# BIO STIMULANTS

Jim Scrimshaw, PGRO

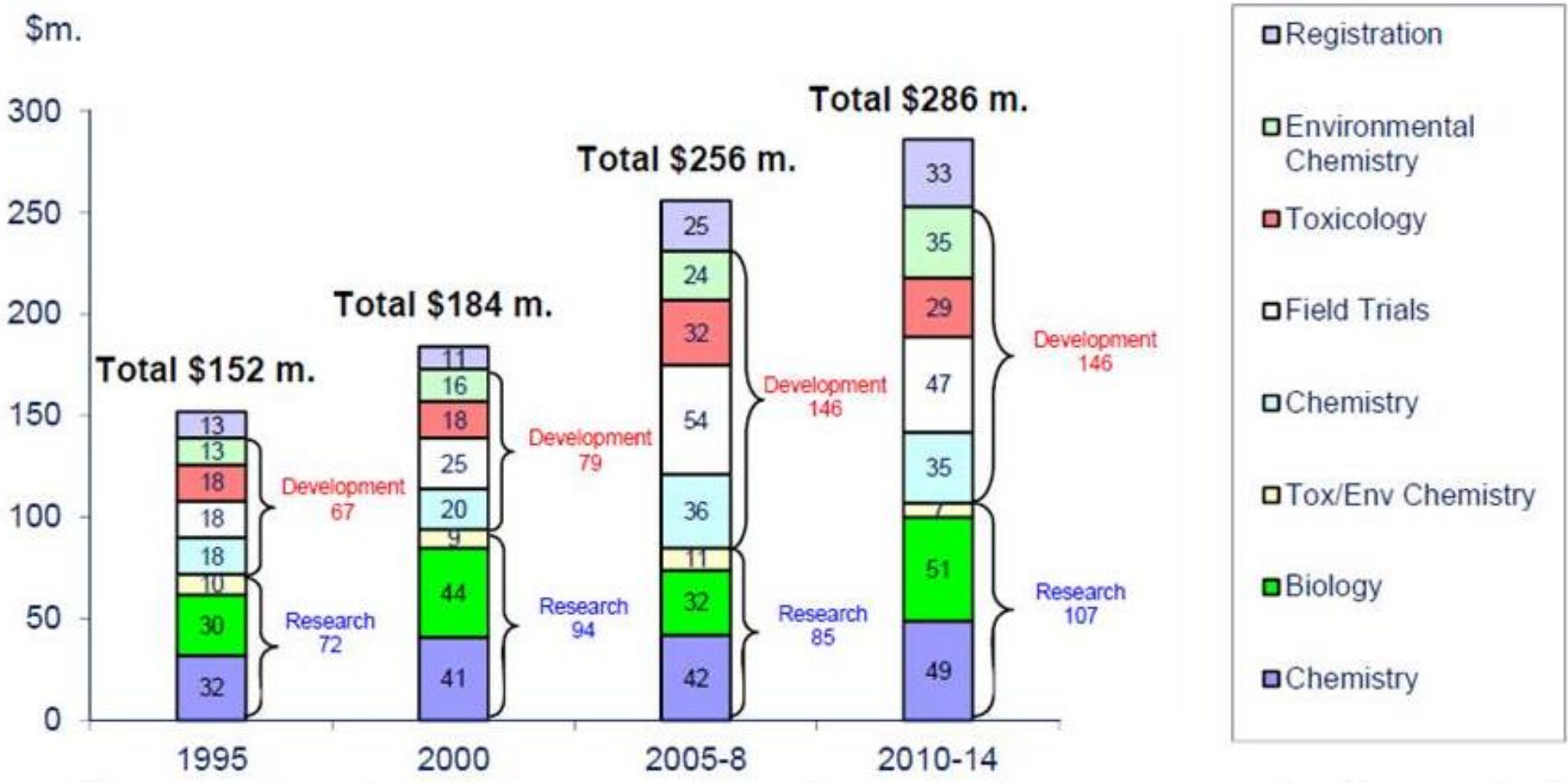
# BIO STIMULANTS

- In the world of Agriculture many chemicals are being withdrawn, lost or the cost of development considered uneconomical for some markets. Into this space an increasing number of biological solutions are being offered.

# UK

- Since Directive 91/414 there has been 60% reduction in actives.
- Actives lost at a greater rate that new ones appear.
- Cost

# Discovery and Development Costs of a New Crop Protection Product




European Crop Protection Association - The Cost of New Agrochemical Product Discovery–Philips Macdougall, 2016



# BIO STIMULANTS

- Loss of PPP will result in lower overall yields.

*Andersons Centre 2015.*

# Imported plant protein

- UK reliant on around 3.3 million tonnes of soya products pa.
- 1.68 million ha

WWF – Risky business –Understanding UK's overseas footprint for deforestation – risk commodities.

- 800 000t beans.
- 2 000 000 t soya cake.

- 430 000 t sunflower cake.
- 240 000 t OSR cake.

*(HM customs and excise)*

# BIO STIMULANTS

- Up to 50% of all soya meal used in livestock feeds could be replaced by domestically-grown crops
- Planting more land in the UK to protein crops would not increase net protein supply

Replacing soya in livestock feeds with UK-grown protein crops: prospects and implications? (CAS Report 19) P.J. Jones, D. Thomas, M. Hazzledine and C. Rymer

Centre for Agricultural Strategy, University of Reading, July 2014

# Field beans

- Average trial yield – 5.3 t/ha.
- Eurostat – 4.0t/ha
- John Nix – 4.05t/ha
- 6.0 – 7.5 t/ha regularly reported.
- Uncorroborated claims of > 9.0t/ha.
- Theoretically yields >24t/ha achievable.

# BIO STIMULANTS

No single, globally accepted definition for legal, regulatory, or commercial purposes

(i) Plant bio stimulants contain substance(s) and/or micro-organisms whose function when applied to plants or the rhizosphere is to stimulate natural processes to enhance/benefit nutrient uptake, nutrient efficiency, tolerance to abiotic stress, and crop quality.' *

(ii) Products that are applied in relatively small amounts to plants or soils to enhance a crops physiological processes consequently making them more efficient.

Bio stimulants have no direct effects on controlling plant pests

# BIO STIMULANTS

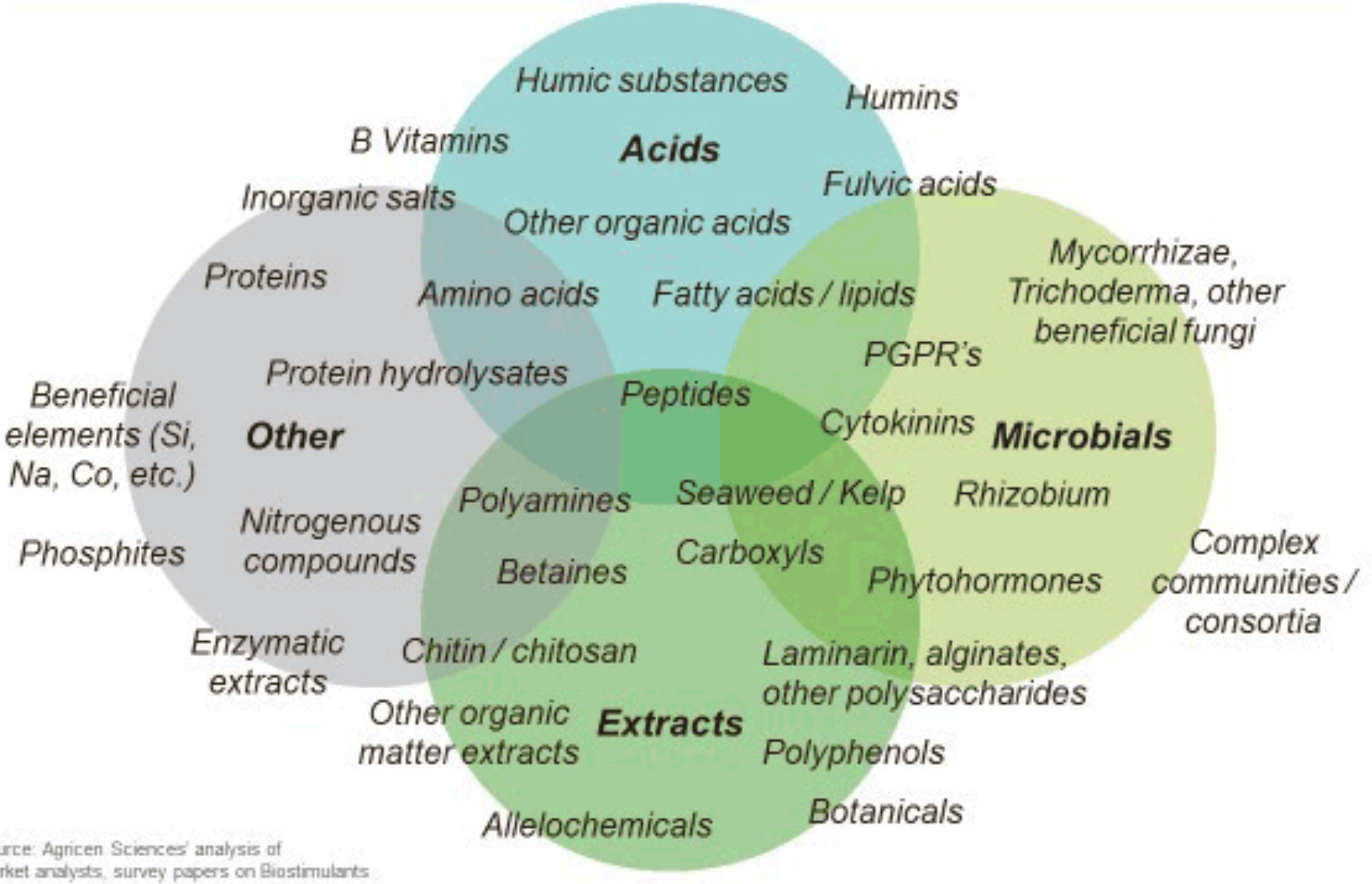
Work demonstrates bio stimulants improve

(i) yield/crop quality
(ii) tolerance of abiotic stresses.
(iii) enhance uptake and use of $H_2O$/nutrients.
(iv) soil health.

Various modes of action but not always well understood.

Affect gene expression, biochemical pathways and physiological processes within the plant.

# The Emerging Landscape of Products – Broad and (Potentially) Confusing

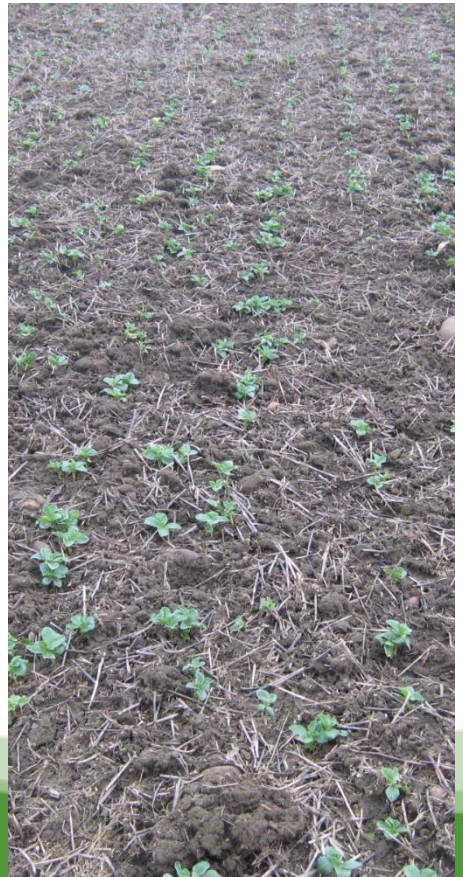



Source: Agricen Sciences' analysis of market analysts, survey papers on Biostimulants

# BIO STIMULANTS

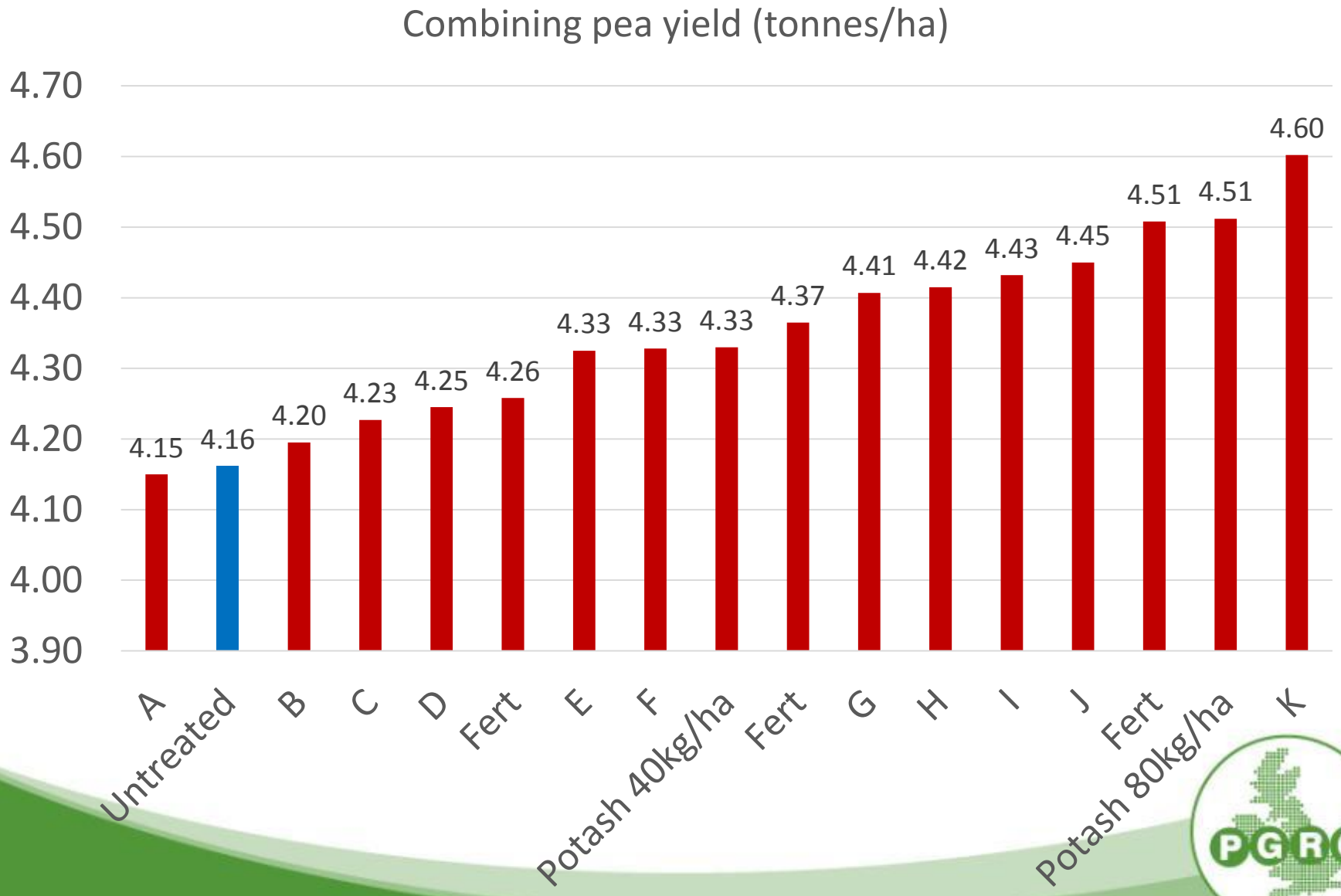
Generally 5 recognized types of bio stimulants.

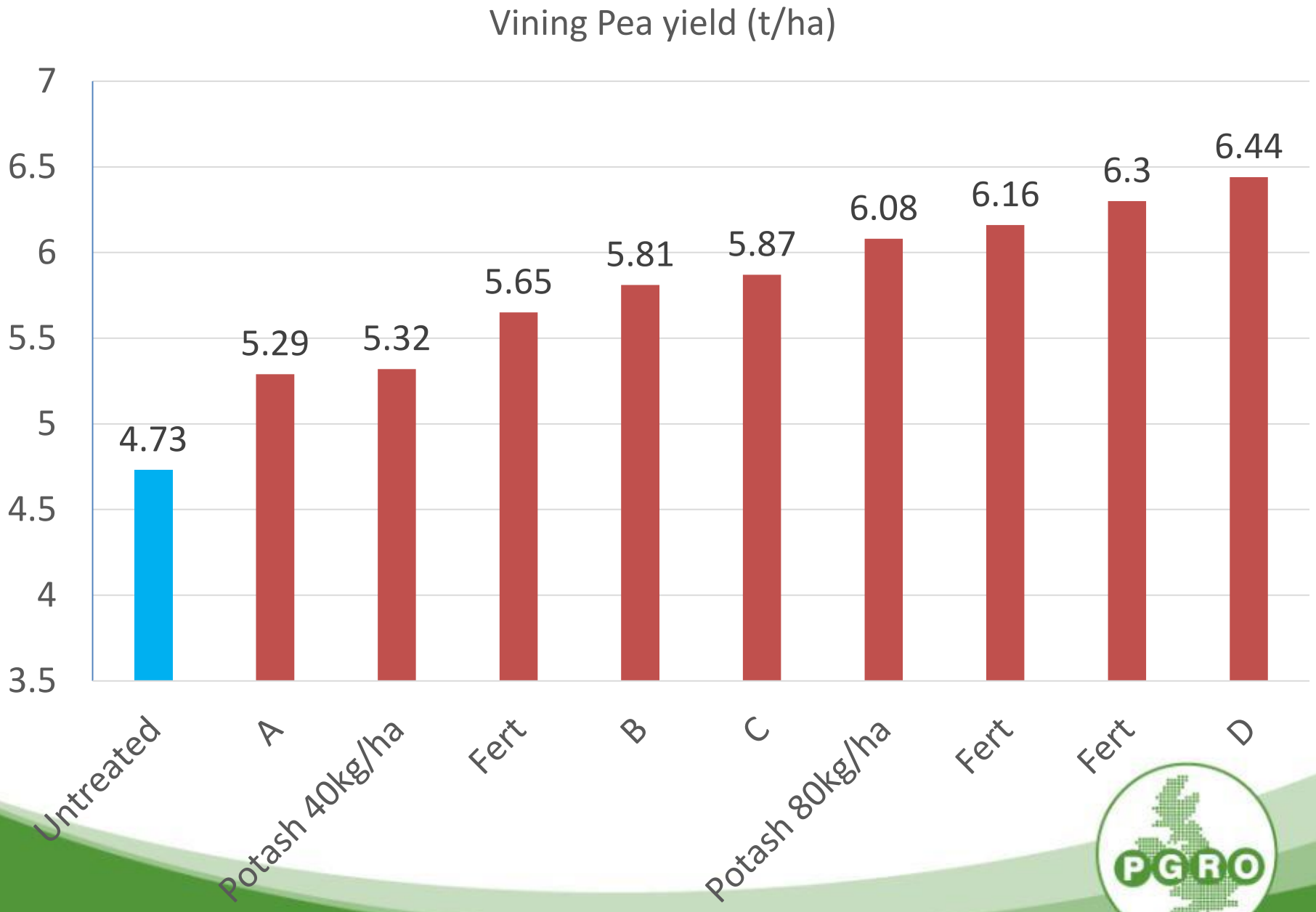
- Microbial inoculants – influence soil biology, rhizosphere
- Humic acids - major organic constituents of soil, peat (HS's)
- Fulvic acids - principal components of humic substances. (HS's)
- Protein hydrolysates - based on a mixture of soluble peptides and amino acids (AACP's)
- Seaweed extracts - complex polysaccharides, fatty acids, vitamins, phytohormones and mineral nutrients (HCP's)



# Application


Spring bean yield (tonnes/ha)
6.70
6.60
6.50
6.40
6.30
6.20
6.10
6.00
6.20
6.21
6.23
6.33
6.38
6.38
6.38
6.39
6.43
6.52
6.61
Potash 80kg K2O
Fert
Fert
Untreated
C
Potash 40kg K2O
D
Fert
F
G
H


Combining pea yield (tonnes/ha)
4.70
4.60
4.50
4.40
4.30
4.20
4.10
4.00
3.90
4.15
4.16
4.20
4.23
4.25
4.26
4.33
4.33
4.33
4.37
4.41
4.42
4.43
4.45
4.51
4.51
4.60
A
Untreated
B
C
D
Fert
E
F
Potash 40kg/ha
Fert
G
H
I
J
Fert
Potash 80kg/ha
K


Vining Pea yield (t/ha)
7
6.5
6
5.5
5
4.5
4
3.5
4.73
5.29
5.32
5.65
5.81
5.87
6.08
6.16
6.3
6.44
Untreated
A
Potash 40kg/ha
Fert
B
C
Potash 80kg/ha
Fert
Fert
D

Thank you

jim@pgro.org