Evaluation of biofumigation crops in the control of *P. penetrans* and *V. dahliae*

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Biofumigation as a new tool to increase soil

Design

- **Experimental field: sandy soil with nematodes (*P. penetrans*) and fungi (*V. dahliae*)**
- **16 different crops were selected based on results and in cooperation with many companies**
- **Random block design with 4 replicates**

Crops selected (companies involved)

1. *Brassica juncea* (Indian musterd) ISCI Lazerri
2. *Eruca sativa* (salad rocket) ISCI Lazerri
3. *B. napus / B. campestris*
   (forage rape: BQ mulch) VanDijke Semo
4. *Brassica napus* (rape seed) Joordens
5. *Brassica carinata* (ethiopian musterd) Joordens
6. *Brassica oleracea L. Italica* (broccoli)
7. *Raphanus sativus* (fodder radish) Petersen/ InnoSeeds
8. *Sinapis alba* (white musterd)

Crops selected (companies involved)

9. *Sorghum bicolor* (Sorghum)
10. *Crambe abyssinica* (Abyssinian musterd) PRI
11. Seed meal (*B. carinata*) applied after Italian ryegrass

    ISCI Lazerri, Cerealtoscana
12. *Tagetes patula* (Marigold) Sahin
13. Metam sodium (Monam) applied after Italian ryegrass
14. Biological Soil Disinfestation (*Avena strigosa)* Petersen/ InnoSeeds
15. *Lolium perenne* (annual ryegrass)
16. Black fallow

Biofumigation project (2006-2008)

Biological Soil Disinfestation: incorporation of organic material (grass)

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BSD; covering soil with oxygen impermeable plastic

Parameters:

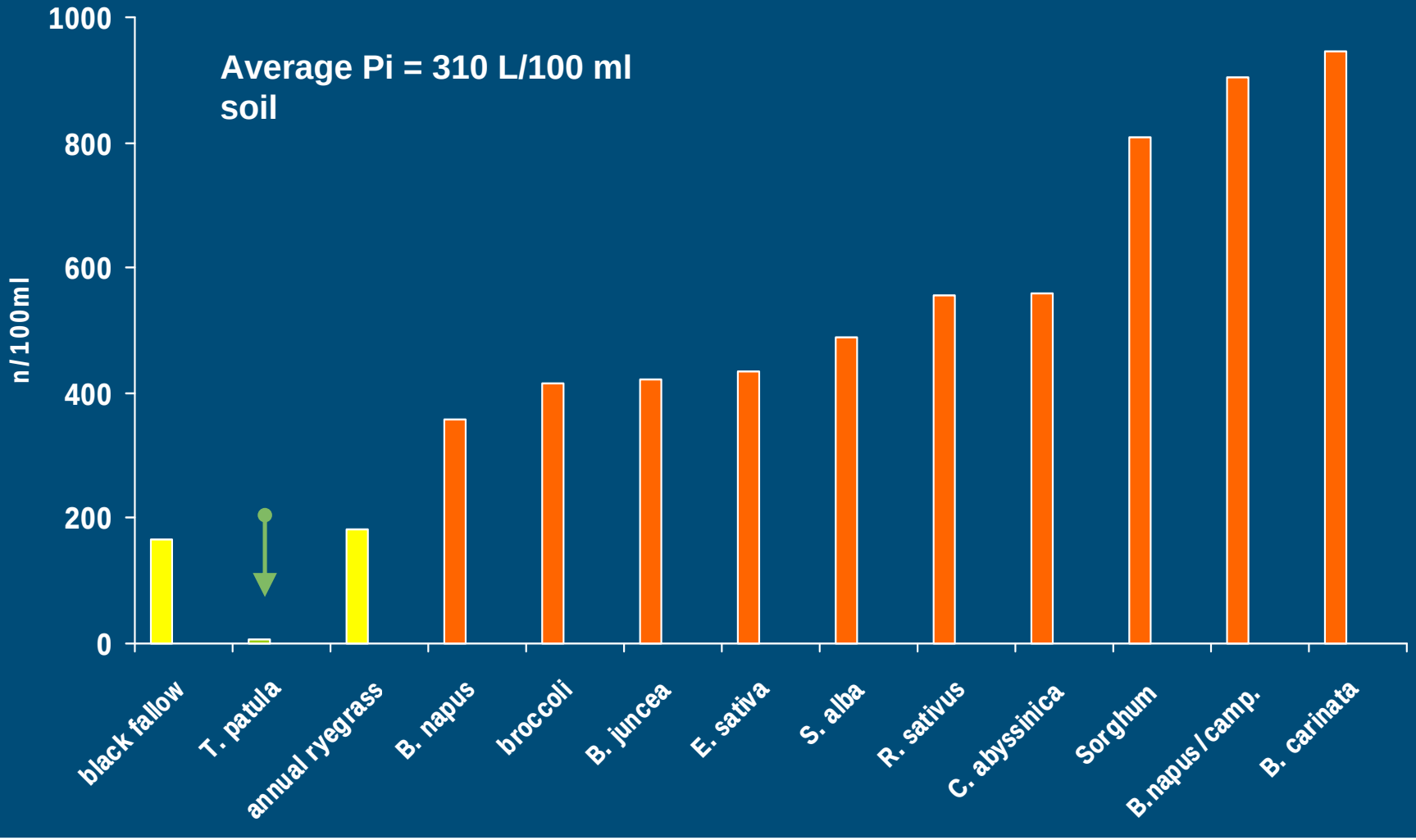
- **Host status of crops and biofumigation effect on *Pratylenchus penetrans* and *Verticilium dahliae***
  - **Pi: before sowing (june 2006)**
  - **Pf1: before incorporation (september 2006)**
  - **Pf2: before growing potatoes (spring 2007)**

- **A year after the biofumigation crops:**
  - **Growing potatoes (cv. Premiere)**
  - **Aboveground: growth and dying off during 2007**
  - **Harvest: quality and quantity of the potatoes**

Overview of experimental field in September

Chopping and incorporating (sept.)

Average number of *Pratylenchidae* (Pf-sept)



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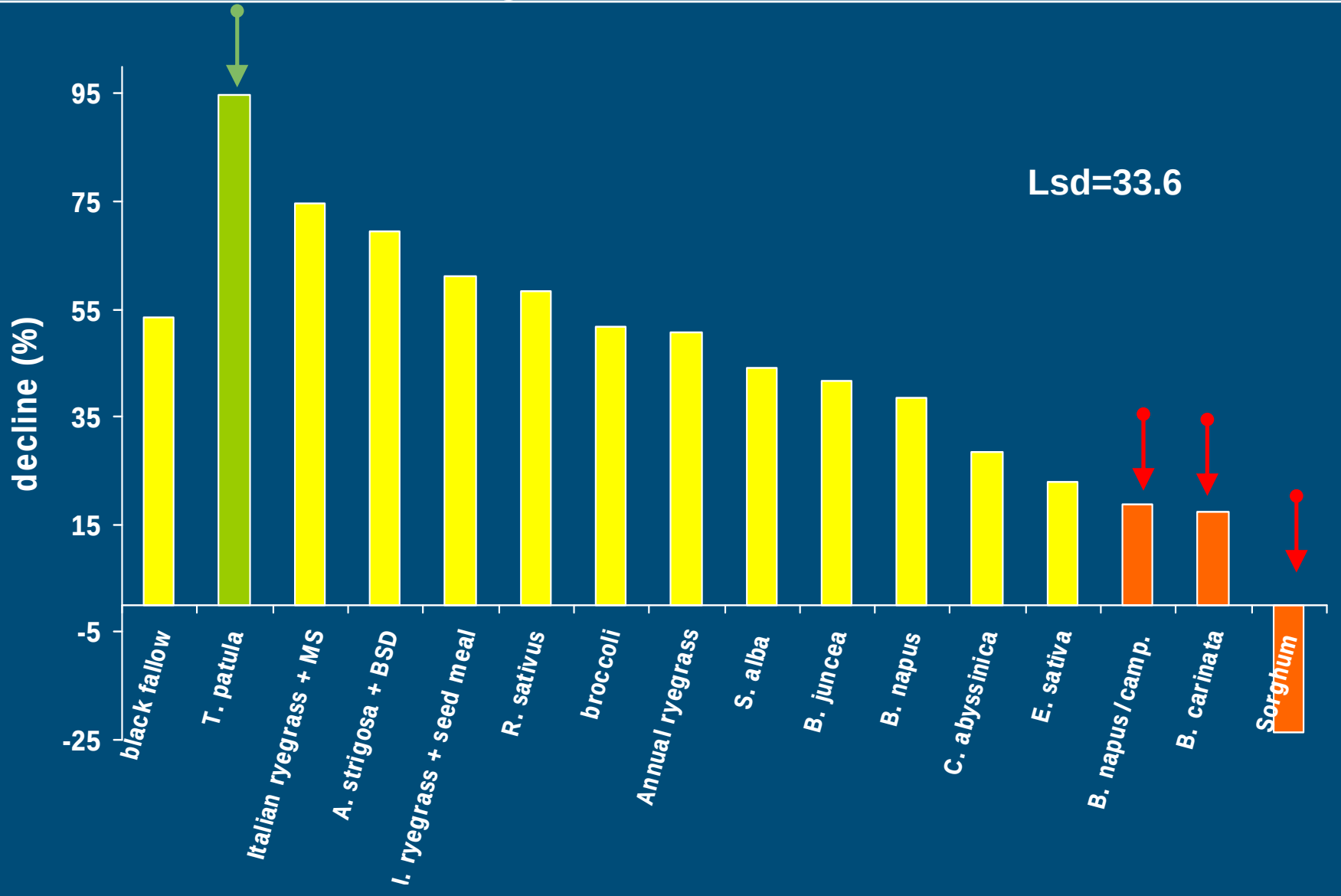
Decline of *Pratylenchidae* (june 2006 - march 2007)



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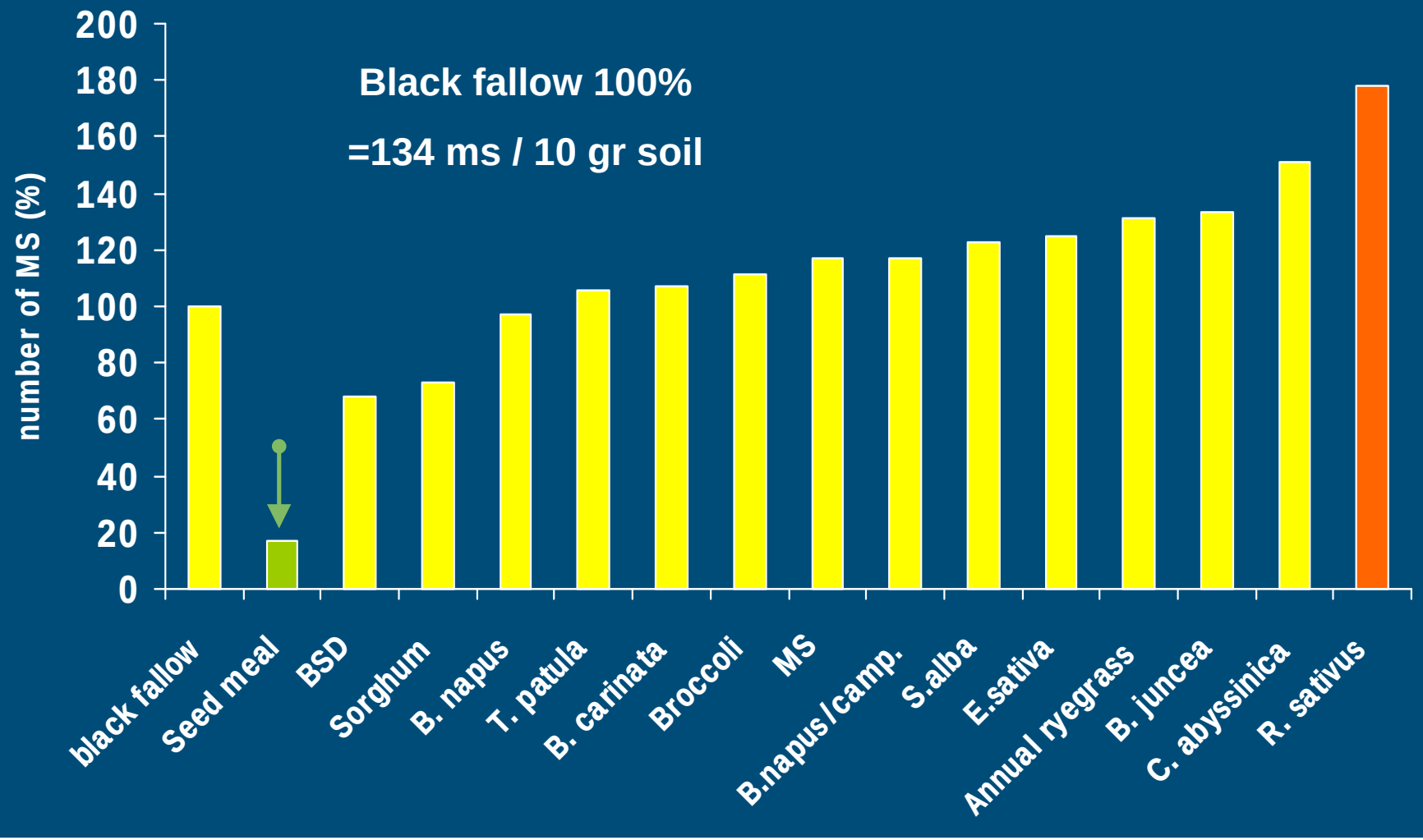
Relative number of microsclerotia of *V. dahliae*



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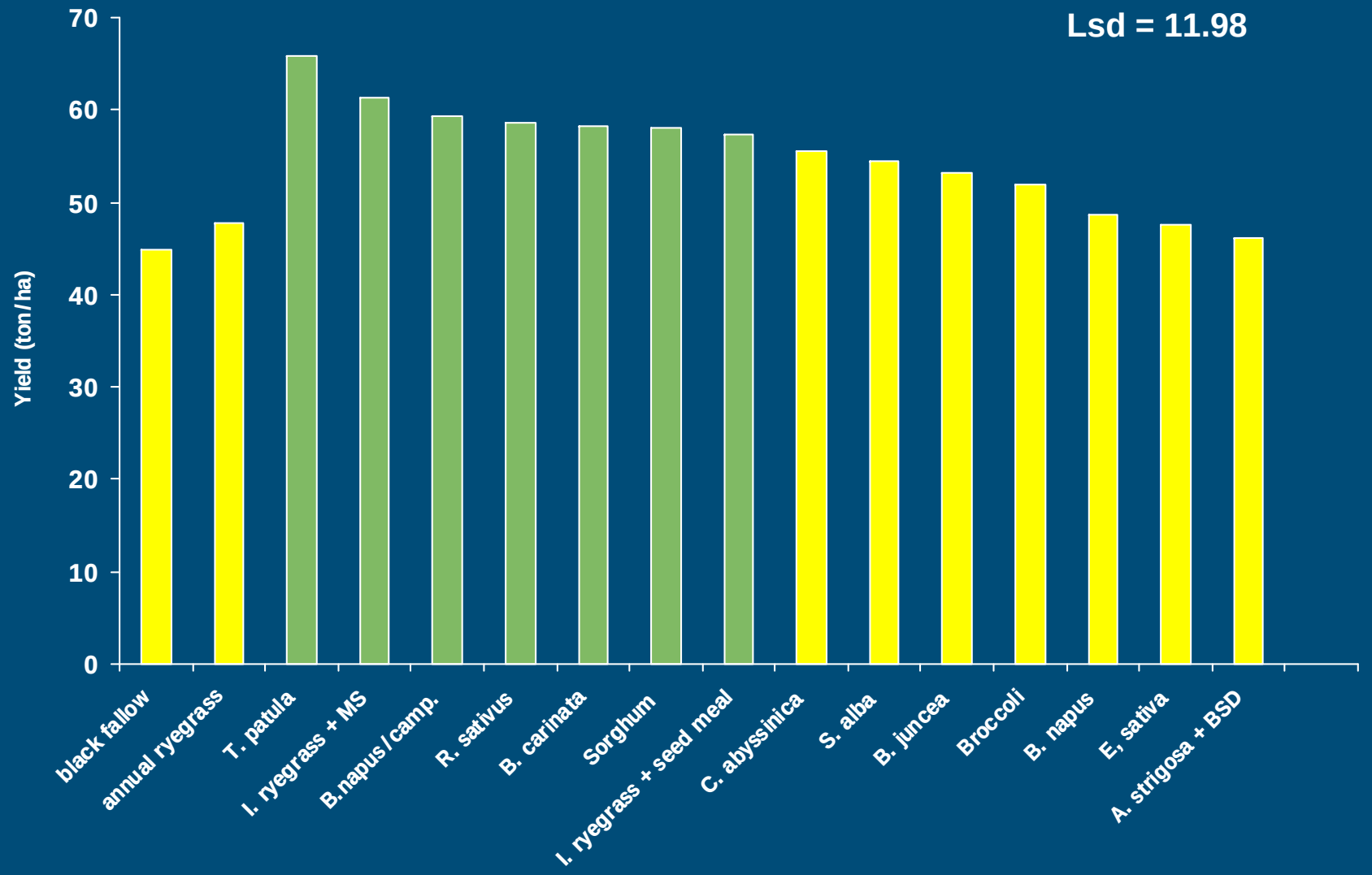
Potato yield



Conclusions 1:

- *Pratylenchus penetrans*: most biofumigation crops act as a host and increase populations
- Effective population decline of *P. penetrans* by Tagetes, Metamsodium and Biological Soil Disinfestation
- *V. dahliae*: significant decrease only by seed meal (84 %)
- All biofumigation crops increased yield of potatoes compared to black fallow

Conclusions 2:

- Biofumigation crops may increase yield
- In this study the mechanism is not by control of soil pathogens, but by improving soil health!
- Innovations in biofumigation crops (contents, resistance etc.) and techniques (incorporation, timing etc.), could develop biofumigation into a tool for sustainable agriculture

Thanks for your attention