or medicine. In addition a better understanding of plant-molecular mechanisms controlling important processes may contribute to the development of more sustainable agricultural practices.

The **rationale** behind the advanced master's programme PBT is the aspiration to make cutting-edge findings and to understand the plant biotechnological research available to tomorrow's scientists. This research is conducted by research groups of the '*Plantenbiotechnologie en Bioinformatica*' Department at the Faculty of Sciences at UGent. Scientists of the research groups carry this advanced master's programme.

The research conducted at the '*Plantenbiotechnologie en Bioinformatica*' Department at the Faculty of Sciences at UGent, is indisputably of world class level. The '*Plant Systems Biology*' group, with its close links to the '*Flemish Institute for Biotechnology (VIB)*', has a mission to integrate genetics, genomics and bio-computing to unravel the biology of plants and to further explore their potential to build a sustainable world. The rationale behind the advanced master's programme PBT is to allow transferring exactly this cutting edge plant biotechnology know-how and expertise to the next generation of scientists. Proof of this aspiration is that the scientists of the research groups themselves carry this advanced master's programme and ensure an intense connection between theoretical courses and practical know-how.

The programme received an **initial accreditation** (TNO – *toets nieuwe opleiding*) in 2011. The programme was first organised in 2012–2013. The current assessment report describes the findings and evaluation, conducted by a peer review panel, in November 2014, when the programme ran for the third time.

In the academic year 2014–2015 there are 9 students registered in PBT.

As a result of the Flemish Act of 30 April 2009 on the Qualifications a **discipline-specific frame of reference** (DSR) was made, within the Flemish Interuniversity Council (VLIR), the umbrella organisation of the Flemish Universities. The DSR for PBT was validated by the NVAO on April 7th 2014.

Generic quality standard 1 - Targeted Outcome Level

The assessment panel evaluates the targeted outcome level for the Master of Science in Plant Biotechnology as satisfactory.

PBT is an advanced master's programme, offering Masters a one-year deepening education in plant biotechnology. PBT **aspires** to immerse students in '*state of the art*' molecular plant biotechnology and various related technologies whilst also addressing practical applicability of the knowledge adhered. The programme aims at preparing its graduates to conduct independent academic research, often starting with a PhD research track in a plant biotechnological laboratory, to start a professional career in a plant biotechnological company or to take up a policy-related position in a governmental organisation.

PBT has outlined **12 discipline-specific learning outcomes** (DSL) and further developed these in 18 programme-specific learning outcomes (PSL), in line with the competences model of UGent (*competency in the specialty and related sciences, scientific competences, intellectual competences, competences in cooperation and communication, social competences, profession-specific competences*). Both the DSL and PSL demonstrate that PBT is strongly oriented towards in-depth knowledge acquisition of plant biotechnology and their practical application.

PBT has a **dual focus**. Next to the focus on preparing for a PhD research track, there is a focus on the graduate's entering the (out of academia) professional field on the labour market. In the PSL, the focus on **academic-research** competences currently is more evident, compared to the focus on professional application of the knowledge adhered. The academic focus is apparent from the close relation between the intended learning outcomes and current cutting-edge research conducted in this respect at VIB and at Ghent University. The panel is convinced of the ambition to conduct top-quality academic research and characterised PBT during the interviews as '*Harvard at the Leie*'. Autonomy in the acquisition of advanced knowledge, advanced problem-solving abilities and a particular in-depth focus on plant biotechnological theory are very prominent in the programme-specific learning outcomes. The aspiration to prepare the graduates to enter the (non-academic) professional labour market is – in the view of the panel - currently less pronounced in the PSL.

During the site visit the panel became convinced that – at that time - the focus on **academic research** exceeded the focus on **professional skills** particularly suitable for entering the labour market. In addition, from the interviews with all parties involved, the panel became convinced that it was not yet clear whether both focal points were intended as equally strong in the curriculum. In the view of the panel, PBT mainly aims at students' preparing themselves for a next step in their academic career, which is a PhD. The focus on entering the (out of academic) professional labour market is less pronounced. The panel suggests that the programme management team discusses this dual focus and particularly addresses the problem whether the emphasis should be on either one or both distinct aspirations. To foster the decision process, the panel further suggests consulting alumni and the professional field *(cf. the Advisory Committee in GQS 2)*. Finally, the programme-specific learning outcomes (as well as the curriculum) will then have to be adjusted accordingly.

The panel is of the opinion that the discipline-specific learning outcomes are applicable to the contexts studied. The competences aimed at are in line with level 7 (i.e. master's level) of the **Flemish Qualification Framework**. The panel concludes that the academic-oriented programme-specific learning outcomes are in line with the current requirements, evident from the international perspective by discipline specialists and the nowadays expectations of the academic research field. Depending on the outcome of the above-mentioned discussion concerning the dual focus the professional-oriented programme-specific learning outcomes could be pronounced more explicitly. For instance the concepts '*creativity*' and '*innovation*' could be included more outspoken in the programme-specific learning outcomes.

With respect to international **benchmarking**, particularly the one-year duration of the programme differentiates PBT from programmes addressing similar subjects such as 'Plant Biotechnology' at Wageningen University (WUR) and 'Plant and Forest Biotechnology' at Umea University. Because of this difference in duration of the programme, the (target) group of potential students is different as well. This study is more appropriate for master graduates with a biotechnology background who want to shift their focus toward fundamental **plant** biotechnology research. This means in comparison with e.g. Wageningen University, that there are relatively more plant-specific courses and less general biotechnology (or general) courses. When comparing the quality of education of these two masters, the quality seems to be equally high, with PBT having an extra advantage due to the availability and integration of expertise and equipment of internationally very high-ranking research groups (including the VIB) within the educational programme.

Students are currently fairly well informed about the programme-specific learning outcomes by means of **various media and information carriers** and seem to have in general a fairly good view on the aims for the programme, although most students come for the rich academic environment, linked with the programme and the opportunities to prepare themselves for PhD research. Throughout the visit, the panel became convinced that **starting a career in industry**, immediately after finishing the PBT programme may not be straightforward. Alumni, whom the panel has spoken with and who found positions in industry, currently function as technicians in a laboratory context. In the plant biotechnology research industry, predominantly either 1) technical, laboratory skills are demanded, or 2) highly trained researchers who usually hold a PhD and

are capable to fulfil leadership positions. The PBT programme ensures students to receive a strong technical expertise and a critical scientific mind-set and certainly has the potential to enrich the pallet of skillsets available for industry. Nevertheless, if PBT fosters the option for alumni to find jobs efficiently in the plant biotechnology industry, it is advisable to further fine-tune in which niche the PBT alumni fit best and hence a strong dialogue with industry would guide this process. The panel therefore suggests clarifying the dual focus of the programme-specific learning outcomes and informing students accordingly. In addition the broad communication and promotion about the programme needs to address this also, in order to avoid wrong expectations.

The **international dimension** is inherent to the programme. PBT studies an internationally relevant and highly valuable discipline (comprising increased crop yield, crop protection, crops with added value, sustainable production, etc.). PBT is oriented towards an international student audience and aims to have students adhere knowledge and competences from generic biology and other life sciences programmes, offering them ample opportunities to study molecular plant biotechnology.

In summary, the panel is of the opinion that the programme-specific learning outcomes are more than adequate. The programme aims at offering Master students a thorough education in cutting-edge academic research in the area of plant biotechnology. The programme aspires to provide top quality academic research, carried by the expertise of various research groups and research institutions at UGent and VIB. The programme-specific learning outcomes of PBT currently are situated at an academic master's level and have the potential to be further strengthened, after clarification of the dual focus. Currently the academic focus is fine while the professional focus needs to be articulated more accurately. Consequently the panel attributes the score 'satisfactory' to this GQS, indicating that the programme-specific learning outcomes are fine with the potential to attain the level 'good', after instillation of the choices to be made with respect to the academic and the professional focus in the programme.

Generic quality standard 2: Learning Process

The assessment panel evaluates the learning process for the Master of Science in Plant Biotechnology as excellent.

The Master of Science in Plant Biotechnology is a one year advanced master's programme. The PBT curriculum (60 ECTS in one year) comprises:
- compulsory core courses (30 ECTS)
- electives (6 ECTS)
- the Master thesis (24 ECTS)

PBT curriculum (60 ECTS)

PBT courses	pillar	ECTS credits
Compulsory courses		**30 ECTS**
Technologies in Plant Biotechnology	**technologies**	**9**
Plant Research Technologies		3
Functional Plant Genomics		3
Molecular Plant Breeding		3
From Plant Cell to Plant Growth	**research disciplines**	**9**
The Plant Cell		3
Plant Growth and Development		3
Plant Yield		3
Plant Interactions		**6**
Plant Environment Interactions		3
Plant Biotic Interactions		3
Plants as Production System	**applications**	**3**
The Plant Factory		3
Regulations in Plant Biotechnology		**3**
Plant Biotechnology: Biosafety, IP and Society		3
Elective courses		**6**
Master thesis		**24**

The **compulsory courses** cover all aspects of modern plant biotechnology related to state-of-the-art technologies, plant growth and development, abiotic stress and biotic interactions, IP and safety regulation. The courses comprise three distinct pillars: '*technologies*', '*research disciplines*' and '*application*'. The **electives** (6 ECTS) can add an element of choice to the programme, according to the student's particular interest, or can be used to remedy shortcomings in the student' prior knowledge (e.g. '*Biostatistics*').

In addition, the **Master thesis** subject is selected by the student, allowing the student to orient about half of the programme towards his or her particular interest, providing a certain degree of orientation or preference and specialisation in the programme. The panel suggests using the electives to offer students some kind of pre-structured choices *(e.g. in minors)* in various relevant sub-disciplines. A more predefined choice – for instance – with respect to content knowledge and (soft) skills strongly appropriate to the non-academic professional world, may be helpful to strengthen the focus on the professional field.

The panel is of the opinion that the content of the **PBT curriculum** is very comprehensive. All key elements and advanced knowledge aspects related to the study of plant biotechnology are covered. Therefore the programme is very well suited to offer graduates, who might want to re-orient themselves towards 'plants' after a broader master in biology, the opportunity to catch up on all crucial elements in the course of one year. The stimulating learning environment in which PBT students find themselves contributes to the high-quality learning experience. The learning curves throughout the courses are well considered, which is apparent from the competence matrix. The Educational Committee safeguards the overall build-up of the programme, including the horizontal and vertical coherence of the programme throughout the various courses. Notwithstanding the large number of fairly small courses (3 ECTS), there is good attention for integration of knowledge covered in different courses. To lift the **integration** of knowledge to the next level, the panel suggests adding some kind of integrated problem solving courses or integrated lab work. The lecturers indicated during the interviews to be in favour of this suggestion. The topics covered tackle nowadays challenges and touch upon future ones and they are in line with current innovative research in the discipline.

The PBT programme is solidly supported by a teaching staff with a **research base** at VIB and the research centres at Ghent University. The panel is of the opinion that this tight link between teaching and academic research is a very strong asset of the programme.

The **alumni strongly appreciate** the programme for various reasons. PBT gives them in-depth insight into the various aspects of plant biotechnology. PBT improves their knowledge and understanding of many aspects of plant biotechnology. In general, the in-house expertise is excellent to provide a true learning experience. In case in-house expertise is less strong *(e.g.*

crop protection) it is efficiently recruited from other institutions. The alumni commented during the interviews that PBT acquaints them with working in a research laboratory, prepares them for a PhD trajectory, and shows them the technological applications in research.

In many lectures the PBT students sit together with other Master students, as the PBT group currently still is rather small. The lecturers have ample attention for the students' **diverse backgrounds** and often check whether everyone is able to keep up with the pace of the lecture. Students who may miss some crucial background elements are referred to appropriate background knowledge and catch up promptly.

The programme uses a variety of **teaching methods**, including numerous student-activating teaching methods. Most lectures are supplemented with examples, demonstrations, discussions, micro-teaching, problem solving sessions, lab work and students' self-study activities with the use of multimedia. The lectures introduce the crucial knowledge; examples demonstrate the theory and lab work is used to support the hands-on approach towards exploring sciences. The panel heard from the students and alumni that they ask for more excursions and visits to companies, allowing them to get better acquainted with real situations on the work floor outside the academic context. The panel finds this a good suggestion. The panel is of the opinion that the teaching methods are in line with the aspiration of the PBT programme, use a good **variety of instruction and hands-on techniques** and address the development of practical skills and critical thinking, useful to operate as a researcher in challenging surroundings.

The panel has examined the **course materials** via the learning environment and the materials on display during the site-visit. Most lecturers use MS PowerPoint presentations and guiding texts and articles that make the study materials easily updatable. The panel is of the opinion that the study materials are situated at master's level, have a very good quality and are up-to-date. The courses are documented and accommodated with good quality reference materials and comprehensive study materials, demonstrating a strong focus on recent developments in the related discipline. There is ample attention for innovative, cutting-edge technology in the programme, which is in conformity with the aspiration of the programme.

The **workload** and feasibility of the programme are safeguarded by the programme management and the Educational Committee. The workload is

measured by means of study time measurements and surveyed by formal and informal consultations of students. From the study time measurement reporting, as well as from the students' comments during the site-visit, the first semester seems particularly challenging. This mainly has to do with additional time needed to get settled in a foreign country, to find one's way around the campus and the University, to get acquainted with the educational system, and possibly to catch up on some missing concepts from disciplines less thoroughly covered in students' prior learning. For PBT the estimated and real workload seem to be fairly well balanced for the various courses. Given the recent establishment of the programme (first organised in 2012–2013), the panel suggests to continuously monitor the link between the intended and real workload for the various courses in the next few years and to make appropriate changes if necessary. This suggestion is in line with the programme director's intentions and will be much easier, since the positions for student representatives (from 2013–2014 onwards) are filled in the Educational Committee.

The **Master thesis** is envisaged as a cornerstone of the PBT programme. It comprises 24 ECTS and is an ambitious, individual research project. The Master thesis research is strongly related to ongoing research in one of the associated research groups or a plant biotechnological research institution or firm. The student is encouraged to select a topic of his personal interest. Once the topic is decided and the supervisors appointed, the relevant biological background, scientific literature and appropriate mechanisms are discussed and studied. The student works in close contact and under the supervision of researchers in the laboratories in an academic (or industrial) setting. Up till now no firms allowed Master theses in their laboratories or research units. Confidentiality and intellectual property rights seem to be a hindrance in this respect. The Master thesis research is similar to the future employment of the alumnus, as it covers all elements of the academic research cycle, situated in a research environment. The Master thesis comprises different phases: *'helping to formulate and setting up a research project, conducting independent research under the supervision of academic and technical staff, scientific reporting (oral and written) about the research and the findings, situating and interpreting the findings of the research within the related academic literature, proposing new hypotheses based on the findings and proposing possible applications and technology transfer'*. The Master thesis has the format of a peer-reviewed journal article. The research can start early in the first semester and runs parallel with the lectures. At two intermediate stages in the process, students get feedback on their work in progress.

Some students and alumni are of the opinion that the time to be invested in becoming acquainted with the research performed at the research groups and hence with the options for selecting a particular Master thesis topic consumes considerable time, which substantially adds to the workload. This is especially the case for students who are coming from abroad and therefore are not familiar with the research groups at the university. The panel suggests organising some kind of a **Master Theses Seminar** (most commonly organised in the third Bachelor in other programmes) at the beginning of the academic year. This would allow the research groups at the university and the adjacent research institutions to present themselves and their research topics. Such an initiative surely will help the students to find their way around the university and VIB and to identify the appropriate research group, given their particular interest in a Master thesis topic.

PBT (60 ECTS) is **accessible** for holders of a Master's degree in Life Sciences. The Flemish university degrees 'Master of Science in Biochemie en Biotechnologie' and '*Master of Science in Bio-ingenieurswetenschappen: Cel- en Genbio-technologie*', grant direct access to the programme. Students with a Master of Science in the areas Sciences, Applied Biological Sciences and Industrial Sciences (specialisation Biochemistry) undergo a *case-based evaluation for admission*. The tuition fee is kept relatively low to allow students from developing countries to apply for the programme. The programme management seeks ways to facilitate funding for the students through the appropriate channels. The students need to demonstrate adequate prior knowledge (in amongst others '*molecular genetics*', '*plant physiology*' and '*bio-informatics*') and a skype motivation interview is held before the student is admitted. During the skype meeting, proficiency of the English language needs to be demonstrated. Students having insufficient background knowledge about particular subjects are suggested preferential reading materials before finally registering for the programme. The assessment panel is of the opinion that the **admission requirements** are fairly well set. As a means to further strengthen it, the panel recommends to communicate the 'intended student profile' more clearly and to better outline the knowledge content related to admission requirements. In addition the preferential reading and study materials could be outlined better and supported with online course materials, readily available on the Internet. Offering these instruments as a pre-defined package will surely help the programme management to keep up with the workload of contacting all interested students individually and direct them to appropriate background materials and references.

PBT can be spread over two consecutive years with the mandatory courses in the first year and the Master thesis in the second year. Till now, no students have opted for this.

In 2012–2013 there were 4 students, in 2013–2014 5 students and in 2014–2015 there are 9 students registered in the programme.

For PBT, 13 **professors**, linked to VIB or the Faculty of Sciences teach in the programme. Their involvement in research (*either at VIB or at the UGent or in agro-biotech firms*) guarantees the close interrelationship between their teaching and research. In addition, frequent guest lecturers are invited and bring their particular expertise into the programme. Research output as well as educational skills are considered upon contracting new lecturers. The teaching assistants are linked to one of the research groups and bring in particular domain-related expertise. All personnel follow a functioning and evaluation cycle. The students and alumni were very positive during the interviews about the quality of the teaching and the disciplinary expertise of the staff. The panel is of the opinion that the programme is strongly supported by an **excellent staff** with an impressive track record for research and strong commitment for education and the student's learning. The panel observed that there is a good group dynamic amongst the lecturers and suggests using this to build a solid group of '*core-faculty members*' to jointly carry this programme.

PBT students follow most of the courses together with other student groups at the 'Technologiepark Zwijnaarde (Ardoyen)' or other UGent campuses, the 'Ledeganck', 'De Sterre'. The **facilities** at UGent are commented to be adequate. The facilities and research environment at Ardoyen are of high quality and are very stimulating for the students to get involved in nowadays research. Overall the lecture rooms are equipped with projection facilities and facilitate modern teaching methods. The laboratories have very good quality high-standard equipment. During the courses and the Master thesis research, students use the facilities in the research laboratories of the research groups. The computer facilities are fine. Wireless access to the Internet is provided on campus. The library facilities are fine. The paper and online collections are up-to-date and opening hours of the library are fine. The learning environment MINERVA is used by the lecturers and helps students focus on their studying. The panel **visited** the premises at Ardoyen during the site-visit and is of the opinion that the facilities are well equipped, offering the students good opportunities to come to grips with the subjects studied. Especially the

VIB building can be described as a very stimulating learning environment, bringing teaching and research closely together.

Ghent University **promotes** PBT on its website, via the international network of the research groups and via the contacts of the staff. Students often learn about the programme by exploring the Internet or from other students and alumni. As a means to further promote the PBT programme, the panel suggests to widely promote the programme *(e.g. at international conferences, by advertising actively and systematically according to various related themes)* and assign the Advisory Committee to promotion of the programme as well.

PBT is by nature an **international master**'s programme. About half of the student population is international, bringing opportunities to learn in an international environment to the classroom. As such internationalisation is not to be sought in student exchange and their staying at different institutions throughout the programme. The international dimension is apparent from the dynamic exchange of ideas among the students from various countries and the lecturers, bringing in international expertise. The programme benefits from the students' different background and the prominent cultural diversity. Outgoing mobility from within the programme is, given the one-year intensive advanced master's programme, not a valid parameter to measure PBT's international characteristic.

The open-door policy, the strong administrative support and the personal contact of the staff with the students are highly appreciated by the international audience. The students are guided prior to their arrival and helped out with all kinds of logistic and practical things and they are welcomed on the first day, when all relevant information is communicated. **Social interactions** between the students are aided by their daily access to the university and the laboratories. Although the PBT students follow lectures with other student groups, they seem to form a coherent student group. The panel is of the opinion that the **student guidance and tutoring**, process-wise and content-wise, is well arranged. The central and faculty services, with the programme coordinator as a crucial pillar in this process, refer the student to the appropriate body or deal with the request themselves. The ombudsperson functions efficiently and students get around and are helped in an appropriate manner. With the eye on the future growth of the number of students, the panel suggests to attribute the function of ombudsperson (last year in the hands of a fellow student) to a staff member who is able to take position in between

the parties involved to solve occurring problems. In addition, a means to pass on topics dealt with by former student groups to next year's student group, and hence device a manner to secure continuity in this respect would further strengthen the student involvement in the programme.

PBT has an operational **internal quality assurance mechanism** in place. The students evaluate the courses as well as the entire curriculum. The teaching of the lecturers is evaluated by the students and linked to the personnel files. The overall results of the curriculum evaluation are discussed at the Educational Board meetings and are applied to improve the programme. Given the size of the student population, informal feedback is conveyed faster than the formally registered data and surely helps to intensively monitor the curriculum. Given the expectation of a growing student population, the programme could make more use of the formal feedback mechanisms available at UGent to capture all relevant information about the programme.

The programme management is very efficient in constantly fine-tuning and improving various aspects of the programme, based on the evaluations of students' and alumni feedback. The panel is of the opinion that PBT has promptly followed up on most of the **recommendations** made by the TNO panel in 2011. The establishment of an Advisory Committee with members of the professional field and the formal student representation for the programme took more time than first envisioned and was taking shape at the time of the site visit. Also the requirements for students entering the programme could be substantiated more thoroughly. The panel observed that the programme management team shows evidence of its functioning internal quality assurance system. In agreement with its suggestion to make more use of the (UGent) formal feedback mechanisms when the student group grows, the panel recommends to address all stakeholders, including delegates from the professional field in the feedback.

The panel is of the opinion, based on the information on display during the site visit and the interviews and discussions, that students, lecturers and alumni have good opportunities **to get involved** in the programme. The aftercare for the alumni as well as opportunities to link them to the programme as ambassadors for the programme could be improved in the next few years.

The **Advisory Committee**, (including a full range of international partners from the academic and non-academic professional field) could

be assigned to help the programme discuss and decide on the dual focus in the programme *(cf. GQS 1)*. The panel recommends that the three to four large industries at Ardoyen campus should be represented in the Committee with influential and committed members, that the Committee should be composed of international experts and that the Committee would have international appearance. In addition, the panel recommends the programme to assign an influential member of the teaching staff to join and possibly chair the Advisory Committee. It seems probable from the interviews with the first cohorts of alumni that future students will first attain a PhD before they enter the (non-academic) professional world or take a job at industry. Therefore the panel suggests that the activities of this Advisory Committee would be extended to the training and education of both the PBT master programme and the related PhDs.

The average study progress, seen as an indicator of an **effective learning environment**, is high. Drop-out only seldom occurs and up till now has always been related to personal non-academic reasons. Students do not need additional time to finish their Master thesis.

The panel describes the **self-evaluation report** as substantial and clear, open, honest and well founded. The interviews and discussions during the site-visit were all held in an open atmosphere and really led to the exchange of ideas in a collegial spirit. The panel felt the interviews as an essential supplement to the pieces that were laid down in preparation and both contributed to a better impression of the strong quality elements of the programme. The panel is of the opinion that the programme management team may be proud of what has been accomplished so far with the PBT programme and a less modest attitude of the team may foster the further promotion of the strong quality elements of the programme and the research teams. The panel wishes to thank the programme and its personnel for the open spirit and for the thorough preparation of the assessment, which enabled it to establish a clear picture about the quality elements of the programme and allowed it to formulate (hopefully) meaningful recommendations, with a view to the further growth and continuous improvement of the programme.

In summary, the panel is impressed by the high quality of the current PBT programme and the meaningful implementation of the targeted learning outcomes. The programme management team has brought the PBT programme to its current stage. The majority of the suggestions, made by the panel are suggestions to anticipate on the growth of the programme

and to help it reach its full potential. One of these issues requiring some further consideration is clarifying the focus on either 'academic research' or 'professional industry' in the content and focus of the curriculum. The panel substantiated this issue and took it into account in the score attributed to generic quality standard 1: *targeted learning outcomes* and will not take this element into account in generic quality standard 2. Furthermore the students are very satisfied with the educational process, the support and rich academic environment and the alumni look back with satisfaction to their training. Both groups state the leading expertise of the lecturers and their teaching qualities as an absolute plus. PBT very explicitly makes the link between research and teaching, which is a strong characteristic for an academic programme. The panel is of the opinion that the programme is systematically positioned well above the generic quality level and may serve as an (inter)national example. Many of the recommendations made by the panel should be seen in the light of the further growth of the programme in the next few years. The panel is convinced that given its recent history, the PBT programme is now to make choices for the future, to facilitate its flourishing to its full potential. The panel hopes that its considerations and recommendations will help the PBT programme to shape its bright future, guide it to reach and grow into its full potential in the next few years.

Generic quality standard 3 – Outcome Level Achieved

The assessment panel evaluates the outcome level achieved for the Master of Science in Plant Biotechnology as satisfactory.

In view of the introduction of learning outcomes and competence-oriented learning, UGent has developed a new assessment method for its study programmes. The programme management teams have been asked to develop, no later than December 2015, a **view on the assessment of student performance**. The PBT Educational Board has developed its view, comprising various important elements *(e.g. testing involves the entire academic process (from hypothesis till evaluation of the results), the relation between knowledge and application, a large spectrum of evaluation methods (formative and summative), a feedback culture, transparency and reliability of the evaluation methods applied)*. The panel is of the opinion that these elements are indeed valid with respect to assessment of students and are a good point of reference for the development of a fully-fledged assessment policy.

The programme uses **formative** (non-period bound or continuous) and **summative** (end-of-term) **evaluation**. There is a mix of examination forms

used. Summative evaluations are either oral or written examinations, or a combination of both formats (in more than half of the courses). Formative evaluation includes lab work, projects, active participation, problem solving, assignments and reports. Knowledge is usually evaluated by summative exams; skills are evaluated through formative assessment. The Master thesis is evaluated, based on the research process, the final paper, the presentation and the oral defence. About one third of the courses use oral exams. Students indicated that they are well informed about the examination formats (in the ECTS-sheets and via information during the lectures) and the examination dates (amongst others on the electronic learning environment MINERVA). Careful attention seems to be paid to the introduction and description of the examination types, particularly relevant for international students, who might not be acquainted with the Western evaluation tradition. Nonetheless, the 2012–2013 students asked to better communicate the evaluation methods. The lecturers, meanwhile, addressed this request.

An **evaluation matrix** shows that the assessment methods used correspond to the targeted learning outcomes. The **validity** or **congruence** is mainly monitored by the alignment between the programme-specific learning outcomes and the examination form. The Examination Board monitors the **reliability** of the exams. In case of dispute, the student can appeal against the exam. Under the heading of **transparency**, communication regarding the evaluation methods and criteria is understood *(e.g. during the lectures and in the ECTS sheets)*. The quality cycle questions the different characteristics of the testing policy among the students and considers adjustments if necessary. The UGent evaluation system is described in the Educational and Examination Code. The Educational Board sets the rules and monitors the assessment and evaluation for the PBT programme.

The panel analysed a sample of **examination assignments and standard answering formats**. The summative assessment is well used to evaluate knowledge and understanding. The formative evaluation, including lab work, registers students' learning and has a focus on the evaluation of skills and complex competences. The panel describes the mix of examination formats as well balanced and the examination questions as well as the standard answering formats as sensible.

The Master thesis is read by the promoter and two reading commissioners, presented and defended in front of a jury of at least three assessors. Various elements contribute to the **evaluation of the Master's thesis** *(e.g. technical*

skills and the quality of the work done: data analysis, writing, interpretation of results and applications, the oral presentation and defence). The final grade is deliberated, based on the grades given by the three assessors. Evaluation forms are used to document the judgements and arguments of the Master thesis evaluation panel. The panel studied (given the recent history) all of the currently available Master theses. These have a high level and the evaluation is thorough. On many occasions, the data obtained within a Master thesis is included in a publication in a scientific journal. The evaluation of the Master thesis seems thorough and significant. However, the arguments and comments on the Master's thesis evaluation sheets are rather short and little informative. With the view on the feedback to be given to the student this could be improved. In addition, the score attributed to creativity, innovation and technical application is rather low, as are the grades. The panel members consistently scored the Master thesis higher, compared to the final grades given by the assessors. The evaluation sheets did not show evidence of poor defence or presentations of the final work by the students. The panel therefore suggests discussing this within the Educational Board with the group of lecturers, changing the balance in the grading scheme and making the appropriate changes in the evaluation mechanism.

The self-evaluation report describes that the discipline-specific, scientific and intellectual competences, attained by the alumnus, attribute to his particular **professional profile**, applicable in various biotechnological companies and enterprises. Bearing from this, the alumni can opt for PhD research; execute a highly qualified technological function in a plant biotechnological company or policy-oriented function at a government institution. The self-evaluation report further highlights that most often; a PhD may be required to really start a research career. The alumni indeed commented during the interviews that finding a research job in industry after graduation from PBT is difficult, as for research positions most often a PhD is requested. This finding has also been corroborated by the delegation of the professional field during the interviews. Most PBT alumni indeed conduct PhD research first or aspire to do so. Some find employment as laboratory technician or as a well-qualified technical employee in an international plant biotechnological enterprise. Following the interviews, the panel is convinced that the alumni may not have been fully aware of the difficulty to find a suitable job after completing the programme and refers to its suggestion made in GQS 1, to clearly communicate this to the incoming students in order not to set false expectations. The PBT degree most probably will be an asset, compared to a master's degree in a related

discipline, but will probably not help the graduate to compete with PhDs when entering the labour market.

In view of the above-mentioned reflections, the panel suggests to add a particular element of evaluation to the current range of evaluation methods, i.e. the evaluation of the **competence profile** of the graduate. Given the attention to application of knowledge and innovation, the panel is convinced that 'other' than the typical evaluation formats are well suited to capture and measure the student's growth with respect to complex competences, applicable on the labour market. A competences profile of the student could be drawn at the beginning of the programme and the growth could then be demonstrated using for instance a portfolio. The competence profile could be an additional dimension to the UGent competence model, for the PBT programme. The panel finds it worthwhile to consider building such a portfolio that demonstrates the student's generic competences and soft skills *(e.g. team work, analytical abilities, networking, communication skills, etc.)*. The panel also sees a benefit in having the core staff build a competences model of the individual student collectively throughout the various courses. Intermediate feedback about the student's development in this respect could help the student develop particular competences and soft skills, particularly relevant in a professional working context (either in industry or in research). In addition to the assessment of the targeted learning outcomes, the staff could then also provide the student (upon his graduation) with a competences profile, developed throughout the course of the programme. The panel is convinced that this will be helpful for the graduates and their future employers to take career decisions. This could be an added value for the programme. Surely, the staff would need to be trained in evaluating these competences.

After the examinations, a **feedback** week is scheduled. Students can contact the lecturers about their results and ask for feedback. For several courses, feedback is provided on MINERVA. Students can also make an appointment with the lecturer to discuss the examination results and see the examination copy. The panel suggests organising proper feedback more proactively from the side of the lecturers and not having feedback depend on the student's request for it.

The panel notes that PBT gradually moves towards a c**omprehensive assessment policy** that supports competences-oriented assessment and found first solid indications of this evolution. However, the panel notes that the effective translation of the wording of the DSL and their

implication for the daily teaching and assessment practices is an ongoing process. This process needs to be carried out for every individual course, a process which takes a substantial amount of time. The panel observed the commitment of the teaching staff to substantiate this '*cultural change*'. It is therefore convinced that this cultural change will eventually find its way into the everyday educational practice of PBT. The panel is strongly of the opinion that, after completing this transformation, the assessment policy will be fully developed. Meanwhile, the assessment practice used is oriented towards the alignment of on the one hand the knowledge learned and skills trained and on the other hand the programme-specific learning outcomes. Consequently, the panel is of the opinion that the assessment on practice, meanwhile, is adequate.

The programme management team intends to follow up on its graduates entering the labour market. The panel advises the programme management to indeed closely listen to the **graduates' experiences** on the labour market and take this into account when addressing the clarification of the profile of the programme.

The **average student success rate** (to date) for PBT is 100%, indicating that all students obtained their degrees within one academic year.

In summary, the panel is of the opinion that the outcome level achieved is adequate and at master's level. The alumni attain the targeted learning outcomes. The programme is on its way to introduce a fully developed assessment strategy. It is acceptable that there is time and care needed before the entire 'culture change' from the DSL and in particular the wording of the programme-specific learning outcomes, is visible in the everyday teaching and evaluation practice. The panel meanwhile is of the opinion that the generic quality standard 'Outcome Level Achieved' is met for PBT and scores generic quality standard 3 as satisfactory.

Final judgement of the assessment panel

As the **Generic quality standard 1** is evaluated as satisfactory, the **Generic quality standard 2** is evaluated as excellent and the **Generic quality standard 3** is evaluated as satisfactory, the final judgement of the assessment panel about the **Master of Science in Plant Biotechnology (PBT)**, is satisfactory, such according to the decision rules.

Summary of the recommendations for further improvement of the study programme

Generic quality standard 1 – Targeted Outcome Level

- Clarify the dual focus of the programme, oriented towards academic research and/or industry, make appropriate choices and align the learning outcomes accordingly (in the programme-specific learning outcomes as well as in the curriculum).

Generic quality standard 2 – Learning Process

- Add an integrated problem solving course or integrated lab work to the curriculum to further strengthen the integration of knowledge throughout the programme.
- Use the electives to add a certain degree of specialisation to the individual student's curriculum.
- Consider conducting more excursions to firms in order to better link to the out of academia professional world.
- Introduce some kind of a Master's theses seminar to bridge the gap between the students and the research groups at the start of the programme.
- Closely keep on monitoring the balance between the estimated and real workload in the next few years to polish and fine-tune the programme.
- Consolidate a formal system to register student feedback in order to capture all relevant information.
- Make more explicit the intended student profile and the content knowledge admission requirements.
- Organise the preferential reading and background materials e.g. in modules over the Internet, readily available for the prospective students to study the materials and catch up the missing links.
- Use the good group dynamic among the lecturers and researchers to form a *core-faculty group* for this programme.
- Attribute the function of the ombudsperson to a staff member who can act as a mediator to solve occurring problems.
- Include all stakeholders of PBT in the feedback related to the programme (also representatives of industry).
- Develop an alumni network and keep track of the alumni's professional careers and better link them to the programme as ambassadors.
- Devise ways to pass on topics and issues dealt with by former student-representatives, to secure continuity in this respect.
- Initiate the establishment of an Advisory Committee with international representatives and support its functioning.

Generic quality standard 3 – Outcome Level Achieved

- Discuss the balance of scores given for creativity, innovation and technical application in the evaluation of the Master thesis.
- Discuss the grading matrix for the Master thesis, with respect to a better reflection of the work done by the student in the final grade for the Master thesis.
- Discuss whether a competence profile could be added to the guidance practice in order to develop the generic competences of the students and consider a competence portfolio graduates could use in their further careers.
- Organise feedback after examinations more proactively.
- Develop a comprehensive assessment policy for the programme.
- Take into account the experiences of the alumni when entering the labour market to more clearly position the programme with respect to the dual focus.

APPENDIX

Curriculum vitae
of the members of
the assessment panel

Prof. dr. Ton Bisseling

Ton Bisseling (1952) has a strong expertise in plant biology with a main focus on molecular mechanisms controlling the Rhizobium legume symbiosis. In the early 90-ties he was the first to monitor transcriptional changes in a legume host plant as an early response to the symbiotic engagement with nitrogen fixing rhizobium bacteria. He characterized the spatial expression of series of plant genes specifically induced during this symbiosis. Till to date many of those genes still form essential markers in symbiosis research. During the last decade his group has also made a major contribution to the international effort to develop the Medicago legume model system. He contributes to the international Medicago genome sequencing program and developed strategies to use Medicago as an efficient intergenomic vehicle to clone pea genes. During the last years a third major contribution has been achieved in this field by the cloning and characterization of three symbiotic key regulatory genes, among which a specific receptor for Nod factors; the Rhizobium signal that sets in motion the symbiosis. Besides Rhizobium legume symbiosis, Ton Bisseling has initiated several other scientific activities of which a research project on the role of chromatin remodelling during development is most important. Since 1998 Ton Bisseling is professor in Molecular Biology at Wageningen University.

In 2004 he became scientific director of the national research school Experimental Plant Sciences. The national graduate school EPS includes about 170 PhD students and 100 associate and assistant professors. It is responsible for the education program of the PhD students and monitors the quality of plant research in the Netherlands and serves as a national platform for plant research. He is a member of the Dutch royal academy of sciences (KNAW) and EMBO and is or has been member of the editorial board of e.g. Science, Plant Biology and The Plant Journal.

Dr. Steven Vandenabeele

Steven Vandenabeele (1975) has gained experience in Plant Biotechnology at the Department of Plant Systems Biology in Gent, Belgium during his PhD and moved to the Rockefeller University (New York, US) for a 3-year post-doc to further deepen his plant biotech background. Shortly after his return to Belgium in 2006, he joined BASF Plant Science – CropDesign as a senior scientist. The following 7 years at BASF, Steven moved into several positions where he gained expertise in process and pipeline

coordination, people management, project management and research management. Mainly his last position as global research manager for the Rice Yield Project, deepened the expertise related to agro biotech product development, regulatory and business development. Since October 2014, Steven works as an independent consultant in plant biotechnology and offers services to the Vlaams Instituut voor Biotechnologie (VIB) to explore opportunities for new agro businesses and new ventures.

Dr. Cis Van Den Bogaert

Cis Van Den Bogaert (1952) received a PhD in elementary particle physics from the *Universitaire Instelling Antwerpen* (one of the precursors of the University of Antwerp). As a doctoral research student he did experimental work at CERN (Geneva), analysed the production of strange particles in proton-antiproton interactions and designed magnetic shielding of photomultipliers.

During the early 80-ties he worked at the Belgian Consumers Association as a project leader for comparative quality assessment and at the Flemish Interuniversity Council as a project leader for educational professionalization. In 1984 he joined the newly established service for study advice and student counselling at the *Universitair Centrum Antwerpen* (another precursor of the University of Antwerp), where he was responsible for physics and mathematics tutoring and for the bridging courses for freshmen. In the early 90-ties he was assigned as secretary to the university's Education Council and acted as institutional co-ordinator for the then newly started educational visitations.

In 1999 he was appointed as educational officer in order to co-ordinate the educational policies of the three then still independent university institutions in Antwerp. Since the merger into the University of Antwerp in 2003 he heads the Department of Education in the university's central administration. The responsibilities of the department involve educational policy and organisation, student and curriculum administration, quality assurance, educational innovation, learning environment, working students, distance learning, and doctoral training (alongside research).

During recent years he was the chairman of Flemish working groups on educational policy topics such as the challenges for higher education in the 21st century, digital learning, and the academic calendar.

Mrs. Eva Goudsmit

Eva Goudsmit (1992) is a second year student of the MSc Plant Biotechnology at the Wageningen University (WUR). She specialized within her masters in Functional Genomics, and has focused her Masters on plant physiology with emphasis on seeds. Before enrolling in this master, she has completed the BSc Plant Sciences (cum laude) with as specialization genes and health. This bachelor was broadened by following an individual major, Global Plant Occurrence and Production, in Scotland at the Scottish Rural College (SRUC). Besides her academic achievements, she is currently chairwoman of the board of the study association of the plant related studies of Wageningen University; Semper Florens. Furthermore, she is employed by the university as "Studiekeuzecoach" (study choice coach) to help the university in the guidance of aspirant students. As for (visitation) committee experience, she was asked to join the Recruitment Advisory Committee of the WUR phytopathology department and she was one of the students selected to answer to the visitation commission that has evaluated the BSc Plant sciences of the WUR.