Caring for vineyards: Transforming farmer-vine relations and practices in viticulture French farms

Alarcon Margaux, Pascal Marty, Anne-Caroline Prévot

Title: Caring for vineyards: transforming farmer-vine relations and practices in viticulture French farms

Authors :
M. Alarcon[a*], P. Marty[b], A.-C. Prévot[a,c]

[a] Centre d'écologie et des sciences de la conservation (CESCO UMR 7204), Muséum national d'Histoire naturelle, Centre National de la Recherche Scientifique, Sorbonne-Université, 43 rue Cuvier, 75005 Paris. France.
[b] Laboratory of Social dynamics and spatial reconstruction (LADYSS UMR 7573) reconstruction, University Paris 1 - Panthéon-Sorbonne. Institute of Geography, 191 rue Saint-Jacques, 75005 Paris. France.
[c] Laboratoire parisien de psychologie sociale (LAPPS EA 4386). Université Paris-Ouest. Département : psychologie. 200 avenue de la république, 92000 Nanterre. France.

Adress for corresponding author: margaux.alarcon@gmail.com

Declaration of interest
None.

Acknowledgments
We thank the members of the Conservatory of Natural Areas of Languedoc-Roussillon who helped us in this work by sharing ideas and offering us the possibility of being in contact with viticulturists in Hérault.

Caring for vineyards: transforming farmer-vine relations and practices in viticulture French farms

Highlights:

- Winegrowers care for vines but relate with other nonhumans within vineyards
- Relations with nonhumans transform with time through evolving farming practices
- The ways farmers take care of nonhumans evolve towards more attentive modes of care
- Those transformations involve specific care spatialities (plots and edges)
- Environmental programs based on observations of nonhumans contribute to those transformations

Abstract:

In the context of ecological crisis, agricultural issues become increasingly present in public debates and call for a better understanding of the relations between farmers and nonhumans. Based on the care theory and through an ethnographic study conducted in *Hérault* (France) among 20 winegrowers, this article answers 3 questions: 1) How do farmers relate and care for nonhumans and the environment?; 2) Do those relationships evolve?; 3) How farmer networks locally affect these relationships? The analysis shows: (1) that vine is the principle care-receiver within vineyards, but that vine-growers also form relationships with a diversity of other non-human entities; (2) that all those relationships can be transformed with increased attentiveness and experimental practices at plot and edge scale of vineyards; (3) that an increase in the observation and contemplation of nonhumans can develop through farmers' participation in different environmental programs. In conclusion, the article indicates the relevance of both the use of care theory in order to study the complexity of farmers' relations to nonhumans, and the key-role of bottom-up collective initiatives among farmers regarding biodiversity conservation.

Key words: care, France, farming, viticulture, farmer networks, biodiversity conservation

1. Introduction

The relationship between people and nature has attracted a rising interest among scientists (Ives et al., 2017)., first based on the evidence of health and well-being benefits (Keniger et al., 2013); and secondly, on the need to address sustainability challenges, including biodiversity conservation or fundamental society changes (e.g.,Krasny et al., 2013). In this context, values attributed to nature are of growing importance (Díaz et al., 2015). Besides human interest (instrumental values) and interest for nature itself (intrinsic values), Chan et al. (2016) recently highlighted that people also consider "what is right" according to how they personally relate with nature and with others toward nature. They called this interest "relational values", which include a diversity of components, such as preferences, principles, and virtues, which also concern interactions with nature. Indeed, for the authors, some components of individual identities are rooted in long-term care with nature and stewardship (this is particular true for rural farmers). Relational values are prominent within different philosophies, including care ethics.

Care ethics are a growing school of ethics, arising out of feminist theoretical thought and further developed in philosophy as a part of a non-theoretical movement in applied ethics, concerning utility of moral principles in order to solve real life problems (Gilligan, 1993). From this perspective, care ethics start from concrete moral issues and observe how humans solve them. Care ethics highlight the value of specific and particular situations. Fundamental are to care ethics the fact that human beings are primarily relational, and the wish to refocus moral thought on relations between human entities instead of on moral action itself (Held, 2006). Thus, several concepts are central to visions of care, such as vulnerability, interdependence and attentiveness (Tronto, 1993; Wood, 1994). Attentiveness is especially described in care studies as an ethical commitment and a concrete practice (Krzywoszynska, 2019). The vast majority of work in care theory has focused on relations among humans and on the influence of societal structures on those relations. However, Fisher and Tronto (1990) enlarged the concept and included "everything we do to maintain and repair our 'world' in order to live in it as well as possible. That world includes our bodies, ourselves, and our environment" (40). Tronto (1993) further extended care to relationships between humans and nonhumans (i.e. plants and animals), and explicitly defined care as both a disposal (care about) and a practice (take care of). Based on these thoughts, care theory highlights (i) interdependence and

existing relations between humans, animals, plants and the environment; and (ii) the fact that human vulnerability is shared with other ecosystem elements, including nonhumans. Finally, since it draws the attention from wilderness to ordinary nature (i.e. areas where humans and nonhumans interact), care theory contributes to transforming the study of environmental concerns (Laugier, 2012). Based on these ethics, co-living and building a common world is a crucial issue in different contexts nowadays; this is the case for landscapes that are dominated by industrial agriculture.

Industrial agriculture has become widespread in Western countries in the second part of the XX century, with the specific aim to increase food production. In this modern paradigm, farming practices became increasingly intensive, by promoting progressive control and management of nonhumans (Stuart, 2008) with mechanization and use of agrochemicals (especially inorganic fertilizer and pesticides) (Woodhouse, 2010). In that perspective, farmers are often presented as making choices only for economic reasons and in order to optimize and raise quantities of food production (Burton, 2004; Burton and Wilson, 2006). Yet, agricultural intensification has been recognized as one of the main driving forces of the global environmental crisis, especially biodiversity loss (Newbold et al., 2015). Combined with food security issues, environmental issues recently became increasingly present in the public debates about agriculture, moving from farmers' discretion to that of public policy and market choices (Meijboom and Stafleu, 2016). In this context, individual farmers are faced with an apparently contradictory injunction: food production and protecting biodiversity (Barbier and Goulet, 2013; McGuire et al., 2013).

In this paper, we explore how farmers deal with this contradiction in French farming landscapes that have been transformed with agricultural modernization. We focus on the relationships farmers build with plants (both cultivated and spontaneous) and animals (both wild and domesticated) that are present in their farms, and explore whether, even in areas that seem structured by modern agriculture, some practices and relations towards those nonhumans can refer to caring attitudes and practices (Tronto, 1993). We use the term 'nonhumans', more general that "nature" when it comes to qualify all types of plants and animals farmers interact with in their farms, as the term is also used in several care studies (e.g., Krzywoszynska, 2016; Pitt, 2017). Based on the care theory, we make the hypothesis that farmers are not only driven by

77 economic choices (De Rooij et al., 2010 and Driessen, 2012), and may be driven by attention towards
78 nonhumans vulnerability too. We also hypothesize that attention towards nonhumans is being developed
79 during formally observation sessions that are conducted in farmer groups (Deschamps and Demeleneare,
80 2013). Such collective field observations may contribute to build relationships between farmers and
81 nonhumans that go beyond production and economic issues.
82 We focus on viticulture, for the two following reasons: first, ecological issues are particularly complex in
83 this agricultural sector where plant-growing practices changed during the second half of the XX century,
84 following mechanization and increased use of pesticides (Clingeleffer, 2013; Pertot et al., 2016). Secondly,
85 global environmental issues such as climate change or water scarcity impact vine production (Van Leeuwen
86 and Darriet, 2016; Costa et al., 2016). More particularly, we focus on winegrowers involved in local
87 professional networks in the South of France (Languedoc region, *Hérault* department, see Fig. 1). We
88 answer the three following questions: How do farmers relate and care for nonhumans and the
89 environment? Can those relationships and the ways of taking care of nonhumans change in time? How do
90 farmer networks contribute to develop farmers' attention towards nonhumans and environmental issues?
91 This paper is organized as follows: The section 2 introduces relevant literature on care for nature in farming
92 context and explores how care theory may contribute to broader conceptualizations of sustainable
93 practices in agriculture. Care theory appears as a pertinent tool in order to study how farmers relate to
94 nonhumans, beyond humans' (instrumental values, i.e. production) or nonhumans' (intrinsic values, i.e.
95 protection) sakes. The sections 3 describes the ethnographic study we conducted in *Hérault* (France)
96 among 20 winegrowers who mostly took part in two local programs of nonhumans' observations on farms
97 (SVG and Biodiv'eau). The main findings of the study are presented in section 4: first, we highlight the
98 complex relations that winegrowers have with a diversity of nonhumans on their farms, including caring for
99 vine and production issues; second, we describe that farmers develop new ways of taking care of vine and
100 biodiversity with field observations, at plots' and edges' scale; finally, we analyze how two programs
101 contribute to foster different ways to take care of nonhumans (vine protection or biodiversity conservation).
102 In section 5, we discuss the broader possibility of new types of farmers and nonhumans communities based
103 on attention and care, and the idea that different types of humans and nonhumans communities may exist

and be developed, depending on the types of care for nonhumans collective actions may foster. We conclude by highlighting the need for more studies about the role of farmer networks for biodiversity conservation (section 6).

2. Care for nature in farming context: a synthesis

Intensive farming systems aim to increase productivity at plot scale (Wilson 2001; Burton, 2004), without any concern on biodiversity conservation. In order to address both objectives of farm productivity and biodiversity conservation, much research in ecology and agronomy has focused on farming practices, first within plots, and secondly, in natural areas around the plots (Franin et al., 2016). Much studies focused on two sets of farming practices : 1) economically-driven technological developments and closed loops of energy, organic matter and minerals, aiming at increasing efficiency of input use and decreasing both production costs and environmental impacts (Horlings and Marsden, 2011); 2) intensification of ecological interactions between the components of each specific farm, in order to promote fertility, productivity, and resilience to external perturbations (Horlings and Marsden, 2011; Kremen, 2015), including increasing semi-natural areas around plots (Franin et al., 2016). Concrete transformations in farmers' practices are sometimes driven by an increased attention to environmental issues (Lamine, 2017). This process combines individual trajectories and collective actions, which provide the necessary resources, including ecological knowledge and social bonds (see Hill and MacRae, 1996). Thus, in the context of environmental crises, new co-operations between farmers and non-farmers develop, together with a greater inclusion of environmental issues in farming practices (Hillis et al., 2018). Many studies highlight the key role of farmer networks for agroecological transition (Compagnone and Hellec, 2015; Šūmane et al., 2018). In France, those bottom-up and place-based farmer networks develop alongside historical professional structures, i.e. the farming federations and the Chambers of Agriculture (Cordellier and Le Guen, 2008).

Research following these initiatives mainly focus on agronomic techniques and solutions, and not on how farmers relate to plants or animals, notably trough increased attention; neither on how these relations may change with transforming farming practices. Yet, linking attitudes towards nonhumans

and farming practices is possible by applying care theory to agriculture. Indeed, care studies are mostly based on narratives and descriptions of individuals' practices (ethnographies), that highlight what people are experiencing, and what matters for them (Beau, 2017). Recent studies have explored care in agricultural contexts (Curry, 2002; Herman, 2015; Bellacasa, 2017) especially breeding (Mol et al., 2010; Linn, 2019 Donati, 2019), as well as specific forms of agriculture such as urban agriculture and agriculture in the global south (Pitt, 2017; Guétat-Bernard, 2017). In these studies, care states that practical engagements can only be delivered by situated and experiential understanding of situations by practitioners (Mol, 2008; Krzywoszynska, 2016). Focusing on the relationships of vine farmers to plants, Krzywoszynska (2016) showed how numerous interacting cares inherent to grape growing are enacted during vine pruning. More precisely, the author described how winegrowers focus on vine and winery needs, and act in order to satisfy these needs. She named these cares "local cares" and defined them as a caring patterning of actions "practiced with its typical flexible adaptation and an acceptance of uncertainty" (303). She calls for recognition of farmer expertise as a way to adapt and be attentive to the direct environment, through observations. Her study shows that care theory can contribute to explore relations between farmers and plants based on attention, that lead to adopt more flexible farming practices, depending of the existing needs at different scales of a farm (plots, or the entire farm management).

Other care studies started to explore farmers' relations to nonhumans within industrial agriculture paradigm and its transformations. Bellacasa (2017) highlighted that, in modern agriculture, soils are viewed primarily as ingredients for yield productivity, i.e. ultimately as objects. Soil care exists, but as an utilitarian care vision (i.e., putting back to work worn out soils and increasing the soil's efficiency to produce). But other kinds of soil conceptualizations and human-soil relationships are possible, in relation to more attention-based farming production. In that matter, soils can be a matter of concern and care "not just for what they provide for humans but for ensuring the subsistence for soil communities more broadly" (Bellacasa 2017: 190). In this new conception of soils, humans are a part of the soil community, where they care for and are cared for. Bellacasa calls it "immersed ecological care". Thus, the development of affective involvement with soils ("haptic engagements in care", for example

158 sensorial engagements, Bellacasa 2017: 197) is tied to the modification of existing relations of care-
159 taking and especially immersed ecological care. Even if the author does not describe precisely the
160 processes of learning how to be more attentive to soils, her work shows that care theory may contribute
161 to consider different modes of farming production (e.g. utilitarian vs. attention-based), and further new
162 types of communities where farmers work and cooperate with nonhumans, on the basis of the key
163 concept of attention.
164 So, care theory provides a conceptualization of sustainable practices in agriculture. Farmers' narratives
165 show how they become attentive to nonhumans and transform their practices accordingly. It
166 contributes to a better understanding of how these changes in farmers' attitudes and practices operate
167 at different scales (farm, plots, edges). Care theory may be accurate to imagine new farming
168 communities of humans and nonhumans based on care and attention (Latour 1995), beyond farmers'
169 (instrumental values, i.e. utilitarian production) or nonhumans' (intrinsic values, i.e. protection) sakes
170 (Chan et al., 2016). Given the existing contributions of care theory to the understanding of how farmers
171 take into account environment and biodiversity in their attitudes and practices, we designed a study
172 with the following goals: to analyze how farmers develop their affecting involvement with soils or other
173 non-human entities; to study the potential of collective action and initiatives in transforming the
174 relations between humans and nonhumans; to explore potential links between local cares (i.e.,
175 interactions with specific and direct non-human entities) and global cares (broader environmental
176 issues).
177

178 **3. Materials and methods**

179 *3.1. Study site*

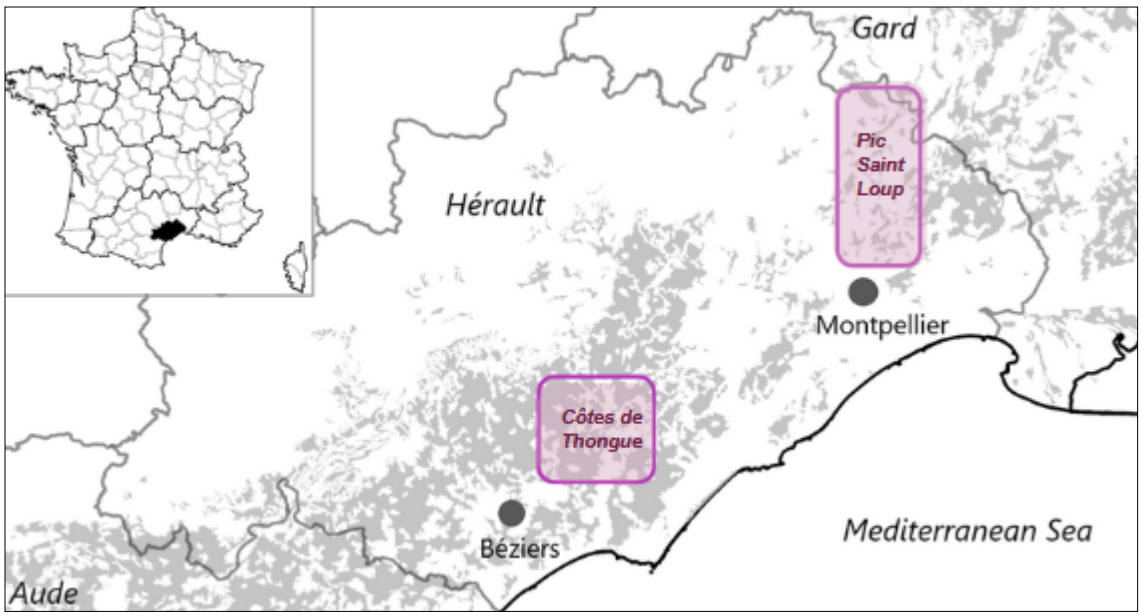

Fig. 1. Map of *Hérault* vineyard (France) including the two research areas: *Pic Saint Loup* and *Côtes de Thongue*.

This qualitative research was conducted in Languedocian vineyard in south of France, particularly in the *Hérault* area (Fig. 1). Languedocian vineyard, historically dominated by co-operatives since the beginning of the XX century has changed since the second half of XX century (Touzard, 2011). First, the vine area strongly decreased in size since 1980 due to several uprooting campaigns, supported by European Economic Community grants (Clement et al., 2013) in order to fight overproduction and decreasing prices by locally increasing the quality of the vine and of the local labels. Moreover, since 1985, co-operatives are less numerous and tend to amalgamate in order to be more competitive in wine market (Touzard, 2011). In *Hérault*, most of the vine production is still dependent on co-operation (Département *Hérault*, 2010). However, a new generation of independent wine producers has recently appeared (Johnson and Robinson, 2013). The *Hérault* area is the second French department with the largest vine surface area (Département *Hérault*, 2010). That department is one of the top three areas in France with the highest use intensity of insecticide spray (Mailly et al., 2017). However, an increasing part of the production comes from organic and biodynamic farming (Interbio Occitanie, 2019; Preston, 2008; Foyer, 2018).

In *Hérault*, we focused our study on two different areas and wine designations: *Pic Saint Loup* (north of the area) and *Côtes the Tongue* (southwest of the area). The Protected Designation of Origin *Pic Saint Loup* relates to 17 towns and the majority of the production is made by independent wineries. Johnson and Robinson (2013) present it as one of the most distinctive terroirs in Languedoc wines. On the other hand, the Protected Geographical Indication *Côtes de Thongue* relies in a stronger co-operative tradition; it suffered an overproduction crisis in the 1970s, which made that co-operatives and winegrowers establish quality processes in order to increase vine and wine qualities. At that time, a part of the winegrowers transformed their winery to become independent from co-operatives.

In these two areas, diverse environmental and agroecological programs were implemented in different periods (Fig. 2). In this study, we focused on two local programs:

(1) The program “Sustainable viticulture groups” (SVG) gathers voluntary groups of winegrowers. It was initiated in the early 1990’s due to the pre-existence of informal groups made of local winegrowers. In *Hérault* the 25 currently active official SVG groups include between 8 and 25 winegrowers each and are animated by an expert from the Chamber of Agriculture. They meet every two weeks for four-hour sessions of collective surveys of different pre-defined acarian species and diseases in references plots. Sessions also include collective discussions about potential treatments or preventions against vine diseases. The main objective of this program is to decrease the use of chemicals and to potentially test alternatives to chemicals. The collective diagnoses are associated with a Chamber of Agriculture meteorological software called Performance Vigne.

(2) The program Biodiv’eau was created between 2010 and 2012, following a demand from local winegrowers to know more about the biodiversity present in their vineyards. This voluntary program now gathers many local structures (Chamber of Agriculture, water supply agency, *Hérault* department for financial support), and is animated by the local environmental NGO named Conservatory of natural areas of Languedoc-Roussillon (CNALR). Biodiv’eau consists of a flora inventory made by winegrowers directly on the edges of their vineyards. Ecologists of CNALR worked closely with winegrowers to build the inventory grid. Each session of the program includes several steps (Fig. 3).

We carried out ethnographic qualitative work, including participant observations and semi structured interviews (Beaud and Weber, 1997). In April 2018, author #1 spent two days conducting participant observations: one with a Biodiv'eau training with 15 winegrowers, and one with a sustainable viticulture group with 15 winegrowers.

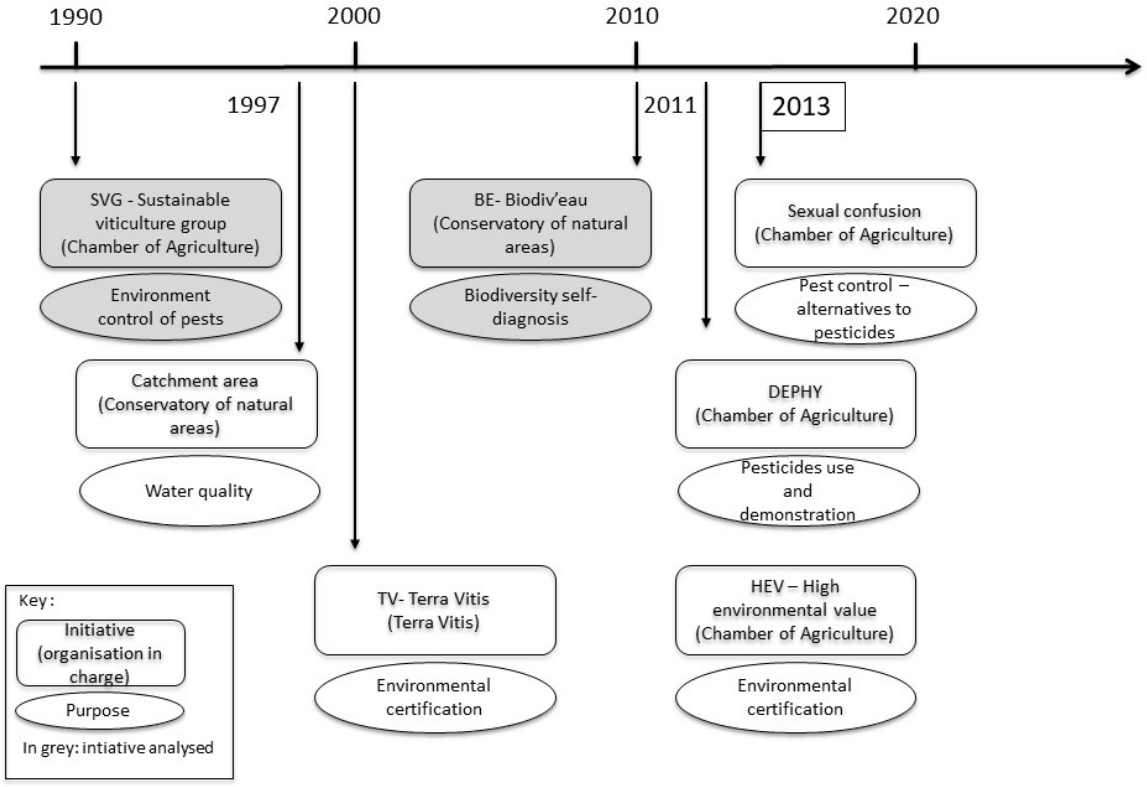

Fig. 2. Main collective environmental initiatives in study area for viticulture.

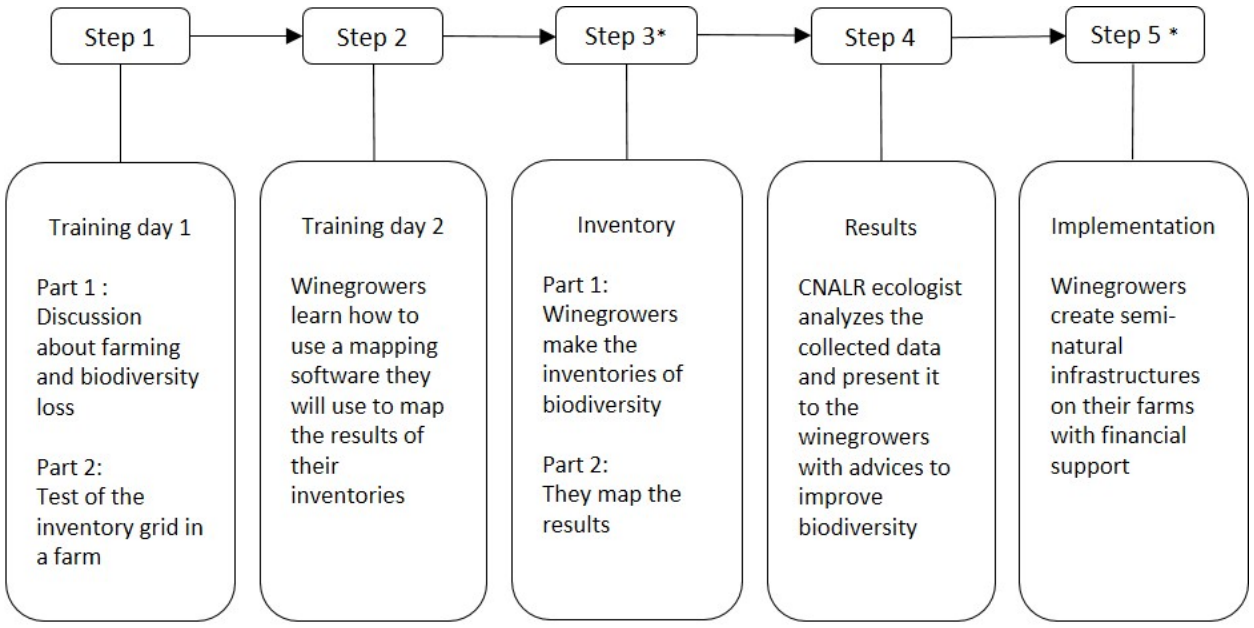

Fig. 3. The five steps of Biodiv'eau program.

3.2. Semi-structured interviews

20 semi-structured interviews with winegrowers were conducted by author #1 from November 2017 to May 2018 (Table 2). Winegrowers were found and contacted by the snowball technique, starting from contacts of participants to Biodiv'eau. All these interviews were individual, completed by phone (7) or face to face (13). The mean duration of the interviews was 1 hour (from 35 minutes to 4 hours). During four of them, the interview included a visit of the vineyard with the winegrower. All the interviews were recorded, transcribed, and anonymized. Notes were also taken during the interviews.

3.3. Qualitative data analysis

Following the principles of thematic coding, we coded the interviews (Paillé and Mucchielli, 2012). Through several cycles of coding, we filtered, focused, and highlighted the salient features in the data, focusing first on caring disposals and practices and second on the part of farmer networks and environmental programs in learning and developing environmental preoccupations and new farming

246 practices. All authors thoroughly discussed results throughout the process to reach consensus and
247 ensure reliable assessment validity.
248
249 **Table 2**
250 Interviewed winegrowers.

Respondent number	Sex	Type of farming	Type of winery	Local initiatives	Type of interview
1	Male	Conventional	Independent	BE, SVG, TV	Face to face
2	Male	Conventional	Co-operative	BE, SVG	Phone
3	Female	Conventional	Independent	CA, TV, BE	Face to face
4	Male	Organic	Independent	BE	Face to face
5	Male	Conventional	Independent	CA, BE	Phone
6	Female	Organic	Independent	BE	Phone
7	Male	Conventional	Co-operative	BE	Phone
8	Male	Conversion to organic	Co-operative	BE	Face to face
9	Female	Biodynamic	Independent	BE	Face to face
10	Male	Conventional	Co-operative	BE	Face to face
11	Male	Conventional	Co-operative	BE, SVG, TV	Phone
12	Male	Organic	Independent	BE	Face to face
13	Male	Biodynamic	Independent	BE	Face to face
14	Male	Conversion to organic	Independent	BE, TV, HEV	Face to face
15	Male	Conventional	Co-operative	BE	Face to face
16	Male	Conventional	Co-operative	BE, SVG, DEPHY	Face to face
17	Male	Organic	Independent	/	Face to face
18	Male	Conventional	Independent	BE	Phone

19	Male	Organic	Independent	/	Face to face
20	Male	Conventional	Independent	BE, HEV, TV	Phone

4. RESULTS

4.1. Winegrowers care primarily about vines

Winegrowers primarily care for their vine, since they have to produce grapes. However, if vine is the main care-receiver within vineyards, winegrowers also form relationships with a diversity of other nonhumans and they care for environmental issues too.

4.1.1. Vine as the main worry

Winegrowers mainly relate to vine as their main concern, especially on vine health and on its vulnerability. Almost all the winegrowers mentioned one or several existing vine diseases as a serious concern, because they threaten vine production. Words such as “diseases”, “vulnerability”, “sensitive’, “risk”, or “pressure” were consistently used relating to vine, and were mostly associated with stress and anxiety. Besides diseases, climate events were also qualified as a threat for vine:

> My nephew [associate] is very scared of leafhopper and *flavescence dorée* that we can’t perfectly control with ecological products, and it devastates the vine. (Respondent 7)

> We are not enough here, and it’s been two years that there has been hail, then there was drought, so we lost 75% of our crop over two years. (Respondent 9)

According to winegrowers, pests or animals such as wild boars threaten crops. But only a few winegrowers mention wild boars as a problem for vine crops and enclose their farm or hunt them. We detected different types of relations with animals that interact with the vines: some animals, especially the ones that are considered as a threat for the crop, are less accepted than birds or animals considered as harmless and thus much more appreciated:

> The only hunted animals in my farm are wild boars, because they come here, they are everywhere. It is hard to enclose the farm. Wild boars attack crops. Moreover, they attack young partridges, rabbits, and hares. So, we have to eliminate them. This year they ate 10% of the crop. (Respondent 19)

> For me, seeing a young Bonelli's eagle in my vineyard is amazing; and the vine is full of young partridges, we see them running after their moms and dads, it is wonderful. (Respondent 3)

The worry for vine is translated into concrete manners to take care of it: 1) Protection of the vine, which is the priority for the majority of the winegrowers. The protection aims at avoiding or decreasing the risk of diseases, pests or weather events (such as drought or frost) that could decrease vine or wood health. It comes before the current diseases, pest or weather event; 2) Cure of the vine, after diseases, pests, or extreme weather events aims at healing vine or woods; 3) Reinforcement of the vine, in order to get it stronger in front of possible diseases or extreme weather events. Reinforcement differs from protecting, it consists of a more general improvement of vine health. This approach is characteristic of biodynamy:

> When you do biodynamic farming, you are asking yourself: why are my vines sick? What should I do to make that they are less sick? And if they are sick anyway, I'll try not to treat only with natural chemicals but with plants and specific preparations too. What we aim is to revive microbial life of soils. We work with this microbial life in order to make plant able to digest the organic stuff that are in the soil, oligo-elements and so on. (…) All the vegetation becomes stronger: leaves are thicker, woods are thicker and much stronger. Plant grows better. Then it resists much more to cryptogamic diseases that are related to humidity. So, the most the leaves are thick, the most it resists. Then, there are consequences on grapes quality. (Respondent 9)

The majority of the people we met used synthesis chemicals to prevent or cure diseases. However, some preferred to use organic certified products, and a minority (only 2) used preparations recommended in biodynamic farming.

4.1.2. Broader environmental preoccupations: the case of biodiversity

Besides production issues and care for vine, winegrowers are concerned for non-production issues too. More specifically, they mentioned quite often such environmental issues, such as biodiversity conservation, soil composition, or water quality. Those concerns were relevant for them and important to care, but were not considered as an immediate threat (compared with vine diseases). Most of the time, when they mentioned biodiversity, winegrowers never explicitly defined it. However, after using this term, they mostly talk about i) birds, ii) plants, and iii) useful biodiversity for the vine. Only a few winegrowers, the ones engaged in organic agriculture especially, referred to biodiversity loss as a real problem:

> Three weeks ago, we knew that a study showed we lost 30% of birds in ten years. This is catastrophic. This is a disaster. There are no bird anymore. We see it today, you raise your eyes and there are no swallows, no swifts, and no goldfinches. (Respondent 19)

So, winegrowers are not only focused on production and economic issues. They feel concerned by biodiversity loss too. However, they regret the few support they get in order to address such issue. Indeed, a few winegrowers asked for support in order to understand and accurately address environmental issues, because they assumed not having enough time to deal with them alone or because they did not know how to.

4.2. Winegrowers change how they take care of their vineyard

The ways farmers relate to nonhumans can be transformed with increased attentiveness and experimental practices. Indeed, at plot scale, winegrowers mainly transform their farming practices by

adapting their interventions with the practice of plots observation; those changes are most of the time progressive and come with experimentations. At edges' scale, winegrowers let vegetation coming back more naturally, and implement agroecological infrastructures in order to improve biodiversity.

4.2.1. Winegrowers change their ways to take care of vines through transforming farming practices

First, all interviewed winegrowers mentioned adaptations of their practices to specific contexts and singular situations. For instance, they described how they adapted their farming actions to vine diseases or weeds through adapting quantities and types of products to the contexts of uses (weather, grape variety and plot location). Observing their plots was described as a key-issue for them, in order to adapt the quantities and the type of interventions on vines. Instead of doing systematic treatments every two weeks, as they used to do, conventional winegrowers declared spending time now on their plots and adjusting their interventions to the threat they see, making limits between conventional and organic farming not as clear as one may imagine:

> My philosophy is closed to organic farming. Chemistry is of course as powerful and amazing as a medicine. It is quick. However, if we overdo it, we decay everything. Here, if we can work only with natural products, we do it. It happened that we only worked with organic products during a full year. In 2017, we did not have that much water in the soil but air was wet, so we did not have that many weeds. We only used a few herbicides. But in June we got mildew and using copper was not enough, so we used chemicals. (Respondent 15)

Most conventional winegrowers declared that they tend to reduce quantities of chemical use:

> I am using an optimal method. It means that instead of putting a full dose of chemicals, I use 40% of it. If there are very difficult conditions, I put 60% of it. (Respondent 16)

Some of them also declared that they tend to suppress specific categories of chemicals while staying into conventional farming:

> In this area, I am supposed to do three treatments against *flavescence dorée*. Do not repeat it, but I do none of them. I don't want to use insecticides. (Respondent 10)

However, some of the interviewed farmers proceeded to more radical and systemic change than chemical reduction at plot scale, and these transformations affected the whole production and distribution system of the farm. This is the case of change from a conventional system to an organic or biodynamic one for example. A few winegrowers chose to transform a former conventional vineyard into an organic one as self-fulfillment, sometimes while changing their way of life and becoming a winegrowers after having first worked in a completely different sector:

> I didn't find myself anymore in what I was doing. I was 45 years old and it took me 5 years more to know, to be sure in myself about what I wanted to do. Therefore, for me, to grow vines is meaningful. My brother-in-law was a co-operator, so he did not make the wine himself. He had taken the family vineyard over in the 1990's, and he was in a receding spiral. He was almost never working, the farm had very bad results. So, in 2011, when I felt ready, I told myself 'this is what I want to do'. So, I proposed him to be his associate, to work hard together and to save what could be saved. (Respondent 6)

Another motivation for such a radical change from conventional intensive to an alternative system is the project to diversify the production and to re-localize the distribution, which are both politically and socially grounded. For instance, one independent winegrower explained that he rents a part of the land in his farm to a bread-maker to cultivate cereals, and that he built a local production shop on the farm. At the same time, he aims for energy autonomy:

> I bought a small combine harvester that goes between grape lines and it will be the only motorized tool in the vineyard. Since it is a diesel motor, it will work with grape or sunflower oil.

> Actually, I am looking for autonomy, not for autarky. I am open to other people, but I want to be self-sufficient. It is more than ecological issues… it is political and social. (Respondent 17)

4.2.2. New ways to take care of vines come with experimentation in time and in different areas

Based on the interviewed winegrowers, the adjustments and transformations of farming practices come with plot experimentation. They mentioned curiosity or desire to experiment new practices. Most of them mentioned some mistakes they did in their practices, and the changes they made in the way to plant and grow vines, use chemicals, and remove weeds. Most of the time, a new practice leads to other new practices, in a long time process:

> Our practices changed, and they will change again. They changed gradually with knowledge and techniques. (…) We started here to evolve on re-planting vines, around 1986. We started by tillage, we stopped using herbicides. We stopped all the herbicides. Gradually we replaced our vineyard. We put cultivation for animals such as lucerne. (Respondent 2)

Note that the processes of change were not all linear. One winegrower for instance declared having decided to stop a new practice after a while:

> I stopped doing biodynamic farming. I did it for three years, but it was too esoteric, too crazy. I prefer peasant common sense. (Respondent 17)

The winegrowers we met generally took many years to experiment and adjust their farming practices. No change was hasty. On the contrary, interviewed conventional winegrowers mostly started by reducing quantities of chemicals first on one plot and then on the whole vineyards progressively in a few years process. Thus, experimentations were commonly conducted progressively within the farm:

> When we had the proof that changing practices could lead to a better water quality, we said 'ok let's do it'. And then we started to use less herbicides, then we completely stopped using them on our plots affected by this catchment area, and then we stopped using it on our entire vineyard. (Respondent 3)

4.2.3. Winegrowers develop ways of taking care of biodiversity with more natural vegetation within edges

Interviewed winegrowers used to change first farming practices at plot scale, and then brought their attention to the areas around plots and changed the way they treat edges. Even the farmers who started directly with organic farming took time to improve and evolve (towards biodynamy for example) and to focus on edges. The concerned winegrowers changed the way they treat vineyard edges by (i) letting vegetation coming back more naturally, and (ii) implementing agroecological infrastructures such as hedges or ponds to improve biodiversity outside of the plots:

> We realized with CNALR that we should mostly do nothing. It has been six or seven years I changed. Before and for a long time I tried to manage just a few, but nature comes back very quickly. Last year I used shredders in order to focus on bushes, stuff that might cause problems. Therefore, we need to open environments in order for biodiversity to appear. But generally, we take just a few actions; we try to keep what grows naturally. (Respondent 4)

> Each year we try to improve what we do. We first planted hedges, and then trees for auxiliary insects. After this, we created a pound, and we put hedges in again. This year we opened some landscapes. (Respondent 14)

Thus, the interest on biodiversity issues comes progressively for the majority of the farmers we met.

4.3. Farmer networks contribute to transform farmers' relation to vine and broader biodiversity

The changes of farming practices described above are often linked with collective initiatives. These initiatives lead to different types of knowledge and of observations of plots or edges, that transform the way winegrowers care for nonhumans. Thanks to the observations conducted in SVG, winegrowers learn to protect and cure the vine with less systematic control of pests and diseases. Biodiv'eau program contributes to interest winegrowers into biodiversity in order to conserve it both for itself and for the vine; moreover, the program helps winegrowers to take care of biodiversity properly, while improving the agroecological infrastructures of their vineyards.

4.3.1. Farmer networks are part of the farming practices' transformation process

Most winegrowers we met were part of several networks and initiatives (see Table 2). A small part of our sample (one biodynamic and one organic) belongs to farmer networks located in other French vine regions, or in a virtual network.

All interviewed winegrowers mentioned the relevance of social and technical interactions with other winegrowers in the process of transforming their farming practices. Sharing ideas and experiments allows them to discuss possibilities of innovations and to know how others deal with the issues they share. The need to talk with other farmers was considered as crucial for those who were conducting self-questioned processes about their own farming practices and their willingness to conduct radical agricultural changes:

> Lots of my colleagues don't convert to organic farming but they are almost free from herbicides. They use them just once a year, as late as possible. (…) We talk about what we do with friends, with colleagues, so sometimes one of them say he got something and asked if we had the same. (…) I am thinking about changing glyphosate for tillage and covering with grass, and then cutting it. We have one colleague who is on the cutting-edge of these kinds of practices. (Respondent 10)

These social professional networks contribute to building different farming and environmental programs. This is the case for SVG and Biodiv'eau. Most of the winegrowers we interviewed took part in one or two of those programs. For conventional farmers, it was quite common to start with SVG and then take part

in Biodiv'eau program. However, we observed two different kinds of relationships between participants in the programs. In SVG, during the observed group sessions, the main questions asked to the participants were related to the presence of mildew in plots. The decision to treat against mildew came partly from collective discussions during observation sessions. Because the sessions were animated by an extension officer from the Chamber of Agriculture, and because meteorological and technical information on diseases are regularly provided to winegrowers by the Chamber of Agriculture, the final decision of winegrowers regarding treatments is probably influenced by the social norms coming from this institution. However, some interviewed winegrowers that belong to SVGs declared that they do not always respect the collective decisions or the weekly advice delivered by the Chamber of Agriculture. In Biodiv'eau, the process is less hierarchical. During the first collective training day, when winegrowers discover the program and learn collectively how to use the inventory grid, ecologist and farmers share knowledge about biodiversity loss, farming responsibility on it, and possibilities for farmers to improve it. This day is the occasion for the group to ask questions to the ecologist who runs the program. During our participatory observation, winegrowers asked many questions about the existence of protected species or the ecological validity of some green infrastructures they already established.

Thus, social relations differ between two programs: even though SVG encourages winegrowers to communicate and take decision together, the program still promotes hierarchical relations between farmers and extension officers that possess the knowledge; on the contrary, Biodiv'eau promotes participatory and co-construction of the ecological knowledge between farmers and ecologists.

4.3.2. Winegrowers are likely to transform their farming practices with SVG

Participation in sustainable viticulture groups (SVG) contributes to transforming farming practices on plot scale, especially for conventional farmers who compose the majority of those groups. Indeed, SVGs mainly focus on vine diseases and chemical use, they deal with the following main issues: when winegrowers should treat the vine, and against what type of problems; what type of chemicals they should use and how they can reduce the quantities of chemicals used. The focus of these groups is, as a

result, more technical than properly environmental, even if chemical alternatives are presented and discussed.

Because it asks for regular and collective observation practices, SVG trains winegrowers to develop a habit of going on their plots and observe. This way, winegrowers progressively learn to judge and decide by themselves what kind of actions they want to implement on their plots, notably regarding treatments against pests. They progressively can stop applying theoretical recommendations. Thus, they learn to adapt the use of chemicals to contextual and located problems, which is linked to a decrease and local adaptation of chemical use:

> Those groups were for us the possibility to meet up with other winegrowers, to speak, and see that it was possible to change our farming system (…) With those groups, we were not alone, and we had technical help. When you want to reason acarian problems, you must recognize them first. You have the harmful ones, the neutral and the useful. You need to train if you want to recognize them. We realized that those useful acarian were disappearing because we did not have good techniques concerning chemical use, and we badly maintained soils and edges. All this causes us to ask ourselves new questions and we ask 'what should I do for this to work better?'. (…) After that, we could have entire years without putting mildew chemicals because the mushrooms didn't develop, whereas traditionally people here protect against mildew even if there is no mildew. (Respondent 1)

SVG sessions also provide opportunities to learn more about alternative vine caring. For instance, during the group session we studied by participant observation, a winegrower presented a plot that he recently converted to biodynamic farming. Before we came to his plot, some conventional winegrowers were joking and laughing at him. However, when we observed his biodynamic plot, all the winegrowers were asking questions about his practices, such as the type of treatments he was using on his vine to protect it. The owner of the plot answered all the questions, talking about the specific biodynamic preparations and presenting the aims of his conversion.

So, while getting the habit of observing their plots with SVG, winegrowers learn progressively to take care of their vines differently as they used to do it without observations. They still aim at protecting the vine and at curing it against diseases or nonhumans considered as threats (acarians, pests for example), but they learn to do it less systematically as they used to.

4.3.3. Winegrowers broaden their conceptions of biodiversity with Biodiv'eau

Biodiv'eau program contributes to transform how winegrowers relate to biodiversity. The program is specifically dedicated to non-productive areas in the vineyards, the edges. Many interviewed winegrowers who had taken part in the program referred to the role of edges' observation practice in changing their way to look at natural areas at the farm scale. Both the self-made inventory of biodiversity, and the final ecological diagnosis proposed by the CNALR, encourage farmers to consider edges as biodiversity areas. Biodiv'eau program offers farmers the possibility to look at vineyards differently than in a strict economic way. It gives them the possibility to interact with plants and other wild species on a contemplative perspective and not on economic perspective only:

> I became aware of edges and I evolved towards letting more things develop by themselves. Before, I was looking at some areas as wasteland, now I look at them as wildlife habitat. (Respondent 20)

> Yes, my way to look at edges changed. Now, I know the endemic species from our area, which I totally ignored before. My dad never taught me, maybe someone had taught it to him… There was much more knowledge before, and now I re-appropriate a knowledge. With Biodiv'eau program, I discovered knowledge about nature. Before, I was not able to go into ecstasies in front of a pistachio tree. Now I do. My look is changing. Even for a tree. You understand it, you respect it. (Respondent 4)

Moreover, the program contributes to the development of participants' ecological knowledge about biodiversity loss and how farmers can contribute to biodiversity conservation on their farms, in close relation with the benefits in their vines. Thus, the program invites winegrowers to conserve biodiversity in order to cooperate with it.

Finally, Biodiv'eau contributes to transform how winegrowers concretely take care of biodiversity at edges' scale, on their farms. Indeed, Biodiv'eau participants receive technical support, with CNALR advises on how to improve biodiversity on edges, especially by implanting agro-ecological infrastructures. They receive also financial support, with departmental funding for semi-natural infrastructure implementation. This way, Biodiv'eau program gives the possibility to match environmental sensitivity to actions. Some winegrowers that belong to this program declared that after their participation to the program, they knew more how to contribute to biodiversity conservation at their vineyard scale and became aware of the benefits for their vine to do it:

> We could see the interest of having hedges or low walls to get birdhouses for insects, and what this could give us to get insects and birds. We learned those things, and we saw all this differently. (…) We could see how we could conserve better. (Respondent 11)

5. Discussion

5.1. Complexity of environmental care

We showed that winegrowers have diverse relations with nonhumans entities, and that care for vines is only one of them (see also Meijboom, 2009; Krzywoszynska, 2016). Besides vines, winegrowers have various environmental preoccupations (water, soils, broader biodiversity) and diverse manners to care about them (e.g., seriously worrying about vine diseases, being interested in environmental issues). Those preoccupations are associated with specific practices, in order to protect, cure or reinforce their vines, in a continuum of practices from conventional, organic to biodynamic ones. In a theoretical

perspective, these findings are consistent with care literature that analyzes both preoccupations (care about) and actions (take care of) (Tronto 1993). The farming care diversity we found is also consistent with the key concepts of adaptation to singular situations and concrete experience in care theory (Laugier, 2012), as part of experiential knowledge (Krzywoszynska, 2016).

Moreover, our results add several highlights for ecological care literature: first, we found spatial logics in farming care. Indeed, different areas in the vineyard deserve different environmental attentions: for instance, plots are important for vine, while edges are particularly important for biodiversity (as confirmed by scientific ecological surveys, see Franin and Barić, 2016 and Froidevaux et al., 2017). Secondly, our work highlights the complexity of the specific biodiversity care for farmers, in a context of increasing double injunction of producing food for human consumption and protecting biodiversity. As we showed, biodiversity is generally not at the core of farming priorities. Still, it is present despite other environmental types of preoccupations, and might be something positive for vine (see Biodiv'eau). We therefore propose here biodiversity conservation to be of interest for winegrowers, for the two following reasons: because useful biodiversity may help the vine production, but also because winegrowers feel concerned about biodiversity loss. As such, we confirmed, as proposed more widely by Chan et al. (2016), that the relationship of farmers with nonhumans is not only binary (intrinsic vs. instrumental value). We also propose to rely these results to the notion of "interest" defined by the philosopher E. Hache (2011). For this author, interest is not strictly utilitarianism but refers to a relation established both for oneself (utilitarianism, instrumental value) and for others (altruism, intrinsic value). Being interested in nonhumans highlights existing complex relations between humans and nonhumans. We therefore propose here biodiversity conservation to be of interest for winegrowers, because useful biodiversity may help their vine production, and because winegrowers feel also concerned about biodiversity loss. As such, we also confirmed, as proposed by Chan et al. (2016), that the relationship of farmers with nonhumans is not only binary (intrinsic vs. instrumental value). More studies are needed to explore more thoroughly the specificities of relational values in people working with nature and biodiversity. More studies are needed to explore more thoroughly the specificities of relational values and interests in people working with nature and biodiversity.

Finally, our work insists on the choices that farmers make regarding care. Winegrowers give priority to certain types of preoccupations, and their vines are clearly their first priority. Moreover, the relations they have with nonhumans are not all attentive modes of care relations established in order to keep them alive; farmers choose what and how to care for, or not. This is close to the results of Pitt (2017) who found different types of human to non-human relationships in urban gardens: some were cooperation or care, whereas some nonhumans are considered enemies or strangers (Pitt, 2017). Within this perspective, despite responsibility (Jonas, 1979) towards nonhumans and environmental issues, our findings suggest that different types of communities (*sensu* Latour, 1995) may exist in farms. In this theoretical framework, so-called 'ecological communities' are characterized by cooperative relationships with nonhumans and responsibility facing environmental issues, while separation between humans and nonhumans or selection within nonhumans characterize so-called 'modern communities' (Hache, 2011; Latour, 1995). Our work confirmed the existence of a continuum of human-non human communities in farming systems, and that people might transform their relationships to nonhumans and biodiversity issues, and thus the community they build with non-humans, with time. Cooperation with nonhumans and responsibility facing environmental issues characterize ecological communities, while separation between humans and nonhumans or selection within nonhumans characterize modern communities (Hache, 2011; Latour, 1995).

5.2. Caring for vine and for the environment is being transformed with time

We showed that winegrowers can change the way they care for their vines with time, generally after getting used to observing their plots. This changing care comes generally through a decreasing systematic control of pests and diseases, making the winegrowers free of practice standardization that is at the core of the modern agriculture paradigm. In other words, farmers are used to caring for their vines (by trying to protect it), but they can transform how they care for them, especially with less systematic control (Stuart, 2008).

More specifically, we showed that farmers can change their relations with nonhumans. First, observing and experimenting new practices make farmers developing new knowledge, made of attentiveness, responsiveness and adaptation, which characterizes good care (Tronto, 1993; Mol, 2008). Attentiveness is key to expanding ethical relations with nonhumans (Krzywoszynska 2019). It is learned with the training of self-judgment capacities (see also Deschamps and Demeulenaere, 2015). This new type of care, i.e. attentive mode of care, confirms that new types of care come with situated and experiential expertise (Enticott, 2012; Krzywoszynska, 2016). Secondly, and consequently, winegrowers can develop new relations to animals and plants that extend from the vineyard, based on observation and contemplation, and not only on economic perspectives. In such dynamics, the number of natural entities that winegrowers care for -in an attentive mode of care- progressively increases and the relations between farmers and nonhumans increase thus in complexity. These results confirm that more attentive ways to take care of environment are tied to sensorial involvements with it (Bellacasa, 2017). Here, the consequence of increased complexity within farmers and nonhumans relations is that farmers do not focus on plots only, but focus on edges too. Thus, care is spread from plots to entire vineyard. This allows us to complete our result regarding care spatial logics. We propose the idea of specific and transforming *care spatialities*, linked to this increase of attentive mode of care. We define care spatialities as the places where farmers take care of nonhumans.

The farming transformations that we highlighted are gradually situated between the modern agriculture frame and the ecologization of practices, i.e. processes of farming transformation toward more and more environmental consideration (see Lamine, 2017). On one hand, some winegrowers still struggle and control weed and pests with a main focus on useful biodiversity; as a practice change, they mainly reduce or stop use of a part of the chemicals they use (Goulet and Vinck,2012 define it as “removal innovations”), but they keep conventional farming systems (see also the weak ecologization of agriculture, Horling and Marsden, 2011). On the other hand, some winegrowers develop local economies and social links and choose to prevent and care with natural preparations or to co-operate with nonhumans within the socio-ecosystems (see also the strong ecologization of agriculture, Horling and Marsden, 2011).

650

651 *5.3. Caring for nonhumans and for the global environment as part of a collective experience*

652

653 The fact that being affiliated to several networks shape preoccupations and farming practices was our
654 last main result (see also McGuire et al., 2013; Compagnone and Hellec, 2015; Hillis et al., 2018). Diverse
655 networks and programs carry out diverse visions of farming and of humans and nonhumans interactions.
656 They tend to develop different affective involvements with nonhumans (as proposed by Bellacasa, 2017).
657 In our research, we highlighted two specific trends in these socially shared visions: fear and protection
658 against some nonhumans qualified as pests (see SVG), or interest for and cooperation with other
659 nonhumans (see Biodiv'eau). We also highlighted two different kinds of relationships between people:
660 hierarchical relations between farmers and so-called experts (technicians or agronomists) that possess
661 the knowledge (SVG); participatory and co-construction of the ecological knowledge between farmers
662 and ecologists (Biodiv'eau).
663 Thus, collective actions may foster different types of ecological care: care for a selection of non-human
664 entities or environmental issues with agronomic and technical solutions mostly, where agronomists or
665 institutions decide, versus care for broader communities composed of humans and nonhumans facing
666 complex environmental issues with combination of practices not only at the plot scale, where farmers
667 are involved in the choices.

668

669 **6. Conclusion and perspectives**

670 In the context of the ecological crisis, the public debate about agriculture often present farmers' choices
671 as dominated by economic and production-centered dimensions (Burton, 2004; Burton and Wilson,
672 2006). By studying the transformations in winegrowers' practices and the ways in which their care for
673 nonhumans develops, we shaded the idea that farmers are only driven by economic choices (see also De
674 Rooij et al., 2010 and Driessen, 2012). We found that farmers can be preoccupied both by production
675 (vine) and environmental issues (biodiversity conservation). The ways farmers relate to nonhumans go

beyond the theoretical opposition between intrinsic and instrumental values towards nature (Chan et al., 2016). Farmers can simultaneously produce food and be attentive to nonhumans. (Bellacasa, 2017).

On the other hand, our study highlights the role of networks for biodiversity conservation. Indeed, farming transformations ask for necessary resources. When it comes to knowledge, social resources are crucial. This is why farmer networks, among other elements, are decisive for agroecological transitions, since they contribute to developing farmers' means in order to transform their farming systems. Still, we found that farmer networks (and related environmental programs) promote different visions of farming ecologization (Horling and Marsden, 2011). More research is needed regarding the role of such networks for agroecology transitions at different scales, with a focus on the types of relationships with nonhumans they promote, the type of knowledge they foster and how they contribute to biodiversity conservation.

References

Barbier, J.-M., Goulet, F., 2013. Moins de technique, plus de nature: pour une heuristique des pratiques d'écologisation de l'agriculture. EDP Sci. « Nat. Sci. Sociétés 22, 200–210. https://doi.org/10.1051/nss/2013094

Beau, R., 2017. *Ethique de la nature ordinaire: Recherches philosophiques dans les champs, les friches et les jardins*. 1re éd. Paris: Editions de la Sorbonne.

Beaud, S., Weber, F., 1997. Guide de l'enquête de terrain, La Découverte.

Bellacasa, M.P. de la, 2017. Matters of Care: Speculative Ethics in More than Human Worlds. University of Minnesota Press.

Burton, J.J.F., 2004. Seeing Through the 'Good Farmer's' Eyes: Towards Developing an Understanding of the Social Symbolic Value of 'Productivist' Behaviour. Sociol. Rural. 44, 195–215.

Burton, R.J.F., Wilson, G.A., 2006. Injecting social psychology theory into conceptualisations of agricultural agency: Towards a post-productivist farmer self-identity? J. Rural Stud. 22, 95–115. https://doi.org/10.1016/j.jrurstud.2005.07.004

Chan, K.M.A., Balvanera, P., Benessaiah, K., Chapman, M., Díaz, S., Gómez-Baggethun, E., Gould, R., Hannahs, N., Jax, K., Klain, S., Luck, G.W., Martín-López, B., Muraca, B., Norton, B., Ott, K., Pascual, U., Satterfield, T., Tadaki, M., Taggart, J., Turner, N., 2016. Opinion: Why protect nature? Rethinking values and the environment. Proc. Natl. Acad. Sci. 113, 1462–1465. https://doi.org/10.1073/pnas.1525002113

Clement, A., Laurens, L., Soulard, C., 2013. Les mutations paysagères engendrées par l'arrachage viticole, un vecteur de mobilisation des acteurs territoriaux dans l'*Hérault*. Méditerranée 120, 49–58. https://doi.org/10.4000/mediterranee.6673

Clingeleffer, P.R., 2013. Mechanization in australian vineyards, in: Acta Horticulturae. International Society for Horticultural Science (ISHS), Leuven, Belgium, pp. 169–177. https://doi.org/10.17660/ActaHortic.2013.978.17

Compagnone, C., Hellec, F., 2015. Farmers' Professional Dialogue Networks and Dynamics of Change: The Case of ICP and No-Tillage Adoption in Burgundy (France). Rural Sociol. 80,

248–273. https://doi.org/10.1111/ruso.12058
Cordellier, S., Le Guen, R., 2008. Organisations professionnelles agricoles : histoire et pouvoirs. Pour 196–197, 64. https://doi.org/10.3917/pour.196.0064
Costa, J.M., Vaz, M., Escalona, J., Egipto, R., Lopes, C., Medrano, H., Chaves, M.M., 2016. Modern viticulture in southern Europe: Vulnerabilities and strategies for adaptation to water scarcity. Agric. Water Manag. 164, 5–18. https://doi.org/10.1016/j.agwat.2015.08.021
Curry, J.M., 2002. Care Theory and "caring" systems of agriculture. Agric. Hum. Values 19, 119–131. https://doi.org/10.1023/A:1016074832696

Département *Hérault*, 2010. La Viticulture et le vin en *Hérault*.
Deschamps, S., Demeulenaere, É., 2015. L'observatoire agricole de la biodiversité. Etudes Rural. N° 195, 109–126.
Díaz, S., Demissew, S., Carabias, J., Joly, C., Lonsdale, M., Ash, N., Larigauderie, A., Adhikari, J.R., Arico, S., Báldi, A., Bartuska, A., Baste, I.A., Bilgin, A., Brondizio, E., Chan, K.M., Figueroa, V.E., Duraiappah, A., Fischer, M., Hill, R., Koetz, T., Leadley, P., Lyver, P., Mace, G.M., Martin-Lopez, B., Okumura, M., Pacheco, D., Pascual, U., Pérez, E.S., Reyers, B., Roth, E., Saito, O., Scholes, R.J., Sharma, N., Tallis, H., Thaman, R., Watson, R., Yahara, T., Hamid, Z.A., Akosim, C., Al-Hafedh, Y., Allahverdiyev, R., Amankwah, E., Asah, S.T., Asfaw, Z., Bartus, G., Brooks, L.A., Caillaux, J., Dalle, G., Darnaedi, D., Driver, A., Erpul, G., Escobar-Eyzaguirre, P., Failler, P., Fouda, A.M.M., Fu, B., Gundimeda, H., Hashimoto, S., Homer, F., Lavorel, S., Lichtenstein, G., Mala, W.A., Mandivenyi, W., Matczak, P., Mbizvo, C., Mehrdadi, M., Metzger, J.P., Mikissa, J.B., Moller, H., Mooney, H.A., Mumby, P., Nagendra, H., Nesshover, C., Oteng-Yeboah, A.A., Pataki, G., Roué, M., Rubis, J., Schultz, M., Smith, P., Sumaila, R., Takeuchi, K., Thomas, S., Verma, M., Yeo-Chang, Y., Zlatanova, D., 2015. The IPBES Conceptual Framework — connecting nature and people. Curr. Opin. Environ. Sustain., Open Issue 14, 1–16. https://doi.org/10.1016/j.cosust.2014.11.002

Donati, K. 2019. « 'Herding Is His Favourite Thing in the World': Convivial World-Making on a Multispecies Farm ». *Journal of Rural Studies* 66 (février): 119-29. https://doi.org/10.1016/j.jrurstud.2018.12.008.
Driessen, C., 2012. Farmers Engaged in Deliberative Practices; An Ethnographic Exploration of the Mosaic of Concerns in Livestock Agriculture. J. Agric. Environ. Ethics 25, 163–179. https://doi.org/10.1007/s10806-010-9293-z

Enticott, G., 2012. The local universality of veterinary expertise and the geography of animal disease: The local universality of veterinary expertise. Trans. Inst. Br. Geogr. 37, 75–88. https://doi.org/10.1111/j.1475-5661.2011.00452.x
Foyer, J., 2018. Syncrétisme des savoirs dans la viticulture biodynamique. Rev. Anthropol. Connaiss. Vol. 12, N°2, 289–321.
Franin, K., Barić, B., Kuštera, G., 2016. The role of ecological infrastructure on beneficial arthropods in vineyards. Span. J. Agric. Res. 14, 0303. https://doi.org/10.5424/sjar/2016141-7371
Froidevaux, J.S.P., Louboutin, B., Jones, G., 2017. Does organic farming enhance biodiversity in Mediterranean vineyards? A case study with bats and arachnids. Agric. Ecosyst. Environ. 249, 112–122. https://doi.org/10.1016/j.agee.2017.08.012
Geniaux, G., Latruffe, L., Lepoutre, J., Mzoughi, N., Napoleone, C., Nauges, C., Sainte-Beuve, J., Sautereau, N., 2010. Les déterminants de la conversion à l'agriculture biologique: une revue de la littérature économique. (Research Report). Auto-saisine.
Gilligan, C., 1992. In a Different Voice: Psychological Theory and Women's Development. Harvard University Press.
Goulet, F., Vinck, D., 2012. L'innovation par retrait. Contribution à une sociologie du détachement. Rev. Francaise Sociol. Vol. 53, 195–224.

768 Guétat-Bernard, H., 2017. Genre et savoirs: Pratiques et innovations rurales au Sud. IRD
769 Éditions.
770 Hache, E., 2011. Ce à quoi nous tenons, Empêcheurs de penser en rond.
771 Held, V., 2006. The ethics of care: personal, political, and global. Oxford University Press,
772 Oxford ; New York.
773 Herman, A. 2015. « Enchanting Resilience: Relations of Care and People–Place Connections in
774 Agriculture ». *Journal of Rural Studies* 42 (décembre): 102-11.
775 https://doi.org/10.1016/j.jrurstud.2015.10.003.
776 Hill, S.B., MacRae, R.J., 1996. Conceptual Framework for the Transition from Conventional to
777 Sustainable Agriculture. J. Sustain. Agric. https://doi.org/10.1300/J064v07n01_07
778 Hillis, V., Lubell, M., Hoffman, M., 2018. Sustainability partnerships and viticulture
779 management in California. J. Environ. Manage. 217, 214–225.
780 https://doi.org/10.1016/j.jenvman.2018.03.033
781 Horlings, L.G., Marsden, T.K., 2011. Towards the real green revolution? Exploring the
782 conceptual dimensions of a new ecological modernisation of agriculture that could 'feed the
783 world.' Glob. Environ. Change 21, 441–452. https://doi.org/10.1016/j.gloenvcha.2011.01.004
784 Interbio Occitanie, 2019. Bilan des dynamiques d'engagements et arrêts de notification bio en
785 2018.
786 Ives, C.D., Giusti, M., Fischer, J., Abson, D.J., Klaniecki, K., Dorninger, C., Laudan, J., Barthel,
787 S., Abernethy, P., Martín-López, B., Raymond, C.M., Kendal, D., von Wehrden, H., 2017.
788 Human–nature connection: a multidisciplinary review. Curr. Opin. Environ. Sustain. 26–27,
789 106–113. https://doi.org/10.1016/j.cosust.2017.05.005
790 Johnson, H., Robinson, J., 2013. The World Atlas of Wine, 7th edition.
791 Jonas, H., 1979. Le Principe responsabilité: une éthique pour la civilisation technologique,
792 Traduit de l'allemand et présenté par Sabine Cornille et Philippe Ivernel, Paris, Rivages, coll.
793 "Rivages poche, Petite bibliothèque."
794 Keniger, L.E., Gaston, K.J., Irvine, K.N., Fuller, R.A., 2013. What are the benefits of interacting
795 with nature? Int. J. Environ. Res. Public. Health 10, 913–935.
796 https://doi.org/10.3390/ijerph10030913
797 Krasny, M., Russ, A., Tidball, K., Elmqvist, T., 2013. Civic ecology practices: Participatory
798 approaches to generating and measuring ecosystem services in cities. Ecosystem Services. 7.
799 10.1016/j.ecoser.2013.11.002.
800 Kremen, C., 2015. Reframing the land-sparing / land-sharing debate for biodiversity
801 conservation 1355, 52–76. https://doi.org/10.1111/nyas.12845
802 Krzywoszynska, A., 2019. Caring for soil life in the Anthropocene: The role of attentiveness in
803 more-than-human ethics. Trans. Inst. Br. Geogr.
804 Krzywoszynska, A., 2016. What Farmers Know: Experiential Knowledge and Care in Vine
805 Growing: Experiential knowledge and care in vine growing. Sociol. Rural. 56, 289–310.
806 https://doi.org/10.1111/soru.12084
807 Lamine, C., 2017. La fabrique sociale de l'écologisation de l'agriculture. Les Editions La
808 Discussion.
809 Latour, B., 1995. Moderniser ou écologiser. A la recherche de la Septième Cité. Ecol. Polit. 13,
810 5–27.
811 Laugier, S., 2012. Tous vulnérables ? : l'éthique du care, les animaux et l'environnement, Payot.
812 Laurent, F., Vieira Medeiros, R., 2010. Des réseaux d'agriculteurs en faveur de l'environnement
813 en France. Cybergeo Eur. J. Geogr. https://doi.org/10.4000/cybergeo.23152
814
815 Linn, A. 2019. « Making Milk with Conscious Care: Raw Milk Ontologies and the Practices of
816 'Bath Milk' Producers in Victoria, Australia ». *Journal of Rural Studies* 65 (janvier): 135-42.
817 https://doi.org/10.1016/j.jrurstud.2018.10.010.
818 Mailly, F., Hossard, L., Barbier, J.-M., Thiollet-Scholtus, M., Gary, C., 2017. Quantifying the
819 impact of crop protection practices on pesticide use in wine-growing systems. Eur. J. Agron. 84,

23–34. https://doi.org/10.1016/j.eja.2016.12.005
McGuire, J., Morton, L.W., Cast, A.D., 2013. Reconstructing the good farmer identity: shifts in farmer identities and farm management practices to improve water quality. Agric. Hum. Values 30, 57–69. https://doi.org/10.1007/s10460-012-9381-y
Meijboom, F., 2009. Care and Responsibility as key concepts of agricultural ethics. Ethical Futur. Biosci. Food Horiz., Wageningen: Wageningen Academic Press. 237–240.
Meijboom, F.L.B., Stafleu, F.R., 2016. Farming ethics in practice: from freedom to professional moral autonomy for farmers. Agric. Hum. Values 33, 403–414. https://doi.org/10.1007/s10460-015-9641-8
Mol, A., 2008. The Logic of Care: Health and the Problem of Patient Choice, London: Routledge.
Newbold, T., Hudson, L.N., Hill, S.L.L., Contu, S., Lysenko, I., Senior, R.A., Börger, L., Bennett, D.J., Choimes, A., Collen, B., Day, J., De Palma, A., Díaz, S., Echeverria-Londoño, S., Edgar, M.J., Feldman, A., Garon, M., Harrison, M.L.K., Alhusseini, T., Ingram, D.J., Itescu, Y., Kattge, J., Kemp, V., Kirkpatrick, L., Kleyer, M., Correia, D.L.P., Martin, C.D., Meiri, S., Novosolov, M., Pan, Y., Phillips, H.R.P., Purves, D.W., Robinson, A., Simpson, J., Tuck, S.L., Weiher, E., White, H.J., Ewers, R.M., Mace, G.M., Scharlemann, J.P.W., Purvis, A., 2015. Global effects of land use on local terrestrial biodiversity. Nature 520, 45–50. https://doi.org/10.1038/nature14324
Paillé, P., Mucchielli, A., 2012. L'analyse qualitative en sciences humaines et sociales. Armand Colin. https://doi.org/10.3917/arco.paill.2012.01

Pertot, I., Caffi, T., Rossi, V., Mugnai, L., Hoffmann, C., Grando, M.S., Gary, C., Lafond, D., Duso, C., Thiery, D., Mazzoni, V., Anfora, G., 2016. A critical review of plant protection tools for reducing pesticide use on grapevine and new perspectives for the implementation of IPM in viticulture. Crop Prot. 97. https://doi.org/10.1016/j.cropro.2016.11.025
Pitt, H., 2017. Questioning care cultivated through connecting with more-than-human communities. Soc. Cult. Geogr. 9365, 1–22. https://doi.org/10.1080/14649365.2016.1275753

Preston, D., 2008. Viticulture and Winemaking in Contemporary Rural Change: Experience from Southern France and Eastern Australia. J. Wine Res. 19, 159–173. https://doi.org/10.1080/09571260902891043

Rooij, S.J.G. de, Lauwere, C.C. de, Ploeg, J.D. van der, 2010. Entrapped in Group Solidarity? Animal Welfare, the Ethical Positions of Farmers and the Difficult Search for Alternatives. J. Environ. Policy Plan. 12, 341–361. https://doi.org/10.1080/1523908X.2010.528882

Stuart, D., 2008. The illusion of control: industrialized agriculture, nature, and food safety. Agric. Hum. Values 25, 177–181. https://doi.org/10.1007/s10460-008-9130-4
Šūmane, S., Kunda I., Knickel K., Strauss A., Tisenkopfs T., Rios I., Rivera M., Chebach C., et Ashkenazy A. 2018. « Local and Farmers' Knowledge Matters! How Integrating Informal and Formal Knowledge Enhances Sustainable and Resilient Agriculture ». *Journal of Rural Studies* 59 (avril): 232-41. https://doi.org/10.1016/j.jrurstud.2017.01.020.
Touzard, J.-M., 2011. Les caves coopératives dans la transformation du vignoble languedocien. Etudes *Héraultaises* 101–111.
Tronto, J.C., 1993. Moral Boundaries: A Political Argument for an Ethic of Care. Psychology Press.
Tronto, J.C., Fisher, B., 1990. Toward a Feminist Theory of Caring. Circ. Care 36–54.
Van Leeuwen, C., Darriet, P., 2016. The Impact of Climate Change on Viticulture and Wine Quality. J. Wine Econ. 11, 150–167. https://doi.org/10.1017/jwe.2015.21

872 Wilson, Geoff A. 2001. « From Productivism to Post-Productivism... and Back again? Exploring
873 the (Un)changed Natural and Mental Landscapes of European Agriculture ». *Transactions of the*
874 *Institute of British Geographers* 26 (1): 77-102.
875 Wood, P.J.T., 1994. Who Cares? Women, Care, and Culture, 1st edition. ed. Southern Illinois
876 University Press, Carbondale.
877 Woodhouse, P., 2010. Beyond Industrial Agriculture? Some Questions about Farm Size,
878 Productivity and Sustainability: Questions about Farm Size, Productivity and Sustainability. J.
879 Agrar. Change 10, 437–453. https://doi.org/10.1111/j.1471-0366.2010.00278.x

880

Author statement :

Margaux Alarcon : conceptualization, methodology, investigation, formal analysis, writing (original draft).

Anne-Caroline Prévot and Pascal Marty : conceptualization and supervision.

All authors contributed substantially to writing (review and editing).