

# Scotch Whisky Powered By Barley

## APPGSTA November 2022

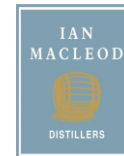
James Brosnan

Director of the Scotch Whisky Research Institute



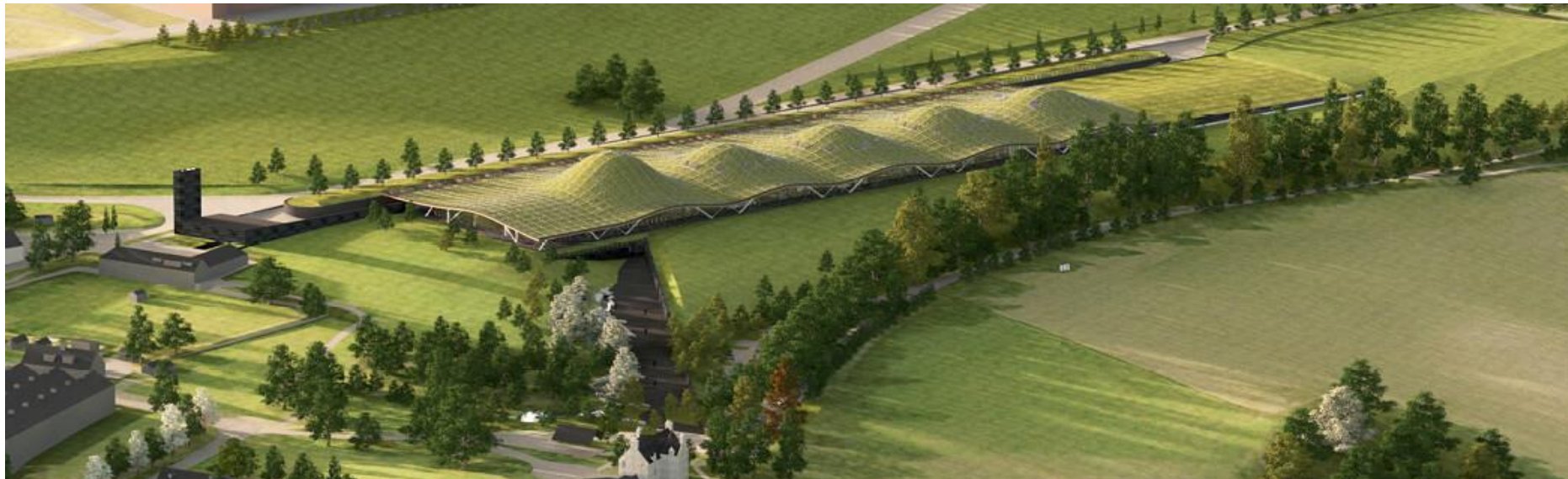
# Competitors in Collaboration: The Scotch Whisky Research Institute

- The Scotch Whisky Industry's Research & Technology Organisation
- Owned by the Scotch Whisky industry
- Funded by our member companies to give them choices
- A 'Research Club'
- Nearly 50 years of pre-competitive research
- Taking the long view



# Why Scotch Whisky Matters

- Manufacturing at its best - mostly exported to a global market
- 75 % Scotland's food and drink exports (2021)
- 22 % of UK's food and drink exports (2021)
- Gross Value Added £5.5 billion
- 11,000 direct – 42,000 indirect jobs
- 141 Operating distilleries – consistent investment in the future



# Scotch Whisky Industry Sustainability Strategy



- Targets centred around four themes
  - *Climate change – (decarbonise)*
  - *Responsible water use*
  - *Transition to a circular economy*
  - *Caring for the land (that grows the barley!)*
- Achieving these targets will require change - new knowledge - RESEARCH



# Distilling Barley is Complex – Product of Genetics X Environment and Supply Chain

## Partners

### SWA Wish List

Spring barley  
 Low N (Pot still)  
 High N (DP) (Grain still)  
 Well modified  
 Friability/homogeneity  
 Good starch levels  
 High HWE  
 Low/No GN  
 EPH Non-producer

*Best available*

### Polysaccharides and Enzymes

#### Starch Composition

A, B-Granules  
 Structure  
 Amylose (Linear)  
 Amylopectin (Branched)  
 Enzymes  
 α-amylase  
 β-amylase  
 Limit dextrinase

*Ensure efficient degradation to fermentable sugars*

#### Cell walls Composition

β-glucans  
 Arabinoxylans  
 Cellulosics  
 Enzymes  
 Solubilisation  
 Hydrolysis  
 Removal

*Minimise processing problems*

### Product Protection and Regulatory Issues

Meets Legal Requirements  
 Definition of Scotch Whisky  
 Minimise EC Production  
 Low / **No GN\***  
 Due diligence  
 NDMA, Pesticides, Metals

#### Proteins

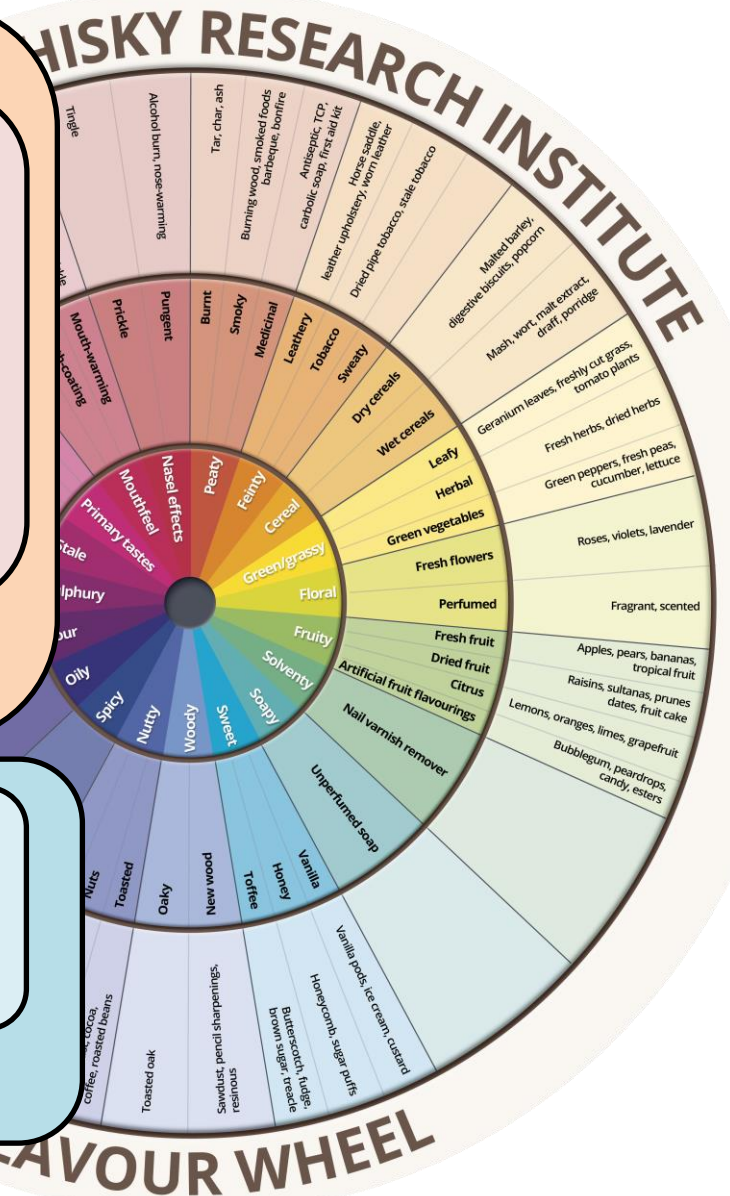
Structural proteins  
 Functional proteins  
 Hydrolytic enzymes  
 Enzyme inhibitors

*Access to starch/release of nutrients*

#### Protein derivatives

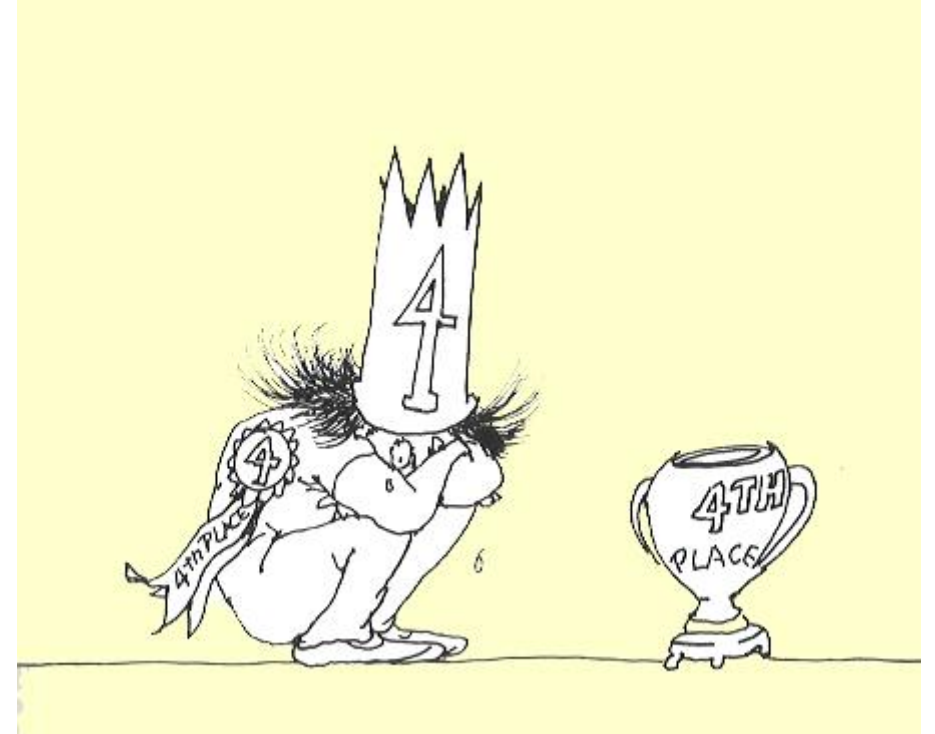
Soluble nitrogen  
 Amino acids (FAN)  
 Short chain polypeptides

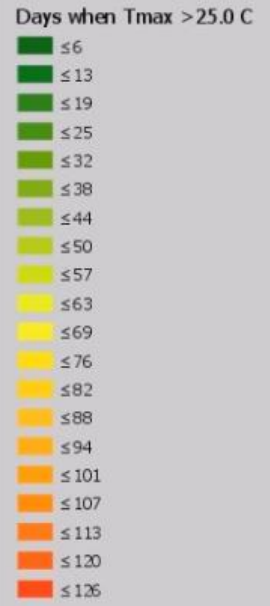
*Yeast nutrition to support fermentation*



# Barley Importance

- Foundation of Whisky
- No 1 in Scotland
- No 2 in UK
- No 4 Globally
- Most versatile major cereal
- Core global food source
- Major challenges

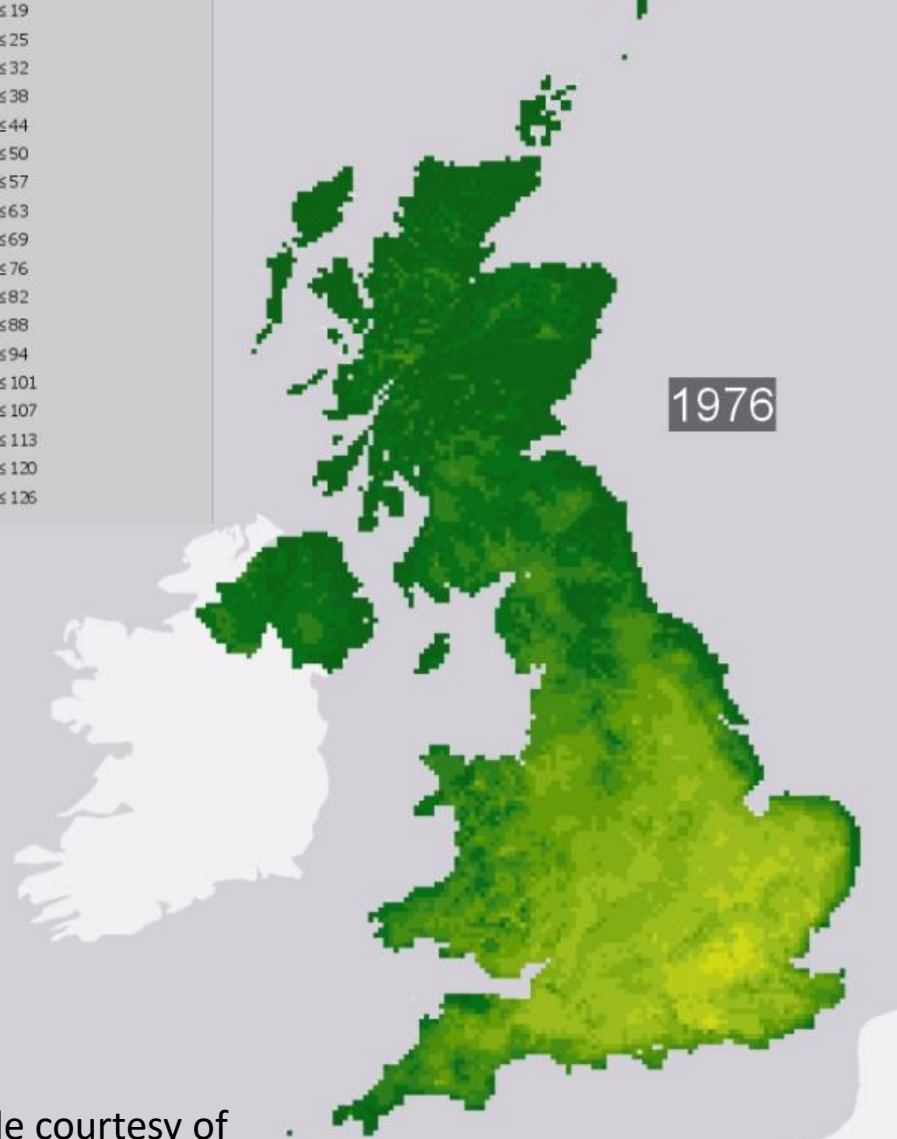




### Plant Heat Stress Days Medium High Emissions Scenario

Observed 1960-2016 / Modelled 2017-2098

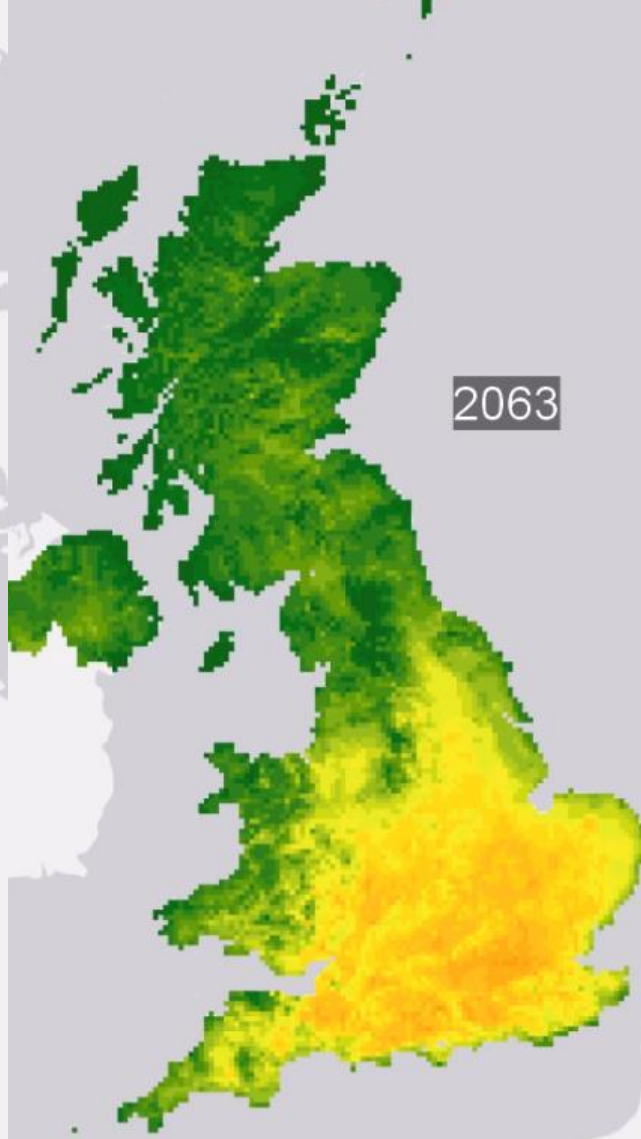
1976



### Plant Heat Stress Days Medium High Emissions Scenario

Observed 1960-2016 / Modelled 2017-2098

2063



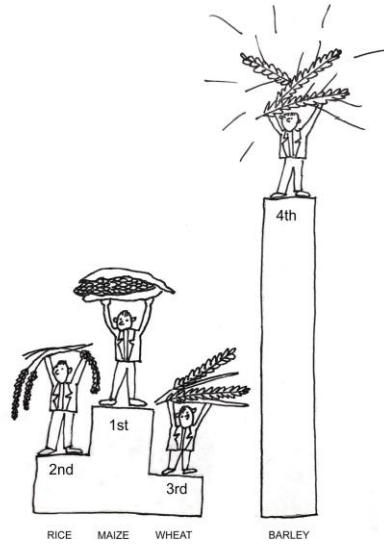
Slide courtesy of  
Mike Rivington JHI

# Barley Challenges

- Climate Change – limiting local & global availability and increasing variability in quality
- Lack of genetic diversity in elite populations imparting greater vulnerability
- Global barley research is fragmented and underfunded in public and private sectors
- How to ensure long term resilient supply of high quality barley for malting, food and other uses?
- Need for coordinated approach to barley research at this time of opportunity in science



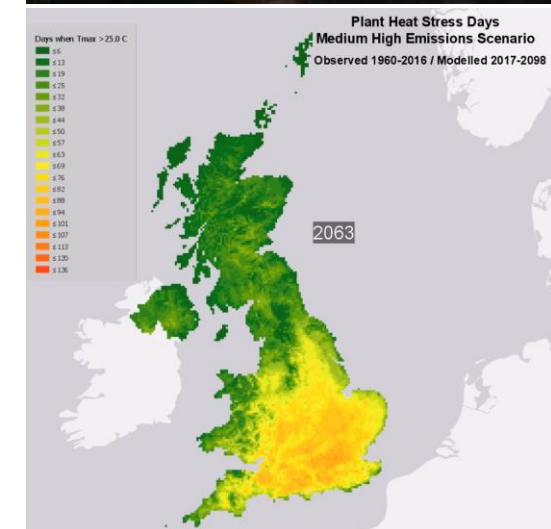




“Creating the world’s leading centre of excellence in barley science supporting the supply chain through industry focused research, innovation and knowledge exchange”

# What Science is Needed - Holistic Approach to Sustainability

- Short, Medium, Long
- Agronomy
- Genetics
- Soil Science
- Data/agrimetrics/models
- Sensors, robotics etc
- Other – Economics & social
- People!



## BARIToNE – Barley Industrial Training Network

- BBSRC (UK government) and industry collaboration
- Lead Partner – SWRI
- 18 industry partners across the supply chain
- Full Academic Partners UoD, UoN, JHI
- Supporting 30 Barley Sustainability PhD projects starting October 2022 until 2028
- “BBSRC aims to encourage a whole food-systems approach for sustainable agriculture and food (SAF) research, to deliver productive, resilient and sustainable farming”



# What is the purpose of BARIToNE?

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Address issues of Barley Sustainability relevant to the barley supply chain along the themes of climate resilience, lower inputs and soil health

Create the future generation of barley experts in industry and academia

Support the overall ethos of the International Barley Hub for collaboration in barley science across the barley supply chain





# Agricultural Innovation Pathway – Often “a Bit Muddy”

- Some personal thoughts
- For Scotch Whisky, consumer acceptance is paramount BUT P(p)olitics sets mood music for this
- Climate challenge logically requires all useful tools available in the toolbox including Gene Editing
- However, GE is not a silver bullet for everything
- Other genetic tools, eg Carlsberg FIND IT, offer promise too for barley sustainability without same debates
- Again a holistic and pragmatic approach to “agricultural revolution”

