



Knowledge, skills and experience matrix of The James Hutton Institute for IBioIC

The James Hutton Institute

The James Hutton Institute is an International Research Centre based in Scotland. The work we do is right at the top of the global agenda and involves tackling some of the world's most challenging problems including the impact of climate change and threats to food and water security.

Natural products and food chemistry: [Contact IBioIC for Contact Details]

We are using high-throughput phenotyping approaches, such as *metabolomics* and transcriptomics, to assess a range of quality characteristics and their genetic control in important crop species. Our objective is to conduct international level research into the chemical, biochemical and genetic bases of quality and bioactivity in plant-derived food, drink and non-food sectors. We aim to enhance the health benefits of these products by improving the nutritional and organoleptic properties of both raw and processed materials and to stimulate diversification in the non-food crops sector via plant product research. We employ and exploit the unique genetic and genomic resources available to the James Hutton Institute and are focused on linking genotype and quality attributes often via metabolomic approaches. Understanding how environmental changes, for example, climate change, or farming practice changes for example, sustainable crop systems influence crop and product quality, safety and security is also a key issue. Allied to this is an international network of biomedical collaborators with smart screens for high throughput efficacy testing of natural products.

Plant molecular physiology: [Contact IBioIC for Contact Details]

We are exploring biotechnological approaches to divert plant metabolism into high value compounds. This area benefits from the James Hutton functional genomics capability which can efficiently generate transgenic plants in a range of species and fuses biology, biochemistry, metabolomics, transcriptomics, genetics and genomics to get to grips with key pathways for high value compounds. Germplasm collections curated at the James Hutton in potato, barley and soft fruit provide a rich source of material that can be mined for genes and metabolites of interest.

Crop improvement: [Contact IBioIC for Contact Details]

A major research focus is on the genetic improvement of cereals, potatoes and soft fruit crops with respect to yield and quality, resource use efficiency and pest and disease resistance. We study processes from the gene and molecular level to field scale, providing knowledge to tackle problems of food security and to develop sustainable production systems against a background of environmental change. Close relationships with breeding and agronomy companies, as well as Government Agencies and other national and international stakeholders ensures the translation of our research into practical applications.

Plant transformation: [Contact IBioIC for Contact Details]

The Functional genomics (FunGen) facility provide high-throughput, high quality transgenic plants for analysis of gene function. We are currently focused on using *Agrobacterium*-mediated methods to investigate the effect of altered gene expression in a wide range of



crops. We are extending our capabilities by exploring the new gene editing technologies (TALENs and CRISPRs) and the utility of synthetic promoters.

See (<http://www.hutton.ac.uk/research/facilities/functional-genomics>)