



The Integrated Management of the Bean Seed Fly

Bean Seed Fly Meeting 2023: 5th January 2023

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Contents



Introduction: The Bean Seed Fly & IPM



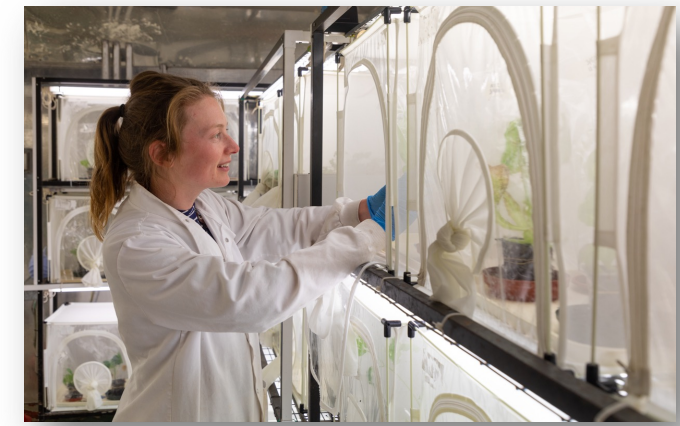
Aims & objectives



Findings



Current conclusions





Introduction: What is the Bean Seed Fly?

- Bean Seed Fly (BSF): Complex of two species (Diptera: Anthomyiidae)
- Root maggot: Feeding on the seed and stem of a wide range of crops
- The problem: Lack of effective insecticides (especially seed treatments)



*Delia platura*¹



*Delia florilega*¹



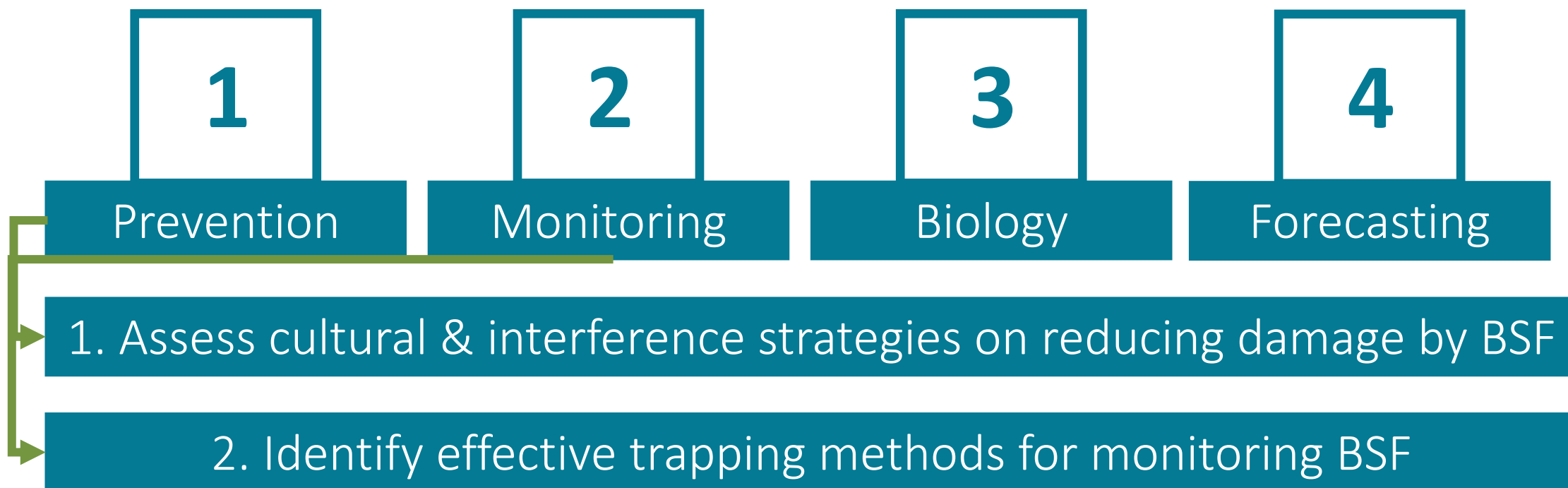
Symptoms of BSF damage^{2,3}



Project Aim:

Contribute towards an integrated pest management strategy to reduce crop and economic losses caused by the BSF

Objectives:





Objective One

Preventing damage by using cultural & interference strategies

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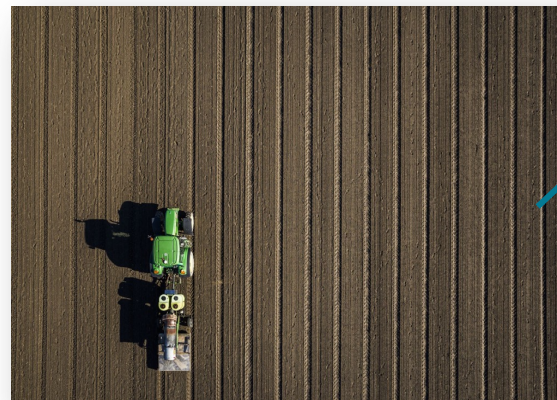


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Cultivation & Covering a Crop

- **Cultivation:** BSF are stimulated to lay eggs in areas of organic matter such as recently cultivated soils⁴
- **Covering the crop:** Row covers may prevent BSF from reaching the soil to lay eggs^{5,6}



1

Can the timing of cultivating a plot in relation to sowing the seed reduce damage caused by BSF?

2

Can the timing of covering a plot with a fine mesh in relation to sowing the seed reduce damage caused by BSF?

Why ask these questions?



Prevents larval feeding on the crop



Methods

- 7 replicated field trials
- Vining peas:
 - 46 seeds/m & 3 – 7 cm depth
 - Repeated 4 times
- French beans:
 - 20 seeds/m & 3 – 7 cm depth
 - Repeated 3 times
- Power harrow & fine mesh
- 2021: Low numbers of BSF

Cultivation (days before sowing)	Crop Covering Timing
21	No covering
14	Day of sowing
7	Day after sowing
3	
1	
0	



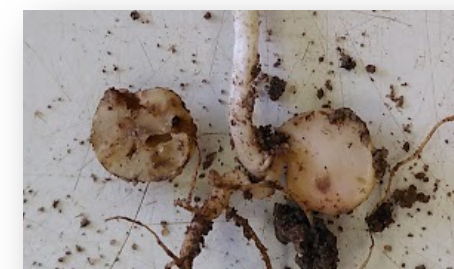
Number of seeds/plants containing larvae



Number of emerged plants



Number of 'baldheaded' plants



Number of seeds with suspected BSF tunnelling



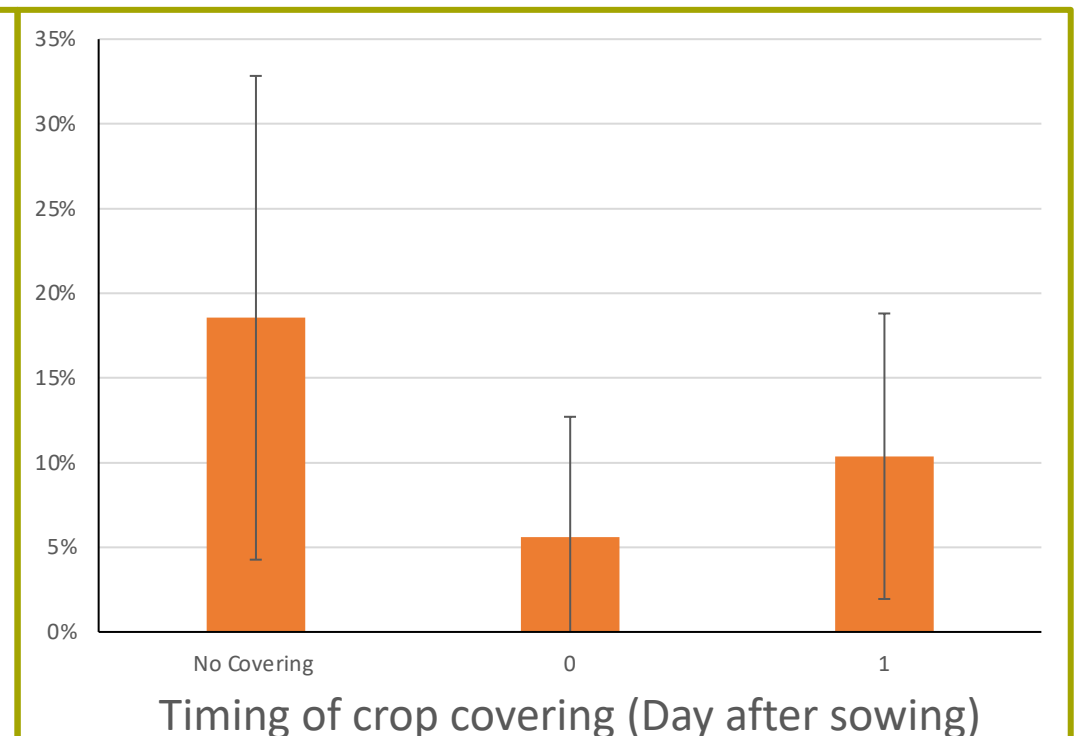
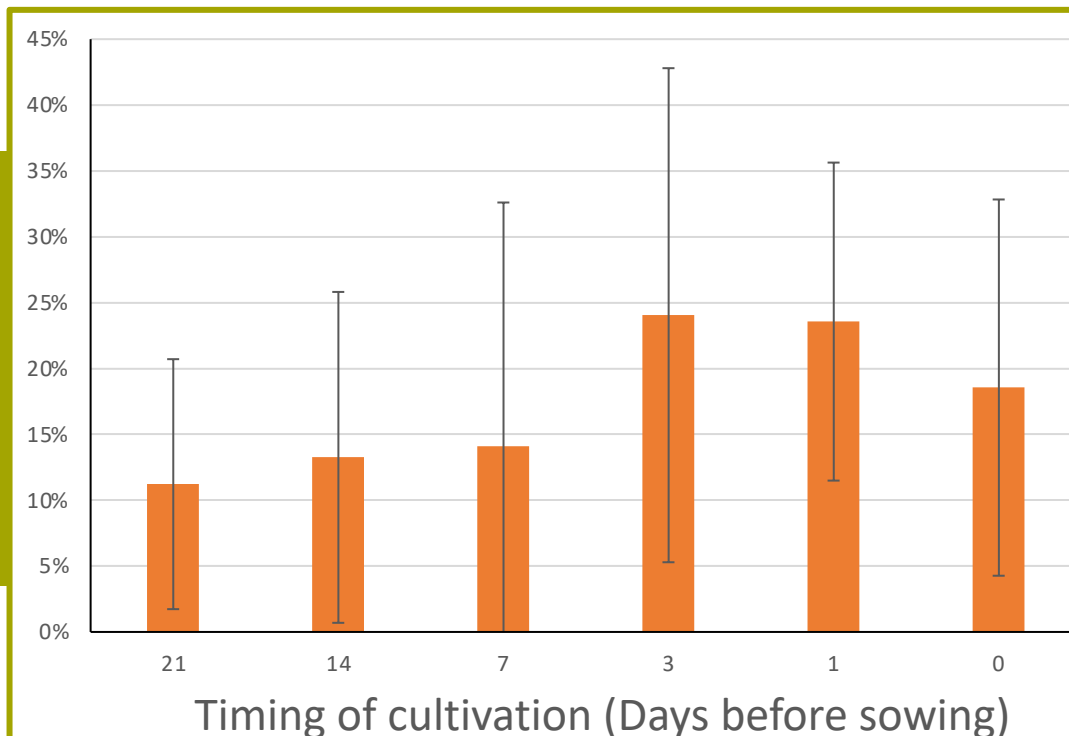
Vining Peas – 2022

- No significant difference but a trend?
- Large variation
- High level of disease?



Number of seeds with suspected BSF tunnelling

Mean proportion of seeds with tunnelling in the seed (per inner middle 2m/plot)

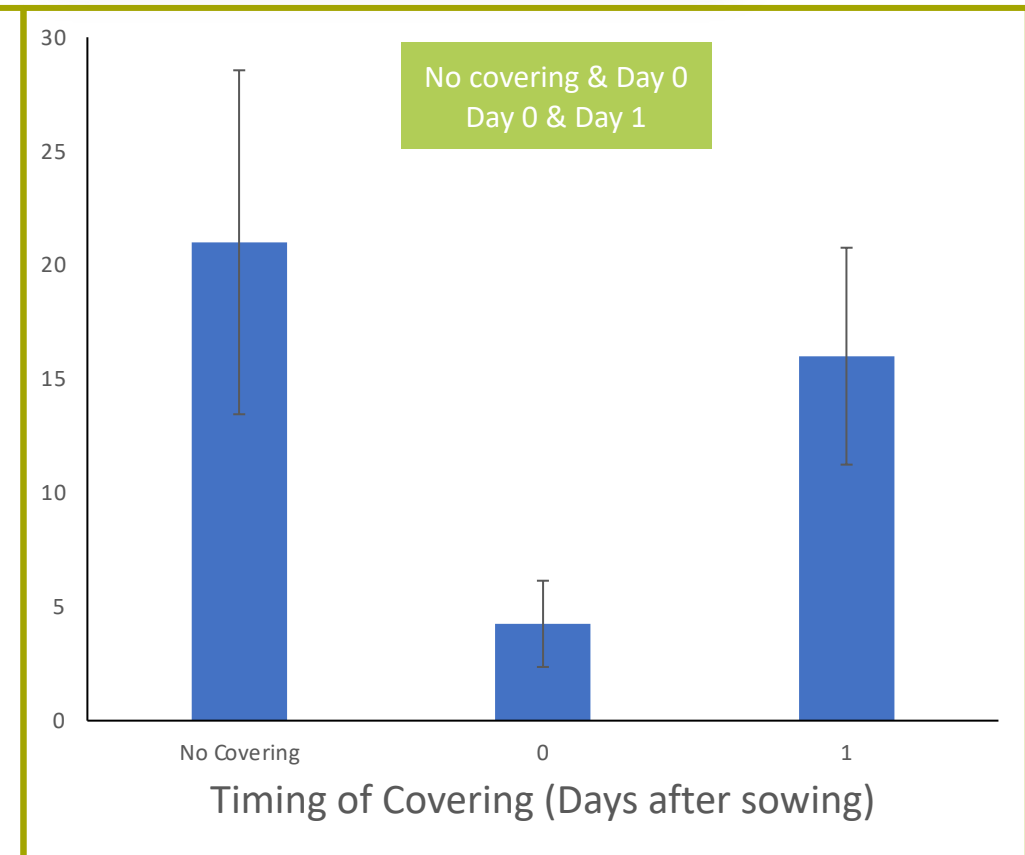
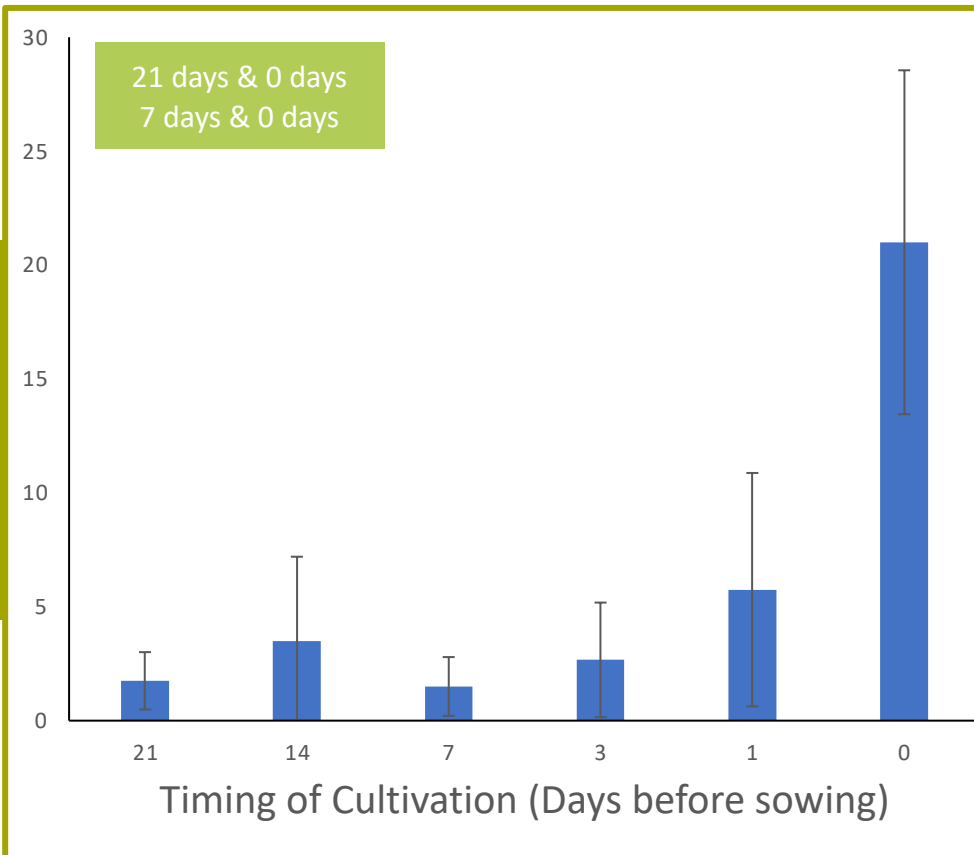


French Beans – 2022

- First repeat: Sowing date: 23/06/22
- Significant differences:
 - Cultivation ($P = 0.03$) & timing of covering ($P = 0.003$)



Number of 'baldheaded' plants

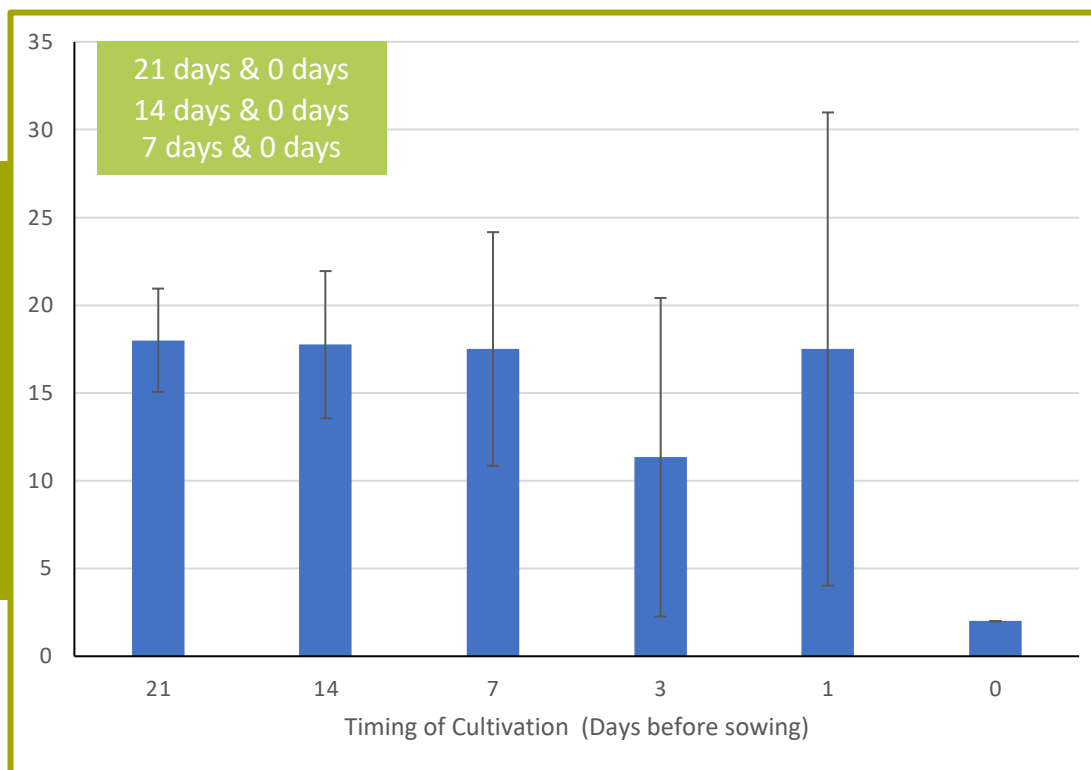


Mean number of 'baldheaded' plants (per inner middle 2m/plot)



French Beans – 2022

- First repeat: Sowing date: 23/06/22
- Significant differences: $P = 0.005$

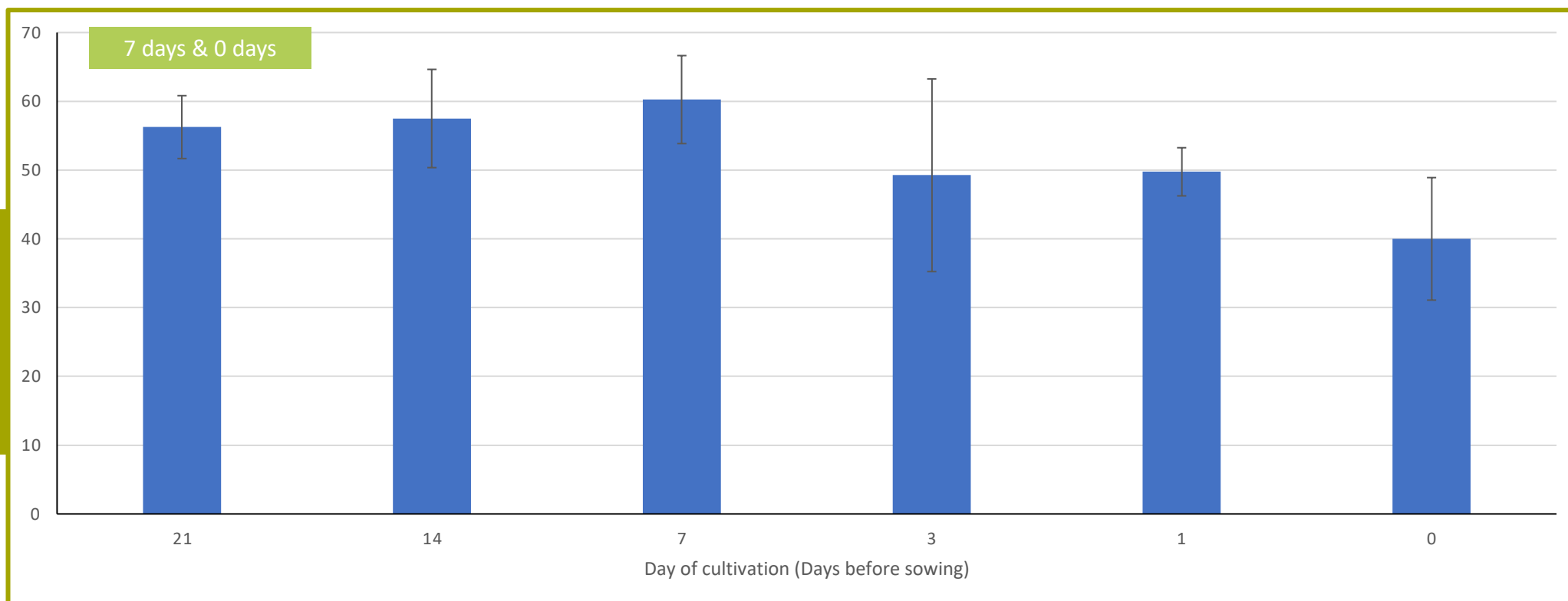


No symptoms (no lesions in leaves or 'baldheadedness')



French Beans – 2022

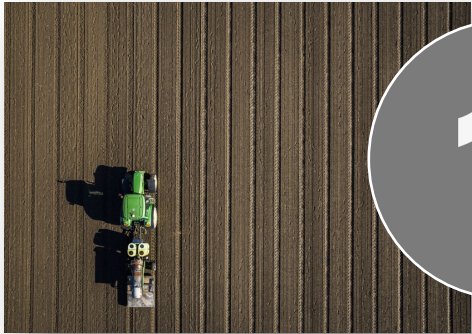
- Second repeat: Sowing date: 11/08/22
- Significant differences: $P = 0.023$
- Reduced BSF numbers at this time of year



Mean number of emerged plants (per inner middle 2m/plot)



Conclusions



1

Can the timing of cultivating a plot in relation to sowing the seed reduce damage caused by BSF?



2

Can the timing of covering a plot with a fine mesh in relation to sowing the seed reduce damage caused by BSF?



Yes – in French Beans

Considerations

- Delaying cultivation: Delay by at least 7 days
- Covering: Cover as soon as possible after sowing the crop
- Vining peas:
 - 2021: Low levels of BSF = low levels of damage?
 - 2022: Increased disease = Difficult to observe potential BSF damage



Prevents larval feeding on the crop



Objective Two

Monitoring fly activity on blue sticky traps



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Blue Sticky Traps

- BSF can be easily confused with similar species
- Sticky traps catch more BSF than yellow water traps⁷
- Blue sticky traps catch larger ratios of BSF to Cabbage Root Fly⁸
- Blue sticky traps containing a lure catch more BSF than traps not containing a lure (Presented these results last year)
- What are the most effective methods of setting up a blue sticky trap so that more BSF are caught?





Research Question

1

Does the height of a blue sticky trap affect the number of BSF to be caught on the trap?

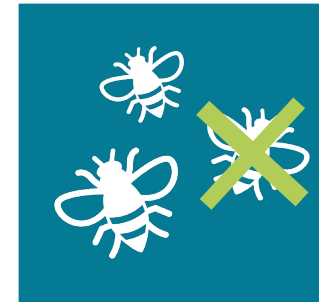
2

Does the orientation of a blue sticky trap (curly vs horizontal) affect the number of BSF to be caught on the trap?

3

Does the proportion of a blue sticky trap that is covered by insects affect the number of BSF to be caught on the trap?

Why ask these questions?



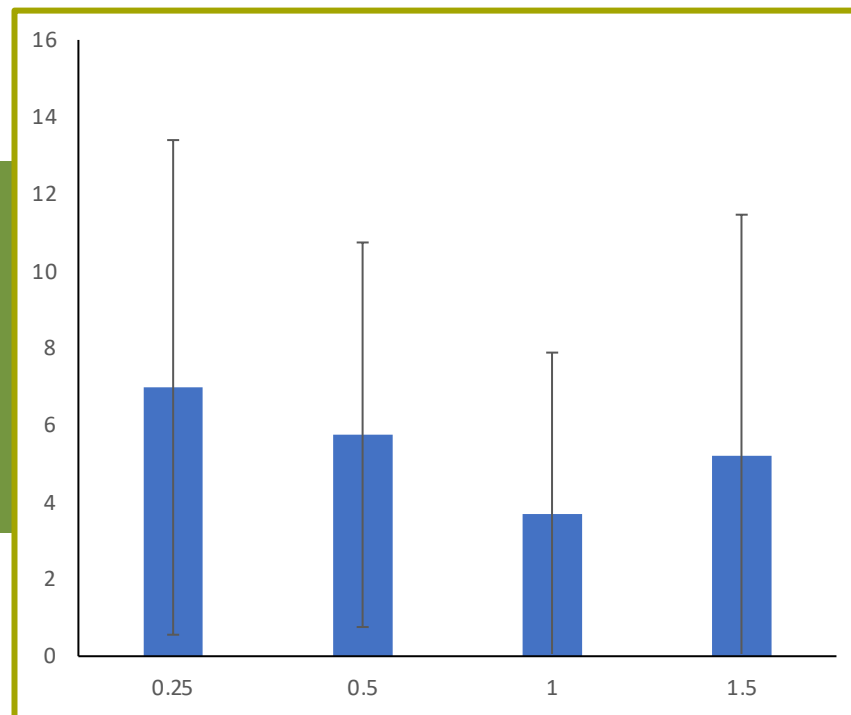
Traps that catch
more BSF than
similar species



Results: Trap Height

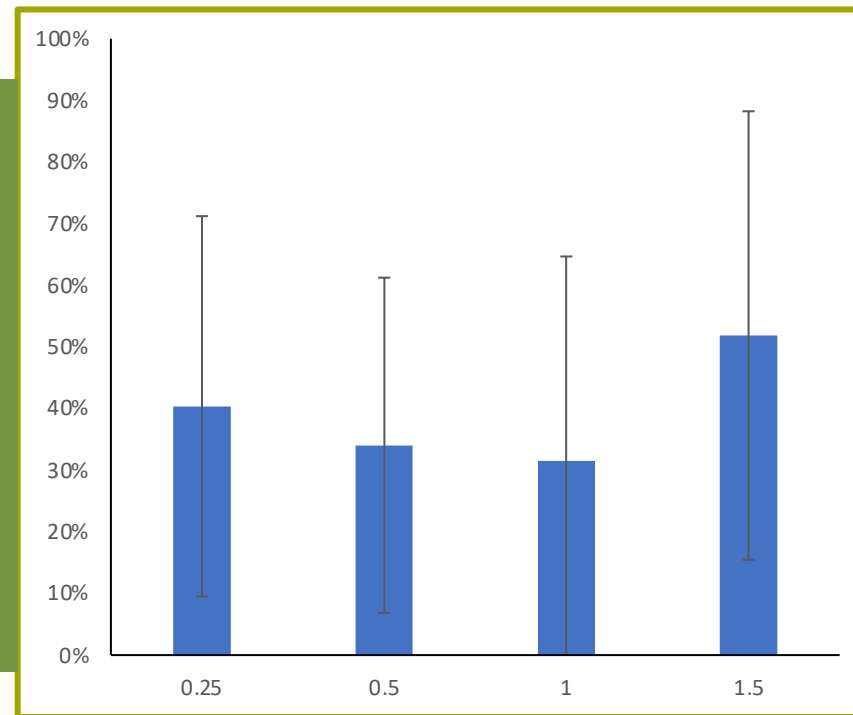
- 4 replicates in space & 4 repeats in time
- No significant difference

Mean BSF
Count (per
trap)



Trap height (m)

Mean
proportion
of BSF (per
trap) (% of
Diptera)



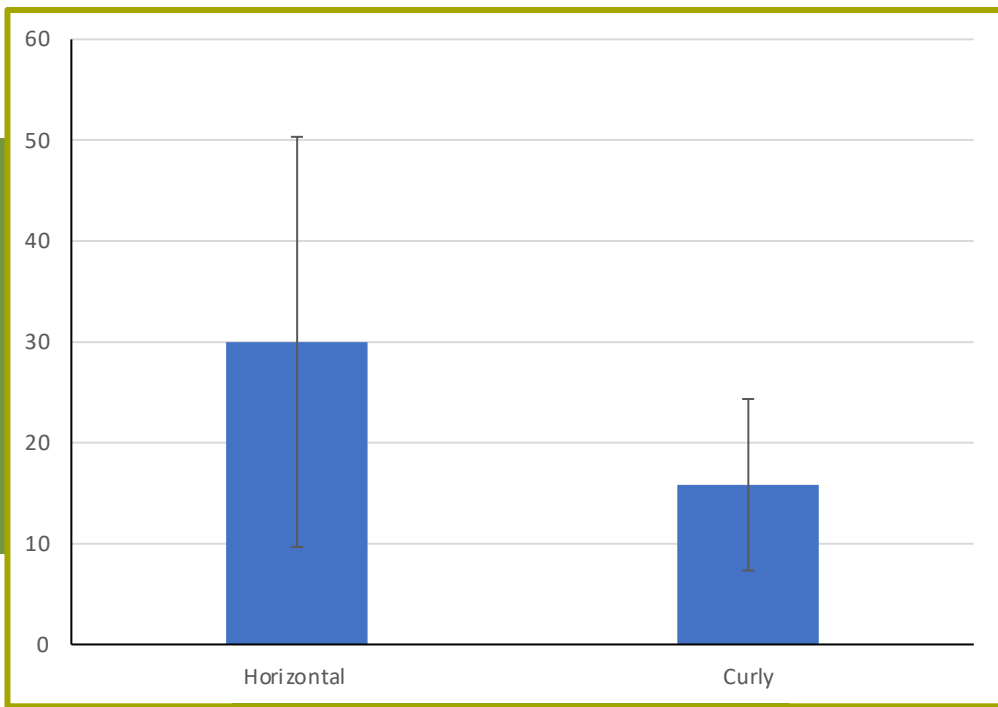
Trap height (m)



Results: Trap Orientation

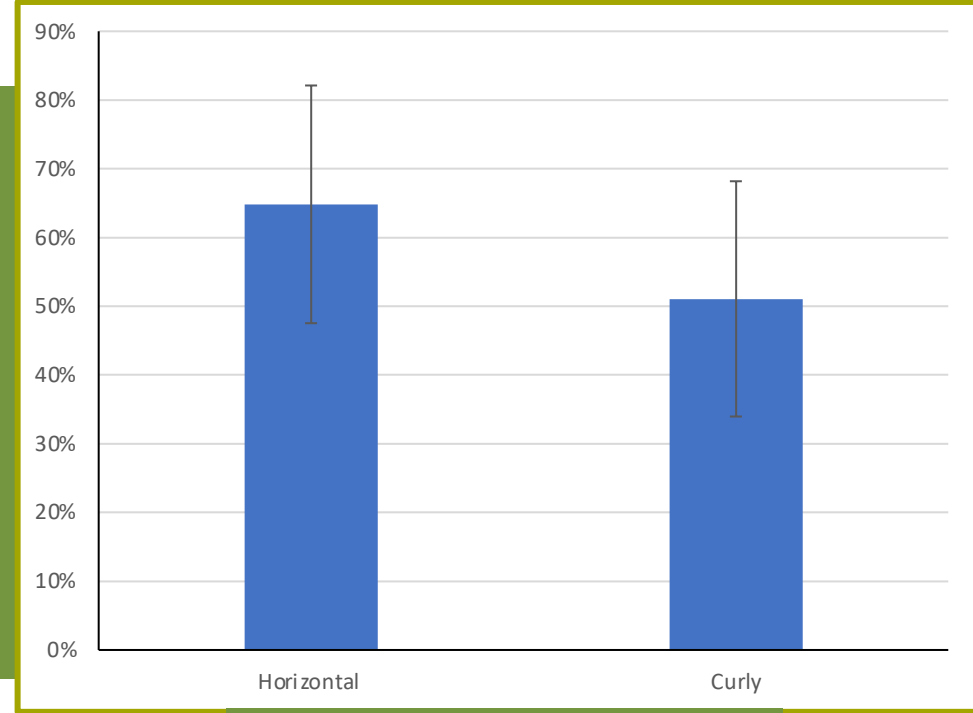
- 4 replicates in space & 4 repeats in time
- Stats tests: TBC

Mean
BSF
Count
(per
trap)



Trap orientation

Mean
proportion
of BSF (per
trap) (% of
Diptera)

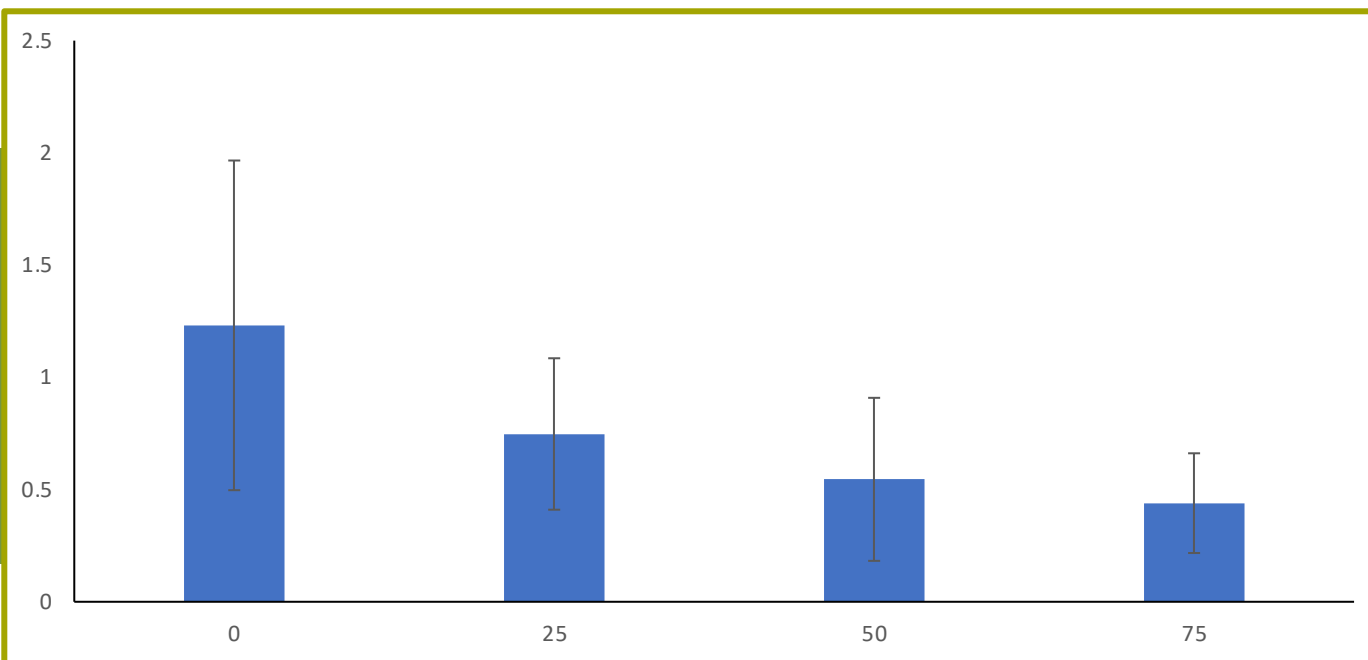


Trap orientation



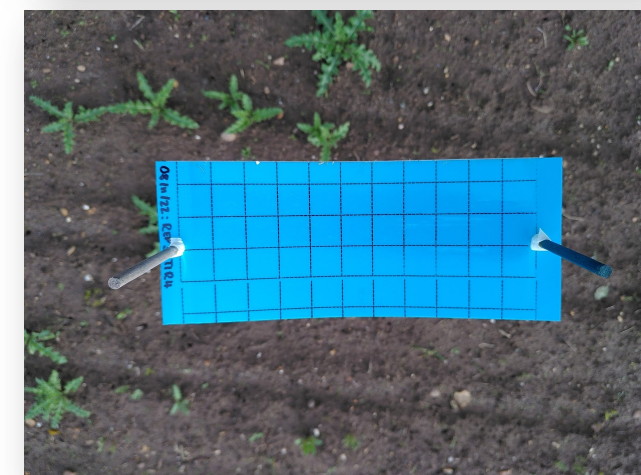
Results: Proportion covered by insects

- 4 replicates in space & 3 repeats in time
- Proportion of trap covered by black card
- Stats tests: TBC but a trend?



Mean
BSF
Count
(per
2cm²)

Trap covered with black card (%)





Summary of findings

1

Does the height of a blue sticky trap affect the number of BSF to be caught on the trap?

No

2

Does the orientation of a blue sticky trap (curly vs horizontal) affect the number of BSF to be caught on the trap?

Horizontal traps seem to catch more BSF

3

Does the proportion of a blue sticky trap that is covered by insects affect the number of BSF to be caught on the trap?

Traps with less covering with black card seem to catch more BSF



Current Conclusions & Advice for Monitoring BSF

- Blue sticky traps
- Lure
- Horizontal
- Leave traps out for 1 – 2 days

Future Work

- Complete data analysis and summarise all of the data



Traps that catch
more BSF than
similar species





Conclusions (So far...)

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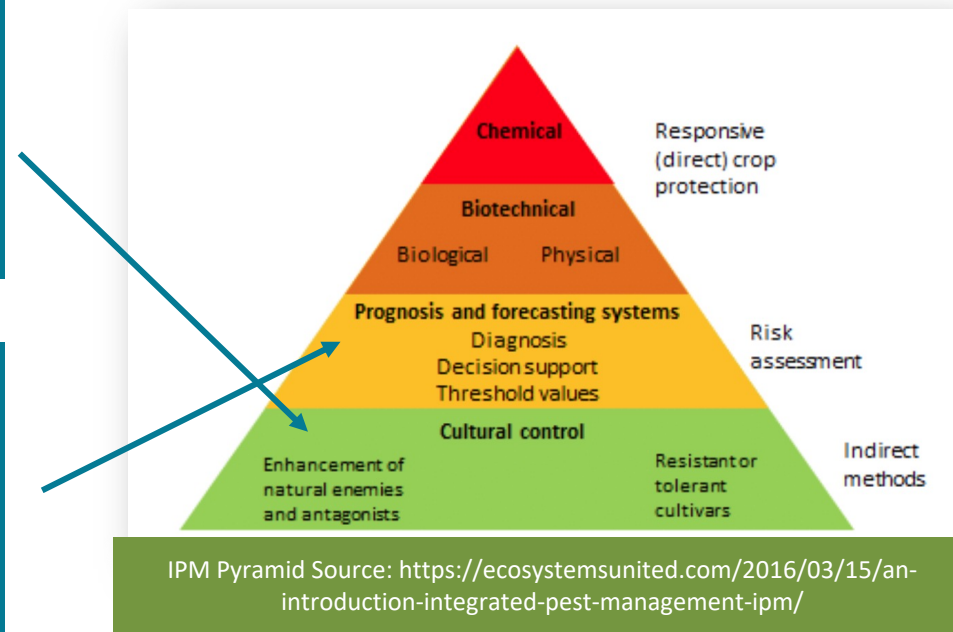
Conclusions



Preventing Damage: Timing of cultivation and covering of the crop can affect levels of BSF damage



Monitoring BSF Activity: Blue sticky traps containing a lure catch more BSF





Any questions?

Big thank you to Rosemary & Rob (Supervisors at Warwick), Becky (Supervisor at PGRO), Andy & Maz (Warwick), Charlotte & Dave (Advisory Panel at Warwick), Horticultural Services at Warwick, PGRO, AHDB & to all of you for your involvement & input



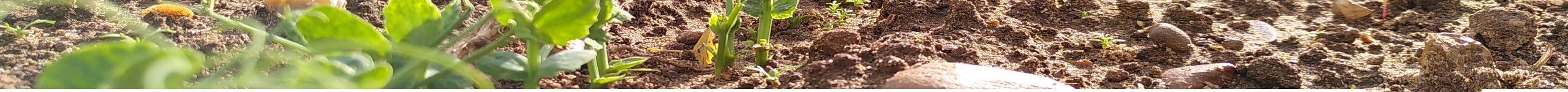
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