

Exploring the potential of cover crop integration for soil health in vining peas

¹Lea Herold, ¹Becky Howard, ¹Tom Jelden, ²Andrew Whiting, ³Paul Hayward, ³Richard Bolden, ³Tamara Hall, ³Chris Byass.

Introduction

Intensive production of fresh-harvested vining peas for the frozen food market has impacted on soil health, leading to yield decline. Efficient, long-term crop production relies on healthy soils which harbour diverse microbial communities and have good soil structure. Cover crops can be employed to improve the condition of agricultural soils by reducing compaction and improving soil structure, helping root penetration and drainage. The aim of this project is to investigate whether cover crops can improve pea yields and positively contribute to the economic and environmental sustainability of the pea industry by improving soil health.

Methods

Three field trials were established in autumn 2016 and four different cover crop mixtures were planted in each field. Common vetch and oil radish were planted as pure crops. Intensiv is a mixture of 20% oil radish and 80% Saia oats. Universal is a mixture of 60% Saia oats, 20% Phacelia and 20% Berseem clover. A control strip without any crops was maintained. In spring 2017, vining pea crops were planted and peas were harvested in July 2017. Before harvest, pea height, fresh and dry weight and pea health were measured. Soil samples were taken to measure soil nutrient and organic matter contents. Pathogen levels in soils of two pea foot rot pathogens, *Fusarium solani* and *Didymella pinodella*, were determined. Soil structure was described using Visual Evaluation of Soil Structure.

Results



Figure 1: Overview of the pea crop in field Molescroft 61B in June 2017. Peas towards the right hand side of the field are visibly greener and less affected by foot rot that peas towards the left hand side of the field. Cover crop mixtures Intensiv and Universal had been grown in strips on the right hand side of the field.

Figure 2: Plant height of pea plants 27 days prior to harvest. Pea plants were measured in strips of the field where cover crops had preceded the pea crop. Height of pea plants grown in soils that had radish or the Universal mixture as preceding cover crops was significantly greater than height of control plants ($p < 0.05$).

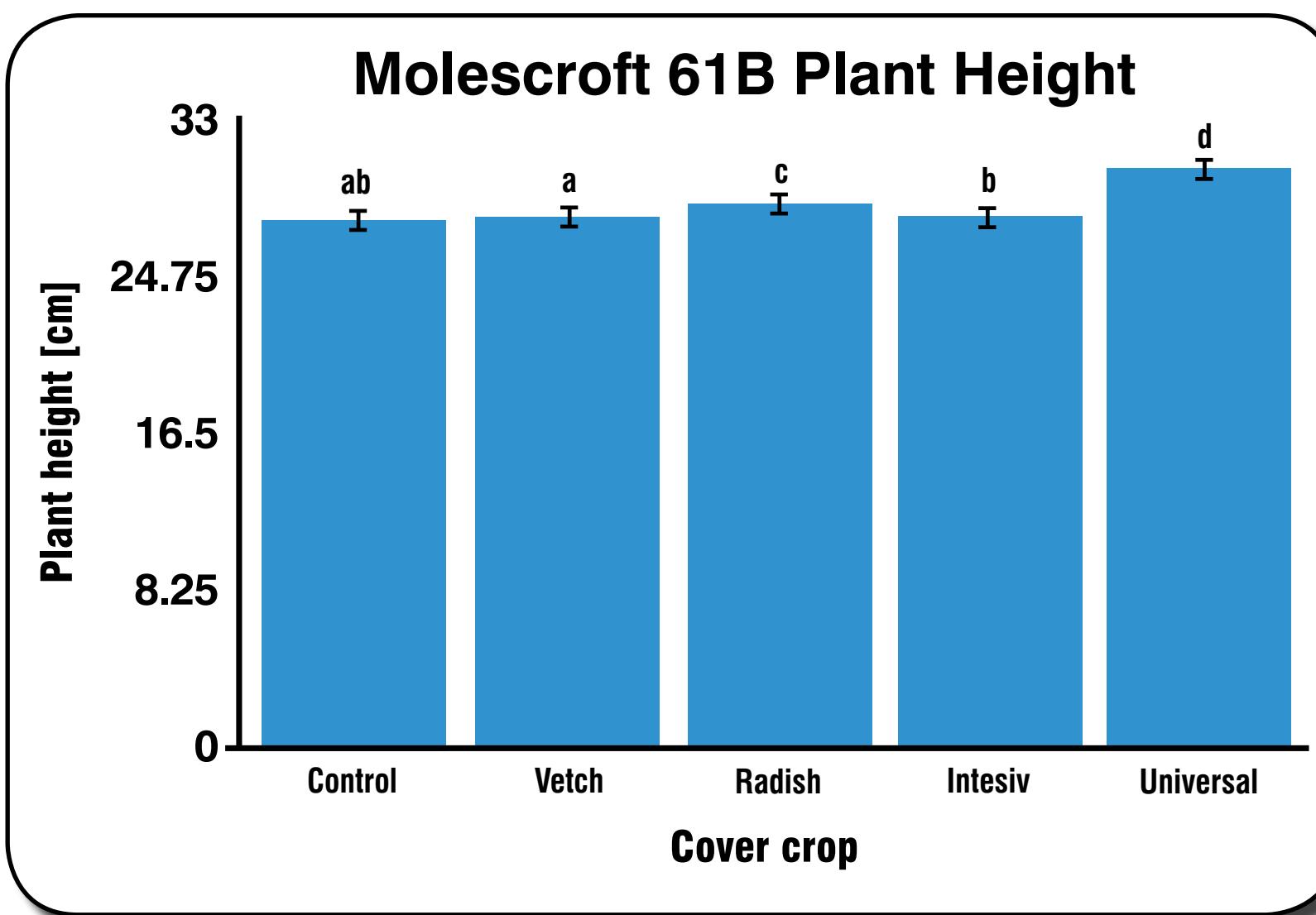


Figure 3: Plant dry weight of pea plants per meter square 5 days prior to harvest. Pea plants were measured in strips of the field where cover crops had preceded the pea crop. Dry weights of pea plants grown in soils that had the Intensiv or the Universal mixtures as preceding cover crops were significantly greater than dry weights of control plants ($p < 0.05$).

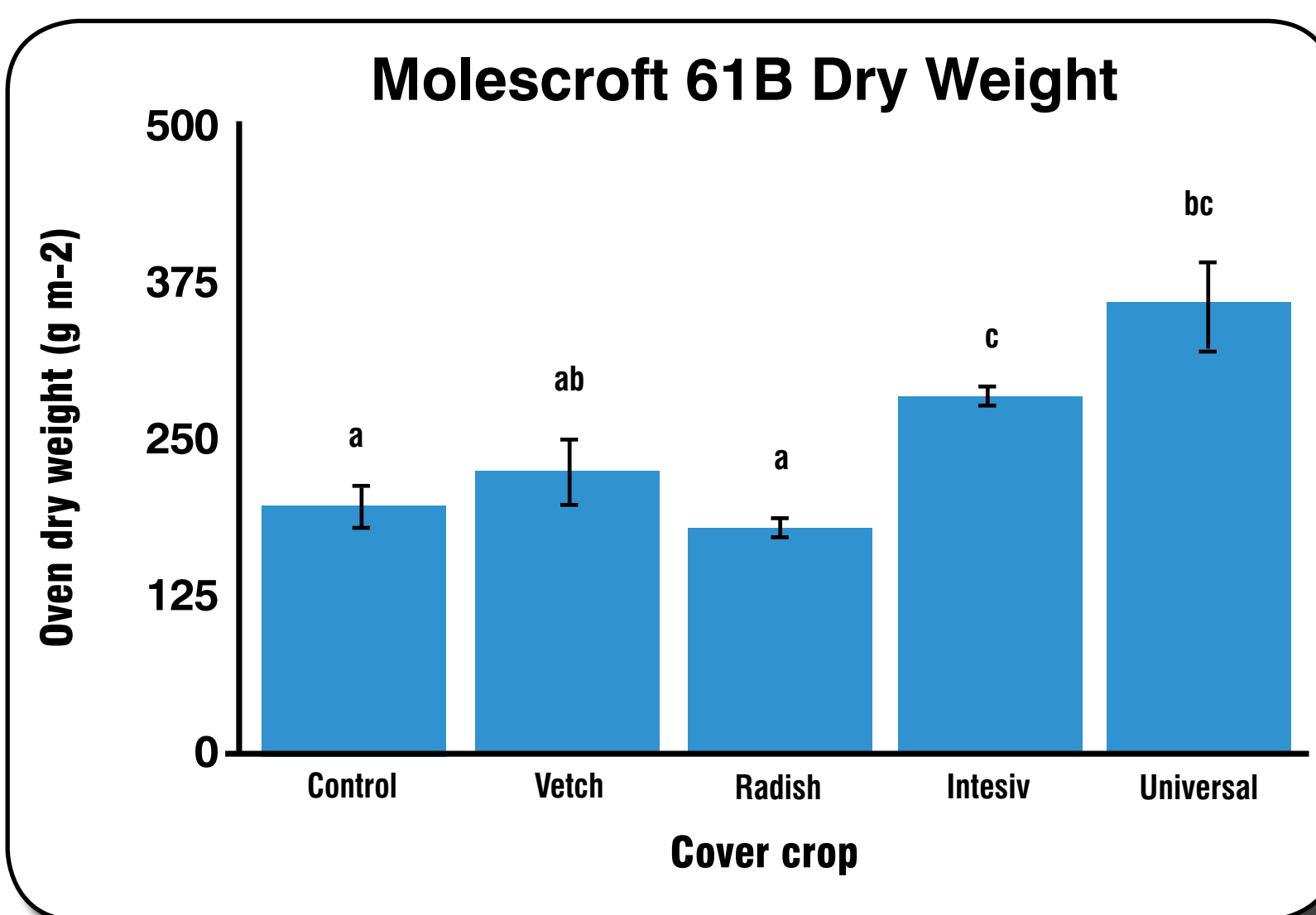


Figure 4: Percentage of pea plants visually infected with foot rot 27 days prior to harvest. Pea plants were assessed in strips of the field where cover crops had preceded the pea crop. Foot rot infection in pea plants grown in soils that had vetch, the Intensiv or the Universal mixtures as preceding cover crops was significantly reduced compared to foot rot infection in the control plants ($p < 0.05$).

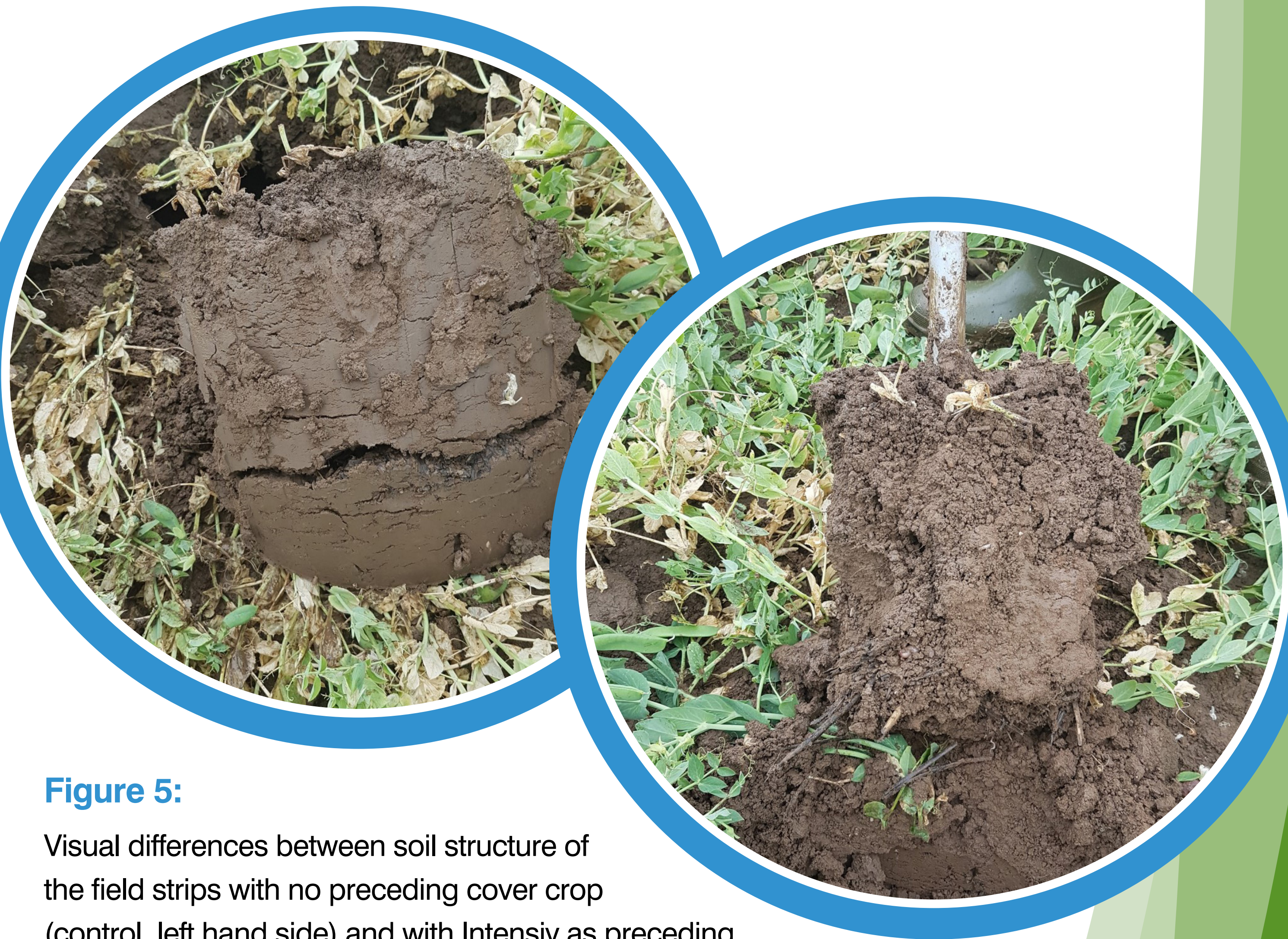
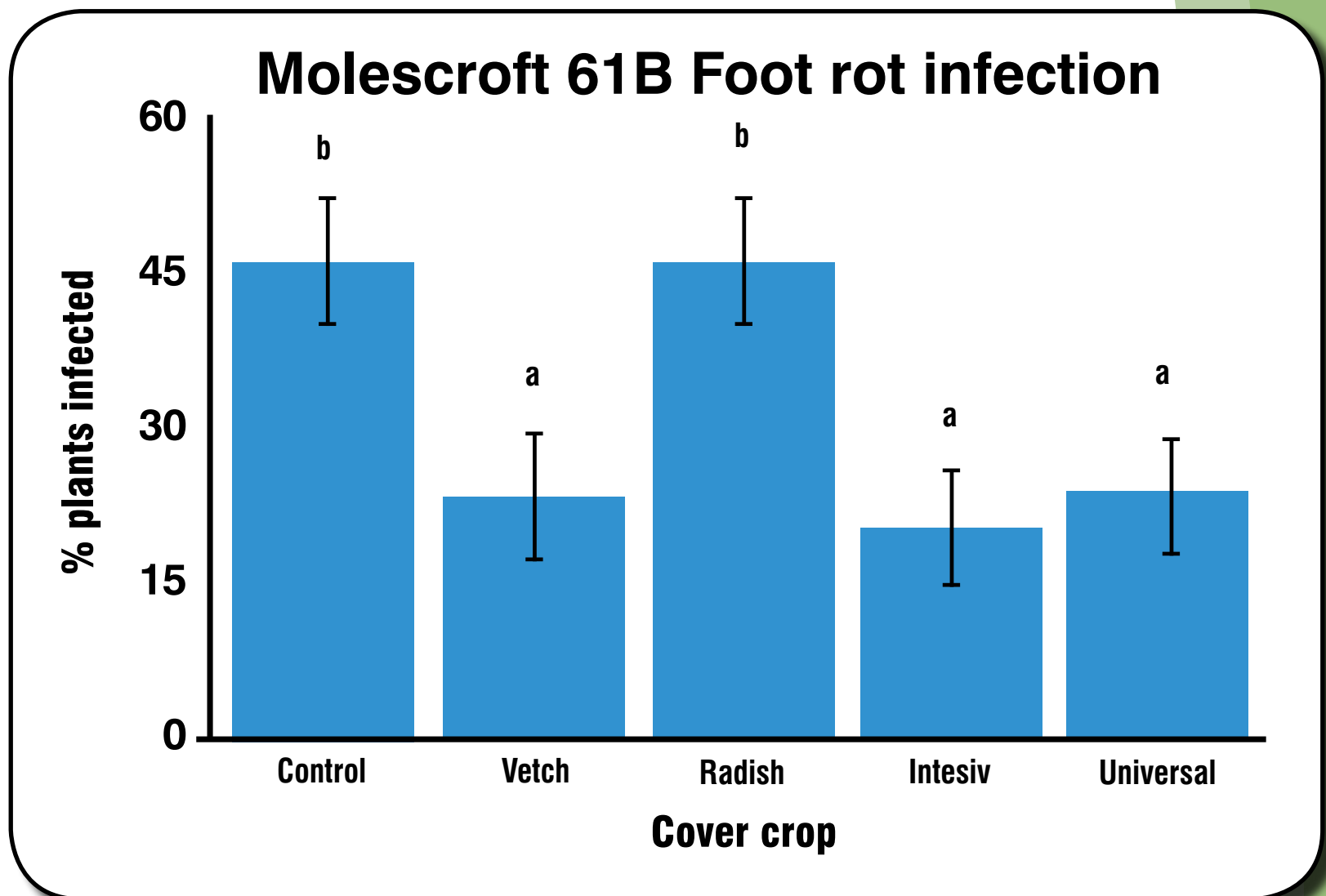


Figure 5: Visual differences between soil structure of the field strips with no preceding cover crop (control, left hand side) and with Intensiv as preceding crop (right hand side) in field Molescroft 61B 5 days prior to pea harvest.

Conclusions and future work

Results from the first year of the study indicated that cover crops improved soil structure, leading to larger and healthier pea crops. Initial results did not indicate that legumes in cover crop mixtures increased foot rot disease pressure. Results presented here are based on one year and one field site only and two more field trials at three different field sites per year will be planted over the next two seasons.

Acknowledgements

PGRO, The Green Pea Company and Birds Eye receive funding from the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-Agri). The cover crop mixtures are supplied by Elsoms Seeds.



¹Processors and Growers Research Organisation, The Research Station, Great North Road, Thornhaugh, Peterborough, PE8 6HJ, UK.

²Birds Eye Ltd., Whapload Road, Lowestoft, NR32 1RX, UK.

³The Green Pea Company, BGA House, Nottingham Road, Louth, LN11 0WB, UK.

