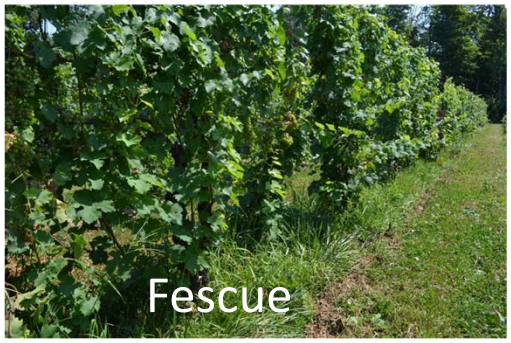
Figure 1. Mature and vigorous Cabernet franc vineyard under-vine ground was managed as bare soil with Glyphosate (a) and as covered with native vegetation (b), Chicory (c), Tillage Radish (d), Fescue (e) and Alfalfa (f) for year 2014 to 2016.

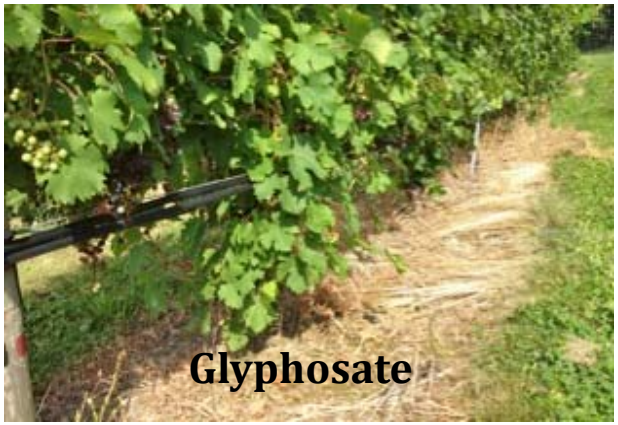



Canada
Tillage Radish

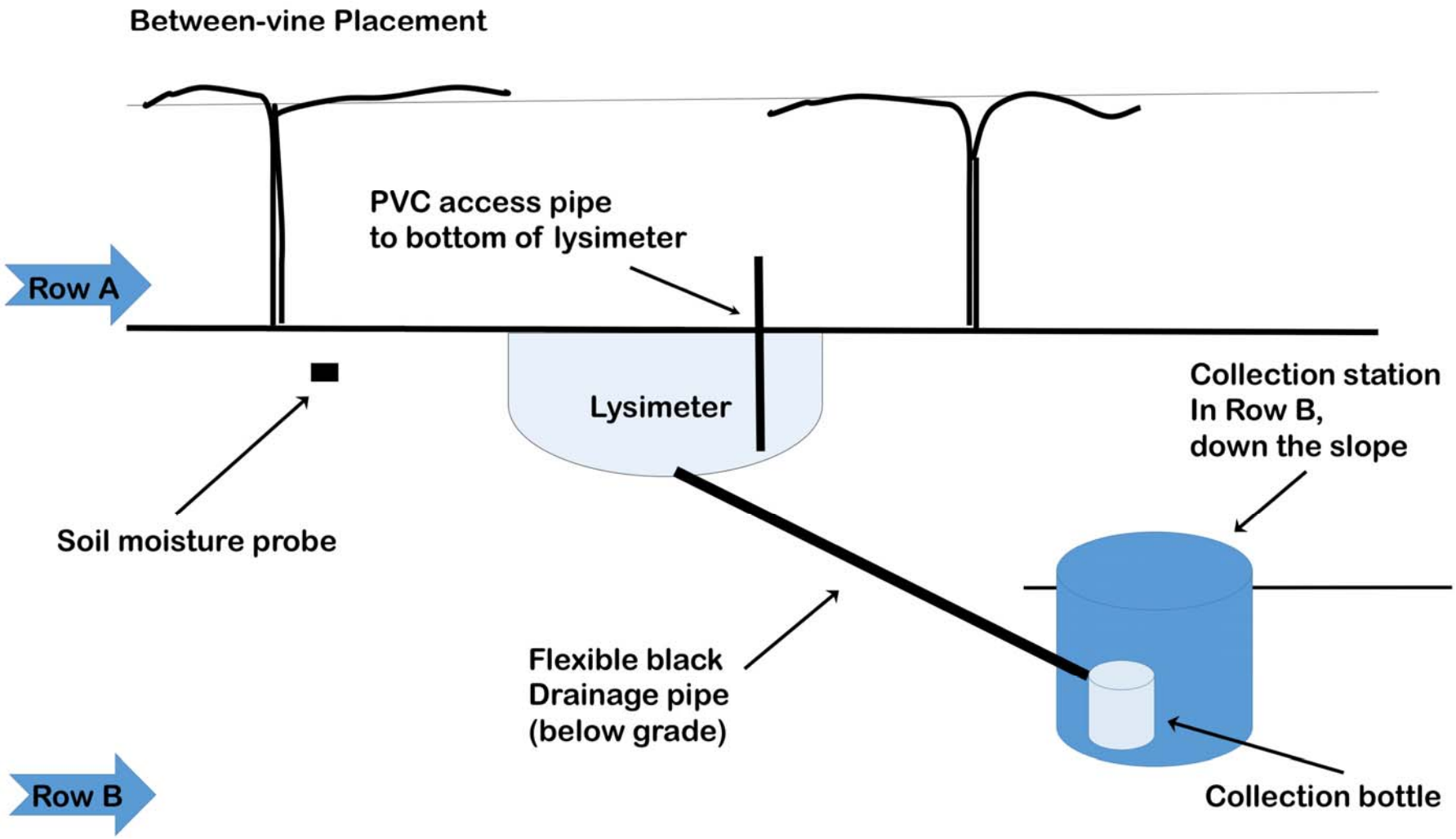

Chicory

Studying under-vine cover crops

- Leachate: analysis of DOC, total N, imidacloprid concentration
- Soil moisture
- Soil nutrient concentrations
- Physical soil properties: bulk density, porosity, penetration resistance
- Water infiltration rate
- Soil microbiome

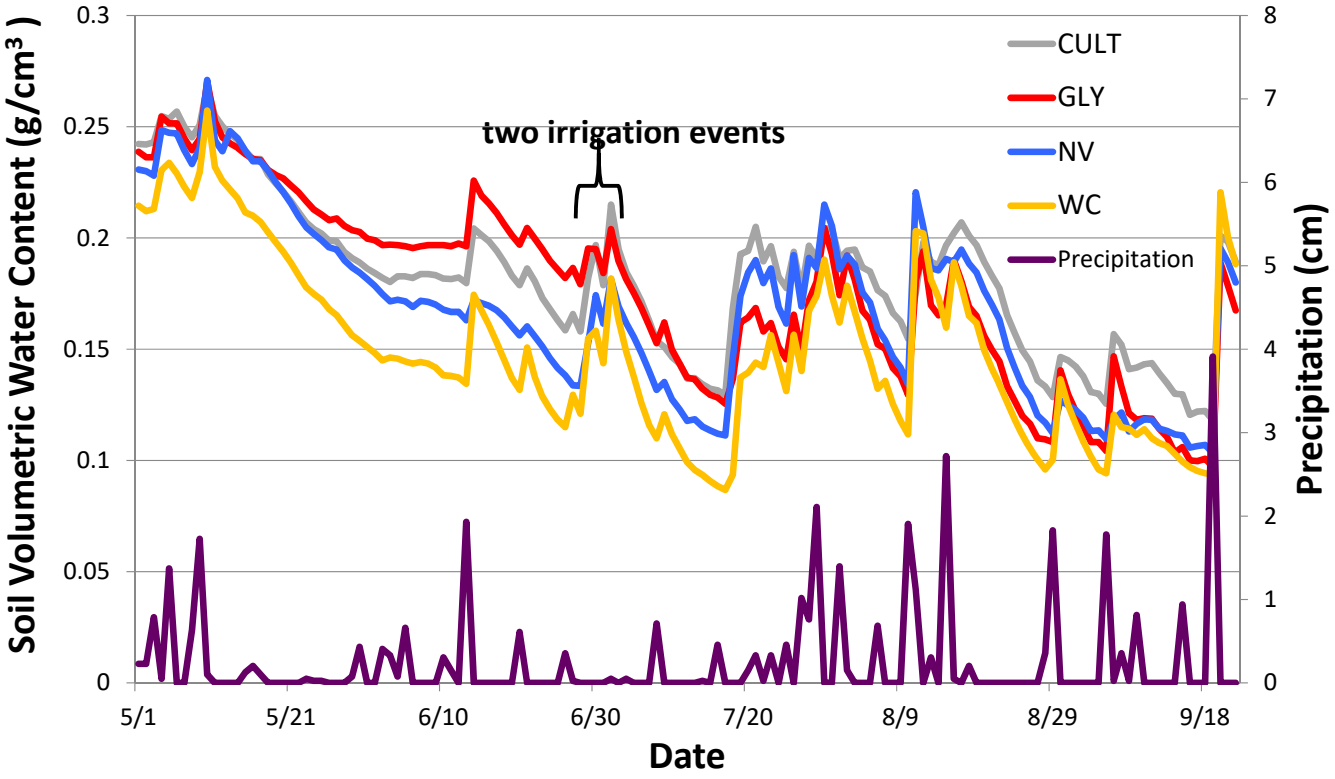


Drainage lysimeters to collect leachate



Lysimeter installation

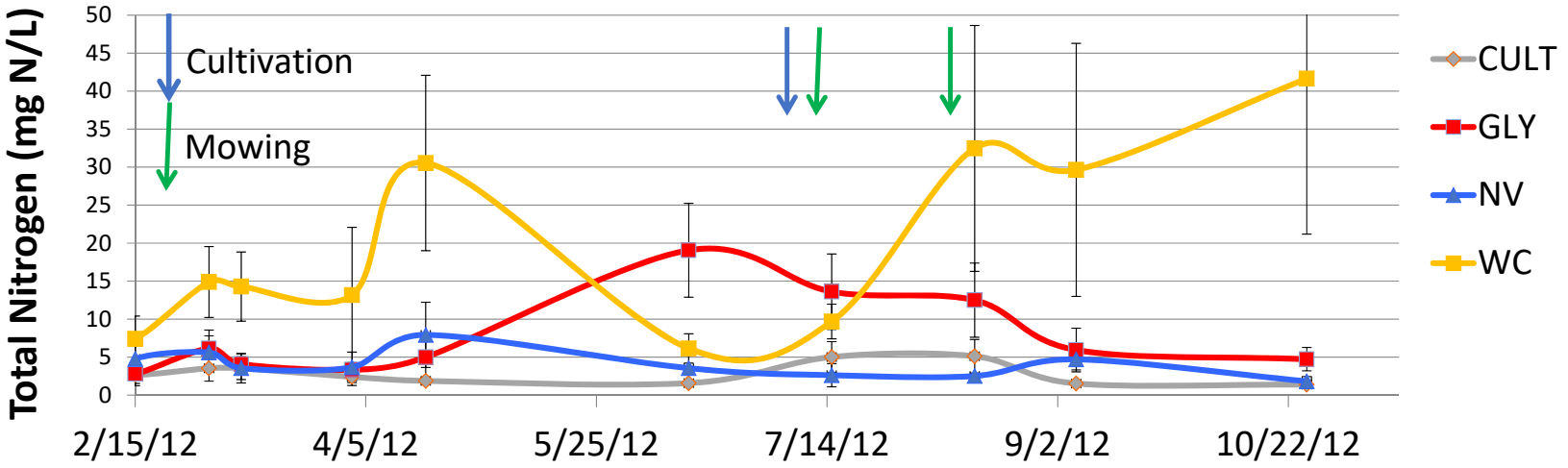
Mid-Day Soil Moisture



Soil water content (g/cm^3) under four under-vine treatments.
CULT=Cultivation, GLY=Glyphosate, NV= Natural Vegetation, WC=White Clover.

Soil moisture differences greater during cover establishment

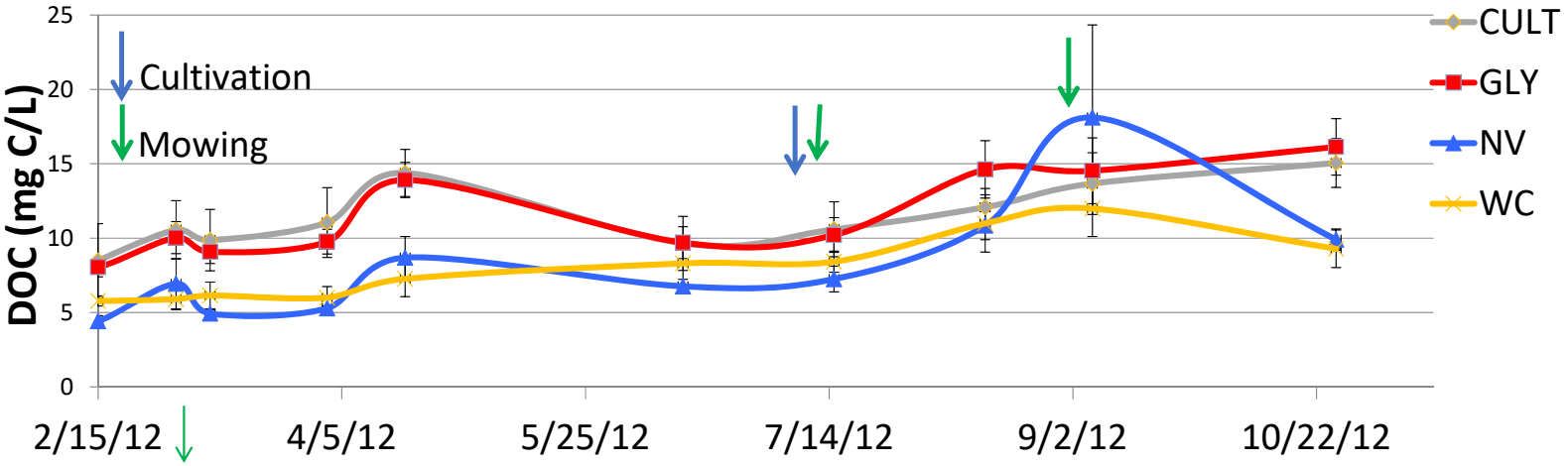
Nitrogen in leachate



N leaching from White clover and Glyphosate plots

Total Nitrogen concentrations in leachate water
CULT=Cultivation, GLY=Glyphosate, NV= Natural Vegetation, WC=White Clover.

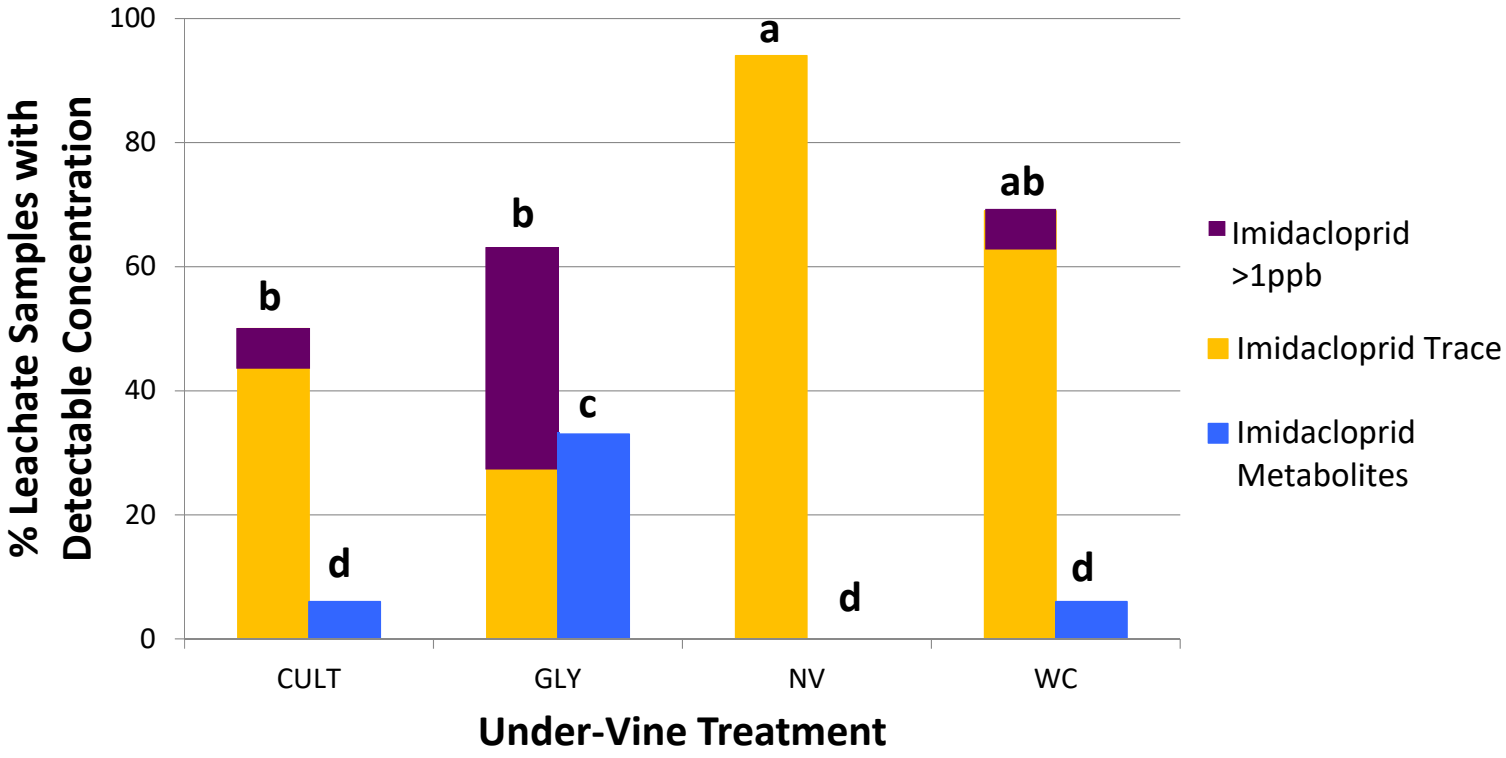
Dissolved organic carbon in leachate



Soil breakdown from Glyphosate and Cultivation early in season

Dissolved Organic Carbon (DOC) concentrations in leachate water
CULT=Cultivation, GLY=Glyphosate, NV= Natural Vegetation, WC=White Clover.

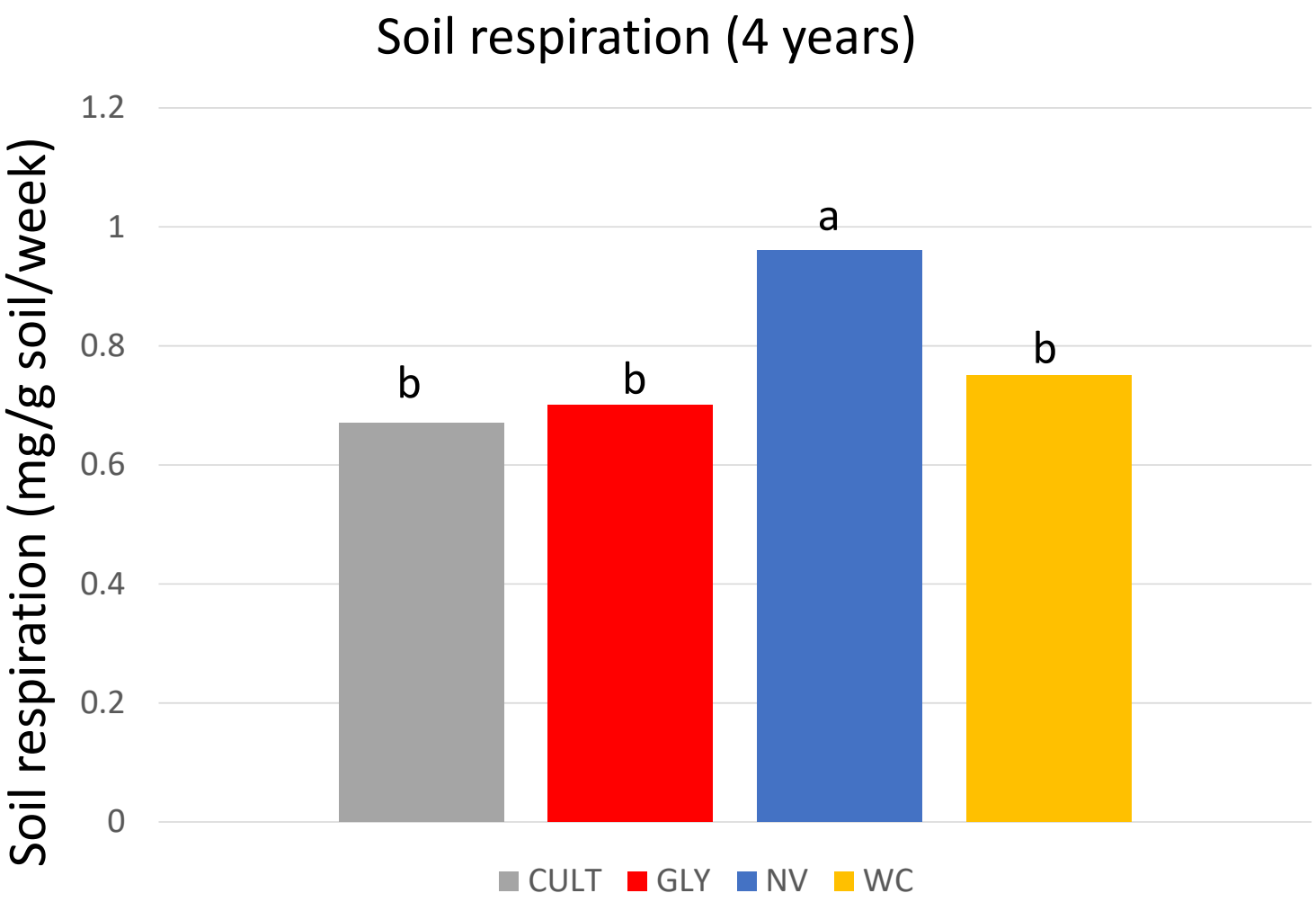
Imidacloprid and its metabolites Occurrence in leachate samples



Most leaching (>1ppb) from Glyphosate

But did Natural Vegetation act as a trap for imidacloprid?

% Leachate Samples with Detectable Concentrations (>1ppb) of Imidacloprid and its metabolites.
CULT=Cultivation, GLY=Glyphosate, NV= Natural Vegetation, WC=White Clover.



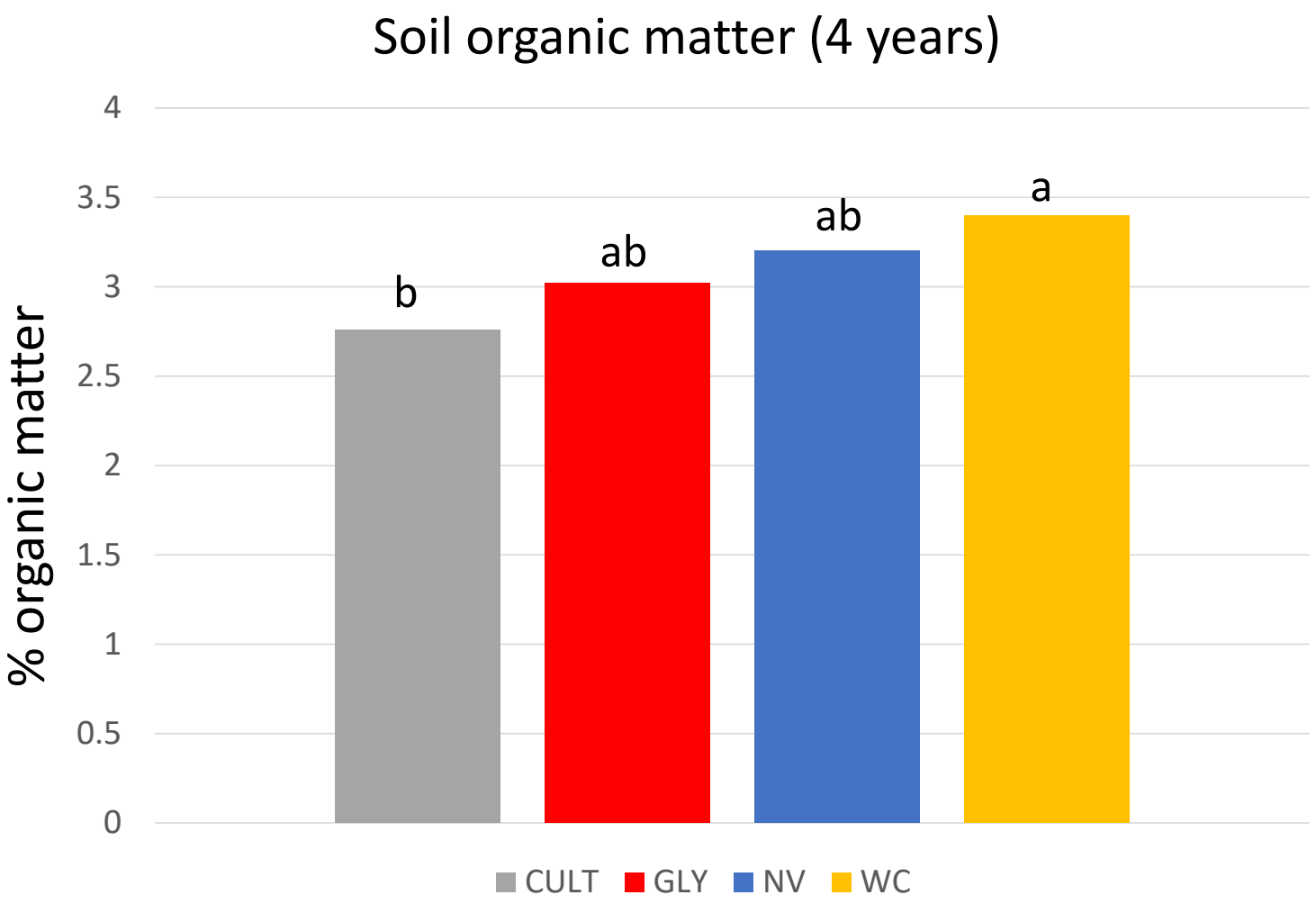
Natural Vegetation improved soil respiration

CO_2 (mg/g soil/week) produced over six weeks of incubation. CULT=Cultivation, GLY=Glyphosate, NV= Native Vegetation, WC=White Clover.

Treatments	Aggregate stability (%)		Organic matter (%)		Microbial respiration (mg CO_2 g/14days)		Mineralizability (mg CO_2/g organic C)	
	2015	2016	2015	2016	2015	2016	2015	2016
GLY	11.05	17.05	2.97	3.02	1.17	0.89	39.5	29.3
NV	20.32*	21.47	3.13	3.33*	1.92*	1.33	60.8*	39.8*
TR	12.05	17.47	3.19	3.28*	1.55	1.16	48.2	35.5
CHI	15.53	22.54	3.36*	3.24*	1.58	1.09	46.6	33.8
FES	12.09	20.28	3.21	3.36*	1.33	1.56*	41.4	46.2*
ALF	20.50*	23.56*	3.27*	3.15	1.56	1.29*	47.8	41.4*

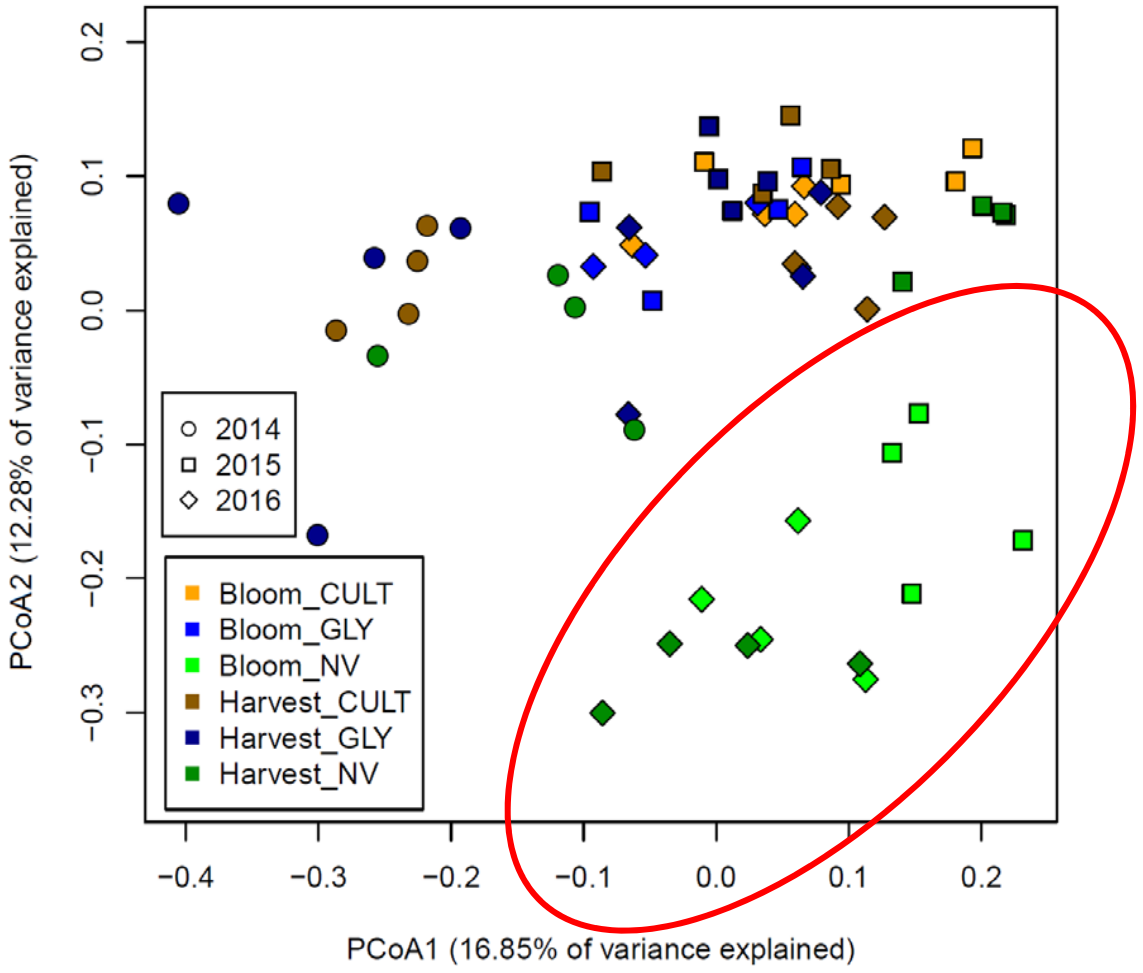
GLY=Glyphosate, NV= Natural Vegetation, TR = Tillage Radish, CHI = Chicory, FES = Fescue, ALF = alfalfa
* Indicates significantly different from GLY

Glyphosate had lowest aggregate stability, OM, microbial respiration, mineralizability



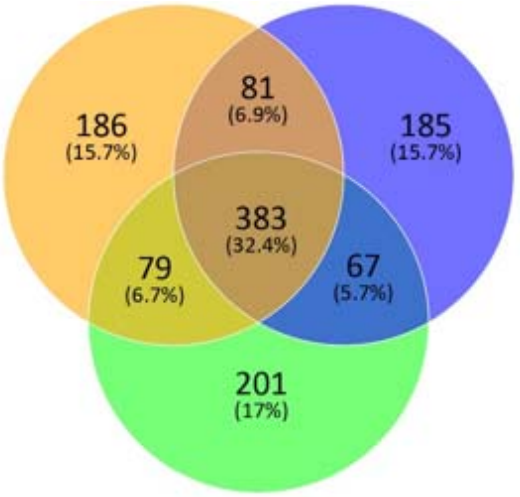
Soil organic matter was lowest in Cultivation, highest in White Clover

% soil organic matter after four years.
CULT=Cultivation, GLY=Glyphosate, NV= Natural Vegetation, WC=White Clover.



Principal coordinates analysis (PCoA) ordinations of soil fungal microbiota Cultivation (CULT), Glyphosate (GLY) and Natural vegetation (NV) field treatments

Soil microbiome differed in NV compared to GLY and CULT

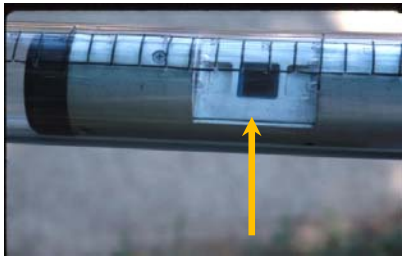


Venn diagram of the total number of fungal OTUs detected in the soil

Analyzing root growth

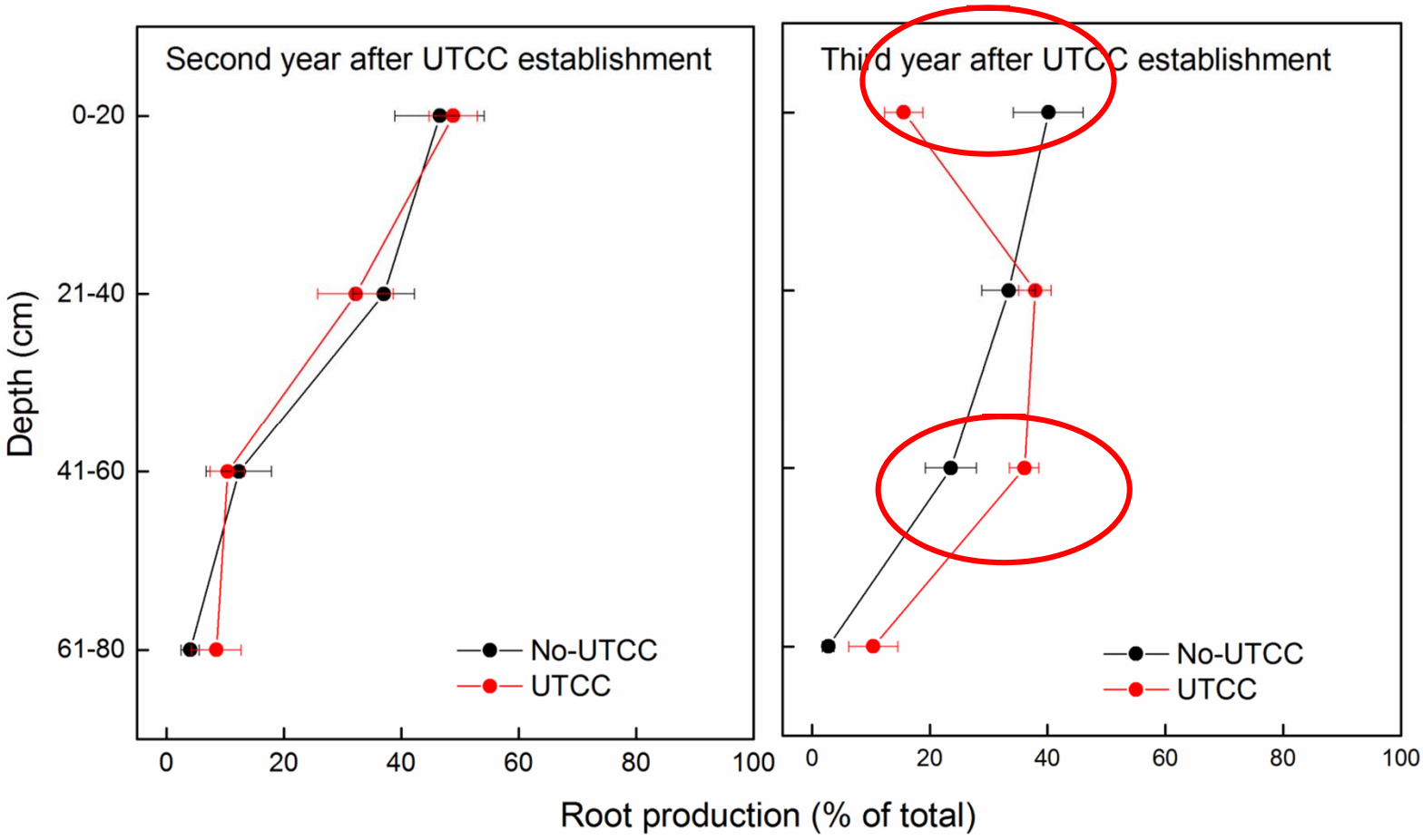
Minirhizotron system

Clear observation tube

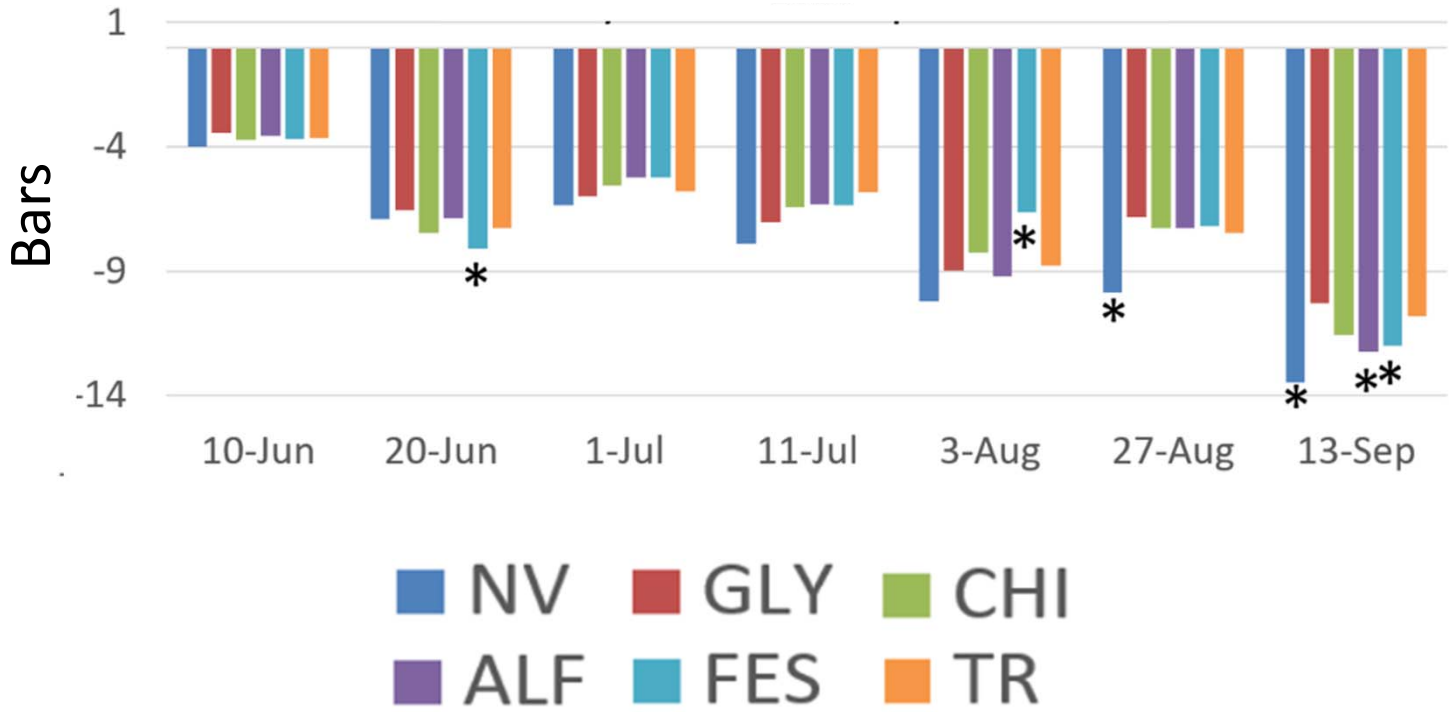


Video camera in tube

Data collection

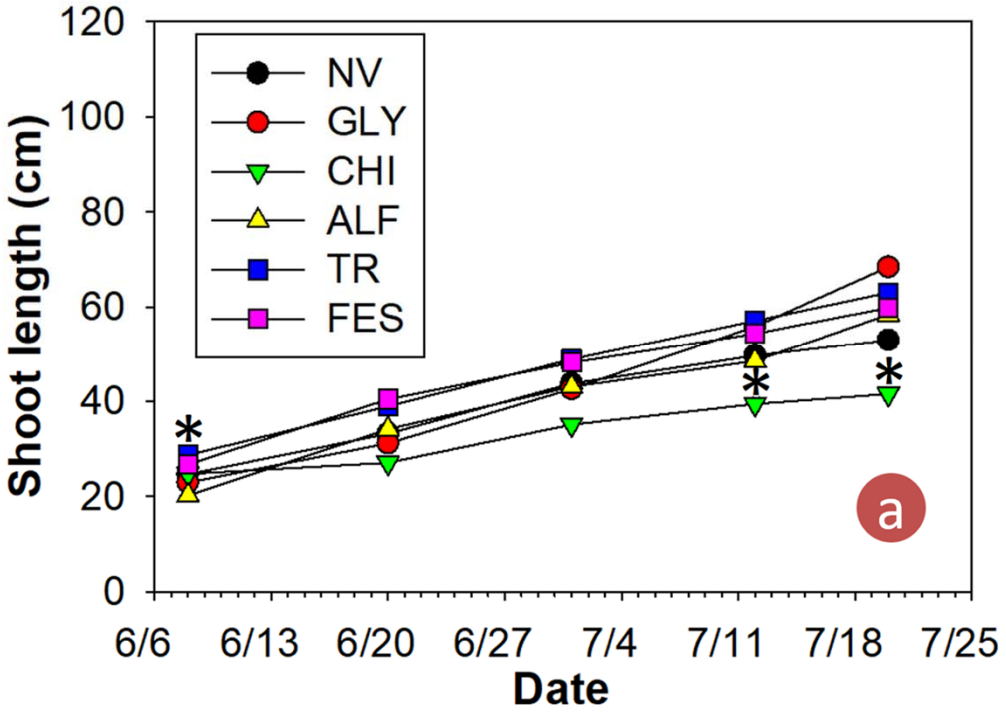


Competition resulted in fewer roots in shallow soil layers, more roots at deeper layers

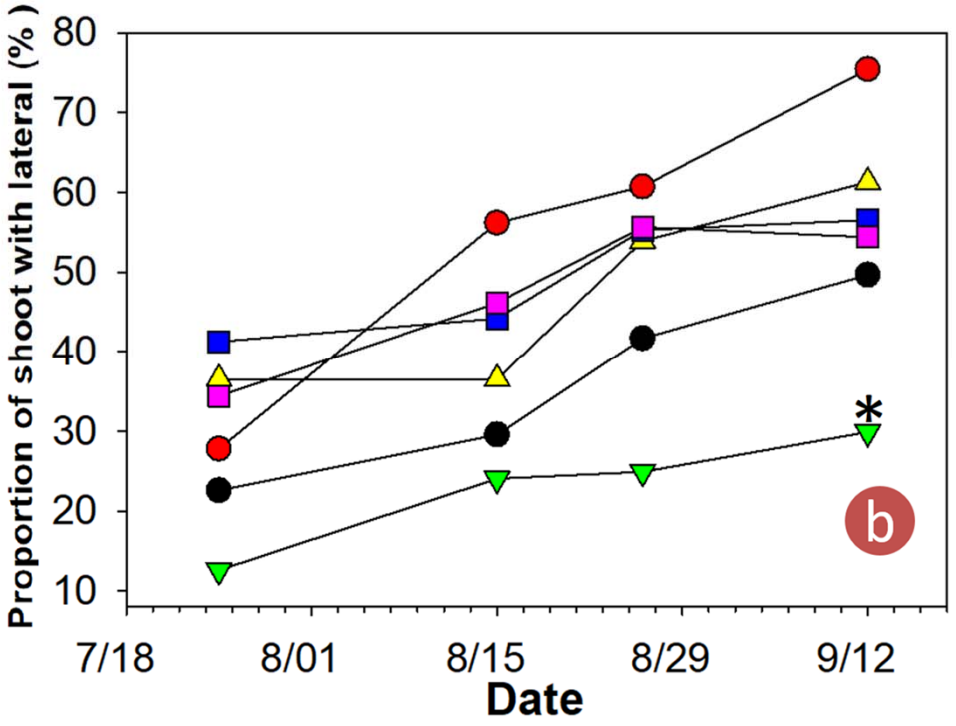


Stem water potential – Minor differences due to cover crops except during drought

Shoot length



Proportion of shoots with laterals



Chicory reduced average shoot length and the proportion of shoots with laterals compared to glyphosate

Treatments	Yield kg/vine		Pruning weight kg/vine		Ravaz Index	
	2015	2016	2015	2016	2015	2016
GLY	3.90	2.89	1.15	0.44	7.54	10.83
NV	4.11	5.80*	0.81	0.36	6.06	20.68
TR	4.74	5.12*	0.53*	0.34	10.51	18
CHI	5.22	3.03	0.40*	0.18*	17.34	18.21
FES	4.28	4.18	0.58*	036	8.20	13.15
ALF	4.61	2.88	0.86	0.35	13.55	14.06

* Indicates significantly different from GLY

Treatments decreased pruning weight without decreasing yield

Summary of impact of under-vine cover crops on yield and pruning weight

Little to no impact	Moderate impact	Significant impact
Buckwheat	Tillage Radish	Chicory
Rosette-forming turnip	Alfalfa	Annual Ryegrass
	Fescue	
	Natural vegetation	

Recommendation: If using an under-vine cover crop, track yield and pruning weight on sentinel vines


FIMCO
CALIBRATION SETTINGS
LBS PER 1000 SQ FT
FLOW CONTROL SETTING
OPERATION INSTRUCTIONS
• USE APPLICATION INFORMATION ON BAG. FIND CALIBRATION SETTING (ABOVE) AND SET GATE STOP TO CORRECT FLOW SETTING
• IF SPREAD PATTERN IS OF CENTER ADJUST PATTERN RING POSITION. SEE OWNER'S MANUAL
• NOTE: ABOVE CALIBRATION SETTINGS HAVE BEEN DETERMINED USING UREA 46-0-0, 20 FOOT SWATH, AND 3 MPH (TRAVEL 88FT IN 20 SECONDS)
• NOTE: CALIBRATION GUIDE SETTINGS IS TO BE USED AS A GENERIC GUIDE. FOR SPECIFIC PRODUCTS. SEE YOUR OWNER'S MANUAL
INSTRUCCIONES DE OPERACIÓN
• USE LA INFORMACIÓN SOBRE APLICACIÓN EN LA BOLSA. BUSQUE LA POSICIÓN LA CALIBRACIÓN (ARRIBA) Y FIJA LA PARADA DE LA PUERTA PARA CORREGIR LA CALIBRACIÓN DE LA CORRIENTE.
• SI PAUTA de EXTENSIÓN ES DE el CENTRO AJUSTA POSICIÓN de ANILLO de PAUTA, VE MANUAL
• NOTA: ENCIMA DE CALIBRACIÓN AJUSTES HA SIDO DETERMINADO UTILIZAR 46-0-0 de UREA, 20 RAYA DE PIE, Y 3 MPH (VIAJE 88 P EN 20 SEGUNDOS)
• NOTA: AJUSTES de GUÍA de CALIBRACIÓN SON de SER UTILIZADOS COMO UNA GUÍA GENÉRICA. PARA PRODUCTOS ESPECÍFICOS, VEA SU MANUAL
SPINNING BLADES HAZARD
TO PREVENT SERIOUS INJURY OR DEATH
• Keep Hands, Feet & Clothing Away From Spinning Blades
• Stay Clear Of All Moving Parts
• Keep Others Away
• Stop The Machine, Shut Off Engine & Disconnect All Power Before Adjusting, Or Servicing
WARNING

Potential challenges in vinifera:

Trunk renewal

Moving for spraying

Copper toxicity

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