



European Weed Research Society

19th European Weed Research Society Symposium

20 – 23 June 2022, Athens, Greece

Unravelling the success of weed control by relay intercropping with legumes in low-input cereal-based Mediterranean cropping systems

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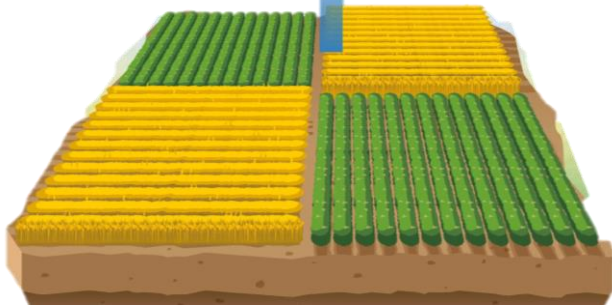


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Highly specialized and simplified
agricultural systems



Weed control strategy based on
Herbicides



Weed species are increasingly
difficult to be controlled



Health and environmental
impacts of herbicides residues

- Weed resistance
- High specialization of weeds for simplified agro-ecosystems
- Progressive reduction of chemical products
- Increasing restriction to the use of herbicide

IWM

Integrated **W**eed **M**anagement

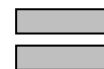
Many tools and tactics are combined to manage weeds



Reliance on
herbicides



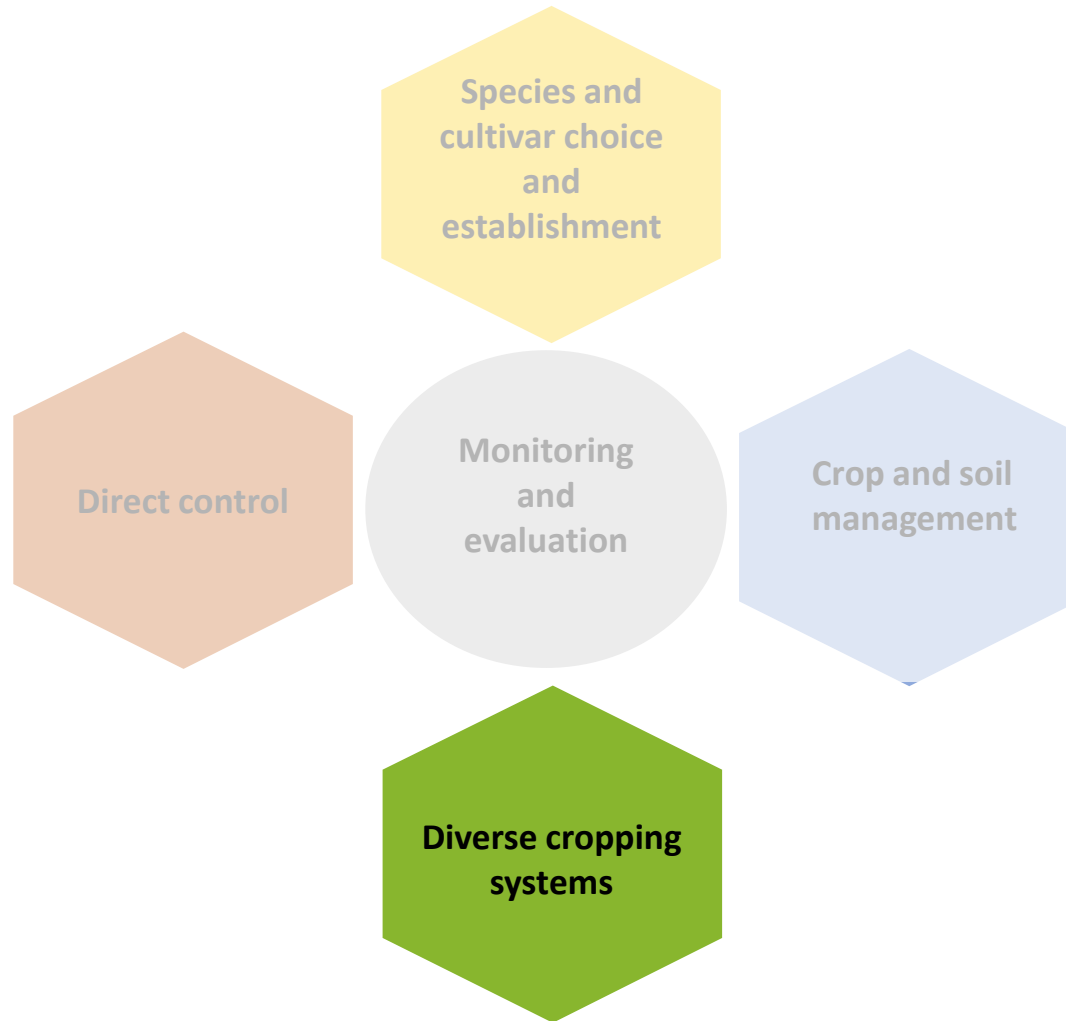
Weed control



Maintain crop
productivity

IWM

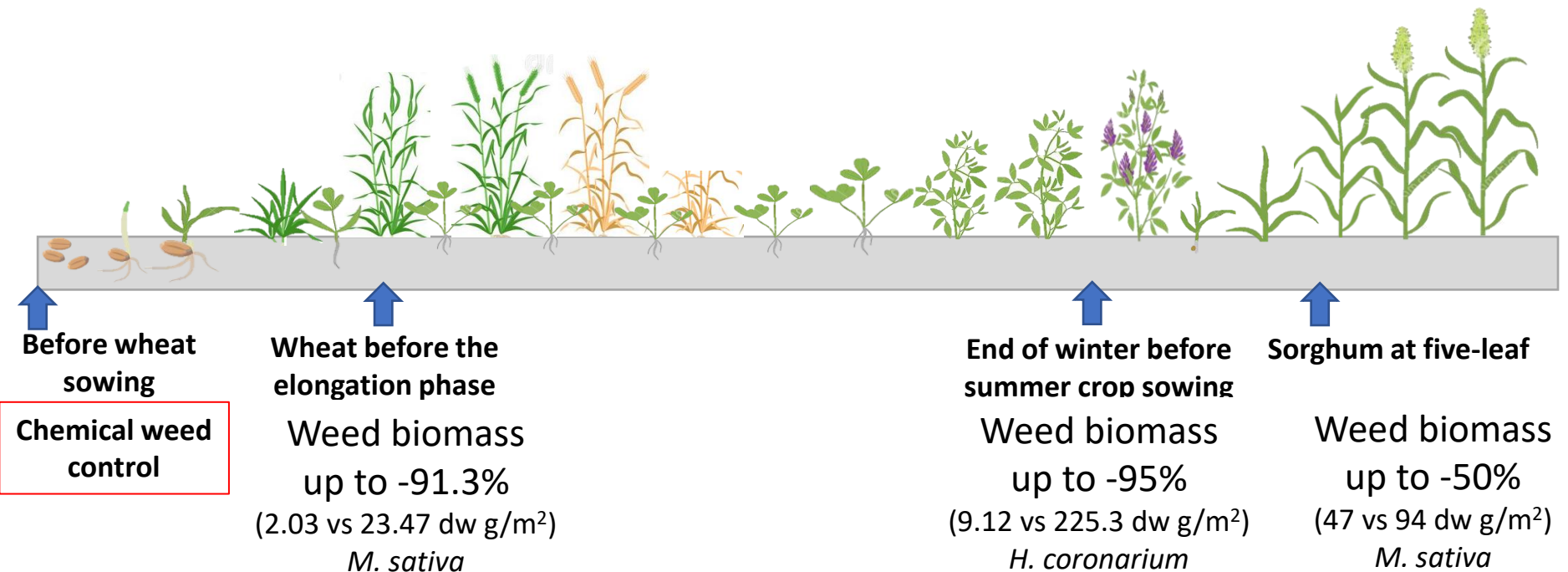
Integrated **W**eed **M**anagement



DURUM WHEAT – SORGHUM CROP ROTATION

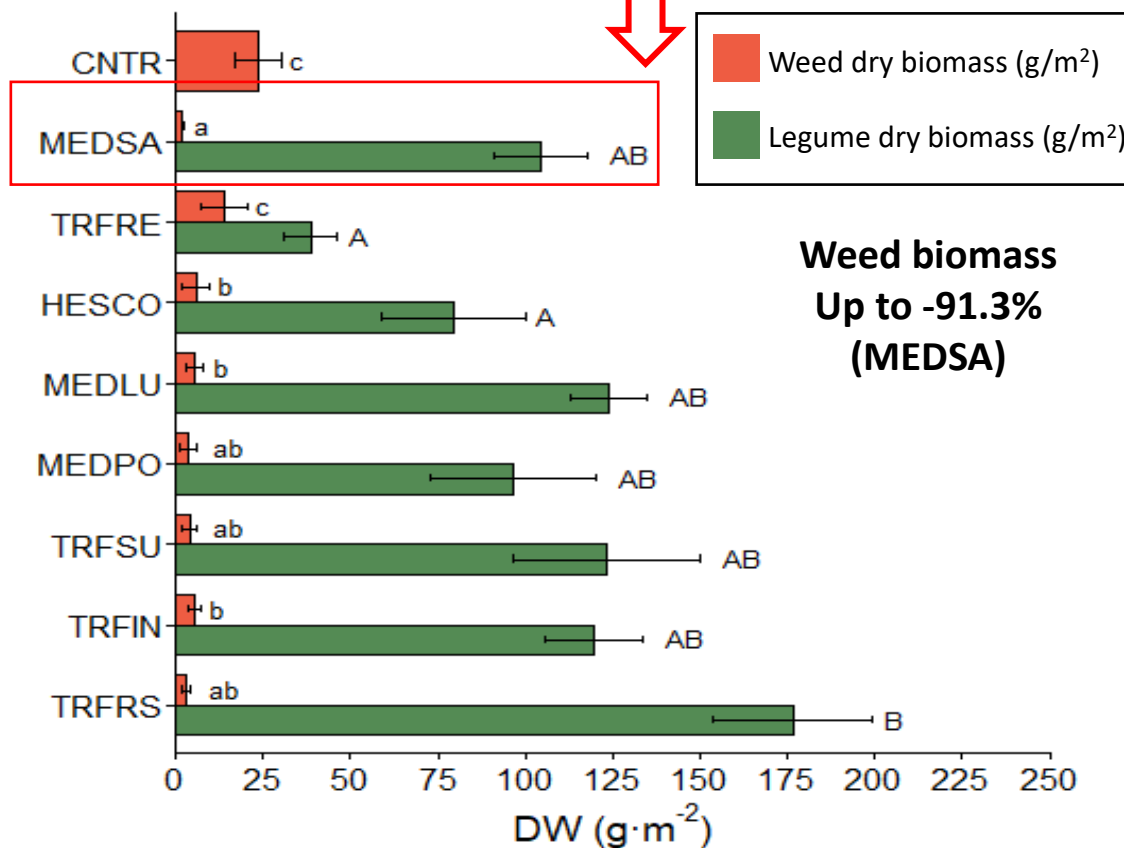
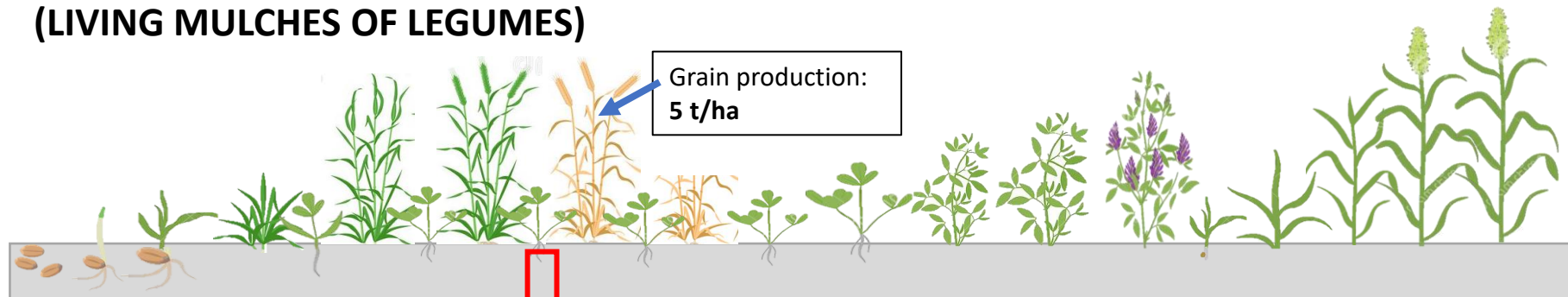
Critical phases for weed control

IWM MANAGEMENT (LIVING MULCHES OF LEGUMES)



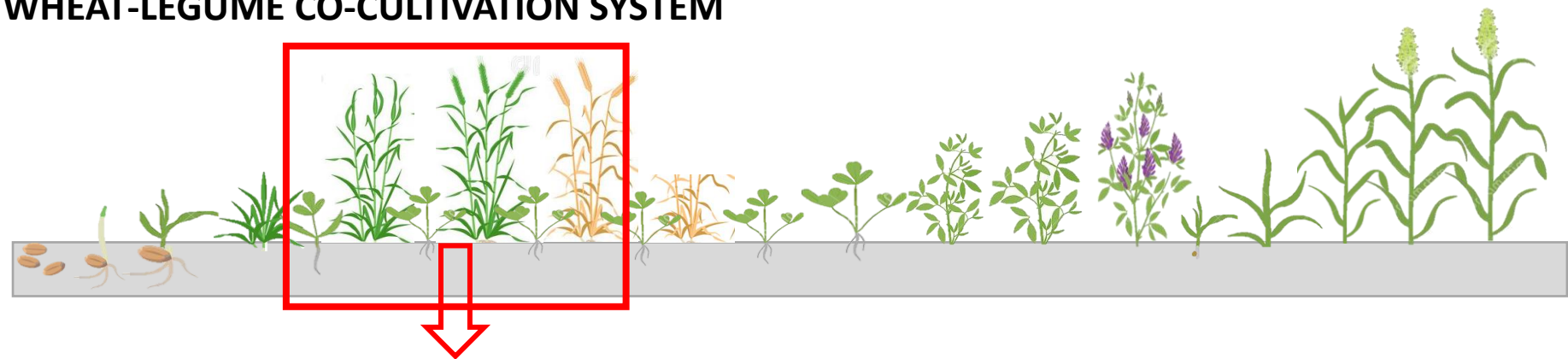
IWM MANAGEMENT (LIVING MULCHES OF LEGUMES)

STAGE: WHEAT HARVEST



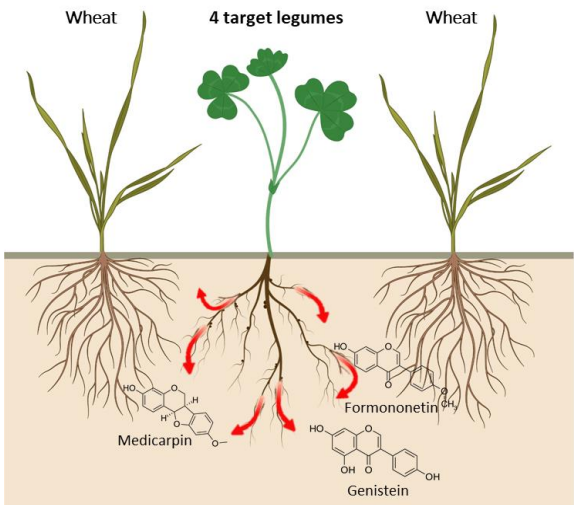
CNTR: control plot (wheat as sole crop) ; MEDSA: *M. sativa*; TRFRE: *T. repens*; HESCO: *H. coronarium*; MEDLU: *M. lupulina*; MEDPO: *M. polymorpha*; TRFSU: *T. subterraneum* ; TRFIN: *T. incarnatum*; TRFRS: *T. resupinatum*.

DETECTION OF ALLELOCHEMICAL COMPOUNDS IN A WHEAT-LEGUME CO-CULTIVATION SYSTEM

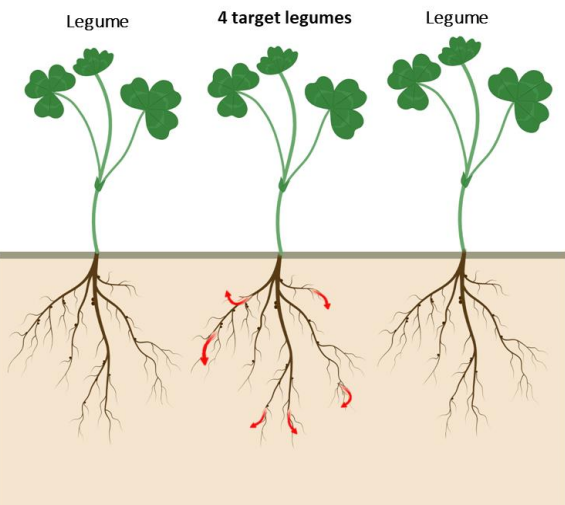


LABORATORY EXPERIMENT

Legume – wheat intercropping

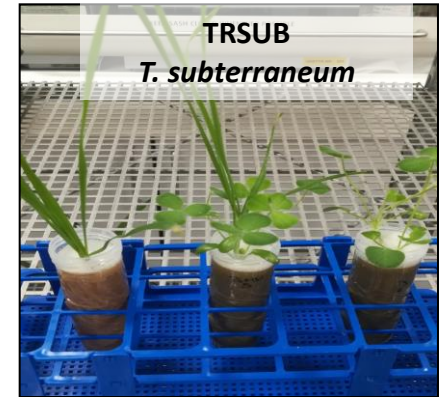
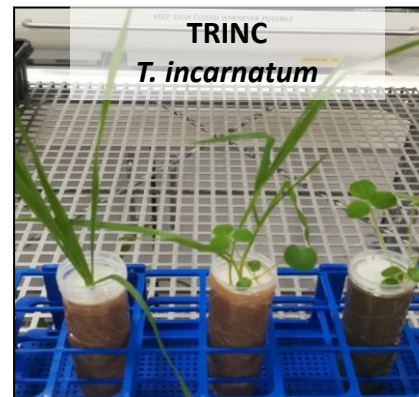
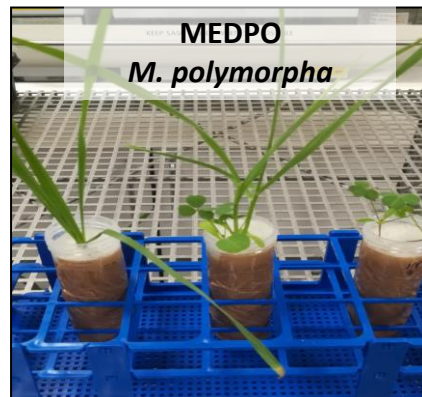
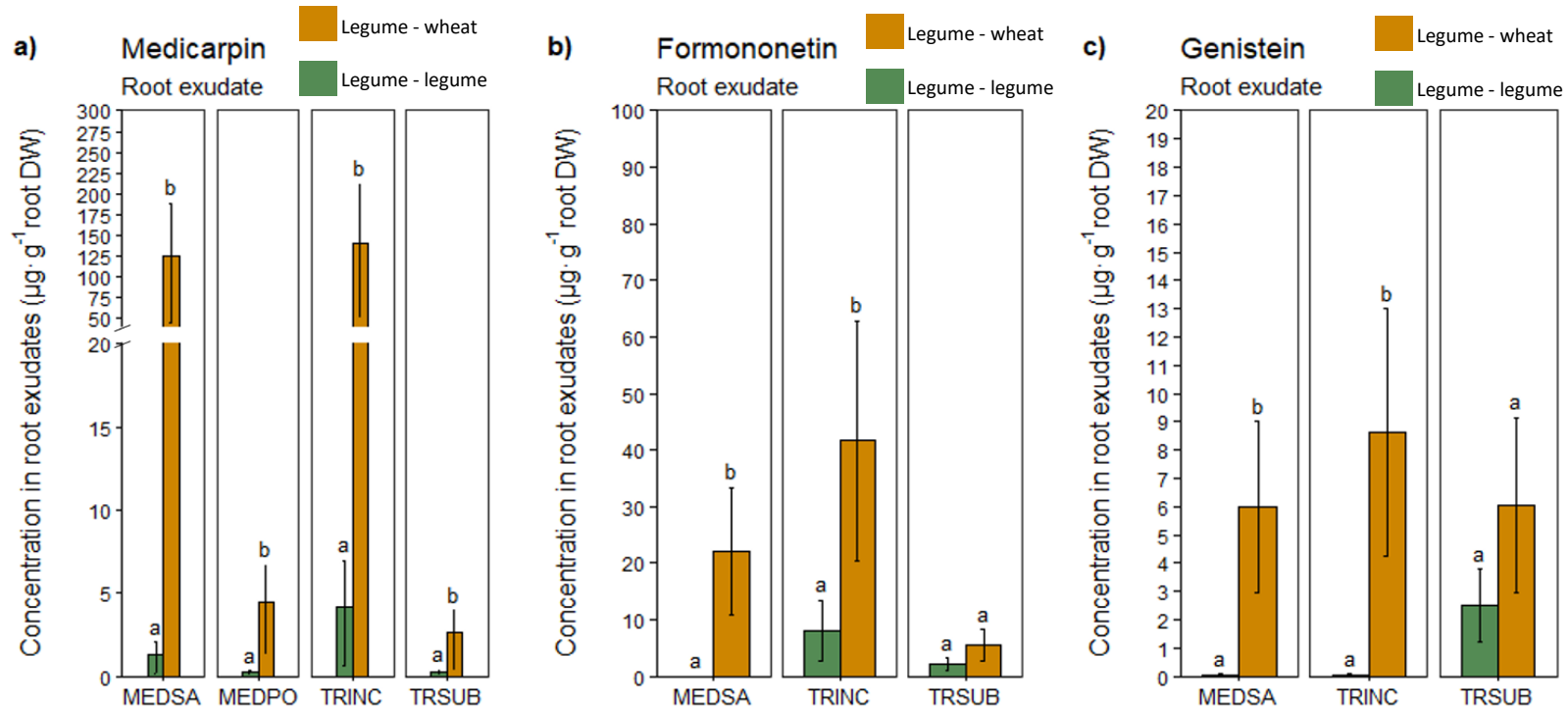


Legume monoculture



Results from glass-peat experiment

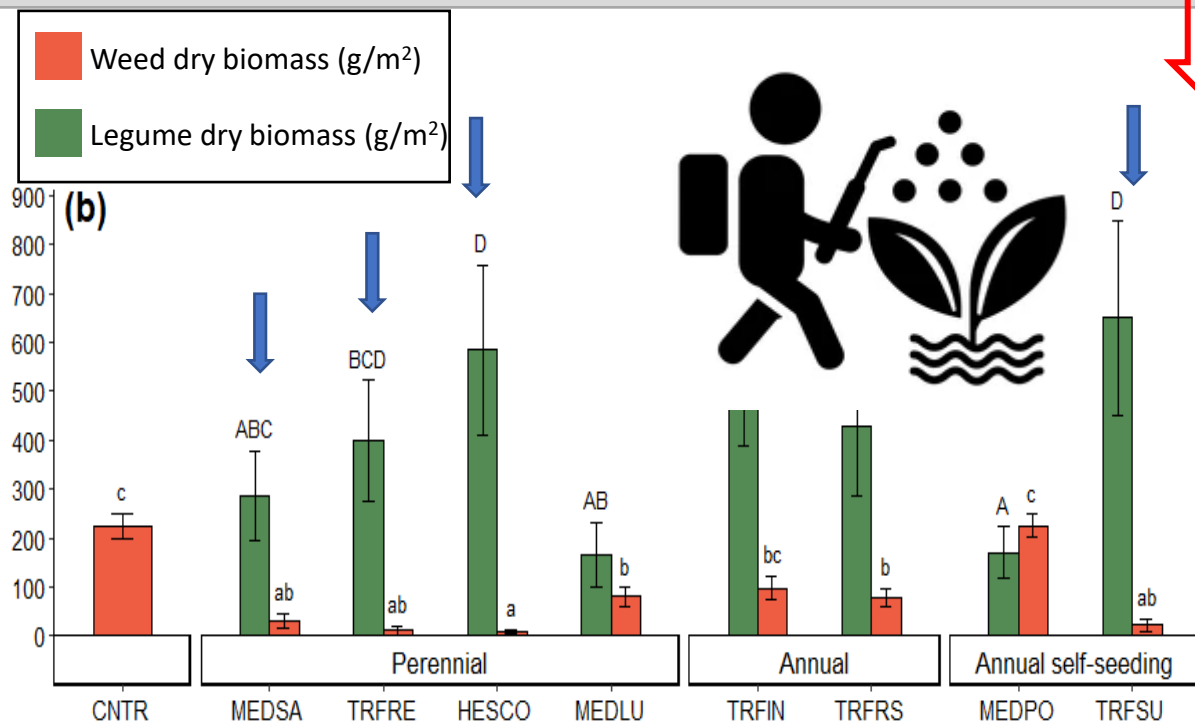
Flavonoids composition in legume root exudates in response to co-cultivation with wheat



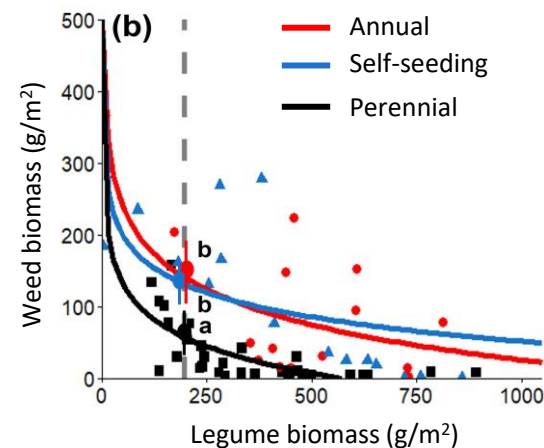
➤ Co-cultivation of wheat with legumes increase the concentration of flavonoids in legume root exudates

IWM MANAGEMENT (LIVING MULCHES OF LEGUMES)

STAGE: FOLLOWING SPRING

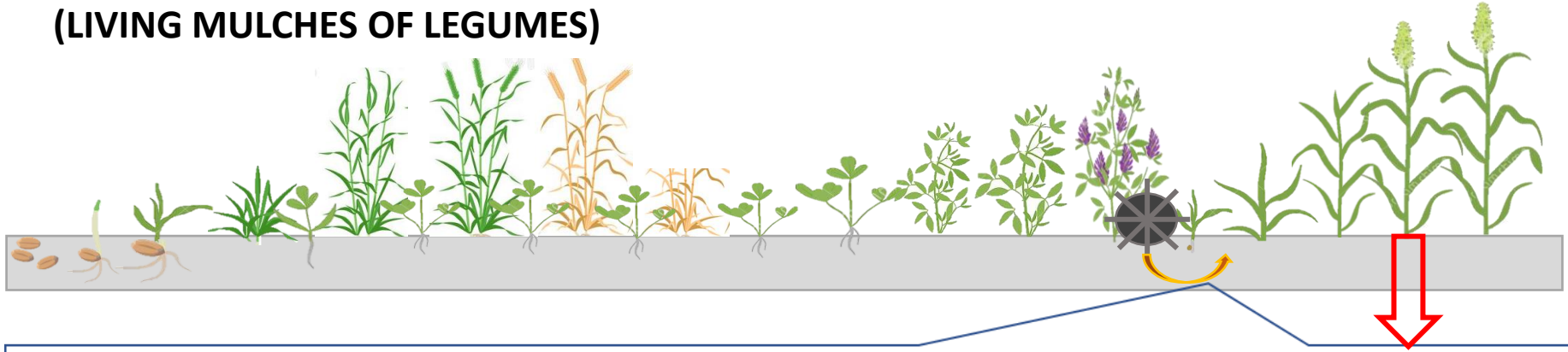


CNTR: control plot; **MEDSA:** *M. sativa*; **TRFRE:** *T. repens*; **HESCO:** *H. coronarium*; **MEDLU:** *M. lupulina*; **MEDPO:** *M. polymorpha*; **TRFSU:** *T. subterraneum*; **TRFIN:** *T. incarnatum*; **TRFRS:** *T. resupinatum*.

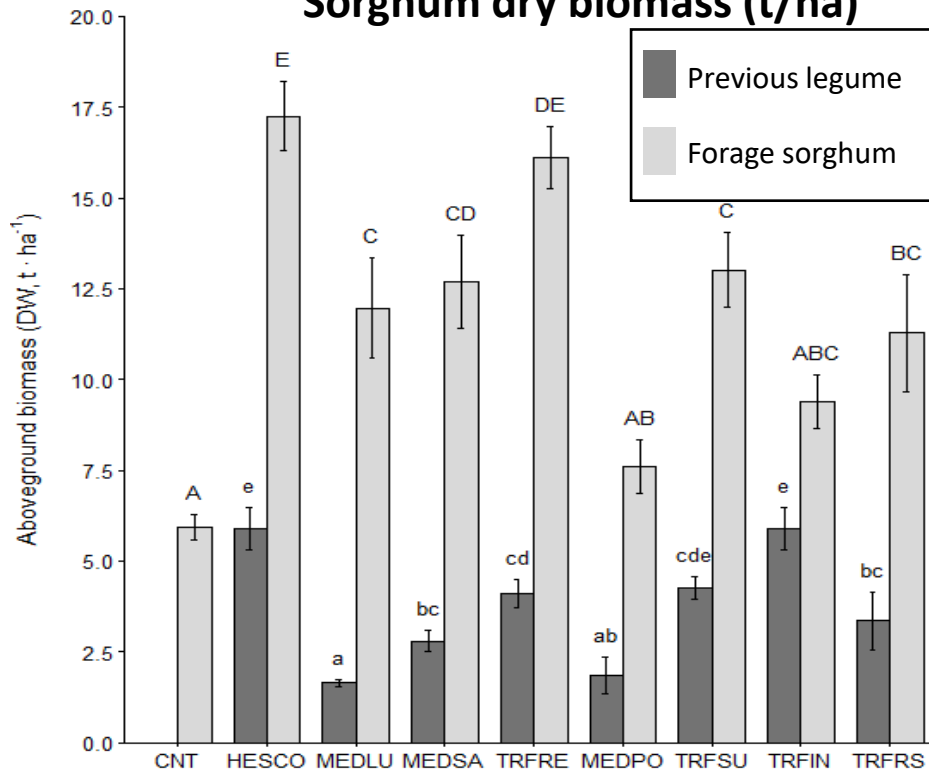


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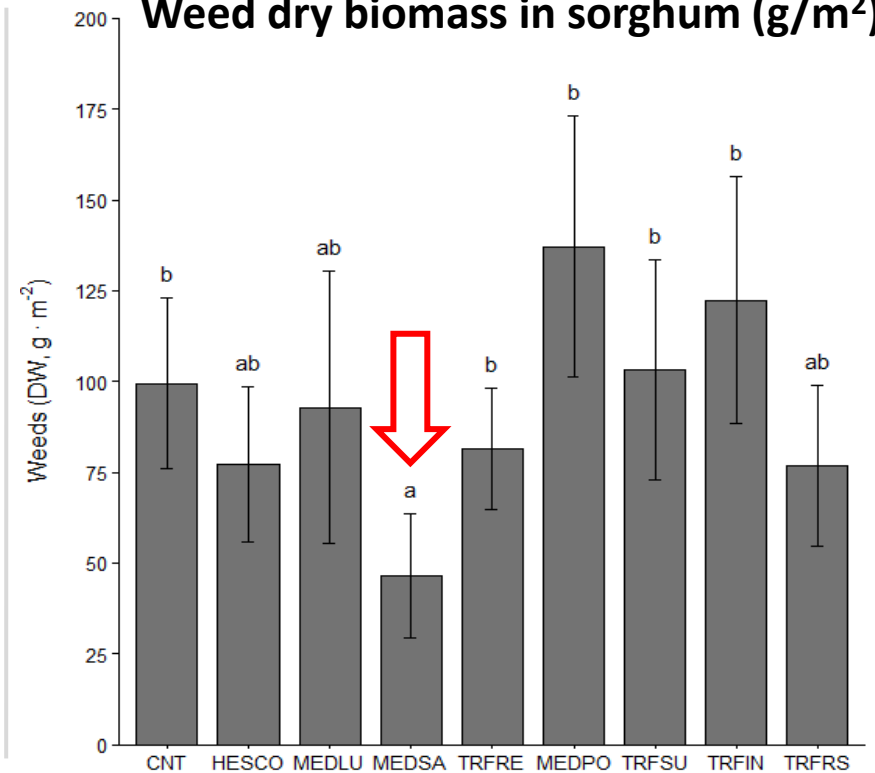
STAGE: SUBSEQUENT FORAGE SORGHUM



Sorghum dry biomass (t/ha)

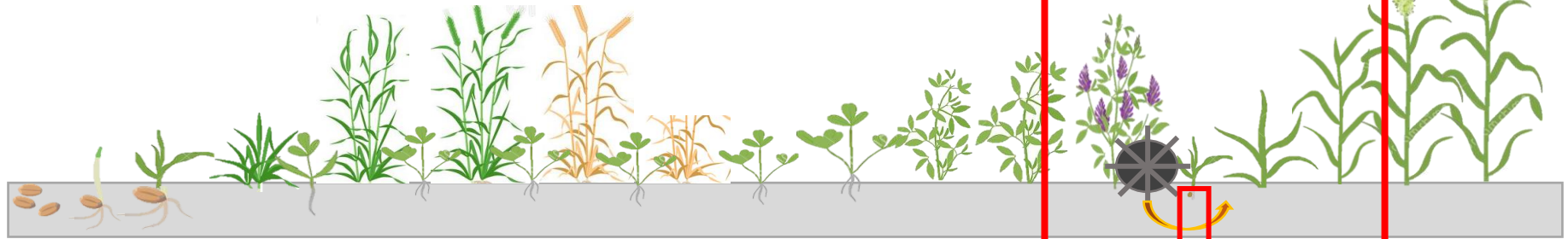


Weed dry biomass in sorghum (g/m²)



CNTR: control plot; MEDSA: *M. sativa*; TRFRE: *T. repens*; HESCO: *H. coronarium*; MEDLU: *M. lupulina*; MEDPO: *M. polymorpha*; TRFSU: *T. subterraneum*; TRFIN: *T. incarnatum*; TRFRS: *T. resupinatum*.

IWM MANAGEMENT (LIVING MULCHES OF LEGUMES)



STAGE: SUBSEQUENT FORAGE SORGHUM

LABORATORY EXPERIMENT

4 target weeds

- *Alopecurus myosuroides*
- *Lolium rigidum*
- *Sinapis alba*
- *Chenopodium album*

3 target legume

- *Medicago sativa*
- *Medicago polymorpha*
- *Trifolium subterraneum*

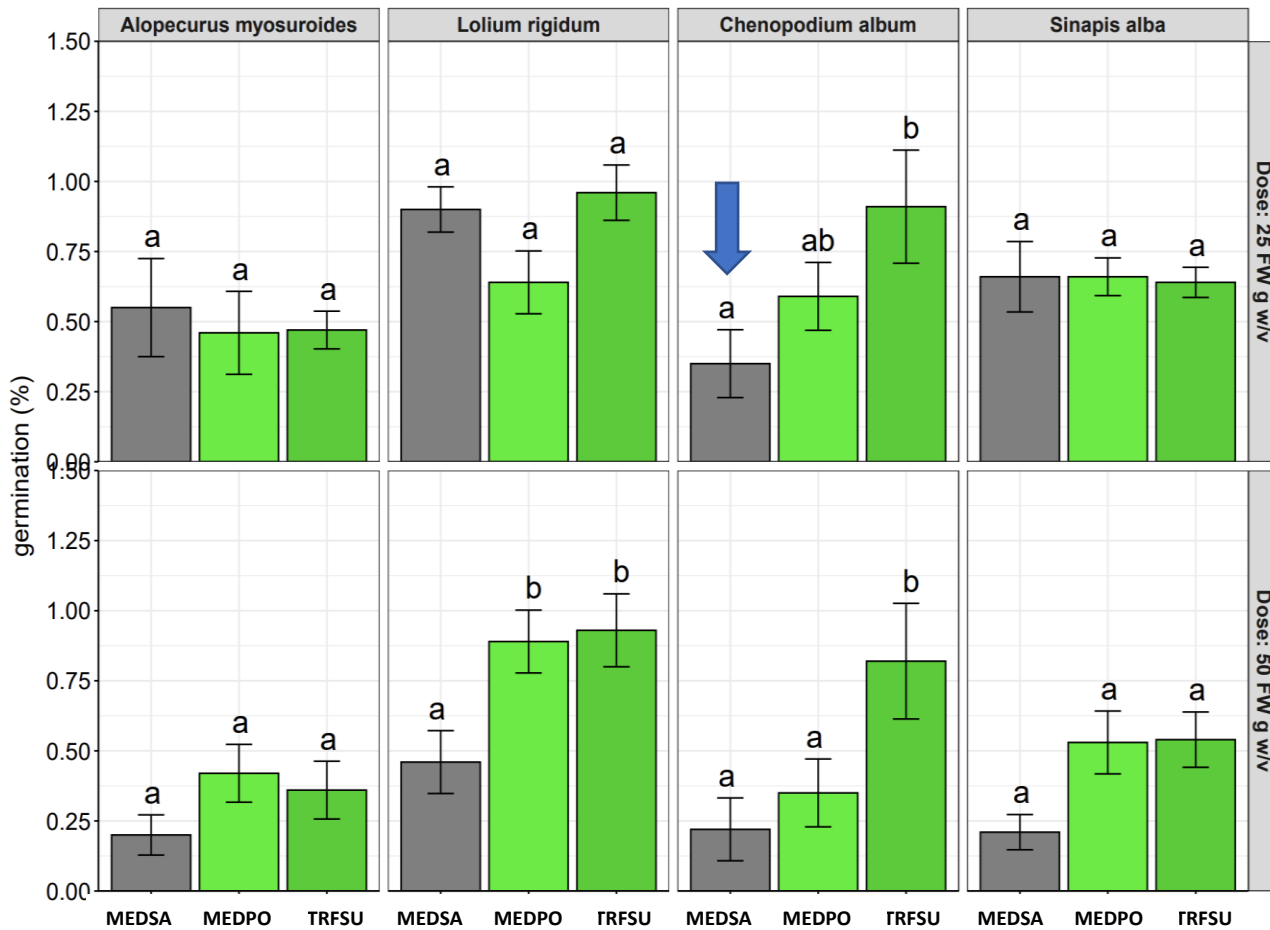


25 g/l
50 g/l



IWM MANAGEMENT (LIVING MULCHES OF LEGUMES)

STAGE: SUBSEQUENT FORAGE SORGHUM



FROM FIELD EXPERIMENTS

- Living mulch is a valuable option for weed control if suitable legumes species are chosen.

Low-input system

- *Medicago sativa*
- *Trifolium repens*
- *Hedysarum coronarium*
- *Trifolium subterraneum*

High input system

- *Medicago sativa*
- *Trifolium repens*



FROM LABORATORY EXPERIMENTS

- Co-cultivation of wheat with legumes increase the concentration of flavonoids in legume root exudates. Changes in flavonoid concentration involved genistein, medicarpin and formononetin which have been found to be involved in the legume nodulation and regulation of inter-plant interaction .
- Residual effect of legume on weeds germinability





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