Is the Current Educational Landscape Suited for Agroecology?

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Abstract: Agroecological agriculture strives for an overall decreased dependency on external resources, by following a systemic approach where ecological and socio-economic aspects of a farm are considered strongly interconnected. As such, it is increasingly recognized as an alternative for more conventional farming systems. However, such an approach also requires the development of specific competencies in farmers, requiring specific education and/or training. The present research assesses both the explicit, i.e. the actual incorporation of agroecology and alternative farming systems in education, and implicit, i.e. through attention for educational methods in support of agroecology, inclusion of agroecology. We thereby focus on the formal and non-formal educational landscape for (future) farmers, for the case of Flanders. We could discern several influencing factors, at the level of society, institution (school or training center and classroom), but further analysis and structuring of our results according to these 3 levels, is needed to better grasp the most important factors and to identify opportunities for improvement.

Key words: agroecology, alternative farming systems, formal education, non-formal education, competencies, farmer

Introduction

The post-war agricultural and food system in industrialized countries has been built around the productivity paradigm. This has ensured the production of sufficient food, available at low prices. However, this system has led to an increasing deterioration of both the natural and social environment in which it resides (Gliesmann, 1998). Decreasing soil fertility, poor water quality, and an increasingly weak position for the farmer within this system, are but a few examples. To counter or at least minimize these negative side-effects, research has often focused on resource efficiency, developing technologies and innovations that strive for a more efficient use of external resources. Agroecology aims to provide an alternative to this approach (Gliesmann, 1998). The concept originates back to the early 20th century (Klages, 1928), but was picked up again in the 1960's – 1970's by ecologist movements, partly in response to the adverse effects of the so-called 'Green Revolution', to analyze agriculture within the broader agro-ecosystem. In the last decades, it has evolved into a scientific discipline in its own right, aiming to (re-) integrate natural and social processes, building on systems thinking and a transdisciplinary research approach. In short, agroecological innovation strives for a more sustainable agricultural and food system, addressing both the ecological and socio-economic challenges at the same time while building on a holistic vision on this system (Silici, 2014).

To implement this knowledge intensive agroecological approach in the day-to-day farming practices, there are increased needs towards the development of and access to different types of knowledge, skills and attitudes. Related to these needs, the question is whether the current educational landscape is suited to "create" such agroecological (future) farmers.

In the context of a research project 'Agroecology as a leverage for education in sustainable agri- and horticulture', we assessed the explicit, i.e. through the actual use of the concept of agroecology, and the implicit, i.e. through attention for agroecological principles and the development of agroecological competencies, incorporation of agroecology in the educational

landscape for the case of Flanders (Belgium). The educational landscape is very diverse and shaped by formal, non-formal and informal education. Formal education is defined as school-based education. This type of education is generally clearly structured and teacher-led, motivation for participation is more extrinsic, and learning is evaluated at different points in time. Non-formal education is also based within institutions, but outside of school. In contrast to formal education, motivations for participation are generally more intrinsic, and learning is not always evaluated. Finally, informal education is ever-present. It results from interaction with colleagues, family, friends, media, etc… It is not structured, not teacher-led, the motivation for learning is intrinsic, and learning is not evaluated (Eshach, 2007). This paper focuses on the results for both formal and non-formal education.

In the following section we present our analytical framework, describing the different definitions, principles and competencies, associated with agroecology. This is followed by a description of the data collection and analysis. Results are structured in two main sections, guided by the analytical framework. First, we focus on educational methods in support of agroecology, i.e. i) methods supporting interdisciplinarity or systems thinking, ii) methods supporting experiential learning, and iii) evaluation methods in support of reflection. Second, we direct our attention to the incorporation of alternative farming systems and agroecology. We conclude our paper with a brief discussion and conclusion section.

Analytical framework

Defining agroecology?

Rather than being a clearly definable term, agroecology is a guiding concept (Stassart et al., 2012). Over time, the definition of this concept has gradually changed, in relation with evolving agroecological practices and research, and increasing insights into the complexity of the broader food system.

Following a first, sensu stricto, definition, agroecology is "the application of ecological concepts and principles to the design and management of sustainable agroecosystems" (p.13 in Gliessman, 1998). This definition is closely linked to the agricultural production system, striving to consider the totality of this system in relation to nature. In this respect, agroecology has the ambition to develop knowledge and practices to enable a more sustainable agricultural system (Stassart et al., 2012). Agroecology focuses strongly on a holistic vision, and stresses the importance of traditional and local farming systems (Silici, 2014).

Over the years, the scope has expanded to include the entire food system, resulting in a second definition, i.e. agroecology is "the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions" (Francis et al., 2003). These definitions broaden the field of agroecology, to bridge the production dimension with the dimension of the food chain and consumption. This broader definition explicitly calls for contributions from a wide range of scientific disciplines, including sociology, anthropology, environmental sciences, ethics and economics (Francis et al., 2013), allowing to integrate socio-economic and political dimensions of the food system (Stassart et al., 2012).

Finally, next to being considered as a scientific discipline, agroecology can also be considered as a set of agricultural practices, or can be associated with social movements (Wezel et al., 2009). This has led to a third definition, in which agroecology is defined as a common concept for action between science, agricultural practice and social movements (Stassart et al., 2012). The interaction between science and society is crucial in that respect.

From definitions to principles

To better grasp the complexity of the concept, several authors have developed agroecological principles, to guide research and education. Altieri (1995) was the first to define 5, now historical, ecological principles of agroecology which reflect the sensu stricto definition. These have been complemented over the years, to also account for the methodological and socio-economic aspects associated with agroecology (Stassart et al., 2012; Dumont et al., 2016). For the purpose of our analysis and based on the aforementioned literature, we defined 6 ecological principles, 4 socio-economic principles, and 2 basic, overarching principles (Table 1). The principles were slightly re-phrased during the data collection process to suit the education level of the students. Especially in the case of the secondary school level students, we had to explain and rephrase the more complex principles.

Table 1: Agroecological principles

Ecological	Recycle biomass, optimize nutrient availability, and ensure balanced nutrient flows
	Enable favorable soil conditions for plant growth, by good management of the soil organic matter, by stimulating soil biotic activity, and by minimizing the use of petrochemical products (chemical fertilizers, pesticides, fossil fuels).
	Minimize losses due to flows of solar radiation, air and water by way of microclimate management, water harvesting and soil management through increased soil cover.
	Strive for species and genetic diversification of the agroecosystem in time and space.
	Enhance beneficial biological interactions and synergisms among agrobiodiversity components thus resulting in the promotion of key ecological processes and services.
	Use agro-biodiversity to re-design agricultural production systems, to ensure resilient and sustainable farms, and autonomous farmers.
Socio-economic	Strive for more financial independence and control over economic and technical decisions for farmers (e.g. decreased dependence on suppliers by decreasing external input use).
	Appreciate diverse forms of knowledge, including local, traditional and practical knowledge, both at the time of problem identification and during the process of finding solutions
	The food system contributes to rural development, and the maintenance of the rural network. Farmers form local partnerships/networks with consumers, producers and processors.
	Farmers should be considered an equal partner within the food system, and should strive for a higher level of autonomy in relation to the more dominant players in the (world) market.
Basic	Use systems thinking: zoom subsequently in and out on the different system components, and recognize the relation between the different components. This means to think analytically and holistically, at alternating moments, to make judgements on the short and long term consequences of decisions, and to take the carrying capacity of systems into account.
	Principles should be regarded and applied simultaneously, not separately.

Competencies for agroecology

Education in agroecology needs to develop the competencies in farmers, which are necessary for designing, managing and evaluating new configurations within the food system, for visioning, and for anticipating on the impact of new systems and future sustainability challenges (Francis, 2004). A competency can in this context be defined as the ability to apply knowledge, skills and attitudes in an integrated manner, to perform certain activities (Valcke, 2005). Developing these competencies fits within a life-long learning process.

Several literature sources describe competencies for sustainable development (e.g. Rieckmann, 2012; Roorda, 2010), and more specifically, agroecology (e.g. Lieblein et al., 2004; Francis et al., 2016). Lieblein et al. (2012) have defined 5 competencies, i.e. deep reflection, rich observation, creative visioning, responsible participation and dialogue-based communication. These competencies are most often defined from a (university-level) student's or educators' perspective, and discuss how they should be trained to become 'agents of change'.

We build on the 6 key competencies for an agroecological farmer to successfully realize an agroecological approach at farm level, i.e. to think and act with a systems perspective, commitment, observation and creativity, critical reflection, emancipation and autonomy, and social openness (Debruyne et al., 2016). Associated with these 6 competencies, we also propose a list of necessary knowledge, skills and attitudes (Table 2).

Table 2: Knowledge, skills, attitudes associated with the 6 key competencies

Knowledge	Skills	Attitudes
General knowledge on different components of the farming and food system, technical know-how, systems knowledge, actor knowledge, methodological knowledge	Holistic thinking, analytical thinking, responsibility, communicative, eager to learn, critical thinking, visioning, decisive, networking, creative, self-knowledge, empathetic	Environmentally aware, resilient, open, flexible, respectful, assertive, courageous

Education on agroecology

Education on agroecology should thus not only focus on providing specific knowledge on the guiding principles, but rather should be aimed at developing the aforementioned competencies.

Various shortcomings have been identified in relation to the current agricultural education, including a strong focus on large-scale, industrialized farming, with little attention for alternative farming systems, and the importance of this diversity, and the fact that it is often founded on a mechanistic world view, where problems are addressed based on predefined, clear-cut answers provided by the teachers to the students (Eksvärd et al., 2014; Francis, 2004). However, based on the definition and the principles of agroecology, several aspects can be identified that should be a part of education on agroecology. Interdisciplinarity, a systems approach, and the framing of the farming system within the wider food system are crucial elements in this respect (Francis, 2004; Francis, 2011; Hilimire, 2014).

Developing such competencies also requires specific teaching or educational methods, requiring a good balance between experience, theory, and the acquisition of practical skills. Education and learning should evolve from a theory-centred approach, to an action-oriented approach, where both students and teachers are embedded in the context of farming and farming communities (Lieblein et al., 2004; Lieblein et al., 2015; Hilimire et al., 2014). More

space should be created for specific problem-solving activities, case studies, project work and/or internships, taking students and teachers out of their 'school' context, and into the 'field'. Contacts with the different actors within the food system should be encouraged. Such approaches should create more opportunities for experiential learning (Kolb, 1984) or action learning (Revans, 1998). In this context, we also want to focus on evaluation, which again should not be solely based on acquiring and reproducing knowledge, but rather evaluation methods should allow for self-evaluation, reflection, peer assessment, etc. (Sluijsmans, 2008; Lambrechts et al., 2009; in Lambrechts, 2012).

Methodology

Data was collected in two consecutive steps. First, a survey was developed and sent to all (n=24) agricultural secondary schools, all (n=8) agricultural higher education providers and 24 non-formal agricultural training centers in Flanders (February-March 2016). We obtained 71 (50 completed) responses from 15 secondary schools, 51 (37 completed) responses from 8 higher education providers and 29 (20 completed) responses from non-formal agricultural training centers (Triste et al., 2016). The survey was structured in two main parts. A first part was addressed at teachers/trainers, with six sections, i.e. (i) general questions on the respondent, (ii) educational tools and methods applied in class, (iii) evaluation methods, (iv) course content, (v) the respondent's vision on alternative farming systems, and (vi) the respondent's knowledge and vision on agroecology. In parts (ii) through (iv), we probed for the implicit presence of agroecology in the respondent's courses, by asking questions on teaching methods, sources of course material, teaching approach, interdisciplinary teaching, evaluation methods, and course content. In part (vi) we explicitly probed for their familiarity with agroecology. The second part was addressed at the managing board (e.g. school principal, program coordinator) of the institution, with three main sections, i.e. (i) general questions on the agricultural curriculum, (ii) vision within the institution on alternative farming systems, and (iii) the respondent's knowledge and vision on agroecology. We performed descriptive statistics using Microsoft Excel.

Second, we organized site visits to a selected set of schools and training centers, for a more thorough analysis. We used the survey to guide our selection, and used 3 selection criteria, i.e. i) alternative farming/production systems are included in the current vision on agricultural education of the institution and part of the agricultural curriculum, ii) teachers are acquainted with and integrate agroecology in the courses to some extent, and iii) teachers indicate that a willingness to work more around agroecology. We selected 9 institutions for site visits, i.e. 3 secondary agricultural schools, 2 Professional Bachelor programs, 2 non-formal education centers (visited in May-June 2016), and 2 Master programs (visited in Oct-Dec 2016). Site visits consisted of (i) an interview with an educational programme coordinator or technical director, (ii) a focus group on the agroecological principles with students and teachers/trainers, and (iii) a workshop on the 6 key competencies for an agroecological farmer aimed at students, although in some cases some teachers also participated. The approach differed somewhat for one non-formal education training center. Rather than the single site visit, we were allowed to follow some practical classes, to document the teaching approach, and were invited to attend the students' presentations on their graduation project. Four students were also willing to participate in a focus group/workshop on the agroecological principles and competencies.

Finally, our preliminary findings were presented and discussed during a workshop for secondary agricultural school teachers (52 teachers and teaching coordinators from 14

Flemish secondary schools), in the context of a seminar on organic farming and agroecology in secondary schools.

Interviews, focus group and workshop discussions were recorded. Interviews were transcribed, and extended reports on the focus groups and workshops were drafted after each site visit. Interview transcripts, focus group and workshop meeting reports were coded and analyzed in NVivo11. Data, methods and researcher triangulation was reached by gathering data from diverse actors (managing directors, teachers, students, …), using different methods for data gathering (interviews, survey, focus group and workshops), and performing the analysis with 2 researchers (Kimchi, 1991).

Results

Educational methods

Methods supporting interdisciplinarity or systems thinking

In the survey this was assessed by question 1 (Table 3). In some cases, an effort is made to make students aware of the link between the different courses, reflecting the different components of the same system. However, this effort is in most cases minimal, by simply referring to another course and can hardly be interpreted as interdisciplinarity or systems thinking, particularly at the secondary school level. This result was confirmed during the site visits. For secondary schools in particular, there is criticism on the overarching educational system and policy, where education is structured in specific courses, with very little overlap in-between. This division leads to a disjointed, rather than an integrated, vision on the complex agricultural and food system. Several secondary school teachers also indicated that they believe the concept of systems thinking is too complex for the secondary school level students. In contrast, university level students did indicate there was sufficient attention for systems thinking.

Methods supporting experiential learning

Respondents to the survey could indicate the frequency with which they used a set of 14 teaching methods (e.g. lecturing from a textbook, demonstrations, internships, guest teachers, group discussions, practical courses, etc). Although the teaching methods do not necessarily reflect the degree of experiential learning that is involved (e.g. practical courses can be construed very differently), they do offer a glimpse on the balance between theoretical and more practical courses. Overall, the survey results indicated an imbalance in favor of more theory-based teaching methods, with lecturing being the most frequent activity, indicated on a daily basis. Practical courses, demonstrations, group discussions take up an important second place, with the majority of respondents indicating that this is done on a weekly (for secondary education) or frequent (for higher and non-formal education) basis. Methods like group work, excursions, field work, projects or internships are not uncommon, but are much less frequent, and are rather organized on a quarterly or even yearly basis (secondary schools). In spite of this, students indicated during the site visits that the more practice-based teaching methods were perceived as highly educational. For instance, projects and individual/groups tasks force them to go out, find information for themselves, and reflect on the value of the information they find. Interesting examples in this respect can be found at university level, in so-called "integrated projects", where students have the opportunity to study a specific case from different angles, using different scientific disciplines.

Another issue in this respect is the coordination between practice- and theory-oriented courses. Schools and training centers are responsible for structuring school curricula and different courses in, often quite strict, course schedules. Constructing these course schedules is complex, due to the often large range of studies available within a single school or training center, further complicated by a combination of elective and required courses. Theory- and practice-oriented courses in the same subject are considered as separate courses and as a result are often not linked to each other. This is especially the case for secondary schools. Some teachers suggest that more time dedicated to projects, where different courses and teachers collaborate on a single subject or topic, embedded in the course schedules could benefit the situation, in line with the aforementioned integrated projects at universities. However, this requires willingness, dialogue and innovation at the level of the teachers and direction and/or course coordinators, and some claim that the timing for this is not right, with mindsets not yet open or mature enough to realize this.

Finally, there is the issue of equipment and infrastructure. In some cases, schools can benefit of the possibilities an on-site farm offers for the integration of more practice-based courses during education. Schools or training centers without a farm, can benefit from cooperation with existing research farms. However, funds to achieve this, are not always available.

Table 3: Survey results for educational methods

	Secondary education	Higher education	Non-formal education
Q1. To what extent do your courses reach beyond your specific subject or expertise (multiple answers possible)?			
Never	2% (n=62)	6% (n=36)	9% (n=11)
I sometimes refer to the content of other specific courses	53%	69%	73%
I organize joint excursions with other teachers, but don't refer to their specific courses	23%	19%	9%
I develop a course together with another teacher/other teachers	23%	39%	36%
Q2. Who evaluates the students?			
I evaluate the students: - Always - Mostly - Regularly - Infrequently - Never	(n=45) 44% 49% 7% 0 0	(n=37) 78% 8% 5% 5% 3%	(n=9) 22% 33% 44% 0 0
I (or my assistants) evaluate together with the student by reflecting on what is learned - Always - Mostly - Regularly - Infrequently - Never	(n=49) 12% 35% 35% 14% 4%	(n=28) 4% 11% 7% 14% 64%	(n=9) 22% 56% 0 11% 11%
The student evaluates him-/herself - Always - Mostly - Regularly - Infrequently - Never	(n=50) 2% 18% 52% 20% 8%	(n=31) 0 23% 32% 13% 32%	(n=7) 0 14% 29% 29% 29%

Students evaluate each other (peer evaluation) - Always - Mostly - Regularly - Infrequently - Never	(n=50) 2% 2% 52% 24% 20%	(n=28) 0 21% 28% 21% 28%	(n=7) 0 0 14% 43% 43%
Q3a. Are evaluation results discussed with the students?			
Always	NA	18% (n=34)	60% (n=10)
Never	NA	3%	0
Sometimes	NA	47%	20%
If requested by the student	NA	38%	20%
Q3b. Are evaluation results discussed with the students?			
Yes, overall results are discussed in the classroom	24% (n=45)	NA	NA
Yes, overall results are discussed with the student individually	27%	NA	NA
Yes, I discuss each question in the classroom	31%	NA	NA
Yes, I discuss each question with the student individually	4%	NA	NA
No	4%	NA	NA
Other, please specify: - This depends on the result and content - We have an online tool for evaluation, where students can follow-up their own profile (skills, attitudes, etc).	 4% 4%	NA	NA

Evaluation methods supporting reflective learning

The survey contained two main questions pertaining to evaluation methods (Questions 2, 3a and 3b, Table 3). The results indicate that the dominant evaluation method is still evaluation done by the teacher, across the different levels. Concerning self-evaluation and peer evaluation, it appears that secondary schools have the most attention for this, with over 50% of the respondents indicating that this occurs on a regular basis (Q2, Table 3). When it comes to discussing evaluation results, it appears that results are more commonly discussed with the students at the non-formal level, when compared to higher education (Q3a, Table 3). A possible explanation for this may be explained by the larger student groups in higher education, although this needs to be confirmed. At the secondary school level (Q3b, Table 3), discussion of the results with the students is quite common, although evaluation methods differ, and more detailed discussion, i.e. all results/questions discussed with the individual student, is less common.

Integration of alternative farming systems/agroecology

The survey at the level of the managing board revealed that attention for alternative farming systems is not a standard item in the vision of the organization. Respondents who confirmed this integration ranged from 62 % (n=13) in secondary education to 42 % (n=12) in higher and non-formal education. Nevertheless, when looking at the responses from the teachers, this is not always reflected in the courses (Q1, Table 4). There we can see that, despite the higher level of incorporation in the school's vision, alternative farming systems are least included at the secondary school level. Also, it is merely mentioned in the context of a certain lesson or included as a single chapter within another course and thus, it is seldom done thoroughly. Respondents were also asked with which alternative farming systems, e.g. organic farming, agroforestry, permaculture, etc, they were best acquainted, of which organic farming was the best known system, in all levels of education. When looking more specifically towards

agroecology, we found that familiarity with agroecology as a concept is relatively limited (Q2, Table 4). Teachers in secondary education appear less familiar with agroecology than teachers in higher education or non-formal education. However, the major part of those who are familiar with agroecology, do mention it in their courses (Q3, Table 4). Furthermore, particularly in secondary education, they would like to teach more about it (Q4, Table 4). Finally, the survey also offered us first insights on the possible barriers for the implementation of agroecology (Q5, Table 4), e.g. the lack of time or room to indulge in the concept, or skepticism of fellow teachers and students.

Table 4: Survey results – integration of alternative farming systems/agroecology

	Secondary education	**Higher education**	**Non-formal education**
Q1. Are alternative farming systems included in your course(s)?			
No	23% (n=48)	18% (n=34)	20% (n=10)
Yes, I mention them briefly in my course	44%	50%	40%
Yes, they are included as a separate item (e.g. a single chapter in the course)	27%	9%	20%
Yes, they are included throughout the course (e.g. discussed in different chapters)	4%	21%	30%
Yes, I have a course dedicated exclusively to alternative farming systems	2%	3%	40%
Q2. Are you acquainted with the concept of agroecology?			
Yes	37% (n=49)	62% (n=34)	50% (n=10)
No	63%	38%	50%
Q3. Is agroecology included in your course(s)?			
No	13% (n=18)	19% (n=21)	20% (n =10)
Yes, I mention it briefly in my course	63%	38%	0%
Yes, it is included as a separate item (e.g. a single chapter in the course)	19%	14%	0%
Yes, it is included throughout the course (e.g. discussed in different chapters)	6%	29%	60%
Yes, I have a course dedicated exclusively to alternative farming systems[1]	0	0	80%
Q4. Would you like to teach more about agroecology?			
Yes	72% (n=18)	55% (n=20)	25% (n=4)
No	28%	45%	75%
Q5. What are barriers for teachers to incorporate agroecology in their courses?			
Too little time or room to indulge in agroecology	29% (n=18)	40% (n=20)	20% (n=5)
Little knowledge about agroecology	24% (n=18)	15% (n=20)	0% (n=5)
Too little course material available	24% (n=18)	15% (n=20)	0% (n=5)
Too rigid official final learning objectives	10% (n=18)	N.A.	N.A.
The school vision does not allow it	5% (n=18)	0% (n=20)	20% (n=5)
Other (according to the number of citations)	- Skepticism of fellow teachers regarding the subject; - Students are not receptive towards the subject (mainly because of family norms and values); - This should be taught after secondary		

[1] There was an error in the choice options for this question. The choice option should have been referring to agroecology rather than alternative farming systems. The main question did refer to agroecology, but we cannot draw any valid conclusions from this.

	school (e.g. in specialized courses and high schools); - Not clear how to integrate it in technical courses; - Agroecology does not fit with the subject of my courses.

Survey results were largely confirmed during the consecutive site visits, and offered us a clearer view on the actual incorporation of agroecology and some of the existing barriers. On the level of the agroecological principles, it appears that the ecological principles are more incorporated in the curricula than the socio-economic principles. They do appear rather fragmented throughout courses, and thus, there seems relatively little attention for the two basic agroecological principles, systems thinking and transdisciplinarity. Universities are the exception, where several students indicated that there was sufficient attention for all principles, and the relationship or interaction between the different principles, grasping the complexity of the food system.

The vision, knowledge and motivation of the individual teacher strongly determines the actual incorporation of agroecology in lessons. During our site visits, we frequently encountered interested and enthusiastic individuals, but these often felt isolated, in particular in secondary schools. Teachers with an interest in agroecology often indicated that this did not fit within the vision and mentality of school management and other teachers. The skepticism of certain teachers appeared to be fueled by current trends and evolutions in agriculture, and the rather conservative attitude within the farming sector towards more radical changes in their production system Also, due to the complexity of the concept of agroecology, even interested teachers often struggle to incorporate it in their lessons. It also was mentioned that it proves hard to attract teachers with a good profile, i.e. knowledge on agroecological principles, familiar with agriculture and agricultural practices, independent, open-minded, reflexive, etc.

A lot of discussion centered around the pre-defined learning goals. This barrier was most explicitly mentioned at the secondary school level. Some teachers see these learning goals as a hurdle, and claim they prevent them from focusing on agroecology or other alternative farming systems. However, others claim that the learning goals allow enough room for flexibility and interpretation. Teachers could benefit from good examples, on how to bring agroecology into the classroom, while complying with learning goals at the same time.

Teachers also often mention time constraints as a reason to focus only on the most conventional farming systems in their lessons. Secondary school teachers state that there is too little room for agriculture-specific courses within the curriculum. The first four years of secondary school are more focused on a general education, with a broad scope. Only in the two final years there is more room for agriculture-specific lessons and courses, but this is deemed insufficient. Time was also an issue for the providers of non-formal education, who state that a large part of the hours available have to go to lessons on legislative requirements, leaving too little time for more in-depth lessons on various agricultural practices. At university level, time is considered as a limiting factor for organizing farm visits or other excursions. They do however try to circumvent this by assignments or projects where students have to visit farms on their own.

Finally, limited availability of suitable teaching materials for agroecology (and agriculture in general) is considered a hurdle, in particular teaching materials specifically adapted for a secondary school level. These materials should also include agroecological or alternative farm examples, with detailed information on the farm’s economic performance. This also links

back to the aforementioned importance of experiential learning. Visits to agroecological farms, or alternatively managed plots on the school farm (if available) could serve as inspirational examples to support critical thinking in students. Schools or training centers without a farm, can benefit from cooperation with existing research farms. However, funds to achieve this, are not always available. Some schools have converted a (small) part of the school farm to organic farming, and there was one example where a school has set up a short-chain distribution system for the end-products. Sharing their experiences, including economic results, with other schools, may trigger others.

Discussion and conclusion

These results offer a first impression on the situation regarding the incorporation of agroecology in Flanders. Two main reasons urge us to treat these results with some care. First, regarding the survey, we were dependent on the goodwill of secretaries and directors of the different institutes. Since the number in responses varied greatly between institutes, and since we did not receive response from all institutes, we must assume that not all teachers were reached by our survey. This also influenced our second stage of data collection, since our site visits were selected based on the survey results. We have tried to address this by presenting our results at different moments to our stakeholder audience, and in general, our results appeared to be confirmed at those times.

Our results indicate a range of influencing factors for the incorporation of agroecology in formal and non-formal education in Flanders, situated at three levels. First, there is a societal level, often reaching beyond the control of the schools and training centers. Second, is the level of the institution (school or training center), and third is the level of the classroom. Further analysis and structuring of our results according to these 3 levels, should allow us to better grasp the most important factors and to identify opportunities for improvement. Results so far indicate towards important policy recommendations, both for the educational and agricultural policy.

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