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Temperate Agroforestry Development: The Case of Québec and of France

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Abstract: This study sought to shed light on the political and organizational dynamics favoring the deployment of agroforestry in temperate environments. Development paths of agroforestry practices in Québec (Canada) and France were analyzed regarding five different issues: political status and recognition, regulation and financing, knowledge acquisition, knowledge transfer and training, development actors and implementation in the field. Scientific studies and results continue to accumulate concerning temperate agroforestry and its environmental benefits. Political recognition of the field appears to be stronger in France (and the EU), which makes state financial aid conditional upon the adoption of the practices. In Québec, only the Ministry of Agriculture provides limited support. It financially assists research at a moderate level, as well as the installation and maintenance of trees by participating farmers to perform specific functions, i.e., erosion control, water quality, and biodiversity. A large number of actors are active in France, where efforts are being made to improve consultation and to reduce redundancy. Stakeholders in Québec are linked to the broader agri-environment field and act partially through agroforestry, according to varying degrees of competency, creating a disparity between regions. Recognition at the highest level, i.e., training for councillors and advisors, greater flexibility in obtaining assistance, inclusion of a greater diversity of systems, and a structure that ensures promotion and consultation, would favour the further development of agroforestry in the industrialized nations of the temperate zone.

Keywords: temperate agroforestry; silvoarable systems; development strategy; recognition; France; Québec

1. Introduction

Adoption of agroforestry practices in areas under cultivation is notably the result of various policy development paths, support programs, and organizations. These paths are currently influenced by an awareness of impacts incurred by the last agricultural revolution (the 3rd or Green Revolution of the 20th Century). While this revolution likely increased food sovereignty within countries of the temperate zone, particularly in developed nations [1], it was also strongly dictated by financial

and industrial interests in a more globalized context. Intensification of agricultural production (i.e., industrial agriculture) has caused the disappearance of ancestral practices and know-how. As a result, biodiversity conditions in many agricultural landscapes have become a cause for concern [2]. For one, impoverishment of the biota and the ecosystem services [3–7] that they supply (for free) has provided impetus for driving the re-emergence of past practices in the different forms of agroforestry being proposed today [8]. Long perceived as an obstacle to agricultural productivity, woody vegetation (trees and shrubs) is now attracting greater interest as a means of mitigating the adverse effects that are imposed by agricultural intensification [9]. The agroforestry systems that are most likely to develop in the intensive agricultural setting of temperate zone countries can be grouped into two large families. These groupings depend upon whether the trees or shrubs are found (i) at the edges of fields (agroforestry hedges) or (ii) they are located within the fields (intraparcellar systems). In the first group, hedges are designed for different functions: to protect farmland, crops, livestock, and infrastructure from wind and its consequences; to reduce the spread of odours around livestock buildings; to limit pesticide drift; and on the banks of watercourses, hedges preserve the quality of the water and the aquatic habitat, as well as limiting soil erosion. In the second group, trees and shrubs are found within the agricultural plot. It involves increased interactions between the components that are put to good use with a view to diversifying production or increasing environmental or societal benefits [10].

This new attention and attitudinal shift towards agroforestry in temperate environments has been supported by scientific work for more than thirty years [9,11–14]. These research results have influenced various initiatives at different decision-making levels within individual nations [12,13,15]. In temperate agricultural environments, agroforestry offers great potential for conserving and restoring biodiversity [16], reducing nonpoint source pollution [17,18], enhancing soil microbial resilience to water stress [19], and combating climate change [20,21]. Trees further contribute to enriching soil organic matter pools [22] and reducing soil erosion [23]. Well-designed agroforestry systems contribute to increasing agricultural productivity [24–26] and provide greater resource- and land-use efficiency [27]. Agroforestry consequently would address many of the problems that have beset modern agricultural practices; indeed, different mechanisms have been set in action to promote agroforestry adoption [28].

This article discusses the political and organizational dynamics favouring deployment of agroforestry in temperate environments. It provides an update of the main actions that have been implemented [29], together with knowledge that has been acquired more recently in France and Québec (Canada). Insights that have been gained from this new information make it possible to specify the initiatives that could be put in place, thereby inspiring efforts in other countries and organizations, while serving as a reference for future measurements of levels of agroforestry adoption associated with the evolution of political and organizational dynamics. By comparing the specific cases of Québec and France, we also wish to not only highlight common developmental paths and barriers, but also take the best out of these contexts to inspire stakeholders on both sides of the Atlantic Ocean.

2. Methods

2.1. Factors Influencing Agroforestry Development Paths

Several studies have scrutinized the social factors influencing agroforestry adoption and deployment at regional or national levels in various temperate contexts, such as England [30], Belgium [31,32], Italy [33], Switzerland [33], Germany [34], Europe [35], the United States [36], and Québec [37]. These studies have been grounded in contrasting frameworks, in terms of agricultural innovation systems [31] to agricultural multifunctionality [36] and social perceptions [30,32–35,37,38]. Yet, these studies globally converged on the main factors influencing agroforestry deployment. What stands out among these factors are the public policy environments, knowledge and transfer structures, market opportunities, farm capital (economic, natural, social), and the presence of qualified professionals or organizations that are dedicated to support and promote agroforestry in rural areas.

Drawing upon these findings and on our own experience in agroforestry development in France and Québec, data collection was started and, by an iterative process, a final set of five factors were selected to compare the two contexts. These factors were selected based upon the availability of information, their comparativeness, and their relevance in illustrating or explaining agroforestry development paths (in Supplementary materials: Table S1). The first factor was the political status and recognition of agroforestry. This factor was assessed through the definition and place that is given to agroforestry in various policy sectors, the political leadership that is exerted for its deployment, and the outcome that this recognition had on agroforestry development. The second factor related to the regulation and funding context, which assessed, through the number and nature of existing support programs, the nature of the responsible organizations (public, private, or nonprofit), the scope of the agroforestry systems that were supported, the program requirements, and, when available, the amounts granted to farmers. The third and fourth factors were knowledge acquisition and knowledge transfer, referring to the research programs, their funding sources, and the dissemination structures, respectively. The last factor was development actors and implementation in the field, referring to the education and extension environment supporting agroforestry implementation processes at the field scale, with the type of educational programs and technical training that are available, and the presence and publications of organizations that promote adoption of agroforestry practices as indicators. By focusing on a selection of factors and indicators stemming from various frameworks rather than starting from a single theoretical background, this comparative study proposes a very practical perspective on the political and organizational factors affecting agroforestry development, in alignment with previous studies conducted with this approach [39,40].

2.2. Data Collection and Analysis

Qualitative data were mainly collected through web searches on various official websites (ministries, funding agencies, agroforestry groups, training programs, etc.) between September 2019 and June 2020. Since relevance and relative importance were prioritized over exhaustivity to increase data collection efficiency, only information on the most prominent and easily accessible programs and organizations was retrieved and compiled. When appropriate, key informants (researchers, public officers, professionals, consulting groups) were asked to complete and confirm the information that was gathered. Documents and websites were read several times and the relevant information was associated with the factors and indicators to ease comparisons. Qualitative data retained focused on the main factors explaining discrepancies or similarities between France and Québec and was intended to highlight lessons that can be drawn from the French context to foster agroforestry development in Québec.

3. Results and Discussion

3.1. Political Status and Recognition

France (FR)—At the European level, agroforestry is recognized in the Common Agricultural Policy (CAP) as:

> "land-use systems and practices where woody perennials are deliberately integrated with crops and/or animals on the same parcel or land management unit without the intention to establish a remaining forest stand. The trees may be arranged as single stems, in rows, or in groups, while grazing may also take place inside parcels (silvoarable agroforestry, silvopastoralism, grazed or intercropped orchards) or on the limits between parcels (denses hedges and trees aligned in rows)" [41].

The CAP specifies that areas including 100 trees/ha or more are not considered as agroforestry systems. This definition has been judged as somewhat restrictive by the French Agroforestry Association and other agroforestry stakeholders, because the CAP definition excludes some agroforestry practices

(e.g., pasture in forest stands), while separating isolated trees, hedges, and intraparcellar systems [42]. As if "caught between a rock and a hard place", the Ministry of Agriculture and Food (In French: ministère de l'Agriculture et de l'Alimentation, MAA) adopted an ambivalent position: on the one hand, it draws upon the definition provided by the World Agroforestry Centre to recognize the critical role of all agroforestry systems for the agroecological transition in France [43] (p. 7); yet, on the other hand, public funding only is awarded to systems complying with the narrow definition of the CAP [42].

In the wake of major agricultural policy changes favouring agroecological practices, the MAA commissioned agroforestry experts in 2014 to highlight the current state of agroforestry in France and propose objectives and means of better valuating this practice. Their conclusions, which are summarized in the a report titled "Promotion of agroforestry systems" [44], led to the creation of the Agroforestry Development Plan, which was launched in December 2015. This five-year plan (2015–2020) aimed to promote and sustainably manage all agroforestry systems, from hedges to intraparcellar systems, in the nation [43]. Its objectives were to improve knowledge regarding French agroforestry systems and their functioning; to improve the legal framework and strengthen their financial support; to develop advice, training, and promotion of the practice; to improve the valuation of agroforestry production; and, finally, to carry out the promotion and dissemination of agroforestry internationally.

The Development Plan has been overseen by a steering committee, coordinated by the MAA, which consisted of 50 agroforestry professionals from all regions of France. Three projects emerged from the Plan:

- The Agroforestry Mixed Technology Network (RMT—Agroforesteries, Réseau Mixte Technologique Agroforesteries), which meets once a year, during the day that is referred to as "Crossing Perspectives" (in French: Croisons les Regards), to discuss progress of the work.
- REUNIR AF (2018–2021)—This project is financed by Europe and the MAA and aims to structure the network of agroforestry operators, support public policies, and set up a coordination mechanism for national competition in agroforestry practices. The project is led by the French Association of Country Trees and Agroforestry (AFAC—Agroforesteries, l'Association française des arbres champêtres et agroforesteries) and the Permanent Assembly of Chambers of Agriculture (APCA, Assemblée permanente des chambres d'agriculture).
- Cross-thematic action project (ATT, Action thématique Transversale)—This program supports various sectors and production, and disseminates innovations in agroforestry. Its goal is to produce references, tools, and data that improve or increase their inter-operability. The project is led by APCA and AFAC—Agroforesteries, with occasional support from French Agroforestry Association (AFAF, Association française d'agroforesterie).

In France, the next agroforestry development plan should include regional particularities and existing measures financed through the 2nd pillar of the CAP that take into account regional priorities [45].

To a lesser extent, the French Ministry of Ecological and United Transition (MTES, Ministère de la Transition écologique et solidaire) recognizes the role of agroforestry systems to preserve and enhance water quality by financing, through the Regional Water Agencies (Agences régionales de l'eau), the implementation of agroforestry systems [46].

Closely linked to this increased recognition by politicians and policymakers, France hosted the 4th World Agroforestry Congress (May 2019) in Montpellier. The theme of this congress was "Strengthening the links between science, society and public policies".

Québec (QC)—In Québec, agroforestry is recognized as an agri-environmental practice by the Ministry of Agriculture, Fisheries and Food (In French: Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec, MAPAQ). Unlike the French system, MAPAQ provides no clear definition of agroforestry. However, the Ministry defines each agroforestry system that is eligible for public support under its agri-environmental program, (entitled "Prime-Vert"), co-financed by the federal Canadian government. These systems are windbreaks, broadened riparian buffer strips, and wooded strips or

patches that promote biodiversity on farmlands. Intraplot agroforestry, such as silvoarable, tree-based intercropping (TBI) or silvopastoral systems, are not considered as agri-environmental practices by the Ministry. The forestry sector does not recognize agroforestry in its policies but acknowledges and supervises the role of forest engineers in the management of trees within agroforestry systems. Agroforestry could fall under other policy sectors (forests, rural affairs, environment), but the former have been neither formally named nor explicitly excluded as agroforestry practices in their policies and strategies.

In Québec, the development, reflections and vision of agroforestry are mainly developed by the "agroforestry committee." This group of stakeholders was formed in 2008 within the Québec Agriculture and Agri-Food Reference Centre (CRAAQ, Centre de Référence en Agriculture et Agroalimentaire du Québec), a nonprofit organization, the aim of which is the production and dissemination of knowledge over a wide range of agricultural subjects. In 2017, the CRAAQ agroforestry committee published a reflection and orientation document entitled Agroforestry for Québec [47] (in french: Une agroforesterie pour le Québec). In this document, agroforestry was defined as "an integrated system based on the intentional association of trees or shrubs to crops and/or animals, and providing economic, ecological and social benefits". This document took stock of the current state of Québec agroforestry and highlighted the mechanisms that are required to encourage this practice on the territory. Through its objectives and some of its recommendations, the report was in accord with the contents of the report written by French agroforesters in 2015 [44].

Apart from national and provincial recognition, agroforestry is gaining increased regional or departmental attention in Québec. Agroforestry is now being considered at the Regional County Municipality (MRC) level. Fifteen of the 34 MRCs in four of the most intensive and extensive agricultural regions of Québec mention agroforestry in their Agricultural Zone Development Plan (PDZA, Plan de développement de la zone agricole) [48]. These frequent references to agroforestry do not guarantee, however, an increased presence of agroforestry on the territory, but they do underscore the new interest for these systems being generated by stakeholders in the agricultural and land-development sectors.

Discussion

In light of these comparisons, public recognition of agroforestry appears far greater in France than it is in Québec. The global policy context may partly explain this difference. In 2014, a wide policy window opened for agroforestry in France as three policy streams [49] converged: (1) the unsustainability of modern agricultural practices became a policy issue; (2) politicians capitalized on environmental and agricultural issues to demonstrate their leadership; and (3) agricultural policy undertook an agroecological shift [50], in which agroforestry could fit. This context enabled agroforestry advocates, already well organized and established in various dedicated associations, to be heard by policymakers, which led to the Agroforestry Development Plan. In Québec, no deep revision of the agricultural policy was on the political agenda and, consequently, the report and policy recommendations provide by the CRAAQ Agroforestry Committee did not lead to similar results. The revision of the Prime-Vert Program in 2017, which took place at the time of the publication of the policy recommendations by the CRAAQ, opened a small window of opportunity for greater recognition of agroforestry. However, this revision was neither rooted in a new vision of agricultural policy nor driven by strong political will, the revision led to marginal changes, and most recommendations made the CRAAQ agroforestry committee were left unheard. Hence, the global policy context seems to have carried more weight than the advocacy actions taken by agroforestry stakeholders in the recognition of agroforestry in public policies.

Despite a greater recognition of agroforestry at the policy level in France, having an "Agrofosrestry Development Plan" will not make it a reality; without proper funding (the plan came with no new funds), and without clear, measurable objectives regarding agroforestry implementation, the real impact of this broader recognition of agroforestry might be lower than expected by agroforesters. At the regional level, however, the increased recognition of agroforestry could serve, in both contexts, as a

springboard for the deployment of agroforestry in the coming years, especially if flexible or adaptable public programs are implemented to meet these regional demands.

3.2. Regulation and Financing

(FR)—For countries in the European Union, agriculture is financed by the Common Agricultural Policy (CAP). Member states can further adjust the financing scheme that they will use, under conditions that are imposed by the EU. Recognized agroforestry systems that are eligible for European and national aid programs are: windbreaks less than 10 m wide, with no discontinuities greater than 5 m; groves with a surface area between 0.1 and 0.5 ha; plots on arable land or under permanent cultivation that integrate forest tree species at densities less than 100 trees/ha (isolated individuals or trees aligned in rows); and finally, scattered trees in meadows or permanent pastures. These may or may not be reasonable and sensible regulations, but perceptions vary across the member EU nations as to what constitutes standard agricultural practice and what is actually agroforestry-related innovation [51]. Consequently, specifications precisely defining agroforestry developments in French agriculture are often restrictive. However, associations and professionals recently proposed to the MAA that agroforestry plots should henceforth be fully eligible for aid under the first pillar of the Common Agricultural Policy, without any particular conditions [52].

Indeed, financial aid from CAP is divided into two pillars. The first pillar is designed to support markets and farm incomes, while the second focuses upon rural development. Both pillars support, to a certain extent, agroforestry systems. The first pillar concerns production support. The right or entitlement to basic payment is given on the basis of areas that are held by the farmer. In France, since 2006, trees form part of the eligible area, but only under certain conditions. For example, the planting density of alley cropping (intraparcellar) must be less than 100 trees/ha. Moreover, only the surface of cultivated alleys is eligible for basic payment. Hedges or shelterbelts bordering fields are recognized as part of the land parcel and, as such, may be eligible for this payment. In France, trees in agroforestry systems are linked, by definition, to the agricultural environment, ever since a ministerial circular was issued on 20 April 2010, which specifies the agricultural status of agroforestry systems [29].

Since 2015, the basic payment of the first pillar can be supplemented by a Green Payment, which encourages the uptake of agri-environmental practices. It requires, among other things, that 5% of the farm surface area be occupied by areas of ecological interest (AEIs). Agroforestry systems, isolated trees, and copses are considered AEIs, thereby indicating that the farmer is entitled to this payment. Conditions under which calculations are made are nevertheless very complex, and even inconsistent between different specifications of the first pillar. Inconsistencies do not favour the development of agroforestry because these obstacles discourage rather than stimulate the implementation of new projects [53].

The allocation of first-pillar support (both basic and green payments) is subject to compliance with "good agricultural and environmental conditions" (GAEC). Among these conditions, GAEC7 (maintenance of specific topographical features) requires the conservation of windbreaks <10 m wide and retention of all tree stands between 0.1 and 0.5 ha in area. Farmers are also prohibited from pruning hedgerows or windbreaks between 1 April and July [31] to encourage the biodiversity that is present in and among the trees. In return for compliance with this GAEC, the areas of protected topographical features become eligible for various forms of CAP aid. Farmers who comply with GAEC directives are eligible for certain second-pillar aid, especially for the establishment of agroforestry systems (Measure 8.2: aid measure for the establishment of an agroforestry system). Mosquera-Losada et al. [53] found that this measure, however, had little effect on agroforestry adoption in most regions of the European Union. They concluded that the lack of recognition of agroforestry practices in different sections of the Common Agricultural Policy substantially reduces its impact. The current Common Agricultural Policy (2015–2020) is coming to an end soon. As a result, several organizations are mobilizing to ensure and, above all, improve the inclusion of agroforestry under the next CAP (2021–2026) [54].

Second-pillar subsidies are distributed to the regions through the European Agricultural Fund for Rural Development (EAFRD). The regions choose the measures that they wish to finance with respect to their own territorial requirements, as defined in their Regional Rural Development Plans [55]. Only some specific measures from the second pillar apply to agroforestry. Measure 8.2 supports implementation of intraparcellar alley cropping agroforestry systems. Of the 22 (former) French regions (prior to the 2015 reform), twelve have invoked Measure 8.2 [56]. The average aid rate varies between 30% and 80% of the installation and maintenance costs. Payments are made in the form of an annual premium per hectare for a maximum period of five years [57]. Measure 4.4, which relates to "aid for investments linked to the achievement of agri-environmental and climate objectives" also makes it possible to finance agroforestry developments. Indeed, this measure finances the establishment of windbreaks and the preservation of heritage regional landscapes [55]. The latter include bocages, which are distinctive mixed woodland–pasture landscapes that are found in France and other parts of the northern EU. This measure can cover up to 100% of the implementation costs.

Agri-environmental and climate measures (AECM) are also measures under the second pillar, which accompany changes in agricultural practices by maintaining more sustainable traditional practices that are at risk of disappearing (mainly the conservation of hedges). As a result, some AECM measures concern agroforestry. Remuneration for these measures is based upon the incremental costs and lost revenues that are associated with maintaining or changing practices [58]. Most CAP agroforestry-supportive measures come with a high number of prescriptions that must be followed in order to be eligible for funding. These prescriptions may concern width, species, and implementation techniques, among others.

The recognition of the importance of hedges has been recently supported by creation of the "Hedges Label", which was officially launched on 4 October 2019. Its goal is to preserve hedges, while supporting the development of sustainable wooded hedge–wood sectors. This first phase benefits from financial support of about €195,000 in public subsidies. The objective is to reach 3500 labeled farmers by 2024, thereby allowing the annual production of 175,000 metric tons of labeled wood chips. The local communities, who are involved, thus wish to promote the safeguarding of 35,000 km through sustainable management according to the quality criteria of the label [59].

Apart from the aid that is related to the agricultural sector, French water agencies have funded the installation of agroforestry systems that reduce nonpoint pollution originating from agriculture. Yet, aid rates and project financing modalities can vary greatly from one water agency to another [46]. Private investors and foundations are also financing the planting of agroforestry trees. This is notably the case for the plantation program intitled "Plantons France", which is led by the Yves Rocher Foundation in partnership with AFAC—Agroforestries and numerous local agencies. Funding varies from €0.85 to €1.02 per tree. This program has been in existence for eight years and has made it possible to finance the planting of more than 3 million trees in rural areas [60].

(QC)—In general, the implementation of agroforestry systems in Québec is authorized wherever the practice of agriculture is permitted, as long as the laws, regulations, and rules of civil law prevailing in these areas are respected. Trees belong to the landowner where they have been planted, rather to the individual who planted them. The relative simplicity of the legislation reflects more of a lack of interest in agroforestry than a genuine commitment to limit the regulatory barriers that would constrain its establishment.

Access to government support for the implementation of recognized agroforestry systems (i.e., riparian buffer strips, shelterbelts, and wooded strips or patches that promote biodiversity) is conditional on compliance with certain management standards. With regard to riparian strips, farmers have a legal obligation under the "Policy for the Protection of Shorelines, Littoral Zones and Floodplains" [61], to maintain a minimum three metre-wide uncultivated strip along watercourses. Respecting this riparian buffer strip width is a mandatory condition for receiving agri-environmental assistance under the Prime-Vert program for planting trees and shrubs. To be funded, the riparian strip must be at least 5 m wide, but no funding is granted for the first two metres from the high-water

mark [48]. MAPAQ further recommends that farmers use multistrata vegetation consisting of native or naturalized trees and shrubs that are well adapted to environmental conditions [62].

To be eligible for the Prime-Vert support program, windbreak widths must be limited to a maximum three rows of trees. Spacing between rows must be between 2 and 4 m, and the application of mulch (plastic or organic) is mandatory. At maturity, tree windbreaks must be composed of at least three different genera, with no one genus exceeding 50% of the total number of trees. Invasive alien species are prohibited [62].

With the exception of the Prime-Vert program, agricultural policies have not encouraged the implementation of agroforestry systems on cultivated land. On one hand, the establishment of trees (and their maintenance) becomes a risky investment for farmers [63], given that agricultural policies (in this case, for Québec) only protect crops and livestock from climatic and economic hazards [64]. On the other hand, the economic role that agroforestry trees may play is neither recognized nor supported; felling agroforestry trees for their timber or biomass is prohibited, and planting more than 50% of a strip or hedge with species producing marketable fruit or nuts is not allowed [65].

The most important assistance program for the implementation and maintenance of agroforestry systems is Prime-Vert [48]. It is the only Québec government program that directly finances the installation and maintenance of agroforestry systems. Section 1 of the 2018–2023 plan provides direct support to agricultural businesses. Its first measure concerns sustainable agri-environmental developments that incorporate trees and shrubs, or which are conducive to fostering biodiversity. Financial assistance under the program covers 70% of eligible expenditures per project. The level of aid can reach 90% if the business is certified for organic farming, if the project results from a collective approach (group of producers), or if it is being conducted by next-generation farmers (viz., entrepreneurs under 40 years of age). The maximum financial assistance per business for the duration of the 5-year program is $CA 40,000. Currently, an individual project cannot exceed $CA 20,000 and costs of $CA 6.45 per linear metre (LM). Soil preparation, mulching, rodent protection, planting, and planning are eligible, together with maximum rates that are associated with each activity. Since 2018, the program has financed replacement of dead trees and the pruning of woody plants in windbreaks, but only where the installation was financed by the Ministry's program. The eligible expenses for pruning vary from $CA 0.50/LM to $CA 3.50/LM, depending upon the tree composition (deciduous or coniferous) and according to their size. This component of the program does not fund intraparcellar systems.

The ALUS Montérégie program [66] has been funding agroforestry projects SINCE 2016. It is the result of a partnership that was established between the Union of Agricultural Producers (UPA, Union des producteurs agricoles) from Montérégie and the program of ALUS Canada [67]. ALUS refers to Alternative Land-Use Services, which is a Canada-wide, nonprofit initiative of the W. Garfield Weston Foundation (Toronto, Ontario).

The administrative region of Montérégie is one of Québec's major centres for intensive agriculture. The ALUS program aims to support the efforts of farmers in the region who carry out developments that promote ecosystem services. It complements the assistance that is provided by MAPAQ through the latter's Prime-Vert program. ALUS Montérégie offers farmers a monetary reward that is equivalent to the average annual rental price of the agricultural area that has been converted to tree and shrub plantings for five years. Acceptable agroforestry projects are the installation of riparian strips and the planting of windbreaks and shrub hedges. Since 2016, the program has enabled to set up plantations totaling 16 ha across the region [66], which is relatively small.

The Québec Wildlife Foundation (Fondation de la Faune du Québec) offers a program to enhance biodiversity in agricultural areas at the scale of small- and medium-sized watersheds. Financial assistance covers 70% of eligible expenditures per project. Assistance is only to public or private organizations that are working in the agricultural sector (e.g., UPA federations and clubs-conseils (non-profit agronomic or environmental advisory clubs or consultancies that are unique to Québec)). Individuals and agricultural enterprises are not eligible for this program. To make the project a

reality, close cooperation is required between project leaders and the environmental or wildlife organization. Projects must also be collective and focused upon biodiversity protection. Riparian strips and windbreaks that are composed of native plants are eligible. Finally, the program does not provide funding for the monitoring or maintenance of developments, which may jeopardize the long-term viability of the projects.

Carbon sequestration through tree planting in agricultural areas is not currently a mechanism that has been integrated into the carbon market that is controlled by the Québec government, but some agroforestry development projects are associated with private funding that has been obtained for carbon offset measures (e.g., Arbre-Évolution 2020; Carbone boréal 2020).

Even though the consideration of agroforestry has continued to evolve over the past decade, the status of agroforestry trees in Québec is still shared between the forestry and agricultural environments. In October 2018, an agreement on agroforestry was reached between the two groups of professionals, i.e., the Order of Agronomists and Order of Forest Engineers of Quebec (OAQ & OIFQ) [68]. Diagnoses are the responsibility of the agronomist for farmlands, while the forest engineer (forester) is responsible for forestlands. To bring an agroforestry project to fruition, the agronomist is solely responsible for everything that is related to crops or livestock, while responsibility is shared for trees and what are referred to as "spontaneous" (volunteer) species.

Discussion

In line with the broader recognition of agroforestry, the scope and number of incentives that are dedicated to agroforestry support are higher in France than in Quebec. Compared to Quebec's supporting scheme and despite many restrictions, the French scheme embraces a wider range of systems (edge types and intraparcellar types) and supports a wider range of agroforestry system functions, from environmental protection to economic diversification and landscape aesthetics. However, the recognition of the multiple functions of agroforestry systems in France is mainly done through the addition of measures targeting specific objectives and often designed following contrasted logics (farm level vs. landscape or regional level, ecology vs. profitability). This complexity is increased by the diversity of payment schemes and calculation methods, which globally leads to inconsistencies that limit agroforestry deployment. The next CAP could be an opportunity to increase policy consistency, simplify payment rules, and relax restrictions for agroforestry support. In Quebec, supporting measures are few, very specific, and most derive from the same agri-environmental program, which ensures their consistency but narrows their scope. In the absence of a shared, global vision for agroforestry and without a strong collaboration between policy sectors, there is no guarantee that the global policy context framing agroforestry development will remain consistent. Both contexts illustrate the difficulty in supporting multifunctional systems with targeted, function-specific policy tools.

Another important difference between the two policy contexts concerns the preservation of existing agroforestry systems. In France, the conservation of agroforestry systems is compulsory to get aids from the first CAP pillar. In Quebec, only basic environmental requirements must be met to get support from agricultural programs, and agroforestry systems are not targeted by any of these requirements. The French cross-compliance measure could inspire Quebec in its future policies to ensure the long-term conservation of agroforestry systems on farms. Currently, Quebec farmers that have benefited from Prime-Vert support to install agroforestry systems are required to maintain their system for a period of five years only. After that period, they incur no financial penalties if the system is replaced by crops. This breach in the legislation, which led to the cutting of many treed riparian buffer strips when maize and soy prices reached peak prices in 2010–2015 [69], should be addressed to increase the long-term efficiency of programs supporting agroforestry implementation such as Prime-Vert.

Despite these differences, public funding frames in Quebec and France impose numerous norms regarding agroforestry system design, implementation, and management. This high level of control

exerted by governments, traducing a certain lack of confidence towards the agroforestry competencies of farmers and agroforestry professionals, is also a barrier to adoption.

Although agroforestry is supported by increasing numbers and varieties of organizations (public, private, nonprofit) in both France and Quebec, most focus upon the agri-environmental role of trees, devoting only minimal attention to their economic or social value. This strict focalization on the provision of nonmarketed ecosystem services impede the development and implementation of profitable agroforestry systems for private owners. Supporting farmers and landowners in their efforts to reach profitability with agroforestry systems instead of subsidizing agroforestry systems designed to be nonprofitable could be a strategy to increase the global sustainability of farming systems and rural communities. Interestingly, in both contexts, agroforestry is supported only marginally by carbon-offset strategies. Advocating for better recognition of the role of trees in climate change mitigation and adaptation on farms could be another opportunity that should be grasped that would increase support for agroforestry system implementation in France and Quebec.

3.3. Knowledge Acquisition

(FR)—Agroforestry is encouraged by French development organizations and research. In the field, new and more diversified forms of agroforestry are emerging that meet many of the objectives of farmers, and which are guiding current research questions. Modern intraplot systems and field-edge elements (windbreaks, hedgerows, riparian zones) are better integrated. Various methods of tree management (pollarding, management of volunteer woody vegetation) are being studied and developed. Agroforestry is increasingly being combined with soil conservation practices, such as no-till cultivation, permanent ground covers, and complex rotations and crop associations [70].

France currently has more than 10 pilot studies for experimentation and demonstration in agroforestry practices. "Historical" plots in the south of France that were established in the 1990s at the initiative of IRSTEA (Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture, previously known as Cemagref) and INRA (Institut national de la recherche agronomique) are still in operation. As of 1 January 2020, IRSTEA and INRA have merged to create INRAE (Institut national de recherche pour l'agriculture, l'alimentation et l'environnement).

The first trials, which constituted the Restinclières Agroforestry Platform (50 ha of plots), were established on the Domaine de Restinclières estate, which is just north of Montpellier. However, their format was not well adapted to intensive agriculture, given that tree density was high. More recently, new plots have been set up by professional organizations within the framework of projects that are co-financed by the "Agricultural and Rural Development Special Allocation Account" (CASDAR, Compte d'Affectation Spécial Développement Agricole et Rural) in closer collaboration with farmers. Agroof-SCOP, a consultancy firm specializing in agroforestry, together with its partners, have also participated in the creation of better-adapted experimental plots, with more diversified species choices. The overall network of sites makes France a pioneering nation in Europe with respect to the development of intraplot agroforestry. Yet, the preliminary study for the Agroforestry Development Plan had highlighted the absence of pooling resources (plot networks, knowledge acquisition, expertise) and the means for monitoring and supporting these innovative farmers.

The agroecological transition of French agriculture is supported by research activities partly funded by CASDAR. Since 2013, this allocation account has made it possible to fund seven research projects in agroforestry for a total in excess of two million euros [71]. Agroforestry projects that have been financed by CASDAR focus on very different subjects, dealing with market gardening (SMART, 2014–2017), viticulture (Vitiforest, 2014–2018), poultry breeding (Poultry course, Projet BOUQUET, 2017–2020), ruminant breeding (ARBELE, 2015–2018), mycorrhization (MYCOAGRA, 2016–2020), and hedgerows (Res'haie, 2019–2020).

The year 2018 marked the end of the AGFORWARD research project [72]. This Pan-European project, which was funded by the European Union, debuted in January 2014. It was based upon existing agroforestry experiments, on ongoing monitoring trials on pilot farms, and on previous

research projects, such as "Silvoarable Agroforestry For Europe (SAFE)". Conducted in partnership with European Agroforestry Federation (EURAF), AGFORWARD has made it possible to take stock of the state of European agroforestry.

National associations play an important role in the dissemination of research results. For example, AFAF participates in regional projects, such as Agr'eau and BAGAGE, which focus on the preservation of green- and blue-belts through agroforestry in the Adour-Garonne Basin of southwestern France [73]. Preservation and restoration of green spaces as buffer zones in urban and periurban areas is practiced globally [74], while the extensive conservation and stewardship of urban and periurban waterways and wetlands as blue-belts is a relatively new idea, both in Europe and in North America [75].

Despite census efforts, gaps in the data still hinder a comprehensive understanding of the diversity and dynamics of French agroforestry. The National Institute of Geographic and Forest Information (IGN, Institut National de l'Information Géographique et Forestière) and RMT—Agroforesteries are undertaking a more concerted inventorying of agroforestry practices and models to provide reliable and recent statistics on this type of farming [76]. These data would make it possible to track the evolution of agroforestry systems over the years, thereby meeting the objectives of the Agroforestry Development Plan.

(QC)—In Québec, one of the principal programs funding research and development in agroforestry is offered by MAPAQ. A section of the Prime-Vert program (2013–2018) was entitled "support for the development and transfer of knowledge in agri-environments" [65]. Its themes included "agroforestry and adaptation to climate change". For the period 2019–2020, the support program for the "fight against climate change in agriculture" has been proposed, with the inclusion of agroforestry domain. There is also the Innov'action program that was proposed by Agriculture and Agri-Food Canada (AAFC), in partnership with MAPAQ. This program has made it possible to analyze agricultural yields in intercropping agroforestry systems [77].

Another federal program is led by AAFC, i.e., the Agricultural Greenhouse Gas Program (AGGP). AGGP supports projects that create technologies, practices, and processes that farmers can adopt to mitigate greenhouse gas emissions. Since 2010, nine agroforestry research projects have been funded by AGGP in Canada. Of the program's four project categories, agroforestry is the second most frequently funded. This encouraging result epitomizes the interest that scientists have in studying these practices, together with the willingness of the Government of Canada to support development in the field. The research resulting from the program, that which has been published to date, has highlighted the interest in agroforestry systems for not only limiting greenhouse gas emissions [20,78], but also for their capacity to sequester carbon [21,79]. Some of this work has advanced the possibility of rewarding agroforestry and its farmers for the ecological services that are produced [80].

The Ouranos consortium on regional climatology and adaptation to climate change is a nonprofit organization that is supported through the Green Fund by the Ministry of Economy and Innovation (Ministère québécois de l'Économie et de l'Innovation) and the Ministry of Environment and the Fight against Climate Change (Ministère de l'Environnement et de la Lutte contre les changements climatiques). One of its activities is co-financing research projects to stimulate and support adaptation to climate change. The consortium has identified agroforestry as an important mechanism for restoring biodiversity in landscapes in agricultural regions where natural habitats are highly fragmented [81]. Studies that have been funded by Ouranos have demonstrated the value of riparian strips in protecting habitats, maintaining water quality, and creating thermal refuges for fish in rivers [82–84]. The value of ecosystem services that are provided by agroforestry intercropping [85] and the study of potential connectivity networks in agricultural areas [86] have also received support from Ouranos. For its 2016–2021 program, Ouranos has funded a project to verify whether trees planted as hedgerows in agricultural areas can serve as natural corridors for wildlife, together with analyzing the perception of agricultural stakeholders regarding these tree-covered installations [87].

The Québec Ministry of Municipal Affairs and Land Occupancy set in place the "Rural Measurement Laboratory" during the period of 2007–2014 to enable rural communities to test and acquire new

approaches to rural development. This action made it possible to fund the "Rural Agroforestry and Landscape Laboratory" (LRAP, Laboratoire rural Agroforesterie et paysage) [88]. LRAP is hosted by the MRC du Rocher-Percé, in the Gaspé Peninsula, which is an extensive cattle breeding region. Its objective was to evaluate the potential of agroforestry practices to diversify the local economy through the production of quality wood and to maintain the quality of the landscapes of this touristic region. About 30 agroforestry plots, including a dozen intraplot agroforestry systems, were monitored. The evaluation showed that agroforestry in areas of extensive farming is technically realistic, that it is of interest to owners and farmers, and that it rapidly results in positive impacts on the landscape. The possibility of providing financial support emerged as a central issue [89].

Discussion

The knowledge acquisition environment is much more developed in France than in Quebec. In France, research programs are conducted at multiple levels (European, national, regional), cover multiple systems, and involve a plurality of actors. Agroforestry research in France is not only nurtured and directed by global challenges (sustainability and climate change, among others), but also by innovative farming practices. It is thus located at the global–local nexus. Research programs that are dedicated to agroforestry exist in France, which leads to a more global comprehension of the functioning and impacts of agroforestry systems.

In Quebec, researchers are the primary drivers of agroforestry knowledge acquisition. Since most agroforestry research projects are financed through nondedicated programs, knowledge acquisition is more fragmented. Follow-ups of past experiments are rare and nonsystematic. In contrast, the role of research in agroforestry recognition is palpable in France. Major recent research initiatives have given agroforestry a boost in Europe and France, and were probably related to the adoption of the "Agroforestry Development Plan" by the MAA. This kind of project is still lacking in Canada and Québec. The "Rural Laboratory" was not a program that was intentionally dedicated to knowledge acquisition, despite being designed this way by its leaders. Recurrent funding for long-term follow-up could increase research impact in Quebec and foster wider recognition of agroforestry by public authorities.

Despite the gaps, research in both contexts has been mainly focused on the tree–crop interactions, together with the environmental and climate change aspects of agroforestry systems. Research on the economic impacts of agroforestry could increase its recognition in public policies and foster its adoption.

3.4. Knowledge Transfer and Training

(FR)—Various research projects have led to the creation of technical tools that are accessible to agroforestry professionals. For example, the "Parcours Volaille" project has created a diversified database (technical and pedagogical documents) and scientific publications on the performance of free-range poultry [90,91]. Likewise, the "Mixed Agroforestry Systems: Creation of Technical and Economic References" (SMART, Systèmes Mixtes Agroforestiers: création de Références Technique et économiques) project has facilitated the creation of an agroforestry orchard guide [92]. One of the most complete sites regarding knowledge translation and transfer (KTT) is the Agroof-SCOP site (https://recherche.agroof.net/projetsRD.html). This site summarizes the results of research and development projects that have been conducted over the last 10 years.

Two books have been published by Editions France Agricole: a 2nd re-issue of "Agroforesterie: des arbres et des cultures" (Agroforestry: trees and crops) in 2018, in collaboration with INRA; and a 2nd edition of "Les Haies Rurales" (Rural Hedgerows) in 2019. In 2019, AFAF and the Forestry Developpement Institute (IDF, Institut pour le Développement Forestier) collaborated in publishing a technical guide synthesizing knowledge and practical know-how that is required for planting, managing and exploiting poplars in agroforestry [93]. APCA (2020) [94] has placed a document online for guiding agricultural advisers so that they can best support the implementation of agroforestry projects.

At the European level, the AGFORWARD program has most notably enabled the creation of extension (nontechnical) documents in the form of practical specific sheets, all the elements of which

should be taken into account before installing an agroforestry system (e.g., selection of species, soil preparation, tree planting, pruning) [95]. EURAF has set up the AFINET project (AgroForestry Innovation Networks), which is a thematic network promoting the exchange and transfer of agroforestry knowledge at the European level [96].

In France, CASDAR finances not only agroforestry research, but also knowledge transfer through calls for projects addressing "agricultural education for agro-ecological transition". These projects promote increasing awareness of future agricultural professionals in taking into account the environment and biodiversity in their agricultural practices. Since 2014, the account has financed about ten projects [97]. Most of these consisted of the creation of experimental agroforestry plots in agricultural schools (secondary schools and centres for professional training and agricultural promotion, among others). Not only do they enable students to discover agroforestry practices, but they also play an important role in the acquisition of knowledge, together with technical and economic references. In 2020, more than 100 agricultural schools will have an agroforestry project on their properties.

Regarding training, a global, exhaustive vision does not exist for agroforestry training currently offered in France. For this reason, RMT—Agroforesteries is currently conducting a census of training courses that are within the country.

Major French agricultural and agroforestry organizations, such as Agroof-SCOP, AFAF, APCA, AFAC—Agroforesterie and Arbres et paysages 32, offer online or on-site training. In agricultural educational institutions, the subject of agroforestry is only given cursory treatment, frequently as an example of innovative and alternative agricultural or forestry practices. There is no obligation to address this topic comprehensively, a task that is left to the initiative of the individual teaching teams.

With respect to higher education, several agricultural engineering schools include introductory courses in agroforestry in their syllabi. Technical schools in Paris (AgroParis Tech) and Bordeaux (Bordeaux Science Agro, i.e., the National School of Agricultural Engineering, Bordeaux) offer more advanced courses and instruction modules in this field. The private engineering school UniLaSalle (Institut Polytechnique UniLaSalle, Beauvais Mont-Saint-Aignan, Normandy, France) has 33 ha of experimental agroforestry plots and also offers courses to its students.

However, there is no diploma program in agroforestry in France. The forestry high school in Crogny, Aube region, is the only institution that offers long-duration training (32 weeks), focusing specifically on agroforestry consultancy. Its focus is on those seeking employment, employees wishing to upgrade their skills, or adults undergoing professional retraining [98].

(QC)—Although scientific knowledge regarding agroforestry in temperate environments is relatively comprehensive, technical data specific to Québec are more limited. There are a few documents that are for farmers and advisors. These include the collaborative site Agri-Réseau (2020) [99], which makes various documentary resources pertaining to agroforestry available to businesses and professionals in the Québec agricultural sector. In particular, the site includes a guide to the development of agroforestry management plans [100], technical specific sheets on implementing windbreaks [101], treed riparian strips [102,103], wooded patches [104], and intercropping systems [105]. The website of the Laboratoire rural Agroforesterie et Paysage [88] also provides technical information on agroforestry.

The CRAAQ Agroforestry Committee has developed several knowledge transfer tools. A Network of agroforestry demonstration sites, accessible online [106], gives detailed information on various agroforestry sites established on Québec territory. With the support of the Innov'action program and MAPAQ, a video on agroforestry [107] and an interactive fact sheet documenting the effect of trees on the microclimate of agricultural plots in the context of climate change [108] were produced. The agroforestry committee has also produced workshops and their proceedings, and compiled a variety of documents that are accessible on the Agri-réseau website [99].

The Gestrie-Sol agri-environmental advisory club published a guide entitled "To everyone, their own hedgerow" (in French: À chacun sa bande) [109]. This resource document synthesizes information on seven different types of riparian strips. Finally, there are many reference documents to help farmers and advisors in the choice of species and the layout of riparian strips [100,103,110].

An annual agroforestry conference has been held at Laval University since 2013. This event brings together students, researchers, and professionals to exchange ideas and participate in discussions that encourage the vitality and growth of the field [111].

Some universities, such as Laval University, Université du Québec en Outaouais (UQO), and TELUQ (Québec's online university), offer agroforestry courses in undergraduate agronomy, forestry, and environmental science programs. Laval University also offers a Master's program in agroforestry (professional or research) with various courses in the field [112]. Two-year Québec colleges, the Institut de technologie agroalimentaire (Institute of Agri-Food Technology) in the town of La Pocatière and post-high school general and vocational college (CEGEP, Collège d'enseignement général et professionnel), unique to QC, in the town of Victoriaville, offer various technical courses in the field of agroforestry. The availability of one-time or ongoing training for professionals, however, is severely limited [47].

3.5. Development Actors and Implementation in the Field

(FR)—AFAC—Agroforesteries is one of the principal French organizations that is involved in the development of agroforestry. Its mission is to bring organizations and individuals together who are working to promote the establishment and maintenance of agroforestry systems in all of their forms. There are more than 200 member groups (associations, chambers of agriculture, private companies, cooperatives, regional nature parks, among others).

Agroof-SCOP plays an important role in the development of the practice and concentrates its work upon research and development and training issues. AFAF was created at the same time as AFAC and was originally instrumental in the development and revitalization of agroforestry. The two organizations wanted to merge, but a divergent vision has prevented it to this day and they act in parallel.

APCA has increasingly developed its expertise in agroforestry. It has around a hundred advisers spread throughout rural France, who are able to help farmers with their development projects.

Finally, there is a multitude of small associations that are working across France at a grassroots level to develop agroforestry. It is these associations and innovative agroforestry farmers who play a real role in promoting the practice.

Currently, no exhaustive list of agroforestry advisers and technicians exists in France. However, the AFAF and APCA websites each offer a directory of agroforestry advisors in the country. There are agroforestry specialists all over France, although there is a strong disparity between regions. AFAC—Agroforesterie offers an inventory, updated annually, of agroforestry advisors and BCAE7-certified "bocage" technicians. In 2019, the association identified 120 advisors from 77 different organizations. An inventory of French agroforestry sites and a directory of professionals in the field are also on the RMT—Agroforesteries website (https://www.rmt-agroforesteries.fr/fr/), despite gaps in its database.

To facilitate the choice of trees, APCA has created an open-access web application, which is called "Auxil'haie" (only available in French), where hedges or agroforestry systems can be designed to attract entomophagous insects [113]. The applicant is provided with a list of appropriate plants, based on the crop system (arboriculture, field crops, market gardens, viticulture), the department in which the farm is located (in metropolitan France), and specific requirements of the farmer (management of certain pest species, other associated insect species, among others).

Regarding the choice of tree species, wild plants of local origin are being recommended more and more. The "Local Plant" (in French: Végétal Local) brand was created by the Federation of National Botanical Conservatories, AFAC—Agroforesteries, and Plant&City in 2015 [114,115]. It is linked to a technical reference system and certifies that seeds of plants that are being sold originate from a natural environment and a specific biogeographical region. The aim is to preserve local genetic diversity and ensure favourable performance of trees during their installation, establishment, and production phases.

(QC)—The CRAAQ agroforestry committee is the only body for which knowledge transfer work is dedicated to agroforestry. Some agri-environmental clubs also have expertise in this field, as do professionals in MAPAQ's regional offices, the Québec's Union des producteurs agricoles (UPA), and watershed organizations (Organismes de bassin versant, OBV). Creation of regional organizations and working groups, including producers, who are dedicated to the development of different forms of agroforestry, would certainly encourage practices. This avenue, however, requires greater recognition from various ministries to obtain public funding that would support organizations, which could then boost the sector.

The presence of agroforestry councillors or advisors in sufficient numbers throughout region is fundamental for the adoption of agroforestry practices. In addition to their roles of supporting and advising farmers, advisors are indispensable in the development of financing that targets the Prime-Vert program. However, the expertise gained by these advisors is often based upon their personal experience or technical knowledge. Unfortunately, no framework yet exists that governs the training and skills that an agroforestry advisor should already possess or would need to acquire [47]. Certain intensive agricultural regions of Québec apparently lack agricultural advisors, which slows down the planning and execution of agroforestry projects and may discourage farmers who wish to participate in these activities. Private nurseries provide the trees and shrubs, but do not exercise control over the geographical origin of seed sources. As already mentioned, a few organizations that offer tree-planting services, particularly to offset greenhouse gas (GHG) emissions, have had a hand in creating agroforestry systems.

Technical data for Québec intraparcellar systems that are adapted to the field crop context are beginning to emerge [77]. However, they are less widely disseminated than in France, since the value of such systems and their functions have yet to be fully recognized. Furthermore, despite their recognized advantages, the constraints of intercropping agroforestry systems are still limiting their interest for various rural stakeholders [37].

Discussion

The level of organization of agroforestry stakeholders in France is higher than in Québec. Experts and farmers who are involved in agroforestry development are grouped into a large number of dedicated structures or associations, which provide them with a higher level of visibility and creates more official and visible channels that can share expertise and knowledge. In Québec, the fewer number of farmers, researchers, and professionals who are involved in agroforestry, combined with a lower degree of recognition by authorities, might explain why networking and knowledge sharing is conducted through diffuse channels and mostly relies upon freestanding initiatives.

4. Conclusions

Researchers in Québec and France agree that agroforestry could be an agroecological tool relevant to the development of a more agronomically and environmentally sustainable agriculture. However, many obstacles are still preventing the adoption of agroforestry.

Even when the practice is recognized and encouraged by the state, as it is the case in France, it is grassroots organizations and committed farmers who are voluntarily changing the practice of agroforestry to adapt it to all agroecosystems. These farmers deplore overly restrictive characterizations of the systems, the complex calculations that are involved, and the many conditions limiting financial aid, which can block their efforts in pursuing these initiatives. It is also thanks to the existence of many committed associations that dozens of research and development projects are underway throughout France.

State-recognized agroforestry systems are subject to even greater restrictions in Québec, greatly limiting their deployment. The compartmentalization of the agriculture and forestry ministries, and the lack of recognition by other ministries regarding the benefits of agroforestry, have prevented the synergy and convergence of resources that are essential to its implementation at a larger scale. To produce a

decisive signal to all actors in the sector, i.e., producers, advisors, managers, and other stakeholders, the term "agroforestry", and the objective of promoting its adoption, must be clearly integrated into Québec government policies and action plans of the main organizations that are involved in agriculture, private forestry, environmental protection, and rural land-use planning. As proposed by the USDA agroforestry strategic framework, it will be necessary to: (i) be able to offer access to the latest tools and information that support agroforestry adoption, (ii) conduct applied and basic research to advance the science and technology that supports the use of agroforestry, and (iii) facilitate the integration of agroforestry information, research, tools, and technologies [8].

A comparison of development paths that temperate agroforestry has taken in Québec and France suggests that successful adoption of the practice comes from recognition at the highest level, which has been translated into favourable policies and development plans, together with substantial participation of advisory and farming stakeholders. Recognition of a wide range of agroforestry practices is called for, which would permit the application of various types of management practices on farms. Moreover, the provision of advanced training and diploma courses for farmers, technicians, advisors, agronomists, and foresters is necessary to enable the implementation of efficient and innovative agroforestry systems. The creation of a consultation group, similar to that of the French Agroforestry Mixed Technology Network (RMT—Agroforesteries) thus seems particularly desirable. Its mandate would be linked to the orientation of research, the development of tools that are conducive to development, and the transfer of knowledge. Such consultation groups should bring together representatives of the main agricultural, forestry, environmental, and regional institutions, including recognized experts. Collectively, their work should lead to concerted implementation of an agroforestry development strategy.

Supplementary Materials: A table summarizes the status of agroforestry in France and Quebec for comparison according to five main issues: political status and recognition, regulation and financing, knowledge acquisition, knowledge transfer and training, development actors and implementation in the field. The following are available online at http://www.mdpi.com/2071-1050/12/17/7227/s1, Table S1: Summary of the elements compared (France–Québec) according to 5 issues.

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Abbreviations

(AAFC)	Agriculture and Agri-Food Canada
(AFAF)	Association française d'agroforesterie/French Association of Agroforestry
(AFAC—Agroforesteries)	l'Association française des arbres champêtre et agroforesteries/French Association of Country Trees and Agroforestry
(AEIs)	Areas of Ecological Interest
(AECM)	Agri-Environmental and Climate Measures
(APCA)	Assemblée Permanente des Chambres d'Agriculture/Permanent Assembly of Chambers of Agriculture
(CAP)	Common Agricultural Policy
(CASDAR)	Compte d'Affectation Spécial Développement Agricole et Rural/Special Agricultural and Rural Development Assignment Account
(CRAAQ)	Centre de référence en agriculture et agroalimentaire du Québec/Quebec Reference Centre for Agriculture and Agri-Food

(EAFRD)	European Agricultural Fund for Rural Development
(GAEC)	Good Agricultural and Environmental Conditions
(IDF)	Institut pour le Développement Forestier/Forestry Developpement Institute
(IGN)	Institut National de l'Information Géographique et Forestière/National Institute for geographic and forest information
(INRA)	Institut national de la recherche agronomique/National Institute of Agronomique Research
(INRAE)	Institut national de recherche pour l'agriculture, l'alimentation et l'environnement/National Institute for Agriculture, Food and Environment
(IRSTEA)	Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture/National Institute of scientific and technological research in environnement and agriculture
(LRAP)	Laboratoire rural Agroforesterie et paysage/Rural Agroforestry and Landscape Laboratory
(MAA)	Ministère de l'Agriculture et de l'Alimentation/Ministry of Agriculture and Food
(MAPAQ)	Ministère de l'Agriculture, des Pêcheries et de l'Alimentation/Ministry of Agriculture, Fisheries and Food
(MRC)	Municipalité régionale de comté/Regional Municipality County
(PDZA)	Plan de Développement de la Zone Agricole/Agricultural zone development plan
(RMT-AgroforesterieS)	Réseau mixte et technologique en agroforesterie/The Agroforestry mixed Technology Network
(RRDP)	Regional Rural Development Plans
(UPA)	Fédération de l'Union des Producteurs Agricoles/Union of Agricultural Producers
(OAQ & OIFQ)	Ordre des agronomes et Ordre des ingénieurs forestiers du Québec

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