Department of AGROECOLOGY

Strategy 2016-2020

AARHUS UNIVERSITY

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Preface

Agroecology as a science is concerned with the interactions between plants, animals, humans and the environment within agroecosystems for producing food, feed, energy and bio-based products.

The Department of Agroecology (AGRO) aims at belonging to the elite of research institutions concerned with agroecosystems and aims at creating, developing and converting pioneering research for the advancement of the public bioeconomy nationally and internationally.

The department contributes to sustainable production and growth through outstanding agroecosystems research, consultancy and teaching. The research qualifications for realising the objectives of the department are described in the department's strategy.

In 2015 AGRO underwent a process in which employees and the management were involved in developing the department's strategy, including developing the concept of scientific flagships which focus agroecological research. The result of this academic development process is described in this document.

The process began at a management seminar on 16-17 April 2015, at which the overall objectives and framework were discussed and a schedule made. This was succeeded by meetings during the period of May to August 2015 in all the sections of the department, at which SWOT analyses were made in relation to AGRO's course.

During the same period the department management team and the local liaison committee (LSU)/Department forum, respectively, also discussed AGRO's strategy on a regular basis.

The first draft of the strategy was submitted to the Dean's Office in August. Feedback from the Dean's Office and the faculty's other departments was received during the next few months. This feedback was then discussed with a view to adjusting the strategy and preparing its second draft.

As something new in AGRO we in 2015 invited our junior VIPs to juniorVIP meetings. These meetings were held in September 2015 at AU Foulum and AU Flakkebjerg, respectively. Besides scientific presentations, the participating PhD students and postdocs had the opportunity to express their opinions on the second draft of the strategy and on the flagships.

Similarly, the department's seniorVIPs had the opportunity to contribute further to the strategy and the flagships at the annual two-day senior VIP meeting in November 2015. These discussions resulted in the second draft of the strategy, which later was fine-tuned in the management group and submitted to the Dean's Office as the final draft on 1 December.

Vision

The Department of Agroecology aims at belonging to the elite of research institutions concerned with agroecosystems and aims at creating, developing and converting pioneering research for the advancement of the public bioeconomy nationally and internationally.

The international Global Rust Reference Center at AU Flakkebjerg plays a central role in the struggle against the fungal disease wheat rust

Mission

The Department of Agroecology is a department which contributes to sustainable production and growth through outstanding agroecosystems research, consultancy and teaching.

Sustainable agroecosystems are a central element in the department's strategy

Summary

The Department of Agroecology (AGRO) aims at belonging to the elite of research institutions concerned with agroecosystems and aims at creating, developing and converting pioneering research for the advancement of the public bioeconomy nationally and internationally. AGRO carries out research in agroecology which means the interactions between plants, animals, humans and the environment within agroecosystems for producing food, feed, energy and bio-based products.

The department contributes to sustainable production and growth through outstanding agroecosystems research, consultancy and teaching. The strategy for 2016-2020 has a strong focus on how the department is going to strengthen its qualifications and increase its visibility internally, nationally and internationally with a view to increasing the recruitment of talented researchers and students and improving financing.

In 2015 AGRO underwent a process in which employees and the management were involved in developing the department's strategy, including developing the concept of scientific flagships

which focus agroecological research. It is also here we see possibilities for continued financing and growth.

The substance of AGRO's objectives and scientific flagships is in keeping with global challenges and objectives. They are closely in line with the "Standing Committee on Agricultural Research (SCAR) Foresight Exercises". These foresight exercises were drawn up by the EU Commission's Standing Committee on Agricultural Research (SCAR). To a high degree SCAR sets the research agenda for sustainable agricultural research in the EU and globally.

We have designated four scientific flagships, which are research areas in which AGRO is particularly strong and unique and from which we supply results for the common good of society now and in future. By focusing the strategic efforts in scientific flagships AGRO can create a stronger scientific profile externally and a strong scientific community internally.

The four flagships are as follows:

- Climate-Smart Agri-Food Systems
- Sustainable Nutrient Management
- Sustainable Pest Management
- Soil Functions

The flagships should be seen as an effort across the department's six research sections. As they – unlike the more discipline-oriented approach in the sections – are thematic, the flagships are expected to be able to contribute to more synergy and cooperation among the sections. By signalling a distinct agroecological approach across research areas the flagships are expected to strengthen the research profile.

Science and Technology has initiated a process with the purpose of identifying a number of interdisciplinary centres. We expect to be able to contribute to synergy and collaboration in this regard and intend to contribute with the competences of our flagships to the interdisciplinary centres.

Research-based policy support to the Ministry of Environment and Food of Denmark and other ministries is a very important activity within AGRO. The precondition is that we carry out extensive internationally significant research within the eight thematic areas for which we have the main responsibility of supplying AU's research-based policy support. Focusing of our research activities in scientific flagships will contribute to this.

In the light of climate changes and a global need for green conversion the demand for research that is able to realise agroecological principles and secure food supply reliability is expected to rise. To keep pace with this, AGRO will increase its international research involvement, especially in developing countries and growth economies where the need for research and innovation in agroecosystems is growing.

Within each of AGRO's six focus areas of research, talent development, teaching, policy support, business collaboration and modern infrastructure we have prepared objectives, action plans and Key Performance Indicators (KPI). These are described in the strategy for 2016-2020.

Organisation and physical framework

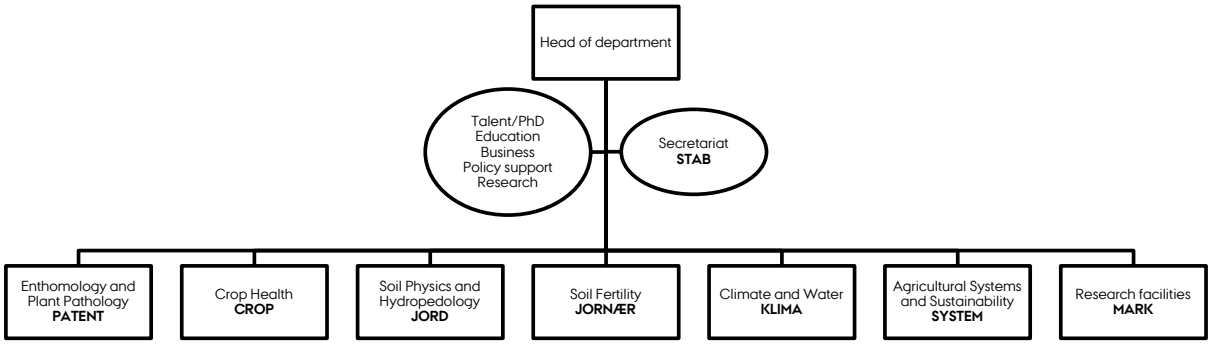
AGRO carries out research into the interactions between plants, animals, humans and the environment within agroecosystems for producing food, feed, energy and bio-based products.

This means that variation in soil and climate conditions plays an important part in the research activities. The fact that the department is geographically distributed over various locations in Denmark reflects this. The main activities are located at the research centres of AU Flakkebjerg and AU Foulum and the research stations of Askov and Jyndevad.

AGRO has approximately 270 employees who are organised into seven sections and a secretariat:

- Crop Health (CROP)
- Entomology and Plant Pathology (PATENT)
- Soil Physics and Hydropedology (JORD)
- Soil Fertility (JORNÆR)
- Climate and Water (KLIMA)
- Agricultural Systems and Sustainability (SYSTEM)
- Field Trials and Semi-field Areas (MARK)
- Secretariat (STAB)

The first six units are research sections, while the last two, which consist of AC-TAP and TAP employees, provide services to the research sections.



The department has five committees, which provide advice to the department management team: the GSST PhD programme committee, degree programme committee, business committee, policy support committee and research committee. The heads of the committees are included in the extended department management team and they participate alternately in the department's management team meetings.

The department is continuously in a dynamic development. In particular, the number of young researchers is increasing yearly. As of 18 November 2015 we have 56 seniorVIPs (professors, senior associate professors and senior researchers), 110 juniorVIPs (researchers, postdocs and PhDs), approximately 10 visiting PhDs and researchers and 117 TAPs. The 166 members of the academic staff (VIPs) are more or less evenly distributed in the six research sections. These six sections are the starting point of all research, consultancy and teaching in the department.

All employees in the sections CROP and PATENT are located at AU Flakkebjerg. The employees in the sections JORD, JORNÆR, KLIMA and SYSTEM are all located at AU Foulum. The employees in STAB are distributed in AU Foulum and AU Flakkebjerg. The employees in MARK are located at all four geographical locations.

Optimum management of the water resource in Denmark and abroad is an important research area in AGRO

Below is a description of the objectives of the eight units in the department:

- **Crop Health**
  This section carries out research into crop health, including pests, nutrients and crop quality, in order to contribute to sustainable crop production.
- **Entomology and Plant pathology**
  This section carries out research into prevention and control of plant diseases, pests and honeybee diseases.
- **Soil Physics and Hydropedology**
  This section carries out research into the understanding of basic soil physical, chemical and hydrological processes and into obtaining quantitative insight into the spatial distribution of soil properties on a local, regional and national scale.
- **Soil Biology**
  This section carries out research into the interaction between plant growth, soil fertility and the biogeochemically-mediated turnover of nutrients and carbon in agricultural soils.
- **Climate and Water**
  This section carries out research into the interaction between climate and agricultural production, including how, taking these conditions into consideration, agricultural climatic load can be reduced, how production can be adapted to changing climatic conditions, how water resources can best be utilised and protected and how biomass production can be increased.
- **Agricultural systems and Sustainability**
  This section carries out research into how the sustainability of different farming and food systems can be improved. The focus is on the balance between production competitiveness, the impact on nature and environment and the contribution to rural development and how this is influenced by agronomic-biological factors, the organisation of food chains and the regulation of agricultural production.
- **Field Trials and Semi-field Areas**
  The section carries out practical trials at the department's unique research facilities, including research stations and semi-field areas with different soil types and climates.
- **Secretariat**
  The secretariat provides administrative support of both the department management team and the department's other employees for their activities within research, teaching and public sector consultancy.

Employees and departmental culture

Key activities for AGRO are research-based policy support to the authorities, business collaboration, teaching and talent development.

The department is organised into sections, each consisting of 15-25 employees. Each section has its focus on its own research subjects and methods within its research area.

The challenges for AGRO change in time with the changing framework conditions for agriculture and society in general. Therefore, the activities of the sections develop over time, including in scope and scientific focus.

Basis for financing

The researchers are the ones with "the ear to the ground". They are the ones who initiate new research projects which they describe in applications to various foundations. The projects are fully financed; this means that the salaries and work of the permanent staff are included in the applications. The researchers thus have a large share in the responsibility for financing. The dynamics of this model provides possibilities of contributing to a favourable development for the entire department. Externally financed research projects amount to approx. two thirds of the income in AGRO. The remaining third stems from the contract with the Ministry of the Environment and Food of Denmark (MFVM) and a small part from the Dean's Office for the PhD and teaching areas.

Even before starting, the externally financed activities have already been described in the form of projects, which in fairly great detail describe staffing and activities in the form of milestones and products. The activities for MFVM are described as assignments and orders. In AGRO these are also divided into projects corresponding to the 13 thematic areas of the contract.

Project descriptions are made in a similar way for the teaching and PhD areas. An interdisciplinary committee has been appointed for the teaching and PhD areas so that a broad foundation is secured in the department for these important activities.

AGRO's PhD students and postdocs, who are an internationally broadly composed group, contributed input to the work of developing the strategy actively and with great committment

Delegation of responsibility

The starting point for carrying out all activities in the department is always a project description. The research initiative and the responsibility for applications, operational budget, publication and teaching are delegated to the individual researcher to as great an extent as possible. This provides the possibility of a great degree of self-management.

A very important part of delegation consists in the formulation of a project by the individual employee either alone or in collaboration with colleagues (internal/external). As long as the overhead is 44%, co-financing is below 10%, and formalities are otherwise observed, a project application will always be approved in the department.

In the case of higher co-financing, or purely internal financing, an approval from the department management team is required. As a starting point, completely internally financed projects will be related to supporting research for the public sector consultancy for the MFVM.

This procedure secures maximum latitude for the individual researcher. The department management team makes its decisions on the basis of the department's strategy, including the contract with the MFVM, which is very important to the department's future activities. When and if financing is obtained for the project, the project manager and the employees involved will thus have secured maximum influence on their own working situation.

The many projects mean that across the individual sections there is a constant need for adaptation in the tasks of the individual employee. Naturally, this applies to the researcher who has secured a new project, but since the individual researcher cannot carry out all the work connected with the project it will also have an influence on the tasks of other employees. In addition, there is a continuous need for initiating major interdisciplinary research initiatives, recruitment of new staff as well as new investments in research infrastructure and operating equipment. The responsibility for this primary adaptation rests with the department management team.

Department management team

The department management team consists of the head of the department, the seven heads of section and the head of the department secretariat. The department management team meets 10-12 times per year. An annual cycle for the work of the department management team, the sections and the LSU/Department forum has been drawn up. A typical agenda for a meeting in the department management team will include the items finance, staff, and public sector consultancy. In addition, the chairs of the five committees in the department: GSST PhD programme committee, degree programme committee, business committee, public sector consultancy committee and research committee are alternately involved in the meetings of the department management team.

The department management team also has an important task in preparing staffing plans in collaboration with the Finance unit on the recommendation of the project managers. These plans are drawn up for the individual employees. The starting point for the staffing plans is the project manager's wishes for staff. This ensures maximum involvement. The task of the department management team is to accommodate these wishes to ensure that the department's resources are used in the most appropriate manner.

Focus on the future: Strategy 2016-2020

AGRO's overall objective is to be among the elite research institutions concerned with agroecosystems by creating, developing and converting pioneering knowledge to promote the public bioeconomy at the national and international level.

The department has identified four scientific flagships in order to strengthen the visibility of its research profile externally and the scientific community internally. The four scientific flagships are research areas in which AGRO is particularly strong and unique and from which we supply results for the public good now and in future. These flagships are described in detail in the section "Flagships" on page 16.

Global challenges

The substance of AGRO's objectives and the scientific flagships is in keeping with global challenges and objectives. They are closely in line with the "Standing Committee on Agricultural Research (SCAR) Foresight Exercises". These foresight exercises were drawn up by the EU Commission's Standing Committee on Agricultural Research (SCAR). To a high degree SCAR sets the research agenda for sustainable agricultural research in the EU and globally. Within a bioeconomic framework SCAR focuses on the global interactions of food supply reliability, regulatory aspects and access to and utilisation of resources.

The objective is food security. The approach is predominantly based on agroecological principles, including sustainable production, food system diversity and resilience. SCAR's recommended research themes match AGRO's research ambitions:

- New paradigms for primary production based on ecological intensification
- Emerging enabling technologies: the digital revolution – technologies promoting precision techniques and resource efficiency in the primary sector and their effect on supply chains and diversity in production systems
- Resilience for a sustainable bioeconomy
- The new energy landscape, particularly how transition from fossil-based technologies to renewable energy affects agriculture
- Business and policy models for the bioeconomy based on the concepts of cascading and circularity
- Socio-cultural dimensions of the bioeconomy, including creation of knowledge about social impacts of technology as well as food production and consumption patterns
- Governance of the bioeconomy and political economy, including regulatory framework, access to resources and social and regional inequality
- Foresight for the biosphere with a view to overall monitoring of sustainability and resilience

AGRO has a strong tradition of cooperation with foreign research institutions and universities

In the light of climate changes and a global need for green conversion the demand is expected to rise for research that is able to realise agroecological principles and food security. To keep pace with this AGRO will increase its international research involvement, especially in developing countries and growth economies where the need for research and innovation in agroecosystems is increasing.

National and international profile

By signalling a distinct agroecological approach across research areas the flagships are expected to strengthen the research profile. The mutual task in AGRO is to make the flagships visible and well known at the national and international level. They must be known as knowledge hubs, which can make the department an attractive collaborator or workplace, and attract funding and talented researchers and students.

The contribution of research-based knowledge supporting sustainable growth and development of Danish agriculture is crucial for AGRO

Policy support to the Ministry of Environment and Food of Denmark and other ministries is a very important activity within AGRO. The precondition is that we have extensive internationally significant research within the eight thematic areas for which we have the main responsibility of supplying AU's research-based policy support. Focusing our research activities in scientific flagships will contribute to this.

In 2014 AU was ranked as number 11 within Agricultural Science on National Taiwan University's (NTU) Ranking for World Universities. This was an improvement of five places compared with the ranking in 2011. An analysis of eight of the categories in the Web of Science used most by the department shows that the impact of our citations is 17-166% higher than the world average.

It is especially within the categories "Agronomy" and "Agriculture Multidisciplinary" that we are placed higher and better than the four universities with whom we have chosen to compare ourselves. This internationally good ranking proves that AU and AGRO have a good international position of strength within Agricultural Science. It is AGRO's ambition to maintain and improve this position of strength.

Flagships focus research, increase visibility and strengthen interdisciplinarity

By focusing the strategic efforts in scientific flagships AGRO can create a stronger scientific profile externally and a strong scientific community internally. We have identified four scientific flagships. The flagships are research areas in which AGRO is particularly strong and unique and from which we supply results for the common good of society now and in the future.

The starting point for finding AGRO's four flagships was, among other things, the scientific landscape in the department by means of a detailed bibliometric analysis of the words in the titles of and the keywords in the department's scientific papers in the period 2010-2014 .

Figure 1 shows that publication overall is grouped into the clusters "crop protection", "the soil and its functions" and "input of auxiliary substances, yields and environmental impact on the individual crops and at other levels in the agricultural system".

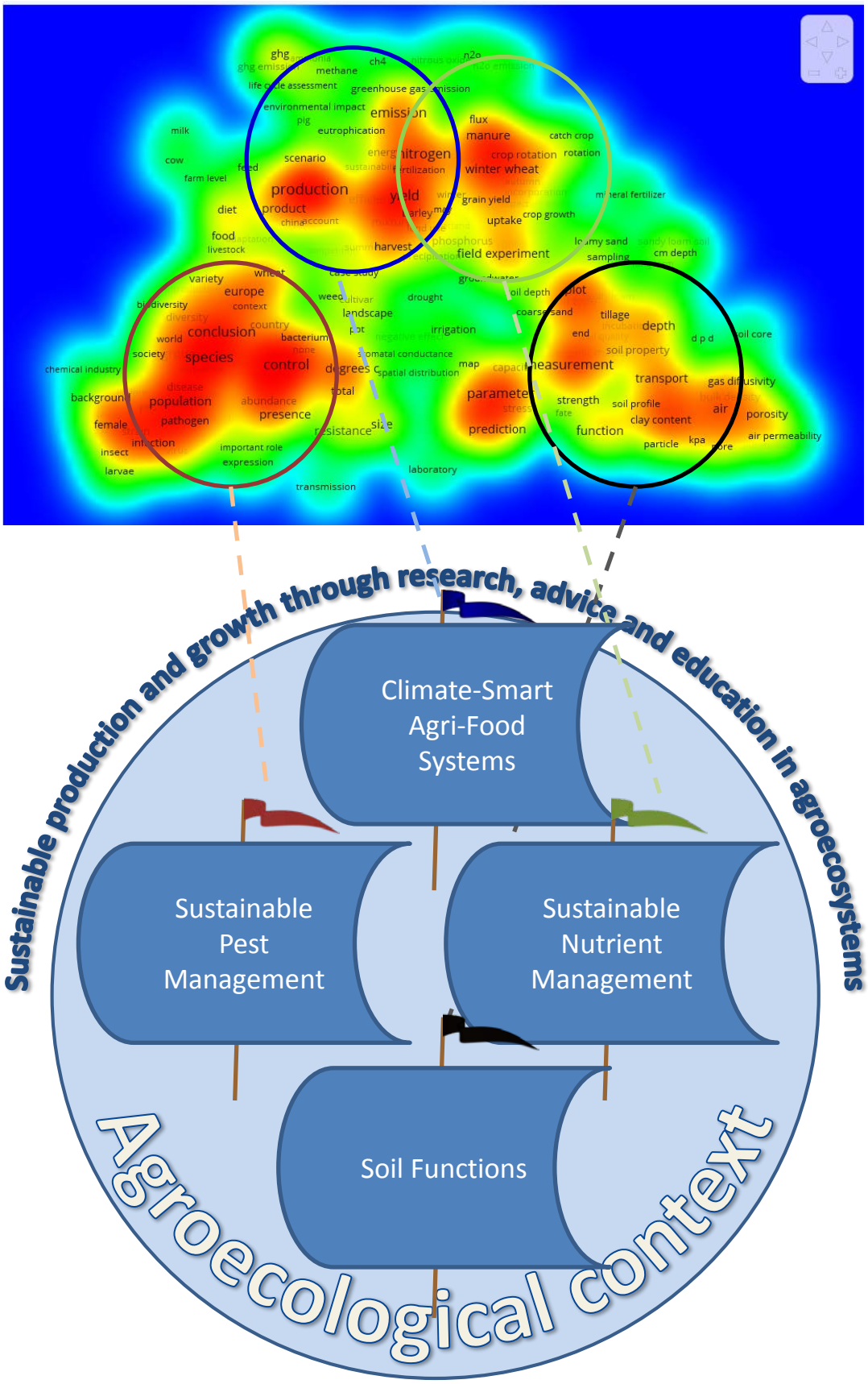


Figure 1. *A bibliometric analysis of the frequency of keywords in AGRO's scientific publications formed the basis for the identification of four scientific flagships, which move within an agroecological context and aims at AGRO's mission*

Based on this and on the possibilities we see for continued financing and growth in them, we identified the four flagships as being:

- Climate-Smart Agri-Food Systems
- Sustainable Nutrient Management
- Sustainable Pest Management
- Soil Functions

The four flagships should be seen as an effort across the six research sections. The extent to which the various sections will contribute to the individual flagships will differ, but precisely because the flagships are thematic as opposed to the more discipline-oriented approach in the sections the flagships are expected to be able to contribute to more synergy and cooperation among the sections.

The flagships comprise research, talent development, policy support and teaching. There is not necessarily convergence between flagships and sections or between the leaders of flagships and heads of sections. On the contrary, the flagships are intended to work across sections.

Science and Technology has initiated a process with the purpose of identifying a number of interdisciplinary centres. AGRO supports ST's strategy and expects to be able to contribute to synergy and cooperation in this regard and aims at contributing our qualifications to the interdisciplinary centres. In particular, our four scientific flagships can contribute in areas such as green energy, sustainable technology, climate, water, environment, preservation of natural resources, biodiversity and socioeconomic aspects in collaboration with a number of ST's other departments.

The flagships each need a frontline person who can represent them externally and who can stimulate development internally so that the flagships maintain or strengthen their value – to the advantage of all of AGRO. To facilitate this, a leader and key persons will be attached to each flagship in AGRO. The leaders of the flagships are leaders in their scientific fields. They have very strong CVs and good leadership qualities. The leaders are at the professor level.

The flagships have an important task in focusing, integrating and making their research areas visible in order to ensure that the total strength in AGRO is as strong as possible. The flagship concept is intended to raise awareness of AGRO's valuable products and ensure that they receive attention – externally and internally, nationally and internationally. Our flagships are what we want to be renowned for.

A more explicit description of each flagship and the expectations related to their activities in this strategy period are given below.

The flagships can contribute to keeping the momentum in the good development currently experienced by AGRO. Among other things they can be used to attract talented researchers from leading foreign universities. The flagships can also be used to address strengths, weaknesses, possibilities and threats.

Our strengths – such as having strong networks nationally and internationally and being good at attracting external financing, especially for strategic research – must be used to an even greater extent. We must work actively with the possibilities pointed out by the SWOT analyses, for example that there is a great demand for cooperation with our research areas/flagships both in ST and externally.

Obviously the flagships can also be used to address our weaknesses and to be prepared for and counteract threats.

Description of AGRO's four scientific flagships

The names of the flagships were chosen very deliberately. The names indicate what the flagships focus on and also signal that the flagships are inclusive and integrating. Visibility, professionalism and interdisciplinarity were key aspects when deciding upon the names. It is important that the names and thereby the flagships can stand alone and thus be independent of each other while also being able to stand together in the agroecological context. We have chosen to have English names partly to signal an international perspective and partly because they quite simply sound better in English.

Climate-Smart Agri-Food Systems

Agricultural production is closely linked to the global challenges related to increased population and prosperity, which increases the demand for food, biofuels and biomaterials. On a global scale agricultural production is responsible for about one fourth of the total emission of climate gases and contributes heavily to the global loss of biodiversity. At the same time the climate is changing, which provides better conditions for agricultural production in some places, but poorer conditions in others.

AGRO supplies insight into the interaction between climate and agricultural production, including in production systems that improve the utilisation of resources, reduce emission of climate gases and adapt to climate changes. Similarly, we supply methods for quantification of the total impact on climate and environment linked to the production of food, bio-based materials and how various players in the supply chains can develop forms of cooperation which improve resource utilisation, credibility and value generation.

Sustainable Pest Management

Crop pests can reduce both yield and quality of the harvested crop, and effective crop protection is a precondition for sustainable crop production. Since the 1950s crop protection has to a wide extent been synonymous with pesticides, but with an increased focus on the undesirable environmental and health effects of pesticides as well as a need for developing a more sustainable crop production there is an increasing need for developing crop protection strategies that are based on agroecological principles and that involve biological and other non-chemical methods. AGRO is among the leaders within sustainable pest management with research activities within all disciplines of crop protection research.

Sustainable management of the auxiliary substances in agriculture i.e. input of nutrients and crop protection products, is a key area in two of the department's scientific flagships

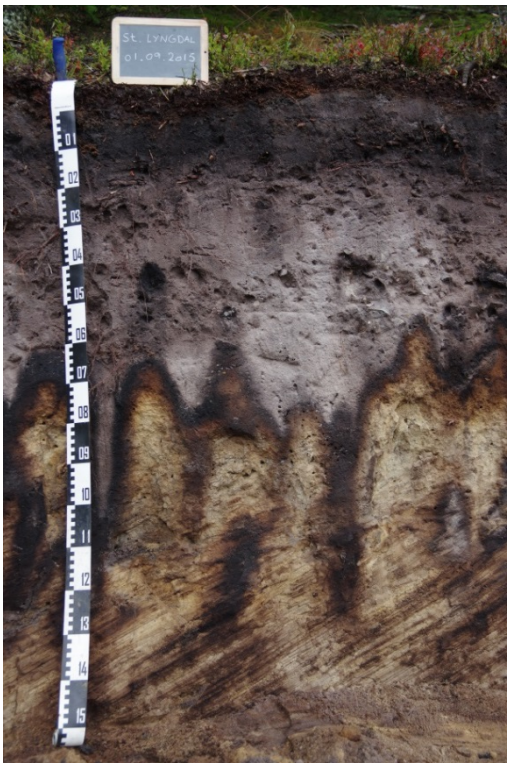
Sustainable Nutrient Management

Intensification of agricultural production with an increased input of plant nutrients for crops with no negative environmental consequences is an important global challenge. AGRO has considerable activity regarding decomposition of nutrients for optimisation of production and minimisation of loss. Central to this are measures for a better utilisation of nutrient inputs supplied through plant residue and fertiliser (commercial fertiliser, manure and residue), less emission of gases, less environmental impact and preservation of soil fertility. The efforts span from basic research to applied research in order to ensure

that the cultivated soil remains a suitable basis for optimisation of the nutrient supply in a sustainable production of plant biomass.

Soil Functions

In a time with a steep increase in population and decreasing resources it is important to gain a deeper understanding of the soil and its functions. This is the focus for AGRO's flagship Soil Functions. The flagship spans from basic research to applied research. In addition to focusing on the soil and its functions, threats to the soil resource such as pollution, decreasing content of organic matter, erosion and compaction are also high on the agenda. The flagship works with innovative sensors for characterisation and mapping of the soil resource and innovative methods for optimisation of the soil as a natural filter.



Soil is a diverse, complex and life-giving ecosystem. The soil is directly or indirectly the basis for by far the greater part of our food supply and sustainable utilisation of the soil resource is fundamental to the future global food production. In addition to producing food, biofuels and biomaterials, the soil provides a number of ecosystem services on which we depend. For example, the soil acts as a filter protecting our water resources against nutrients and foreign substances and as a pool for extraction of antibiotics.

AGRO's carries out in-depth research – also literally. The soil and its functions are the focus for the research flagship Soil Functions

Focus areas

AGRO has six focus areas, each with its objectives and action plans. The focus areas are research, talent development, teaching, public sector consultancy, business collaboration and modern infrastructure. The objectives of the focus areas are as follows:

Research

AGRO aims at increasing the number of professors over the coming three years. We also aim at increasing the number of peer-reviewed publications per VIP, including increased publication in ”high impact” journals within our field.

Talent development

AGRO aims at encouraging personal development and integrity of both PhD students and junior researchers. This is encouraged through both participation in research teams and handling research assignments.

We offer an attractive study environment to PhD students, for example through cooperation with universities around the world and by providing relevant PhD courses to the students, thus appealing to a large number of PhD students.

Teaching

The department contributes research-based teaching at Bachelor's and Master's degree levels. The department's employees participate as course coordinators and teachers, and a few are study

programme supervisors. Lectures primarily take place at Campus Aarhus, but some teaching also takes place at Flakkebjerg and Foulum. Thesis projects are typically prepared on a decentralised basis with daily contact to the supervisors.

Together with other parts of AU and other Danish universities the department is involved in developing an MSc degree programme called "Water & Environment" under " The Sino-Danish Center for Education and Research" (SDC) in collaboration with the Graduate University of Chinese Academy of Sciences (GUCAS) in Beijing, China.

Policy support
AGRO aims at increasing the number of peer-reviewed publications related to policy support. Together with DCA, we also aim at increasing the dissemination of research results to the public.

Business collaboration
The department aims at mapping existing collaboration with private enterprises in order to obtain a clearer picture and exploiting the knowledge available in the department in future collaboration.

We also aim at focusing on career development for researchers who mainly collaborate with private enterprises in order to ensure that the individual employee continues to be an attractive collaborative partner.

Modern infrastructure
We are working on at a continuous updating of the unique outdoor research facilities at AGRO's disposal to ensure continuance of high trial use intensity. We also aim at adapting the trial areas to research needs before the end of 2017 with regard to both number of hectares, soil types and climatic conditions.

Recruitment
AGRO aims at maintaining the current level of approximately 60 permanently employed VIPs. The relatively high level is necessary due to our public sector consultancy. We wish to increase the number of professors to 20% of the seniorVIPs, i.e. a total of 10-15. Natural retirement is expected to be at 1-3 per year, and in order to be able to attract the best possible internationally talented candidates and at the same time give them time to become acquainted with the Danish context, we aim at employing these persons as professors and in tenure track positions. These employees are meant to contribute to ensuring the visibility of the flagships and to providing the best possible service with regard to policy support assignments.

We also aim at maintaining the number of PhD students at 60-70.

We wish to increase the number of postdocs to 50-60 persons so that there will be approximately two juniorVIPs per seniorVIP. However, recruitment of juniorVIPs will be determined by the needs of the individual projects.

During the coming five years AGRO wishes to employ the following:

Professorship	1-2 positions per year, targeted at relevant flagships
Tenure track/researcher	1-3 positions per year, targeted at relevant flagships
Postdoc	20-30 positions per year
PhD	Approximately 20 positions/enrolled per year

Action plans 2016-2020

As can be seen below, a number of action plans are linked to AGRO's flagships and focus areas. The action plans are also shown schematically in the strategy cards in the appendix on page 32. AGRO has also defined a number of Key Performance Indicators (KPI). These are shown in the appendix on page 45. The KPIs show that AGRO exceeded the targets set in 2013. We expect to be able to maintain the good momentum.

Flagships

- We will prepare research strategies for each flagship.
- In order to strengthen the flagships we will select subjects within the flagship frameworks to provide a basis for peer-reviewed papers that can contribute to the development of that particular research area.
- We will strengthen our publication via basic research within the individual flagship areas.
- We will initiate key projects that strengthen our public sector consultancy.
- In order to make the flagships visible internally in AGRO, we will provide specific descriptions of them at internal "open" meetings.
- We will make the flagships visible through for example:
  - Conferences, project days, lectures, etc.
  - Website
  - Leaflets

Outstanding research

- In order to increase the quality of our research we will continue to focus on increasing the number of professors through a greater focus on growth potential and on our own talented researchers.
- We will increase our focus on our choice of journals, including the use of open access, in order to increase our impact. We will for example do this through internal support and guidance.
- We intend to maintain the number of PhD students and by this the number of peer-reviewed publications per VIP. We will do this through support and guidance on publication, for example via Journal clubs, etc.
- In order to increase our impact and leadership both nationally and internationally AGRO will maintain the current incentive structure regarding seed money from internal funds, as described in the section "Employees and departmental culture".

Focused talent development

- In order to increase the quality of the PhD programme and continue having an attractive programme for the best students we will maintain the economic support of the tasks regarding the courses. This will e.g. be done by involving more researchers in the course work.
- We will maintain the high extent of internationalisation in our degree programmes. We will do this by, for example, initiating the creation of an Erasmus Mundus MSc semester and an Eramus Mundus PhD degree programme and by involvement in Marie Curie EU applications.
- In order to recruit the best talents at home and abroad we will use established networks for recruitment and emphasise that we provide good support for student supervision.
- In order to establish clear connections in our career paths and by this attract and keep the best young talents we will write postdocs into applications and provide opportunities for seed money for both bridging and longer work positions.
- There must be at least one AU starter pack per year for retention and attraction of good talents.

Business collaboration

- In order to increase the dialogue and collaboration with the private business sector AGRO's business committee will prepare a list of private enterprises participating in existing projects.
- AGRO will continue to strengthen its role as an attractive partner for the business sector by entering into a dialogue with enterprises regarding the research content in collaborative projects. Investment will be made in continuous modernisation of AGRO's research infrastructure.
- AGRO will continue its focused efforts to get more industrial PhDs and postdocs. We will therefore dedicate resources to establish consortia with private enterprises within the scope of AGRO's key competences.
- In order to increase the visibility and dissemination of knowledge to the public we will provide information about AGRO's participation in business-oriented projects via the department's website.
- The flagships will host project days relevant to the business sector.

AGRO has semi-field facilities where the conditions are similar to field conditions, but where it is still possible to control climate and soil conditions

Public sector consultancy

- We will incorporate documentation of the quality of our policy support in order to increase the quality of the national public sector consultancy.
- We will involve PhD students and postdocs in data collection and publication linked to consultancy assignments.
- We will intensify dissemination via DCA's newsletters and website.
- We will continue to develop integration of research activities in the public sector consultancy through project applications to Innovation Fund Denmark, the Danish Council for Independent Research (DFF), GUDP, etc.
- We will continue to provide the best possible policy support to MFVM, for example through quality control of the service and internal examination of reports and memoranda.
- We will strengthen our visibility among the public through thematic meetings for interested parties.

Top quality degree programmes

- In order to increase student admission and to ensure a continuing supply of attractive graduates to Danish and foreign enterprises and research institutions we will maintain and increase our PR and recruitment activities regarding BSc Agrobiology and increase our focus on recruitment of Master's degree students both nationally and internationally.
- In order to reduce drop-out rates we will revise our courses in connection with conversion to the semester structure.
- We will establish more agroecological summer courses – preferably one course for each flagship.
- In order to improve the study and learning environment we will take a measure of the study environment before establishing a new study environment at our new premises in Aarhus. We will also encourage our lecturers to develop even more inspiring courses.
- In order to strengthen national collaboration within the plant-environment area we will work on getting lecturers from AU and KU to collaborate on developing courses.

Modern infrastructure

- In order to maintain AGRO's possibilities for carrying out research under varying natural conditions we will continuously review AGRO's needs for trial sites, including acquisition of sandy soil near Foulum, more trial sites at Flakkebjerg, etc.
- We will continue to train the staff at the research stations and upgrade our trial equipment.
- We will increase awareness and visibility of our research stations so other departments in ST can see their possibility for using them for agricultural trials.
- The outdoor special facilities must be upgraded before the end of 2017, and there must be sufficient staff to meet the researchers' and students' demands regarding facilities.
- In order to ensure optimum, efficient and simple service we will analyse the need for prompt and efficient support of administrative functions.
- We will establish a simple access to administrative support, including collaboration with ST's administrative centre.

Job satisfaction

- In order to increase job satisfaction among the employees who work extensively with, for example, policy support, we will continue to work on improvement of the planning and dimensioning of the assignments. We will also work on easing the workload through short-term staff employment for routine assignments.
- In order to support individual employees' need for tools that can help to find focus and bring peace and clarity into everyday life we will offer support for courses in, for example, mindfulness according to individual wishes.
- In order to ensure good job satisfaction for PhD students we will distribute supervision among all senior VIPs and young talents (postdocs) as co-supervisors thus providing better supervision and reducing the workload for seniorVIPs.
- In order to reduce stress and loneliness among PhD students and thus increase the quality of their research AGRO will continue the following initiatives:
    - Introduction meetings
    - Job satisfaction talk
    - Buddy schemes
    - Journal clubs
    - Grand meetings

Appendix

a. Organisation

The Department of Agroecology (AGRO) has six research sections, a field section and a secretariat. The department management team consists of the head of the department, the seven heads of section and the head of the department secretariat. Two of the heads of section are also appointed as vice-heads of department at Foulum and Flakkebjerg respectively.

The department is organised into sections, each consisting of 15-25 employees. Each section has its own scientific focus. The activities of the sections develop over time, among other things in size and scientific focus. The main part of all activities takes place in externally financed projects. The dynamics in AGRO's sections is therefore great.

The researchers are the ones with "the ear to the ground". They initiate new research projects which they describe in their applications to various foundations. The projects are fully financed; this means that the salaries and work of the permanent staff are included in the applications. The researchers thus have a large share in the responsibility for financing. This provides possibilities of a favourable development for the entire department. The starting point is to delegate as much responsibility as possible to the individual employee and thus provide the possibility for a great degree of self-management.

Funding from the MFVM and the Dean's Office for the PhD and teaching areas constitute the department's ordinary activity. Even before starting, the externally financed activities have already been described in the form of projects which in fairly great detail describe staffing and activities. The activities for the MFVM are described as assignments and orders (Supplement 2 and 1b assignments). In AGRO these are also divided into projects corresponding to the 13 thematic areas described in the contract with the MFVM. Project descriptions are made in a similar way for the teaching and PhD areas.

The dynamics in the many projects mean that across the individual sections there is a constant need for adaptation in the tasks of the individual employee. In addition there is a continuous need for initiating major interdisciplinary research initiatives, recruitment of new staff as well as new investment in research infrastructure and operating equipment. The responsibility for this primary adaptation rests with the department management team.

The department management team meets 10-12 times per year; their discussions include finance, staff, public sector consultancy, the PhD and teaching areas and business collaboration. The chairs of the degree programme committee, the GSST PhD programme committee and the business committee are asked to attend the relevant meetings as the occasion requires.

The department management team also has an important task in preparing staffing plans in collaboration with the Finance unit on the recommendation of the project managers.

"Staff" is an important item which is on the agenda at nearly all meetings of the department management team. The reason for this is that there is a large need for new recruitment in many research projects.

Through their participation in the department management team the heads of the sections contribute to the preparation of the staffing plans, involvement in staff matters, investments and other decisions of a strategic nature. One of the important roles of the heads of the sections is to be the theme coordinator in relation to one or more of the 13 themes in the contract with the MFVM.

All sections typically hold 6-8 meetings per year. At the section meetings the subjects for discussion include publication, project work, applications, welcoming new colleagues, other general

activities and social activities within the section. These meetings are thus also an important instrument for gaining more insight into – and becoming involved in –decision-making.

The project managers are the next management level. Their fields of responsibility are described in the specific project descriptions.

Finally, the department has a number of managers and coordinators who are responsible for the distribution of work for a number of TAP employees within a well-defined field.

b. Geography/physical framework

The research activities are mainly located at Foulum and Flakkebjerg, which also have well-developed laboratory facilities. The teaching activities take place mainly in Aarhus with a few courses taking place at Foulum and Flakkebjerg.

AGRO has trial facilities at three locations (Flakkebjerg, Foulumgård and Askov). They represent a broad range of various climate and soil types for the department's research activities. These activities support the department's research, public sector consultancy and teaching.

Foulum

Buildings: 2,000 m² offices, 1,500 m² laboratories, etc. and 700 m² archives/basement. In addition there are semi-field facilities where precipitation can be controlled and plants and soil studied at root level, greenhouses and climate chambers) as well as other work buildings

Furthermore 100 ha soil of the quality type JB4 and a small area of JB1.

Flakkebjerg

Buildings: 1,000 m² offices, 2,000 m² laboratories and 800 m² archives/basement. In addition semi-field facilities (covered pot trial facilities, greenhouses and climate chambers) and work buildings.

Furthermore 170 ha soil of the quality type JB6-7.

Askov

Buildings: 280 m² offices and 190 m² laboratories. In addition semi-field facilities and work buildings.

Furthermore 25 ha soil of the quality type JB5.

Jyndevad

90 ha soil of the quality type JB1.

c. Staff composition

AGRO's staff composition in mid-2015 can be seen in table 1. The department has a total of 274 employees with 114 TAPs and 160 VIPs. The age distribution for VIP and TAP is shown in figure 2.

Table 1. Number of employees at AGRO distributed over sections and staff groups

	Pro-fes-sor	Senior research-er/ ass. professor	Researcher /postdoc /research assistant	PhD*	Technical AC-TAP	Technical TAP	Admin. TAP/ AC-TAP	Total
CROP	1	13	8	12	3	6		**43**
PATENT	1	9	6	3	1	10		**30**
JORD	1	7	9	13	3	8		**41**
JORNÆR	2	7	7	7	2	10		**35**
KLIMA	2	5	8	17	7		2	**41**
SYSTEM		8	6	9		1		**24**
MARK					1	49		**50**
STAB							14	**14**
Total	**7**	**49**	**44**	**61**	**17**	**84**	**16**	**278**

* Including PhD students enrolled at GSST

It can be seen from figure 2 that there is a large group of elderly TAPs. More than 60% of the TAPs are more than 50 years old. Nine VIPs and 24 TAPs are 60 years old or more and are expected to retire within the next 5-7 years.

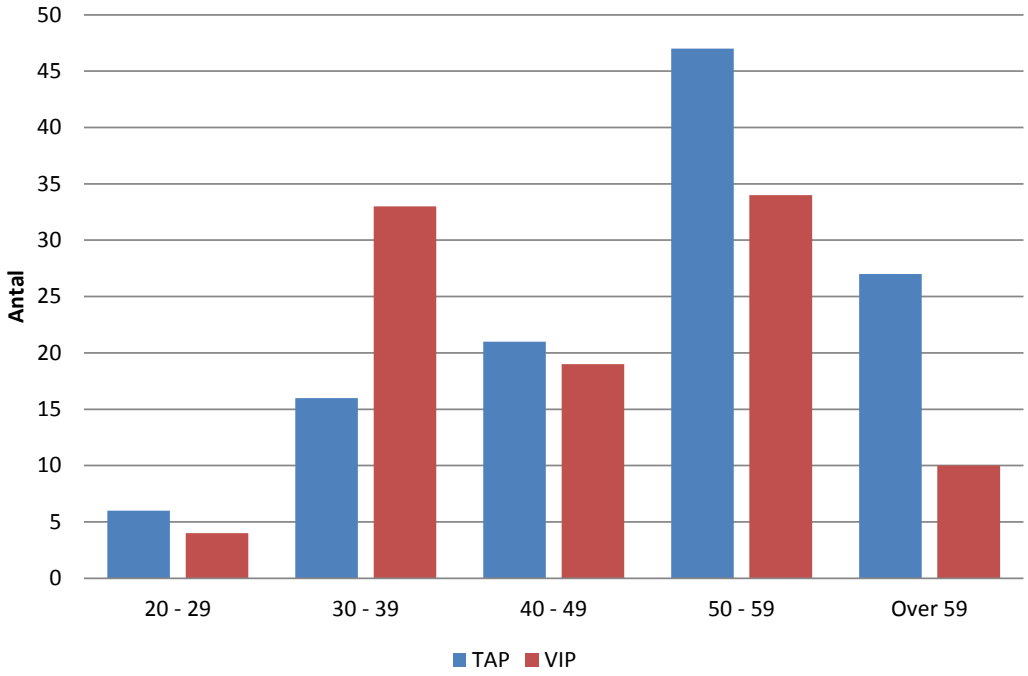


Figure 2. VIP and TAP age distribution in AGRO, mid-2015.

d. Infrastructure/research platforms

The Global Rust Reference Center

In 2008 a global rust centre was established at the request of the international CGIAR centres CIMMYT and ICARDA. The centre contains quarantine facilities for handling rust fungi from wheat. The centre is unique at a global level as it is open to reception of rust samples from all over the world throughout the year. The centre has at its disposal a unique collection of more than 15,000 isolates, which represent genetic variations of wheat rust from the late 1950s to 2014. The collection is available for research and resistance breeding purposes. The centre also hosts a comprehensive information database of data concerning global rust diseases and rust fungi.

Long-term trials

Studies carried out in full-scale field trials are a central element in the department's research, including basic research and strategic research that provides the grounds for policy support to the Ministry.

As something quite unique the department has field trials in which a specific trial design has been maintained for many years. The trials are located at several sites with different soil and climate types. Access to full-scale field trials with a permanent trial design is of paramount importance to agroecological efficacy studies that only change slowly over time, which are episodical or which are affected by gradual changes in climate, atmospheric deposition and other environmental factors.

Examples of long-term trials:

Warning system for Leaching of Pesticides to the Groundwater

Established in 1999/2000 with data and previous history. Carried out at five sites: three clay soil (drainage) and two sandy soils. These soils are considered representative of cultivated soils in Denmark with respect to geology, soil and precipitation.

Long-term fertiliser trials at Askov
The field trials were established in 1894 with input of N, P and K in commercial fertilisers being compared with an equivalent input from livestock manure. The trial is internationally unique and is a platform for projects within vastly different subject areas, primarily internationally binding collaborations.

Organic crop rotations
Two cattle and four crop rotations established in 1987 and 1997, respectively, are being undertaken at Foulum. Gradients are conducted regarding the percentage of clover in grass, fertiliser input and catch crops. All plots have suction cells in order to determine leaching.

Crop rotation and soil tillage trials
Established in 2002 at Foulum and Flakkebjerg. There are split-plot trials with four crop rotations at each site and four soil tillage strategies within the crop rotations. The trials were established with a view to quantifying the effect of crop rotation and soil tillage on crop production, soil quality, nutrient use, nitrogen leaching, greenhouse gas emission, weeds, diseases and pests.

The continuous recordings in the trials ensure the creation of databases with long time series for soil, crop and climate parameters, crop yields and other management parameters which are crucial to the creation and validation of simulation models. The high quality of data and with this

the possibility of a more secure clarification of causal relations were maintained by the fact that the areas and their management history were well documented and that trial treatments, recordings and additional tillage measures are carried out timely and correctly, also for extreme and/or complex trial treatments.

Several Bachelor's, Master's and PhD degree projects were completely or partly dependent on activities in the department's long-term field trials.

Semi-field facilities

AGRO has semi-field facilities at Flakkebjerg, Foulum and Askov. They comprise pot experiment facilities, lysimeter facilities, tank and basin facilities, climate chambers and greenhouses.

The semi-field facilities are an important link in a chain of research tools ranging from the field to the laboratory for analyses of soil and plants. The climate chambers enable simultaneous studies of the importance of individual factors on plant growth as well as the interactions between several parameters.

The semi-field facilities also offer students the possibility of carrying out trials in which they can follow several growth cycles in one season and by this obtain a better underlying data basis, which is not possible in field trials.

Laboratories

AGRO has at its disposal approximately 3,700 m^2 of state-of- the-art laboratories with facilities that support all the research groups. The laboratories at Foulum were renovated through funding from UNI-lab in 2015. The renovation at Flakkebjerg is expected to be finished in 2016.

GIS

The department has at its disposal advanced GIS facilities that are used in many connections involving mapping. An extensive development effort in GIS is going on in a large number of the department's tasks (soil, climate, management, etc.). GIS is used to a great extent for assignments in connection with public sector consultancy.

e. Production and benchmarking

The department's results are mainly published as research papers and popular science papers (see table 2). The table shows that the number of peer-reviewed papers has increased by 94 in the period 2010-2014, which is equivalent to an increase of 60%.

Table 2. Number of publications at AGRO 2010-2014

Year	Peer review Pure	Number in the Web of Science	Other research papers	Popular science
2010	165	109	293	115
2011	189	142	338	98
2012	238	160	353	77
2013	242	200	208	78
2014	259	171	168	66

Analysis of peer-reviewed publication

A very large part of the department's publications are in the top half of the Web of Science's (WoS) ranking of journals within our field. In the journals in which we publish most more than two thirds are above the average for the WoS categories.

During the same period most publications were within the eight subject areas shown below. The department's publication (number of papers as percentages of AU's publications) is shown in brackets.

- Agriculture Multidisciplinary (72/30%)
- Agronomy (117/64%)
- Ecology (76/11%)
- Entomology (76/50%)
- Environmental Sciences (142/15%)
- Plant Sciences (61/17%)
- Soil Science (182/76%)
- Water Resources (51/37%)

Table 3 shows how Aarhus University is ranked compared with five selected universities in a comparison in the Web of Science.

Table 3. Specification of AGRO's share of AU's publication and comparison of the five selected universities' peer-reviewed publication in 2010-2014 within the top 8 of AGRO's subject areas

Subject area	No. of pub. AGRO	Percent-age of AU's pub	Relative Impact Factor in relation to sub-ject*				
			AU	KU	SLU	UGENT	WUR
Soil Science	182	76	1.35	1.43	1.56	1.23	1.71
Agronomy	117	64	1.69	1.19	1.13	1.23	1.55
Entomology	76	50	1.17	1.88	1.83	2.14	1.77
Water resources	51	37	1.50	1.26	1.21	1.63	1.62
Agriculture multidisciplinary	72	30	1.61	1.59	1.16	1.56	1.37
Plant Science	61	17	2.10	2.65	2.31	3.15	2.58
Environmental Sciences	142	15	2.66	2.20	2.16	2.09	2.41
Ecology	76	11	2.59	2.64	3.07	2.16	3.19

***** Based on a relative impact factor in relation to the subject for which 1= world average. The analysis was made in InCites on the basis of an extract from the Web of Science

AGRO has chosen to compare itself to the University of Copenhagen (KU), the Swedish University of Agricultural Sciences (SLU), Ghent University, Belgium (UGENT) and Wageningen University, the Netherlands (WUR). Benchmarking is only possible for publications at university level, as shown in table 3.

As can be seen from table 3 AU's publication rate is generally high, between 17 and 166% above world average. Among the selected universities we are in the top 3 in the selected subject areas (Agronomy, Environmental Sciences, Agricultural Multidisciplinary) and in line with the University of Copenhagen in the others. However, we are ranked low in Entomology.

Every year the National Taiwan University publishes a ranking assessing publications within a number of areas. Table 4 shows the level of the five universities within the area "Agriculture" and the sub-subject "Agricultural Sciences" for 2011 and 2014, respectively.

Table 4. The five universities compared in this part of NTU's ranking

	Agricultural Sciences	
	2011	**2014**
AU	16	11
KU	7	9
SLU	24	25
UGENT	19	5
WUR	1	1

Figure 3 shows the result of a bibliometric analysis of the words in the titles and keywords of all publications in the Web of Science in 2010-2014. This provides a picture of the scientific landscape of the department's publication distributed in various areas. The publications are grouped into 3-4 clusters around crop protection (lower left corner), the soil and its functions (lower right corner) and input of auxiliary substances, yields and environmental impact on the individual crops and at other levels in the agricultural system (upper corner).

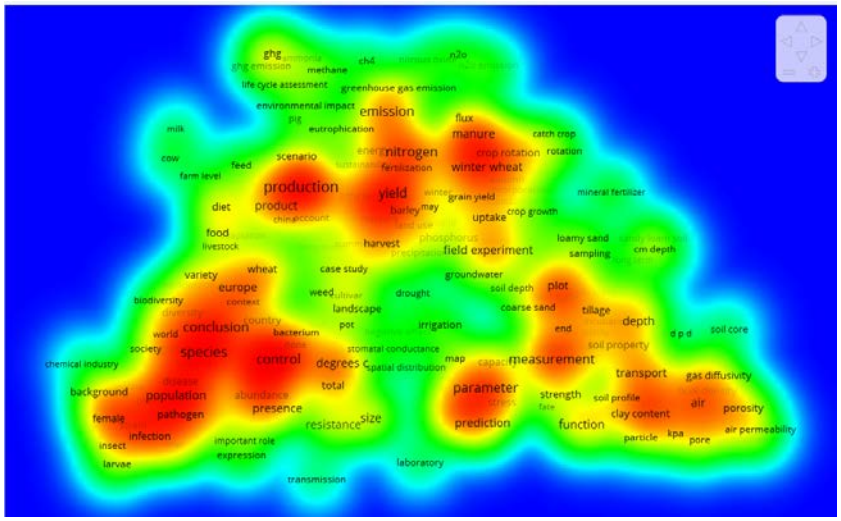


Figure 3. The scientific landscape identifies clusters and visualises networks. Source: Web of Science & WoSviewer

f. Public sector consultancy for the MFVM

The department contributes substantially to the research-based public sector consultancy in DCA – Danish Centre for Food and Agriculture in a large number of areas. The so-called Supplement 2 assignments are assignments for which a reply to one or more specific questions must be supplied within a relatively short period of time. These assignments have since 2013 been divided into 13 thematic areas as shown in table 5. The table shows that the number of assignments for AU totalled 159 in 2013 and 175 in 2014. Of these assignments AGRO supplied replies to 77 and 104 respectively, which is equivalent to 50-60% of the total number of replies from AU. AGRO is the theme coordinator for eight thematic areas (1.2, 1.4, 1.5 and all five regarding 2). The table shows that AGRO in particular replies to many questions regarding the area Sustainable crop production (1.2) and Food production, auxiliary substances and environment (2.4).

Table 5. Number of assignments for the MFVM in AU and AGRO (2013-2015)

	2013		2014	
	No. of Suppl. 2	AU - AGRO	No. of Suppl. 2	AU - AGRO
1. A development and growth-oriented food sector				
1.1. Sustainable animal production	30	1	36	4
1.2. Sustainable crop production	32	29	37	32
1.3. Sustainable technology development and assessment	11	1	15	3
1.4. Bioeconomy, bioenergy and rural development	8	5	6	10
1.5. Resource efficiency	5	4	5	5
2. Responsible management and natural resources				
2.1. Food production and the arable soil	2	2	6	8
2.2. Food production and bioresources	5	1	8	3
2.3. Food production, landscape, nature and biodiversity	8	6	10	4
2.4. Food production, auxiliary substances and environment	23	19	24	23
2.5. Food production, climate and greenhouse gases	10	7	9	11
3. Food safety, consumer options and healthy dietary habits				
3.1. Food quality	10	2	10	1
3.2. Consumer behaviour and food preferences	11	0	7	0
3.3. Importance to health of food and eating habits	4	0	2	0
Total	**159**	**77**	**175**	**104**

g. Analysis of the department's strengths and weaknesses

The department's overall objective for the next strategy period is to produce knowledge about "Sustainable production and growth through research, consultancy and teaching of agroecosystems".

Subsequently all six sections have prepared a SWOT analysis in order to determine strengths, weaknesses, opportunities and threats. A summary of these is shown in the diagram below.

	Strengths	**Weaknesses**
Internal	Highly qualified staff with comprehensive research knowledge within the agroecological area High quality, good strategic aim and large research output Strong networks both nationally and internationally We are good at attracting external financing, especially for strategic research Unique research facilities and well-documented analysis and measuring techniques Good possibilities for MSc and PhD for use of data and facilities We are team oriented and have a good collaboration culture both internally and externally We are placed centrally in relation to the business sector and authorities	Extensive external financing may lead to lack of time for in-depth study and for support of basic activities Inconvenient age profile and "below critical mass" within some of our subjects Public sector consultancy is linked to a few permanently employed staff members who also have many other assignments Increasing workload resulting in stress Scientifically very dispersed, and not enough focus on new trends Lack of expertise regarding financing Difficult to attract highly qualified PhDs and postdocs in some areas Too few students Not enough publication in journals with a high Journal Impact Factor
External	**Opportunities**	**Threats**
	Great demand for collaboration with our research areas, both internally in ST and externally Developing international public sector consultancy (the EU), especially in relation to pesticides Good profile in relation to new initiatives from the Danish funding providers and the EU Better utilisation of "big data" from sensors and new technologies for proactive research supporting public sector consultancy assignments Great demand from the business sector for our graduates New teaching facilities and better possibilities for having more students	Reduction of our public sector consultancy contract with the MFVM Increasing competition for national research funds, including more funding going to applied/demonstration and less to strategic research (both nationally and internationally) Changing political attention results in a lack of understanding of the context (system level) addressed by our research Lack of interest in our degree programmes among students

h. Strategy cards

Vision	**AU must belong to the elite of universities and contribute to development of national and global welfare**					
AGRO's mission	**To contribute to sustainable agricultural production and growth through research, policy support and teaching of agroecosystems**					
Interested parties	**Authorities, enterprises, organisations and students**					
Focus areas	**Outstanding research** • Strengthen the quality of research in AGRO • Strengthen interdisciplinary research • Increase our impact and leadership in international and national research	**Focused talent development** • Strengthen the quality of the PhD programme • Recruit the best talents from Denmark and abroad • Establish clear and unbroken career paths	**Business collaboration** • Increase dialogue and collaboration with the private business sector • Strengthen visibility and dissemination of knowledge to the business sector	**Public sector consultancy** • Strengthen independent research-based consultancy • Strengthen visibility and dissemination of knowledge to the public	**Top quality degree programmes** • Increase admissions • Increase pass rates • Create an inspiring study and learning environment • Establish national collaboration within the plant-environment area	**Modern infrastructure** • Ensure access to well-managed research stations • Ensure access to modern special equipment and facilities • Ensure optimum and efficient service
Strategic preconditions	**A financially sustainable and staff friendly organisation** Professional management / Attraction and development of employees / High quality physical facilities and infrastructure / High administrative service level / Continuous quality assurance and process control / Strong profiling / Strategic resource management / Staff and student involvement / Inspiring working and study environment / Holistic thinking					
Values	**Freedom and independence; staff and students work inquiringly and critically in an open and dynamic interaction with the outside world**					

Outstanding research

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
Strengthen the quality of research in AGRO	More power of penetration in AGRO's research	More high profile researchers with a high H-index	Increasing the number of professors and tenure track positions targeted at the flagships to 10 during the next three years	Recruitment plan 01/08/2016 Establishment of two search committees 01/10/2016 Responsible: Per Kudsk & Jørgen E. Olesen Establishment of two search committees 01/10/2017 Responsible: Jørgen Eriksen & Lis Wollesen de Jonge
		Increase the impact of AGRO's publication	Publish more papers per year per flagship in high impact journals More citations	Selection of subjects in the flagships for scope 01/10/2016 Responsible: the leaders of the flagships Strengthen the basic research within individual flagship areas via tenure track positions Responsible: as for the application committees Strategy for the department's use of open access 31/12/2016 Responsible: the department management team Focus on impact and internal support and guidance for pub-

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
				lication at SDDs Responsible: the heads of section
		Maintain the number of peer-reviewed publications per VIP	The number of peer-reviewed publications per seniorVIP must be higher than four	Maintain the number of PhD students Responsible: the heads of section
Strengthen interdisciplinary research	Strengthen integration at the department and at AU	More research projects across sections/departments	All flagships contribute a leading part in at least one cross-cutting initiative	Implementation of flagships. 3 applications for interdisciplinary research projects prepared and submitted 31/12/2017 3 applications for interdisciplinary research projects prepared and submitted 31/12/2020
Increase our impact and leadership in international and national research	AGRO must be more visible internationally	More internationally financed research projects	All flagships have experience as coordinators or another central part in an EU project or the like	Preserve the present incentive structure regarding ”Seed money” from internal funds Coordinators on 6 international applications 31/12/2017 Coordinators on 12 international applications 31/12/2020

Focused talent development

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
Strengthen the quality of the PhD programme	Increase the range of PhD courses and extend it to more subject areas Each research section to be responsible for at least one Journal club	Maintain top evaluation of our courses	The programme is attractive to the best students All flagships to be responsible for at least one PhD course and at least one MSc/PhD Summer School	2016-20: Maintain financial support for developing and running courses (approx. 7-8 courses per year) Responsible: Head of degree programme committee and department management team 2017: PhD course in IPM. Researchers around the flagship 2018: PhD course in Arctic Soils. Researchers around the flagship 2019: PhD course in Nutrient Management. Researchers around the flagship 2020: PhD course in Climate-Smart Agriculture. Researchers around the flagship
	Maintain/intensify the high degree of internationalisation in our degree programme Broader recruitment of the best talents	Students wish to take their PhD or spend part of their PhD at AGRO because they know us due to our high scientific level, good and international environment and unique	The best foreign universities include us in applications Obtain international scholarships and attract top students with own scholarships	2017: AGRO takes the initiative to establishing for example an Erasmus Mundus MSc semester 2018: AGRO takes the initiative to an Erasmus Mundus

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
		facilities		PhD degree programme 2019: Take part in Marie Curie EU applications
	Job satisfaction for PhD students	Less stress and less feeling of loneliness Better integration into the research environment	Increased research quality, increased productivity and finishing the programme on time	2016-2020: All supervisors on courses on a regular basis and 2 annual job satisfaction talks 2019: All seniorVIPs are active as either principal supervisors or co-supervisors 2016-2020: 2-4 strategic, open PhD positions within the flagships opened each year
Recruit the best talents from Denmark and abroad	Increase the already high number of admissions of PhD students from all over the world	Graduates from the very best universities wish to take their PhD with us	Maintain the number of PhD students at the present level Increase the number of top students from the best universities	2016-2020: Seek out all talented Master's degree students across our own and other degree programmes and established networks 2018-2020: Targeted recruitment from Erasmus Mundus semester
Establish clear and unbroken career paths	Become considerably better at attracting and especially maintaining the best young talents	Increase the number of talented postdocs Increase the number of industrial PhDs and postdocs	Employment of at least one tenure track researcher a year in one of the flagships	2016-2020: Maintaining promising talents by writing them into applications and by using seed money

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
				2017: One tenure track researcher in IPM; candidates found for example through the application committee 2018: One tenure track researcher... 2019: One tenure track researcher... 2020: One tenure track researcher...

Business collaboration

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
Increase dialogue and collaboration with the private business sector	Identify relevant collaborative partners within AGRO's key competences	Identify private enterprises for new or extended collaboration	Mapping of the existing collaboration with private enterprises	2016: The prepared summary is used to identify enterprises with which collaboration can be increased. The business committee 2016-2017: Host a "Brainnovation Day" for selected enterprises. The business committee 2017-2020: Identify key parameters for the continued collaboration with specific enterprises. The business committee
	Strengthen the part of preferred collaborative partner for the business sector	Maintain high level of expertise and access to unique research infrastructure within AGRO's key competences	Focus on career development for researchers who mainly collaborate with private enterprises and on research infrastructure	2016-2017: Prepare suggestions for "career development" for researchers who mainly collaborate with private enterprises. The business committee and the department management team 2016-2020: Enter into a dialogue with enterprises regarding research collaboration projects. The business committee

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
				2017-2020: Modernisation of phenotyping facilities
	Participate in more innovation projects and maintain involvement in GUDP projects	Focus efforts on getting more industrial PhDs and industrial postdocs	Continuously have 1-2 large innovation projects and a number of GUDP projects	2016: Encourage students/enterprises to more business projects 2016: Increase knowledge about the possibilities of funding for industrial PhD students and industrial postdocs among our students 2017-2020: Channel collaboration from industrial projects into industrial PhD students and industrial postdocs
Strengthen visibility and dissemination of knowledge to the business sector	AGRO's involvement in enterprise-targeted projects is to be disseminated nationally and locally	The relevant collaborative partners know AGRO's key competences	More business and enterprise-targeted events	2016: Information about AGRO's participation in projects aimed at the business sector to be found on the department's home page. 2016: Flagships organise project days that are relevant to the business sector

Public sector consultancy

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
Strengthen independent research-based consultancy	Strengthen the quality of the national public sector consultancy	Incorporate quality documentation of the public sector consultancy	The number of peer-reviewed publications related to public sector consultancy is to be increased by five % a year. Increase dissemination of research results in collaboration with the DCA	2018-2019: Involving at least 20 postdocs in data collection and subsequent publication in connection with research and consultancy in support of authorities in 2017, rising to 25 and 30 in the following years (the department management team) 2017-2018: At least 20 news items via the DCA's home page and newsletters in 2016, rising to 25 and 30 in the following years (the department management team)
	Proactive within AGRO's flagships	Extend the integration of research activities in the public sector consultancy and vice versa	Maintain the grant from the MFVM	At least 4 project applications to national foundations (Innovation Fund Denmark, GUDP, etc.) (1 per flagship) and participation in at least 1 EU application per year (the leaders of the flagships) 1 thematic meeting for interested parties in 2016 and 2

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
				thematic meetings in the following years built around the flagships (the leaders of the flagships)

Top-quality degree programmes

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
Quantity	Maintain/increase admissions to BSc Agrobiology. Increase admissions of Master's degree students	Supply candidates to Danish and foreign enterprises and research institutions	Yearly admission of at least 72 BScs and a yearly graduate production of 40 within the crop environment area (Agrobiology: plant, AEM)	2016-2020: Participation in AU PR and recruitment activities regarding BSc Agrobiology. 2016-2020: Establishment and implementation of activities within agrobiology targeted at upper secondary schools 2016-2017: The degree programme committee prepares a strategy for recruitment of Master's degree students both nationally and internationally

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
Quality	Improve pass rates (reduce drop-out)	Supply attractive candidates to Danish and foreign enterprises and research institutions	At least 85% of the admitted students complete BSc. At least 90% of the admitted students complete their Master's degree programme	2016-2017: Revision of courses in connection with conversion to semester structure. 2016-2018: Establishment of four Agroecology summer courses. One course for each flagship 2016: Advanced soil physics 2017: Integrated nutrient management 2018: Course within nutrients 2018: Course within IPM
Study and learning environment	Improve the physical and social study environment	Offer our students the best possible and inspiring conditions during their studies	Measured through evaluations and investigations of study environment	2016-2017: Establishment of a new study environment at Katrinebjerg 2016-2018: Development of new teaching methods in collaboration med STLL
National collaboration within the plan-environment area	Develop the range of courses within the IPM area together with KU	Offer our students the best courses within IPM and attract students from other universities	Establish a course offered by KU and AU	2016-2018: Lecturers from AU and KU together develop courses within IPM

Modern infrastructure

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
Ensure access to well-managed research stations	Maintain the department's possibilities of carrying out research under varying natural conditions, partly at research stations, partly with suitable farmers	That research at the research stations results in a satisfactory number of publications	That research, degree programmes and public sector consultancy continue to have access to the unique outdoor research facilities that are at AGRO's disposal	2016: Focus on the possibilities of increasing the areas at the locations at which AGRO needs more soil for trials and at the same time disposing of soil where this is needed/possible (the department management team/the Dean's Office)
		That the research stations are used in connection with teaching	Before the end of 2017 the trial areas will be adapted to research needs as regards both number of hectares and soil types and climate conditions	2016-2020: Continuous training of staff at the research stations and upgrading of trial equipment (staff and heads of section) 2016-2020: Promotion of the research stations to other departments in ST (the department management team)
Ensure access to modern special equipment and facilities	Ensure access to facilities in and outside Aarhus which together can support research, teaching and public sector consultancy	That the necessary facilities are kept in repair and optimised	To adapt capacity and optimum utilisation of facilities and staff	2016-2017: Mapping of future needs for special facilities 2018: The outdoor special facilities must have become upgraded, and there must be sufficient staff to meet the demands for facilities of researchers and students (the department manage-
	Ensure coherence between physical facilities and staff who can operate them	That competent staff necessary for the work assignments are available.	Maintain key staff	

Focus area at department level:	Strategic objectives at department level	Critical success factors	Objectives	Initiatives/ Projects
				ment team) 2016-2020: Maintenance and extension of competences (staff)
Ensure optimum, efficient and simple service	Ensure homogeneous, efficient organisation of TAP support, including local, efficient and flexible secretarial support and a prompt and efficient support of administrative functions	That service and use of financial resources are satisfactory	That assignments are completed within an acceptable time frame and that costs are kept down	2018: Map the need for TAP support (the head of the secretariat) 2016-2020. Ensure simple access to administrative support, including the collaboration with the administrative centre (the head of the department and the head of the secretariat)

i. KPI for AGRO for the period 2014-2016

Definitions: VIP covers permanently employed VIPs such as professor, professor with special responsibilities (MSO), associate professor, senior researcher and senior adviser expressed as full-time equivalents (FTEs) per year.

2013: 61.40 FTEs 2014: 59 FTEs 2015 (FC3): 55 FTEs

Purpose	KPI	KPI target	KPI result
1. Financing: *Increased attraction of external funding*	Use of external funding per VIP FTE	2014: 1.52 2015: 1.84 2016: 2.00 2017: 2.09 2018: 2.14	1.53 1.87
2. Publications: *Increased number of publications*	Number of peer-reviewed publications per VIP FTE	2014: 4.02 2015: 4.2 2016: 4.38 2017: 4.46 2018: 4.46	4.17 4.40
3. Growth layer: *Increased number of talents*	Number of talents (PhD, postdoc, assistant professor, researcher, including tenure track and other VIPs) as FTE used per year	2014: 1.24 2015: 1.3 2016: 1.61 2017: 1.96 2018: 2.14	1.28 1.47
4.b Public sector consultancy: *Increased number of consultancy publications*	Number of consultancy publications (scientific reports and memoranda to authorities) recorded as *Rådgivning* in PURE per VIP FTE	2014: 1.2 2015: 1.25 2016: 1.31 2017: 1.32 2018: 1.32	0.85 1.32
5. External collaboration: *Increased number of external collaborative partners on publications*	Number of publications with external co-authors (= not employed at AU) in peer-reviewed publications recorded in PURE per VIP FTE	2014: 2.82 2015: 2.94 2016: 3.07 2017:3.39 2018:3.39	2.92