



# Bean YEN Entry Protocol

## Welcome to the Bean Yield Enhancement Network (YEN) 2021

### CONTENTS

GENERAL INFORMATION .....	2
SOIL SAMPLING KIT .....	2
Top Tips for sampling soils for the YEN.....	2
Visual Evaluation of Soil Structure (VESS).....	5
BEAN YEN ONLINE FORMS .....	5
Site Visits and Crop Observations .....	5
The PGRO Pea and Bean Guide App .....	5
1. Full emergence GS 10 (March /April).....	5
2. Start of nodulation, Fourth Node (April/May) ..	6
Leaf Tissue sampling .....	6
3. First florets visible (May/June).....	6
4. First flower and full flower (May/June) .....	6
5. End of flowering & Senescence (July/ August) .	6
6. Harvest (July/August).....	7
Bean YEN HARVEST PACK.....	7
CONTACTS .....	7
Appendix I .....	8
Phenological growth stages and BBCH-identification keys of faba bean ( <i>Vicia faba</i> L.).....	8

### IMMEDIATE ACTIONS

- Collect and return your soil samples
- Complete your site details forms using the link emailed to you

### PRE-HARVEST ACTIONS

- Take overhead crop photo at GS10 or complete 1 m<sup>2</sup> plant counts
- Complete and return the online forms throughout the season. Links will be emailed to you
- Record dates of crop growth stages
- Collect and send leaf tissue samples at GS34 and GS65
- Collect and send grab sample just before harvest

### POST-HARVEST ACTIONS

- Collect and return seed samples at harvest
- Return Yield Entry Form
- Make sure all information is completed

### DO-IT dates

### ... and the final date

APRIL	Return Soil Samples and GS 10 overhead photos	
APRIL/MAY	Return tissue sample GS34	
MAY/JUNE	Return tissue sample GS65	
SEPTEMBER	Return Grab and Grain samples	30 SEPTEMBER
SEPTEMBER	Return Yield Entry Form	15 OCTOBER

## GENERAL INFORMATION

Welcome to Bean YEN 2021, the third year of Bean YEN. We're excited to be broadening out the Bean YEN this season to include more growers. There may be some optional extras available throughout the season which become available (any updates will be emailed to entrants).

## SOIL SAMPLING KIT

HuttonSoils (based at the James Hutton Institute, Aberdeen campus) provides soil-nutrient assessments for registered entrants of the Pea- and Bean-YENs. Soils may also be analysed for rhizobium population analysis and other soil characteristics.



Soil samples after Mid-May are still encouraged but may incur a charge.

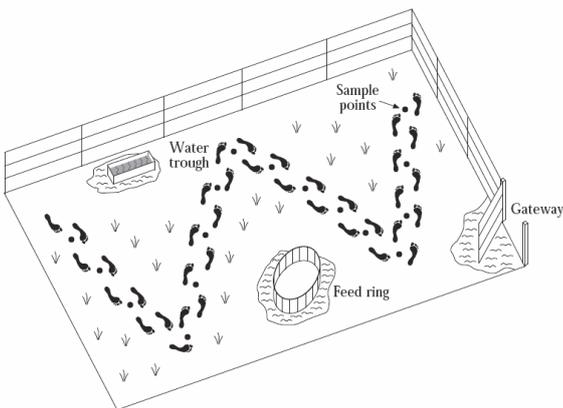
Once registered, a soil-sampling kit will be sent to you and samples should be collected using the recommended protocol detailed below.

### Top Tips for sampling soils for the YEN

#### Where & how to sample

- Make sure you have a suitable soil-corer or auger for your sampling depth. The sampling depth should be 0-15 cm minimum and as deep as 23 cm if the land has been ploughed in the last few years. The sampling depth should always be 0-23 cm if min- or no-till cultivations have been used.

Figure 1. Schematic diagram of 'W' (or 'M') field sampling pattern, showing sampling points ('•').



- To avoid cross contamination, ensure your soil auger and bucket is cleaned between sampling areas/fields.
- Soil sample should be taken to get representative range from the whole cropped area (field). Take 20-25 evenly spaced cores from sampling points along a 'W or M' pattern across the sample-area (Figure 1, opposite).
- Avoid taking samples from headlands, or in the surrounding areas which will not be included in the YEN-entered area.

#### Preparing & labelling your sample

- Please remove all roots, plant material, or accumulated surface organic matter in the sample.
- Ensure the pooled soils cores from all 20-25 positions are mixed very well, and in a clean container to form a fair and representative sample.
- Fill the clear plastic bag with approx. 500 g soil. Seal and place this in the small cardboard tube. Label the small cardboard tube with the sticker provided by HuttonSoils with which the YEN ID and field name should be added. This completed sticker must accompany the sample returned.
- Place the small tube in the large tube and return this to HuttonSoils using the FreePost label provided which should be attached to the large tube. Visual instructions are provided below:

## Kit Contents

The kit has five parts:

- Small sample tube – with label
- Large tube
- Freepost label (adhesive)
- Sampling Instructions
- Plastic bag



### Step 1

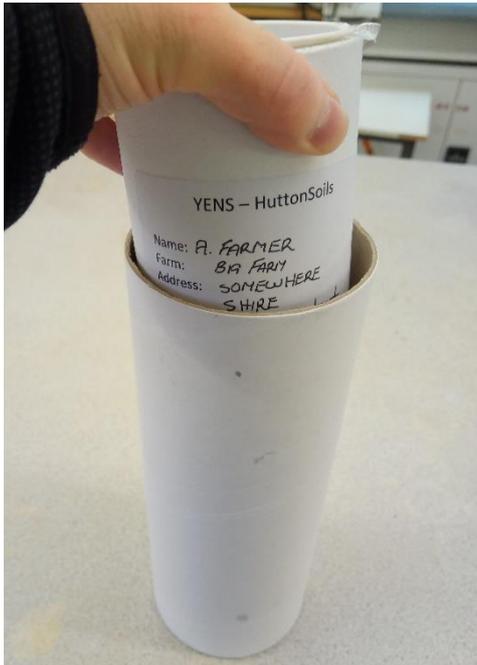
Take soil sample as instructed and fill plastic bag in the small sampling tube.

### Step 2

Write your details on the label on the small sample tube.

Place both caps on the tube.





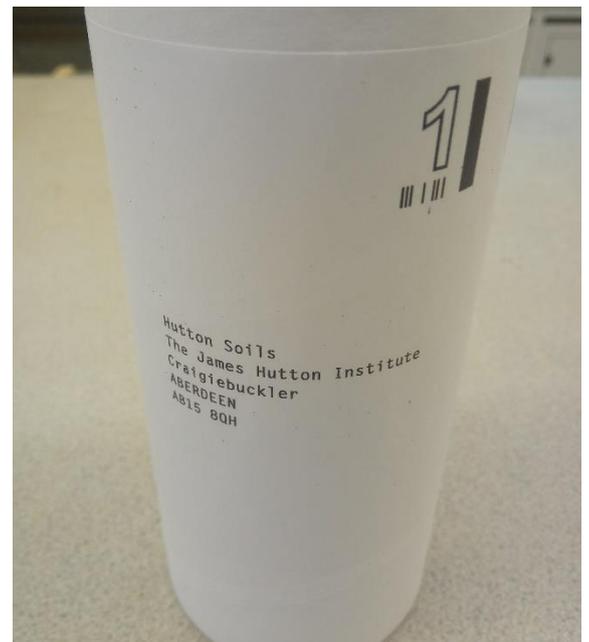
### Step 3

Place small sample tube with soil sample and completed label within the large tube.

### Step 4

Stick the adhesive Freepost label to the large tube containing the soil sample.

Ensure that the label covers your address details if kit has been posted to you.



### Step 5

Post back to the James Hutton Institute using the Freepost label.

**Note:** If required the end caps on the large tubes might need secured with some sticky tape. Rolled up old newspaper can be used to stop the small sample tube sliding about within the large postal tube.

## Visual Evaluation of Soil Structure (VESS)

The visual evaluation of soil structure is a quick assessment of soil structure. This test is a desired optional extra. If you have the time and are interested, please follow the links below and complete the assessment.

The SRUC webpage for information on VESS and links to methods and videos click [here](#)

To download the pdf of the VESS score chart click [here](#)

## BEAN YEN ONLINE FORMS

From this year (2021) we are collecting Bean YEN entry information such as site details, crop observations, agronomy and yield using online forms. Links to these forms will be made available once you have registered. Please also be aware that once registered, you will receive an automated email confirming your registration along with your YEN **ENTRY ID** (please check your spam/junk folder if an email has not been received within an hour). Please use this entry ID and the links to the forms to submit your Bean YEN data. For further information or any questions please get in touch at [beanyen@adas.co.uk](mailto:beanyen@adas.co.uk).

## Site Visits and Crop Observations

This information allows us to understand how a bean crop develops in different situations, helping us understand constraints to yield. All the information you collect can be returned via the online form system and site visit dates are listed below (numbered 1 to 6). The progress of the online forms can be saved, so information can be entered throughout the season. Growth stage information can be found in Appendix 1.

As well as the actions listed under 1-6, there is an option to record further information at each site visit including:

- Score overall appearance of crop
- Score weeds, pests (birds and insects), diseases and viruses
- Control strategy or other notes, if applicable

## The PGRO Pea and Bean Guide App

PGRO have developed a free agronomy app, which will be useful in the field. It can aid with pest and disease recognition and is capable of recording and submitting reports of pests and diseases. There is also a built in growth stage guide. The app is available for both Android and Apple devices.

### 1. Full emergence GS 10 (March /April)

- Record the date of full emergence (**GS 10**). If this is missed please record the growth stage on the date you visit.
- Carry out plant counts.
  - In five locations, using a meter stick or quadrat count the number of plants in a 1 m<sup>2</sup> area. If it's easier, use a 0.25 m<sup>2</sup> quadrat to count the number of plants and multiply that number by 4 to get the number of plants in 1 square metre. Please record the count in each individual location.
- **Alternatively**, plant counts can be calculated from photographs. Take images at three locations from within the 2ha area entered in the YEN. Take the photo from above the crop looking vertically down, showing as wide an area as possible and including an A4 piece of paper flat on the ground for scale. See examples in Figure 1. Photos can be uploaded using the online forms.



Figure 1. Example photographs for plant population estimate

## 2. Start of nodulation, Fourth Node (April/May)

- Record date of 4<sup>th</sup> node - start of nodulation (**GS 34**)
- Collect a representative **leaf tissue sample**, following the method described below.

### Leaf Tissue sampling

As part of Bean YEN Lancrop/YARA provide free tissue testing for YEN entrants. Once you have registered you will be sent sampling kits.



At each sampling timing:

- Sample and send Monday to Wednesday to avoid the sample in the post over the weekend.
- Within your YEN area walk up 2 to 4 representative tramlines and sample tissue at regular intervals from between 5 - 20 points along the sampling path.
- At each sampling site select several plants at the same stage of development and sample the youngest mature leaf without the petiole (first fully expanded leaves away from the growing point) until you have between 300g – 400g of material.
- Avoid leaves showing pest, disease or other damage. Take leaves only, not stems.
- Mix the leaves thoroughly, if wet blot the leaves dry with a paper towel and place into a sample bag, squeezing out the excess air and sealing.
- Fill in the order form including crop and growth stage. **Include your email to ensure you get the results.**
- Place the sample bag and the order form into a Lancrop/Yara pre-paid envelope and post. **Do not put the order form inside the bag with the sample as it may get wet.**

## 3. First florets visible (May/June)

- Record date when the first florets are visible outside the flower bud (**GS 51**)

## 4. First flower and full flower (May/June)

- Record date of 1<sup>st</sup> flower seen sporadically within the crop (**GS 60**).
- Record date of full flower, first 1 inch pod not on the headland (**GS 65**)
- Collect a representative **leaf tissue sample**, as outlined above.

## 5. End of flowering & Senescence (July/ August)

- Record date when crop is out of flower (**GS 69**).
- Record date of seed senescence (**GS 89**)
- Take a **Grab sample** of 25 plants. The representative sample should be taken from inside the 2 ha area ensuring that all stems and any branches are collected from 5 plants in 5 locations. The plants should be placed into the large sack provided as part of the harvest pack, and posted to ADAS Gleadthorpe with the address sticker provided.

## 6. Harvest (July/August)

- Record date when crop is first ripe for harvest, full senescence (**GS 97**).
- Record actual harvest date (**GS 99**).
- Provide accurate yield information from either
  - a. Whole field of known area with total weights from weighbridge tickets or calibrated combine yield monitor
  - b. A selected area with minimum size of 2ha, marked out and measured, with total weights from weighbridge or calibrated yield monitor
  - c. Area of a yield map (calibrated yield monitor) ensuring data from cuts of full header width only.
- Record harvest losses by counting number of beans in an A4 paper sized area at 5 locations directly behind the combine and 5 locations between the swaths (ie where beans would only be present by shattering before entering combine, not due to losses over the sieves.) Subject to amendment in the harvest pack.
- Retain a combine samples in the bags provided (the **seed sample**) and forward to the appropriate laboratories for analysis as detailed in the harvest pack provided.

## Bean YEN HARVEST PACK

Prior to harvest you will receive the Harvest Pack, sent to the address indicated upon registration.

The Harvest Pack will contain:

1. Further guidance on collecting grab and grain samples.
2. Pre-labelled potato sacks, for the grab sample just before harvest.
3. Pre-labelled polythene bags, for the grain samples at harvest.

## CONTACTS

Thomas Wilkinson	<a href="mailto:Thomas.Wilkinson@adas.co.uk">Thomas.Wilkinson@adas.co.uk</a>	07503570264
Shona Duffy	<a href="mailto:Shona@pgro.org">Shona@pgro.org</a>	07854655331
Daniel Kindred	<a href="mailto:Danial.Kindred@adas.co.uk">Danial.Kindred@adas.co.uk</a>	07774701619
Or email <a href="mailto:beanyen@adas.co.uk">beanyen@adas.co.uk</a> for general enquiries.		 @adasYEN

Further information can be found at [www.yen.adas.co.uk](http://www.yen.adas.co.uk)



## Phenological growth stages and BBCH-identification keys of faba bean (*Vicia faba* L.)

Faba bean Weber and Bleiholder, 1990; Lancashire et al., 1991

### Code Description

#### Principal growth stage 0: Germination

- 00 Dry seed
- 01 Beginning of seed imbibition
- 03 Seed imbibition complete
- 05 Radicle emerged from seed
- 07 Shoot emerged from seed (plumule apparent)
- 08 Shoot growing towards soil surface
- 09 Emergence: shoot emerges through soil surface

#### Principal growth stage 1: Leaf development<sup>1</sup>

- 10 Pair of scale leaves visible (may be eaten or lost)
- 11 First leaf unfolded
- 12 2 leaves unfolded
- 13 3 leaves unfolded
- 1. Stages continuous till . . .
- 19 9 or more leaves unfolded

#### Principal growth stage 2: Formation of side shoots

- 20 No side shoots
- 21 Beginning of side shoot development: first side shoot detectable
- 22 2 side shoots detectable
- 23 3 side shoots detectable
- 2. Stages continuous till . . .
- 29 End of side shoot development: 9 or more side shoots detectable

#### Principal growth stage 3: Stem elongation

- 30 Beginning of stem elongation
- 31 One visibly extended internode<sup>2</sup>
- 32 2 visibly extended internodes
- 33 3 visibly extended internodes
- 3. Stages continuous till . . .
- 39 9 or more visibly extended internodes

<sup>1</sup> Stem elongation may occur earlier than stage 19; in this case continue with the principal stage 3

<sup>2</sup> First internode extends from the scale leaf node to the first true leaf node

### **Principal growth stage 5: Inflorescence emergence**

- 50 Flower buds present, still enclosed by leaves
- 51 First flower buds visible outside leaves
- 55 First individual flower buds visible outside leaves but still closed
- 59 First petals visible, many individual flower buds, still closed

### **Principal growth stage 6: Flowering**

- 60 First flowers open
- 61 Flowers open on first raceme
- 63 Flowers open 3 racemes per plant
- 65 Full flowering: flowers open on 5 racemes per plant
- 67 Flowering declining
- 69 End of flowering

### **Principal growth stage 7: Development of fruit**

- 70 First pods have reached final length (“flat pod”)
- 71 10% of pods have reached final length
- 72 20% of pods have reached final length
- 73 30% of pods have reached final length
- 74 40% of pods have reached final length
- 75 50% of pods have reached final length
- 76 60% of pods have reached final length
- 77 70% of pods have reached final length
- 78 80% of pods have reached final length
- 79 Nearly all pods have reached final length

### **Principal growth stage 8: Ripening**

- 80 Beginning of ripening: seed green, filling pod cavity
- 81 10% of pods ripe, seeds dry and hard
- 82 20% of pods ripe, seeds dry and hard
- 83 30% of pods ripe and dark, seeds dry and hard
- 84 40% of pods ripe and dark, seeds dry and hard
- 85 50% of pods ripe and dark, seeds dry and hard
- 86 60% of pods ripe and dark, seeds dry and hard
- 87 70% of pods ripe and dark, seeds dry and hard
- 88 80% of pods ripe and dark, seeds dry and hard
- 89 Fully ripe: nearly all pods dark, seeds dry and hard

### **Principal growth stage 9: Senescence**

- 93 Stems begin to darken
- 95 50% of stems brown or black
- 97 Plant dead and dry
- 99 Harvested product

**Faba Bean**

