



SARIC • SUSTAINABLE AGRICULTURE RESEARCH & INNOVATION CLUB

SUMMER 2016 – IMPACT SUMMARY

A £10 million partnership between BBSRC, NERC, ESRC and industry to improve the efficiency, productivity and sustainability of UK crop and livestock sectors

www.bbsrc.ac.uk/saric

www.nerc.ac.uk/innovation/activities/sustainablefood/saric



Sustainable Agriculture Research and Innovation Club (SARIC)

SARIC is a joint BBSRC and NERC initiative to support innovative solutions to key challenges affecting the efficiency, productivity and sustainability of the UK crop and livestock sectors.

The agricultural industry has a significant impact upon the UK's economy and environment. The industry has around 150,000 businesses in the UK, which is 6% of the total, and employs 660,000 people. The sector contributes £9.9Bn to UK GDP through production of both livestock and crops. In 2014 the Utilised Agricultural Area was 17.2M hectares, which is 71% of UK land.

SARIC was developed in consultation with trade associations, levy boards, policy makers and academia. The discussions found a need to connect researchers from the environmental and biological sciences with industry, to generate and translate knowledge about the sustainability of agricultural production.

The Club operates as a public-private partnership bringing together the Research Councils with a consortium of leading companies. The partners will invest £10M in pre-competitive

research to benefit the UK agriculture system by delivering:

- Resilient and robust crop and livestock production systems
- Predictive capabilities for sustainable agriculture

SARIC funds two types of projects:

- **Research grants** – exploratory projects that generate new, industrially relevant, knowledge
- **Research translation grants** – projects applying existing knowledge and creating tools or technologies to generate industrial and societal relevance

ESRC will also provide funding for consideration of the social and economic aspects of the innovations and approaches developed.

“SARIC has enabled AHDB to engage with applicants to ensure the delivery of scientifically excellent but also industry relevant outcomes in areas of specific interest to the arable and livestock sectors.

Jon Knight – Head of Crop Health and Protection, AHDB Horticulture

SARIC Research Translation Grants use existing data and knowledge to develop new tools and technologies for economic or societal benefits

Enhancing Innovation in Barley Integrated Disease Management with the application of an innovation systems approach to research translation - Fiona Borthwick, SRUC

CROPROTECT: a knowledge exchange system to support UK growers in sustainable crop protection to allow efficient crop production - Toby Bruce, Rothamsted Research

Enhancing nutrient use efficiency from biosolids for a resilient crop production system - Ruben Sakrabani, Cranfield University

Delivering a decision-support framework – soilquality.org.uk - Elizabeth Stockdale, Newcastle University

Biosolids, Yield, Organic amendments in Soil: research to mitigate Leaching and Denitrification: BYOSOLID - Andrew Whitmore, Rothamsted Research

Device measuring plant available phosphorus to increase crop yields and minimise nutrient leaching - Hao Zhang, Lancaster University

SARIC Research Grants generate new knowledge and data to help address strategic challenges relating to Sustainable Agriculture

Magnesium Network (MAG-NET): Integrating Soil-Crop-Animal Pathways to Improve Ruminant Health - Martin Broadley, University of Nottingham

Impacts of different vegetation in riparian buffer strips on hydrology and water quality - Adrian Collins, Rothamsted Research

Reduced Stomatal Density Wheat: New Prospects for Drought and Pathogen Resistance - Julie Gray, University of Sheffield

Increasing wheat drought tolerance and recovery throughout the life cycle through regulation of plant growth mechanisms - Matthew Paul, Rothamsted Research

Diverse forage mixtures to optimise ruminant animal production, nutrient use efficiency, environmental impact, biodiversity, and resilience - Chris Reynolds, University of Reading

Future-proofing our breeding goals - Breeding for climate resilience in UK dairy systems - Eileen Wall, SRUC



Improving crop disease management

Enhancing Innovation in Barley Integrated Disease Management - Fiona Borthwick, SRUC

The barley supply chain is complex, but only by persuading growers, suppliers and end users to work together can the impact of pests be reduced.

Social network analysis has helped generate models and ways of working that have the potential to bring about change accepted by all parties, and should change practices across the supply chain.

“Being a member of SARIC gave us the opportunity to have one door access on cutting edge science in agriculture and to enlarge our network”

Dr Isolde Haeuser-Hahn, Bayer CropScience AG

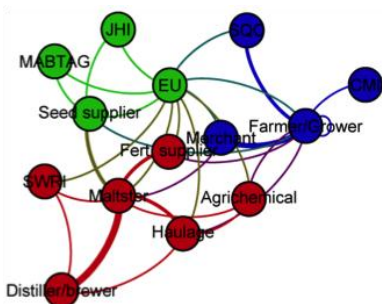


Image courtesy of SRUC



Image courtesy of Rothamsted Research

CROPROTECT: a knowledge exchange system to support UK growers in sustainable crop protection to allow efficient crop production - Toby Bruce, Rothamsted Research

A first round SARIC research translation grant, CROPROTECT aims to link growers to solutions.

A web-based resource has been released that allows farmers to access guidance on tackling pest, weed and disease problems. For maximum impact, a smartphone app has recently been released.

CROPROTECT's user base is growing, with over 800 users now, as more farmers realise how it can benefit them.

Enhancing soil health and resilience

Enhancing nutrient use efficiency from biosolids for a resilient crop production system - Ruben Sakrabani, Cranfield University

This project provides a tool that utilises geo-spatial datasets to target suitable landbanks to receive phosphate rich biosolids needed to meet crop demand whilst considering stakeholder constraints.

“Through SARIC, Cawood Scientific has made a number of new connections with academic groups that we had not previously worked closely with. As a result of this Cawood Scientific is now looking to develop a new service in collaboration with one of these new connections”

Duncan Rose, NRM Laboratories



Image courtesy of Rothamsted Research



Image courtesy of Cranfield University

Understanding the benefits of adding organic matter to soil - Andrew Whitmore, Rothamsted Research

Taking advantage of long-term data from many of the plots at Rothamsted Research, this project aims to determine the duration of benefits of adding organic matter to soil along with chemical fertiliser. This work may help growers obtain more yield at the same time as using less fertiliser.

Novel Tools for management of soil nutrients

Delivering a decision-support framework – soilquality.org.uk -

Elizabeth Stockdale, Newcastle University

Farmers would like to be able to monitor the health/ quality of their soils in response to management. Soil type and climate varies dramatically between regions of the UK, and therefore there is no single set of targets that can be used. This tool will aid decisions on soil management by benchmarking physical, chemical and biological indicators allowing site-specific decisions making its potential impact very widespread.



Image courtesy of Newcastle University

Improved measurement of plant available phosphorus to increase crop yields - Hao Zhang, Lancaster University

University

Precisely measuring the amount of bioavailable nutrients in soils could revolutionise fertiliser use—under or overuse can limit crop yields, and overuse is harmful to the environment.

A device combining cutting edge sampling techniques (DGT) and analytical measurements (X-ray fluorescence) is in development, allowing more accurate determination in the field.

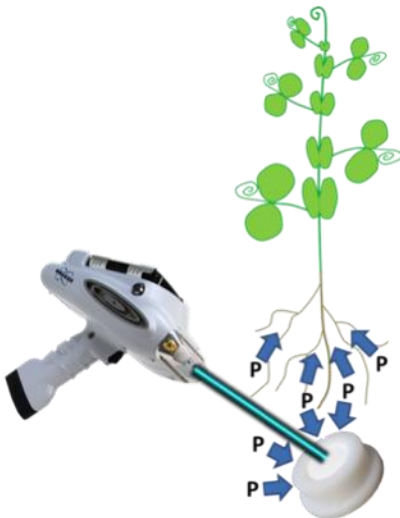


Image courtesy of Lancaster University

Supporting livestock health

**Magnesium Network (MAG-NET):
Integrating Soil-Crop-Animal
Pathways to Improve Ruminant
Health** - Martin Broadley, University
of Nottingham

Low magnesium (Mg) status (hypomagnesaemia) can lead to serious health problems in cattle and sheep (such as tetany/staggers), often with high fatality rates.

This project aims to improve understanding and management of this issue via mapping soils to predict high-risk areas, developing new management strategies and support tools, and plant breeding to increase the supply of Mg and other elements from forage grasses.



Image courtesy of Nottingham University

**Future-proofing our breeding goals -
Breeding for climate resilience in UK
dairy systems** - Eileen Wall, SRUC

With climate change, we can expect to see increases in temperature and the frequency of extreme weather events, such as heat waves, flooding and drought.

This project aims to identify the characteristics that indicate how well dairy cows cope with the challenges of climate change, and identify cattle breeding strategies to help dairy farmers tackle this important issue.



Image courtesy of SRUC

Sustainable management of agricultural land

Impacts of different vegetation in riparian buffer strips on hydrology and water quality - Adrian Collins, Rothamsted Research

Runoff from agricultural land and the pollution it carries can cause problems for flooding and water quality.

This project will test the cost-effectiveness of different types of buffer strips to reduce runoff from grass and maize crops, including novel deep rooting grasses, mixed deciduous woodland and willow, and provide results to inform farmers, policy makers and water companies.

'The Club has enabled us to access research in agricultural production systems. Working in collaboration, we can ensure healthy and resilient land management to benefit both agriculture and water protection, which means our customers continue to receive excellent drinking water and helps us keep costs, and customer bills, down.'

Tara Froggatt, Dŵr Cymru Welsh Water



Image courtesy of Reading University

Improving the diversity of forage mixtures for more sustainable and resilient grazing - Chris Reynolds, University of Reading

Growth and utilisation of pasture is the most cost effective way to feed sheep and cattle, but more variable climatic conditions make growth of the typical UK ryegrass and clover swards more difficult.

This project will examine whether more diverse 'multi-species' forage mixtures can be more productive under variable climates, require less Nitrogen fertiliser, and improve efficiency at an animal and farm scale.

Improving cereal drought tolerance

Increasing wheat drought tolerance and recovery through regulation of plant growth mechanisms - Matthew Paul, Rothamsted Research

Water availability is the major universal factor that limits agricultural productivity worldwide, and even in the UK it is predicted that droughts could strongly impact food production by the 2020s.

This research will provide new knowledge and strategies, genes, genetic markers and varieties to improve wheat drought tolerance and wheat yields under varying water availability throughout the crop life cycle.



Image courtesy of Rothamsted Research

Reduced Stomatal Density Wheat: New Prospects for Drought and Pathogen Resistance - Julie Gray, University of Sheffield

Stomata are microscopic pores on the surface of leaves that allow gas exchange between plants and the atmosphere. They are crucial for photosynthesis, but also allow water vapour loss, and disease entry.

This project will investigate whether reducing stomatal density in wheat can improve water use efficiency, drought tolerance, and pathogen resistance without compromising nutrient uptake, quality and yield.



Image courtesy of University of Sheffield

Managed by BBSRC and NERC, SARIC is a partnership with ESRC and a consortium of companies with interests in enhancing the sustainability of crop and livestock production in the UK.





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