Potential of brassica cover crop and biofumigation to reduce Verticillium dahliae germination and Sunflower Verticillium Wilt

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AIMS

1. Evaluate *in vitro* the toxicity of 5 selected brassica on *V. dahliae* germination and development
2. Assess *in situ* the biofumigant potential of 3 brassica on Sunflower Verticillium Wilt

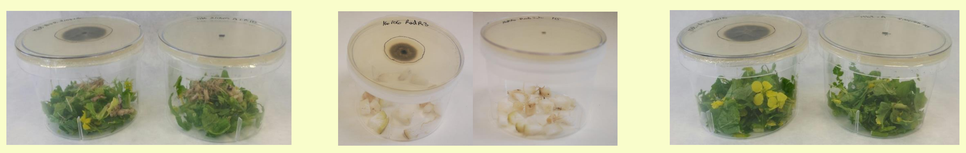
CONTEXT

Sunflower Verticillium Wilt (SVW) is caused by the soil-borne fungal pathogen *Verticillium dahliae*. The widespread of the disease is due to short rotations with sunflower. Currently, there is no agronomic solution except for varietal resistance.
This research may provide an interest of **brassica cover crops** and **biofumigation** to **reduce SVW**, instead of leaving the soil bare in winter**.**

METHODS

Field study, INRAE (Auzeville, France)

- Microsclerotia (MS) or developed *V. dahliae* on growing media (PDA) were exposed to 5 grinded brassica or no brassica for 21 days (Fig. 1). Brassica were chosen for their contrasted profile in GSL.



- The radial growth of the fungus was measured to calculate the AUDPC.

- Sole crop of brassica were cultivated between wheat and sunflower or the soil was left bare (control) for two years.
- Brassica were brown mustard, fodder radish, turnip rape. Biofumigation (Biof) was carried out at bud stage.
- Brassica were sown in september et biofumigation in december

- The incidence and severity of SVW were assessed weekly on sunflower for each treatment (2016, n=30 ; 2017, n=75).

RESULTS

- Brassica reduced (*P*<0,01) the development of *V. dahliae* from MS up to 90% with turnip rape (**Fig. 1**) and the mycelium development up to 90% (brown mustard, data not shown) compared to the control without brassica.
- Effective suppression of *V. dahliae* using mustards is in line with Olivier et al. (1999) and Neubauer et al. (2014).

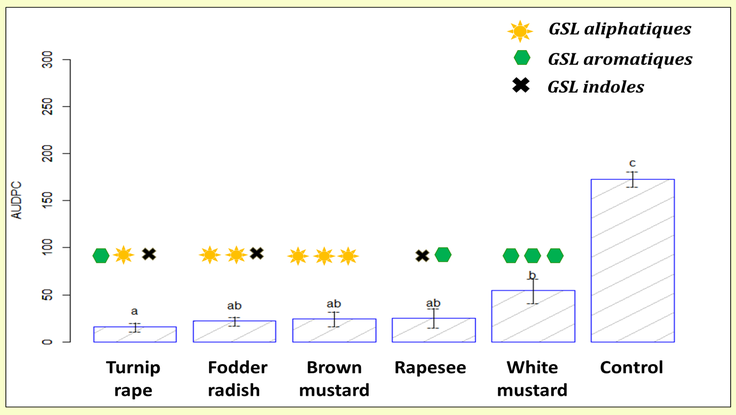


Fig.1 – AUDPC of the radial growth of *V. dahlia* MS on PDA exposed to grinded brassica or no brassica (control) for 21 days (n = 30 per treatment)

- Brassica cover crop and biofumigation reduced (*P*<0,01) the incidence and severity of SVW compared to bare soil both years (**Fig. 2**). The highest reduction of SVW was observed after a fodder radish (up to -43% of SVW).
- Similar reduction of plant disease were observed on vegetables crops (Subbardo et al., 2007 ; Larkin et al., 2010).

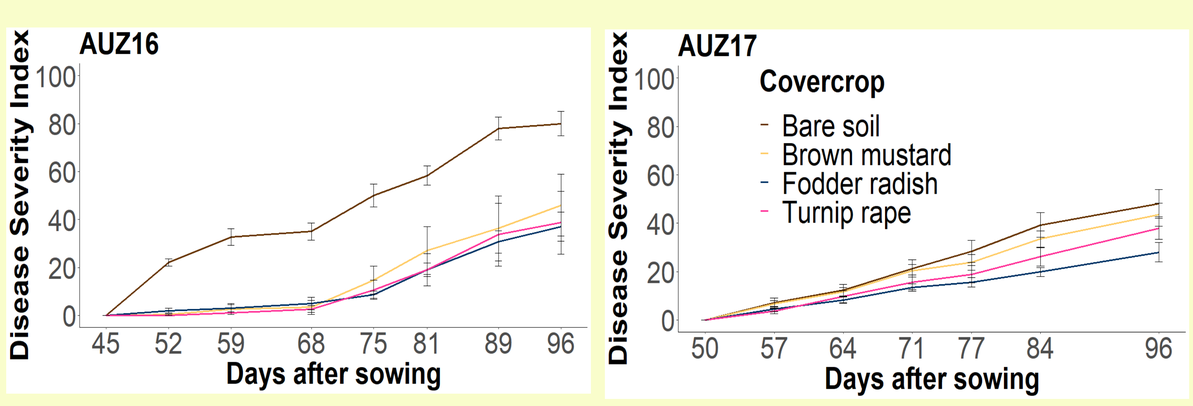


Fig.2 – Disease severity index of SVW on sunflower after a bare soil or a Brassica cover crop + biofumigation for 2 years of field trials

CONCLUSION

- Grinded Brassica reduced the germination and the development of *V. dahliae* on growing media
- Biofumigation with brassica reduced SVW compared to a bare soil in the field trials both years
- Fodder radish showed the most promising effects on *V. dahliae* regulation.

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