

**Stellungnahme zum  
Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung (IPK),  
Gatersleben**

**Inhaltsverzeichnis**

1. Beurteilung und Empfehlungen .....	2
2. Zur Stellungnahme des IPK .....	4
3. Förderempfehlung .....	4

**Anlage A: Darstellung**

**Anlage B: Bewertungsbericht**

**Anlage C: Stellungnahme der Einrichtung zum Bewertungsbericht**

## Vorbemerkung

Die Einrichtungen der Forschung und der wissenschaftlichen Infrastruktur, die sich in der Leibniz-Gemeinschaft zusammengeschlossen haben, werden von Bund und Ländern wegen ihrer überregionalen Bedeutung und eines gesamtstaatlichen wissenschaftspolitischen Interesses gemeinsam gefördert. Turnusmäßig, spätestens alle sieben Jahre, überprüfen Bund und Länder, ob die Voraussetzungen für die gemeinsame Förderung einer Leibniz-Einrichtung noch erfüllt sind.<sup>1</sup>

Die wesentliche Grundlage für die Überprüfung in der Gemeinsamen Wissenschaftskonferenz ist regelmäßig eine unabhängige Evaluierung durch den Senat der Leibniz-Gemeinschaft. Die Stellungnahmen des Senats bereitet der Senatsausschuss Evaluierung vor. Für die Bewertung einer Einrichtung setzt der Ausschuss Bewertungsgruppen mit unabhängigen, fachlich einschlägigen Sachverständigen ein.

Vor diesem Hintergrund besuchte eine Bewertungsgruppe am 8. und 9. November 2018 das IPK in Gatersleben. Ihr stand eine vom IPK erstellte Evaluierungsunterlage zur Verfügung. Die wesentlichen Aussagen dieser Unterlage sind in der Darstellung (Anlage A dieser Stellungnahme) zusammengefasst. Die Bewertungsgruppe erstellte im Anschluss an den Besuch den Bewertungsbericht (Anlage B). Das IPK nahm dazu Stellung (Anlage C). Der Senat der Leibniz-Gemeinschaft verabschiedete am 9. Juli 2019 auf dieser Grundlage die vorliegende Stellungnahme. Der Senat dankt den Mitgliedern der Bewertungsgruppe und des Senatsausschusses Evaluierung für ihre Arbeit.

## 1. Beurteilung und Empfehlungen

Der Senat schließt sich den Beurteilungen und Empfehlungen der Bewertungsgruppe an. Das Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung (IPK) arbeitet sehr erfolgreich an der Aufklärung grundlegender Prinzipien der Evolution, Entwicklung und Anpassungsfähigkeit wichtiger Kulturpflanzen. Mit der „Bundeszentralen Ex-situ-Genbank für landwirtschaftliche und gartenbauliche Kulturpflanzen“, einer Forschungsinfrastruktur von Weltrang, leistet das IPK einen wichtigen Beitrag zur Erhaltung der genetischen Vielfalt von Kulturpflanzen und ihrer Wildarten.

Seit der **letzten Evaluierung** hat das IPK seinen Status als eine der international führenden Einrichtungen auf dem Gebiet der Pflanzengenetik und Kulturpflanzenforschung konsolidiert. Eine Reihe von Maßnahmen trug zur weitergehenden Profilierung bei. Empfehlungsgemäß wurde eine stärkere Fokussierung auf genbank-bezogene Arbeiten und eine größere inhaltliche Kohärenz innerhalb der Abteilungen erreicht. Die Organisationsstruktur wurde verbessert und die Bioinformatik in geeigneter Weise eingebunden.

Das IPK hat sehr überzeugende **Leistungen** vorzuweisen. Die Forschungsergebnisse werden hervorragend publiziert, so dass sich wie empfohlen die internationale Sichtbarkeit des Instituts erhöht hat. Stark wahrgenommen werden beispielsweise die Publikationen im Zusammenhang mit der Entschlüsselung des Gerstengenoms, an der das IPK in führender Rolle beteiligt ist. Auch erbringt das Institut umfangreiche Serviceleistungen für ein

---

<sup>1</sup> Ausführungsvereinbarung zum GWK-Abkommen über die gemeinsame Förderung der Mitgliedseinrichtungen der Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz e. V.

breites Spektrum von wissenschaftlichen und züchterischen Fragestellungen. Die vier Abteilungen werden zweimal als „exzellent“ und jeweils einmal als „sehr gut bis exzellent“ und „sehr gut“ eingeschätzt. Sobald die hochmoderne Infrastruktur für die Phänotypisierung von Pflanzen in den Vollbetrieb übergeht, sind weitere Leistungssteigerungen zu erwarten.

Die **Forschungsstrategie** des IPK ist auf eine nachhaltige Verbesserung der Leistungsmerkmale von Nutzpflanzen ausgerichtet. Das Institut hat große Erfolge mit Gerste und Weizen, zwei für die Ernährungssicherung wichtigen Pflanzen, vorzuweisen. Es sollte sich zukünftig weiteren Nutzpflanzen zuwenden. Mit seinen vielfältigen Sammlungen verfügt das Institut über die besten Voraussetzungen, die entsprechenden Potenziale auszuloten. Die „Bundeszentrale Ex-situ-Genbank“ wird gegenwärtig zu einem bio-digitalen Ressourcenzentrum weiterentwickelt. Diese Entwicklung ist strategisch äußerst relevant. Daher wird die Ausarbeitung eines Antrags für einen „kleinen strategischen Sondertatbestand“ für diesen Zweck befürwortet. In einem Antrag sind die Mittel über die im Rahmen der Evaluierung vorgelegten Angaben hinaus zu präzisieren und näher zu begründen (maximal bis zur der vom IPK ab 2021 vorgesehenen Höhe von 700 T€ pro Jahr zzgl. Eigenanteil).

Die **Ausstattung** mit Mitteln der institutionellen Förderung ist zur Erfüllung des derzeitigen Aufgabenspektrums des IPK auskömmlich. Zusätzlich wirbt das Institut umfangreiche Drittmittel ein. Das IPK hat außer in Gatersleben (Sachsen-Anhalt) auch Anbauflächen an zwei Standorten in Mecklenburg-Vorpommern, die andere Anforderungen an Bodenqualität und Saatgutsicherheit bedienen. Dort befinden sich die Kartoffel-, Öl- und Futterpflanzensammlungen, auf deren Basis das Institut wichtige Serviceleistungen erbringt. Im Hinblick auf die zukünftige Entwicklung sollten deren Forschungspotenziale jedoch noch besser ausgenutzt werden. Die von der Institutsleitung ergriffenen Maßnahmen zur Verbesserung der Zusammenarbeit über die Standorte hinweg müssen nun wirksam werden.

Die **Beratungsleistungen** des IPK für Politik und Behörden etwa zu neuen Methoden der Pflanzenzüchtung oder zum Erhalt der genetischen Vielfalt sind von hoher Bedeutung. Es wird sehr begrüßt, dass das Institut den Diskurs zwischen Wissenschaft und Zivilgesellschaft zu diesen für die Ernährungssicherung wichtigen Themen befördert. In seinem Schülerlabor („Green Lab“) hat das IPK hohe Besuchszahlen vorzuweisen. Die Überlegungen des Instituts zum Ausbau der **Wissenschaftskommunikation** sollten weitergeführt werden.

Das IPK ist an einer Vielzahl von **nationalen und internationalen Konsortien** beteiligt, in denen es häufig eine führende bzw. koordinierende Rolle einnimmt. Auch für die Industrie ist das Institut ein wichtiger Partner. Mit den Universitäten Halle und Göttingen ist es über gemeinsame Berufungen und Forschungsvorhaben verbunden. Die Zusammenarbeit mit Fachhochschulen in der Region hat sich in Ausbildung und Nachwuchsförderung bewährt. Insgesamt wird das verstärkte Engagement des IPK in der akademischen Lehre sehr begrüßt.

Mit den unabhängigen Arbeitsgruppen, die es seit 2015 am Institut gibt, ist es gelungen, ausgewiesene jüngere Wissenschaftler für das Institut zu gewinnen. Darüber hinaus muss das IPK das Thema **Personalgewinnung** zukünftig deutlich aktiver und strategischer angehen, um den derzeit am Institut stattfindenden Generationenwechsel zu gestalten.

In diesem Zusammenhang wird vom Institut erwartet, dass es die entsprechend dem DFG-Kaskadenmodell vorgesehenen Maßnahmen konsequent umsetzt. Die anstehenden Neubesetzungen müssen dazu führen, mehr **Wissenschaftlerinnen** auf Leitungsebene zu beschäftigen, um die vom Institut festgelegten Zielquoten zu erreichen. Zwar liegt der Frauenanteil in Forschung und wissenschaftlichen Dienstleistungen bei 40 %, von den 28 Leitungspositionen sind jedoch nur vier mit Frauen besetzt (Stand November 2018). Bereits bei der letzten Evaluierung war mit Verweis auf anstehende Pensionierungen eine Verbesserung erwartet worden.

Das IPK betreibt ein angemessenes System zur internen Qualitätssicherung. Hervorzuheben ist, dass sich der **Wissenschaftliche Beirat** in beispielhafter Weise in die Arbeit des Instituts einbringt.

Das IPK erfüllt die Anforderungen, die an eine Einrichtung von überregionaler Bedeutung und gesamtstaatlichem wissenschaftspolitischen Interesse zu stellen sind. Insbesondere die dauerhafte Bereitstellung von genbankbezogenen Serviceleistungen sowie die dadurch ermöglichten Forschungsarbeiten sind in dieser Form an einer Hochschule nicht möglich. Eine Eingliederung des IPK in eine Hochschule wird daher nicht empfohlen.

## 2. Zur Stellungnahme des IPK

Der Senat begrüßt, dass das IPK beabsichtigt, die Empfehlungen und Hinweise aus dem Bewertungsbericht bei seiner weiteren Arbeit zu berücksichtigen.

## 3. Förderempfehlung

Der Senat der Leibniz-Gemeinschaft empfiehlt Bund und Ländern, das IPK als Einrichtung der Forschung und der wissenschaftlichen Infrastruktur auf der Grundlage der Ausführungsvereinbarung WGL weiter zu fördern.

## Annex A: Status report

### Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Gatersleben

#### Contents

1. Structure, tasks and institutional environment.....	A-2
2. General concept and profile.....	A-5
3. Subdivisions of IPK .....	A-12
4. Collaboration and networking.....	A-17
5. Staff development and promotion of junior researchers.....	A-18
6. Quality assurance .....	A-20

#### Appendices:

Appendix 1: Organisational chart .....	A-26
Appendix 2: Publications.....	A-27
Appendix 3: Revenue and Expenditure .....	A-28
Appendix 4: Staff.....	A-29

## 1. Structure, tasks and institutional environment

### Development and funding

The IPK was founded in 1943 as Institute for Research on Cultivated Plants of the Kaiser Wilhelm Society for the Advancements of Sciences. In 1948, it was integrated into the GDR's Academy of Science. The IPK has been jointly funded by the Federation and the German *Länder* since 1992 and subsequently became a member of the Leibniz Association. In 2006, the Institute was renamed in Leibniz Institute of Plant Genetics and Crop Plant Research.

The IPK was last evaluated in 2012. Based on the recommendations of the Leibniz Senate and a joint statement by the responsible departments at Federal and *Länder* (state) level, the Joint Science Conference confirmed that the IPK meets the requirements for joint funding.

Responsible department at *Länder* level: Ministry of Economy, Science and Digitalisation of Saxony-Anhalt

Responsible department at federal level: Federal Ministry of Education and Research

### Mission and tasks

According to its statutes IPKs task is to conduct basic and application-oriented research in the fields of plant genetics and crop plant research. The scientific focus is particularly on the development of new insights into the structure, function, and evolution of hereditary material, on the conservation, research and development of the hereditary diversity of crops, their ancestors and relatives as well as contributions to breeding genetics at the forefront of practical plant breeding.

With the conservation, exploration, and exploitation of the genetic diversity of crop species in the Federal *Ex situ* Gene Bank and research in the areas of molecular breeding and molecular crop biology the IPK aims to contribute to the development of a plant-based bio-economy that addresses important societal challenges including:

- Securing the food supply of a growing world population;
- Supply of renewable raw and high-value plant based products and renewable energy sources;
- Further development of sustainable, resource-efficient plant production and
- Adaptation of primary agricultural production to the consequences of climate change.

### Legal form and organisation

The IPK is a foundation under public-law situated in Gatersleben. Its relevant bodies are the Board of Trustees, the Board of Directors, the Executive Board and the Scientific Advisory Board.

The Institute is headed by a Board of Directors consisting of the Administrative Director and the heads of the (four) scientific departments. One of the department heads is appointed by the Board of Trustees as Managing Director for a term of three years (re-appointment possible). The Executive Board is formed by the Managing Director and the Administrative Director. The Managing Director represents the Institute, chairs the Board of Directors and is responsible for the ongoing scientific business. The Administrative Director heads the department of Administration and Central Services and is responsible for the Institute's budget ("Beauftragte/r für den Haushalt").

The Board of Trustees is chaired by a representative of the State Ministry of Saxony-Anhalt. A representative of the Federal Ministry takes the deputy chair. The board also comprises two representatives of scientific life, including a representative of a neighbouring university. The Board of Trustees oversees the Board of Directors. It needs to approve, amongst others, the long-term strategic planning of the Institute (programme budget), the annual financial budgeting, the appointment of departmental heads, and the principles for the use of the foundation's research and development results. The Board of Trustees convenes at least once a year.

The Scientific Advisory Board (SAB) comprises six to twelve scientists whose expertise matches the research agenda of the Institute. They are appointed by the Board of Trustees for a term of four years (re-appointment possible once in a row). The SAB consults the Board of Trustees and the Board of Directors in scientific matters (see Chapter 6). It convenes once a year.

## **Research structure**

At the operational level, the scientific work at the IPK is implemented by four scientific departments which are sub-structured into programmes (see Chapter 3):

1. Department Genebank  
→ 7 research groups in 3 programmes
2. Department Breeding Research  
→ 5 research groups in 3 programmes
3. Department Molecular Genetics  
→ 7 research groups in 2 programmes
4. Department Physiology and Cell Biology  
→ 5 research groups in 2 programmes

In addition to the 24 departmental research groups, there are four independent research groups which are not included in the departmental management. Their leaders report directly to the Board of Directors (see Chapter 3).

Scientific work is supported by the Administration and Central Services Division. Here, the core administration is represented by four working groups (Finances, Personnel, Purchas-

ing, Technology Transfer & Legal Matters). Four additional groups take care of cross-cutting services: Research Library & Information Services, Campus Management and Logistics, Buildings and Equipment, Experimental Fields and Nurseries.

### **National and international scientific environment**

With its large collection of germplasm for a wide range of crop plant species, its scientific concept focussing on the exploitation of genomic diversity, and with its knowledge and technologies enabling crop improvement, the IPK claims to have a profile unique both at the national and international level.

However, with regard to size, research infrastructure, knowhow and thematic portfolio, the IPK can be compared to the following non-university institutions in Germany:

- Max-Planck Institute for Plant Breeding Research (MPI-PZ) in Cologne,
- Max-Planck Institute of Molecular Plant Physiology (MPI-MP) in Potsdam,
- Julius Kühn Institute (JKI) in Quedlinburg, a departmental research institution of the Federal Ministry of Agriculture (BMEL),
- Leibniz Institute of Plant Biochemistry (IPB) in Halle.

Crop-related topics employing genetic approaches are also investigated by research groups at a number of German universities (e. g. in Göttingen, Munich and Hohenheim).

According to IPK, only a few institutions with similar orientation and structure exist at the international level:

- James Hutton Institute (GB),
- John Innes Centre (GB),
- Several INRA Institutes (France),
- National Institute of Crop Science (NICS, Japan),
- Institute for Genetics and Developmental Biology (IGBD) of the Chinese Academy of Sciences (CAS).

### **National interest and justification for funding as a non-university institution**

The operation of the Federal *Ex situ* Gene Bank is a permanent task that requires a high degree of stability and planning security. Research at the IPK is to a large extent centred around the *Ex situ* Gene Bank and ranges from fundamental questions of plant evolution, development, and performance up to the development of biotechnological processes and the exploitation of genetic resources for plant breeding. In addition to its central role for research, according to the Institute, the Gene Bank is a major contributor to the implementation of the National Programme for Conservation and Sustainable Use of Plant Genetic Resources of Agricultural and Horticultural Crops and the National Biodiversity Strategy. The IPK states, that the work provides contributions to (i) the conservation of the biological and genetic diversity of crops, (ii) the development of sustainable agriculture and (iii) the establishment of a plant-based Bioeconomy. Thus, according to the In-



stitute, the research programme shows manifold references to the goals and fields of action set out in the High-Tech Strategy for Germany, and the National Research Strategy BioEconomy2030. To support research activities regarding trait analysis within the IPK and beyond, technical platforms for phenotypic analysis have been established over the past 10 years that became part of a European research infrastructure listed on the ESFRI roadmap.

## 2. General concept and profile

The main research topic at the IPK is the elucidation of processes underlying trait expression of crops including their targeted manipulation and improvement. The work covers the entire plant, from roots to flowers and seeds, as well as the entire life cycle, from embryogenesis to seed maturity and senescence. The leading crops are barley and wheat. Specific questions are investigated on other important crops such as rapeseed, pea, maize, rye but also on model species, in particular, Arabidopsis.

Genetics is the overarching discipline of the Institute. The different levels of the implementation of genetic information are investigated using high-throughput phenotyping, DNA and RNA sequencing, analytical techniques and different types of microscopy. For the IPK, of particular importance is the interdisciplinary approach facilitated by a combination of different disciplines represented in the Institute: taxonomy, plant physiology, biochemistry, molecular biology, cell biology, genetics, plant breeding, bioinformatics and biotechnology.

### Development of the institution since the last evaluation

According to IPK, important developments in recent years have been the further strengthening of bioinformatics, the establishment of quantitative genetics and statistical genomics as well as molecular plant nutrition and the expansion of sensor-based and automated plant phenotyping. Furthermore, changes include the discontinuation of stem cell research.

The Institute is structured into four scientific departments which currently comprise 24 scientific research groups (see Chapter 1). The IPK describes the profiling of the departments as a continuous process. One aim of the structural adjustment process after the last evaluation (see Chapter 6, recommendation 6) was to create scientifically coherent and manageable units by sub-dividing the departments into thematically defined research programmes.

In 2015, the IPK started to establish independent research groups. They are meant to prospect novel fields of research and to achieve a high degree of scientific independence and visibility (for details see Chapter 3, Subdivision V). As of June 2018, five independent research groups have been established (three grant-funded, two core-funded) and two more core-funded groups are scheduled for 2019 and 2020, respectively.

In order to strengthen cross-departmental communication and networking five research themes defining overarching research topics have been established since 2016 (see Chapter 6, recommendation 1). Core funds from the Institute were set aside to trigger joint projects.

Due to the increasing importance of bioinformatics for the implementation of the research agenda, the IPK created a cross-sectional bioinformatics platform. This development was essentially based on the analysis of demands within the Institute along with a review of the existing organisational structure. The IPK now has a range of applied bioinformatics disciplines covered by six thematically oriented research groups. These are housed in three departments according to their scientific scope. The aim of this decentralised, organisational structure is to warrant networking of bioinformaticians as closely as possible with experimental groups. Research and development in the field of bioinformatics are coordinated across departments to promote cooperation and coordination between the six bioinformatics groups. Furthermore, the established coordination model aims at a coherent approach to data management and storage, hardware and software procurement, the advancement of the institute-wide IT infrastructure and the organisation of bioinformatics seminars. Accordingly, the bioinformatics coordination is divided into two sub-areas, namely (i) Biodiversity Informatics and (ii) Systems Analysis & Modelling, each headed by a coordinator (see also Chapter 6, recommendation 2 and 8).

The IPK states, that in recent years the Institute has begun employing systemic approaches and expanding omics platforms in molecular/(bio)chemical analytics (genomics, transcriptomics, ionomics, metabolomics and proteomics), in cell biology (microscopy platforms) and at the level of plant traits by developing and using non-invasive and high-throughput methods (phenomics). The latter have been a particular focus of the Institute's development, which in 2017 was coined by the inauguration of the Plant Cultivation Hall. The phenotyping facilities of the Institute have become part of a research infrastructure within the framework of the national (DPPN), European (EPPN2020), and international (IPPN) Plant Phenotyping Networks. They have been included into the EU-supported structural funding program (ESFRI Roadmap) in 2016 (EMPHASIS).

## Results

In the period 2015-2017, IPK scientists contributed to more than 580 publications, 81% of them articles in peer-reviewed journals (see Appendix 2 for details). IPK states, that while the total number of publications slightly decreased during the reporting period, the impact of the publications improved as reflected by a significant increase of papers in journals of IF >4. Particular emphasis was put on increasing the frequency of papers in transdisciplinary journals with IF >9.

The publication strategy of IPK comprises the following components: Research quality assurance, capacity building, open access publishing, the establishment of publication infrastructures and the obligation for IPK scientists to register at ORCID as well as data publications following the FAIR principles (Findable, Accessible, Interoperable, and Re-usable). The IPK has set apart a budget that covers open access publishing in peer-reviewed and

quality-assured scientific journals, which are indexed at common databases such as Web of Science, PubMed, Scopus etc.

Some research highlights in the period 2015-2017:

- The IPK states, that the completion of a high-quality reference sequence of the barley genome together with TU Munich in 2017 is seen as a major milestone in cereal genetics and breeding. To ensure wider use of this data resource, web applications have been developed that allow integration of the sequence information with a wide range of related datasets, e.g., from other species.
- The identification of genes involved in spike morphology will, according to IPK, blaze the trail for systematically scrutinising new spike ideotypes in wheat and barley bearing more seeds and giving rise to increased yield potential. In this context, genes were identified regulating spike morphology in barley and wheat. The mode of function of one of those genes, *Vrs2*, has been elucidated. It is involved in floral organ patterning in phase duration, by maintaining hormonal homeostasis during spike development.
- The IPK demonstrated that the two centromeric proteins CENH3 and KNL2 play a crucial role in the maintenance of proper centromere function, which is important to improve selection schemes to the more efficient production of doubled haploids.
- To improve sustainable crop plant production, promising candidate genes have been identified for non-race-specific types of resistance to powdery mildew in barley. Among these, cellulose synthase-like D2 gene (*HvCslD2*) mediates penetration resistance to host-adapted and non-host isolates of the fungus, while *HvLEMK1*, a LRR-malectin domain-containing transmembrane receptor-like kinase mediates non-host resistance to the non-adapted wheat powdery mildew.

#### Scientific services and infrastructure tasks:

The IPK operates the Federal Ex situ Gene Bank for Agricultural and Horticultural Crops. In addition to the conservation and research activities related to biodiversity, the Gene Bank provides users with seeds, tubers or plant material as well as related information. According to IPK, this is a highly-demanded service provided by the Institute and with 150,751 samples from 2,933 species and 776 genera, the Gene Bank ranks amongst the largest and most diverse worldwide. Based on a quality management system certified according to DIN EN ISO standard, the processes of the conservation management are monitored, and comprehensive statistics on the conservation, propagation, and distribution of seeds and propagating material are available. In the 2015-2017 reporting period, 119,112 samples were distributed, 47,885 of which were sent abroad. Also, the IPK manages the International Barley Core Collection (BCC) and the European Core Collection for Allium.

Regarding Plant genetic resources and taxonomic collections, several databases have been developed and are being curated at IPK, including e.g.:

- The Gene Bank Information System (GBIS) is the central database for the administration and management of accessions in the Federal Ex situ Gene Bank. The vast majority of seed orders by external users are processed via this web application.

- Since 2014, the IPK has been hosting and advancing the European Search Catalogue for Plant Genetic Resources (EURISCO). This system is a central entry point for information on European ex situ collections. At present, EURISCO's database comprises almost two million gene bank accessions from 380 institutions in 43 countries.
- Central Crop Databases of the European Cooperative Programme for Plant Genetic Resources (ECPGR) have been developed and are curated and made available by the Genebank Department, as the European Barley Database and the European Allium Database.

Data publication systems, resources for molecular biology and bioinformatics tools comprise

- e!DAL-PGP, a repository to publish plant research data with a Digital Object identifier (DOI),
- BARLEX, a web-based application to access the developing genomic infrastructure of barley,
- IPK Blast Server, a simple and easy-to-use application to perform sequence comparisons against plant genomic resources.

The IPK operates and further develops a trans-departmental plant phenotyping infrastructure for automated, non-invasive quantification of plant traits assessed at the cellular, the organ, and the whole plant level. These platforms have been set up through institutional funds and in the frame of the BMBF-funded German Plant Phenotyping Network (DPPN) project. Centrally coordinated by the Department "Molecular Genetics", the infrastructures are accessible for external users based on bilateral co-operation, third-party funded grants, and through transnational access support in the frame of the EPPN/EPPN2020 projects. Overall, the fraction of the use of the platform in projects involving external partners ranges from 50 to 75% of their capacity.

#### Knowledge and technology transfer:

IPK staff provide direct policy advice and support research policy in Germany and Europe. Based on the expertise input is provided, e.g., on regulatory law or the formulation of political guidelines (e.g., GMO legislation, Novel Breeding Technologies, legislation on genetic resources, amendment to the German fertilizer ordinance). Meetings with politicians, the participation of IPK scientists in panel discussions and contributions to ad hoc statements (e.g., Digital Sequence Information, Nagoya Protocol, Genome Editing) resulted in seven policy papers.

For IPK the most important form of knowledge and technology transfer is the implementation of co-operations with other research institutions, companies and other institutions, mainly via cooperative research and development projects, contract research, research services, joint research laboratory and the use of infrastructure (see Chapter 4).

Also, at IPK, transfer takes place via intellectual property rights and other intellectual property (licensing, patent sales, know-how agreements, transfer of software to compa-

nies and own spin-offs): Eight inventions were disclosed at IPK in 2015-2017, three inventions were filed for patent (five are listed as BG) and seven patents were granted. In the reporting period, e.g. licensing agreements were concluded for the use of material (wheat introgression lines) and for the use of the iMS Flux software (see Annex 2). The exploitation of other technologies which have been applied for industrial property rights could be initiated, e.g. by contributing them into further cooperation projects. Examples include the KNL2 technology for generating haploids or the technology known as RGEN-FISH (CRISPR/Cas9 based method to label genomic sequences in various species) or the technology/ method for production of oligomeric vaccines from plants by S-tag-S protein fusions.

Furthermore transfer takes place via laboratory rotation of researchers between academic as well as academic and business partners, e.g. in the context of the Horizon 2020 MSCA-ITN projects "Comrec", "Chip-ET" and "Cerealpath".

#### Academic events and public relations:

Scientists from the IPK contribute to conferences, workshops and other scientific events. IPK Gatersleben also organises conferences and workshops, e.g. the "Gaterslebener Research Conference or the "Gatersleben Dialogue" (Gaterslebener Gespräche). During the reporting period, the IPK organised a total of 43 scientific events and conferences with around 2,000 participants. Also, the IPK was co-organising 19 national and international conferences and workshops in cooperation with other institutions.

According to IPK, the organisational and conceptual adjustments of the public relations work of the Institute has professionalised the internal and external communication. For better usability the Institute's website has been redesigned. At the same time, YouTube, Facebook, and Twitter channels were set up and linked with the already existing communication paths. Every year between 40-50 visitor groups visit the Institute. IPK scientists provide first-hand information on the conservation and use of genetic resources as well as on plant breeding, domestication, and biotechnology.

#### **Strategic work planning for the next few years**

The overarching long-term strategy of the research and their implementation are laid down in IPK's research strategy. It has been developed in a participatory approach by the Board of Directors in close interaction with the research groups and the Scientific Advisory Board.

With its research designed to increase the performance of crop plants sustainably, the IPK aims to strengthen its international position in the years to come

- as the leading biological-digital resource centre for a knowledge-based use of biodiversity,
- a global trendsetter in the genome analysis of barley and wheat,
- innovation centre for the development of plant breeding technologies for wheat and barley,

- an international beacon for the elucidation of the molecular and physiological processes shaping agronomical traits.

Against the backdrop of the five institute-wide research themes the medium-term research strategy is structured according to the disciplinary orientation of the departments. The IPK states, that special care has been taken to provide research groups with sufficient freedom to sharpen their research agenda and to raise third-party funds.

To further increase its scientific impact in the developing world, the IPK plans to establish a joint lab on “International Agriculture” with the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) in Hyderabad, India. This lab will merge know-how in genetics and genomics at IPK with the expertise in tropical cereals and legumes at ICRISAT. The envisaged activities will include the exchange of staff and the development of joint projects regarding applied genomics in sorghum and chickpea.

Future uses of the phenotyping platform infrastructure will involve:

- Analysis of genetic diversity (in particular related to the Gene Bank collections and derived populations) and the elucidation of genotype-trait relations,
- Systems-level investigations on molecular mechanisms and processes, leading to the expression and heterosis of agronomically important traits, integrating molecular ‘omics’ analyses with information on genome – phenome – environment interactions,
- Performance assessment of specifically selected (e.g. through genomic prediction) and/or generated (through genome editing and/or genetic and epigenetic modification) genotypes under dynamic environmental conditions including expected future climate scenarios.

### **Appropriateness of facilities, equipment and staffing**

Appendix 3 gives a detailed list of IPK’s revenue and expenditure from 2015 to 2017. In 2017, IPK’s revenue totalled approximately 51.8 M€. The institutional funding by Federal and *Länder* governments according to AV-WGL amounted to 29.3 M€. In the period from 2015 to 2017 the revenue from project funding accounted for 25.7% (2015) to 26.7% (2017) in relation to the revenue (see Appendix 3, I.).

For personnel see Chapter 5.

The IPK has sites in Gatersleben, Malchow and Groß Lüsewitz. At the locations in Mecklenburg-Western Pomerania, field areas and greenhouses are mainly used for the Federal Ex situ Gene Bank. In Gatersleben, about 50% of the temperature controlled greenhouse area is reserved for the propagation of gene bank accessions. The remaining 4,000 square meters of greenhouse space as well as approximately 50 hectares of land are available for scientific experiments.

State of the art equipment for cell biological, biochemical and metabolite analysis, as well as for molecular genetic analysis and sequencing is available in the laboratories.

### **Science Communication Centre**

The IPK aims at professionalising and extending its science communication strategy by integrating and expanding the Green Lab (on the campus in Gatersleben) into the Institute.

The Green Lab is an educational training station independent of the Institute and hosts more than 5.000 visitors per year, 3.200 of them scholars aged 10 to 18 years. It was established more than eleven years ago by a private registered non-profit association (Ver- ein zur Förderung des Schülerlabors „Grünes Labor Gatersleben“ e.V.). Since the IPK and the Green Lab already manage up to 7,500 visitors a year, a science communication centre open to the public shall be established. It will consist of a combination of seasonal demon- stration plots, an orchard, an exhibition and demonstration area and seminar rooms with their cafeteria. This centre will address the following topics:

- Research contents and values of the IPK to provide factual and targeted information on plant improvement-based topics of social relevance,
- Current challenges to feed a growing world population and solutions through crop development, research and breeding,
- Evolution and diversity of crops in the context of human civilisations,
- Training courses to life sciences and STEM (Science, Technology, Engineering and Mathematics) subjects.

The Board of Trustees and the Scientific Advisory Board both support this concept. The IPK envisages to take over an existing building and to rent an additional space for the Green Lab. Currently, the preparation of the budget plan (approx. 3.5-4.5 M€) is in pro- gress. According to IPK, the project will be handled as a large construction project (Bau- vorhaben).

#### Development of scientific equipment and large-scale facilities

The IPK management and boards claim the necessity of an increase of the annual budget for investments to finance the procurement of scientific and IT equipment. The envisaged “Minor extraordinary item of expenditure of a scientific-strategic nature” amounts to 700.000 € from 2021 (calculated without the Institute’s own contribution). The current and upcoming research challenges together with the rapid technological developments in molecular genetics, biochemical analytics and omics-relevant sensor technologies, the in- creasing amount of data and requirements for long-term research data management call for a reliable and secure financing scheme. In the past, investments in permanently re- quired equipment were frequently financed within third party-funded research-projects or by the European Regional Development Fund, which will no longer be available from 2021.

#### Condition of the property and redevelopment plan

For the energetic optimisation of the campus, the IPK already has an additional budget of 5 M € at its disposal for first steps to improve the campus infrastructure with respect to the supply of electrical energy as well as heating and cooling systems. Next steps are planned, but not yet ready for financing.

### 3. Subdivisions of IPK

**Subdivision I: Department Genebank** (as of 31 May 2018: 29.7 Full-time equivalents [FTE] in research and scientific services, 1.0 FTE doctoral candidates, 58.3 FTE service staff)

The central focus of the department is the preservation of the collections maintained in the Federal *Ex situ* Gene Bank for Agricultural and Horticultural Crop Species along with the continuous improvement of the conservation management. As service activity, this includes the distribution of seed samples and plant materials and the provision of information related to the genetic resources. The Gene Bank is integrated in the national plant genetic resources programme and operates the European Search Catalogue for Plant Genetic Resources (EURISCO).

The department's core competencies are resource management, taxonomy and diversity analysis.

Since the last evaluation, the prerequisites for systematic genotyping of the Gene Bank's collections have been put in place by establishing a new research group focusing on "Genomics of Genetic Resources" in 2015 which also takes care of the management of the institute-wide DNA sequencing facility.

The department is structured into three research programmes with currently seven research groups (RG):

1. The programme "Characterisation and Documentation" is concerned with the description of gene bank materials at the DNA level, along with the maintenance and advancement of the Gene Bank's IT system.
  - RG "Genome Diversity" (4.8 FTE in research and scientific services, 3.5 FTE service staff)
  - RG "Genomics of Genetic Resources" (*since 2015*; 8.5 FTE in research and scientific services, 8.8 FTE service staff)
  - RG "Genebank Documentation" (5.0 FTE in research and scientific services, 2.0 FTE service staff)
2. The programme "Conservation Management and Evaluation" aims at improving germplasm maintenance procedures.
  - RG "Genetics and Reproduction" (2.0 FTE in research and scientific services, 25.0 FTE service staff)
  - RG "Cryo and Stress Biology" (*former research group on "In vitro Storage and Cryopreservation" [until end of 2015]*; 1.8 FTE in research and scientific services, 2.8 FTE service staff)
  - RG "Satellite Collections North" (4.8 FTE in research and scientific services, 8.3 FTE service staff)
3. The programme "Taxonomy and Evolution" is mainly concerned with phylogenetic classification and investigation of speciation within selected plant genera.



- RG “Experimental Taxonomy” (6.2 FTE in research and scientific services, 5.5 FTE service staff)

Two independent research groups (“Plant Architecture” and “Domestication Genomics”, see below) are associated with the department.

In the period 2015–2017, researchers in the department published 133 articles in peer-reviewed journals, 14 monographs (including doctoral theses) and 30 individual contributions to edited volumes. The *Ex situ* Gene Bank over the past three years provided nearly 120 thousand samples to users (see Chapter 2 for more).

**Subdivision II: Department Breeding Research** (as of 31 May 2018: 24.5 Full-time equivalents [FTE] in research and scientific services, 9.3 FTE doctoral candidates, 27.6 FTE service staff)

Scientists in the department of Breeding Research are aiming to gain insights and develop innovative approaches to allow the genetic diversity of crop plants to be better exploited as a way of achieving future breeding goals. The research of the department spans the entire breeding process, from the induction of genetic variation, through the identification of parental material to the selection of superior genotypes and maintenance breeding. Most research is done on wheat and barley, but studies also encompass other crops such as pigeon pea, cowpea, rye, rice, or soybean. For studies of fundamental processes of inheritance also model species, like *A. thaliana* or wild species are used.

The department’s core competencies are chromosome biology, breeding methods and quantitative genetics.

With the appointment of a new department head in 2013, the department was refocused and renamed from “Cytogenetics and Genome Analysis” to “Breeding Research”. In this course, several research groups were discontinued (“Karyotype Evolution”, “Epigenetics”, “Apomixis” and “Genome Plasticity”). Thus, according to IPK, the overall profile of the department was sharpened as recommended in the last evaluation.

The department is structured into three research programmes with currently five research groups (RG):

1. Research in the programme “Breeding Informatics” aims at developing and evaluating novel ‘omics’-based (pre)breeding strategies.
  - RG “Quantitative Genetics” (since 2013; 15.0 FTE in research and scientific services, 7.9 FTE service staff)
  - RG “Bioinformatics and Information Technology” (7.0 FTE in research and scientific services, 10.5 FTE service staff)
2. Research in the programme “Chromosome Biology” centres around the regulation of chromosome segregation and chromosomal domains relevant to manipulate recombination and fixation of genetic variation.
  - RG “Chromosome Structure and Function” (15.0 FTE in research and scientific services, 3.8 FTE service staff)

3. The programme “Genome Analyses” focuses on the identification and validation of candidate genes for agriculturally relevant traits.
  - RG “Pathogen Stress Genomics” (as of 31 MAY 2018: 4.25 FTE in research and scientific services, 0.5 FTE doctoral candidates, 2.25 service staff)
  - RG “Gene and Genome Mapping” (1.3 FTE in research and scientific services, 3.0 FTE service staff)

In the period 2015–2017, researchers in the department published 186 articles in peer-reviewed journals, 14 monographs (including doctoral theses) and 12 individual contributions to edited volumes.

**Subdivision III: Department Molecular Genetics** (as of 31 May 2018: 25.3 Full-time equivalents [FTE] in research and scientific services, 2.0 FTE doctoral candidates, 27.6 FTE service staff)

The Molecular Genetics department focuses on the investigation and modulation of plant biomass accumulation and seed production. Detailed knowledge of the controlling genetic and epigenetic factors and the involved molecular process chains is acquired through ‘omics’ analyses, non-invasive phenotyping and computational modelling. Results are used to develop solutions for crop improvement. The installation and utilisation of plant phenotyping platforms form the basis of the participation in national, European and international networks.

The department’s core competencies are phenomics, growth dynamics and seed biology.

Following the recommendations of the last evaluation, IPK states, that the department has undergone a major thematic and organisational re-structuring process in order to focus its research agenda and scientific profile. Two research programmes (see below) were implemented, the establishment of a third programme (“Systems Genetics”) is envisaged for 2019/2020. This process was made possible by a significant personnel turnover at the group leader level due to individual career advances and retirements. On the whole, five out of seven group leaders have been newly appointed. Since the last evaluation three research groups were discontinued (“Data Inspection”, “Hybrid Wheat” and “Plant Bioinformatics”). The establishment of a new research group on “Metabolic Diversity” is planned for 2018.

The department is currently structured into two research programmes with seven research groups (RG):

1. Research in the programme “Growth Dynamics” uncovered important genetic and physiological factors governing and linking plant performance at the level of central metabolism and vegetative growth.
  - RG “Heterosis” (10.3 FTE in research and scientific services, 10.8 FTE service staff)
  - RG “Image Analysis” (2.0 FTE in research and scientific services, 1.0 FTE service staff)

- RG “Phytoantibodies” (2.7 FTE in research and scientific services, 3.7 FTE service staff)
  - RG “Acclimation Dynamics and Phenotyping” (since January 2018)
2. Research in the programme “Seed Biology” revealed highly relevant novel information on regulatory factors, signalling mechanisms, and metabolic processes of seed development, growth, filling, ageing, and germination.
- RG “Seed Development” (4.3 FTE in research and scientific services, 4.3 FTE service staff)
  - RG “Assimilate Allocation and NMR” (7.0 FTE in research and scientific services, 5.3 FTE service staff)
  - RG “Gene Regulation” (0.5 FTE in research and scientific services, 1.8 FTE service staff [until 1 April 2017])
  - RG “Network Analysis and Modelling” (1.0 FTE in research and scientific services, 0.2 FTE service staff)

In the period 2015–2017, researchers in the department published 100 articles in peer-reviewed journals, 14 monographs (including doctoral theses) and 13 individual contributions to edited volumes. In addition, major achievements relate to platform installations and methodological advances.

**Subdivision IV: Department Physiology and Cell Biology** (as of 31 May 2018: 20.7 Full-time equivalents [FTE] in research and scientific services, 9.0 FTE doctoral candidates, 27.9 FTE service staff)

Research in the department focusses on transport, metabolic and developmental processes in plants and yeast cells, which improve their stress tolerance, resource efficiency or their adaptation to agricultural or biotechnological production systems. These research aims are followed by the establishment and steady improvement of analytical and technical platforms with related competences in physiology, biochemistry, cell biology and biotechnology. The department’s fundamental and application-oriented research targets topics of the German National Sustainability Strategy and the Federal High-Tech Strategy.

The department’s core competencies are biotechnology, biochemistry and plant nutrition.

In 2012, the research group “Systems Biology” was closed when the former head moved to a university position. In 2015, the position of a computational plant physiologist was newly established, operating across all groups in the department. Recruitment of a new group leader on crop root research is planned for 2019; in 2022 the IPK plans to recruit a new group leader for plant biochemistry.

The department is structured into two research programmes with currently five research groups (RG):

1. Research in the programme “Physiology & Biochemistry” has contributed to the elucidation of nutrient efficiency mechanisms by studying nutrient-dependent root development, by the in-depth characterisation of ammonium and metal transporters, by identifying a new class of root-secreted coumarin-type siderophores by discovering

transcriptional regulators for cold tolerance and by modifying yeast for biotechnological use and environmental monitoring.

- RG “Molecular Plant Nutrition” (13.5 FTE in research and scientific services, 11.3 FTE service staff)
  - RG “Applied Biochemistry” (3.8 FTE in research and scientific services, 2.0 FTE service staff)
  - RG “Yeast Genetics” (7.0 FTE in research and scientific services, 5.4 FTE service staff)
2. Research in programme “Cell Biology & Biotechnology” focussed on methodological developments in genome engineering as novel biotechnological tools for target sequence-specific modifications of cellular DNA.
- RG “Plant Reproductive Biology” (8.6 FTE in research and scientific services, 8.7 FTE service staff)
  - RG “Structural Cell Biology” (3.0 FTE in research and scientific services, 1.5 FTE service staff)

In the period 2015–2017, researchers in the department published 149 articles in peer-reviewed journals, 15 monographs (including doctoral theses) and 15 individual contributions to edited volumes.

**Subdivision V: Independent Research Groups** (as of 31 May 2018: 14.7 Full-time equivalents [FTE] in research and scientific services, 4.8 FTE doctoral candidates, 7.5 FTE service staff)

Independent research groups have been started as an additional structural element in 2015 based on a recommendation from the last Evaluation. They are either funded by grants/fellowships or through the core budget of the Institute. In case of extramural funding the lifetime of an independent group is limited by the duration of the grant/fellowship. Internally funded groups are supported for two periods of three years each. The prolongation after the first term is dependent on the positive evaluation by the Scientific Advisory Board. Independent research groups report once a year to the board of directors, to review scientific progress and to identify needs for individual coaching or support.

Currently the IPK hosts five independent research groups (IRG) with a sixth group being scheduled to start in 2019:

- IRG “Plant Architecture” (Heisenberg fellowship, since 2015)
- IRG “Domestication Genomics” (core funding, since 2015)
- IRG “Metalloid Transport” (Emmy-Noether grant, since 2016)
- IRG “Meiosis” (BMBF funding, since 2016)
- IRG “Applied Chromosome Biology” (*core funding, since 2018*)

The IPK plans to increase the number of independent research groups with core funding to a total of four in the next years while taking additional measures to further increase the number of third party-funded independent research groups.

In the period 2015–2017, researchers in the independent research groups published 53 articles in peer-reviewed journals, 6 monographs (including doctoral theses) and 1 individual contribution to an edited volume.

## 4. Collaboration and networking

### Collaboration with universities

The IPK is linked to the University Halle-Wittenberg via a cooperation agreement. The four department heads hold joint appointments (W3) with this university:

- Professorship for Molecular Plant Genetics
- Professorship for Plant Genetic Resources
- Professorship for Cytogenetics and Genome Analysis
- Professorship for Molecular Physiology and Cell Biology

Three research group leaders have been appointed as junior professors and extraordinary professor. Another joint appointment procedure for a “Heisenberg Professorship” is expected to be concluded by the end of 2018.

Additionally, a cooperation agreement was signed with the University of Goettingen in 2017. A first joint appointment procedure (W3) has been successfully concluded (from September 2018: W3 professorship for Genomics of Plant Genetic Resources). Further cooperation agreements exist with the Universities of Kiel and Magdeburg as well as with the Anhalt and Merseburg Universities of Applied Sciences (see Chapter 6, recommendation 3 for more).

The IPK participated in several collaborative programmes of the German Research Foundation (DFG):

- Collaborative Research Centre 648 (“Molecular Information Processing in Plants”, 2005–2016),
- DFG Priority Programme 1530 (“Flowering time control: from natural variation to crop improvement”, since 2011),
- DFG Research Group 948 (“Nitrogen uptake, metabolism and remobilization in leaves during plant senescence”, 2009–2015).

Also, IPK is linked to the DFG-funded German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig via a joint independent research group.

### Collaboration with other domestic and international institutions

The IPK highlights its cooperation with

- Julius Kühn Institute (JKI) in Quedlinburg and
- Max Planck Institute of Molecular Plant Physiology in Potsdam-Golm.

At the international level, formal cooperation agreements exist with

- National Institute for Crop Sciences in Tsukuba (Japan) and

- Institute of Genetics and Developmental Biology Beijing (China).

The IPK collaborates with other institutions of the Leibniz Association in the framework of the Leibniz ScienceCampi

- “Plant-based Bioeconomy”, University Halle-Wittenberg,
- “Phosphorous research”, University of Rostock and
- “Science Outreach Campus”, University of Kiel.

Additionally, the Institute is involved in the Leibniz Research Alliances “Biodiversity”, “Sustainable Food Production and Healthy Nutrition” and “Bioactive Components and Biotechnology”.

### **Other collaborations and networks**

According to IPK, there are more than 250 national and international (bilateral as well as multilateral) contractual co-operations with universities, non-university research institutions and other institutions, and more than 80 with companies.

Since 2015, the IPK coordinates the German Crop Bioinformatics Network (GCBN) and is a member of ELIXIR Germany which are both part of the German Network for Bioinformatics Infrastructure. The IPK also takes part in several phenotyping networks, such as European Plant Phenotyping Network (DPPN), the European Research Platform for Plant Phenotyping (EMPHASIS) and the International Plant Phenotyping Network.

Additionally, the IPK is a member institution of the following international networks:

- International Barley Genome Sequencing Consortium (IBSC),
- Barley Genome Net,
- International Wheat Sequencing Consortium (IWSC),
- International Wheat Initiative,
- DivSeek Consortium (biodiversity informatics).

## **5. Staff development and promotion of junior researchers**

### **Staff development and personnel structure**

On 31 December 2017, the IPK employed 452 people. This corresponds to 375 full-time equivalents (FTE), 142 of which were assigned to research and scientific services, 208 to service positions and 25 to administration (see Appendix 4 for details). 52% of the positions assigned to research and scientific services were financed by third party funds. 81% of the people working in research and scientific service were employed on temporary contracts.

Over recent years, the Institute has been subject to generation change. This will continue in the next few years. One third of the research groups active by the end of 2017 (9/28) were established after the last evaluation. Within the upcoming evaluation period, a total of seven group leaders will retire, four of them within the next five years. This applies to a similar extent to permanent staff, of which 30% will leave in the next 10 years.

Given the size of the Institute, both regarding physical distances and number of staff, internal communication is a challenge. A multi-level communication concept was developed to allow an efficient communication flow despite spatial distance and staff size. Still, it is a challenge to recruit outstanding young scientists at the international level. Therefore, a workshop has been organised in summer 2018 for potential independent research group leaders open to highly qualified applicants from the IPK and elsewhere. Participants were selected on a competitive basis along with their publication record, research concept and strategic fit with the IPK research profile for the (common) preparation of grant applications.

### **Promotion of gender equality**

Of the total number of 182 scientists at the IPK, 73 (40%) are women, whereof 48 women are employed as scientists in non-executive positions and 22 as doctoral candidates. Only three women fill executive positions and no female professor is employed at IPK (see Appendix 4 for details).

The IPK states, that the Institute has not yet met the targets set by the Leibniz Association and following the DFG's cascade model. Reasons include the lower percentage of female applicants for leadership positions (in the period 2015-2017, 35.3 % of applications were from women) and the remote location of the Institute, limiting the opportunities for dual career recruiting. Also, four women in leadership positions left the Institute due to the discontinuation of research groups, retirement and the appointment to a university professorship. On the other hand, four female group leaders were appointed between 2012 and 2018, leaving the portion of female group leaders unchanged (14%) since 2012.

According to IPK a series of measures have been implemented to improve the situation, amongst other:

- In 2016, the IPK has adopted "The Equality Concept 2016 – 2019" that includes both strategic gender equality objectives by means of flexible target rates for scientific leadership positions following the DFG's cascade-model as well as a set of concrete measures related to different areas of activity, namely personnel recruitment and development and reconciliation of family and working life.
- The gender balance in the Scientific Advisory Board has been improved from 13% (2012) to 30% (2017). Similarly, major emphasis has been put on gender balance regarding the composition of selection committees.
- The IPK applies the implementation agreement to the GWK Agreement on Equality between Women and Men (AVGlei). In this context, the Board of Directors has adopted the rule that, if women are under-represented in a specific area, the Institute shall give preference to them when allocating training places, recruitment and career advancement.
- Regarding family-life balance, the Institute has been certified according to the "berufundfamilie" standard in 2010 which was successfully recertified. To further increase its attractiveness regarding the promotion of the careers of young scientists of both genders, the Institute strives to provide opportunities for dual careers.

### **Promotion of junior researchers**

In 2017, the IPK hosted 40 PhD students. From 2015-2017, 36 Bachelor- and 35 Master-theses and 55 PhD-theses have been completed.

The “Leibniz-Graduate School for Yield Formation in Cereals” has been transformed into a structured graduate program, which is mandatory to all PhD candidates since 2014.

The Institute states, that it supports personal career development during the postdoctoral qualification phase. The core is a personalised career development plan established between junior researchers or junior group leaders and department heads. The corresponding measures include regular talks with group leaders regarding career development, including, amongst others, coaching activities to support teaching skills, scientific writing, and various soft skills. For information on the independent junior research groups see Chapter 4, Subdivision V.

### **Vocational training for non-academic staff**

The IPK offers a total of approx. 20 training positions in various occupations (Biology laboratory assistant, Office management, Plant technologist, IT for systems integration, Cook) and six training positions for students in the dual Bachelor’s programme “Biotechnology” at the Anhalt University of Applied Sciences in Köthen.

## **6. Quality assurance**

### **Internal quality management**

According to IPK, the Institute is committed to quality assurance of scientific performance. Any person directly involved in research work at the IPK is obligated to follow the rules of good scientific practice as defined by the DFG and further specified by the Leibniz-Association’s guidelines. The IPK implemented these guidelines in an internal regulation in 2016. Relevant criteria and their implementation are outlined, including the election procedure and responsibilities of the ombudspersons and their roles in quality assurance.

Internal monitoring of quality assurance takes place at various levels:

- Monthly consultations of the board of directors with subsequent departmental meetings at working group leader level;
- Weekly meetings within working groups;
- Regular progress seminars at working group and departmental level;
- Internal review process of publications and research proposals;
- Election of the ombudsperson.

External quality assessment:

- Annual review by the scientific advisory board;
- Publication in peer-reviewed journals;
- Review of the research proposals by funding organisations;



- Review of proposals by private sector partners and contractual obligation of the IPK to industry stewardship rules.

### **Quality management by the Scientific Advisory Board and Supervisory Board**

The review by the Scientific Advisory Board (SAB) plays an important role in the external quality assessment. Every year departments are reviewed down to the level of individual research groups. Until 2016, the Gene Bank Advisory Board assisted the SAB to take into account specific issues of the Gene Bank. On the recommendation of the SAB, the Gene Bank Advisory Board was integrated into SAB from 2017 onwards, which facilitated coordination of the review of the Department of Genebank.

The members of the SAB cover the disciplinary spectrum of research and service activities at the Institute. The Governing Board, which convenes twice a year is informed about any important scientific and managerial matters by the head of the SAB, who is invited to all sessions of the Governing Board.

The SAB is involved in all major decisions on research planning and the acquisition of large-scale equipment as well as in the appointment of new heads of department. The SAB also supports the Institute's management in recruiting staff of the 2nd tier (research group leaders). Also, the SAB is involved with an advisory vote in decisions regarding the extension of work contracts and appointments of research group leaders and senior scientists. In the context of the points mentioned above, the SAB provides input regarding the strategic development, reflected by the Institute's Research Strategy and the implementation of recommendations resulting from the evaluations by the Leibniz Association.

In addition to quality assurance by the SAB, the Institute has established a series of additional measures regarding Research Data Management and adherence to a DIN EN ISO certified QM system effective in the Genebank Department and the Department of Administration and Central Services.

### **Implementation of recommendations from the last external evaluation**

The IPK responded to the central recommendations made by the Senate of the Leibniz Association in the last evaluation (highlighted here in italics, see also Statement of the Senate of the Leibniz Association from 29 November 2012, pages B-3 f). Following a request as part of the statement of the Senate of the Leibniz Association on 29 November 2012, the IPK management submitted a report by 1 June 2015. The Senate of the Leibniz Association acknowledged this report on 29 October 2015.

1. *It is recommended that the IPK develops a substantive future concept. Innovative research priorities must be identified from which the individual work of the Institute can be stringently inferred. It must aim at increasing the coherency of the research and service focus. Research should be focused more on gene bank-related work, as to shape out the unique value proposition of the Institute.*

According to IPK, the board of directors developed in close interaction with the research group leaders a research strategy that serves as the framework for the development of the Institute. The scientific advisory board approved the strategy. It defines the major mid and

long-term goals of the Institute and aims at enhancing its uniqueness, including research on and with the genetic resources maintained in the Gene Bank and the advancement of the Gene Bank to a Bio-Digital resource centre.

The research agenda addresses five research themes, which are implemented by the contributions of the four departments as well as the independent research groups. The overarching slogan “Biodiversity and Crop Plant Performance” points at the Gene Bank resources and related information as a basis for developing research in each of the five themes. The research strategy is being updated in order to match the dynamics of plant research. Herein the goals for the individual themes and their implementation have been set out. Core funding has been set aside to support strategic projects on a competitive basis.

2. *Bioinformatics should be valorised as an independent research area as well as a necessary internal service for the working groups of the IPK. The goal of bioinformatics must be to cover all internal service needs, to provide research impulses for experimental groups and to carry out innovative method development. At the same time, bioinformatics must have sufficient space for its own (basic) research.*

The IPK states, that Bioinformatics research and services have received considerable upgrading over the past years, which is reflected by budget increases from core funding. In the period 2010-2017, resources for staff, consumables, and investments increased from about € 1.3 million to more than € 1.9 million.

According to IPK, the internal demands of the Institute are addressed by re-enforcing and focussing existing resources and by the establishment of two new research groups (Quantitative Genetics, Domestication Genomics; see Chapter 2).

To strengthen the analysis and reconstruction of networks at the level of gene regulation, signal transduction and the metabolism of nutrients and secondary metabolites, a decentralised Computational Plant Physiology unit in the Department of “Physiology & Cell Biology” has been established. In the Department “Molecular Genetics” the research group “Network Analysis and Modelling” focusses on the integrative analysis and visualisation of omics data including spatially and temporally resolved phenotypic feature data for the investigation of biological networks and modelling of underlying plant developmental and metabolic processes. Also, the upcoming establishment of the research group “Metabolic Systems Interactions” aims at advancing metabolic modelling in plants towards the interactions among different metabolic networks within the same organism and between organisms and environment. Its establishment is provided for 2019.

3. *The IPK should improve its international visibility to equal its very good national integration. It is not sufficient to respond to suitable international programmes, such as for example, within the European Framework Programmes. It is expected that the IPK plays a more active role and takes part in the agenda setting at European level.*

The IPK states that a number of measures have been taken to play a more proactive role regarding the initiation of research programs at national and the EU level. For example, being a European Plant Science Organization (EPSO) member institution, the IPK provides

feedback and input in formative stages of program development. Also, the IPK participated in meetings of the working group Horizon 2020 and organised a colloquium in Brussels to introduce its research infrastructure to decision-makers at EU-level, e.g. members of the EU-Parliament.

Furthermore, incentives are provided for the coordination of EU proposals by IPK scientists. In 2015, a program was started to provide internal support during the application phase. Coordination of EU proposals has been included in target agreements for group leaders.

4. *IPK should be more ambitious regarding publication of its results in high-ranking, trans-disciplinary journals, with  $IF > 10$ . The Institute is supposed to develop a publication strategy for its major research themes.*

According to IPK, over the past seven years, the Institute has continuously increased the number of publications in moderate ( $>4$ ) to high impact journals ( $>9$ ) both in relative and absolute figures. In particular, this includes the number of publications with IPK scientists as first and last authors.

The IPK states, that this is indicative of an increased “publication competence” of a growing number of researchers at the Institute, which comprises the whole value chain, from the conception of a project up to the assortment of the results regarding their publication. Also, the IPK offered courses on scientific writing for PhD students and Postdocs.

5. *In order to improve the promotion of junior researchers IPK is recommended to develop an overarching concept addressing students, PhD candidates and junior research group leaders. This should also comprise training and career planning.*

According to IPK, since the last evaluation, researchers have shown a continued and increased commitment to teaching (102 contact hours for the period 2015-2017 vs 83 during the period 2009-2011). Furthermore, the increase of joint appointments, extraordinary professorships and the extended collaboration with additional universities (Rostock, Göttingen) is expected to improve access to talented students. As an additional measure, „Dual Study Programs“ for Biotechnology and Informatics have been established with the Anhalt University of Applied Sciences in Köthen and with the Otto-von-Guericke University Magdeburg. As a result, the number of Bachelor/Master theses supervised at IPK increased from 66 (2009-2011) to 73 (2015-2017). To attract students, a competitive two year scholarship programme for two Master students per year has been initiated in 2013 in cooperation with private sponsors/industry and with the Leibniz ScienceCampus Halle.

The supervision and education of PhD students have benefitted from the establishment and further evolution of the IPK Graduate Program, which was initiated in 2012 by a Leibniz (SAW) grant for the establishment of the “Leibniz-Graduate School for Yield Formation in Cereals”. Over the past years, this graduate school has been transformed into a structured graduate programme which is mandatory to all PhD candidates since 2014.

Also, the IPK states, that postdoctoral training activities and promotion of junior group leaders have been intensified (for more see Chapter 5). In 2015, the IPK has started to establish independent research groups (see Chapter 3, Subdivision V).

6. *The IPK research strategy has to be based on an appropriate organisational structure with clear thematic foci, transparent responsibilities, and substructures of appropriate size.*

In 2012, three of the four departments were very broadly positioned regarding their scientific scope. As a result, some of the research groups showed only weak connections to the main topic of their department. Occasionally, research groups showed thematic overlaps. In addition to the line management of the four departments, some research groups were also assigned to one of the two cross-sectional areas, the Plant Genome Resource Centre (PGRC) and the Bioinformatics-Platform. According to the evaluation report, the dual affiliation led to unclear hierarchical assignments.

The IPK states that this situation has been changed. To implement a clear governance, a consultative process involving, amongst others, the Scientific Advisory Board was initiated. Also, the retirement of a substantial number of leading scientists was used for a conceptual focusing and streamlining of the departments.

In parallel to sharpening the scientific focus of the departments, these were substructured into thematically defined research programmes. In this way, manageable units of a maximum of four groups were created.

The department heads are responsible for the development of the research programme and the integration of new research topics into the institute-wide research priorities, which are determined in close interactions with the research group leaders.

The acquisition of third-party funding at the national, European and international level is seen as the primary task of research group leaders to (i) develop competitive research concepts and to (ii) network within and outside the Institute. The target is a share of 25% third-party funds in relation to the core budget (excluding special funds for construction measures). All research group leaders have a key role in ensuring high-quality standards and counteracting malpractice of scientific data handling.

Programme leaders (Bereichsleiter) adopt an advisory function vis-à-vis the respective department head with regard to strategic development and priority setting. They represent the head of the department or the Institute in selected committees. Additionally, the tasks of the programme leaders include the participation in new appointments of research group leaders, notably in their research programme and in the development of the strategic orientation of the research programme. Furthermore, they engage in the promotion of cooperation and coordination between the research groups within the research programme, ensure the fitting of the research projects within strategic goals of the department and provide input in advancing the research infrastructure of the respective research programme.

7. *The double affiliation of the two cross-cutting platforms should be reconsidered as this structure may entail conflicts in governance and authority.*

According to the Institute, many of the original tasks of the Plant Genome Resource Centre (PGRC, see also above) have been merged into new structures (bioinformatics), are no longer required as a central resource/know-how platform (physical mapping, marker de-

velopment) or the know-how no longer needs to be provided centrally, as it is now distributed across many research groups (genetic mapping, transcriptome analysis). Thus, the PGRC was closed by the end of 2014 and the institute-wide DNA sequencing service was assigned to the Department of Genebank.

8. *It should be examined if the establishment of an autonomous unit “Bioinformatics” headed by a jointly appointed leader could be an alternative to the existing structure. Upgrading the unit, however, should not challenge the important dual function of bioinformatics as a service and research area.*

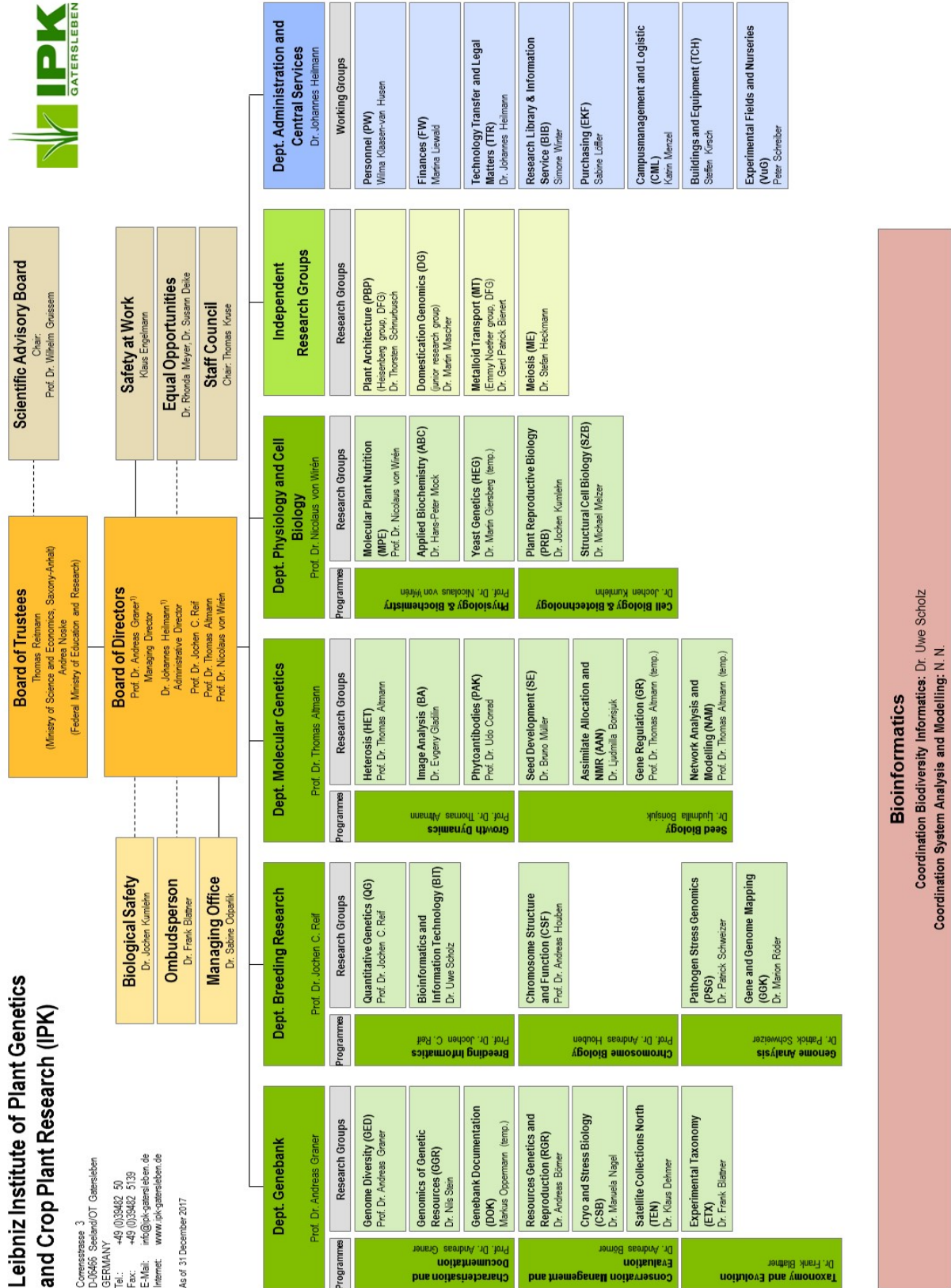
Respecting the great importance of bioinformatics for the research concept of the Institute, the IPK and its Scientific Advisory Board considered the establishment of a separate department of bioinformatics not appropriate. This was mainly due to the expectation that bioinformatics competence needs to be linked with experimental work, via the integration into research concepts and interaction with experimentally oriented research groups. Bringing all bioinformaticians together in one department of bioinformatics might contradict this idea, while a decentralised governance model was considered more effective to warrant the required interactions.

9. *The IPK is not yet sufficiently committed to gender equality and family-friendliness. It is recommended that the Institute address this issue in a more targeted way. The upcoming retirement of a substantial number of staff offers ample opportunities to improve the situation.*

Regarding gender balance, the IPK states that the Institute has not yet met the targets set by the Leibniz Association and following the DFG’s cascade model. Reasons include the lower percentage of female applicants for leadership positions and the remote location of the Institute, limiting the opportunities for dual career recruiting. Regarding family friendliness, the IPK has been distinguished regularly by the certificate “berufundfamilie”. For more information see Chapter 5.

Appendix 1

Organisational Chart



## Appendix 2

## Publications and patents

	Period		
	2015	2016	2017
<b>Total number of publications</b>	<b>196</b>	<b>183</b>	<b>206</b>
Monographs (not including dissertations)	2	1	1
Individual contributions to edited volumes	23	18	23
Articles in peer-reviewed journals	157	146	168
Articles in other journals	11	14	12
Editorship of edited volumes	3	4	2

<b>Industrial property rights (2015-2017) <sup>1</sup></b>	Granted	Registered
Patents	7	3
Exploitation rights / licences	3	

---

<sup>1</sup> Concerning financial expenditures for revenues from patents, other industrial property rights and licences see Appendix 3.

## Appendix 3

## Revenue and Expenditure

Revenue		2015			2016			2017		
		K€	%	%	K€	%	%	K€	%	%
<b>Total revenue (sum of I., II. and III.; excluding DFG fees)</b>		54,622			57,415			51,242		
<b>I.</b>	<b>Revenue (sum of I.1., I.2. and I.3)</b>	40,301	100 %		40,498	100 %		41,621	100 %	
1.	<u>INSTITUTIONAL FUNDING (EXCLUDING CONSTRUCTION PROJECTS AND ACQUISITION OF PROPERTY)</u>	28,544	70.8		28,789	71.1		29,293	70.4	
1.1	Institutional funding (excluding construction projects and acquisition of property) by Fed. and <i>Länder</i> governments according to AV-WGL	28,544			28,798			29,293		
1.2	Institutional funding (excluding construction projects and acquisition of property) not received in accordance with AV-WGL	0			0			0		
2.	<u>REVENUE FROM PROJECT GRANTS</u>	10,348	25.7	100 %	10,086	24.9	100 %	11,102	26.7	100 %
2.1	DFG	2,029		19.6	1,845		18.3	1,791		16.1
2.2	Leibniz Ass. (compet. procedure)	591		5.7	667		6.6	554		5.0
2.3	Federal, <i>Länder</i> governments	4,930		47.6	4,703		46.6	6,718		60.5
2.3.1	thereof: BMBF	3,229		31.2	3,007		29.8	4,028		36.3
2.3.2	BLE	980		9.5	1,400		13.9	1,650		14.9
2.3.3	BMWi and AiF	561		5.4	285		2.8	406		3.7
2.3.4	Fed. State of Saxony-Anhalt	161		1.6	10		0.0	634		5.7
2.4	EU	913		8.8	550		5.4	556		5.0
2.5	DAAD	7			13			9		
2.6	Industry	1,747		16.9	2,209		21.9	1,397		12.6
2.7	Foundations	0		0	0		0	14		0.1
2.8	Other sponsors	131		1.3	100		1.0	63		0.6
3.	<u>REVENUE FROM SERVICES</u>	1,409	3.5		1,614	4.0		1,225	2.9	
3.1	Revenue from commissioned work	1,376			1,525			1,203		
3.2	Revenue from publications	0			1			6		
3.3	Revenue from exploitation of intellectual property for which the institution holds industrial property rights	33			14			15		
3.4	Revenue from exploitation of intellectual property without industrial property rights	0			75			0		
<b>II.</b>	<b>Miscellaneous revenue</b>	13,521			15,417			11,121		
II.1	thereof: withdrawal from reserves	12,886			15,087			10,685		
II.1a	thereof: cash resources third party funding	428			875			1,271		
II.1b	thereof: cash resources investment/building projects	1,819			6,131			1,601		
II.1c	thereof: cash resources core funding	620			1,213			1,515		
<b>III.</b>	<b>Revenue for construction projects (institutional funding by Federal and <i>Länder</i> governments, EU structural funds, etc.)</b>	800			1,500			1,500		

Expenditures		T€		T€		T€	
<b>Expenditures (excluding DFG fees)</b>		54,622		57,415		54,242	
1.	Personnel	21,770		22,143		23,430	
2.	Material expenses	13,962		13,525		16,077	
2.1	Proportion of these expenditures used for registering industrial property rights (patents, utility models etc.)	53		36		38	
3.	Equipment investments	4,117		4,573		3,985	
4.	Construction projects, acquisition of property	1,862		6,532		5,123	
5.	Other operating expenses	12,911		10,642		5,627	
DFG fees (if paid for the institution – 2.5% of revenue from institutional funding)		709		715		726	



## Appendix 4

## Staff

(Basic financing and third-party funding / proportion of women (as of: 31 December 2017))

	Full time equivalents		Employees		Female employees	
	Total	on third-party funding	Total	on temporary contracts	Total	on temporary contracts
	Number	Percent	Number	Percent	Number	Percent
<b>Research and scientific services</b>	<b>141.6</b>	<b>52.3</b>	<b>182</b>	<b>80.8</b>	<b>73</b>	<b>90.4</b>
Professors / Direct. (C4, W3)	4.0	0	4	0	0	0
Academic staff in executive positions (A15, A16, E15 or equivalent)	19.8	0	20	20.0	3	33.3
Junior research group leaders / junior professors/ post-doctoral fellows (C1, W1, A14, E14 or equivalent)	4.0	50.0	4	100	0	0
Scientists in non-executive positions (A13, A14, E13, E14 or equivalent)	92.4	72.7	114	86.7	48	93.5
Doctoral candidates (A13, E13, E13/2 or equi.)	21.5	13.9	40	100	22	100
<b>Service positions</b>	<b>208.0</b>	<b>17.8</b>	<b>241</b>			
Laboratory (E9 to E12)	39.5	20.2	43			
Laboratory (E5 to E8)	77.5	28.4	90			
Laboratory (E1 to E4)	5.7	17.6	9			
Library (E9 to E12)	1.0	0	1			
Library (E5 to E8)	3.0	0	3			
Information technology - IT (E9 to E13)	6.0	0	6			
Information technology - IT (E5 to E8)	3.8	0	4			
Technical staff (workshops, large equipment, service) (E9 to E12)	10.0	0	10			
Technical staff (workshops, large equipment, service) (E5 to E8)	6.0	0	6			
Administrative and scientific management staff (E9 to E13)	12.0	18.3	12			
Staff on Experimental fields / nurseries and campus management (E5 to E8)	34.3	2.9	41			
Seasonal staff (E1 to E4)	9.4	10.7	16			
<b>Administration</b>	<b>25.0</b>	<b>0</b>	<b>29</b>			
Head of the administration	1.0	0	1			
Administration staff (financial administration, human resources, purchasing etc.) (E9 to E12)	9.5	0	11			
Administration staff (E5 to E8)	14.5	0	17			
<b>Student assistants</b>	<b>1.2</b>	<b>0</b>	<b>5</b>			
<b>Trainees</b>	<b>29.2</b>	<b>0</b>	<b>34</b>			
<b>Scholarship recipients at the institution</b>	<b>9.0</b>	<b>100</b>	<b>9</b>		<b>8</b>	
Doctoral candidates	7.0	100	7		7	
Post-doctoral researchers	1.0	100	1		0	
Scientists	1.0	100	1		1	

## Annex B: Evaluation Report

Leibniz Institute for Plant Genetics and Crop Plant Research (IPK),  
Gatersleben

### Contents

1. Summary and main recommendations .....	B-2
2. General concept and profile .....	B-3
3. Subdivisions of IPK .....	B-7
4. Collaboration and networking .....	B-12
5. Staff development and promotion of junior researchers.....	B-13
6. Quality assurance .....	B-14

Appendix:

Members of review board

## 1. Summary and main recommendations

IPK is one of the world's leading institutes in the field of plant genetics and crop plant research. It works very successfully on fundamental principles of evolution, development and adaptability in important cultivated plants. The Gene Bank is a world-class research infrastructure through which IPK makes an important contribution to preserving the genetic diversity of cultivated plants and their wild forms.

Since the last evaluation in 2011/2012, IPK has developed excellently. A coherent future strategy was developed that defines important mid- and long-term goals as well as appropriate focus areas. In line with the recommendations, more emphasis has been placed on gene bank-related activities; in the departments, greater substantive coherence has been achieved. IPK has introduced a number of meaningful re-structuring measures which led to a clear organisational structure. Bioinformatics is appropriately integrated whilst retaining its decentralised structure. Thanks to its Independent Research Groups that were introduced in 2015, IPK now has a very suitable tool at its disposal for attracting early-career researchers and their expertise to the institute. In addition to the Gene Bank, IPK started operating a state-of-the-art plant phenotyping infrastructure in recent years.

IPK's four departments are rated as "excellent" in two cases and "very good to excellent" and "very good" in the other two. The research agenda is highly topical. IPK has produced impressive research results which have been excellently published. The recommended enhancement of visibility has thus been successfully achieved. With its Gene Bank the institute provides services for a raft of scientific and breeding issues. The Gene Bank is currently morphing from a biological into a biodigital resource centre, a development of the utmost strategic relevance which must be rigorously driven forward.

IPK is well-connected both nationally and internationally in many ways. It is also an important partner for industry (plant breeding). The institute raises a high level of third-party funding. It engages in scientific transfer and would like to extend this engagement. Junior researchers experience very good conditions at IPK. In terms of human resources, the institute is in the middle of a generational change. In order to manage this, it will need to address the topic of recruitment more proactively and strategically in the future.

Special consideration should be given to the following main recommendations in the evaluation report (highlighted in **bold face** in the text):

### General concept

1. The decentralised organisational structure of bioinformatics is convincing. It should, however, be ensured that the bioinformatics groups, just like the other service-oriented groups, have sufficient time for research of their own.
2. In recent years, IPK has been extremely successful in researching barley and wheat. In order to maintain or expand its vanguard position in the future, IPK should develop a strategy to explore potentials with other crop plant species in good time. The outstanding collections of genetic resources provide the best prerequisites for this.

3. The institute should devote more attention to communicating the value of its genetic resources to the public. The great importance of research for food security, for increasing resource efficiency and for developing a bioeconomy must also be emphasised time and again. Against the backdrop of current political debates on genetically-modified plants, this has a strategic dimension for IPK. Therefore, the considerations outlined during the evaluation visit to establish a science communication centre on the basis of an existing pupils' laboratory ("Green Lab") are welcomed.

#### Appropriateness of facilities, equipment

4. The institute has sites in Mecklenburg-Vorpommern. This distribution was plausibly justified with the differing demands on soil quality and seed safety. However, collaboration over such a distance is a challenge. The institute management is aware of the situation and has taken measures which must now bear fruit. With regard to the strategic potential of the potato, oil and fodder crop plant collections located in Mecklenburg-Vorpommern, this is of major relevance.
5. It is of the greatest strategic relevance for IPK to develop the Gene Bank into a Bio-Digital Resource Centre. For this purpose, as of 2021, investment in scientific equipment and IT will be required for which the institute would like to apply for additional institutional funding totalling 700 k€ per annum. This is expressly endorsed.

#### Staff development

6. In the future, the institute must start addressing appointment issues much earlier and in a more targeted fashion. This also applies to technical personnel. Moreover, it is recommended to develop transparent criteria for removing time limits on contracts as well as providing bridging funding to complete research work.
7. IPK is called upon to employ more female researchers at the top leadership levels. The measures adopted so far are insufficient. The institute must break new ground in order to be successful.

## **2. General concept and profile**

The Leibniz Institute for Plant Genetics and Crop Plant Research (IPK) conducts basic and application-oriented research. It works successfully on fundamental principles of evolution, development and adaptability in important cultivated plants. Work covers the entire plant (from roots to flowers and seeds) and its entire life cycle (embryogenesis, germination, ageing etc.). IPK boasts a broad spectrum of expertise in plant biology and genetics.

The institute's core infrastructure is the *ex situ* Gene Bank which is not only extremely well managed but also enjoys an outstanding international reputation. It collects, characterises and documents genetic resources from agricultural and horticultural cultivated plants. In this connection, services are provided for an array of scientific and breeding issues. Through its Gene Bank IPK makes an important contribution to preserving the genetic diversity of cultivated plants and their wild forms.

## Development of the institution since the last evaluation

Since the last evaluation in 2011/2012, IPK has developed excellently. In the course of a consultative process, a coherent future strategy was developed that defined important mid- and long-term goals as well as appropriate focus areas. In line with recommendations, more emphasis has been placed on gene bank-related activities; in the departments, greater substantive coherence has been achieved. As a number of group leaders are due for retirement this will subsequently become even more pronounced in the near future.

IPK has introduced a number of meaningful re-structuring measures which led to a clear organisational structure. The arrangement whereby research groups had two different affiliations has been abolished. The four departments are still large but now comprise fewer groups which are better related to one another in terms of content. In addition, research groups within the departments have been combined to form research programmes which, although they only have content coordination functions, still constitute an appropriate structuring element.

In accordance with recommendations, IPK has taken measures to upgrade bioinformatics and examined the organisational integration of bioinformatic expertise. For this purpose, a needs analysis was conducted. As a result, a decision was taken in agreement with the Scientific Advisory Board not to pool the bioinformatics groups in an independent organisational unit but to retain the decentralised structure with two coordinating cross-cutting areas. This helps to ensure that they and their expertise in research and services are better integrated in the work of the departments. **The decentralised organisational structure of bioinformatics is convincing. It should, however, be ensured that the bioinformatics groups, just like the other service-oriented groups, have sufficient time for research of their own.** Other important developments since the last evaluation include the opening of the plant phenotyping infrastructure (see below) and the introduction of Independent Research Groups (see Chapter 3).

## Strategic work planning for the next few years

IPK's research strategy seeks to sustainably improve crop plant performance. Work will continue to focus on barley and wheat. This is plausible because these plants are important for securing the food supply. Moreover, in this field, IPK can boast wide-ranging expertise and major achievements in research. With regard to specific questions, IPK also looks at other important crop plants like maize, oil-seed rape and peas as well as model plants (e.g. Arabidopsis).

**In recent years, IPK has been extremely successful in researching barley and wheat. In order to maintain or expand its vanguard position in the future, IPK should develop a strategy to explore potentials with other crop plant species in good time. The outstanding collections of genetic resources provide the best prerequisites for this.** For example, a systematic study of legumes seems promising.

## Results

### *Research*

The recommendation issued at the last evaluation to publish research results more frequently in high-ranking, cross-disciplinary journals has been implemented with notable success. In the last seven years, the institute has increased both the number and quality of its publications, so that the publication record is now excellent. The strength of IPK's international visibility is demonstrated, for instance, by its leadership in sequencing the barley genome and the publication of these results in *Nature*.

### *Research-based infrastructure and services*

The Gene Bank is a world-class research infrastructure. IPK uses it to provide wide-ranging services for research and plant breeding. The Gene Bank is currently morphing from a biological into a biodigital resource centre, a development of the utmost strategic relevance for the institute which must be rigorously driven forward (see below "Appropriateness of facilities" and Chapter 3, Genebank Department).

The plant material is preserved in cold storage, cryoconserved in liquid nitrogen, as a permanent crop in the field, or as an in-vitro culture. The standards of storage and documentation are excellent. Information can also be accessed externally via a user-friendly gene bank information system (GBIS). In accordance with recommendations, IPK reorganised the release of gene bank material; it makes sense that the institute introduced a modest fee for this service in 2016.

Furthermore, in recent years, IPK has started operating a state-of-the-art plant phenotyping infrastructure which is available for use by users from collaborating institutions. It facilitates research under precisely controlled dynamic environmental conditions and in high throughput. Its construction tied up extensive financial resources and staff. Once the facility starts operating fully, excellent research results are to be expected.

### *Knowledge and technology transfer*

Knowledge and technology transfer are conducted in various ways, often in the context of collaborations. Staff at the institute play an active role in consultancy, for example with regard to novel breeding technologies and legislation on genetic resources. The institute holds intellectual property rights (e.g. software licences, patents, know-how agreements).

**The institute should devote more attention to communicating the value of its genetic resources to the public. The great importance of research for food security, for increasing resource efficiency and for developing a bioeconomy must also be emphasised time and again. Against the backdrop of current political debates on genetically-modified plants, this has a strategic dimension for IPK. Therefore, the considerations outlined during the evaluation visit to establish a science communication centre on the basis of an existing pupils' laboratory ("Green Lab") are welcomed.**

The "Green Lab" on the BiotechCampus Gatersleben is currently funded by a friends' association. It was established more than ten years ago and is extremely successful with

more than 5,000 visitors annually. IPK itself is also engaged in education and receives large numbers of visitors. Together they would be able to communicate green biotechnology topics to a significantly broader public. It seems plausible to envisage additional institutional funding, which would have to be applied for under the relevant procedures, to develop a science communication centre. A detailed proposal should also include success monitoring and quality assurance measures. As intended, the institute should cooperate closely with the Leibniz Institute for Science and Mathematics Education (IPN) in Kiel and the Museum für Naturkunde (MfN) in Berlin.

### **Appropriateness of facilities and equipment**

The level of institutional funding is sufficient to enable IPK to fulfil its current portfolio. In 2017, institutional funding totalled nearly €30 m.

In addition, IPK raises substantial third-party funds. In the period 2015-2017, these accounted for approx. 30 percent of the institute's overall revenue. IPK is particularly successful in its efforts to acquire third-party funding from the Federation and the *Länder* (52%, mostly BMBF). At an average of 18 percent, a significant share was acquired from the DFG. The proportion of EU funding is still relatively low (6%) although it has increased slightly since the last evaluation. In this context, it is welcomed that IPK acquired an ERC Consolidator Grant in 2016. Overall, it is very positive that IPK's third-party funding strategy is clearly focused on curiosity-driven research. An appropriate volume of funding is also raised from industry (17%), plus revenue from services (3%), essentially the provision of seed materials.

At its sites in Gatersleben (Sachsen-Anhalt), Malchow/Poel and Groß Lüsewitz (both in Mecklenburg-Vorpommern) IPK has approx. 50 hectares of land. **This distribution of sites was plausibly justified with the differing demands on soil quality and seed safety. However, collaboration over such a distance is a challenge. The institute management is aware of the situation and has taken measures which must now bear fruit. With regard to the strategic potential of the potato, oil and fodder crop plant collections located in Mecklenburg-Vorpommern, this is of major relevance** (see Recommendation 2 above and Chapter 3: "Satellite Collections North").

The current provision of office space is appropriate. The laboratory equipment for cell biological, biochemical and metabolite analysis as well as for molecular genetic analysis and DNA sequencing is state of the art.

**It is of the greatest strategic relevance for IPK to develop the Gene Bank into a Bio-Digital Resource Centre (see above). For this purpose, as of 2021, investment in scientific equipment and IT will be required for which the institute would like to apply for additional institutional funding totalling 700 k€ per annum. This is expressly endorsed.**

See Chapter 5 for human resources.

### 3. Subdivisions of IPK

**Genebank Department** (as of 31 May 2018: 29.7 FTE in research and scientific services, 1.0 FTE doctoral candidates, 58.3 FTE service staff)

This department is responsible for managing the maintenance as well as the breeding and scientific utilisation of the *ex situ* Gene Bank, duties it fulfils in an outstanding manner. Since the last evaluation, the department has developed excellently. In line with recommendations, research is more strongly focused on its own collections. This work is fundamental and can only be carried out in this way at IPK. The publication record is outstanding, particularly considering the high percentage of service activities in the department. The recommended focusing and enhancement of visibility have thus been successfully achieved. At the same time, the strategy is geared to the needs of the other departments. The department is also excellently connected internationally. It acquires very extensive third-party funding.

The department is sensibly divided into three areas with altogether seven research groups (RGs). Overall it is rated as “excellent”.

Three groups address the **utilisation of the databases** and their sub-collections: The Research Group “Genome Diversity” conducts cutting-edge research on genetic analysis of agronomic traits. The work on barley, in particular, is world-leading. The research group publishes at the highest level. It is very well connected both within and outside the department. The Research Group “Genomics of Genetic Resources” conducts extremely successful research on decoding the genomes of the most important types of cereal (barley, wheat, rye). It also publishes at top international level. The publication in *Nature* in 2017 on the characterisation of the barley genome, in which the group played a leading role, was a milestone. The work on maize is also considered to be very promising. The group “Genebank Documentation” carries out extremely important services relating to the development and maintenance of the information system (including GBIS). It is strategically very well positioned and active at a central European intersection thanks to its coordination of the EURISCO Project.

Three further groups aim to **improve collection management**: The Research Group Genetics and Reproduction carries out extensive central services for the entire institute focusing on the long-term storage, distribution and propagation of seed material. Given this, it is impressive that it also conducts extremely relevant work on duplication and replication research. Its fundamental activities on predicting longevity have great potential. The Research Group “Cryo and Stress Biology” is responsible for the preservation of vegetatively propagated plants. This small group, which has only been working together since 2016, conducts application-related research on very interesting issues relating to cryoconservation. Against the backdrop of its time-intensive, long-term service portfolio, the group’s publication record is remarkable. The work on short-lived cereal pollen has great potential and should be intensified. The Research Group “Satellite Collections North” is located at both sites in Mecklenburg-Vorpommern. It is responsible for potato, oil and fodder crop plant genetic resources, thus providing extensive and important services. In comparison with the other service-oriented units in the department, however, the research



potential is distinctly under-exploited. Due to the distance from IPK's main site, challenges emerge in cooperation with other groups. The institute management is aware of the situation. With regard to the strategic potential of the collections, changes should be issued as quickly as possible (see Recommendations 2 and 4 in Chapter "General concept").

Research Group "Experimental Taxonomy" curates IPK's **taxonomic collection** (*Herbarium*/wild *Hordeum* species) and thus complements the other groups. It also addresses complex scientific topics at a level which is cutting edge in taxonomy terms. The group managed, for example, to discover new evolutionary connections by including wild crop relative. The group is very visible internationally.

**Breeding Research Department** (as of 31 May 2018: 24.5 FTE in research and scientific services, 9.3 FTE doctoral candidates, 27.6 FTE service staff)

Since the last evaluation, the department has been successfully re-structured. With the appointment of a new head of department in 2013, the former department of "Cytogenetics and Genome Analysis" was refocused and renamed. As a result, several research groups were wound up and the overall profile of the department was successfully sharpened, as recommended at the last evaluation. Strategically, the department is very well integrated in IPK and has successfully upgraded its bioinformatics topics. The department is excellently connected, being involved, for example, in the German Network for Bioinformatics Infrastructure and the international development of standards in phenotyping (MIAPPE). Its research is regularly published in high-ranking journals and enjoys the concomitant international visibility. Third-party funding income is high.

The department is composed of three very strong groups and two very good groups in transition. Overall, the department, which is very well managed, is rated as "very good to excellent". Once the groups in transition line up with the overall strategy, the department clearly has the potential to become excellent.

Two groups in the department work on **breeding informatics**: The Research Group "Quantitative Genetics" has developed very well since 2013. It introduces innovative methods into the field of statistical genomics which excellently complement IPK's research portfolio. The Research Group "Bioinformatics and Information Technology" provides services which are of major importance to the whole institute. Moreover, it also conducts research and development activities, particularly in biological databases and sequence-related bioinformatics. The group's work contributes to developing international standards. It is very well connected and visible internationally. Novel software solutions are very well published.

One group successfully addresses **chromosome biology**. The Research Group "Chromosome Structure and Function" conducts groundbreaking research in this area, which is also highly relevant to applications, on topics such as speeding up the breeding process. The group also distinguishes itself by sustained publication productivity in high-level journals, extensive third-party funding and patented technology. Special mention should be made of its intensive cooperation with the Independent Research Group "Meiosis".

Two groups undertake **genome analysis** using methods developed in the breeding informatics field: The Research Group "Pathogen Stress Genomics" is known for being very strong in research but is currently undergoing restructuring following the tragic accidental death of the group leader. A new leader is starting in January 2019. Currently, the group works on convincing strategies for storing and processing extensive image datasets. The time is coming when expertise in this area will be in ever greater demand, so reinforcement is recommended. The Research Group "Gene and Genome Mapping" is active in an extremely relevant research field with great potential for development. The group leader is strong on research. The group is, however, very small and should be restructured. Those responsible at IPK are aware of this and have already introduced appropriate measures.

**Molecular Genetics Department** (as of 31 May 2018: 25.3 FTE in research and scientific services, 2.0 FTE doctoral candidates, 27.6 FTE service staff)

This department has developed very well since the last evaluation. In line with recommendations, it was refocused and now concentrates on growth dynamics and seed biology. This process was facilitated by a significant turnover in personnel due to individual career advances and retirements. The plan to include work on "Systems Genetics" is explicitly welcomed. In recent years, the department has, in particular, built worldwide unique infrastructures in which environmental conditions are controlled, and current and future field conditions can be simulated. Furthermore, imaging NMR technologies have been established for the high-resolution, non-invasive study of structures and substances. Investment has also been made in imaging research.

The department has an international reputation and connections. Its overall publication record is very good, and it also raises extensive third-party funding. Overall, the department is rated as "very good", with the potential to become excellent.

Four groups in the department address **growth dynamics**: In recent years, the department head's Research Group "Heterosis" has developed the phenotyping infrastructures and plant cultivation hall mentioned above. This proved to be visionary as they are gradually becoming a core element of IPK's research. The construction did, however, tie up extensive financial resources which are now available for research activities once again. The first interesting data should soon generate research results. Investigations into the genetic foundations of growth characteristics are thought to hold great potential for the future. With few staff, the Research Group "Image Analysis" works on an important infrastructure element for future automated phenotyping. The group has had a new head since autumn 2016 and appears to be still in the build-up phase with only few published results so far. The group is recommended to intensify its networking within the institute, particularly with the bioinformatics groups. It should also resort to standard solutions more often before capacity is invested in developing its own applications. To meet the demands and to deliver on the great potential and relevance image processing currently has, additional support may be required. For years, the Research Group "Phytoantibodies" has been working very successfully on interesting, application-relevant topics which, however, lie

outside the institute's focus. The group leader is highly respected and consistently publishes at a high level. In 2019, he is reaching retirement age and will have completed his projects by then. With a new leader the group will adopt a different focus. The processes involved should be launched in good time. The Research Group "Acclimation Dynamics and Phenotyping" only started work at IPK in January 2018. Since then, it has set up promising experiments to investigate, for example, environmental factors determining plant performance. The group has great scientific potential. It also provides important data management services. It should be ensured that the group leader can spend 50 percent of her working time conducting research.

Three groups are active in the field of **seed biology**: The Research Group "Seed Development" pursues interesting questions with very good results. It is an important part of the department and cooperates closely with the second group. There have been a number of changes in leadership and the position is currently a temporary appointment. Given the promising application situation, a successor should soon be identified. By emphasising developmental aspects new momentum is to be expected. The Research Group "Assimilate Allocation and NMR" is excellently positioned and connected across departments. It develops highly-innovative methods that generate completely new insights into interactive processes in seed tissue. The work is an excellent example of phenotyping that already delivers. The group successfully raises funding from the DFG and industry. Its publication record reveals a very positive trend which should be further reinforced with high-ranking publications. The potential is there. The Research Group "Network Analysis and Modelling" has only been under new leadership for a short time. Currently, it is a very small group working on complex, large-scale topics relating to the computer-assisted modelling of biological processes. Moreover, it coordinates one of the two bioinformatics platforms. In order for the group to implement its great potential, it must be either significantly expanded in terms of human resources or more clearly focus its broad spectrum of activities.

**Physiology and Cell Biology Department** (as of 31 May 2018: 20.7 FTE in research and scientific services, 9.0 FTE doctoral candidates, 27.9 FTE service staff)

This department is a core element of the institute's scientific profile and plays a major role in IPK's international visibility. The department's research results are excellent and produce internationally-regarded results. They are published accordingly. One of the department's strengths lies in the use of non-crop models (*Arabidopsis*) and extending them to crops. It has also developed a new and insightful mechanism of iron acquisition/uptake. The department cooperates intensively both within IPK as well as nationally and internationally. In total, it raises extensive third-party funding.

The departmental leadership manages the complementary groups very competently and successfully. More coherence will be achieved when the work on yeast has been completed. The plans to build expertise in root physiology and root development are convincing. Department 4 is rated as "excellent".

Three of the groups in the department are pooled under the umbrella of **physiology & biochemistry**: Using innovative approaches, the Research Group "Molecular Plant Nutrition" most successfully studies the regulation of transport and metabolic processes. It has

established impressive analytical platforms and its publication record is excellent. The department's much lauded findings on iron uptake/acquisition and the transfer of the model plant *Arabidopsis* to barley are conducted here. The Research Group "Applied Biochemistry" provides a central metabolics and proteomics platform. It can also boast a very good publication record and third-party funding. The group is very well connected, not only within IPK (Genebank Department/Nagel), but also with the University of Halle and Europe-wide. The Research Group "Yeast Genetics" conducts genetic and biotechnological studies on yeasts. It is a very strong application-oriented group that has been highly successful and productive in the past. Now, however, the group's topics no longer fit IPK's research profile. It is therefore welcomed that, following the retirement of the group leader in 2019, the topic will not be continued; instead, a group will be established to work on root research.

Two groups are active under the umbrella of **biology & biotechnology**: The Research Group "Plant Reproductive Biology" conducts technology development at cutting-edge international level. With its exciting, novel approaches to speeding up the breeding process and creating haploids, it is of central importance for other groups' research. It is accordingly strongly connected not only within IPK, but also nationally and internationally. The great potential of the group is limited by EU legislation. It should therefore utilise this potential and communicate its exemplary work on genome editing to the public. Moreover, the group is encouraged to acquire third-party funding. The Research Group "Structural Cell Biology" is a core unit that facilitates the research of other groups by providing and developing imaging technologies. Particular mention should be made of its achievements in high-throughput microscopy technology. With its strong service component, the group is very well connected and thus involved in many third-party projects and publications. The group has the potential to conduct original research. It is therefore encouraged to apply for its own third-party funding.

### **Independent Research Groups**

Through the Independent Research Groups, which were introduced in 2015, IPK manages admirably to promote younger researchers at the institute. They report back to the Board of Directors directly and are thus not integrated in the institute's scientific departments, which allows them a high degree of independence and visibility. At the same time, they contribute important additional expertise to IPK's scientific portfolio. The plans to expand this instrument are welcomed; in the future, however, women must be recruited for the leadership of Independent Research Groups (see Chapter 5 "Promotion of gender equality").

Three groups are financed by funding programmes. Initially, the head of the "Plant Architecture" group (9 individuals) had a DFG Heisenberg Fellowship before he was awarded an ERC Consolidator Grant for the work at IPK in 2016. The "Metalloid Transport" group (2 individuals) has been funded under the DFG's Emmy Noether Programme since 2016. The "Meiosis" group (5 individuals) has also largely financed itself from the BMBF's Junior Research Fellowship Programme since 2016.

Two additional groups are financed from IPK's core budget. It is very positive that this format has meant that the head of the "Domestication Genomics" group (4 individuals), a researcher of outstanding potential, could be retained at IPK. The group cooperates closely with the "Genomics of Genetic Resources" Research Group, for example in the field of old varieties/old genes that has already produced impressive results. The group was established jointly with the German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig. The second group financed from the core budget, "Applied Chromosome Biology" (4 individuals), was only established on 1 March 2018. The leader also holds a joint junior professorship at the University of Halle. He was previously employed at distinguished institutions. The projects he has presented suggest great potential but are, of course, still in their infancy.

## 4. Collaboration and networking

### Collaboration with universities

As a result of the joint professorial appointments (W3) held by four heads of department and one junior professorship, IPK is linked with the University of Halle-Wittenberg. This link is productive, as demonstrated by the joint acquisition of collaborative projects. In 2017, a cooperation agreement was concluded with the Faculty of Agricultural Sciences at the University of Göttingen which has already brought about one joint appointment (W3). It is welcomed that a further W1 appointment is scheduled to follow. IPK's cooperation with Anhalt University of Applied Sciences on dual study programmes has proved valuable in training and promoting junior researchers. In general, IPK's increased engagement in academic teaching as well as supervising Bachelor's and Master's dissertations is greatly welcomed.

Furthermore, IPK is linked to the German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig via the Independent Research Group on "Domestication Genomics".

### International collaborations and networks

IPK is involved in a raft of national and international scientific consortia. Not least thanks to its research infrastructures, the institute is a visible, sought-after partner. It often assumes a leading or coordinating role as, for example, in the Barley Genome Sequencing Consortium (IBSC), the German Crop Bioinformatics Network (GCBN) and ELIXIR Germany. IPK is a valued partner in several phenotyping networks (DPPN, EMPHASIS). On the service side, special mention should be made of its engagement in operating and developing the European Search Catalogue for Plant Genetic Resources (EURISCO).

IPK is also an important partner for industry. It is linked to multiple breeders and involved in numerous PPP proposals. By maintaining its collections and delivering seed material the institute also provides important services for the breeding community.

## 5. Staff development and promotion of junior researchers

### Staff development and personnel structure

On the reporting date, 31 December 2017, IPK employed 452 staff, which equated to 375 full-time equivalents (FTE). Of these, 142 were employed in research and scientific services, 208 in the service sector and 25 in administration.

The personnel structure is adequate for fulfilling IPK's current portfolio. The relation between the number of staff in research and scientific services and those in the service sector is appropriate. The talks with employees clearly revealed a high degree of work satisfaction and motivation.

IPK is in the middle of a generational change. In the coming years, approx. 30 percent of its permanent staff will reach retirement age, including seven of the 24 group leaders and the scientific director. It is welcomed that the institute has already developed new recruitment formats which have been quite successful. Given that the institute is located so far from major centres, it is not easy to recruit enough established researchers from home and abroad. At the same time, IPK offers an excellent research environment. In order to cope with the imminent turnover in human resources, IPK must address the issue more proactively and self-confidently. In dealing with recruitment, the institute should generally rely more on creative, possibly collaborative ideas. It could, for example, pool resources and expertise with universities and other research institutions in order to make the region more attractive for applicants and their families.

**In the future, the institute must start addressing appointment issues much earlier and in a more targeted fashion. This also applies to technical personnel. Moreover, it is recommended to develop transparent criteria for removing time limits on contracts as well as providing bridging funding to complete research work.**

### Promotion of gender equality

Just as at the last evaluation, the proportion of women in research and scientific services is 40 percent, whereby the share of women at group leader level has dropped from 18 percent to 15 percent. There are still no women at IPK holding positions at top management level (institute and departmental heads) or professorships. It is particularly inexplicable that none of the Independent Research Groups is headed by a woman. **IPK is called upon to employ more female researchers at the top leadership levels. The measures adopted so far are insufficient. The institute must break new ground in order to be successful.**

IPK's employees benefit from appropriate measures to improve the reconciliation of work and family life. This has been certified by the audit *berufundfamilie* since 2010 and regularly re-confirmed.

### Promotion of junior researchers

On 31 December 2017, 40 doctoral candidates (21.5 FTE) were employed at IPK. They are very well supervised and trained. In accordance with recommendations, a structured

training programme was developed that is mandatory. In addition to the graduate programme coordinators, there is a doctoral committee (PSB) which organises educational and social activities. A welcome procedure has been devised for doctoral candidates from abroad, which has been very well received. In the reporting period 2015-2017, 55 doctorates were completed.

Postdocs also experience very good conditions at IPK. It is recommended to reinforce cross-group communication at this level by introducing targeted measures (e.g. retreats) and thus to promote cooperation. The postdoc group is also very motivated to play a role in the institute's strategic development. IPK should utilise this potential better.

### **Vocational training for non-academic staff**

The institute's engagement in training and continuing education is very pleasing. Altogether, it offers some 20 positions for trainees in various occupations. The Review Board acknowledges the level of qualifications and the dedication of IPK's technical staff.

## **6. Quality assurance**

### **Internal quality management**

IPK operates an appropriate system of internal quality assurance. In 2016, it implemented the Leibniz Association's recommendations on assuring good scientific practice in the form of internal regulations. There is an ombudsperson and a deputy ombudsperson. Research data management is certified according to DIN EN ISO and operated appropriately according to fair data standards. It is also positive that the publication strategy places its emphasis on the quality of publications. The well-established system of performance-based funding allocation is based on the previous year's third-party income, meaningfully weighted according to third-party funder.

### **Quality management by the Scientific Advisory Board and Supervisory Board**

The Scientific Advisory Board is exemplary in its engagement in the institute's work. Special mention should be made of the exceptional quality of its reports. Every year, the departments are reviewed down to the level of individual research groups. In 2016, the Scientific Advisory Board conducted the audit which is normally held at Leibniz institutions between two evaluations, assessing both the scientific units and IPK as a whole. On the Scientific Advisory Board's recommendation, the Gene Bank Advisory Board was integrated into the SAB in 2017.

### **Implementation of recommendations from the last external evaluation**

The recommendations issued by the Leibniz Senate at the 2012 evaluation (see Status Report pp. A-22-A-25) have been successfully implemented, an assessment also endorsed by the Scientific Advisory Board. With the support of the SAB, the institute found a very appropriate solution for bioinformatics. It is merely in the field of gender equality that there is still need for action.

## Appendix

### 1. Review Board

#### *Chair (Member of the Senate Evaluation Committee)*

Andreas **Weber** Department of Biology, Heinrich Heine University  
Düsseldorf

#### *Vice Chair (Member of the Senate Evaluation Committee)*

Ulrike **Woggon** Institute of Optics and Atomic Physics, Technical  
University Berlin

#### *Experts*

Robin **Buell** Department of Plant Biology, Michigan State Uni-  
versity

Robert **Furbank** Research School of Biology, The Australian Na-  
tional University, Canberra

Erwin **Grill** TUM School of Life Sciences Weihenstephan,  
Technical University of Munich, Freising

Ian **Henderson** Department of Plant Sciences, University of Cam-  
bridge

Kerstin **Kaufmann** Institute for Biology, Humboldt-Universität zu  
Berlin

Thomas **Lubberstedt** R. F. Baker Center for Plant Breeding, Iowa State  
University

Alan **Paton** Science Collections Department, Kew Gardens,  
London

Dirk **Walther** Max Planck Institute of Molecular Plant Physi-  
ology, Potsdam

#### *Federal Representative*

absent with apologies Federal Ministry of Education and Research

#### *Representative of the Länder (Member of the Senate Evaluation Committee)*

Bernd **Ebersold** Thuringian Ministry of Economy, Science and  
Digital Society, Erfurt



30 April 2019

**Annex C: Statement of the Institution on the Evaluation Report**

**Leibniz Institute for Plant Genetics and Crop Plant Research (IPK),  
Gatersleben**

Das IPK dankt der Bewertungsgruppe und allen an der Evaluierung Beteiligten für den konstruktiven Verlauf des Vor-Ort Besuchs. Die Mitarbeitenden des IPK freuen sich über die positive Bewertung der wissenschaftlichen Arbeiten und der Institutsentwicklung.

Die in dem Bewertungsbericht aufgeführten Empfehlungen der Bewertungsgruppe werden einen Leitfaden für die Arbeit in den kommenden Jahren darstellen. Nachfolgend möchten wir zu den zentralen Punkten im Bewertungsbericht nach einer ersten Befassung Stellung beziehen und die Sichtweise des IPK darlegen.

## **1. Gesamtkonzept und Arbeitsschwerpunkte**

### **Bioinformatik**

S. B-2, Punkt 1: *The decentralised organisational structure of bioinformatics is convincing. It should, however, be ensured that the bioinformatics groups, just like the other service-oriented groups, have sufficient time for research of their own.*

Die Institutsleitung wird gemeinsam mit allen Arbeitsgruppen den Service und Unterstützungsbedarf in den Bereichen Bioinformatik und IT Infrastruktur überprüfen und gemeinsam mit den Bioinformatikgruppen Adjustierungen vornehmen, die sicherstellen, dass ausreichend Freiraum für deren Forschungsarbeiten gewährleistet ist.

### **Erweiterung des Spektrums der beforschten Pflanzenarten**

S. B-2, Punkt 2: *IPK should develop a strategy to explore potentials with other crop plant species in good time*

Im Zentrum der Forschungsarbeiten des IPK standen in den vergangenen 10 Jahren die Gerste und der Weizen. Dabei wurde das Ziel verfolgt, durch Bündelung von Ressourcen wissenschaftliche Kompetenzen inkl. innovativer Technologien aufzubauen und diese mit gesellschaftlicher Relevanz zu verbinden, da beiden Nutzpflanzenarten eine herausragende Bedeutung für die Ernährungssicherung zukommt. In jüngster Zeit haben wir begonnen, unsere Kenntnisse und etablierten Methoden für die Bearbeitung weiterer Getreidearten einzusetzen.

Gerne nehmen wir die Hinweise der Gutachtergruppe auf, das Spektrum der Schwerpunktarten um weitere, nicht-gramineenartige Kulturarten zu erweitern.

Hierbei kann das Institut bereits auf Erfahrungen aus umfangreichen über Drittmittel geförderten Forschungsarbeiten mit Raps, Gartenbohne, Lupine, Kartoffel, Futtergräsern, Johanniskraut oder Safran zurückgreifen. Darauf aufbauend soll in enger Abstimmung mit dem Wissenschaftlichen Beirat geprüft werden, welche Nutzpflanzenarten durch institutionelle Passfähigkeit sowie wissenschaftliche und gesellschaftliche Relevanz besonders geeignet sind. Für die Implementierung des Vorhabens bietet sich die Etablierung einer entsprechend ausgerichteten unabhängigen Arbeitsgruppe sowie die gezielte Ausweitung der Forschungsarbeiten am Standort Groß Lüsewitz an. Hier wurde ein erstes Forschungskonzept entwickelt, in dessen Zentrum die Kartoffel sowie Futtergräser stehen und welches dem Stiftungsrat in der anstehenden Maisitzung vorgelegt wird.

### **Verstärkung der Wissenschaftskommunikation**

S. B-3, Punkt 3: *The institute should devote more attention to communicating the value of its genetic resources to the public. [...] Therefore, the considerations out-lined during the evaluation visit to establish a science communication centre on the basis of an existing pupils' laboratory ("Green Lab") are welcomed.*

Das IPK begrüßt den Hinweis und führt die Arbeiten zur Konzeption und zur Errichtung eines Science Communication Centre derzeit mit Hochdruck fort. Auf der Basis eines in der bevorstehenden Stiftungsratssitzung zu diskutierenden Businessplans werden die weiteren Schritte zu Beantragung eines entsprechenden Sondertatbestands bei der GWK in enger Absprache mit den Aufsichtsgremien erfolgen.

## **2. Angemessenheit der Ausstattung**

### **Weiterentwicklung der Standorte in Mecklenburg-Vorpommern**

S. B-3, Punkt 4: *With regard to the strategic potential of the potato, oil and fodder crop plant collections located in Mecklenburg-Vorpommern, this is of major relevance.*

Die Institutsleitung hat ein Konzept zur Weiterentwicklung der beiden Standorte entworfen, welches die langfristige Absicherung des Erhalts der Sammlung sowie die forschungsbasierte Nutzbarmachung zum Ziel hat. Ein zentraler Aspekt ist hierbei die Intensivierung der Zusammenarbeit mit der Universität Rostock, die im Zuge einer gemeinsamen Berufung erfolgen soll. Ein erstes Gespräch mit allen Beteiligten wird im Rahmen der anstehenden Stiftungsratssitzung im Mai erfolgen.

### **Aufwuchs der institutionellen Förderung**

S. B-3, Punkt 5: *It is of the greatest strategic relevance for IPK to develop the Gene Bank into a Bio-Digital Resource Centre. For this purpose, as of 2021, investment in scientific equipment and IT will be required for which the institute would like to apply for additional institutional funding totalling 700 k€ per annum. This is expressly endorsed.*

Die Institutsleitung bedankt sich für dieses Votum, dessen Umsetzung für die weitere Entwicklung der Forschungssammlungen zu einem bio-digitalen Ressourcenzentrum von zentraler Bedeutung ist. Das IPK wird einen Antrag auf zusätzliche Mittel vorbereiten.

## **3. Personalentwicklung**

### **Vorausschauende Personalgewinnung**

S. B 3, Punkt 6: *In the future, the institute must start addressing appointment issues much earlier and in a more targeted fashion.*

Die Institutsleitung hat in Abstimmung mit dem Wissenschaftlichen Beirat begonnen, als Bestandteil der fortgeschriebenen Forschungsstrategie ein Personalkonzept mit einem 5-Jahres-Horizont zu entwickeln.

## **Gender Balance**

*S. B-3, Punkt 7: IPK is called upon to employ more female researchers at the top leadership levels. The measures adopted so far are insufficient. The institute must break new ground in order to be successful.*

Die Institutsleitung ist sich der unbefriedigenden Situation bewusst. Es besteht jedoch Zuversicht, dass die eingeleiteten Aktivitäten kurz- und mittelfristig eine Erhöhung des Anteils weiblicher Führungskräfte bewirken werden. Hierzu zählen u.a.

- Durchführung eines internationalen Workshops im Herbst 2018 zur Gewinnung junger Wissenschaftler-Innen für ein Coaching zur Beantragung eigener Forschungsgruppen (DFG, ERC, Leibniz). Bisheriges Ergebnis: Zwei hervorragende Kandidatinnen, welche in 2019 Anträge einreichen werden;
- externes und internes Mentoring und Coaching von Wissenschaftlerinnen für die weitere Karriereplanung sowie
- gezielte Sichtung, Einladung ans IPK und Gewinnung von Bewerberinnen im Vorfeld von Stellenausschreibungen mit dem Ziel, dass mindestens 1/3 der Bewerbenden weiblichen Geschlechts sind.

Als eines der ersten Ergebnisse dieser Maßnahmen wird zum 01.07.2019 eine haushaltsfinanzierte, unabhängige Arbeitsgruppe (Metabolic Systems Interactions) unter der Leitung von Dr. Nadine Töpfer in der Abteilung Molekulare Genetik ihre Arbeit aufnehmen. Darüber hinaus wird die Institutsleitung gemeinsam mit der eigens für diese Aufgabe eingesetzten Direktoriumsbeauftragten für Gleichstellungsfragen weiter an innovativen Ansätzen zur Erhöhung des Frauenanteils in der 1. und 2. wissenschaftlichen Führungsebene arbeiten.