**BBRO PROJECT REPORT FORM**

**Please note the details on page 2 will be used to formulate the BBRO printed Annual Report.**

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| **Project Title:**

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| **Maximising the benefits from cover crops through species selection and crop management (Maxi Cover Crop)**  |

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| **BBRO project no:**  | **BBRO part-funding of larger AHDB /ADAS project to facilitate a cover crop trial prior to sugar beet cropping in 2019 to be undertaken.** |
| **Project sponsor:**  | **Dr Simon Bowen/ Dr Anne Bhogal (ADAS)** |
| **Final report** (delete as appropriate) |
| **Project lead or student name:** |  |
| **Project mentor or supervisors:** |  |
| **Report Date:** |  |
| **Reporting period covered:****(e.g. 1/1/16 - 31/12/16)** | **2019 (sugar beet cropping)** |
| **Timeline (e.g. Year 1 of 4)** |  |
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| BBRO use only | Date assessed:  |
|  Assessors comments |  |
|  Action required |  |

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| **Project summary for BBRO Publication (no more than 300 words)** |
| A range of cover crop species ahead of sugar been showed varied establishment with a range of biomass dry matters measured between 0.2 and 2.1 t/ha. Oil radish, two mixed species treatments and Phacelia showed much greater biomass production than other single and species mixtures. Buckwheat was found to be very intolerant of frost.Measurement of yields showed no significant effect of cover crops on sugar beet yields. |
| **Short summary of key objectives** |
| Part-funding allowed the original AHDB/ADAS project to be extended for a further year to include cover crops being grown ahead of sugar beet at the trial site at Stetchworth in Suffolk on a light sandy loam soil. The objective was to assess establishment of a range of different species of cover crops on soil properties and sugar beet yields. BBRO undertook yield assessments. ADAS undertook cover crop and soil property measurements.The results were linked to the wider scope of the Maxi cover crop project, providing greater insight to the potential value of cover crops. |
| Insert picture/graph | Insert picture/graph |
| **Outcomes/Key messages for growers and industry** |
| The wider results of the Maxi Cover Crop project have shown that: • Early establishment (August rather than September) is important to maximise the benefits of cover crops, particularly to ensure good crop cover and nutrient recovery. Typically, the different cover crops yielded between 1 and 3 t/ha aboveground biomass and took up between 30 and 50 kg N/ha, although up to 90 kg/ha N was recovered following early establishment at one of the sites. • Highest N recovery was achieved by using either species that were able to fix N from the atmosphere (i.e. clover and vetch) or establish good above or below ground biomass, early in the season (e.g. radish, phacelia and rye). • Rye produced the largest root length early in the season. Phacelia also rooted well although the roots were slower to develop. By the time the cover crops were destroyed (February), phacelia had produced the greatest amount of roots, particularly in the topsoil, and it also had the narrowest roots, suggesting it explored more of the soil for a given root biomass compared to the other cover crop treatments. There was no relationship observed between the amount of cover crop rooting and rooting of the following spring cash crop. • Soil structural improvement from a single year of cover cropping was difficult to detect. However, at two of the tramline trial sites with medium textured soils, penetration resistance, bulk density and visual structural scores were lower (i.e. ‘better’) where cover crops had been grown indicating improved soil structure and workability. Earthworm numbers were also increased where a five species mix (comprising phacelia, oats, oil radish, clover and buckwheat) had been grown. • Cover cropping on heavy textured soils can result in increased topsoil moisture content, probably as a result of the vegetative cover preventing evaporation from the soil surface. Late destruction and incorporation of a high cover crop biomass (< 1 week prior to drilling) resulted in poor seedbed conditions for the establishment of the following cash crop, which led to lower crop yields. • Cereal cover crops (as a single species) should not be grown ahead of a spring cereal cash crop. At the experimental sites, spring barley establishment, rooting to depth and grain yields were all reduced following oat and rye cover crops. The reason for this is uncertain, but N immobilisation, and pest and pathogen carry-over (‘green bridge’) have been cited as possible causes. A buckwheat cover crop may enhance P availability to the subsequent cash crop. At the experimental sites, there was a trend for higher phosphorus concentrations in spring barley grain following a buckwheat cover crop compared to the control (volunteer/weeds). It is uncertain what the mechanism is for this, as rooting by the buckwheat and total above ground biomass production was low compared to the other species evaluated. • A single year of cover cropping does not improve gross margins. Nearly all the cumulative (2 year) margins calculated across the sites (20 comparisons) showed a reduction in margin from growing a cover crop compared to no cover crop (ranging from + £64/ha following oil radish on a clay loam to - £476/ha following a two species mix on a clay soil). The lower margins were caused by an absence of sufficient yield increases to compensate for the additional seed and establishment costs. The benefits from changes in soil physical properties or nutrient dynamics are unlikely to appear within the 2 years of the project so the longer-term use of cover crops over a full rotation (including more than one year of cover cropping) is required to fully assess the impact on margins. Moreover, non-tangible benefits such as improved water quality, erosion control and enhanced biodiversity should be considered as a wider public good.  |

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| **Section 1: To be completed by Project Lead:** |
| **Other project objectives (not listed on previous page)** |
| **Milestones for current period** |
| **Note: mentors will be asked to comment on the status of this project (yellow column) using the scoring system in section 2.** |
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| **Summary of results (including figures and tables)*****For Project Annual Report****: please provide a 2 page summary of key findings from the reporting year.****For Project Final Report:*** *please provide a summary of project findings and outcomes with relevant supporting data.* |
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| **Annual report: Key issues to be addressed next year:** |
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| **Publication of results to date/planned publications**: |
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| **Section 2: To be completed by project mentor** |
| **Status - Mentor’s scoring system for interim reports.** |
| Red | “Major concern - escalate to the next level" Slippage greater than 10% of remaining time or budget, or quality severely compromised. Corrective Action not in place, or not effective. Unlikely to deliver on time to budget or quality requirements. |
| Amber | "Minor concern – being actively managed” Slippage less than 10% of remaining time or budget, or quality impact is minor. Remedial plan in place |
| Green | "Normal level of attention" No material slippage. No additional attention needed |
| **Milestone** | **Comments + action required** | **Status** **R/A/G** |
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| **Is the project on track to meet the stated objectives? (please comment in relation to milestones and the status score awarded in section 1).** |
| **Are conclusions scientifically robust? (please comment on data analysis/interpretation)** |
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| **For final reports only:**  |
| **How would you rate the project against the following criteria (please give a score out of 10, with 10 being highest)**1 ) The project met its original objectives:2) Contribution to scientific knowledge:3) Direct relevance to growers: |