

## Environment template (REF5)

<b>Institution:</b> University of Greenwich
<b>Unit of Assessment:</b> (UoA 6) Agriculture, Veterinary and Food Science
<b>a. Overview</b> <p>The life science research groups submitted to the Agriculture, Veterinary and Food Science Unit of Assessment are in the <b>Natural Resources Institute (NRI)</b> of the Faculty of Engineering and Science of the University of Greenwich. It is a multi-disciplinary centre specialising in research, advice, teaching and training in support of global food security, sustainable development and poverty reduction. NRI life scientists undertake research in collaboration with NRI social scientists that have been submitted under Unit of Assessment (UoA) 24 in support of these aims.</p> <p>The research agenda within the University is led by the Deputy Vice Chancellor for Research and Enterprise, who chairs the University Research and Enterprise Committee (R&amp;EC). The Committee exists to promote and develop the research environment and to review and recommend policies and objectives for the strategic development of research and enterprise in the University. Directors of Research and Enterprise for the constituent Schools and Institutes of the University are members of the R&amp;EC. Each School and Institute is accountable to the R&amp;EC and must provide an annual reporting and strategic research planning document. The University's research is also guided and monitored by a Research Ethics Committee. The University has a central Research and Enterprise (GRE) office. GRE provides, a range of support services (managed through an intranet portal) to research staff including training for research and enterprise development; fostering linkages with the public and private sector; funding advice; and guidance on intellectual property.</p> <p>Research in NRI takes place in an interdisciplinary environment coordinated jointly by the Director of Research and Enterprise and the Director of cross-cutting Thematic Programmes. More than 65% of staff are engaged in research, and those in UoA6 fall within two of three operational departments established to identify research funding opportunities, mentor staff, maintain professional standards, provide research resources and infrastructure, and oversee staff development. These two are the Food and Markets Department and the Agriculture, Environment and Health Department. Each department is represented at weekly meetings of the NRI Management Group chaired by the Institute Director to discuss ongoing research projects and development programmes, and to provide strategic direction for research in the Institute. Minutes of these meetings are sent out via the Institute's intranet and discussed at monthly departmental meetings. Research seminars are held every two weeks with presentations by staff members, research students as well as by visiting researchers and development practitioners. Research and fund-bidding activities are managed under ISO9001: 2000 validated quality-control systems to ensure quality, financial viability, and for delivery of outputs.</p> <p>Research is closely integrated with consultancy and advisory activities, and this supports the ongoing relationship with donors, research funders and research users in the public, private and voluntary sectors in UK and overseas. Research informs our short courses for continued professional development for the agricultural and natural resources sector, and for the MSc programmes in Agriculture for Sustainable Development, Sustainable Environmental Management and Food Safety and Quality Management.</p> <p>The number of research groups being submitted under UoA6 has increased from five, submitted under UoA16 (RAE 2008), to six. This is as a response to increasing global concern about climate change, agriculture and the environment, and the growth in staff numbers reflects the importance of these areas of research. These groups, their research activities, successes and strategic aims are briefly described below.</p> <p><b>The Agriculture Biosecurity Group</b> undertakes research to develop and use diagnostic technologies to investigate the epidemiology of economically damaging fungi, bacteria and viruses that cause diseases in root crops, vegetables and cereals. The mix of molecular and whole-organism expertise has not only developed an understanding of the mechanisms involved in the spread of plant diseases, but has also enabled the creation of several new environmentally sustainable solutions to disease. These involve modelling, forecasting, as well as sustainable pest and disease management technologies. The group plans to continue meeting the challenges presented by emerging plant disease epidemics on important agricultural crops. In particular it will research cassava whitefly control, mixed viral infections and transgenic cassava. Additionally it will sequence isolates of <i>Jatropha mosaic virus (Colvin)</i>; study the epidemiology of UK and European</p>

invasive species (**Holt**); develop environmentally benign locust control methods and population modelling for use in Africa and Asia (**Cheke**); develop new biological technologies to control major field pests in the UK and research integrated pest management in genetically modified crops with leading researchers in Cornell and Melbourne Universities (**Grzywacz**).

The **Chemical Ecology and Plant Biochemistry Group** undertakes research on the identification, synthesis and formulation of natural products from plants and animals that play key roles in the biology of pests, and the diseases which impact agricultural crops and livestock. These products include pheromones and other semiochemicals developed for monitoring and control of field and storage pests; host attractants for monitoring and control of vectors of disease in both plants and animals; and chemicals responsible for resistance of crops to pests and pathogens. The group works closely with the **Pest Behaviour Group** in studies on the behavioural activity of these chemicals and their application to management of pests and diseases. The research group plans to continue to build its portfolio of projects in the identification of oviposition attractants for disease vectors (**Vale** and **Hall**); mechanisms that make some plant species effective as alternative pesticidal materials for poor farmers in sub-Saharan Africa (**Stevenson, Belmain, and Hall**); development of sweetpotato germplasm which are multiple resistant to *Cylas* weevils (**Stevenson and Gibson**).

**The Pest Behaviour Group** covers research relating to agroecology and insect behaviour, vector-borne diseases of livestock and humans, and the ecology and behaviour of rodents and quelea birds in order to reduce or even eliminate pest problems and serious diseases. The team's research achievements include developing better methods for controlling tsetse that spread sleeping sickness in cattle (and humans) in Central and West Africa. They have also added to our understanding of the physiological and behavioural basis of mosquito mating behaviour and the development of larvicidal plant products against malarial mosquitoes. Additionally there have been studies on tree crop pollination and ecology, and the control of rodents. The group plans to strengthen existing research collaborations and develop new avenues of study with a number of institutes. These are the London School of Tropical Medicine and Hygiene; Liverpool School of Tropical Medicine; the Universities of Sussex, Newcastle and Southampton; the Institute of Animal Health; Rothamsted Research; the Royal Botanic Gardens, Kew; and the French Institut de Recherche pour le Développement. The research programme will continue to develop strategies for control measures against the major vector-borne diseases associated with rats (**Belmain**), tsetse (**Vale**), mosquitoes (**Gibson and Hall**), and blackfly (**Cheke**), as well as expand the research on understanding pollinator behaviour in a changing climate and environment (**Arnold, Stephenson and Belmain**).

The **Molecular Virology and Entomology Group** undertakes research on the molecular characterisation of tropical plant viruses and insect pests to support epidemiological and plant health studies. It also studies gene expression through use of the latest sequencing and bioinformatics technologies. The team's research encompasses the development of improved disease control technologies and support to breeding programmes in national and international research organisations. The group will continue to develop funding streams and partnerships focusing not only on maintaining its internationally recognised reputation in tropical plant virology - particularly aimed at sustainable intensification of roots and tubers - but also on building its research in cutting-edge molecular biology areas. These areas include genomics, bioinformatics, gene silencing, transgenic resistance, and real-time PCR diagnostics (**Seal, Maruthi, Bouvaine, Silva, Bömer and Gibson**).

**The Post-Harvest and Value Addition Group** undertakes post-harvest research on durable and perishable crops. The aim is to reduce losses, enhance economic and nutritional crop-value and assure food safety. Research ranges from the fundamentals of storage and preservation of quality throughout the marketing chain, to food-science aspects of agroprocessing and the responses of consumers to new food products. The group has developed an international profile in post-harvest research, especially relating to grain storage management and development, and tropical root crops. It is increasing its research work on fruit and vegetables through a joint research centre established with East Malling Research. The team's future research strategy includes building upon current multidisciplinary research projects in roots and tubers to improve quality management and adding value to small and medium-sized enterprises (**Westby, Tomlins, Bechoff, Greiner**). It aims to support new areas of research in areas of global trade, food supply chains, food safety,

**Environment template (REF5)**

reduction of carbon footprints, and the social and economic aspects of durable and perishable crops.

The **Eco-system Services** research group (new since RAE2008) undertakes research on the functioning and management of UK and tropical agro-ecosystems. Research includes analysis of the carbon balance and footprint of organic and conventional agricultural systems; the economic and environmental trade-offs in sustainable agriculture; impacts of land-use change on environmental services; the role of conservation practices in supporting biodiversity; and farmer decision criteria and costs of erosion control. The group also engages with the private sector on environmental sustainability with the Ecosystem Services Knowledge Transfer Network and sustainable certification bodies. The future research plans of the group are to identify how ecosystem services can contribute to poverty alleviation in the tropics and the sustainable intensification of food production across the world (**Haggar, Atkinson and Porter**).

**b. Research strategy**

At the beginning of the assessment period the unit developed a strategic research plan around three key objectives:

- increase the portfolio of research projects, with more long-term research programmes;
- promote inter-disciplinarity and collaboration to put research into use and increase impact;
- raise the profile and dissemination of the Groups' research with a range of stakeholders and end-users of research.

***Increasing the research portfolio***

At the beginning of 2008, the unit had five research groups (since expanded to six as indicated in the overview) made up of staff with a common discipline or research interest working on clearly defined research challenges in agriculture, food and natural resource management. Since 2008, each group has received funding through an annual internal development budget against which research objectives, plans and activities were developed. Clear targets and indicators are produced in relation to the production of knowledge (proof of concepts), peer-reviewed publications, value of research and development proposals submitted to funders and esteem activities, and support to the development of early career researchers and post-graduate students. Quarterly and annual reports monitored progress and achievements against the agreed milestones. This support is key to enabling the groups to plan their research and build their externally funded research portfolio and dissemination programme. In addition to this core support to the research groups, individual staff (particularly early career researchers) have been able to apply at the beginning of the academic year to the University's competitive research fund to help develop the excellence and capability of their research. This approach has been successful in increasing the number and size of research projects. At the beginning of 2008, the unit's research groups had a total portfolio of 24 projects with 11 of duration greater than three years. By 2013, the unit's project portfolio funded from external sources had increased to 60, of which 23 projects were more than three years' duration.

***Interdisciplinarity***

The support to the research groups has created a focus for undertaking research along disciplinary lines, but research capacity has been enhanced by the formation of the following cross-cutting thematic development programmes, combining natural and social sciences in interdisciplinary approaches:

1. **Climate change, agriculture and natural resources:** brings our expertise to the challenges posed by climate variability and change on smallholder agriculture, natural resources management, economic development and rural livelihoods. With a range of partners, the programme contributes to the search for equitable and sustainable future mitigation pathways, developing and implementing appropriate technical, institutional and policy-based strategies for adaptation.
2. **Equitable trade and responsible business:** develops strategic partnerships with key public and private sector organisations working on equitable trade and responsible business. This is in order to take part in critical analysis and action research on the impact and governance of trade. Additionally, focus is on responsible business interventions for agricultural workers and smallholders to inform ongoing policy debates and practice.
3. **Sustainable agricultural intensification:** this programme addresses three themes:
  - i. integrated crop and pest management practices which reduce crop losses and minimise

environmental impact through reduced dependency on chemical inputs.

- ii. farming systems that use resources more efficiently while increasing production, reducing crop losses and increasing environmental resilience.
- iii. enhanced ecosystem services on farms for pollination, pest control, biodiversity conservation and developing resilience to climatic change.

4. **Capacity Strengthening for Agricultural Development and Food Security Research:** this programme aims to help agricultural researchers and agricultural research organisations to develop appropriate skills, management practices and strategies to increase standards of research. It also supports knowledge management and capacity strengthening for farmers' organisations, civil society, the private sector and other users of agricultural research outputs.

These programmes bring together research staff from across the institute to address significant developmental challenges and opportunities emerging from the new agricultural development agenda and focus on food security. The programmes are important in directing specific areas of research and attracting wider donor interest and support. This interdisciplinary approach is enhanced by links with external research collaborators and end-user/beneficiary groups, which has led to the funding of the following significant projects during the period:

- Cassava: Adding Value for Africa (Bill and Melinda Gates Foundation [BMGF] – £7 million)
- Strengthening Capacity for Agricultural Research and Development in Africa (DFID – £1.9 million)
- Yam Improvement for Incomes and Security in West Africa (BMGF – £2 million)
- Reducing Post-harvest Losses and Waste Utilisation (FP7 – £2.37 million)
- Accessible systems to manage risk in family agriculture in Africa (EC – £3.5 million)
- Yam virus diagnostics development (BMGF – £1 million)
- Improving the Livelihoods of Smallholder Cassava Farmers Through Better Access to Growth Markets (EC – £2.33 million)

A programme advisory board provides support to the Institute. It comprises experienced development practitioners from the public, private and charity sectors and guides the Institute with particular reference to the ongoing research programmes and development initiatives. It also identifies synergies with organisations and initiatives in the UK, EU and worldwide.

#### ***Dissemination and promotion***

In addition to producing academic-oriented research outputs, research is disseminated through other channels and formats including project bulletins and web pages, policy briefs, newsletters, the NRI annual report, and training materials in order to reach a broader audience. This increases our visibility, ensures a more rapid and broader uptake of research findings and recommendations, and enhances the impact of the research.

We have promoted and continues to promote research dissemination and discussion by active participation in a range of fora including:

- the All-Party Parliamentary Group on Agriculture and Food for Development, which brings together policy makers and practitioners in the field. It aims to encourage progressive and informed debate on agriculture, nutrition and wider food/water security in the developing world. The Institute is a founder member and a staff member acts as coordinator.
- the International Society for Tropical Root Crops (under the presidency of **Tomlins**) which was created to foster, stimulate and support research leading to the general improvement of world tropical root crop production and utilisation.
- AGRINATURA EEIG (a consortium of European research organisations, under the presidency of **Westby**), the major institutional voice in Europe for agricultural research and education for development.
- National and international research conferences.
- Participation in briefing meetings at international organisations such as World Trade Organisation, the Food and Agriculture Organization and the European Commission.
- House of Commons Science and International Development Committee meetings.
- G20 and G8 meetings on agricultural research for development (**Westby** presented at G20 food security meeting in 2011).

### Future strategy

The Institute has developed a five-year strategic plan (*Knowledge to Feed the World*) for 2012–17 that provides clear strategic aims, goals and indicators for furthering research. The plan underlines the Institute's mission: '**To discover, apply and share knowledge in support of global food security, sustainable development and poverty reduction**'. At the core of the plan is growing research. This is measured by income growth of a minimum of 35% by committing staff to an increase in their portfolio of projects both from competitive and non-competitive bidding activities to secure a balance of large, medium and small projects.

The Institute will continue to support the research groups and development themes described above. These themes have been under review in 2013 and new theme areas have been proposed following an internal discussion of relevant global trends and emergent policy issues in agriculture and food science. The new development themes are post-harvest and waste loss reduction; roots and tubers in development; food safety and quality management; and trade, standards and market development.

Competitive bidding efforts will continue to focus on existing funding sources, combining this with increased efforts to find other sources of funding, including from UK research councils, foundations and bilateral donors. Larger projects will be the priority to ensure effectiveness in operations, but strategic use of small- and medium-scale projects will build overall capacity, positioning and relationships. There will be a goal to expand enterprise partnerships in order to target direct funding opportunities within the private sector and develop partnerships that are suited to attract funding from, for example, the Horticulture Development Company and Technology Strategy Board. While retaining a focus on developing country food and agriculture systems, in growing our research, we aim to expand the amount of research and enterprise in UK and Europe. To this end it will build on initiatives such as the Institute's European Centre for Integrated Pest Management developed by the Pest Behaviour research group, and the Produce Quality Centre created by the Post-Harvest and Value Addition research group in partnership with East Malling Research.

A key strategy in delivering growth is the move towards winning high-value research projects through large non-competitive programmes, which have the potential to bring financial stability and growth and produce significant research outputs and impact. To achieve this, we will support research leaders to develop closer relationships both with funding agencies in UK, Europe and worldwide and with strategic partners, including non-governmental organisations such as CONCERN and Farm Africa, and multilateral fora such as AGRINATURA. This strategic approach to engaging directly with funders has risen out of the significant change in the research funding environment with increased calls for greater investment in agriculture in developing countries from bodies such as the World Bank. There has also been increasing growth in support to agriculture from international organisations such as the Bill and Melinda Gates Foundation.

Our research produces a variety of dissemination outputs for a range of clients and beneficiaries. Particular focus will continue to be given to producing academic outputs in high quality peer-reviewed journal publications, conference papers and book chapters. The fora for promotion and dissemination of research will continue to be supported and new opportunities explored with support from the programme advisory board which will be leading a review of the unit's communications and dissemination strategy during 2014.

### c. People, including:

#### i. Staffing strategy and staff development

The University has committed to the goals established by the Concordat to Support the Career Development of Researchers developed by Vitae. To this end it is a signatory of the Concordat and has created a comprehensive Researcher Development Framework which has been disseminated across the institution. Plans are in place for full implementation, including comprehensive research training programmes, from September 2013. Furthermore, the University has extended this work and successfully applied for the HR Excellence in Research Award of the European Commission. This involved making substantial progress towards addressing and embedding the principles of the Concordat – and this is demonstrated through a comprehensive gap analysis and action plan (<http://gre.ac.uk/hr/concordat>).

The research groups aims to grow research volume by continually seeking to increase the portfolio of research projects and by applying a balanced recruitment process, bringing in staff at different

stages of their research career as the volume of research work grows. Responsibility for staff development and quality control of research activities and outputs rests with the leaders of NRI's operational departments, under the overall leadership of the Institute's director. Staff development is managed through annual staff appraisals that provide the framework for personal development. Management of staff retention and recruitment has focused on core research strengths, and losses have not affected the coherence or quality of research in UoA6. Staff are entitled to study internally for a part-time PhD at no cost, and are encouraged to apply for the titles of reader and professor in the University of Greenwich. **Westby, Hall, Cheke, and Colvin** were already professors and **Hodges, Tomlins, Rees, Torr and Stevenson** readers in 2008. **Stevenson, Tomlins and Hodges** have become professors, and **Seal and Maruthi** have become readers since 2008.

Recent recruitment initiatives have led to the appointment since 2008 of 11 new staff members who are classified by the University as early career researchers (ECR) and three new professorships, **Atkinson** (Sustainable Agriculture and Climate Change), **Greiner** (Food and Nutrition) and **Porter** (Agriculture and Climate Change). The new professorships will provide greater strength and depth in their research areas and add to the cross-cutting thematic programmes.

Particular attention is given at departmental and research group level to foster ECR development and support in research bidding activities and delivery. ECRs are encouraged in their endeavours with an opportunity to win an annual award for research excellence (**Bechoff** was awarded this prize in 2013), and matching funds to support research bids to funders such as the Leverhulme Trust. ECRs new to postgraduate supervision are required to attend the University's 'Supervising postgraduate research students' programme. This programme not only introduces and covers matters such as good supervisory practice, but – equally importantly – addresses wider matters that shape the way the University, supervisors and research students engage with and conduct postgraduate research.

A strategic focus in support of ECRs is their development through the Greenwich Early Career Researcher Initiative set up in 2010 to support early career research staff. The initiative is informed by the principles of the 'Concordat to support the career development of researchers' launched in June 2006. A steering group comprising of the directors of Greenwich Early Career Researcher Initiative, Greenwich Research and Enterprise and Postgraduate Research and a member of the Human Relations Department oversees a strategy for the initiative, which is supported by the University's research support manager. Each school has an ECR representative appointed by and from existing ECR staff and an ECR 'school champion'. The purpose of the role of ECR champions is to support ECR staff at the school level, and in most cases the champion is the school director of research and enterprise. A specific programme of ECR training has been put in place to support professional development.

## ii. Research students

Since 2008, the unit has mainly accepted either self-financed students or those funded by operational projects. Currently 42 students are either funded by projects or self funded, with a further ten receiving University bursaries or fee waivers as part of staff development. The aim is to increase postgraduate numbers by 40% over five years, mainly through incorporation of studentships within larger project bids and bidding into the Vice Chancellor's postgraduate bursary scheme.

Each research student is supervised by a team of three supervisors, with experience of supervising at least three students to completion. The administration and quality control of research degrees are overseen by the University Research Degrees Committee. The University also runs and internally audits a transferable skills programme, with a series of online courses in research skills and management being compulsory for students. NRI recruits students on a flexible basis to undertake research programmes that involve work at NRI for most of the research period, although some international students undertake field work in their home country. If students are based in their home countries, effective communications are ensured and a local supervisor is also appointed.

**Environment template (REF5)**

Students are allocated a dedicated workspace and their own networked computer, with suitable software as required. In addition, students are encouraged to attend Master's level courses as part of their transferable skills development. In addition, specialist training courses are run in quantitative and qualitative research methods, experimental design and statistical analyses. NRI runs a 'one-on-one' statistics support service to provide individual assistance. A seminar series is run for PhD students as part of the post-graduate student club and final year students also present at the NRI research seminar series.

**d. Income, infrastructure and facilities**

Since RAE2008, staff in the research groups being submitted to UoA6 have achieved income from agricultural and food research valued at over £19 million. Income is from a wide range of sources including the European Commission, charitable foundations (including Bill and Melinda Gates and McKnight), UK government departments, international donors, the private sector and civil society.

Staff and students work in state-of-the-art ISO9001-accredited laboratories (for molecular diagnostics, pest management, post-harvest technology, chemical ecology and insect behaviour), which are also used by visiting workers. During the census period the University has invested £230,000 in upgrading the Microbiology, Food Quality and Post-Harvest laboratories.

Unique specialist facilities (DEFRA-licensed) allow quarantine tropical pest and pathogen research to be carried out, e.g. screening of transgenic cassava with live whitefly and virus isolates. Recent investments from the University's Sustainability Fund have upgraded the unit's tropical quarantine greenhouse, which has significantly reduced energy and water use. Another unique facility is a wind tunnel for behavioural studies in chemical ecology, as well as flight arenas and acoustic chambers to study insect vectors.

Investment in research facilities is undertaken in the context of the strategic goals and achievements of each research group to ensure that equipment purchase is rationalised across the University to ensure the competitiveness of its research teams. The University strategically reinvests part of its income in equipment to complement external funding. Project-specific equipment is included in grant proposals where feasible. Recent additions to our equipment and facilities include real-time PCR, LCMS, GCMS, electronic nose and tongue, fluorescent microscope, insect-movement imaging devices, equipment for transient kinetic and proteomics analyses, and a chamber for studying mosquito flight and acoustic mating behaviour.

All research activities are covered by ISO 9001 (2008) registration that includes procedures for preparation, approval and quality control of proposals for research funding, as well as for ensuring quality and timeliness of reports to funding organisations and for submission of journal articles.

The University has a proactive approach to investing in sustainability (it collected an award in 2012 for its success in sustainability, coming top of the [People & Planet Green League](#) table). The research groups are fully committed to supporting the University Sustainability Strategy and will continue to benchmark the environmental impact of the scientific infrastructure and set sustainability targets (see above for greenhouse refurbishment). There will be regular engagement between scientific staff and our quality management taskforce undertaking cost-benefit analyses of future laboratory accreditation and obtaining accurate information on the carbon footprint of our laboratory infrastructure and travel. It will also identify where reductions can be made.

**e. Collaboration and contribution to the discipline or research base**

Partnership and collaboration are central to the groups' research strategy. The research groups have undertaken research and development projects working with partner organisations in 125 countries for 220 clients since 2008, and have worked in 152 countries.

At the institute level, the researchers work closely with staff submitted under UoA 24 as part of the Institute's strategy to work in interdisciplinary teams through the thematic programmes. All of the research groups in the unit engage in collaborative partnerships with a range of international institutes, companies, research organisations, universities, farmers' groups and non-governmental organisations in Africa, Asia and Europe. Partnerships with research organisations and universities are often formalised through Memoranda of Understanding, covering both research bidding and delivery. NRI collaborates with research institutes belonging to the Consultative Group on International Agricultural Research (CGIAR) and other international centres giving access to the world's most significant germplasm collections of tropical crops, such as:

- sweet potato at CIP (storability studies, resistance to viruses);

## Environment template (REF5)

- cassava at CIAT (resistance to whiteflies);
- yams, cassava and maize at IITA (biofortification acceptability, post-harvest management, breeding programmes, development of planting materials);
- and tomato at AVRDC (resistance to viruses).

NRI also seeks to maximise collaborative use of research facilities by joint appointments or staff placements at other institutions, such as Kew Gardens (**Stevenson**), and IPAC Silwood Park. It has a new joint initiative, the Produce Quality Centre, with East Malling Research Centre, to develop research programmes with the UK/European horticulture sector. This involves the development of shared laboratory facilities at both institutes for pesticide bioassay, pesticide application, tissue culture, and post-harvest storage and quality management.

Examples of interactions with the wider scientific community includes:

- the unit's staff undertaking a number of collaborative research projects with national and international research organisations as evidenced immediately above and in the section 'Research strategy';
- research staff reviewing selected research projects or programmes of the CGIAR;
- successful partnership between donor-funded research, promotion and commercial marketing which received an International Award of Recognition at 6th International IPM Symposium (2009) for sustainable adoption of eggplant integrated pest management in South Asia;
- participation in All-Party Parliamentary Group on Agriculture and Food for Development and other appropriate All-Party Groups;
- Outstanding International Strategy Award of the Times Higher Leadership and Management Awards 2010 for agriculture and sustainable development in India;
- participation in G20 meetings to advocate support for agricultural research for development;
- coordinating lead author (**Porter**) for Chapter 7 'Food Security and Food Production Systems' of the 5<sup>th</sup> Assessment report Vol 2: 'Impact, Adaptation and Vulnerability of the Intergovernmental Panel on Climate Change'.

A number of staff undertake editorial responsibilities, including:

- **Stevenson**: subject editor, Bulletin of Entomological Research; regional editor, Biopesticides International; editorial board, Crop Protection and Natural Products Journal;
- **Burt**: editor, Meteorological Applications;
- **Hodges**: Journal of Stored Products Research and is convenor of the Royal Entomological Society's special interest group on postharvest entomology;
- **Tomlins**: International Advisory Board Member of the Journal of Natural Sciences, Engineering and Technology;
- **Seal**: editorial board for Annals of Applied Biology;
- **R Gibson**: editorial board of African Crop Science Journal.

In addition to numerous project interactions, the unit's staff liaise with other research and academic communities through a number of strategic actions, including:

- membership of the AGRINATURA EEIG (Westby is currently president) which aims to:
  - play a proactive policy advocacy role for agricultural research and education for development in Europe and worldwide;
  - develop and strengthen strategic alliances and partnerships with and between the different stakeholders in development, both in the North and in the South;
  - encourage networking and partnerships between institutions, organisations and individuals;
  - organise, facilitate and implement joint participation in European and international programmes and projects;
- membership of the European Forum for Agricultural Research for Development;
- support to pan-African organisations such as the Forum for Agricultural Research in Africa (an umbrella organisation bringing together and forming coalitions of major stakeholders in agricultural research and development); the Regional Universities Forum for Capacity Building in Agriculture, a consortium of 29 universities in Eastern, Central and Southern Africa;
- Sub-regional research and development organisations in west Africa and east Africa (CORAF and ASARECA).