

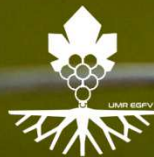


# Les préparations biodynamiques 500 et 501 ont-elles un effet sur la vigne ?

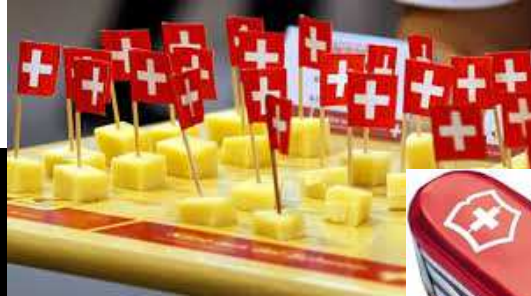
Markus Rienth, Frederic Lamy, Clément Chessex, Thierry Heger

University of Sciences and Art Western Switzerland

CHANGINS haute Ecole de viticulture et oenologie



# En Suisse Non seulement:



**FiBL**  
France



de  
ue



**synger**

Et même un  
centre de  
formation et de  
la recherche viti-  
vinicole



  
CHANGINS



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# Contexte – les produits phytosanitaire

La viticulture ne représente que 3% du surface agricole en Europe mais consomme environ 30% des produits phytosanitaire

"L'indice moyen de fréquence des traitements (IFT) pour les vignobles français était de 13,5 en 2016, tandis que l'IFT moyen pour le blé (une culture annuelle majeure en France) était de 4,9 en 2017."

**Tableau 1.** Consommation de produits phytopharmaceutiques (PPP) par la viticulture en France.

	1999	2003	2009
Surface, x 1000 ha	901	851	790
PPP, tonnes de SA (*)	14 100	10 700	9 800
PPP, % toutes cultures (*)	26	24	28

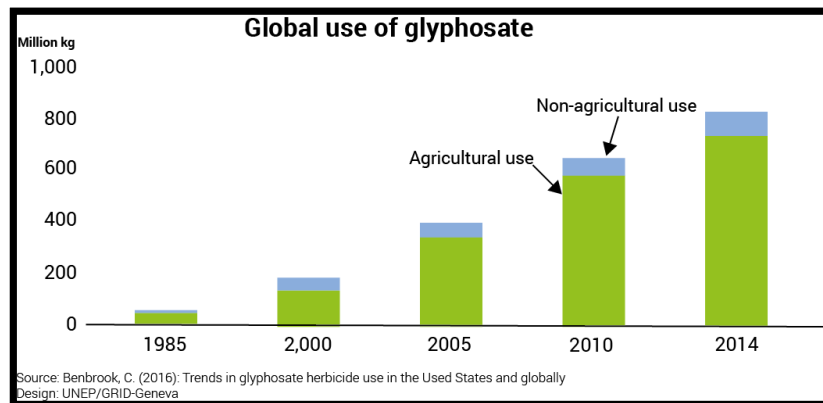
(\*) : Soufre minéral exclu ; 80 % des PPP sont des fongicides.

Schneider et *al.*, 2019\_BIO\_web



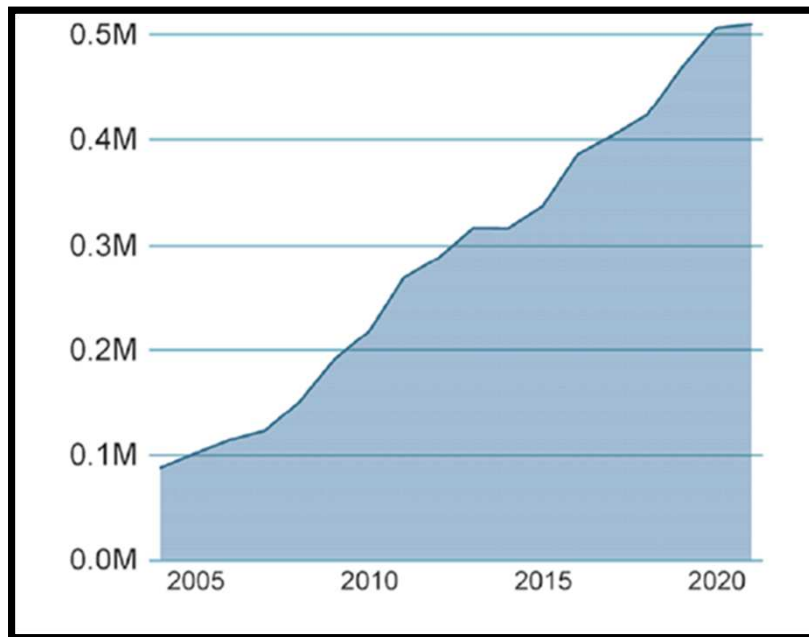
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# Contexte – les herbicides et la biodiversité

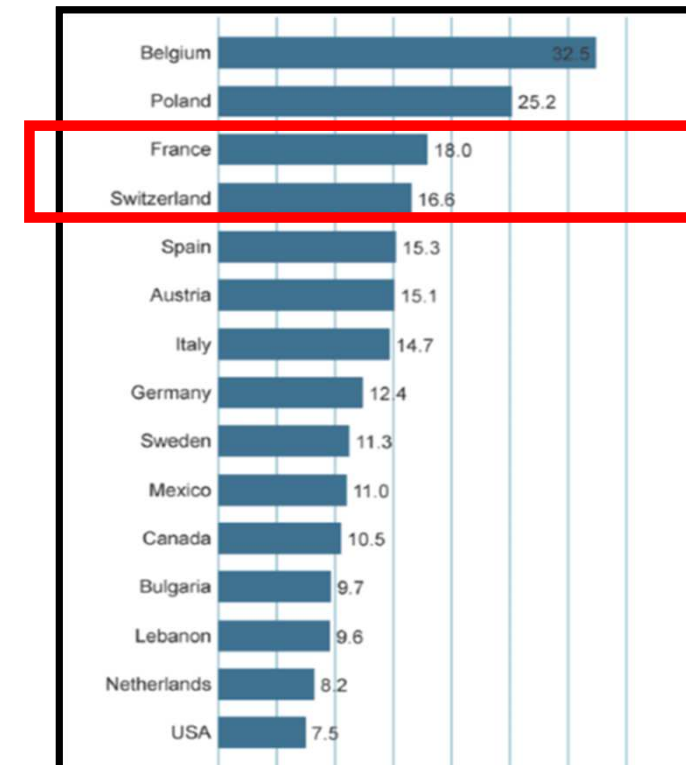


# Contexte – surface en viticulture biologique

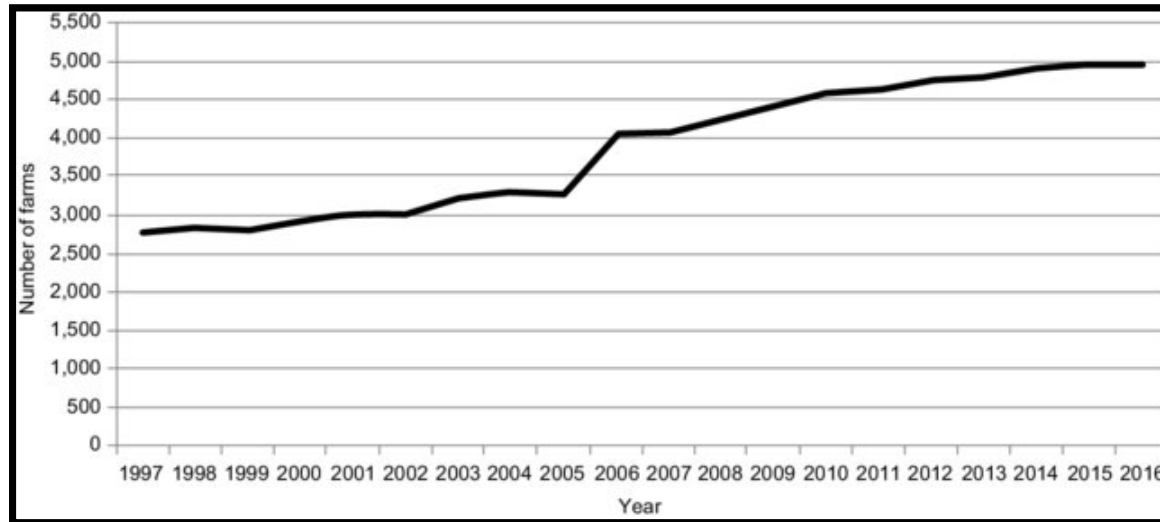
Surface en viticulture biologique au mondiale (ha)



Pays avec la plus grande part de surface biologique (%)



# Contexte – exploitations en viticulture biodynamique



Country	Number of farms with grapes for wine*	Area (hectares) with grapes for wine	Average hectares/farm
Certified by DI members			
Austria	34	348	10.2
Belgium	1		
France	286	4,706	16.5
Germany	54	218	4
Italy	74	1,303	17.6
The Netherlands	2	1	0.5
New Zealand	8	241	30.1
Slovenia	9	69	7.7
Spain	33	1,014	30.7
Switzerland	37	215	5.8
UK	6	35	5.8
USA	58	1,314	22.7
Certified by DI (ICO)			
Argentina	9	312	34.7
Chile	17	1,224	72
Czech Republic	1	53	
Greece	1	5	
Hungary	3	11	3.7
Mexico	1	4	
Portugal	1	3	
South Africa	3	93	31
<b>Total</b>	<b>639</b>	<b>11,188</b>	

**Notes:** \*Demeter certification and "in conversion" certification. Data courtesy of Demeter-International data. Statistics of biodynamic winegrowers worldwide. Not all farms included here are certified as biodynamic. Some of them are in conversion.  
**Abbreviations:** DI, Demeter International; ICO, International Certification Office.



# Contexte – exploitations en viticulture biodynamique

***Beaucoup de domaines très prestigieux font de la biodynamie, MAIS on ne peut pas assumer qu'ils sont bons parce qu'ils font de la biodynamie...  
- Beaucoup de «résultats» empirique sans control***

***La plupart des ces domaines étaient déjà bons avant...?!?!?***



***"Les preuves scientifiques claires d'une meilleure performance de la vigne, de la qualité du vin ou du sol sont encore manquantes."***

***"Probablement un grand nombre d'études non publiées entraînant un biais de publication positif ????"***

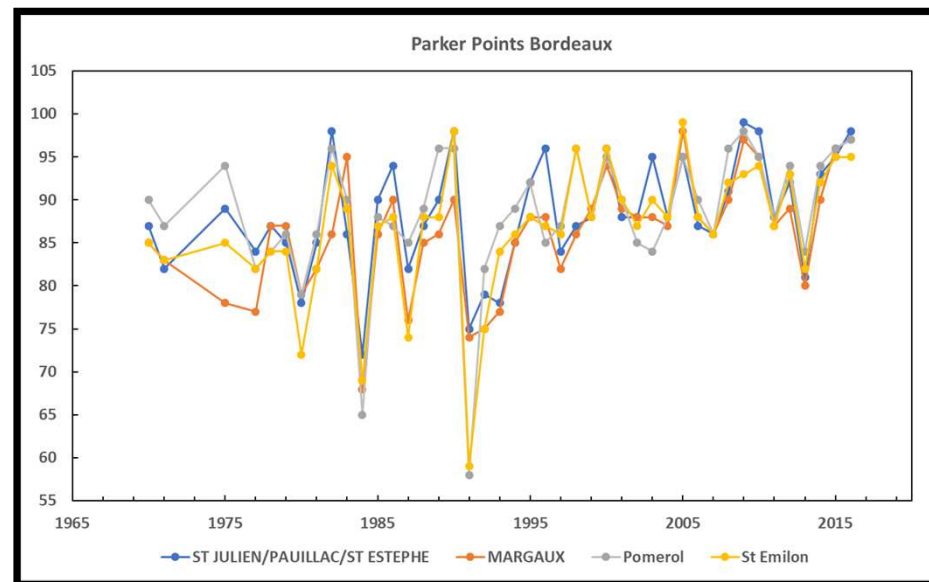




# Les études / expériences / rapports techniques

*«J'ai commencé la biodynamie en 2002 et en 2003 j'ai déjà vue que toutes mes vins sont diffèrent.....».....*

- *Malgré l'effet millésime????*



# Les études / expériences / rapports «non-scientifique»

---

- *«les feuilles sont plus verte»*
- *«L'angle de feuille change après application»*
- *«mes vins sont plus expressive»*



# Quelques études mondiales les plus pertinentes au niveau rigueur scientifique

Received: 28 April 2019 | Accepted: 2 September 2019 | Published: 18 October 2019  
DOI:10.20870/oeno-one.2019.53.4.2403



## Conversion to organic and biodynamic viticultural practices: impact on soil, grapevine development and grape quality

Georg Meissner<sup>1</sup>, Miriam Athmann<sup>2\*</sup>, Jürgen Fritz<sup>3</sup>, Randolph Kauer<sup>1</sup>, Manfred Stoll<sup>1</sup> and Hans R. Schultz<sup>1</sup>

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Received: 5 August 2019 | Accepted: 18 May 2020 | Published: 17 June 2020  
DOI:10.20870/oeno-one.2020.54.2.2548



## Quality assessment of grape juice from integrated, organic and biodynamic viticulture using image forming methods

Jürgen Fritz<sup>1,2</sup>, Miriam Athmann<sup>1</sup>, Georg Meissner<sup>1</sup>, Randolph Kauer<sup>1</sup>, Uwe Geier<sup>2</sup>, Roya Bornhütter<sup>4</sup> and Hans R. Schultz<sup>3</sup>

<sup>1</sup>Institute of Crop Science and Resource Conservation, Department of Agroecology and Organic Farming, University of Bonn, Auf dem Hügel 6, D-53121 Bonn, Germany

<sup>2</sup>Department of Organic Farming and Cropping Systems, University of Kassel, Nordbahnhofstr. 1a, D-37213 Witzenhausen, Germany

<sup>3</sup>Institute of General and Organic Viticulture, Hochschule Geisenheim University, Von-Lade-Str. 1, D-65366 Geisenheim, Germany

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\*Corresponding author: j.fritz@uni-kassel.de

## Soil and Winegrape Quality in Biodynamically and Organically Managed Vineyards

Jennifer R. Reeve,<sup>1\*</sup> L. Carpenter-Boggs,<sup>1</sup> John P. Reganold,<sup>1</sup>  
Alan L. York,<sup>2</sup> Glenn McGourty,<sup>3</sup> and Leo P. McCloskey<sup>4</sup>

## Organic and Biodynamic Viticulture Affect Biodiversity and Vine and Wine Properties: A Systematic Quantitative Review

Johanna Döring, Cassandra Collins, Matthias Frisch, Randolph Kauer

Am J Enol Vitic. February 2019 : ajev.2019.18047; published ahead of print February 20, 2019 : DOI: 10.5344/ajev.2019.18047

## SCIENTIFIC REPORTS

### OPEN Responses to climatic and pathogen threats differ in biodynamic and conventional vines

Received: 21 May 2018  
Accepted: 29 October 2018  
Published online: 15 November 2018

Isabelle Soustre-Gacougnolle<sup>1,2</sup>, Marc Lollier<sup>2</sup>, Carine Schmitt<sup>1</sup>, Mireille Perrin<sup>1</sup>, Estelle Buvens<sup>1</sup>, Jean-François Lallemand<sup>1</sup>, Mélanie Mermet<sup>1</sup>, Mélanie Henaux<sup>1</sup>, Christelle Thibault-Carpentier<sup>1</sup>, Doulaye Dembele<sup>1</sup>, Damien Steyer<sup>1</sup>, Céline Clayeux<sup>1</sup>, Anne Moneyron<sup>1</sup> & Jean E. Masson<sup>1</sup>



RESEARCH ARTICLE

## Growth, Yield and Fruit Quality of Grapevines under Organic and Biodynamic Management

Johanna Döring<sup>1\*</sup>, Matthias Frisch<sup>2</sup>, Susanne Tittmann<sup>1</sup>, Manfred Stoll<sup>1</sup>, Randolph Kauer<sup>1</sup>

<sup>1</sup> Department of General and Organic Viticulture, Hochschule Geisenheim University, Geisenheim, Germany, <sup>2</sup> Institute of Agronomy and Plant Breeding II, Justus Liebig University, Gießen, Germany



# Synthèse des études scientifiques sur les effets de la biodynamie en viticulture

## Organic and Biodynamic Viticulture Affect Biodiversity and Vine and Wine Properties: A Systematic Quantitative Review

Johanna Döring, Cassandra Collins, Matthias Frisch, Randolf Kauer  
Am J Enol Vitic. February 2019 : ajev.2019.18047; published ahead of print February 20, 2019; DOI: 10.5344/ajev.2019.18047

**Il y souvent des différences significatives entre conventionnelle/intégrée Vs. Bio / Biodynamie mais jamais entre Bio et Biodynamie**

Table 2 Effects of organic viticulture in comparison to conventional viticulture grouped by different fields of interest.

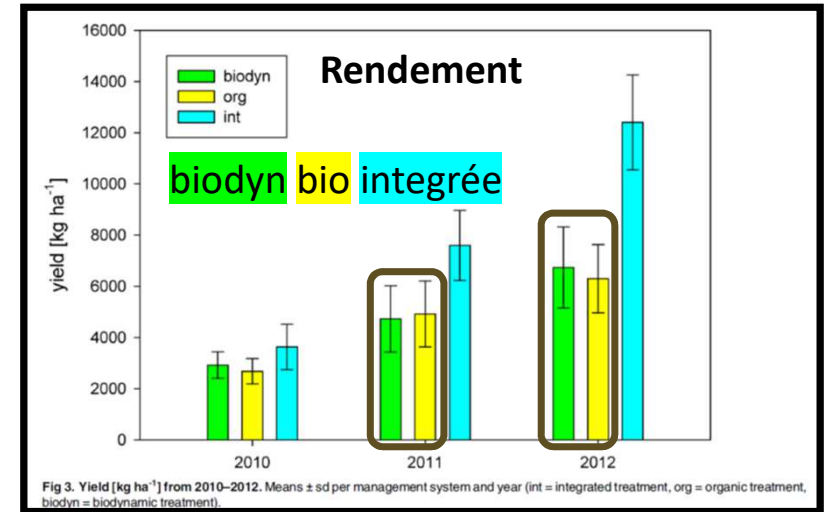
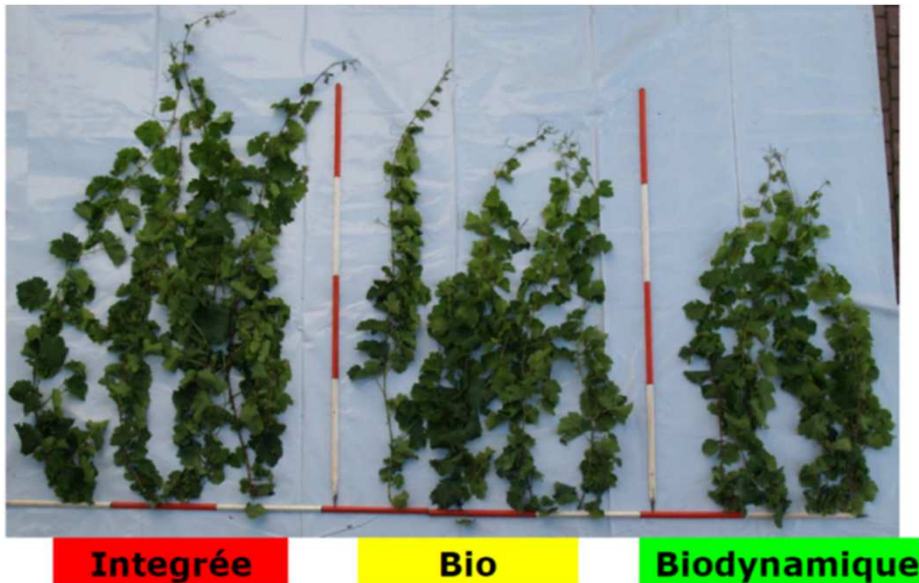
Field of interest	parameter	effect compared to integrated/conventional management	management system	References
soil	biological activity: binding activity of soil organisms and organic matter: total N	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total organic C: content: total N: P: K: available fraction C: heavy cation content	no difference	increase	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	biological nitrogen: C:N: C:P: soil temperature after conversion	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	soil composition	increase	no difference	Collin et al. 2011
	beneficial species: p: CO <sub>2</sub>	no difference	increase	Doring et al. 2011, Pothier et al. 2008
vine	phenolic compounds: flavanols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total polyphenols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavanols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavonols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavonols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
harvest	phenolic compounds: flavanols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total polyphenols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavanols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavonols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavonols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
phenol	phenolic compounds: flavanols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total polyphenols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavanols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavonols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	total flavonols	increase	no difference	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
yield	vine yield	no difference	increase	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	vine yield: components of harvest	no difference	increase	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	vine yield: components of harvest	no difference	increase	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
	vine yield: components of harvest	no difference	increase	Collin et al. 2011, Denton et al. 2011, Gelles 1988, Oliva et al. 2008, Ruppel et al. 2008
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Field of interest	parameter	effect compared to integrated/conventional management	management system	References
vine arachnids	vine arachnids: <i>Phytoseius viticola</i>	no difference	increase	Doring et al. 2011, Pothier 2014
	vine arachnids: <i>Erythraeus vitinus</i>	increase	no difference	Doring et al. 2011
	vine arachnids: <i>Dolichopus</i>	increase	no difference	Linder et al. 2008
	vine arachnids: <i>Phytoseius</i>	increase	no difference	Doring et al. 2011, Doring et al. 2015
	vine arachnids: vine rot, root necrosis (fungal pathogens)	increase	no difference	Doring et al. 2011, Linder et al. 1999, Mielke 2011
vine grape quality	berry composition	no difference	increase	Collin et al. 2011a, Collins et al. 2010b, Doring et al. 2015, Henck Klapp 1995, Hofmann 1991, Kauer 1994, Linder et al. 2004, Madau et al. 2004, Tassan et al. 2013, Tassan et al. 2014, Winter 2006
	Fla and Fla in berries	increase	no difference	Collin et al. 2011
	total soluble solids and soluble acid	increase	no difference	Collin et al. 2011
	total acidity: citric and malic acids	increase	no difference	Collin et al. 2011
	total sugar and total phenol	increase	no difference	Collin et al. 2011
vine grape yield	vine yield: components of harvest	increase	no difference	Collin et al. 2011, Doring et al. 2015, Doring et al. 2015, Henck Klapp 1995, Hofmann 1991, Kauer 1994, Linder et al. 2004, Madau et al. 2004, Tassan et al. 2013, Tassan et al. 2014, Winter 2006
	vine yield: components of harvest	increase	no difference	Collin et al. 2011, Doring et al. 2015, Doring et al. 2015, Henck Klapp 1995, Hofmann 1991, Kauer 1994, Linder et al. 2004, Madau et al. 2004, Tassan et al. 2013, Tassan et al. 2014, Winter 2006
	vine yield: components of harvest	increase	no difference	Collin et al. 2011, Doring et al. 2015, Doring et al. 2015, Henck Klapp 1995, Hofmann 1991, Kauer 1994, Linder et al. 2004, Madau et al. 2004, Tassan et al. 2013, Tassan et al. 2014, Winter 2006
	vine yield: components of harvest	increase	no difference	Collin et al. 2011, Doring et al. 2015, Doring et al. 2015, Henck Klapp 1995, Hofmann 1991, Kauer 1994, Linder et al. 2004, Madau et al. 2004, Tassan et al. 2013, Tassan et al. 2014, Winter 2006
	vine yield: components of harvest	increase	no difference	Collin et al. 2011, Doring et al. 2015, Doring et al. 2015, Henck Klapp 1995, Hofmann 1991, Kauer 1994, Linder et al. 2004, Madau et al. 2004, Tassan et al. 2013, Tassan et al. 2014, Winter 2006



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# Quelques exemples des études scientifiques



- *Moins de vigueur*
  - *Rendement plus*
  - *Baie plus petites*
- *Plus de sucres (concentration)*  
→ *Différences seulement entre Bio/biodyn vs intégrée PAS entre Bio et Biodyn*



# Quelques exemples des études scientifiques

Received: 28 April 2019 | Accepted: 2 September 2019 | Published: 18 October 2019  
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## Conversion to organic and biodynamic viticultural practices: impact on soil, grapevine development and grape quality

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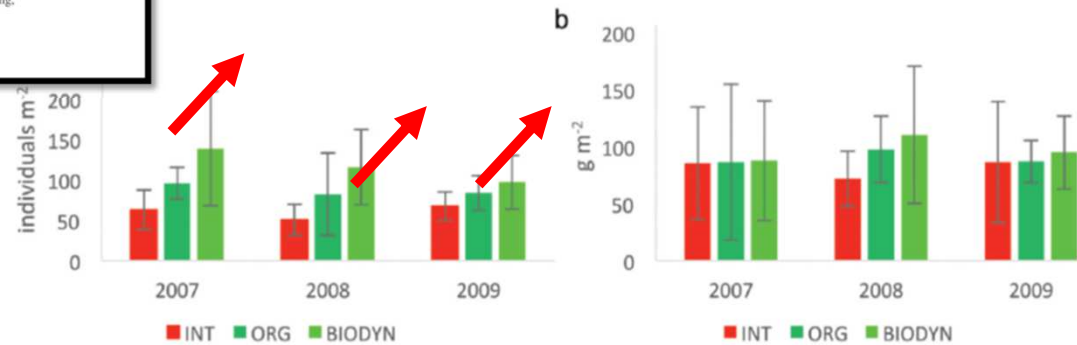
<sup>1</sup>Institute of General and Organic Viticulture, University of Geisenheim, Von-Lade-Straße 1, D-65366 Geisenheim, Germany

<sup>2</sup>Institute of Crop Science and Resource Conservation, Department of Agroecology and Organic Farming, University of Bonn, Auf dem Hügel 6, D-53121 Bonn, Germany

<sup>3</sup>Department of Organic Farming and Cropping Systems, University of Kassel, Nordbahnhofstraße 1a, D-37213 Witzenhausen, Germany.

\*Corresponding author: Miriam Athmann, mathmann@uni-bonn.de

**Plus de vers de terre (moins gros) en bio/biodyn  
≠ entre bio & biodyn pas significative**



**TABLE 6.** Mean values of crop variables affecting reproductive development for vines under integrated, organic and biodynamic management (n = 4).

Variable	Year	Management		
		integrated	organic	biodynamic
Gaps in the canopy (%)	2008	17.00 b	25.00 a	22.50 ab
	2009	3.25 b	3.00 b	5.50 a
Exposed grapes (%)	2008	36.88	35.50	36.75
	2009	25.58 b	37.20 ab	41.03 a
Grape cluster compactness (cluster flexibility index)	2008	2.25 a	1.89 b	1.75 b
	2009	3.35 a	2.99 b	2.83 b

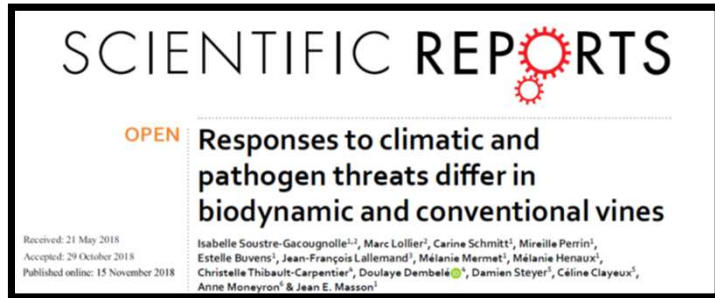
weight biomass (b) in plots under integrated (INT), organic means ± standard deviation, n = 4).

**Grappes plus lâches en bio/biodyn  
≠ entre bio & biodyn pas significative**



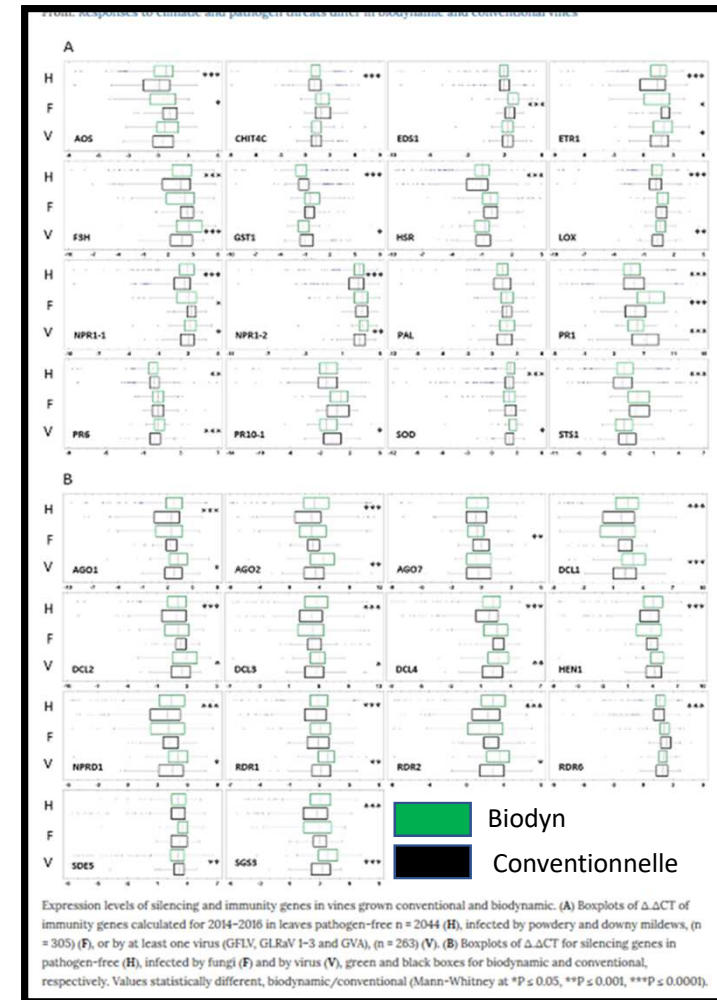
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# Quelques exemples des études scientifiques



**Etude «TRANSCRIPTOMIQUE»**  
 → Expression de gènes dans les feuilles

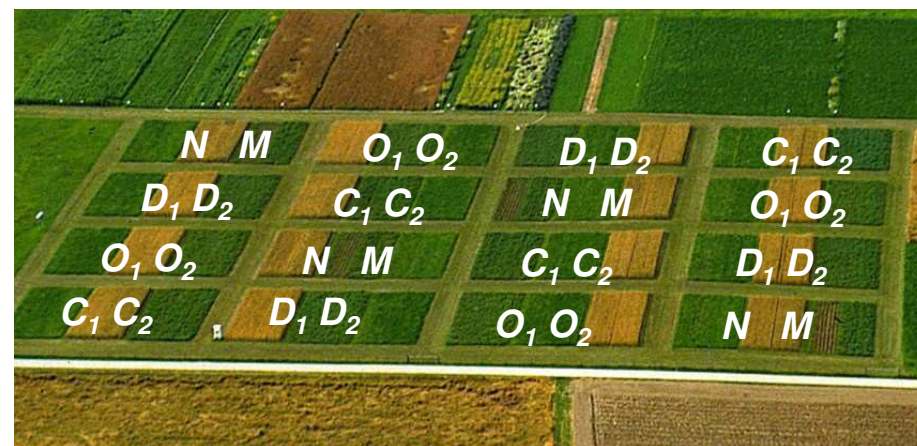
**«Expression de gènes» en relation avec l'autodéfense, Mais pas effet sur le «phénotype» Et seulement «conventionnelle» contre «Biodyn» ET PAS «Bio»**



## Quelques exemples des études scientifiques

### L'essai DOC

Comparaison de systèmes de culture biologiques et conventionnels sur 45 ans



#### *Qualité du sol*

- Paramètres chimiques, physiques et biologiques de la qualité du sol améliorés dans les procédés biologiques
- Fertilité du sol et biodiversité supérieures dans les procédés biologiques

#### *Biodiversité*

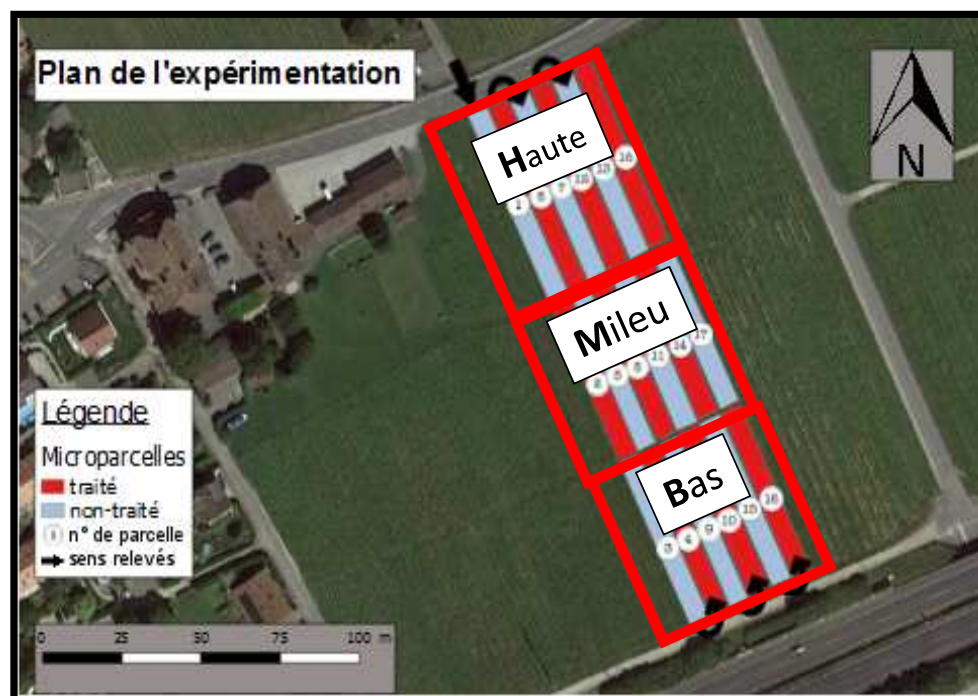
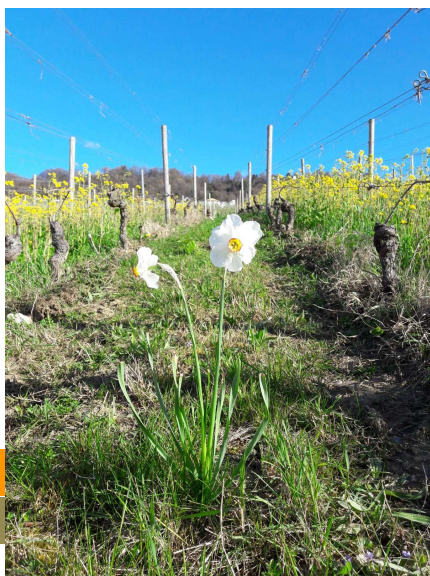
- Biodiversité supérieure dans les procédés biologiques (vers de terre, insectes, adventices, champignons mycorhiziens)





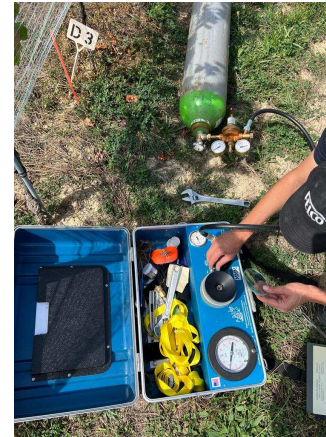
# Etude menée par CHANGINS

- Chasselas / 3309
- Ajout préparations 500 (P) et 501
- 2012/2013
- La Côte
- Sol de bas de pente
- Profond
- Teneur en MO élevée
- Grande RU



# Méthodes

- Physiologie de la vigne
    - Maladies
    - Rendement
    - fertilité
    - Photosynthèse
    - Stress hydrique par bombe scholander et delta 13C
    - Vigueur – poids de bois de taille, N-tester
    - Qualité de baies
- Vinifications et analyses sensoriel par panel professionnel



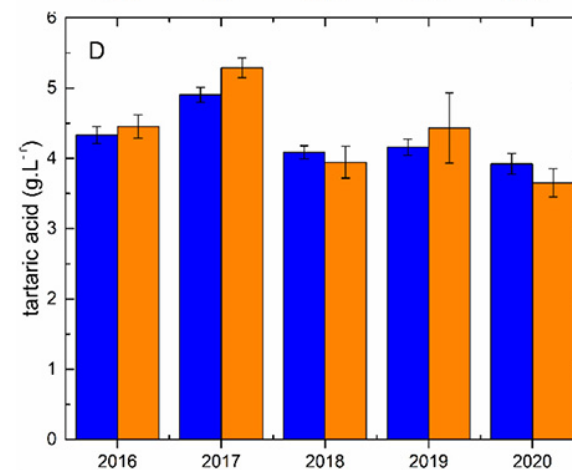
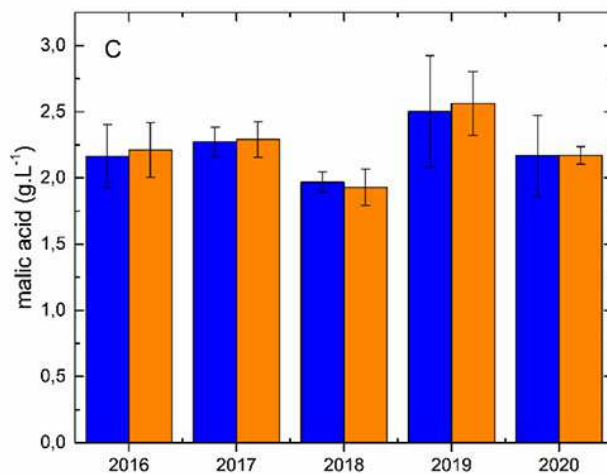
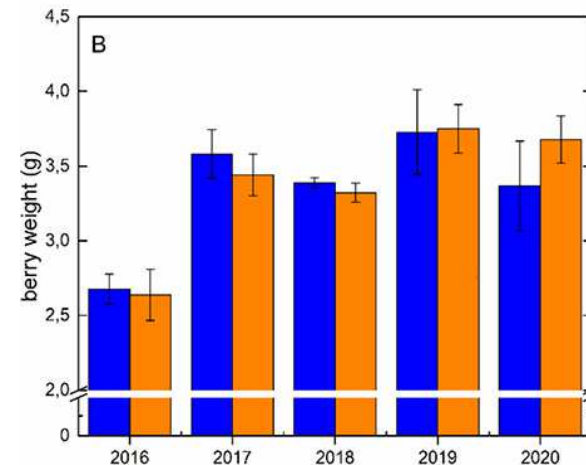
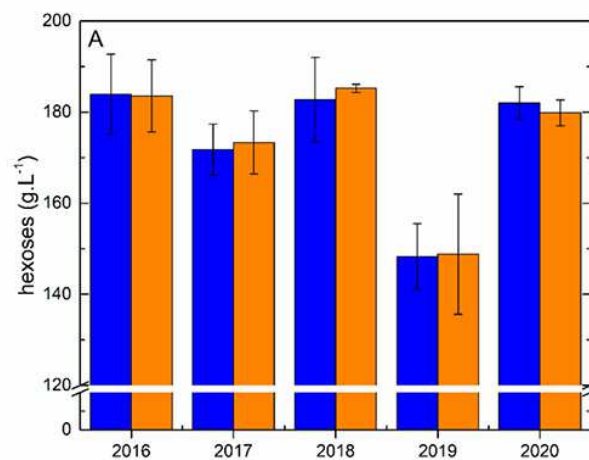
- Sol
- Porosité du sol
  - Stabilité de la structure
  - Dégradation des Matières organiques fraiches du sol
  - Microbiome: ADN : extraction, amplification et séquençage



# Résultats – Qualité de baie

avec

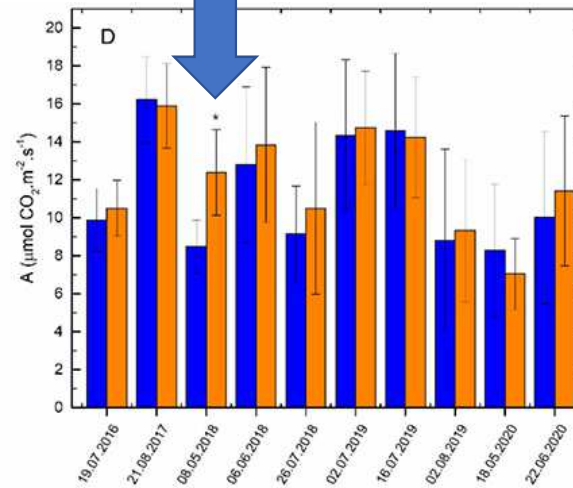
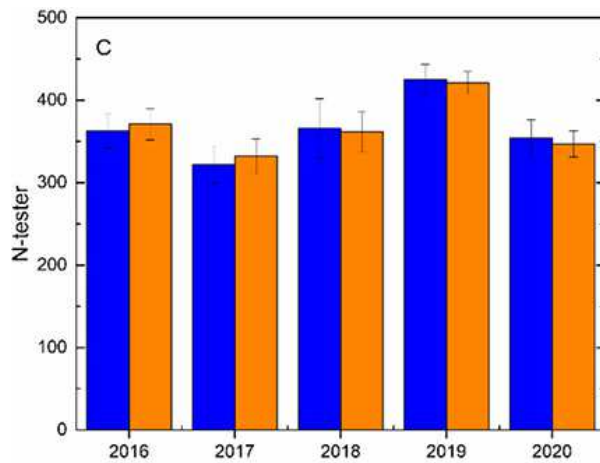
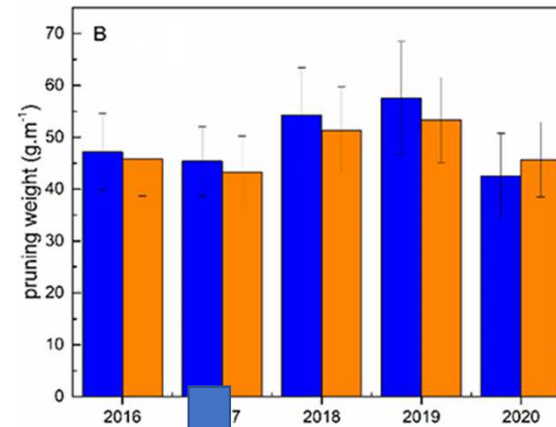
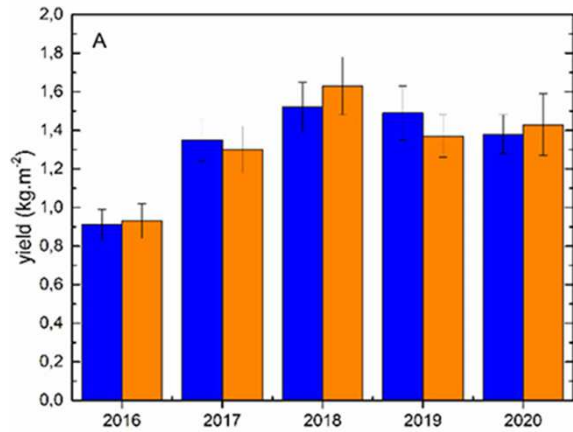
sans



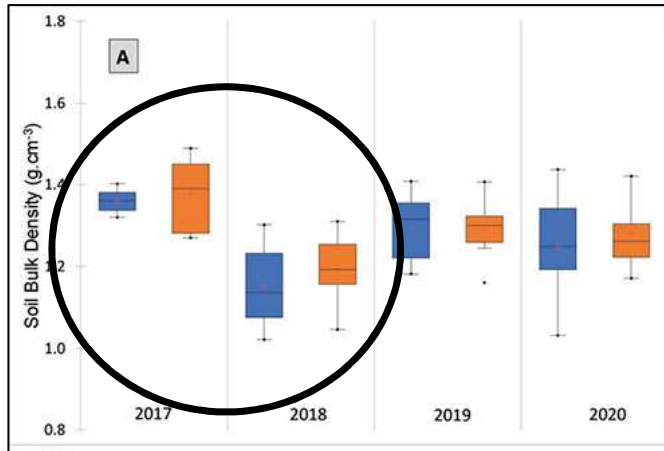
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# Résultats – Physiologie de la vigne

avec  
sans

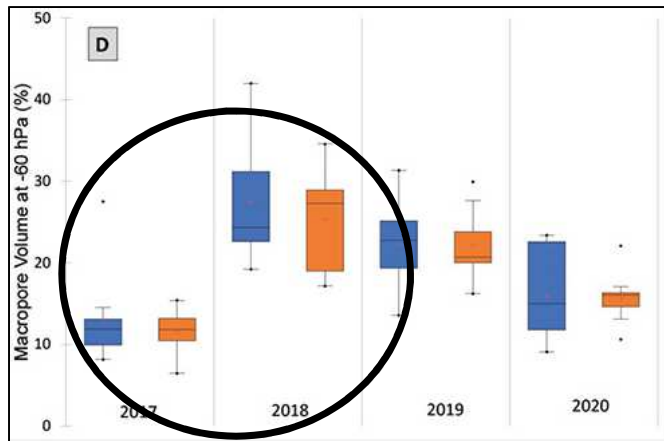


# Résultats – Sol

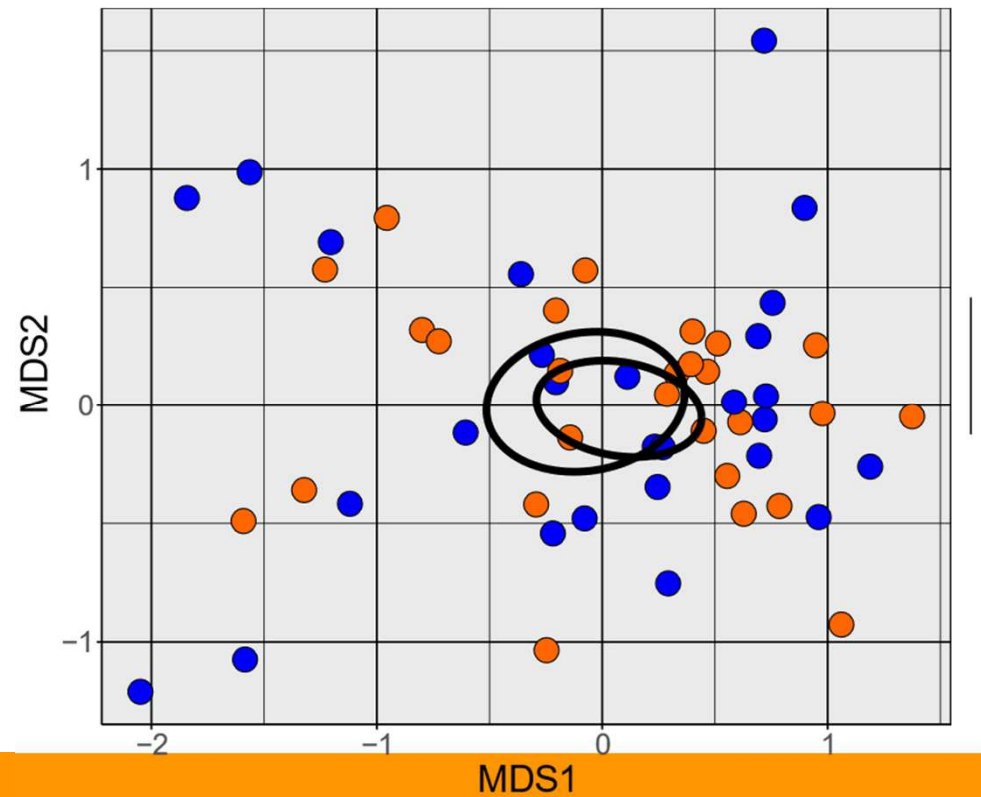


avec

sans



## Communautés fongiques microbiennes



# Résultats – Vinification – analyses sensorielle

Chasselas

biologique

biodynamique

Levure (LSA)

Pied de cuve (PDC)

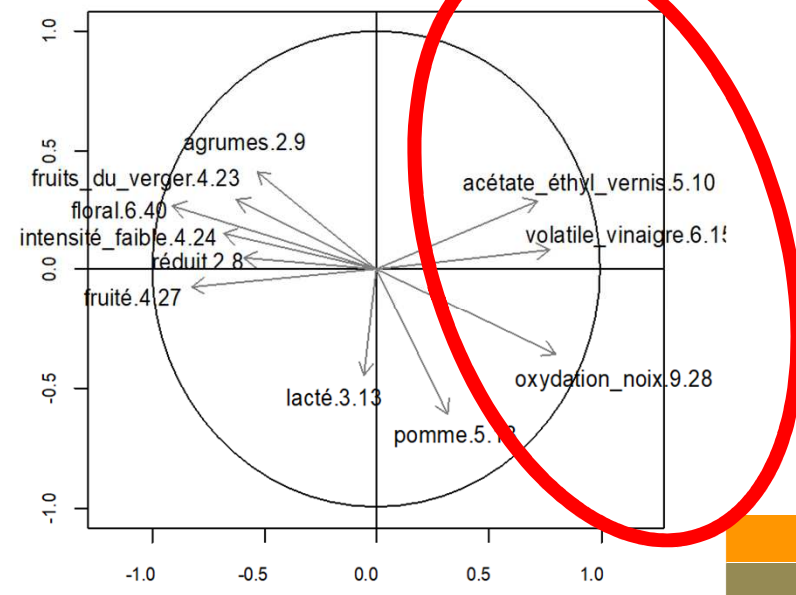
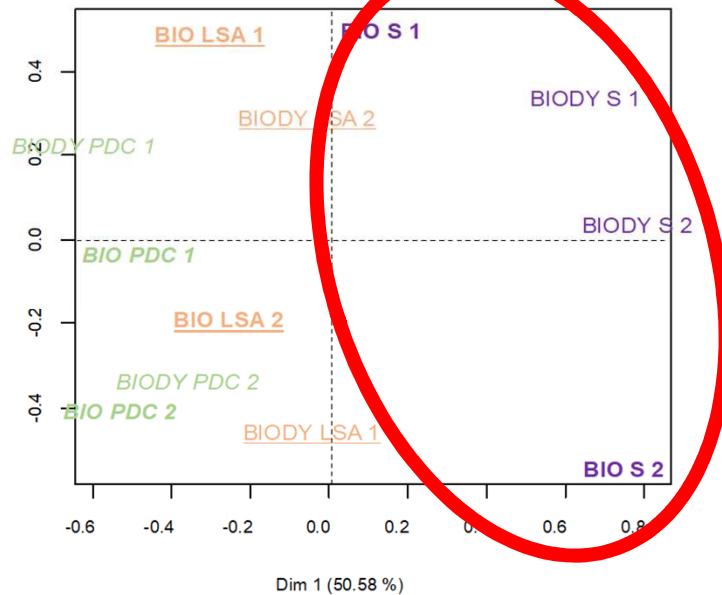
Spontané (S)

Levure (LSA)

Pied de cuve (PDC)

Spontané (S)

**Différences entre les fermentations spontanées et les fermentations inoculées par levures**  
**JAMAIS entre l'agriculture biologique et biodynamique**



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## Conclusion

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- Aucune différence significative dans tous les paramètres évalués (sauf 1 fois PS)
- Confirmant la plupart de la littérature scientifique
- D'autres études scientifiques trouvent des effets positifs des pratiques de gestion biodynamique par rapport à la gestion conventionnelle + souvent pas de « conception expérimentale stricte »
- Critiques
  - Testé uniquement 500 et 501 !!!
  - Durée : pas assez longue ?
  - Qualité des préparations biodynamiques ? Pas les mesures appropriées
- Effet indirect potentiel ? Les viticulteurs doivent être plus attentifs et « plus proches » de leurs vignes ???



Merci pour  
votre attention



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