Grower Summary

Sustainable soil management for stand longevity and yield optimization in asparagus

FV 450b

Final report 2022

Project title:	Sustainable soil management for stand longevity and yield optimization in asparagus
Project number:	FV 450b
Project leader:	Dr Rob Simmons, Cranfield University
Report:	Final Report, July 2022
Key staff:	Dr Lucie Maskova and Dr Lynda Deeks
Location of project:	Gatsford, Ross-on-Wye
Date project commenced:	01/07/2021
Date project completed (or expected completion date):	30/06/2022

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The results and conclusions in this report are based on an investigation conducted over a three-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

GROWER SUMMARY

Headlines

- The results of this study confirm the previous findings of the FV450 and FV450a projects that asparagus yield, profitability, alleviation of soil compaction, increased infiltration and improved soil health can be achieved by moving away from conventional practice and adopting one of several alternative Best Management Practice (BMP) options.
- PAS 100 Compost applied annually to asparagus interrows in combination with shallow soil disturbance (SSD) without annual re-ridging continues to result in significant (>20%) yield uplift, reduced in soil compaction, improved infiltration rates and improved profitability as compared to conventional practice.
- Zero-tillage also referred to as 'ridging for the life of the crop' continues to result in significant (>20%) yield uplift, improved yield and profitability, reduced soil compaction and improved soil health as compared with conventional practice.
- Companion cropping with rye (*Secale cereale*) with annual re-ridging, can result in >20% yield uplift as compared to conventional practice. However, non-ridging carries a risk of a 20% yield penalty compared with conventional practice suggesting that growers need to be confident that they can re-ridge if rye is grown as a companion crop for run-off and erosion control.

Background

Conventional operations associated with UK asparagus production, i.e., tillage operations, such as ridging and sub-soiling, spray operations, harvesting (foot-trafficked and/or hand harvested using picking rigs) can result in progressive and severe compaction of all inter-bed wheelings. In addition, research undertaken over the last 20 years has demonstrated that root damage associated with annual re-ridging has a major impact on stand longevity and productivity and increases the susceptibility to crown and root rots caused by *Phytophthora* and *Fusarium* species.

Further, compaction of wheelings leads to a significant reduction in infiltration resulting in an increased risk of surface water ponding and on sloping land, run-off generation and erosion. In turn, surface water ponding and/or erosion compromises field operations by restricting foot and vehicular traffic, and water ponding in furrows increases the risk of crown and root rots leading to yield decline.

The long-term field trials established under this project have evaluated a range of best management practices (BMPs) to prevent and/or mitigate compaction, improve soil structural status in asparagus wheelings and facilitate long-term profitability of asparagus production.

Summary

This report represents the continuation of research activities initiated in 2016 under FV 450, continued until the end of June 2021 under FV 450a (Figure 1) and further pursed under FV 450b.

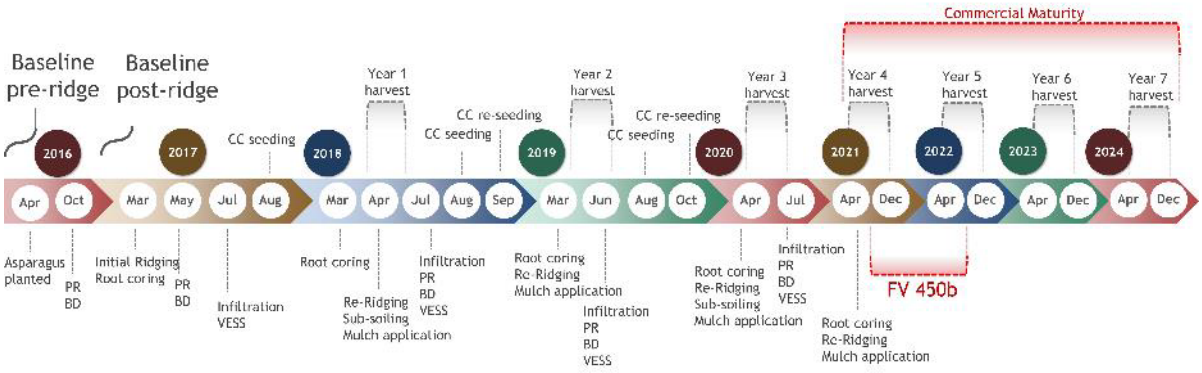

Figure 1. FV 450 / FV 450a and FV450b project timeline indicating activities undertaken to date and period of commercial maturity.

Financial Benefits

This project has provided information on the state of asparagus soils and provides focused, practical and robust guidance on how to identify and alleviate compaction and water-logging in asparagus interrows, thereby reducing the risk of asparagus decline, increasing asparagus yields and farm profitability, while minimising environmental impact. In addition, this project has also provided research outcomes that can feed directly into policy discussions associated with the Environmental Land Management scheme (ELMS) scheme such that asparagus growers can receive ‘financial reward in return for delivering environmental benefits’.

Cost-benefit analysis for the 2021 harvest demonstrated potential revenue increases for the Zero-tillage, Oats non-ridged (NR), PAS 100 NR, PAS 100 ridged (R), Rye R and Straw Mulch NR treatments of 64%, 61%, 96%, 63%, 52% and 52%, as compared with Conventional practice, respectively. In 2022, only Zero-tillage, PAS 100 NR and Rye R treatments were associated with significant 48%, 61% and 48% higher potential revenues as compared to the Conventional practice.

In 2021, Zero-tillage and Bare soil SSD NR of Guelph Millennium treatments were associated with significant 40% and 45% higher potential revenues as compared to the equivalent Gijnlim treatments. Similarly, in 2022, Zero-tillage, Bare soil SSD NR and Bare soil SSD R Guelph Millennium treatments were again associated with significantly higher potential revenues as compared to the equivalent Gijnlim treatments.

Action Points

1. In order to prevent storage root damage through re-ridging or subsoiling operations, growers should undertake exploratory root profile distribution surveys prior to commencing re-ridging and/or sub-soiling operations. Guidance on how to undertake asparagus root coring can be found at: https://www.youtube.com/watch?v=Lms3GfRgiXM.
2. Compost and mulches: Use PAS 100 compost and straw mulch treatments in combination with shallow soil disturbance to significantly reduce soil compaction to 0.5 m depth as compared with conventional practice. This will result in improved infiltration, soil moisture recharge and reduced run-off and erosion risk.