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

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Declaration of interest

None.

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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

23 1. Introduction

24 The relationship between people and nature has attracted a rising interest among scientists (Ives et al.,
25 2017)., first based on the evidence of health and well-being benefits (Keniger et al., 2013); and secondly, on
26 the need to address sustainability challenges, including biodiversity conservation or fundamental society
27 changes (e.g.,Krasny et al., 2013). In this context, values attributed to nature are of growing importance
28 (Díaz et al., 2015). Besides human interest (instrumental values) and interest for nature itself (intrinsic
29 values), Chan et al. (2016) recently highlighted that people also consider “what is right” according to how
30 they personally relate with nature and with others toward nature. They called this interest “relational
31 values”, which include a diversity of components, such as preferences, principles, and virtues, which also
32 concern interactions with nature. Indeed, for the authors, some components of individual identities are
33 rooted in long-term care with nature and stewardship (this is particular true for rural farmers). Relational
34 values are prominent within different philosophies, including care ethics.

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

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

56

57 Industrial agriculture has become widespread in Western countries in the second part of the XX century,
58 with the specific aim to increase food production. In this modern paradigm, farming practices became
59 increasingly intensive, by promoting progressive control and management of nonhumans (Stuart, 2008)
60 with mechanization and use of agrochemicals (especially inorganic fertilizer and pesticides) (Woodhouse,
61 2010). In that perspective, farmers are often presented as making choices only for economic reasons and in
62 order to optimize and raise quantities of food production (Burton, 2004; Burton and Wilson, 2006). Yet,
63 agricultural intensification has been recognized as one of the main driving forces of the global
64 environmental crisis, especially biodiversity loss (Newbold et al., 2015). Combined with food security issues,
65 environmental issues recently became increasingly present in the public debates about agriculture, moving
66 from farmers' discretion to that of public policy and market choices (Meijboom and Stafleu, 2016). In this
67 context, individual farmers are faced with an apparently contradictory injunction: food production and
68 protecting biodiversity (Barbier and Goulet, 2013; McGuire et al., 2013).

69 In this paper, we explore how farmers deal with this contradiction in French farming landscapes that have
70 been transformed with agricultural modernization. We focus on the relationships farmers build with plants
71 (both cultivated and spontaneous) and animals (both wild and domesticated) that are present in their
72 farms, and explore whether, even in areas that seem structured by modern agriculture, some practices and
73 relations towards those nonhumans can refer to caring attitudes and practices (Tronto, 1993). We use the
74 term 'nonhumans', more general than "nature" when it comes to qualify all types of plants and animals
75 farmers interact with in their farms, as the term is also used in several care studies (e.g., Krzywoszynska,
76 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 (Clingeffer, 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

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

107

108 **2. Care for nature in farming context: a synthesis**

109 Intensive farming systems aim to increase productivity at plot scale (Wilson 2001; Burton, 2004),
110 without any concern on biodiversity conservation. In order to address both objectives of farm
111 productivity and biodiversity conservation, much research in ecology and agronomy has focused on
112 farming practices, first within plots, and secondly, in natural areas around the plots (Franin et al., 2016).
113 Much studies focused on two sets of farming practices : 1) economically-driven technological
114 developments and closed loops of energy, organic matter and minerals, aiming at increasing efficiency
115 of input use and decreasing both production costs and environmental impacts (Horlings and Marsden,
116 2011); 2) intensification of ecological interactions between the components of each specific farm, in
117 order to promote fertility, productivity, and resilience to external perturbations (Horlings and Marsden,
118 2011; Kremen, 2015), including increasing semi-natural areas around plots (Franin et al., 2016).
119 Concrete transformations in farmers' practices are sometimes driven by an increased attention to
120 environmental issues (Lamine, 2017). This process combines individual trajectories and collective actions,
121 which provide the necessary resources, including ecological knowledge and social bonds (see Hill and
122 MacRae, 1996). Thus, in the context of environmental crises, new co-operations between farmers and
123 non-farmers develop, together with a greater inclusion of environmental issues in farming practices
124 (Hillis et al., 2018). Many studies highlight the key role of farmer networks for agroecological transition
125 (Compagnone and Hellec, 2015; Šūmane et al., 2018). In France, those bottom-up and place-based
126 farmer networks develop alongside historical professional structures, i.e. the farming federations and
127 the Chambers of Agriculture (Cordellier and Le Guen, 2008).
128 Research following these initiatives mainly focus on agronomic techniques and solutions, and not on
129 how farmers relate to plants or animals, notably trough increased attention; neither on how these
130 relations may change with transforming farming practices. Yet, linking attitudes towards nonhumans

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

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

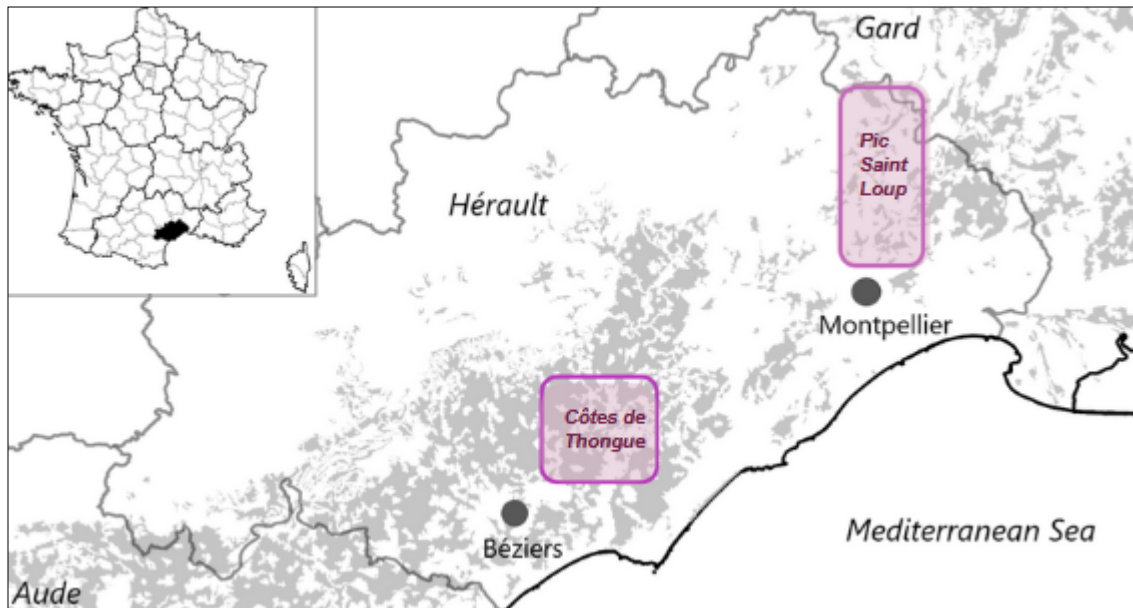
158 sensorial engagements, Bellacasa 2017: 197) is tied to the modification of existing relations of care-
159 taking and especially immersed ecological care. Even if the author does not describe precisely the
160 processes of learning how to be more attentive to soils, her work shows that care theory 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*



180

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

183

184 This qualitative research was conducted in Languedocian vineyard in south of France, particularly in the
 185 *Hérault* area (Fig. 1). Languedocian vineyard, historically dominated by co-operatives since the beginning
 186 of the XX century has changed since the second half of XX century (Touzard, 2011). First, the vine area
 187 strongly decreased in size since 1980 due to several uprooting campaigns, supported by European
 188 Economic Community grants (Clement et al., 2013) in order to fight overproduction and decreasing
 189 prices by locally increasing the quality of the vine and of the local labels. Moreover, since 1985, co-
 190 operatives are less numerous and tend to amalgamate in order to be more competitive in wine market
 191 (Touzard, 2011). In *Hérault*, most of the vine production is still dependent on co-operation
 192 (Département *Hérault*, 2010). However, a new generation of independent wine producers has recently
 193 appeared (Johnson and Robinson, 2013). The *Hérault* area is the second French department with the
 194 largest vine surface area (Département *Hérault*, 2010). That department is one of the top three areas in
 195 France with the highest use intensity of insecticide spray (Mailly et al., 2017). However, an increasing
 196 part of the production comes from organic and biodynamic farming (Interbio Occitanie, 2019; Preston,
 197 2008; Foyer, 2018).

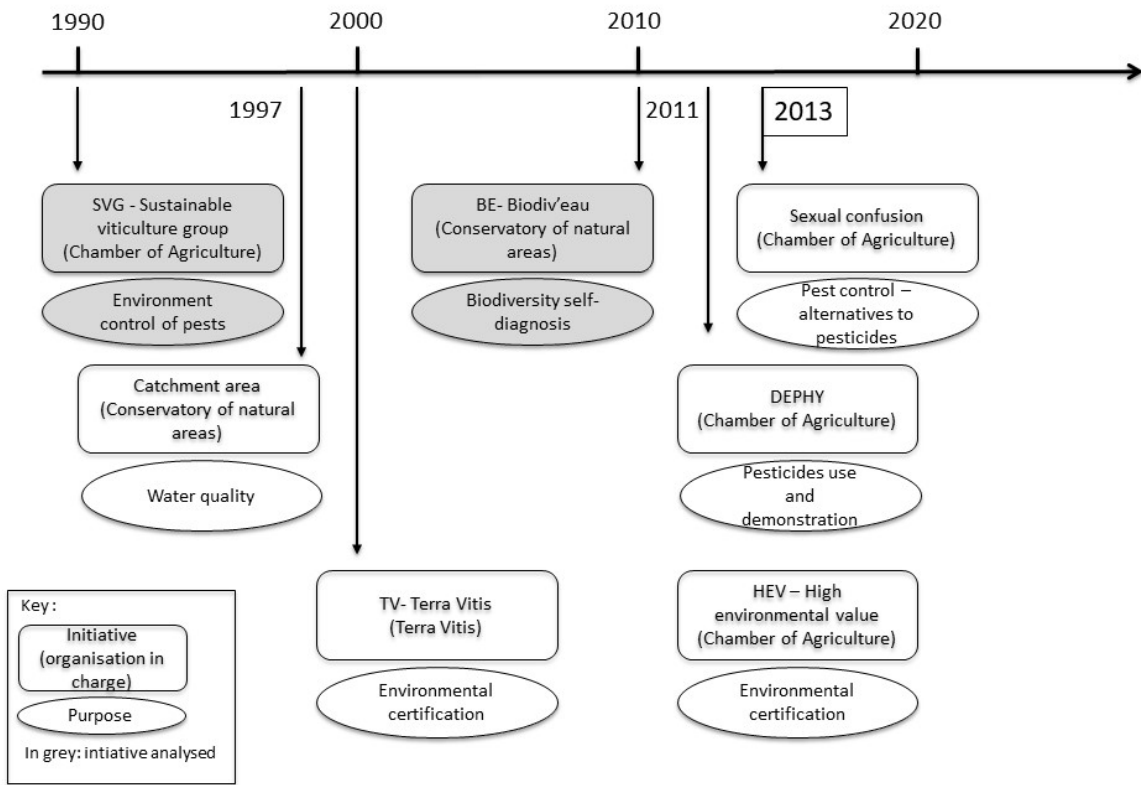
198 In *Hérault*, we focused our study on two different areas and wine designations: *Pic Saint Loup* (north of
199 the area) and *Côtes the Tongue* (southwest of the area). The Protected Designation of Origin *Pic Saint*
200 *Loup* relates to 17 towns and the majority of the production is made by independent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

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

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

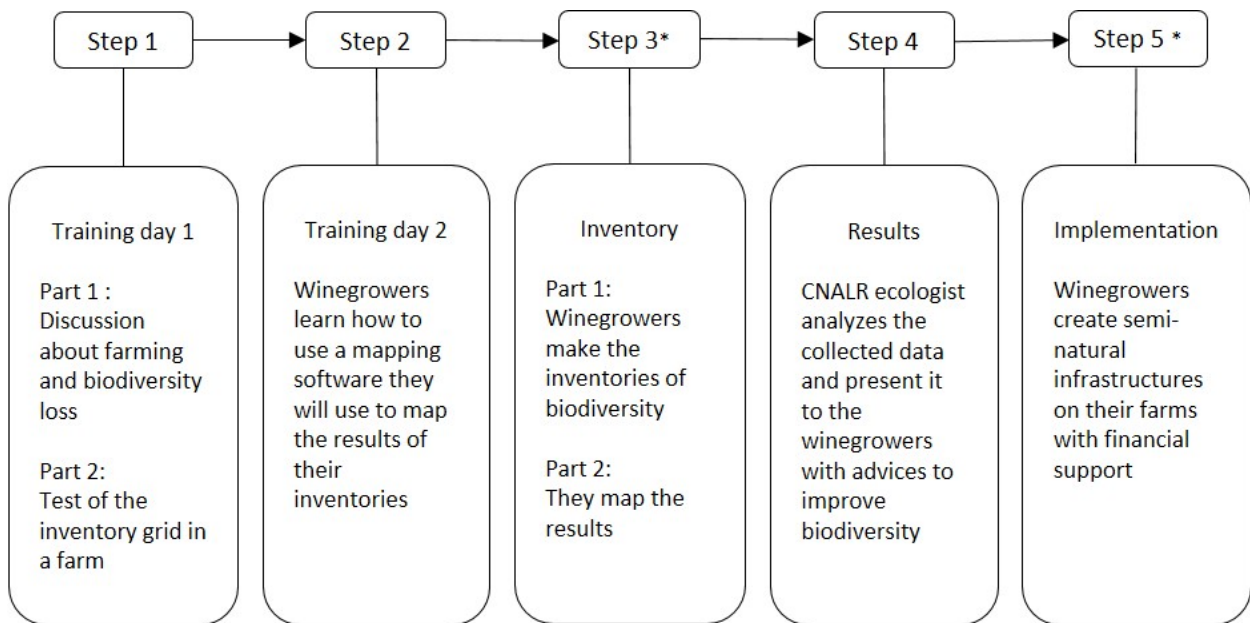
217 (2) The program Biodiv’eau was created between 2010 and 2012, following a demand from local
218 winegrowers to know more about the biodiversity present in their vineyards. This voluntary program
219 now gathers many local structures (Chamber of Agriculture, water supply agency, *Hérault* department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

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



228

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



* : CNALR helps winegrowers during this step.

Note: Winegrowers can decide at each step if they want to continue the program.

230

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

232

233 3.2. Semi-structured interviews

234 20 semi-structured interviews with winegrowers were conducted by author #1 from November 2017 to
 235 May 2018 (Table 2). Winegrowers were found and contacted by the snowball technique, starting from
 236 contacts of participants to Biodiv'eau. All these interviews were individual, completed by phone (7) or
 237 face to face (13). The mean duration of the interviews was 1 hour (from 35 minutes to 4 hours). During
 238 four of them, the interview included a visit of the vineyard with the winegrower. All the interviews were
 239 recorded, transcribed, and anonymized. Notes were also taken during the interviews.

240

241 3.3. Qualitative data analysis

242 Following the principles of thematic coding, we coded the interviews (Paillé and Mucchielli, 2012).
 243 Through several cycles of coding, we filtered, focused, and highlighted the salient features in the data,
 244 focusing first on caring disposals and practices and second on the part of farmer networks and
 245 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

251

252

253

4. RESULTS

254

4.1. Winegrowers care primarily about vines

255

Winegrowers primarily care for their vine, since they have to produce grapes. However, if vine is the

256

main care-receiver within vineyards, winegrowers also form relationships with a diversity of other

257

nonhumans and they care for environmental issues too.

258

4.1.1. Vine as the main worry

259

Winegrowers mainly relate to vine as their main concern, especially on vine health and on its

260

vulnerability. Almost all the winegrowers mentioned one or several existing vine diseases as a serious

261

concern, because they threaten vine production. Words such as “diseases”, “vulnerability”, “sensitive”,

262

“risk”, or “pressure” were consistently used relating to vine, and were mostly associated with stress and

263

anxiety. Besides diseases, climate events were also qualified as a threat for vine:

264

265

My nephew [associate] is very scared of leafhopper and *flavescence dorée* that we can't perfectly

266

control with ecological products, and it devastates the vine. (Respondent 7)

267

268

We are not enough here, and it's been two years that there has been hail, then there was drought,

269

so we lost 75% of our crop over two years. (Respondent 9)

270

271

According to winegrowers, pests or animals such as wild boars threaten crops. But only a few

272

winegrowers mention wild boars as a problem for vine crops and enclose their farm or hunt them. We

273

detected different types of relations with animals that interact with the vines: some animals, especially

274

the ones that are considered as a threat for the crop, are less accepted than birds or animals considered

275

as harmless and thus much more appreciated:

276

277 The only hunted animals in my farm are wild boars, because they come here, they are everywhere.

278 It is hard to enclose the farm. Wild boars attack crops. Moreover, they attack young partridges,

279 rabbits, and hares. So, we have to eliminate them. This year they ate 10% of the crop.

280 (Respondent 19)

281

282 For me, seeing a young Bonelli's eagle in my vineyard is amazing; and the vine is full of young

283 partridges, we see them running after their moms and dads, it is wonderful. (Respondent 3)

284

285 The worry for vine is translated into concrete manners to take care of it: 1) Protection of the vine, which

286 is the priority for the majority of the winegrowers. The protection aims at avoiding or decreasing the risk

287 of diseases, pests or weather events (such as drought or frost) that could decrease vine or wood health.

288 It comes before the current diseases, pest or weather event; 2) Cure of the vine, after diseases, pests, or

289 extreme weather events aims at healing vine or woods; 3) Reinforcement of the vine, in order to get it

290 stronger in front of possible diseases or extreme weather events. Reinforcement differs from protecting,

291 it consists of a more general improvement of vine health. This approach is characteristic of biodynamy:

292

293 When you do biodynamic farming, you are asking yourself: why are my vines sick? What should I

294 do to make that they are less sick? And if they are sick anyway, I'll try not to treat only with

295 natural chemicals but with plants and specific preparations too. What we aim is to revive

296 microbial life of soils. We work with this microbial life in order to make plant able to digest the

297 organic stuff that are in the soil, oligo-elements and so on. (...) All the vegetation becomes

298 stronger: leaves are thicker, woods are thicker and much stronger. Plant grows better. Then it

299 resists much more to cryptogamic diseases that are related to humidity. So, the most the leaves

300 are thick, the most it resists. Then, there are consequences on grapes quality. (Respondent 9)

301

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

305
306 *4.1.2. Broader environmental preoccupations: the case of biodiversity*

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

315
316 Three weeks ago, we knew that a study showed we lost 30% of birds in ten years. This is
317 catastrophic. This is a disaster. There are no bird anymore. We see it today, you raise your eyes
318 and there are no swallows, no swifts, and no goldfinches. (Respondent 19)

319
320 So, winegrowers are not only focused on production and economic issues. They feel concerned by
321 biodiversity loss too. However, they regret the few support they get in order to address such issue.
322 Indeed, a few winegrowers asked for support in order to understand and accurately address
323 environmental issues, because they assumed not having enough time to deal with them alone or
324 because they did not know how to.

325
326 *4.2. Winegrowers change how they take care of their vineyard*

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

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

332 *4.2.1. Winegrowers change their ways to take care of vines through transforming farming practices*

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

341

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

348

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

350

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

353

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

356

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

359

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

366

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

374

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

380

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

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

385

386 4.2.2. *New ways to take care of vines come with experimentation in time and in different areas*

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

392

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

397

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

400

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

403

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

408

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

412 (Respondent 3)

413

414 *4.2.3. Winegrowers develop ways of taking care of biodiversity with more natural vegetation within*
415 *edges*

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

422

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

428

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

432

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

434

435 *4.3. Farmer networks contribute to transform farmers' relation to vine and broader biodiversity*

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

443 *4.3.1. Farmer networks are part of the farming practices' transformation process*

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

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

453

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

459

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

463 in Biodiv'eau program. However, we observed two different kinds of relationships between participants
464 in the programs. In SVG, during the observed group sessions, the main questions asked to the
465 participants were related to the presence of mildew in plots. The decision to treat against mildew came
466 partly from collective discussions during observation sessions. Because the sessions were animated by
467 an extension officer from the Chamber of Agriculture, and because meteorological and technical
468 information on diseases are regularly provided to winegrowers by the Chamber of Agriculture, the final
469 decision of winegrowers regarding treatments is probably influenced by the social norms coming from
470 this institution. However, some interviewed winegrowers that belong to SVGs declared that they do not
471 always respect the collective decisions or the weekly advice delivered by the Chamber of Agriculture. In
472 Biodiv'eau, the process is less hierarchical. During the first collective training day, when winegrowers
473 discover the program and learn collectively how to use the inventory grid, ecologist and farmers share
474 knowledge about biodiversity loss, farming responsibility on it, and possibilities for farmers to improve it.
475 This day is the occasion for the group to ask questions to the ecologist who runs the program. During
476 our participatory observation, winegrowers asked many questions about the existence of protected
477 species or the ecological validity of some green infrastructures they already established.
478 Thus, social relations differ between two programs: even though SVG encourages winegrowers to
479 communicate and take decision together, the program still promotes hierarchical relations between
480 farmers and extension officers that possess the knowledge; on the contrary, Biodiv'eau promotes
481 participatory and co-construction of the ecological knowledge between farmers and ecologists.

482
483
484 *4.3.2. Winegrowers are likely to transform their farming practices with SVG*

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

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

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

498
499 Those groups were for us the possibility to meet up with other winegrowers, to speak, and see
500 that it was possible to change our farming system (...) With those groups, we were not alone, and
501 we had technical help. When you want to reason acarian problems, you must recognize them first.
502 You have the harmful ones, the neutral and the useful. You need to train if you want to recognize
503 them. We realized that those useful acarian were disappearing because we did not have good
504 techniques concerning chemical use, and we badly maintained soils and edges. All this causes us
505 to ask ourselves new questions and we ask 'what should I do for this to work better?'. (...) After
506 that, we could have entire years without putting mildew chemicals because the mushrooms didn't
507 develop, whereas traditionally people here protect against mildew even if there is no mildew.

508 (Respondent 1)

509
510 SVG sessions also provide opportunities to learn more about alternative vine caring. For instance, during
511 the group session we studied by participant observation, a winegrower presented a plot that he recently
512 converted to biodynamic farming. Before we came to his plot, some conventional winegrowers were
513 joking and laughing at him. However, when we observed his biodynamic plot, all the winegrowers were
514 asking questions about his practices, such as the type of treatments he was using on his vine to protect
515 it. The owner of the plot answered all the questions, talking about the specific biodynamic preparations
516 and presenting the aims of his conversion.

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

521

522 4.3.3. Winegrowers broaden their conceptions of biodiversity with Biodiv'eau

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

531

532 I became aware of edges and I evolved towards letting more things develop by themselves.

533 Before, I was looking at some areas as wasteland, now I look at them as wildlife habitat.

534 (Respondent 20)

535

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

542

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

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

555
556 We could see the interest of having hedges or low walls to get birdhouses for insects, and what
557 this could give us to get insects and birds. We learned those things, and we saw all this differently.
558 (...) We could see how we could conserve better. (Respondent 11)

559

560 **5. Discussion**

561

562 *5.1. Complexity of environmental care*

563

564 We showed that winegrowers have diverse relations with nonhumans entities, and that care for vines is
565 only one of them (see also Meijboom, 2009; Krzywoszynska, 2016). Besides vines, winegrowers have
566 various environmental preoccupations (water, soils, broader biodiversity) and diverse manners to care
567 about them (e.g., seriously worrying about vine diseases, being interested in environmental issues).

568 Those preoccupations are associated with specific practices, in order to protect, cure or reinforce their
569 vines, in a continuum of practices from conventional, organic to biodynamic ones. In a theoretical

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

574 Moreover, our results add several highlights for ecological care literature: first, we found spatial logics in
575 farming care. Indeed, different areas in the vineyard deserve different environmental attentions: for
576 instance, plots are important for vine, while edges are particularly important for biodiversity (as
577 confirmed by scientific ecological surveys, see Franin and Barić, 2016 and Froidevaux et al., 2017).

578 Secondly, our work highlights the complexity of the specific biodiversity care for farmers, in a context of
579 increasing double injunction of producing food for human consumption and protecting biodiversity. As
580 we showed, biodiversity is generally not at the core of farming priorities. Still, it is present despite other
581 environmental types of preoccupations, and might be something positive for vine (see Biodiv'eau). We
582 therefore propose here biodiversity conservation to be of interest for winegrowers, for the two
583 following reasons: because useful biodiversity may help the vine production, but also because
584 winegrowers feel concerned about biodiversity loss. As such, we confirmed, as proposed more widely by
585 Chan et al. (2016), that the relationship of farmers with nonhumans is not only binary (intrinsic vs.
586 instrumental value). We also propose to rely these results to the notion of "interest" defined by the
587 philosopher E. Hache (2011). For this author, interest is not strictly utilitarianism but refers to a relation
588 established both for oneself (utilitarianism, instrumental value) and for others (altruism, intrinsic value).

589 Being interested in nonhumans highlights existing complex relations between humans and nonhumans.
590 We therefore propose here biodiversity conservation to be of interest for winegrowers, because useful
591 biodiversity may help their vine production, and because winegrowers feel also concerned about
592 biodiversity loss. As such, we also confirmed, as proposed by Chan et al. (2016), that the relationship of
593 farmers with nonhumans is not only binary (intrinsic vs. instrumental value). More studies are needed
594 to explore more thoroughly the specificities of relational values in people working with nature and
595 biodiversity. More studies are needed to explore more thoroughly the specificities of relational values
596 and interests in people working with nature and biodiversity.

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

614
615 *5.2. Caring for vine and for the environment is being transformed with time*

616
617 We showed that winegrowers can change the way they care for their vines with time, generally after
618 getting used to observing their plots. This changing care comes generally through a decreasing
619 systematic control of pests and diseases, making the winegrowers free of practice standardization that is
620 at the core of the modern agriculture paradigm. In other words, farmers are used to caring for their
621 vines (by trying to protect it), but they can transform how they care for them, especially with less
622 systematic control (Stuart, 2008).

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

640 The farming transformations that we highlighted are gradually situated between the modern agriculture
641 frame and the ecologization of practices, i.e. processes of farming transformation toward more and
642 more environmental consideration (see Lamine, 2017). On one hand, some winegrowers still struggle
643 and control weed and pests with a main focus on useful biodiversity; as a practice change, they mainly
644 reduce or stop use of a part of the chemicals they use (Goulet and Vinck, 2012 define it as "removal
645 innovations"), but they keep conventional farming systems (see also the weak ecologization of
646 agriculture, Horling and Marsden, 2011). On the other hand, some winegrowers develop local
647 economies and social links and choose to prevent and care with natural preparations or to co-operate
648 with nonhumans within the socio-ecosystems (see also the strong ecologization of agriculture, Horling
649 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

676 beyond the theoretical opposition between intrinsic and instrumental values towards nature (Chan et al.,
 677 2016). Farmers can simultaneously produce food and be attentive to nonhumans. (Bellacasa, 2017).
 678 On the other hand, our study highlights the role of networks for biodiversity conservation. Indeed,
 679 farming transformations ask for necessary resources. When it comes to knowledge, social resources are
 680 crucial. This is why farmer networks, among other elements, are decisive for agroecological transitions,
 681 since they contribute to developing farmers' means in order to transform their farming systems. Still, we
 682 found that farmer networks (and related environmental programs) promote different visions of farming
 683 ecologization (Horling and Marsden, 2011). More research is needed regarding the role of such
 684 networks for agroecology transitions at different scales, with a focus on the types of relationships with
 685 nonhumans they promote, the type of knowledge they foster and how they contribute to biodiversity
 686 conservation.

687

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