



Bean YEN Protocol

Welcome to the Bean Yield Enhancement Network (YEN)

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IMMEDIATE ACTIONS

- Complete and return entry pack first two sheets
- Collect and return your soil sample

PRE-HARVEST ACTIONS

- Take overhead crop photo at GS10 or as close to GS10 as possible
- Record date of crop growth stages
- Collect and send tissue samples at GS34 and GS65
- Collect and send grab sample just before harvest

POST-HARVEST ACTIONS

- Collect and return grain sample at harvest
- Complete and return the Entry Pack
- Return Yield Entry Form

DO-IT dates

		... and the final date
APRIL	Return Soil Samples and GS 10 overhead photos	31 May
APRIL/MAY	Return tissue sample GS34	31 MAY
MAY/JUNE	Return tissue sample GS65	30 JUNE
SEPTEMBER	Return Grab and Grain samples	30 SEPTEMBER
SEPTEMBER	Return Yield Entry Form	15 OCTOBER

GENERAL INFORMATION

Welcome to Bean YEN 2019. We're excited to be bringing you the soft launch of the bean YEN. We're capitalising on PGRO's InnovateUK project with Hummingbird in which intensive measurements of 7 bean crops are taken. The bean YEN assessments will be aligned to, but less intensive than, those in the IUK project, and taken by entrants themselves.

The bean YEN will enable interested bean growers to engage and benchmark their crops.

SOIL SAMPLING KIT

As part of the YEN, NRM provide free soil assessments for YEN entries up until the end of May. Once you have registered and confirmed the postal address, a soil sampling kit will be sent to you. Top Tips for sampling soils for YEN are given below; all images in this section are courtesy of NRM.



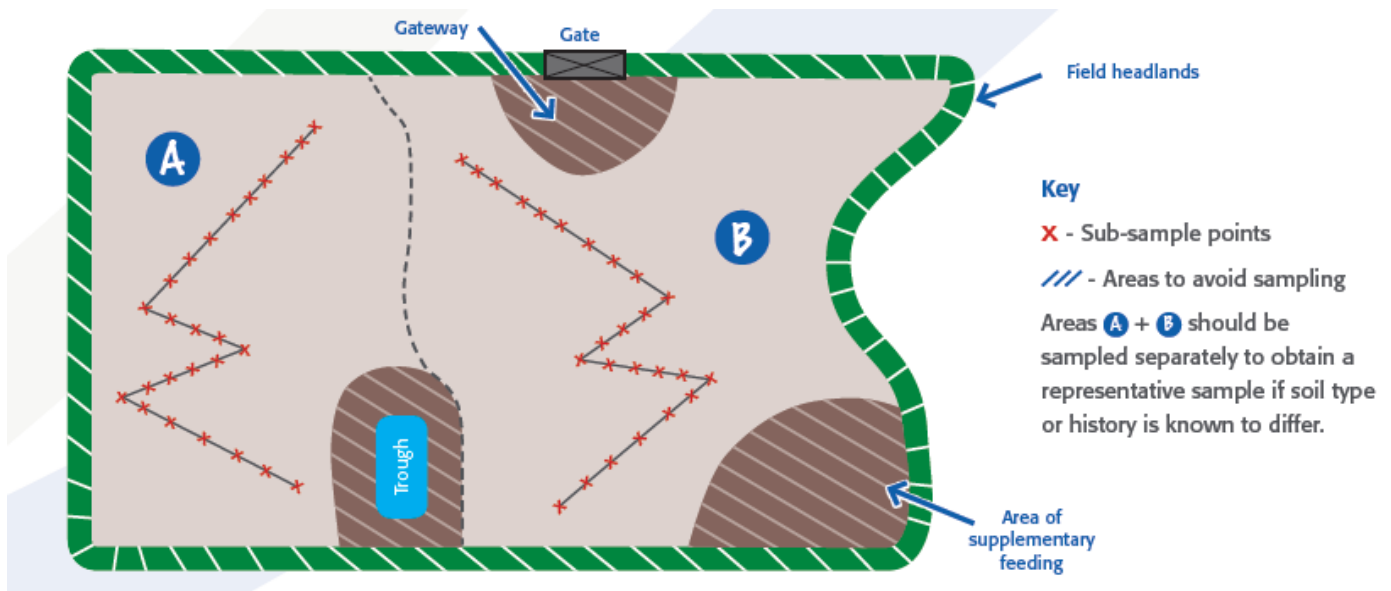
Top Tips for sampling soils for the YEN

Before taking the sample

- A fresh soil analysis on the YEN-entered area is needed to assess soil health etc. Previous soil analyses are only useful if sampling of the YEN-entered area proves impossible.
- Ideally sample by February but leave more than 4 months after P or K fertiliser or lime applications and more than six weeks after any organic manure application. NRM provides free analysis for YEN entrants before May.

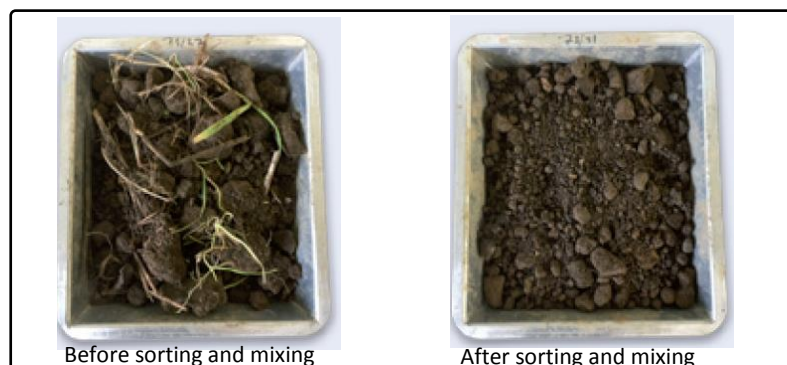
Where & how to sample

- Make sure you have a suitable soil corer or auger for your sampling depth. The sampling depth can be 0 - 15 cm or 0 - 23 cm if the land has been ploughed in the last few years, but should be 0 - 23 cm if min-till or no-till cultivations have been used recently.
- To avoid cross contamination, clean your soil auger and bucket between sampling areas.
- The sample should be taken to represent the whole YEN-entered area. Take 20-25 cores from sampling points forming a 'W or M' pattern across the area.
- Avoid taking samples from headlands, or in the surrounding areas which will not be included in the YEN-entered area (please refer to diagram below).



Preparing & labelling your sample

- Remove all roots, plant material or accumulated surface organic matter in the sample and mix together the sub-samples from all 20-25 positions in a clean container to form a representative sample. See images before and after sample preparation below.



- Place approximately 300g in the packaging provided by NRM (either box or medium grip-seal bag filled to top of middle line)
- Clearly label and seal each sample with your YEN entry number (e.g. PF00XXX) and field name (e.g. Big Field)
- Paperwork (provided by NRM) must accompany the samples.

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 ENTRANTS PACK

The Bean YEN Entry Pack contains five sections:

1. YEN Entrant Details
2. Site Details
3. Crop Observations and Actions
4. Crop Agronomy
5. Rainfall & Irrigation

Sections one and two will be pre-populated with some information. This should be checked, and any additional information must be returned to beanyen@adas.co.uk as soon as possible.

Section three will need updating over the course of the season, and should be returned before harvest to beanyen@adas.co.uk

Section four is for collation of agronomic inputs should be completed over the course of the season, and returned after harvest.

The contact details should be kept up to date to ensure you receive information and sampling packs throughout the season.

Site Visits and Crop Observations

At each site visit:

- Record growth stage (See Appendix 1)
- Score overall appearance of crop:
 - 0 = Crop failure; 1 = Poor; 2 = Satisfactory/Average; 3 = Good; 4 = Very Good; 5 = Excellent
- Score weeds, pests (birds and insects), diseases and viruses:
 - 1 = Present (very); 2 = Present (common); 3 = Present (infrequent); 4 = Present (rare); 5 = None.
- Record control strategy, if applicable
- Record at least 2 photos (panoramic, side on shots with scale if possible) and any other observation of interest (pest, disease, deficiency, etc.)
 - Save and name the photo with your YEN field ID number and the month e.g. BF000XXX
 - Send the images as jpeg files to beanyen@adas.co.uk

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 sowing date
- Record the date of full emergence (**GS 10**). If this is missed please record the growth stage on the date you visit.
- Take overhead photographs at GS 10 or as close to GS10 as possible. These will be used to estimate the plant population at full emergence.
 - 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.
 - Save and name the photo with your YEN field ID number and the month e.g. BF000XXX
 - Send the images as jpeg files to beanyen@adas.co.uk

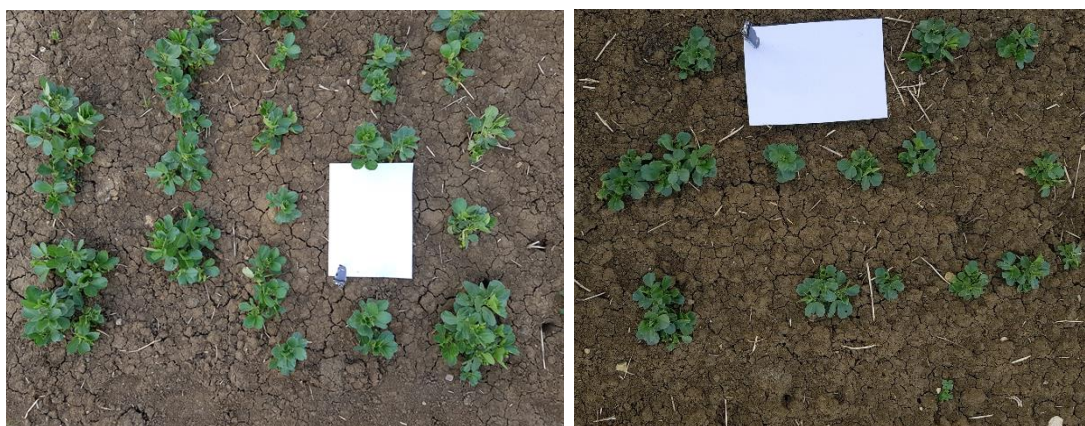


Figure 1. Example photographs for plant population estimate

- Desired optional extra, carry out plant counts.
 - In the same three locations as the photographs, using a meter stick or quadrat count the number of plants in a 1 m² area. Please record the count in each individual location.
 - In an additional seven locations please take a photograph as above and count the number of plants in a 1 m² area using a meter stick or a quadrat. Please record the count in each individual location.

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

- Record date of 4th node - start of nodulation (**GS 34**)
- Collect a representative **leaf tissue sample**, picking the top 3 nodes of the whole plant (including leaflets/stems/stipules) from at least 5 places in the 2 ha area, until you have about 200 g of material. Post to YARA in bags provided.

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 about 200g 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 1st 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. Ideally, keep the whole plants intact, including roots, so that the number of stems per plant can be assessed if there's more than one.
- The plants should be placed into the large sack provided, and posted to ADAS Gleadthorpe with 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 representative 2 kg combine sample in the bag provided and forward to ADAS Gleadthorpe, Netherfield Lane, Meden Vale, Mansfield, Nottinghamshire, NG20 9PD

Bean YEN HARVEST PACK

Prior to harvest you will receive the Harvest Pack, sent to the address indicated in your Entry Pack.

The Harvest Pack will contain:


1. Further guidance on collecting grab and grain samples, printed on A4 card that can be used to count harvest losses.
2. One pre-labelled potato sack per entry, for the grab sample just before harvest.
3. One pre-labelled polythene bag per entry, for the grain sample at harvest.
4. One yield entry form per entry, which should be completed and returned to ADAS as soon as possible. This can either be by post or an electronic version can be emailed to beanyen@adas.co.uk

CONTACTS

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Daniel Kindred Danial.Kindred@adas.co.uk 07774 701619

Or email beanyen@adas.co.uk for general enquiries.

 @adasYEN

Further information can be found at www.yen.adas.co.uk



Appendix I

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 development¹

- 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 internode²
- 32 2 visibly extended internodes
- 33 3 visibly extended internodes
- 3 . . . Stages continuous till . . .
- 39 9 or more visibly extended internodes

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

² 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

