Establishing bean acres in Scotland – a variety trial

Summary

Scottish agronomists and growers are looking for an alternative crop to oilseed rape and beans are a viable option but there is uncertainty on what variety/varieties are best suited to regional conditions. It is difficult to do field scale varietal trials without support and this field lab will help to determine what variety/varieties of bean should be grown in Scotland to provide a consistent and reliable crop. Increasing bean area will not only provide more crop rotation options, but it will also help to lower GHG emissions and improve soil health. Until now very little work has been done in Scotland and the climatic conditions are different than the traditional UK bean growing region, so localised field labs for knowledge exchange to other famers, seed companies and agronomists are key to increasing bean cropping area.

The field labs will consist of 5 arable farms, one of which will be growing beans under an organic system, located in Scotland. PGRO and Scottish Agronomy will be actively involved in the research and coordination of the field labs. The trialist farmers are keen to find an alternative crop to oilseed rape and understand the benefits of including a legume in the rotation.

The issue:

The major problem is the Scottish farming industry, including famers and agronomists, are not confident on advising what variety to grow for beans and if they should advise to grow the crop. There is hesitancy that beans will not mature in time or be profitable. As a result, the crop is rarely grown in the region. Clubroot infected oilseed rape is getting to be very problematic in Scotland, so farmers are struggling to grow a successful and profitable break crop. Scottish farmers are seeking to find an alternative to oilseed rape crops that are not susceptible to clubroot. Bean crops could become a viable option, once it is proven to be successfully grown in the region.

Trial design:

Strip trials of 3 to 4 winter bean varieties, with a possibility one of the varieties being a spring variety sown in the autumn, will be established. Each variety will be about 2 ha (required area for a bean YEN entry), although exact size will depend on field dimensions.

Fields will be selected to allow sufficient plot size to give robust data, along with soil type and management homogeneity. The varieties will be jointly selected by PGRO and Scottish Agronomy, together with the trialists and field bean breeders. Varieties will not be replicated in the field as the size of each strip will be large enough to account for field variation and multiple samples will be evaluated or assessed within each plot to provide

robust data. Headlands will be excluded from trials if possible. Where in-field variation exists, plots will be laid out so that this is fairly distributed across each plot.

As this crop is so new for Scotland, a control variety is not established for the region. Trials and treatments will be marked clearly using in-field canes and mapping software for clarity. Satellite or aerial imagery will be collected, where possible, to identify potential field variation.

Each trialist will enrol one variety, the same variety across all trials, in the Bean Yield Enhancement Network (YEN). Bean YEN collects data on stand establishment, soil and plant nutritional analysis, key crop development stage dates, yield and details of pest, weed and disease crop protection product use.

Further information is collected about crop rotation, cultivation strategy, fertiliser and manure inputs across the rotation, regional weather conditions (including water availability and solar radiation), crop biomass, yield components, seed physical quality and seed nutritional content.

These assessments will be jointly carried out by the trialist and the researchers to ensure the samples are collected at the proper intervals. This will enable the field lab participants an opportunity to assess how their crop performed compared to other UK growers and assess possible improvements for the following season, if needed. Due to costing, one YEN entry per trialist is viable. Bean YEN is an excellent tool to baseline Scottish grown winter beans to other UK bean growing regions within the same growing season.

Beyond bean YEN, the data captured for each variety will be at key growth stage dates (GS10, GS34, GS60 and GS69 -Growth stages of mono-and dicotyledonous plants – BBCH Monograph). Each variety will also be monitored for pest and disease pressures and any differences will be evaluated. Plant counts before and after winter, to determine winter hardiness will also be captured. The final data point will be yield, which will be collected using yield mapping or weighbridge. Data will be collected by the trialist and researcher along with reminders from the coordinator. If a problem arises for the data to be collected at the determined intervals, it will be communicated immediately to the coordinator.

Data will be analysed using appropriate data analysis techniques for this type of trial.

Guidelines laid out in ‘Guide to Farmers’ Crop Trials’ (ADAS 2018) will be used to provide growers and researchers with information about how best to conduct farm trials - https://yen.adas.co.uk/sites/default/files/2019-10/ADAS%20Guide%20to%20Farm%20Trials.pdf