

BRIEFING ON NATURAL PRODUCTS

LEADING IDEAS FOR HEALTHIER FOODS

SEFARI

LEADING IDEAS
FOR BETTER LIVES



BIOMATHEMATICS AND STATISTICS SCOTLAND

THE JAMES HUTTON INSTITUTE

MOREDUN RESEARCH INSTITUTE

THE ROWETT INSTITUTE

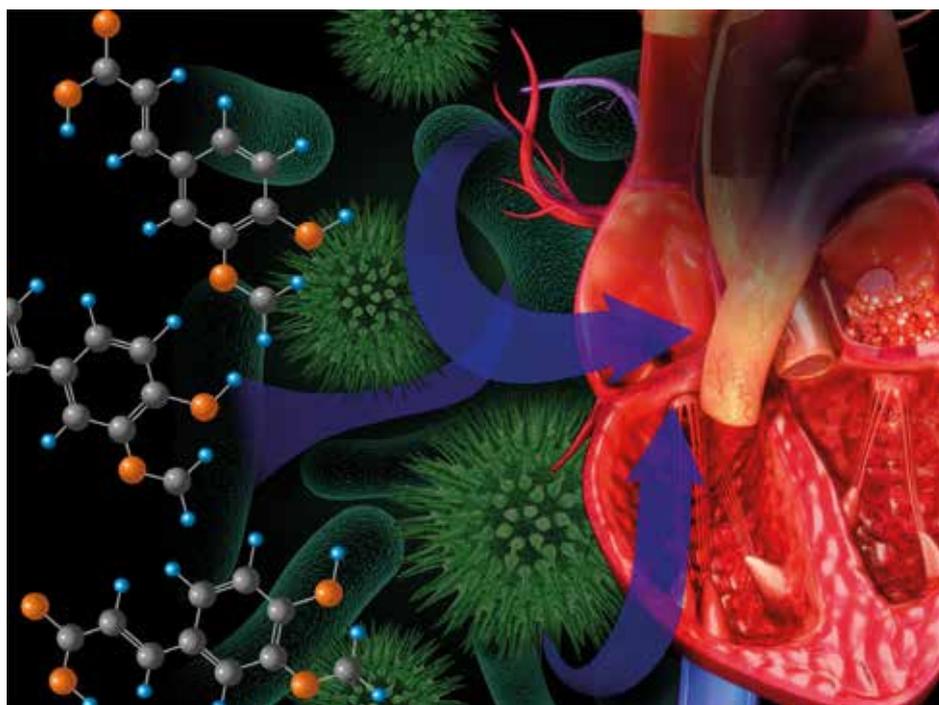
THE ROYAL BOTANIC GARDEN EDINBURGH

SCOTLAND'S RURAL COLLEGE

SEFARI stands for Scottish Environment, Food and Agriculture Research Institutes – it is the collective of Biomathematics and Statistics Scotland; The James Hutton Institute; Moredun Research Institute; The Rowett Institute; Royal Botanic Garden Edinburgh; and Scotland's Rural College. These institutes work together to deliver unique and globally distinctive multi and inter-disciplinary research.

This collective delivers the Scottish Government funded 2016-2021 Strategic Research Programme (SRP) on agriculture, environment, food and land. **SEFARI** improves the flow of research findings and expertise between the SRP and policy, commercial and public users. **SEFARI** works alongside the Scottish Centres of Expertise on climate, water and animal disease.

SEFARI aims to deliver 'Leading Ideas for Better Lives', reflecting that publicly funded research in Scotland must ultimately deliver positive impact for individuals, whether in Scotland or elsewhere. Whilst this work takes place across a number of sectors, this briefing focuses on examples of **Natural Products** research funded within the SRP.



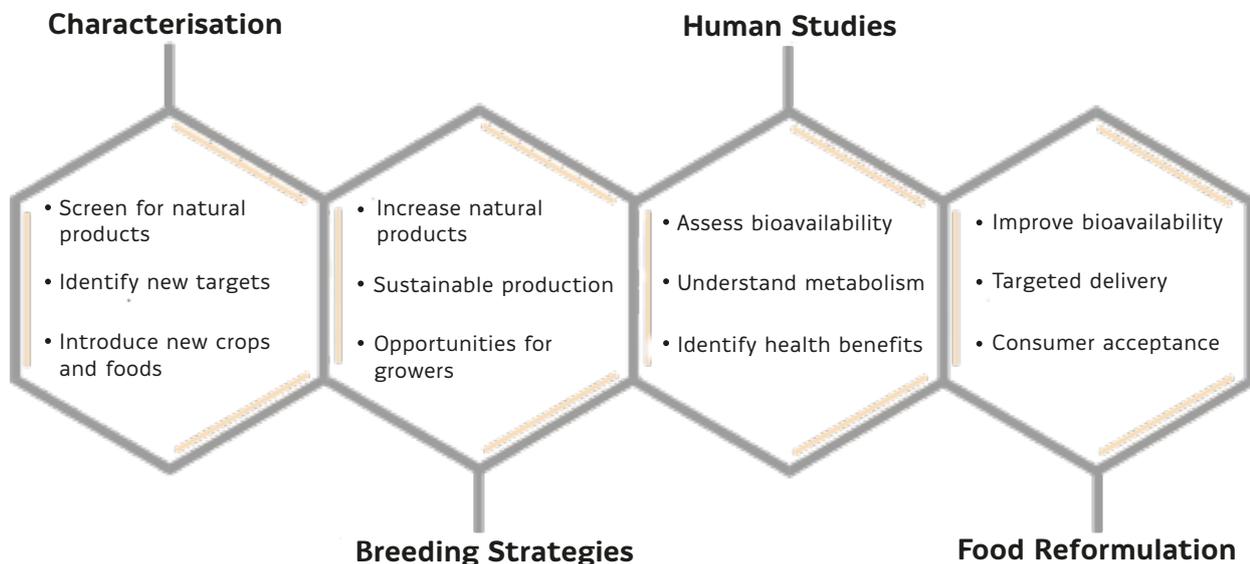
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Natural products can be broadly defined as (bio)chemical compounds or substances which are produced by living organisms found in nature. Natural products underpin the lives of everyone; be it in the form of food, functional biomolecules (for example, carbohydrates or proteins), as sources for pharmaceuticals, and as a sustainable feedstock for more complex molecules, such as polymers and plastics.

Such natural products underpin a body of research ranging from the characterisation of new bioactive natural products; developing breeding strategies to increase their production in crops; assessing their health benefits; and exploring how natural products can be used as ingredients in functional foods with extra health benefits in addition to the basic nutritional value (nutraceuticals), or to reduce the energy, sugar, salt and certain fats in processed foods (food reformulation). This research also covers significant levels of scale from sustainable primary production at field level, down to single plant and the engineering of single compounds.



Characterisation

- Ground breaking work has identified novel ursolic acid-based triterpenoid glycosides in raspberry fruits after demonstrating their presence in humans after eating. The anticancer potential of these compounds is being studied.
- Other fruit studies have exploited a yeast-based bioactivity screening platform to identify bioactive/health beneficial compounds. This screening has generated many potential hits including one with bioactivity against Huntingdon's disease.

Breeding Strategies

- Improving primary produce through targeted breeding strategies, exploiting wild species, underutilised resources and novel crops that can be grown or produced in Scotland. This interdisciplinary research involves engaging with stakeholders across the food supply chain to identify both barriers and opportunities.



- The Centre for Sustainable Cropping hosts a long term crop rotation experiment (pictured) to establish whether a shift from conventional agricultural practices to more sustainable approaches impacts upon the economic viability of barley, wheat, oilseed rape, potato and faba beans.
- New molecular pathway manipulation approaches are improving the crop-based production of tropane alkaloids, like hyoscyamine and scopolamine, which are the largest group of commercially important plant secondary metabolites (naturally occurring substances produced by plants that are not essential for metabolic functions like growth, development or reproduction).
- Investigating the commercial potential of harvesting the foliage and stems of potato plants to produce solanesol, a high-value compound employed in the manufacture of coenzyme Q10, found in many cosmetics and drugs.

Human Studies

- In tightly controlled human studies we are identifying bioactive natural product metabolites (substances produced through metabolism) and working to understand any potential health benefits. This also includes research to exploit the human gut microbiome to deliver functional dietary metabolites which improve gut function.

Food Reformulation

- Explore unique opportunities to enhance the content of desirable ingredients, such as micronutrients, fibre and a range of natural products.
- Apply novel state-of-the-art technologies to develop new strategies for food reformulation that will enhance the benefits of inclusion of natural products in the diet.