



Sant'Anna

School of Advanced Studies – Pisa

SELECTION OF SUITABLE LEGUMES FOR RELAY INTERCROPPING WITH DURUM WHEAT IN MEDITERRANEAN CEREAL-BASED CROPPING SYSTEMS

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XVI European Society for Agronomy Congress 1 to 3 September, 2020 - **Sevilla** - Spain



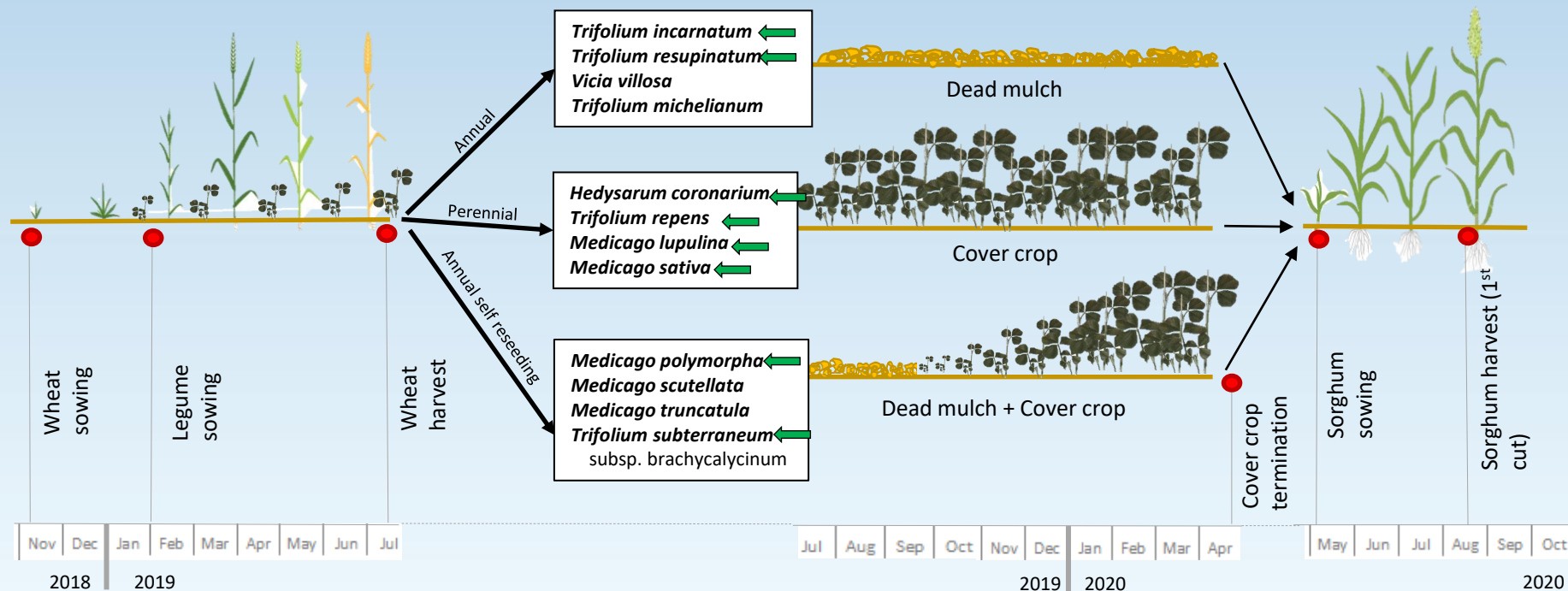
Integrated **W**eed **M**anagement:
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Relay intercropping of legumes in durum wheat: effects at crop rotation level

Experiment carried out at the Centre for Agro-environmental Research (CIRAA) "E. Avanzi", Pisa, Italy.

Legumes used in the second repetition of the experiment ←



Relay intercropping of legumes in durum wheat: effects at crop rotation level

Experiment carried out at the Centre for Agro-environmental Research (CIRAA) “E. Avanzi” , Pisa, Italy.



June 2019

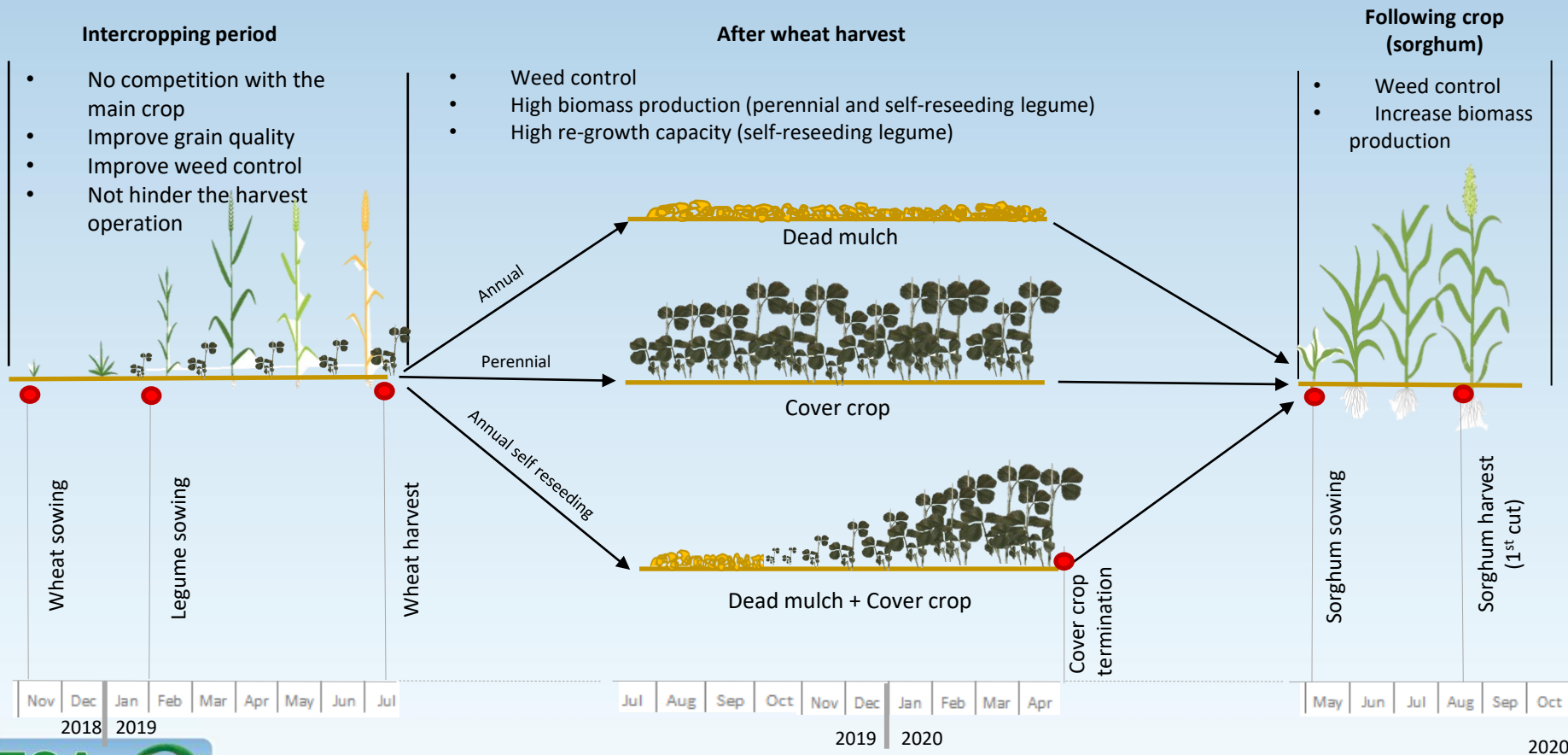
Undersown legumes in durum wheat



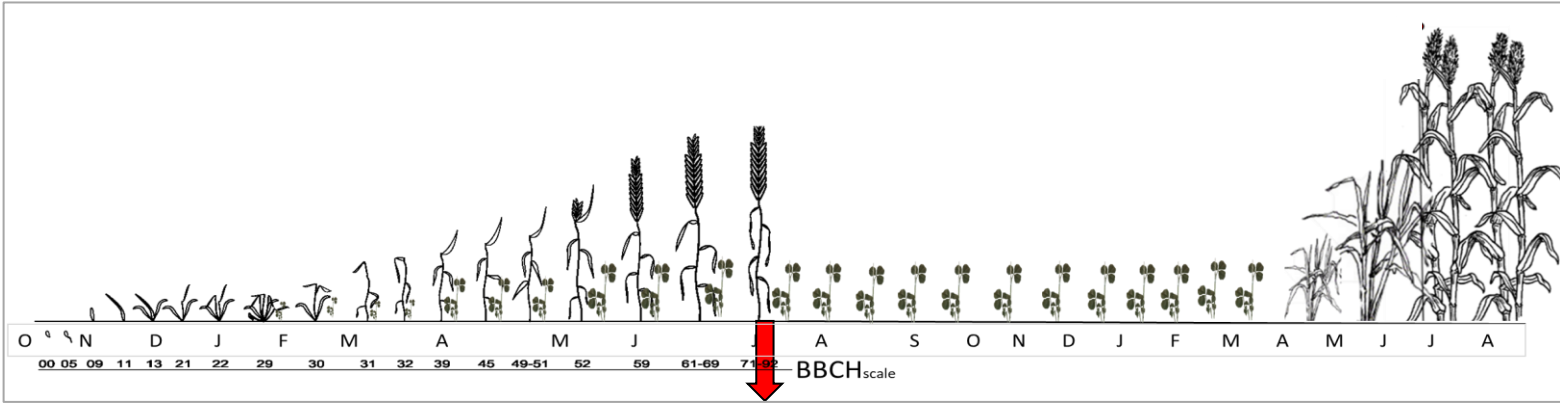
June 2020

Subsequent sorghum (for forage production)

Which characteristics should legumes have for this system?



Selection of suitable legumes for relay intercropping with durum wheat in Mediterranean cereal-based cropping systems



Wheat harvest time



1) Wheat biomass (Total biomass and grain)

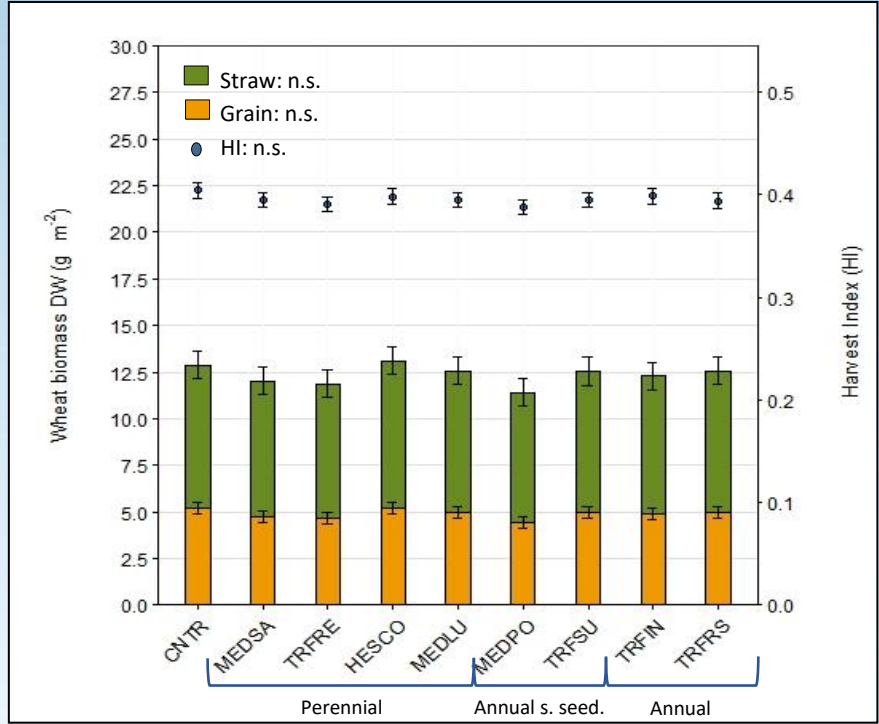
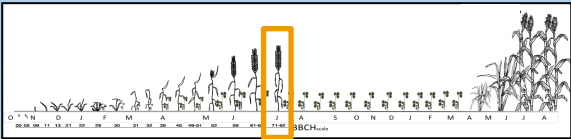


2) Legume biomass accumulation



3) Weed control

Wheat biomass (straw and grain)



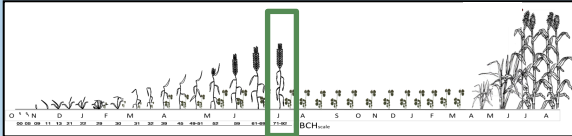
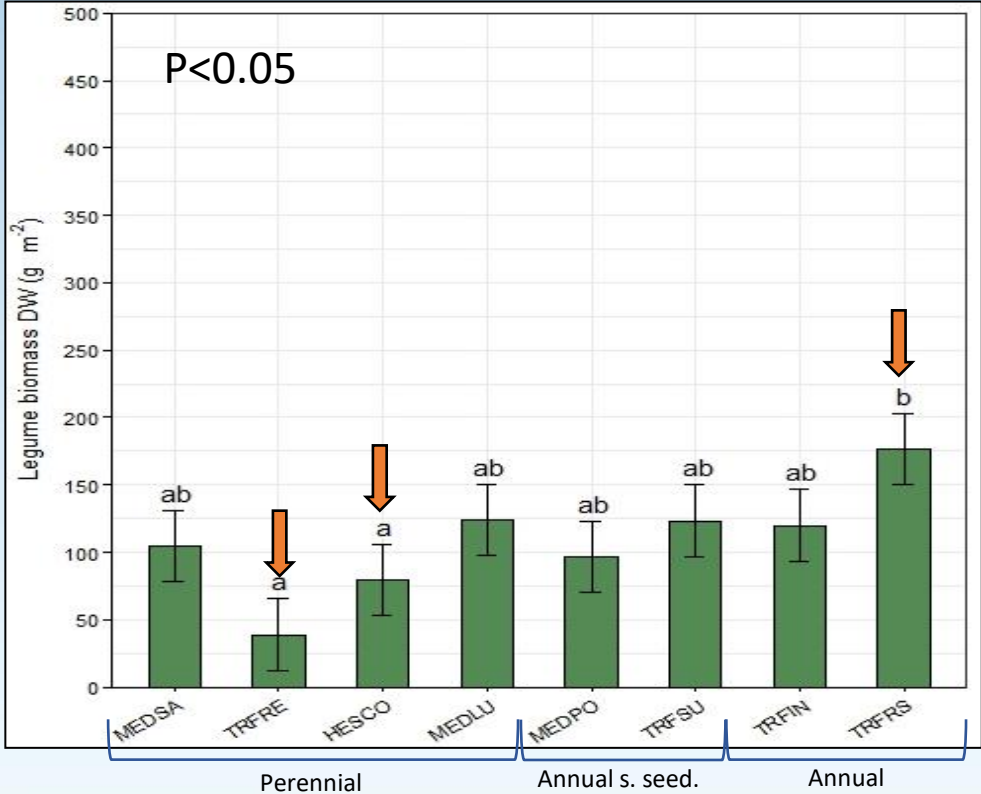
Medicago sativa (MEDSA)



Trifolium resupinatum (TRFRS)

CNTR: Wheat as sole crop stand, **MEDSA:** *Medicago sativa*, **TRFRE:** *Trifolium repens*, **HESCO:** *Hedysarum coronarium*, **MEDLU:** *Medicago lupulina*, **MEDPO:** *Medicago polymorpha*, **TRFSU:** *Trifolium subterraneum*, **TRFIN:** *Trifolium incarnatum*, **TRFRS:** *Trifolium resupinatum*.

Legume biomass accumulation



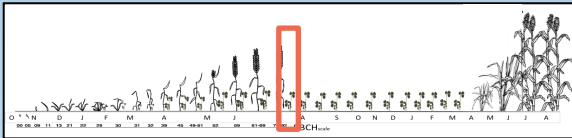
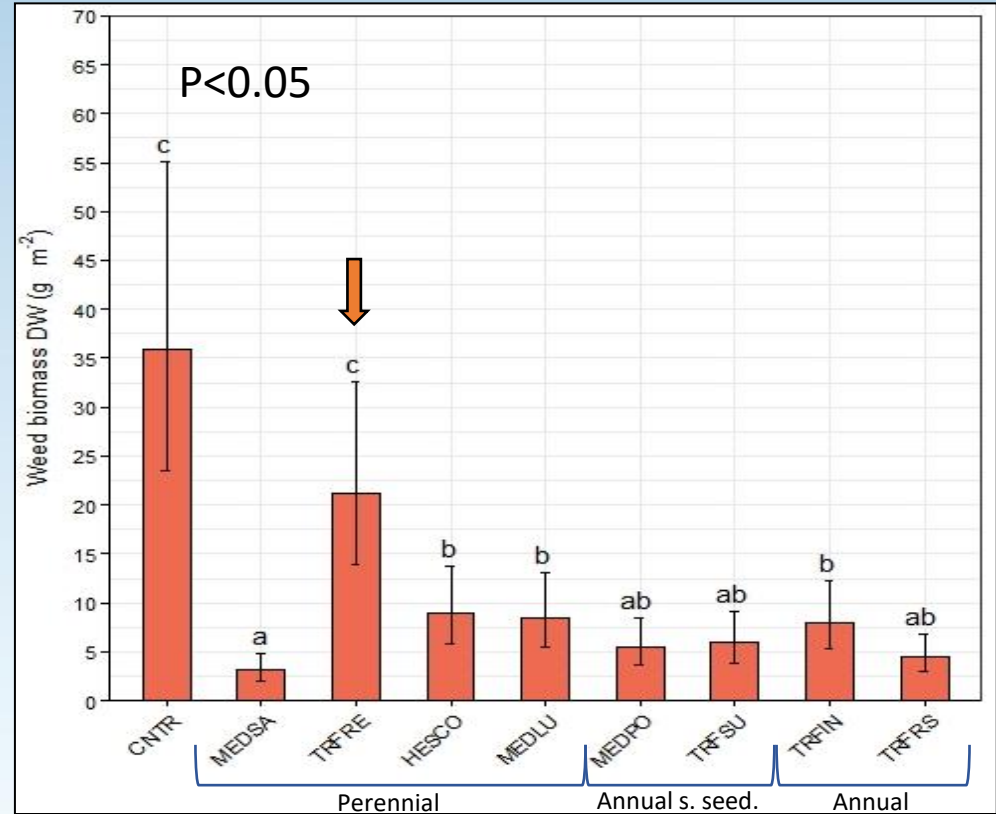
Hedysarum coronarium (TRFSU)



Trifolium subterraneum (TRFSU)

MEDSA: *Medicago sativa*, **TRFRE:** *Trifolium repens*, **HESCO:** *Hedysarum coronarium*, **MEDLU:** *Medicago lupulina*, **MEDPO:** *Medicago polymorpha*, **TRFSU:** *Trifolium subterraneum*, **TRFIN:** *Trifolium incarnatum*, **TRFRS:** *Trifolium resupinatum*.

Weed control



Control plot (CNTR)



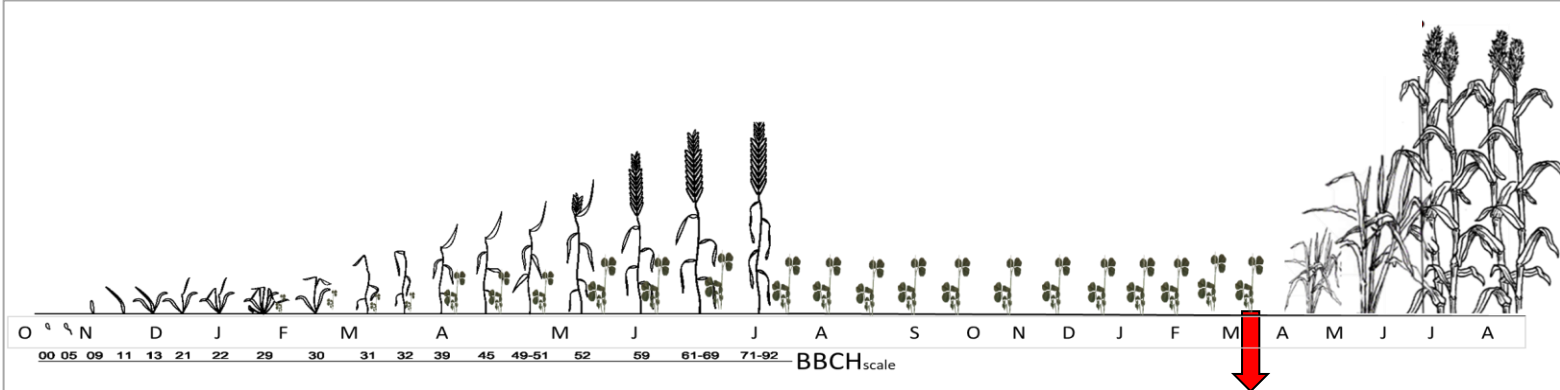
Dead mulch
Trifolium subterraneum (TRFSU)

CNTR: Wheat as sole crop stand, **MEDSA:** *Medicago sativa*, **TRFRE:** *Trifolium repens*, **HESCO:** *Hedysarum coronarium*, **MEDLU:** *Medicago lupulina*, **MEDPO:** *Medicago polymorpha*, **TRFSU:** *Trifolium subterraneum*, **TRFIN:** *Trifolium incarnatum*, **TRFRS:** *Trifolium resupinatum*.



Medicago sativa (MEDLU)

Selection of suitable legumes for relay intercropping with durum wheat in Mediterranean cereal-based cropping systems



1) Legume biomass accumulation

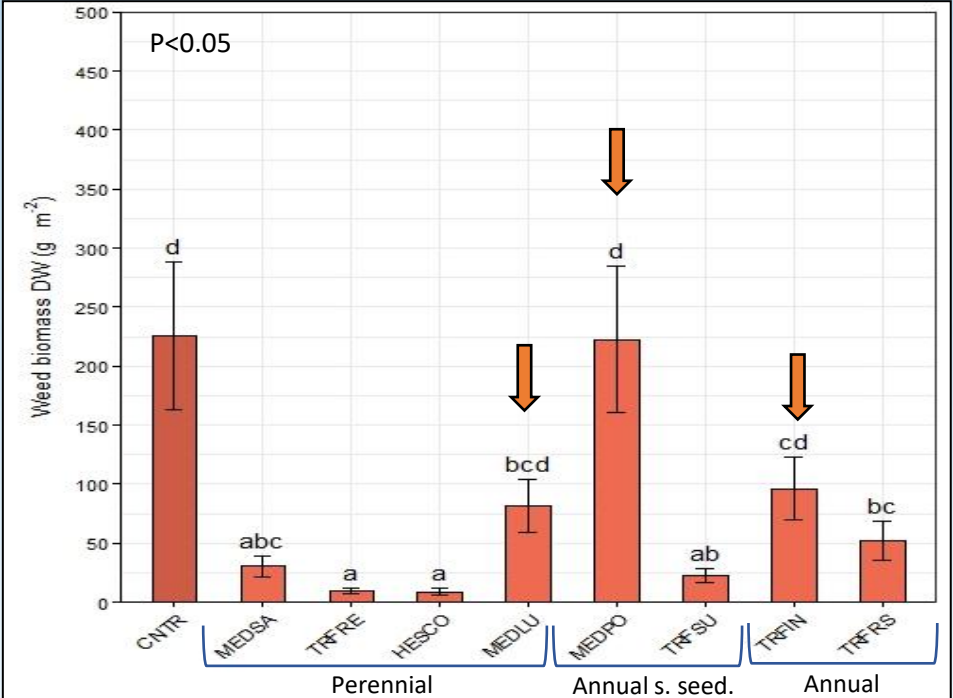
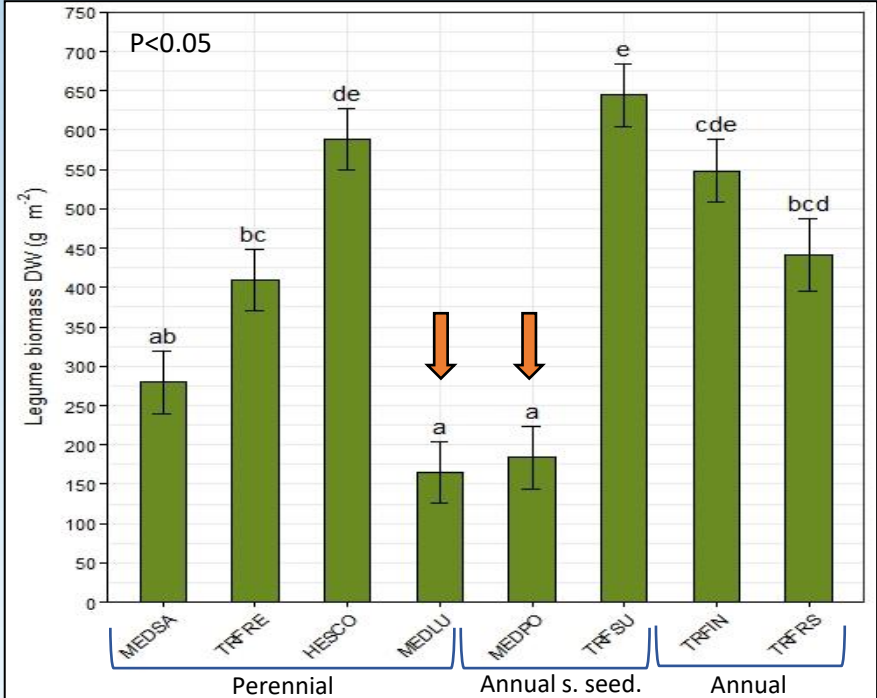
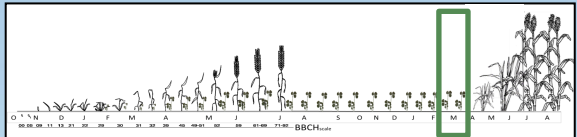


2) Weed control

Legumes termination



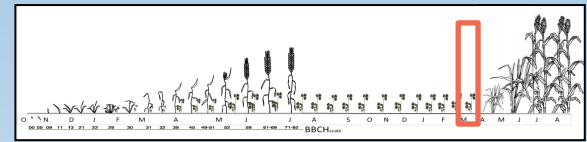
Legume biomass accumulation and weed control



CNTR: Wheat as sole crop stand, **MEDSA:** *Medicago sativa*, **TRFRE:** *Trifolium repens*, **HESCO:** *Hedysarum coronarium*, **MEDLU:** *Medicago lupulina*, **MEDPO:** *Medicago polymorpha*, **TRFSU:** *Trifolium subterraneum*, **TRFIN:** *Trifolium incarnatum*, **TRFRS:** *Trifolium resupinatum*.



Weed control

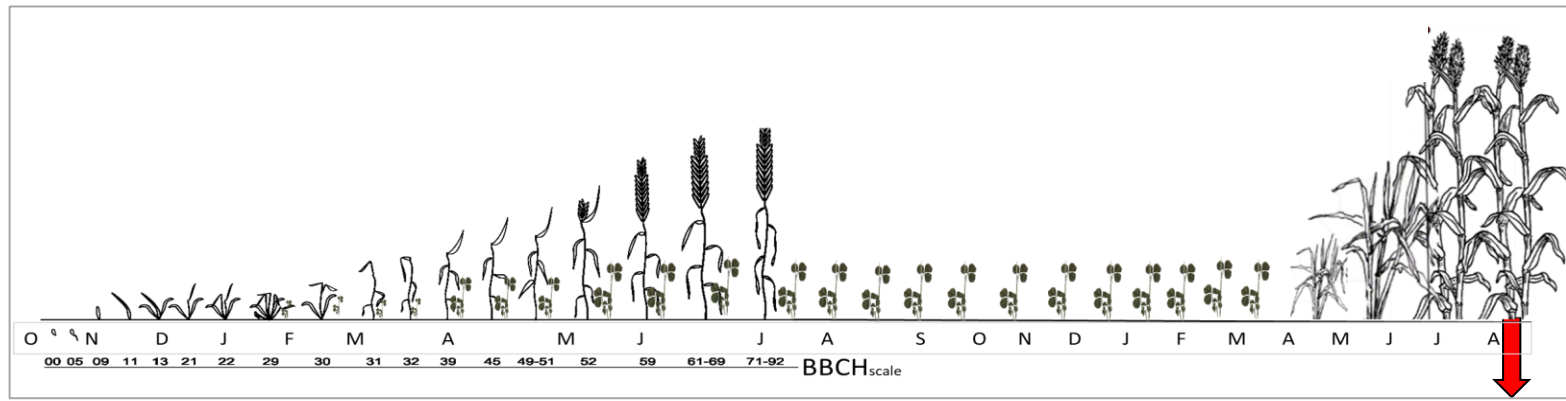


Control plot (CNTR)



Trifolium subterraneum (TRFSU)

Selection of suitable legumes for relay intercropping with durum wheat in Mediterranean cereal-based cropping systems



Subsequent sorghum

Residual effects of legumes on:

- 1) Sorghum biomass
- 2) Effects on weeds*

*(Data not shown)



Selection of suitable legumes for relay intercropping with durum wheat in Mediterranean cereal-based cropping systems

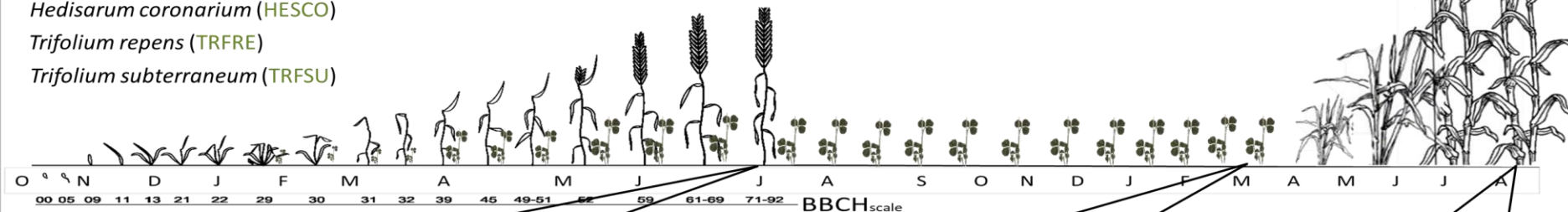
Most promising legumes:

Medicago sativa (MEDSA)

Hedysarum coronarium (HESCO)

Trifolium repens (TRFRE)

Trifolium subterraneum (TRFSU)



Time: wheat harvest	Wheat (Limit the competition with the associated cash crop)	Legume (Ability to grow and persist in the already established wheat)	Weed control (Ability to contrast weed growth and germination)
SUITABLE	- MEDSA - TRFRE - HESCO - MEDLU - MEDPO - TRFSU - MEDSC - TRFMI	- MEDSA - TRFRE - HESCO - MEDLU - MEDPO - TRFSU - TRFIN - MEDTR - VICVI - TRFRS	- MEDSA - HESCO - MEDLU - MEDPO - TRFSU - TRFIN - MEDTR - VICVI - TRFRS
NEUTRAL	- TRFIN - MEDTR		- TRFRE - MEDSC - TRFMI
UNSUITABLE	- VICVI - TRFRS	- TRFMI - MEDSC	

Time: Legume termination	Legume (Ability to grow and persist after the wheat harvest)	Weed control (Ability to contrast weed growth and germination)
SUITABLE	- MEDSA - TRFRE - HESCO - TRFSU	- MEDSA - TRFRE - HESCO - TRFSU
NEUTRAL	- MEDPO - TRFRS - TRFIN - MEDLU - VICVI	- MEDPO - TRFRS - TRFIN - MEDLU - VICVI
UNSUITABLE	- TRFMI - MEDSC - MEDTR	- MEDTR - MEDSC - TRFMI

Time: Sorghum harvest	Sorghum (Residual effects of legumes on sorghum)
SUITABLE	- MEDSA - HESCO - TRFSU - TRFRE
NEUTRAL	- MEDSC - TRFMI - MEDLU - MEDPO - TRFIN - TRFRS - VICVI - MEDTR
UNSUITABLE	

Acknowledgements

- **PhD programme in Agrobiodiversity** at School of advanced study Sant' Anna of Pisa.
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