



syngenta

OPTIBEAN PROJECT BEAN AGRONOMY TOOL

Stephen Belcher

**TSB:101082 - Improving the Availability of UK
sourced Protein Feed through New Faba Bean
Varieties, Production and Utilisation Systems**

**“OPTIBEAN” – A 4 Year project
funded by Innovate UK to optimise
faba bean breeding, production and
usage**

OPTIBEAN 

optimising faba bean breeding, production and usage

Who was Optibeans ?



Waitrose



We work with
Innovate UK



Wherry & Sons Ltd 
Pulse Specialists and Plant Breeders

Lincs Turkeys Ltd



Optibean General Aims

Identification and utilisation of a blueprint growing system to maximise UK faba bean production



Increase yield and address yield inconsistencies sometimes associated with faba beans through genetics and plant breeding



OPTIBEAN 

optimising faba bean breeding, production and useage

Utilisation in animal feed of a sustainable UK vegetable protein rather than imported soya, thus reducing the Carbon footprint



What was Optibeans ?

Work Package 1 Objectives: Wherry & NIAB-TAG

- Breeding for yield stability & quality
- Genetics behind pod set stability

Work Package 2 Objectives: PGRO, NIAB-TAG

- Sowing date & population studies
- Fungicide & aphicide timing studies
- Soil SNS studies
- Inter row weeding studies (NIAB-TAG)
- Produce web-based agronomy tool



Work Package 3 Objectives: Waitrose Producer Groups

- Feeding studies – Salmon, Pigs, Turkeys, broiler and layer chickens, Pekin Ducks.
- LCA (North Energy)

PGRO – Output (work package 2)

- The Optibean Agronomy Tool -
A spreadsheet based collection of Economic and Agronomic worksheets to aid the production of UK produced field beans



The screenshot shows a Microsoft Excel spreadsheet titled "Optibean tool 151126 - Microsoft Excel". The spreadsheet content is as follows:

The Bean Agronomy Tool

This tool has been developed to:

- 1 provide support to bean farmers to optimise their economic output of beans
- 2 Help non-bean growers to consider beans as a part of their rotation and business


Simple Instructions

4.20 There are **orange** figures which are standard costs from the John Nix Farm Management Pocketbook

9.0 Insert the actual or budgeted figures for your own farm in the grey cells.

→ Then follow the guidance on each worksheet

Completed November 2015

OPTIBEAN 

Innovate UK
Technology Strategy Board



This tool has been developed by The Andersons Centre for the PGRO with funding from Innovate UK and industry partners

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<http://www.pgro.org/>

The spreadsheet interface includes a ribbon with tabs for File, Home, Insert, Page Layout, Formulas, Data, Review, View, Developer, and PDF Architect. The active cell is C9, containing the text "Seed". The status bar at the bottom shows "Ready" and "190%".



WORKPACKAGE 2 - AGRONOMY

Sowing date & population work 2012 - 15



Soil Nitrogen Supply

- Paired locations with non-fertilised w.wheat following either beans or OSR
- Soil samples for SMN/ – Feb/March
- Samples analysed for ammonium-N and nitrate-N
- Crop samples – July/August
- Measured for fresh weight and subsampled for dry weight, N% (grain and straw separately), grain yield/ha and total N uptake (kg/ha)



Fungicide and Insecticide Timings

- 4 sites – 2 winter, 2 spring
- Cambridgeshire WB - Marholm
- Herts/Essex WB – Much Hadham
- Rutland SB – Ashwell
- Oxfordshire SB – Weston on the Green



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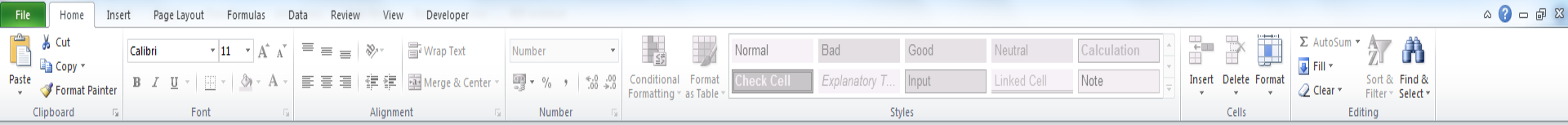
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The Bean Agronomy Tool

Page Index

[Gross Margins](#)

[Seed](#)

[Fertiliser](#)

[Bruchid Beetles](#)

[Moisture meter](#)

[Gantt Chart](#)

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Gross Margin Schedule: Use this to build your own gross margin.

This page is populated with standard data from the John Nix Farm Management Pocketbook. You can overwrite it with your own data in the grey cells

Physical Data

Bean Type:

Spring Beans

Winter Beans

Output

Cropped Hectares

1.0

Standard Data

Yield

3.70 t/Ha

t/Ha

Total Tonnes Produced

4

Prices

Standard Data

Farm Data

Human Consumption percenta 60%

Feed percentage 40%

Human Consumption Price 150

Feed Bean Price 130

Average Price 142

£/t

£/t

142 £/t

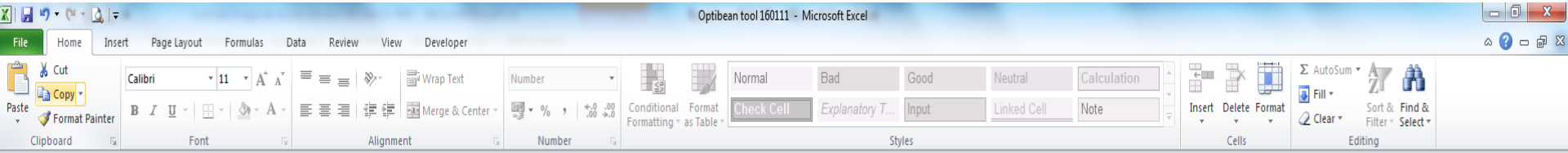
Financial Data

Output	per Hectare		Total
	Standard Data	Own Data	
	£/Ha	£/Ha	£
Sales	525	525	525
Total Output		525	525

Variable Costs

Seed	119	152	152
Fertiliser	45	45	45
Sprays	120		120
Total Variable Costs	284	317	317
Gross Margin		208	208

<i>Available Nitrogen Left in Soil for following wheat</i>		34	34
Total Margin from Beans		242	242



Seed

Insert your own seed information to replace the standard data

	Standard Data	Your Data	
TSW	565	574	g/1000
Seed Establishment Rate	90%	90%	%
Seed Germination Rate	95%	90%	%
Number of Plants Established	50	60.00	plants/m2
Merchant's Seed £/t	460		£/t
Kg/Ha	425		Kg/Ha
I use Home Saved Seed	<input type="checkbox"/> Tick if Yes	No	

Seed Weight to Plant Rate Conversion

Seed Weight	425	kg/ha
	=	172 Kg/Acre
Seeds Planted	74.1	/m2
Establishment	90%	
Germination	90%	
Plants Established	60	/m2

Spring Beans

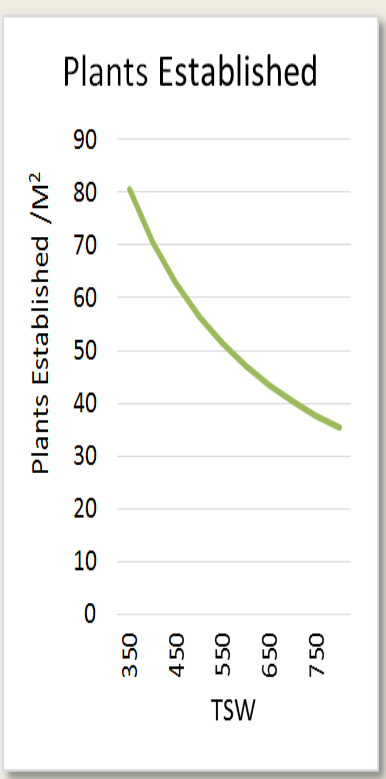
Planting date **Late Mar - Mid Apr**

Seed Rate Calculators

how much sown vs what is in the ground and established

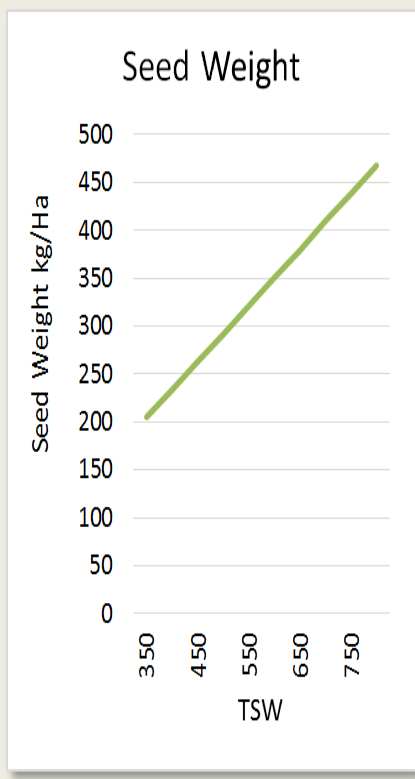
Seed Weight to Plant rate Calculator

Seed Weight	330	kg/ha
=	134	Kg/Acre
TSW	565	g
Seeds Planted	58.5	/m2
Establishment	90%	
Germination	95%	
Plants Established	50	/m2

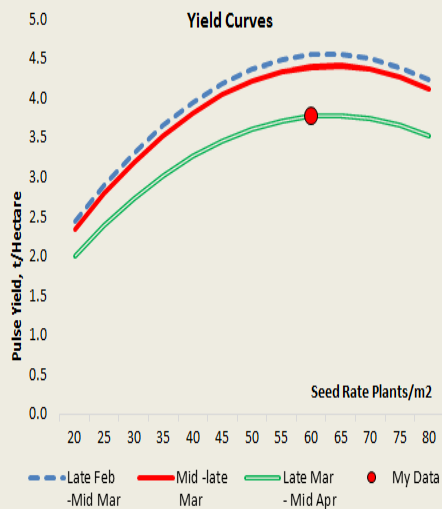
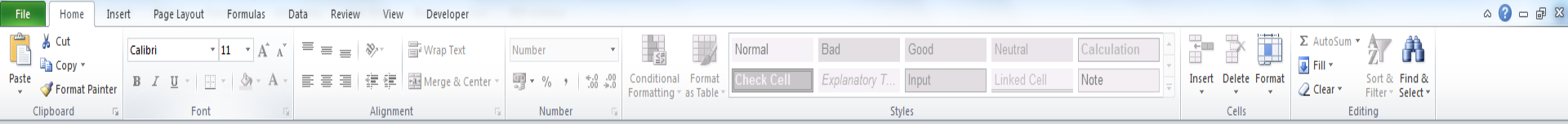


Plants /m2 to kg/ha

Plants Established	50	/m2
Establishment	90%	
Germination	95%	
Seeds Planted	58	/m2
TSW	565	
Seed Weight Needed	330	kg/ha
	134	Kg/Acre



TSW = Thousand Seed Weight (Grams)



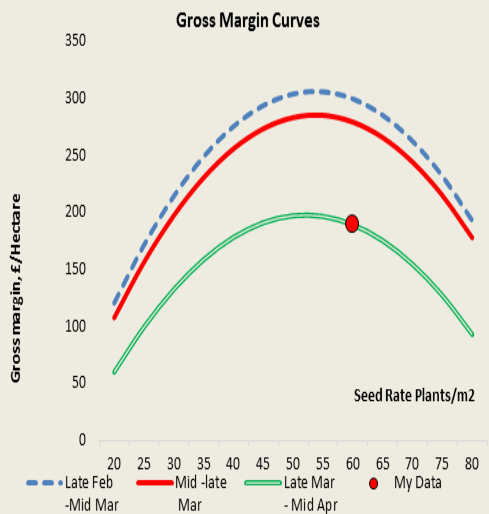
Recent research by the PGRO Shows the relationship with seed rate and planting date.

These charts show the relationship between seed rate and planting date and yield

- Delayed planting date after Early March leads to reduced yield
- This is particularly so if planting dates are delayed until late March or Early April
- Seed rate of up to 65 plants/m² offers higher yields but not necessarily highest gross margin

This chart Links your inputted yield and seed rate data from the Gross Margin page to the research

If you are growing on fertile soils or areas that produce very vigorous growth then target plant populations should remain 35-45 plants/m².

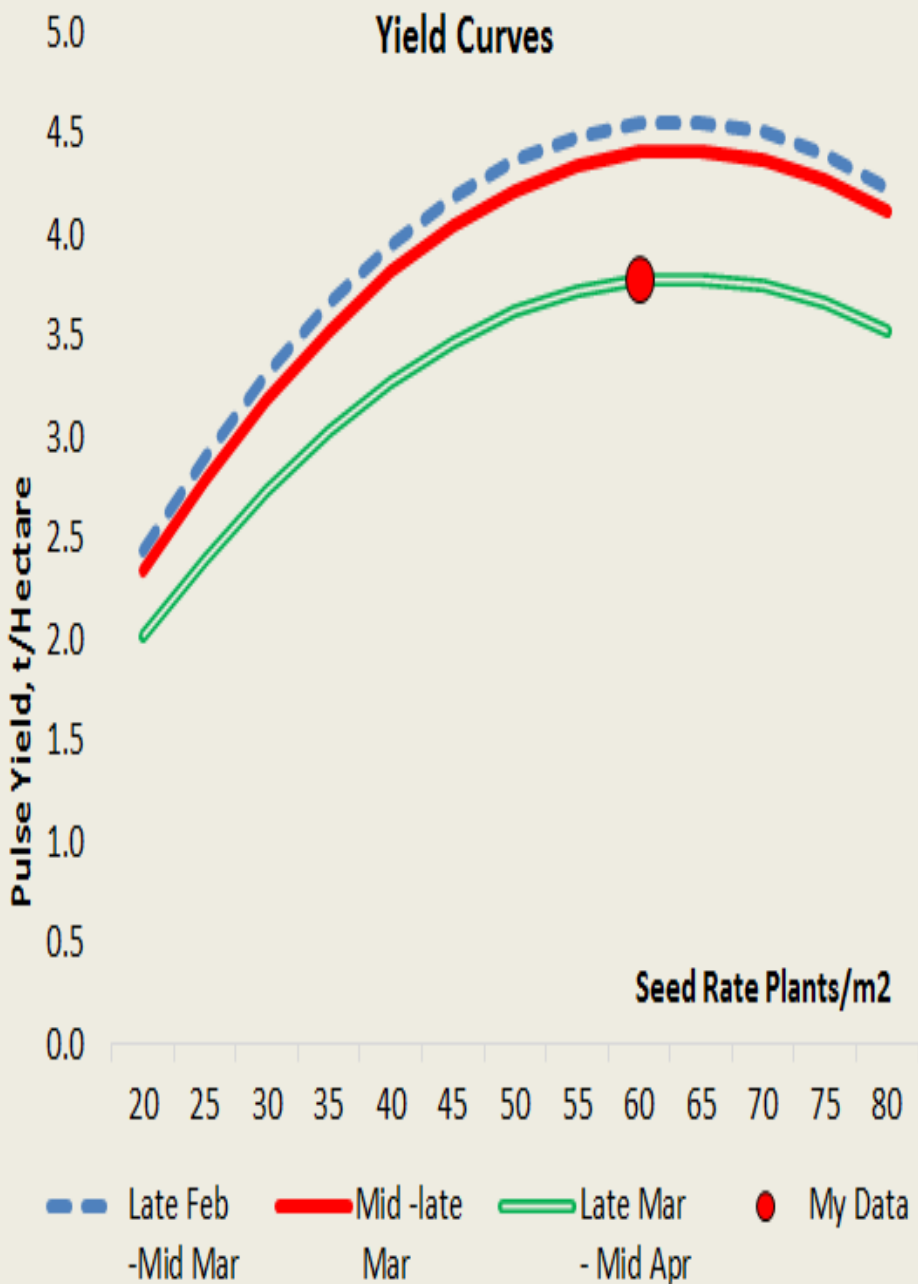


The gross margins have been calculated to account for the change in seed rate and yield using the seed rates and other prices on the gross margin page this chart predicts the yield change on your farm by changing drilling seed rates

Consider the germination rate and Thousand Grain Weight. These may vary considerably. It is therefore more important to consider seed rate than seed weight.

By planting earlier you could gain... £110 /ha

If you changed your seed rate to 50 plants /m²= you could have increased your gross margin by £8 /ha



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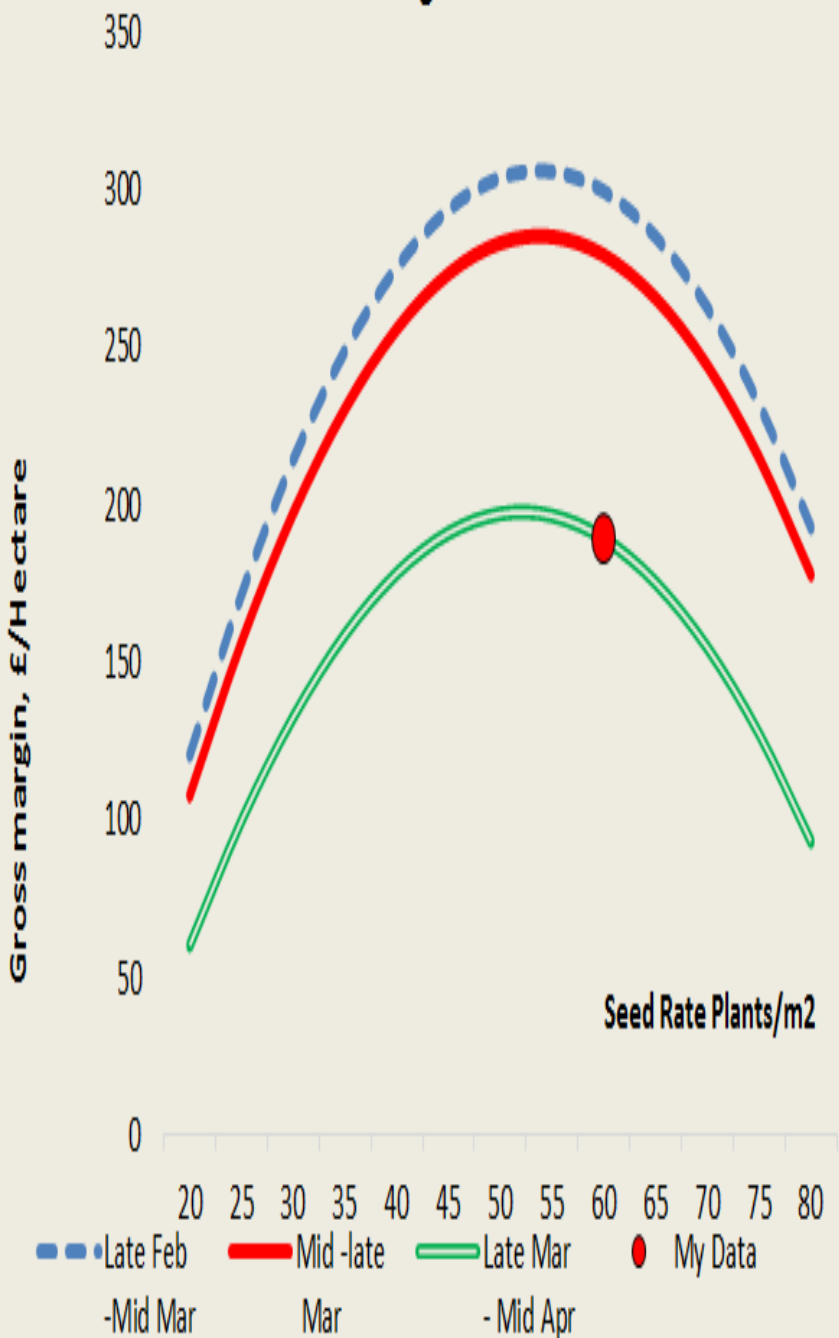
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Gross Margin Curves



The gross margins have been calculated to account for the change in seed rate and yield using the seed rates and other prices on the gross margin page this chart predicts the yield change on your farm by changing drilling seed rates

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Fertiliser

Beans are nitrogen fixing so leave additional N in the soil. They require no N fertiliser

Any harvest removes P and K from the field which needs replacing. This shedule calculates how much P and K is removed and therefore is required to retain soil indeces as before.

Yield of Beans in Gross margin 3.70 t/Ha

	Kg/Ha/t	Kg/Ha	
Kg Phosphate removed per Ha	11	40.7	Kg/Ha
Kg Potash removed per Ha	12	44.4	Kg/Ha
Value of Mineral Fertiliser Required		£45.00 /Ha	

Winter Bean Fertiliser Basis 3.7t/Ha

Nutrient	Kg/t	Fert Price	Makeup	Pence/Kg	Kg/Ha	Fert £/Ha
N	0	233	35%	68	0	£0.00
P	11	300	46%	65	41	£26.74
K	12	255	60%	43	44	£18.70
					Total	£45.00

Residual Nitrogen

Utilisable nitrogen left in the soil for the following crop ranges from 25 to 200kg/ha

The average used is 50kg/ha.

It is difficult to assess how much additional usable nitrogen residue is left.

The figure normally used of available nitrogen to the following crop is 50kg/ha

Hence, at the prices quoted above,

	£/Ha	£ total
Available Nitrogen Left in Soil	34	34

Value of residual N to the following wheat crop

Fertiliser on Different Soil Conditions

Kg/Ha	Soil Index				
	0	1	2	3	4
Phosphate	102.2	72.2	40.7	2.2	2.2
Potash	102.4	72.4	44.4	2.4	2.4

£/Ha	Soil Index				
	0	1	2	3	4
Phosphate	67	47	27	1	1
Potash	44	31	19	1	1

This table shows the recommendations by RB209, the Fertiliser Manual, to apply to beans in soils of varying indices.

Historic Bruchid Count Map

Bruchid beetle is the main factor that lowers quality in beans. It takes the human consumption premium away from a clean sample.

Bruchid beetle is more prevalent in the South of GB, although farms in the North must remain vigilant of this potentially very damaging beetle.



Use the Bruchidcast web--based service to refine spray dates

[Click here to register.](#)

This is when spraying should occur

Pods present defined as pods, 50% 2cm long or more , remembering that at that length they can be hidden by decaying petals.

2 consecutive days when max daily temperature is at least 20 degrees

Follow up sprays

7-10 days after initial spraying and thereafter depending on temperature

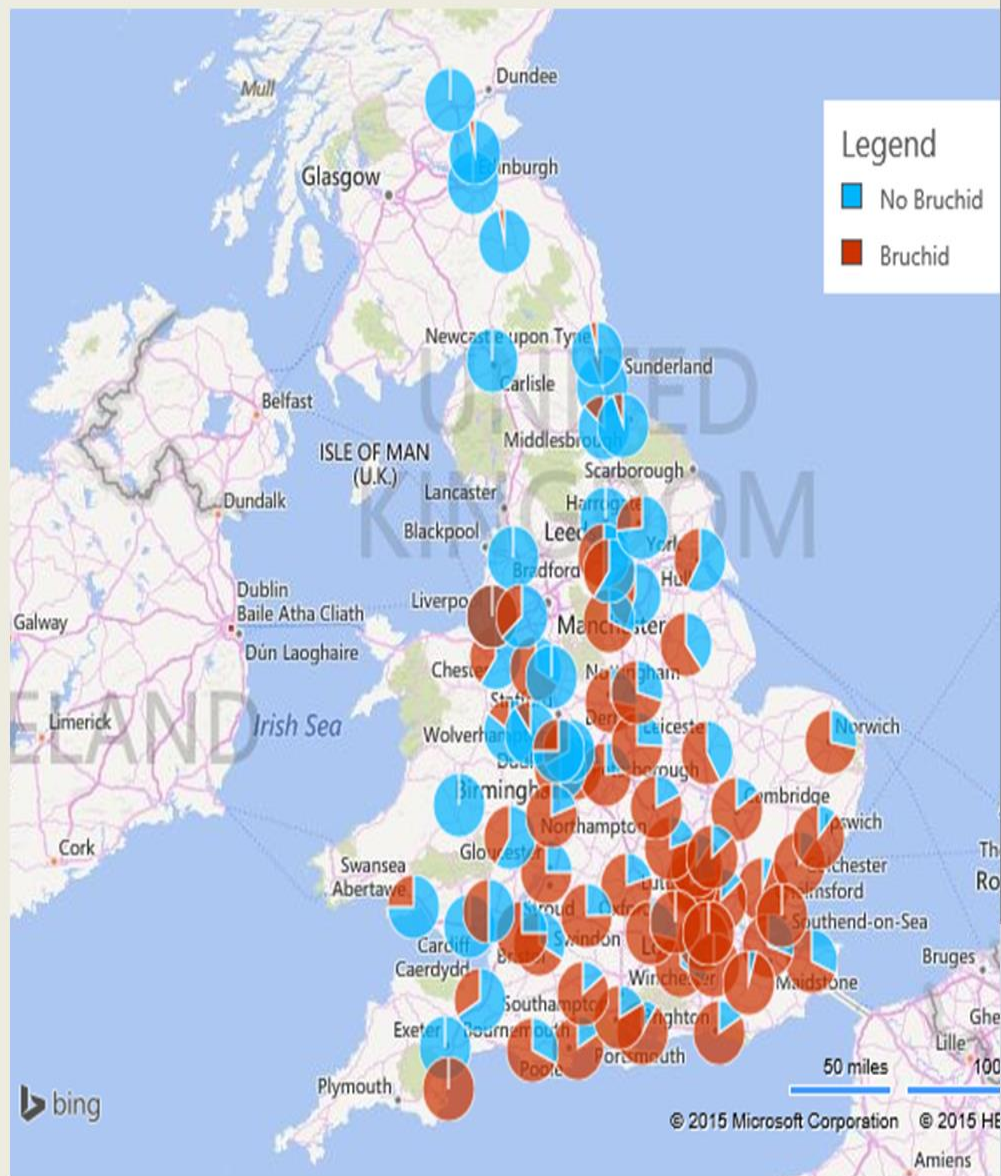
Maximum total dose of Hallmark is 0.15 l/ha per annum

Other products for use during flowering are available.

You must check product labels for restrictions of use at this time

Risk is reduced

If flowering is late and temps are cold



File Home Insert Page Layout Formulas Data Review View Developer

Cut Copy Paste Format Painter Clipboard Font Alignment Number Styles

Normal Bad Good Neutral Calculation

Check Cell Explanatory T... Input Linked Cell Note

Insert Delete Format Cells

AutoSum Fill Clear Sort & Find & Filter Select Editing

D10 fx

Pulse Weight Loss at Drying

Preferred Weight Unit

Tonnes

Initial Weight	Initial Moisture	Total Water Content	Total Dry Matter	New Moisture	Final total grain weight
Tonnes	Percentage	Tonnes	Tonnes	Percentage	Tonnes
40.00	19.00%	7.60	32.40	15.00%	38.12

You are anticipating a gross margin yield of 4t/ha

Are you assuming this includes:

- A T1 Fungicide Application?
- A T2 Fungicide Application?
- A T3 Fungicide Application?

TICK Cost £/Ha

yes	£20.00
no	£25.00
no	£18.00
Total Fungicide Cost	£20.00

Description

First Flower
First Pod
=T2 +21-28 days

Hover

Rust

Trials demonstrate untreated rust takes up to 14% of yield from Winter Beans

Beans are protected from rust primarily by the T3 application

- You are potentially risking 14% yield loss from Rust
- By not spending £18/Ha on a T3 could be costing you 0.6t/Ha worth about £79/Ha

Chocolate Spot

Up to half the yield can be lost because of Chocolate Spot.

T2 offers the best protection for Chocolate Spot, followed by T1

Evidence suggests the following fungicide applications provide varying protection as follows:

High Impact Year

T1	T2	T3	Possible Yield Loss	Program me Cost	Possible £ Loss	You have selected
n	n	n	50%	£0	£281	
y	n	n	35%	£20	£197	←
n	y	n	25%	£25	£141	
n	n	y	45%	£18	£253	
y	y	n	7%	£45	£39	
n	y	y	25%	£43	£141	
y	n	y	35%	£38	£197	
y	y	y	0%	£63	£0	

Hover

NOTE:

If conditions are not conducive to disease development and disease is visibly less than 5% on the leaf, it is probable that treatment is unnecessary. Consult your agronomist for details.

Research demonstrates that 3 Fungicide programme provides fullest Chocolate Spot protection under a high disease pressure scenario. Yields fall from this 'full' fungicide programme according to the table in a severe Chocolate Spot Infection.

The programme you have selected may lose you 35% of yield if Chocolate Spot is bad this year.

NOTE, If conditions are not conducive to disease development and disease is visibly less than 5% on the leaf, it is probable that treatment is unnecessary. Consult your agronomist for details.



Latest News & Events

Contract Services

Agronomy Guides & Publications

Pests, Diseases & Monitoring Services

Research & Development



- Agronomy Guide (2015)
- Annual Report (2014)
- Broad Bean Varieties (2011)
- Green Bean Varieties (2013)
- Lupin Agronomy Guide (2014)
- Optibean Project**
- Pulse Magazine (Winter 2015)
- Recommended Lists (2016)
- Variety Trials Results Manual (2015)
- Vegetable Magazine (Winter 15/16)
- Vining Pea Growers Guide (2016)
- PGRO Technical Updates
- RL Advanced Results (Trials 2015)
- Annual Reports (Archive)
- Growers Guides & Variety Lists (Archive)
- Pulse Magazines (Archive)
- Vegetable Magazines (Archive)

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2016 INTERNATIONAL YEAR OF PULSES

LATEST PGRO NEWS

- **PGRO Bean Yield Challenge** [Thu 31 Dec 2015]

A generation ago, the Ten Tonne Club for wheat helped to change the aspirations of the best growers to their wheat growing. PGRO believes it is now time to do the same for the bean crop and have...

[Read More ...](#)





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LATEST TWEETS FROM @PGRORESEARCH

RT @PVR_org: Love it - @sciencemagazine thank you for guide to reading scientific papers - who has not experienced this! <https://t.co/SytKI...>

pgro about 15 hours ago

New 2016 PGRO Pulse Agronomy Guide just arrived. Copies at the Road Show events <https://t.co/TVA4GP0SeC> <https://t.co/xtlqB9QI8p>

pgro about 20 hours ago





PGRO Bean Yield Challenge

A generation ago, the Ten Tonne Club for wheat helped to change the aspirations of the best growers to their wheat growing.

PGRO believe it is now time to do the same for the bean crop and have issued the **PGRO Bean Yield Challenge** towards growing a 10 tonne feld bean crop by 2020.

The Challenge is open to any UK-based grower of any commercial UK-grown grain crop and will run annually until crop 2020 - or until the first 10t/ha crop is validated, whichever is the sooner.

A prize trophy will be awarded annually for the highest verified yield for each crop year starting with the 2015-2016 year.

The absolute Yield Challenge winner will be the first grower to achieve a verified yield of 10t/ha or more. In the event that two or more growers achieve the 10t/ha goal in the same crop year, the grower producing the highest yield will be declared the winner.

For more information about the Challenge & to read the rules, [please open/download our Information Sheet](#).

To receive a copy of the entry form please complete the short form below ...

Name (*)

Email (*)

Address (*)

Postcode (*)



SEARCH...



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PGRO AGRONOMY GUIDES & PUBLICATIONS

- Agronomy Guide (2016)
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Thank you

