Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

Multidisciplinary Agroforestry Study Mission to France

May 21 to 25, 2012

Mission Report

Prepared for Agriculture and Agri-Food Canada

by Geneviève Laroche and Alain Olivier

Groupe interdisciplinaire de recherche en agroforesterie

July 2013

Canada

Multidisciplinary Agroforestry
Study Mission to France

Presented to Agriculture and Agri-Food Canada
by Alain Olivier, Director, Groupe interdisciplinaire de recherche
en agroforesterie, Laval University
June 29, 2012
Contract 01B46-2011-0362

Authors
Geneviève Laroche, MSc, Laval University
Alain Olivier, PhD, Laval University

For more information:
Stéphane Gariépy
Knowledge and Technology Transfer Office
Agriculture and Agri-Food Canada
Jules Dallaire Building
2828 Laurier Blvd., Suite 640
Quebec City, Quebec
G1V 0B9
Email: stephane.gariepy@agr.gc.ca
Telephone: 418-648-3652
Fax: 418-648-7342

Multidisciplinary Agroforestry Study Mission to France (PDF), May 21 to 25, 2012.

AAFC No. 12171E
Cat. No. A59-11/2013E-PDF
ISBN No. 978-1-100-23064-1

Aussi offert en français sous le titre :
MISSION D'ÉTUDE MULTIDISCIPLINAIRE SUR L'AGROFORESTERIE EN FRANCE

ACKNOWLEDGEMENTS

This multidisciplinary agroforestry study mission to France would not have been possible without the help of many people.

First of all, special thanks go to the mission organizers, particularly David Rivest, a post-doctoral fellow at the University of Quebec at Montreal, who provided the overall coordination of the mission in Quebec, and to the team from AGROOF – société coopérative et participative spécialisée en AGROFORESTERIE, who developed a full, varied and relevant mission program.

We also wish to thank the various partners involved, including Agriculture and Agri-Food Canada, Laval University and all of the Quebec organizations that believed in the value of this mission dedicated to agroforestry for the future of rural communities and agricultural and forestry activities in Quebec and allowed their representatives to take part.

Lastly, our deepest thanks go to the many stakeholders, technicians, producers, ecologists, researchers, government employees and other stakeholders in agroforestry development who generously answered our questions and enthusiastically shared their experiences, thoughts and visions regarding the future of agroforestry in France and Quebec.

Geneviève Laroche and Alain Olivier, Groupe interdisciplinaire de recherche en agroforesterie

Stéphane Gariépy, Agriculture and Agri-Food Canada

EXECUTIVE SUMMARY

In Quebec, agroforestry has valuable potential to help rural residents and stakeholders in the agricultural and forestry sectors address the social, economic and environmental issues they face. However, farmers, foresters, researchers, rural development officers, regional or watershed project managers, and key policy stakeholders still know relatively little about agroforestry systems.

From May 21 to 25, 2012, a multidisciplinary study mission to France was held to address this knowledge gap, to raise awareness among the key stakeholders of the potential of agroforestry, and to provide opportunities for collaboration and interaction between Quebec and France. Because of its positioning as a leader in agroforestry research, development and regulation, France was ideal for this type of study. The general objective of the mission was to enable the participants to understand the organizational and operational structure of the agroforestry sector in France, by identifying the organizations involved, the available human, material and financial resources, the operational and regulatory challenges, the manner in which economic and political aspects are taken into account, and the way in which agroforestry is integrated into the value chain.

The 18 mission participants toured a variety of agroforestry systems, from silvopasture to alley cropping in which several high-value tree species were grown with various crops (grains, vegetables, oilseeds, vines, etc.). The conditions at the sites contrasted greatly in terms of climate (temperate to Mediterranean), soil, crops, production systems (conventional or organic) and management practices (regional or private). Led by key stakeholders such as producers, technicians, agrologists, landowners or researchers, the tours included discussions, dialogues and exchanges of ideas and were supplemented by written documentation and a workshop in which representatives of the French Ministry of Agriculture, Agri-Food and Forestry participated. The following observations—some of the many that emerged from the mission—could help guide measures aimed at the future and development of agroforestry in Quebec.

- ✓ The environmental effectiveness of agroforestry systems has been scientifically demonstrated, given that they fulfil numerous ecological functions, such as enhancing biodiversity, creating wildlife corridors and improving water and soil quality. In addition, given the potential of trees for sequestering carbon in woody biomass and soil, agroforestry systems are valuable tools that could be developed as part of climate change mitigation and adaptation strategies.

- ✓ The practice of agroforestry is economically viable (1) when the costs of tree planting and the initial few years of maintenance (which are the main costs associated with the establishment of agroforestry systems) are partly funded by outside sources (such as quasi-public agencies), with trees causing little or no decline in crop yields, and (2) when the market for the wood produced is strong and offers attractive sales opportunities for producers (wood for energy or higher-value wood products). However, the long lead time between tree planting and harvesting,

particularly in the case of fine, high-value species, remains a barrier to the adoption of agroforestry.

- ✓ Agroforestry systems can meet regional development requirements in terms of multifunctionality, landscapes and the integrated use of resources, particularly when agroforestry forms part of a regional strategy rather than being implemented on an individual, voluntary basis.

- ✓ Determining factors in the rapid evolution of agroforestry practices in France were the recognition of trees as a vital and integral part of the agricultural system and the eligibility of agroforestry plots for the first two pillars of support under the Common Agricultural Policy. These changes also clearly indicate that agroforestry is recognized as a sustainable and productive agricultural practice. Recognizing the status of trees simplifies the management of programs and subsidies associated with the production of trees and agricultural crops on the same plot.

- ✓ It is critical that research, development, policy, education and outreach activities be coordinated and develop at the same pace, so that all stakeholders are able to work together and conduct collaborative projects that address multiple objectives. In France, it was critical that the stakeholders involved in complementary fields work together to establish structures for promoting ideas and collaborating as well as forums for promoting the potential of agroforestry on the policy front.

- ✓ The adoption of agroforestry systems (alley-cropping and silvopasture systems) is limited by producers' lack of knowledge of the benefits and specific characteristics of these systems. To overcome this lack, further research is required and more demonstration sites need to be established. However, access to technical and financial support and the support of local and regional authorities are aspects that facilitate the adoption of agroforestry systems.

In addition to shedding light on the key aspects of the evolution of agroforestry in France, this mission allowed the Quebec and French stakeholders to get to know and understand each other better and to lay the foundation for future collaborations that could lead to the development of agroforestry systems suitable for the challenges and issues specific to Quebec and Canada.

CONTENTS

LIST OF ABBREVIATIONS

AAFC	Agriculture and Agri-Food Canada
AGROOF	AGROOF – société coopérative et participative spécialisée en AGROFORESTERIE
AFTA	Association for Temperate Agroforestry
CDAQ	Conseil pour le développement de l'agriculture du Québec
CEMAGREF	See IRSTEA
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
CLD	Local Development Centre
CRAAQ	Centre de référence en agriculture et agroalimentaire du Québec
CRÉ	Regional Conference of Elected Officers
CRPF	Centre régional de propriété forestière
CRRNT	Commission régionale sur les ressources naturelles et le territoire
DDAF	Direction départementale de l'agriculture et de la forêt
FDSEA	Fédération départementale des syndicats d'exploitants agricoles
INRA	Institut national de la recherche agronomique
IRBV	Institut de recherche en biologie végétale
IRSTEA	Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture (formerly CEMAGREF)
ITA	Institut de technologie agroalimentaire
MAAF	Ministry of Agriculture, Agri-Food and Forests (France)
MAPAQ	Department of Agriculture, Fisheries and Food (Quebec)
MRC	Regional county municipality
MRN	Quebec Department of Natural Resources
ONF	Office national des forêts
CAP	Common Agricultural Policy
PIRAT	Programme intégré de recherches en agroforesterie
PMAD	Plan métropolitain d'aménagement et de développement
PRDIRT	Plan régional de développement intégré des ressources et du territoire
UQAM	University of Quebec at Montreal
USDA	United States Department of Agriculture
UPA	Union des producteurs agricoles

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INTRODUCTION

From May 21 to 25, 2012, 17 stakeholders from Quebec and one stakeholder from Saskatchewan, representing the agriculture, forestry and rural development sectors, took part in a multidisciplinary agroforestry mission to France. The mission was organized by Agriculture and Agri-Food Canada (AAFC) and Laval University's Groupe interdisciplinaire de recherche en agroforesterie [interdisciplinary agroforestry research group].

The theme and general objective of the exploratory mission was "better action through discovery." Over the course of the mission, the Quebec stakeholders were put in contact with French agroforestry stakeholders and given opportunities to discover the systems the French had established. The idea was essentially for the participants to immerse themselves in the current agroforestry issues and activities in France and to discover the various technical, social, economic and regional facets in order to assess the extent to which the lessons learned from the French experience could be applied in the Quebec and Canadian context. The mission also gave the participants an opportunity to learn more about their respective aspirations and visions for agroforestry, and to establish ties that would later facilitate the implementation of joint agroforestry initiatives.

This report presents the results of the multidisciplinary mission to France. The report is divided into three parts. The first provides a brief overview of the background of the mission, a short description of the organizations and persons involved, and a chronological outline of the activities carried out. The second part presents each of the specific objectives and describes to what extent they were achieved. The last part looks at the possible outcomes of the mission, as perceived by the various stakeholders who took part in it.

It should be noted that the information gathered in this report is essentially what was presented by the stakeholders that the participants met during the mission and by the participants themselves. The report also includes inferences that could be drawn from the field observations. The information is therefore only partial and is subjective to a certain degree. The report does not pretend to provide the final word on the French agroforestry context, but rather presents a summary of the thoughts and ideas that were voiced during the mission while attempting to reflect as accurately as possible what the participants took from it.

1. BACKGROUND

Sustainable agricultural and forestry development and the sound management of rural areas are concerns for Quebec and for Canada as a whole. The practice of agroforestry, i.e., the combination of trees and crops in productive systems, is receiving increasing attention from stakeholders in the sector thanks to agroforestry's potential to ensure that agricultural and silvicultural activities are sustainable in a management and development context that must reflect social, economic and environmental imperatives. In Quebec, hedgerows and forested riparian buffers are among the better known agroforestry systems. However, various stakeholders are also becoming increasingly interested in more-advanced systems for combining trees with crops and even pastured livestock, such as alley cropping and silvopasture. These agroforestry systems involve planting widely spaced rows of trees, so that crops or pasture can be established in the alleys between the rows. However, such systems are still relatively unknown in Quebec, particularly since few systems have been established in the province, and those that have are relatively recent. The coordination of the stakeholders in the sector and promotion and outreach efforts at various levels are therefore still in their early stages.

Europe, and specifically France, has a head start in this area, and France's experience could serve as a model for the next steps in the development of this sector in Canada and Quebec. France has a growing number of practitioners involved in innovative and integrated agroforestry systems, and the country can count on adapted policies, experienced stakeholders, and support from the academic sector. The key areas in which France has established a high level of expertise include institutional recognition of and structural funding for agroforestry, economic and environmental assessments of agroforestry by researchers, the establishment of a vast national network of demonstration plots, the adaptation of agroforestry systems to regional issues, technical guidance and assistance, and collaborative working relationships.

Canada and Quebec can therefore learn much about agroforestry from France. Now more than ever, collaboration among local, regional, provincial and national stakeholders in land-use planning, support for agricultural and forest producers, and R&D is desirable in order to ensure that agroforestry is well understood, documented, adapted and applied in the Quebec context. The mission allowed the key stakeholders to gain an understanding of France's experience and provided a unique opportunity for them to get together to discuss and explore various approaches to agroforestry development in Quebec.

2. OBJECTIVES

The mission to France was designed to bring together nearly 20 key leaders (representatives and managers in the agricultural and forestry sectors, researchers, advisors, development officers) who were already or could be called upon to become involved in agroforestry in Canada, particularly Quebec, and who could have a significant impact on promoting agroforestry development.

The general objective of the mission was to enable the participants to understand the organizational and operational structure of the agroforestry sector in France, by identifying the organizations involved, the available human, material and financial resources, the operational and regulatory challenges, the manner in which economic and policy aspects are taken into account, and the way in which agroforestry is integrated into the value chain.

The implicit specific objectives of the mission were to allow the participants to:

1) learn about the current state of agroforestry in France, by identifying the strengths, weaknesses and challenges of agroforestry in the biophysical, policy and institutional context of France;

2) understand the organizational and operational structure of the agroforestry sector, by identifying the key stakeholders (owners, producers, private-sector stakeholders, non-governmental organizations, governments, industry, etc.), the financial and material resources available, and the operational and regulatory challenges the sector faces;

3) improve their knowledge of the implementation and benefits of agroforestry projects, by focussing on how economic aspects are taken into account and how agroforestry is integrated into the value chain;

4) understand the agroforestry research, development and knowledge transfer structure;

5) discuss the adoption of agroforestry systems in France and the mechanisms used over the years to improve the adoption of such systems; and

6) interact with leaders in agroforestry development in France and to improve networking between Quebec and French stakeholders.

The mission also included a workshop on the development of agroforestry in Europe, specifically alley cropping and a comparison of the approaches to agroforestry in France and Quebec. Also as part of the workshop, the director of the Groupe interdisciplinaire de recherche en agroforesterie and the AAFC representatives prepared and delivered presentations.

In short, the mission was intended as a strategic, capacity-building activity that could contribute significantly to advancing agroforestry in Canada, particularly Quebec.

Figure 1. Mission participants

3. PARTICIPATING ORGANIZATIONS

The mission brought together 18 stakeholders representing 16 organizations in various key fields related to agroforestry development in Quebec (research, development, outreach, technical support, policy, etc.). In addition to a variety of fields, the stakeholders represented various regions, namely Montérégie, Montreal, Quebec City, Bas-Saint-Laurent and Gaspésie. An AAFC representative from Saskatchewan was also part of the delegation, but only for the visits to northern France. This regional and sector diversity not only guaranteed representativeness but was also a tangible sign that agroforestry is not the exclusive domain of one region or group; instead, agroforestry is considered a way for improving agricultural and forestry systems as well as rural landscapes by a growing number of stakeholders in a variety of disciplines. The following is a list of the participating organizations, grouped by major sector. The complete list of the individuals who took part in the mission is provided in Appendix 1.

Research, Education and Development Institutions

- Biopterre, or Centre de développement des bioproduits [bioproduct development centre] (Bas-Saint-Laurent)
- Agroforestry Development Centre, AAFC
- Institut de recherche en biologie végétale [plant biology research institute], University of Montreal (Montreal)
- Laval University (Quebec City)
- University of Quebec at Montreal (Montreal)
- Institut de technologie agroalimentaire [agri-food technology institute], La Pocatière campus (Bas-Saint-Laurent)

Agriculture Support Organizations

- AAFC
- Centre local de développement de Vaudreuil-Soulanges [Vaudreuil-Soulanges local development centre] (Montérégie)
- Club-conseil en agroenvironnement Agri-Durable [Agri-Durable agri-environmental advisory club] (Montérégie)
- Conseil pour le développement de l'agriculture du Québec [Quebec agricultural development council]
- Union des producteurs agricoles [farmers' union]

Forest Producer Support Organizations

- Agence forestière de la Montérégie [Montérégie forestry agency] (Montérégie)
- Quebec Department of Natural Resources – Direction de l'aménagement et de l'environnement forestiers [forest land-use and environment branch], Service de la planification, des programmes et de la forêt privée [planning, programs and private forests service]

Rural Support Organization

- Solidarité rurale du Québec [Quebec rural solidarity organization]

Regional Government Organizations

- Conférence régionale des élus Gaspésie–Îles-de-la-Madeleine [regional council of elected officials of Gaspésie–Îles-de-la-Madeleine]
- Conférence régionale des élus Montérégie Est [regional council of elected officials of Montérégie Est]
- Conférence régionale des élus Vallée-du-Haut-Saint-Laurent [regional council of elected officials of Vallée-du-Haut-Saint-Laurent]

4. MISSION ACTIVITIES

The program of the mission was designed by the Groupe interdisciplinaire de recherche en agroforesterie in collaboration with AGROOF – société coopérative et participative spécialisée en AGROFORESTERIE, a participatory cooperative that specializes in agroforestry training and development in France and Europe. The coordination of the mission was overseen by AGROOF, which managed the logistics (travel within France, meals and accommodation) and acted as host and guide. The main activities that were carried out are presented below by type rather than in chronological order. The chronological list of the activities is presented in Appendix 2.

A. Visits to agroforestry plots and discussions with front-line stakeholders

The mission gave the participants an opportunity to take part in numerous guided tours of agricultural plots where agroforestry systems have been established. Given the wide variety of systems and the significant contrasts among both the regions and the contexts in which the systems had been implemented, the participants were able to get an idea of the diversity of situations in which the adoption of agroforestry is considered and even, in some cases, has been demonstrated to be a viable, promising practice. Details on the sites toured are provided in Appendix 3.

Figure 2. Organic silvopasture system

In northern France, the focus was on silvopasture and alley-cropping systems in which hardwoods are grown in association with grains (wheat) or oilseeds (canola).

At the Bergerie de Villarceaux farm, in Île-de-France, the participants toured an organic operation where a silvopasture system had been established in 2011 to allow cattle pasturing, cultivation of grains and canola in rotation with pasture, and eventually production of high-value tree species (Figure 2). A number of hedgerows, some young and some that had been established for decades and had become a feature of the agricultural landscape of the property, were also of interest to the participants (Figure 3), although hedgerows themselves are not considered an agroforestry practice in the strict sense of the term in France.

The tour was guided by Baptiste Sanson, a certified agrologist at the Domaine de Villarceaux, and Yves Bachevillier, of AGROOF.

Figure 3. Hedgerows

Further north, in Caps et Marais d'Opale Regional Natural Park in the Nord-Pas-de-Calais region, the participants observed the effects of agricultural research and a land-use planning and development plan on agroforestry practices. In the 1990s, CEMAGREF (now IRSTEA, the Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture [national institute for science and technology research in the environment and agriculture]) promoted and monitored the establishment of silvopasture plots on cattle and sheep farms within the park. Moreover, the regional natural park management plan provides for funding and technical support for the design, monitoring and maintenance of agroforestry plots to facilitate the work of producers who undertake this type of project and to give them access to public funding. In return, the agroforestry plots are designed around regional issues and priorities and around the trees present on neighbouring plots.

Three plots were toured in the regional natural park. The first was an alley-cropping system established in 2006 in which hardwoods (sycamore, wild cherry, European alder [*Alnus glutinosa*] and ash) were planted with grains (Figure 4). The second was a silvopasture system established in 2000 combining ash, pasture and Salers cattle (Figure 5). The last plot was a 20-year-old silvopasture system in which mature trees provided shade for the sheep pastured there (Figure 6).

Figure 4. Young plot of hardwoods grown with wheat

Figure 5. Philippe Majot speaking with participants about technical constraints associated with the silvopasture plot, in Nord-Pas-de-Calais

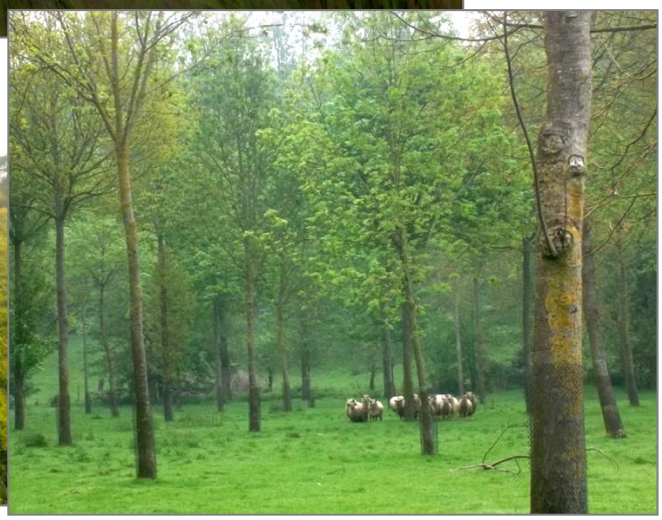

Figure 6. Silvopasture system combining sheep production, pasture and mature trees

Successive presentations by Philippe Majot, the technician responsible for managing the regional national park, by Yves Bachevillier, and by Hervé Potterie, Gilbert Bécue and Mr. Bécue's wife, the producer-owners of the property, provided essential information on the organizational and technical aspects specific to these systems, aspects that have been incorporated into a regional land-use plan. Close collaboration between IRSTEA and the park authorities, the contribution of individuals qualified to advise the producers on managing agroforestry systems, and the availability of public and quasi-public funding were factors in the success of agroforestry in this region of France.

In Beauvais, Picardie, the participants toured experimental plots on which canola was being grown with hardwood species. The tour was guided by David Grandgirard, a researcher and professor at the Institut polytechnique LaSalle-Beauvais [LaSalle-Beauvais polytechnic institute] (Figure 7). The participants were given information about the projects under way, agroforestry research funding, and the scientific developments and issues in the area. The French regulatory context, which provides for a significant reduction in agricultural inputs by 2018, has prompted private-sector investment in research aimed at developing new agricultural systems, such as agroforestry systems, that are more resilient and require fewer inputs. As Mr. Grandgirard explained to the participants, this context represents an opportunity for researchers.

Figure 7. Plots of hardwoods grown with canola at the Institut polytechnique Lasalle-Beauvais

Another tour took place in Languedoc-Roussillon, a completely different bioclimatic region in southern France. There, a number of stakeholders, including Fabien Liagre, founder of AGROOF, and Christian Dupraz, a researcher with the Institut national de la recherche agronomique [national institute for agronomic research] (INRA) research station in Montpellier, gave a guided tour of agroforestry plots on the Restinclières property, where INRA first began research more than 20 years ago. The various systems presented at Restinclières included diversified alley cropping, where either

mature hardwoods were being grown with grains (Figure 8) or conifers or hardwoods were being grown with grapevines (Figure 9).

Figure 8. Wheat grown under a canopy of hardwoods at Restinclières

Figure 9. Grapevines planted between rows of hardwoods and conifers

Through this tour, the participants learned more about the history and teaching role of the site as well as the issues in this hot, dry region of France that can be addressed by agroforestry practices, such as improving water, soil and biodiversity management. For example, the participants were able to observe the distribution of crop and tree roots in the soil horizon, and to talk with the stakeholders and researchers present about the differences in the distribution patterns under different soil and climate conditions. The site also demonstrated the marked difference in growth between trees grown under agroforestry systems and trees from control sites in forests: growth is much more rapid under agroforestry systems.

At Vézénobres, in the same region, the participants toured an organic operation in which mature poplar and walnut were grown with a wide variety of fresh-market crops (herbs, potatoes, cabbage, lettuce, leeks, carrots, etc.). The participants were accompanied by the producers, Denis Florès and his wife, and by AGROOF representatives (Figure 10). The plot had been the subject of a landmark legal case relating to the agricultural and forestry support granted to the former owner. The case led the administrative authorities and AGROOF to call for reform of the financial support for agroforestry practices and fuelled the argument for the recognition of field-grown trees as a component of the agricultural system. The current owners based their decision to keep the trees on the fresh-market plot on the potential beneficial effects of the trees on crops and the environment (organic matter, water quality and management, shade conducive to manual weeding required in organic production, increased biodiversity of beneficial organisms in crop production, diversification of revenues, support for the irrigation system, etc.). Their decision was supported by their producer association (GRAPPE3) and justified by external factors, such as regional management plans and drinking water quality improvement projects headed up by their regional water board.

Figure 10. Plot of fresh-market vegetables under rows of mature walnuts and poplars

According to the producers, the external support was a determining factor in their decision to maintain the trees on the plot and, as a result, was a significant incentive for all producers wishing to give the experience a try. The producers also spoke about the difficulty they have had making the promises of agroforestry systems a reality, particularly in terms of maintaining the trees to produce high-quality logs and selling the wood once the trees reached maturity. Through the real, concrete examples that the producers provided, the participants gained an understanding of the challenges facing producers who adopt agroforestry systems. The participants also heard about the importance of funding opportunities for projects to promote the establishment of agroforestry systems in regions where this practice remains marginal, including opportunities for funding related to the contribution of agroforestry systems to solving water quality problems.

Each of these tours was guided by key stakeholders, who provided both essential and complementary information to give the participants an understanding of the biophysical, historical, regulatory, social, agronomic and economic context in which the systems had been established. In addition to supplying technical data on each type of system visited, the stakeholders also made a point of clearly indicating

the individuals and organizations responsible for managing the sites, providing funding and carrying out follow-up, and were for the most part very generous in responding to the participants' questions.

B. Workshop on alley-cropping systems in France

Another highlight of the mission was the workshop held at the Bergerie de Villarceaux on the development of alley cropping in France. Organized jointly by AAFC, Laval University and the Bergerie, the workshop gave the participants an opportunity to meet with representatives from different branches of the French Ministry of Agriculture, Agri-Food and Forestry, and with a number of stakeholders from the organic agriculture research sector (ARVALIS–Institut du végétal,[1] among others). The participants were also able to share their views of the potential and future prospects of agroforestry in France and Quebec. The workshop took the form of a series of presentations, each followed by a question and answer period and by comments from those present (Figure 11).

Figure 11. Workshop participants listening to the presentation by Régis Ambroise, of the French Ministry of Agriculture, Agri-Food and Forestry

- ***"Agroforestry and Regulations in France"***
  By Régis Ambroise, French Ministry of Agriculture, Agri-Food and Forestry

In his presentation, Régis Ambroise described the history of agroforestry in France and the regulatory changes that led to the recognition of agroforestry systems as agricultural systems in their own right. This history was marked by the radical change in the status of trees on agricultural plots, from a forestry component to an agricultural component ineligible for agricultural premiums to a fully recognized agricultural component. These profound changes in the regulations required the coordination of a large number of stakeholders from all sectors related to agriculture and forestry (producer associations, researchers, government staff, etc.) within the framework of workshops and special meetings. In their efforts, the stakeholders benefited from that fact that research was answering questions related to the productivity and value of agroforestry systems at the very time that agricultural policies were to undergo an in-depth reform.

[1] The applied research organization ARVALIS-Institut du végétal [plant institute] produces technical, economic and agronomic references that are directly applicable in production systems.

- ***"Agroforestry at Agriculture and Agri-Food Canada: An Overview"***
  By Stéphane Gariépy and John Kort, AAFC

The presentation by the AAFC representatives provided the participants and representatives of the French Ministry of Agriculture, Agri-Food and Forestry with information on the history of the development of agroforestry projects in Canada, focussing on the variety of systems found across the country (silvopasture systems in British Columbia, windbreaks in the Prairies, alley-cropping systems in Ontario and Quebec, and crops grown under tree cover in Eastern Canada). The presenters also spoke about AAFC's Agroforestry Development Centre in Saskatchewan and the ties it has established with various partners in Quebec to advance research on different agroforestry systems. Lastly, the speakers mentioned that the current policy context in Quebec appears to be increasingly favourable to the integration of agroforestry into agricultural and forestry systems in agricultural areas, specifically with the emergence of programs promoting the multifunctionality of agriculture, government support for tree planting under certain systems, and the recent signature of a memorandum of understanding between AAFC and the United States Department of Agriculture to strengthen cooperation in agroforestry.

- ***"Agroforestry R&D in Quebec"***
  By Alain Olivier, Laval University

In his presentation, Alain Olivier shed light on the current state of agroforestry R&D in Quebec, underscoring the fact that trees are worth more than just their wood. He also described the agroforestry systems used primarily for their ecological functions (windbreaks and agroforestry riparian buffers) and those systems combining productive and ecological functions, which are growing in popularity (alley-cropping and silvopasture systems). In addition, Mr. Oliver traced the history of agroforestry projects and associations that were established to promote them, both in North America (e.g., the Association for Temperate Agroforestry) and in Quebec (e.g., the agroforestry committee of the Centre de référence en agriculture et agroalimentaire du Québec [Quebec agriculture and agri-food reference centre]). He emphasized the necessary linkages between educational institutions, R&D organizations, and rural communities to facilitate the expansion of agroforestry in Quebec. He closed his presentation by providing an overview of the main constraints on the development of alley-cropping systems, such as the needs to establish a tailored regulatory framework and to train technicians and professionals able to support producers in their initiatives.

The presentations by Mr. Gariépy, Mr. Kort and Mr. Olivier enabled the participants to draw parallels between the situations in Quebec and in France, particularly with respect to research, stakeholder collaboration, the regulatory framework, and programs.

C. Meetings with R&D specialists

Alongside the visits and the workshop on alley cropping, the participants had the privilege of meeting with high-level researchers specializing in agroforestry in France and to speak with them at greater length about the issues.

David Grandgirard, of the Institut polytechnique Lasalle-Beauvais, presented his vision of agroforestry research to the participants, showing the obvious link he sees with the development of systematic, integrated approaches in agriculture. He also explained how agroforestry training and research is incorporated into the Institute's programs and priorities. He gave an overview of the current state of research, not only from a technical perspective but also in terms of the acceptance of the idea of alley-cropping systems among producers, two aspects which, in his view, are inseparable.

Figure 12. David Grandgirard

Christian Dupraz, a researcher at the INRA research station in Montpellier and president of the European Agroforestry Federation, joined the participants on the plots at Restinclières to provide an overview of the research and initiatives undertaken by INRA to promote agroforestry and produce the research results that can address the major issues associated with growing trees in association with crops. Moreover, students under his supervision provided a lay summary of the purpose and results of their research on root systems.

Mr. Dupraz also gave the participants an overview of the European Agroforestry Federation, which had been established in December 2011, and outlined its key objectives, which are to better structure agroforestry R&D efforts in Europe and to bring proposals to the European Commission and European Parliament to ensure that agroforestry is taken into account to a greater extent in the next Common Agricultural Policy.

Figure 13. Christian Dupraz

In these meetings with the researchers, the participants were given a brief overview of the current state of agroforestry research and priorities and gained an appreciation that the research was not being done in a vacuum. It was often the case that the early trials had been made possible by the innovation and collaboration of producers, that larger projects had been funded by organizations interested in promoting the return of trees to the agricultural landscape, and that the far-reaching scope of the research findings was the result of alliances among researchers, producers and various

levels of government. Rather than selecting the best sites for experimental purposes, the researchers had opted for sites where collaborations would be easier, a strategy that served them well.

Figure 14. Fabien Liagre

Figure 15. Yves Bachevillier

In addition, the presence throughout the mission of stakeholders working at the interface of R&D in agroforestry systems made it possible to link research projects and development in agroforestry, and provided a better understanding of how an organization specializing in technical support and the cooperation of various stakeholders on the ground could contribute to the rapid development of agroforestry initiatives, despite the fact that regulations and funding alone are not always sufficiently attractive incentives for agricultural producers. In this regard, the contributions of Fabien Liagre and Yves Bachevillier, both of AGROOF, were of tremendous importance in providing the participants with an understanding of the administrative, financial and technical aspects of projects. The explanations given by Mr. Liagre and Mr. Bachevillier shed light on, for example, the market and mechanics surrounding the sale of forest products such as valuable wood; the outreach activities conducted by their organization and others with which AGROOF is associated; the technical and management challenges of each system that was discussed; and the cooperation among the various stakeholders required to complete their projects and promote them to important decision-making bodies.

D. Consultation of written and audio-visual materials on agroforestry and its context

The participants had access to a number of pieces of complementary information on the various aspects of agroforestry discussed during the mission. The oral information was complemented by written documents on the sites toured that contained further details on the context in which the agroforestry projects had been established and the specific roles of the parties involved.

A documentary on agroforestry in France produced and directed by AGROOF was shown to inform the participants of the broader context of agroforestry and enable them to draw links between what was reported in the documentary, what the participants had seen at the sites toured, and what the various stakeholders had said. Given the diversity of these information documents, they were a good way for the participants to validate the information received and to look at agroforestry from perspectives different from those presented during the tours.

E. Opportunities for discussions and interaction among the mission participants

The mission also gave the participants an opportunity to exchange information, views and ideas. Through this informal interaction, the stakeholders were able to get to know one another better, to gain a greater understanding and appreciation of their respective responsibilities and areas of expertise, and to begin to think more clearly about future opportunities for cooperation on the development and dissemination of agroforestry initiatives in Quebec. Some participants also took advantage of this opportunity to hold small working meetings to discuss agroforestry projects in Quebec, or to question the other participants about their motivations and draw on their knowledge to gain an overall picture of the vision of the various stakeholders involved in agroforestry and the management of agricultural areas in Quebec.

5. KEY LEARNINGS

Through the activities conducted, the participants achieved the mission objectives and learned a number of key concepts needed to understand the context and issues associated with agroforestry development in France. A brief summary of the key concepts relating to each of the previously identified sub-objectives is provided below, demonstrating the achievement of both the general and specific objectives of the mission. The general objective was to enable the participants to understand the organizational and operational structure of the agroforestry sector in France, by identifying the organizations involved, the available human, material and financial resources, the operational and regulatory challenges, the manner in which economic and policy aspects are taken into account, and the way in which agroforestry is integrated into the value chain.

A. Current snapshot of agroforestry in France

The various complementary activities provided the participants with an overall view of agroforestry in France, and the visits in the field gave them a concrete idea of the nature and development of certain agroforestry systems. The stakeholders' comments provided a clear idea of the technical, social, economic and environmental challenges associated with the establishment of agroforestry systems and of the motivations that led producers to adopt such systems. The presentations and documentation helped enhance understanding of the historical regulatory and policy context of agroforestry and provided insight into how the roles of the local, regional and national stakeholders contributed to the development and recognition of these systems. The effects of these various components of the broader context of agroforestry could be seen directly on the ground during the visits, and in this way the visits and presentations complemented one another.

Needless to say, the mission alone could not have provided a detailed picture of the current state of agroforestry in France. However, it is important to note a number of key points that provide a broad overview of the current state of agroforestry as seen from the various activities.

- ✓ Agroforestry is still a very recent development in France, but it is growing in popularity, with 30% of producers saying in surveys that they would be prepared to considered it on their plots. According to initial estimates, the cap of 10,000 ha under agroforestry systems could be reached in metropolitan France by 2013. For the time being, producers are using agroforestry primarily as an alternative to the model based exclusively on productivity and high yields. Producers who adopt agroforestry practices are often considered eccentric by their colleagues, but the advantages of agroforestry systems in terms of soil, water and environmental quality are enough to convince producers to persevere despite the difficulties they encounter. Interestingly, agricultural producers who had adopted agroforestry did not report a marked decline in crop yield, even with the presence of mature trees on the plots.

- ✓ From a strictly economic perspective—and excluding the environmental benefits—most agroforestry systems in France are still too young to provide meaningful data on their economic viability (the first systems established have just now reached maturity). The establishment costs are high, particularly for silvopasture systems that require protecting the trees from animals. In addition, timber yields remain hypothetical, because they are contingent on a multitude of factors, including rigorous maintenance and timely pruning for training, precise diagnosis of pest and growth problems, wind resistance, and the wood market. However, more and more funding sources are available for the establishment of these systems (particularly through projects headed up by water boards, research centres, and regional management structures such as regional natural parks, as well as through agricultural subsidies). In addition, the current market for high-quality wood in France is very strong and prices are high, suggesting that establishment costs may be recouped over the long term.

- ✓ From a technical perspective, agroforestry systems are designed and established in such a way as to adapt to the specific conditions of the plot (climate, soil, crops, availability of water, exposure to sun and wind, etc.) and to the producers' needs and resources. While research has provided answers to many questions (tree–crop interactions, effects on yields, distances required between the trees in a row and between rows, the most appropriate tree species, etc.), other questions remain unanswered, leaving it up to the judgement of producers and technicians to manage these systems. The most difficult aspect for producers, however, continues to be tending and maintaining the trees so that they produce high-quality logs and provide attractive revenues. The management of agroforestry plots also requires making changes to the crop management regime and sometimes to the machinery and inputs used. In the coming years, an important operational challenge will be to ensure that the expectations and proposals of producers and other stakeholders involved are taken into account from scientific, technical and regulatory perspectives. Innovative scientific and technical collaboration with producers is a key to the development of agroforestry systems and a source of inspiration for stimulating innovation in agriculture.

- ✓ The high environmental standards and the general awareness of the importance of trees in agricultural ecosystems are conducive to public support for agroforestry and encourage producers and even certain companies to view agroforestry as a valuable agri-environmental practice. These views are increasingly supported by research results relating to the biodiversity of insects found in agroforestry plots, the impact of the rows of trees on wildlife movements, or the effects of the trees on ecology and on soil and water quality. According to a number of the stakeholders that the participants met, the environmental or ecological services provided by agroforestry systems are undeniable advantages in the context of climate change mitigation and adaptation.

- ✓ From a social perspective, factors that facilitate the establishment of agroforestry systems are the existence of regional development plans (such as regional natural parks), the involvement of proponent groups (producer associations, researchers, administrators, etc.), and the presence of a desire to improve quality of life in rural areas and the health of ecosystems that support agricultural activities. Research activities conducted in close cooperation with producers (action research) have also been ways to more quickly disseminate the results of field experiments and facilitate the adoption of agroforestry systems.

- ✓ The strength of the high-value wood market (e.g., wood for sawmills) in France is a major economic incentive for producers interested in agroforestry systems. However, it appears to be rather difficult for producers to obtain quality logs from their trees, since the maintenance and management of trees in agroforestry systems requires knowledge and specific interventions. Moreover, new markets are developing around biomass, either for second-generation wood energy or for biocomposites for the chemical industry. A number of French stakeholders believe that the trees produced under agroforestry systems can provide this lignocellulosic resource without encroaching heavily on agricultural areas, as short-rotation coppice plantations do.

- ✓ From a regulatory perspective, agroforestry is currently well supported and formally recognized by regulatory authorities in France and the European Community; indeed, intercrop trees are now considered integral components of the agricultural system, and agroforestry plots are now eligible for various subsidies under the Common Agricultural Policy (first and second pillars). This recognition required time-consuming efforts and the collaboration of multiple stakeholders. The prospects for the next Common Agricultural Policy are encouraging. A working group that includes the Association française d'agroforesterie [French agroforestry association], the Assemblée permanente des chambres d'agriculture [standing assembly of chambers of agriculture], and the ministries involved has made concrete proposals for the 2014–2020 period.

- ✓ The key strength of the agroforestry sector in France is the parallel development of R&D activities, adapted policies, and agroforestry outreach and promotion organizations that also provide technical support. The coherent and interrelated development of these aspects has established the role and place of agroforestry in France's agricultural landscape and resulted in an effective structure.

- ✓ Agroforestry development in France continues to face multiple challenges that are closely linked to its current weaknesses. Despite now-consistent regulations, an increasing number of encouraging research results, and a social context that is favourable to both environmental initiatives and initiatives aimed diversifying the use of agricultural land, the fate of agroforestry is not sealed. The sector lacks professionals who are trained and qualified in the development and monitoring of agroforestry plots and systems. The lack of professionals limits both the production and the dissemination of knowledge on these systems. Overcoming this lack would require improving educational programs, training field advisors, and supporting project proponents. The difficult economic climate also creates barriers for producers who wish to transform their

production systems. The uncertainty surrounding the status of agroforestry in the new Common Agricultural Policy is another factor that is limiting the development of the sector. In addition, agroforestry promotion associations must work together and develop common action plans. Agroforestry still faces many technical challenges, since maintaining the systems requires skills in forestry, arboriculture, ecology and agrology.

B. Organizational and operational structure of the agroforestry sector

Over the course of the mission, and particularly during discussions with the researchers and members of the AGROOF team, it emerged that there are two key stakeholders that are responsible for the establishment and development of agroforestry initiatives in France: producer-owners and research centres. It is because these two groups of stakeholders came together that the systems developed or maintained by producer-owners were studied and subsequently led to larger-scale research initiatives. The government only recently recognized agroforestry indirectly, without providing concrete means of having it considered a valid practice. Nonetheless, the government has funded many agroforestry research projects. The participants could also see that government authorities, such as the water boards and other agencies responsible for environmental protection, are important stakeholders in the agroforestry sector, particularly when they have funding envelopes that can be used to establish agroforestry systems. The involvement of regional stakeholders such as the administrations of communes (small administrative divisions in France) or regions was also important, as in the case of GRAPPE3 (Vézénobres) or the Caps et Marais d'Opale Regional Natural Park. The private sector appeared to be more active in research and in support for producers.

From an economic perspective, the mission did not give the impression that there was currently a particular market stream for agroforestry products, which are simply sold through traditional agricultural and forestry channels. However, it was possible to confirm the existence of research projects, outreach groups and organizations dedicated to the promotion of this type of agricultural land management. There is a network of groups in France that advocate agroforestry or support the establishment of agroforestry systems, along with a variety of parallel initiatives that, while not aimed primarily at the establishment of agroforestry systems, do not necessarily exclude it. There also appears to be a high level of coordination among the groups of stakeholders.

C. Implementation and impacts of agroforestry projects

The implementation of each agroforestry project at each site visited was a unique initiative. The projects had been initiated sometimes by producers without any external financial support, sometimes by producers with support from an association or government agency, and sometimes by research groups, either with or without the collaboration of technical support organizations. The initiatives to which the participants were exposed appeared to be highly dependent on the

stakeholders involved, the objectives of the producer or the research group, the requirements and resources of the stakeholders, the funding available, and the environmental, social and regulatory conditions. In all cases, however, it appeared that the implementation of projects required the coordination of several stakeholders, and that the presence of technical support for monitoring and managing the agroforestry systems and trees was a determining factor in project success.

The benefits of agroforestry projects also vary significantly depending on the specific characteristics of each system, the reasons for which the projects were established, and the ability of the producers to find a market for their agricultural and forestry products. Although a number of the advantages are still hypothetical at this time—as they are long-term in nature—and remain estimates (e.g., yield of logs, economic viability), it generally appears that the stakeholders have observed an improvement in soil quality and water management, little or no decline in crop yields, increased biodiversity of agricultural systems, and an overall improvement in crop and livestock production conditions. The project benefits are also felt at the regulatory and social levels. Thanks to the results achieved in the projects, agroforestry is now a recognized practice in current agricultural policy. The projects have also enabled the stakeholders in the agricultural sector to work together to integrate agroforestry into strategies for addressing the challenges facing their environments.

D. Agroforestry research, development and knowledge transfer

The mission provided an opportunity to learn about a few of the institutions currently involved in agroforestry R&D in France. The participants also learned about the involvement of CEMAGREF in the mid-1990s, including its contribution to regional projects such as the Caps et Marais d'Opale Regional Natural Park.

Over the course of the tours of the research centres and the discussions with the researchers and knowledge dissemination stakeholders, the participants observed that agroforestry research in France revolves around several main components, such as interactions among the biological components of the agroforestry system (trees, crops, livestock) and the resources of these environments (water, soil, air, minerals, light conditions, etc.), the economic and ecological benefits of agroforestry systems (including their environmental goods and services), and the dissemination and adoption of agroforestry systems.

With the Restinclières site, INRA appears to be the most advanced research institution in terms of the study of agroforestry systems and the relationship between the various biological, soil and climate components of these systems. The researchers with the Institut polytechnique Lasalle-Beauvais focus their efforts primarily on the links between agroforestry and biodiversity (e.g., pollinators), as well as on agroforestry as a more ecological agricultural model and a supplier of environmental goods and services. In contrast, AGROOF specializes to a greater extent in action research with producers and in the development of projects designed primarily to address the producers' prerogatives and objectives.

All of these organizations disseminate the results of their field trials to their respective audiences, and it appears that information circulates effectively between the research centres and outreach organizations. In 2010, the government also did its part for the dissemination of knowledge by producing a circular on agroforestry. This ministerial circular presents the set of rules respecting agroforestry within the framework of the Common Agricultural Policy (first and second pillars: status of plots, eligibility for direct support, cross-compliance, etc.), tax rules, and the tenant farming statute, as well as the national application framework for Measure 222 of the country's Plan de développement rural hexagonal [rural development plan for metropolitan France], which provides for support for the establishment of agroforestry plantations on agricultural plots. However, further collaboration is required to address the growing demand from producers.

E. Adoption of agroforestry systems in France

The adoption of agroforestry systems was addressed several times during the mission, specifically in meetings with producers who owned the properties on which such systems had been established and in discussions with the front-line stakeholders. The adoption of agroforestry systems is still limited, but that situation is likely to change with the recognition of trees as agricultural components of agricultural systems. However, the overall picture is certainly distorted by the fact that hedgerows and forested riparian buffers are not taken into account in statistics on alley cropping.

From the outset, research has been focussed on the factors involved in the adoption of alley-cropping systems, and that focus is in part what has made it possible to precisely identify the regulatory, technical and economic barriers to their development. As previously mentioned, R&D initiatives undertaken in partnership with producers and stakeholders less familiar with agroforestry (local administrations, quasi-governmental organizations, etc.) proved to be effective mechanisms for promoting agroforestry systems and facilitating dissemination of relevant information to stakeholders closely or remotely affected by the systems' potential impacts.

The meetings with the agricultural producers demonstrated that the producers had been influenced more by the ecological and environmental benefits of agroforestry systems and by personal and operational considerations than by strictly economic benefits. It also emerged from the meetings that the producers who had adopted agroforestry had previously reviewed their agricultural systems and were willing to give up maximum yields in return for greater ecological diversity on their farms.

The front-line stakeholders that the participants met indicated that adoption is also more likely when guidance and support structures are available and when the cost of establishing agroforestry systems can be partly covered by agricultural, environmental or forestry assistance programs. In addition, the creation of associations that bring together producers who have taken up agroforestry with those who have not increases the chances that the latter members will adopt agroforestry too.

F. Knowledge of agroforestry sector stakeholders and development of networks between France and Quebec

At the end of the mission, there was no doubt that the participants knew more about the key agroforestry sector stakeholders in France as well as their roles and interactions. The participants made these discoveries, both institutional and personal, not only about the stakeholders from France but also about their Quebec colleagues. Through the mission's many formal and informal meetings with the representatives of government ministries and rural development organizations, producers, agrologists, technicians and researchers, to name a few, human and institutional networks were established. Although perhaps not yet formalized, these networks will nonetheless facilitate future collaborations and foster openness to joint initiatives.

The mission underscored the fact that each of the various stakeholders in agroforestry plays a distinct but complementary role and therefore cannot claim sole responsibility for agroforestry. In France, collaboration among several of these organizations of producers, researchers, professionals and rural networks has led to recent major regulatory developments as well as the creation of more formal multi-sector associations. It is now clear that the determining factor in the facilitation of agroforestry development in France has been and continues to be the roles played by French government ministries, particularly the Ministry of Agriculture, Agri-Food and Forestry (policy and regulations), by AGROOF (research, development and dissemination), by the INRA research station in Montpellier and the Institut polytechnique Lasalle-Beauvais (research and links with the public, quasi-public and private sectors), and by local administrations.

6. OUTCOMES OF THE MISSION

A. Clearer vision of the potential of agroforestry in Quebec

The stakeholders indicated that by learning about the background and context of the emergence and development of agroforestry in France, they were in a better position to assess the appropriateness of agroforestry systems in the Quebec context and to consider developing such systems in keeping with the opportunities and constraints specific to Quebec. Before taking part in the mission, a number of the participants had only a vague idea of agroforestry and its issues. By exposing the participants to the context in France, the mission allowed them to discover various fundamental aspects of this practice and to contemplate applying it at a larger scale in Quebec. For the experts, the mission also provided an opportunity to gain a better understanding of issues with which they were less familiar, and to discuss possible developments with respect to agroforestry research, adoption and dissemination directly with their French counterparts.

B. Networking of Quebec stakeholders

Although some of the agroforestry stakeholders had already begun networking and establishing collaborative relationships, this mission afforded an opportunity for other stakeholders to gain a better understanding of existing initiatives in the field and to meet people involved or interested in agroforestry development in Quebec. The informal discussions during travel time and with French counterparts were very rewarding.

C. Prospective new collaborations

A number of the stakeholders stated that they had gained a better understanding of certain structures involved in agroforestry in France and are now considering collaborations with French stakeholders. Although no official agreements or projects resulted from the mission, it is clear that the links established among the stakeholders during this mission will help strengthen the ties between organizations in Canada, particularly Quebec, and in France. Certain collaborations already exist between Canadian and French researchers, including projects under the Global Research Alliance on Agricultural Greenhouse Gases. Other potential collaborations could take shape in both agroforestry research and agroforestry development.

D. Production of videos and participant surveys

Videos of a number of the field visits were taken by the AGROOF team, and the Quebec and French stakeholders were interviewed during the visits. Excerpts from the interviews will more than likely be used in various outreach and networking documents, thereby strengthening the ties between the stakeholders on both sides of the Atlantic as well as disseminating knowledge of agroforestry systems in France and Quebec to a broader public.

A student from Laval University took advantage of the presence of a large number of stakeholders to conduct semi-structured interviews with them and to gain a deeper knowledge of the Quebec and French agroforestry sector. Her aim is to focus her doctoral research on social and policy issues related to agroforestry in Quebec, on the basis of the concerns expressed by the key stakeholders in agroforestry development. There is no doubt that the mission has already advanced the state of research on these issues or, at the very least, has oriented the research to address the real concerns of stakeholders on the ground.

CONCLUSION

Through the presentations, meetings, exchanges of ideas, field visits and discussions, the participants in this agroforestry study mission to France were exposed to the policy, social, environmental and economic issues related to agroforestry in a variety of contexts in France. Several of the stakeholders, including representatives of the French Ministry of Agriculture, Agri-Food and Forestry and members of the AGROOF team, gave presentations providing a relatively detailed overview of the current state of scientific and technical advances, the benefits to producers and the environment, the key constraints on accelerating the dissemination and development of agroforestry, and the social context that makes it possible to make small steps forward. Although it was not possible for the participants to learn in detail about every facet of agroforestry, they gained an overall picture of the sector from the information received during the mission.

In keeping with the initial requirements, the primary focus was on visits to agroforestry plots and meetings with the key stakeholders in agroforestry R&D and in the establishment and monitoring of agroforestry systems. This combination of on-site observations and discussions proved to be the best way to enable the visitors to gain an understanding of the systems' complexity, effects, and focus on regional, economic, ecological and social issues.

The participants also benefited from the expertise and experience of producers, agrologists, land-use planners, environmentalists, field technicians, researchers, and representatives of government ministries and institutions who generously agreed to host field visits and to share their experience. The participants also attended various presentations on the biophysical, socio-economic and policy aspects of agroforestry in France, including the presentations at the workshop organized jointly by AAFC, Laval University and the representatives of La Bergerie de Villarceaux, the presentations by Yves Bachevillier, Baptiste Sanson and Régis Ambroise, and the meeting with David Grandgirard at the Institut polytechnique Lasalle-Beauvais.

In the end, the mission achieved its objectives by providing a vision of agroforestry in France that offers opportunities for the participants on their return to Quebec. In addition to contributing to networking among the participants, the mission allowed everyone to get to know the agroforestry stakeholders in France and to establish contacts that will certainly evolve into more direct collaborations in the years ahead. The mission also demonstrated that agroforestry is a practice that Quebec and Canada would do well to develop and provided clear courses of action for facilitating the development and recognition of agroforestry by key stakeholders and regulatory authorities.

SUGGESTED REFERENCES TO LEARN MORE ABOUT AGROFORESTRY IN FRANCE

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APPENDIX 1 – LIST OF PARTICIPANTS AND ORGANIZATIONS REPRESENTED

Agence forestière de la Montérégie
Luc Dumouchel, Director

Agriculture and Agri-Food Canada
Stéphane Gariépy, Regional Agricultural Land and Agroforestry Manager, Science and Technology Branch, Quebec Region
John Kort, Researcher, Agroforestry Development Centre

Biopterre and Institut de technologie agroalimentaire, La Pocatière campus
André Vézina, Agroforestry Project Lead and Professor

Centre local de développement de Vaudreuil-Soulanges
Marie-Loup Tremblay, Agri-Food Commissioner

Club-conseil en agroenvironnement Agri-Durable
Simon Lacombe, Agrologist

Conférence régionale des élus Gaspésie–Îles-de-la-Madeleine
Bertrand Anel, Co-ordinator, Agroforestry and Landscapes Laboratory

Conférence régionale des élus Montérégie Est
Martine Ruel, Co-ordinator, Commission régionale sur les ressources naturelles et le territoire [regional commission for natural resources and land]

Conférence régionale des élus Vallée-du-haut-Saint-Laurent
Régent Gravel, Co-ordinator, Commission régionale sur les ressources naturelles et le territoire

Conseil pour le développement de l'agriculture du Québec
Odile Comeau, Executive Director

Institut de recherche en biologie végétale and Montreal Botanical Garden
Alain Cogliastro, Researcher

Laval University
Alain Olivier, Researcher and Director, Groupe interdisciplinaire de recherche en agroforesterie
Geneviève Laroche, PhD student

Quebec Department of Natural Resources, Direction de l'aménagement et de l'environnement forestiers, Service de la planification, des programmes et de la forêt privée
Robert Gagnon, Forest Engineer
Sébastien Lefebvre, Unit Head

Solidarité rurale du Québec
Caroline Jacob, Research Officer

Union des producteurs agricoles
Pierre Lemieux, First Vice-President

University of Quebec at Montreal
David Rivest, Post-doctoral Researcher

APPENDIX 2 – SCHEDULE

May 21 – Bergerie de Villarceaux

- ✓ Presentation by AGROOF
  by Yves Bachevillier

- ✓ "The Bergerie de Villarceaux: Addressing Contemporary Challenges"
  by Baptiste Sanson, agronomy engineer at the Bergerie de Villarceaux

- ✓ Guided tour of silvopasture plots and hedgerows

May 22 – Bergerie de Villarceaux

- ✓ Workshop on alley cropping in France with representatives of the French Ministry of Agriculture, Agri-Food and Forestry:
  - "Agroforestry and Regulations in France"
    by Régis Ambroise, Direction de l'aménagement [land-use management branch], French Ministry of Agriculture, Agri-Food and Forestry

  - "Agroforestry at Agriculture and Agri-Food Canada: An Overview"
    by Stéphane Gariépy and John Kort, AAFC

  - "Agroforestry R&D in Quebec"
    by Alain Olivier, Laval University

  - Tour of research plots dedicated to organic farming

May 22 – Caps et Marais d'Opale Regional Natural Park, Colembert

In the 1990s, in collaboration with CEMAGREF, the park administrators established a dozen research sites on farmland used for cattle and sheep grazing.

- ✓ Guided tour of the alley-cropping system and silvopasture plot at the Ferme de la Vausserie with Philippe Majot, the technician in charge of park development

- ✓ Meeting with Hervé Potterie, the producer who owns the farm

May 23 – Sheep farm, Cormont

This farm has had a silvopasture system for more than 20 years. Gilbert Bécue, the farm owner, met with a few participants.

May 23 – Institut polytechnique Lasalle-Beauvais

- ✓ Meeting with David Grandgirard, a researcher at the institute
- ✓ Tour of alley-cropping plots where canola is grown in association with hardwoods

- ✓ Presentation on the training program and agroforestry research projects under way at the institute

May 24 – Research site at Restinclières, Hérault

Research projects have been carried out, in partnership with producers, by about 15 different research teams at this site for some 15 years. Visits were made to alley-cropping systems combining trees with cereal crops and trees with grapevines.

- ✓ Visit to the research site at Restinclières in partnership with INRA
  with Fabien Liagre (AGROOF) and Christian Dupraz (INRA)

May 25 – Vézénobres, Gard

- ✓ Tour of the Vézénobres agroforestry project in the Gard region. Meeting with the farmer, Denis Florès, who was also the president of CIVAM Bio. Discussions with farmers, AGROOF representatives and members of the GRAPPE3 association concerning the regional project funded by the water agency.

APPENDIX 3 – DESCRIPTION OF PROJECTS AND SITES VISITED

Bergerie de Villarceaux project in Val d'Oise

The Bergerie de Villarceaux is an experimental site dedicated to the sustainable management of rural areas. This site, which belongs to the Charles Léopold Mayer pour le Progrès de l'Homme foundation, encompasses 370 ha of land devoted to organic farming (polyculture and livestock raising) and 240 ha of forests. This is the first large-scale experimental organic agroforestry project (43 ha) to be undertaken in France. The site has 11 different tree species that are associated with crop rotations incorporating the use of temporary pastures and various annual crops (wheat, forage mixtures, lentils, einkorn wheat, sunflower, spelt, fava beans, barley and buckwheat).

The main objective of the agroforestry project is to demonstrate the benefits of combining tree plantings and crops within an organic farming approach by assessing the effects of different management schemes (leguminous vs. non-leguminous tree species, low vs. high tree density, deep vs. shallow soil system) on overall plot productivity (trees and crops), soil quality, biodiversity and the landscape. Some pre-existing landscape elements (hedges and woodlands) have been used to study how agroforestry can promote the connectivity of green corridors across the landscape.

Because agroforestry, like any other agricultural activity, affects the landscape created from the organization of agricultural lands and forested areas, it is essential to take landscape issues into account when implementing agroforestry systems. Other aspects given special attention were preserving landscape views, setting aside a prominent place for agroforestry systems in the landscape, and studying tree-planting sequences.

This project is the result of a partnership between the Bergerie de Villarceaux and AGROOF, an agroforestry research institute. The research partners include INRA, the Institut polytechnique Lasalle-Beauvais, ARVALIS, the Chambre d'agriculture 77 [chamber of agriculture 77], the Chambre d'agriculture interdépartementale d'Île-de-France [Île-de-France interdepartmental chamber of agriculture], the Office national des forêts [national forest office], the Vexin Regional Natural Park, the French Ministry of Agriculture, Agri-Food and Forestry, and the Groupement des agriculteurs bio d'Île-de-France [Île-de-France organic farmers' association].

Silvopasture projects in the Caps et Marais d'Opale Regional Natural Park in the Pas-de-Calais region

The Caps et Marais d'Opale Regional Natural Park, created in March 2000 with the merger of two parks (Parc du Boulonnais and Parc de l'Audomarois), is managed by a board made up of representatives from the 152 communes in the Pas-de-Calais department (as well as four associated communes in the Nord department that are located in the area of the Audomarois marsh), six inter-municipality associations, five business advisory organizations, the department, and the region. Agriculture is an important component of the park, with intensive farming and field crops concentrated in the eastern portion and extensive range-type animal production (dairy cows, Boulonnais sheep, etc.) in the hedged portion. The Audomarois marsh is the site of the oldest market-gardening operation in France, producing cauliflowers, endives, carrots, lettuce and other vegetables.

Agroforestry projects were launched more than 20 years ago in the Boulonnais and Haut Pays regions, in areas characterized by permanent grassland and polyculture. The managers of these projects wanted to develop the grasslands within a context of introduced quota systems, to earn additional income from tree plantings without compromising the agricultural uses of the land, and to increase biodiversity, improve water quality and enhance landscapes. This is a major undertaking involving various partners, including a number of farmers, the Fédération départementale des syndicats d'exploitants agricoles 62 [departmental federation of farmer's unions 62], the regional natural park, IRSTEA, the Centre régional de la propriété forestière [regional forest property centre], and Direction départementale de l'agriculture et de la forêt 62 [departmental agriculture and forestry branch 62]. The overall objective is to determine the limiting factors and requirements for a successful agroforestry project (e.g., plot choice, species selection, planting schemes, protective measures, tending/maintenance and profitability). A network of about ten experimental plots covering 10 ha was established in order to incorporate contrasting soil and climate conditions and various types of pasture land (sheep, cattle and poultry). The trials are also comparing 11 different tree species.

Institut polytechnique Lasalle-Beauvais project in the Oise region

On the 200-ha research farm belonging to the Institut polytechnique Lasalle-Beauvais, a restructuring process was begun several years ago with the objective of developing activities and projects in keeping with the Institute's research and education programs. Agroforestry was adopted as the focus area to meet the expectations of this undertaking. The parcel of land dedicated to agroforestry covers 33 ha, making it one of the most important sites showcasing agroforestry practices in France. The following hypotheses are being tested over the long term: production of high-quality timber; increased overall production per hectare (crops and wood); an increase in the organic matter content of soils; and a decrease in input requirements related to crop pest and disease control.

In all, nearly 3,500 trees (10 species) have been planted (80 trees per hectare) in association with field crops, including barley, canola and winter wheat. The project is more ambitious than those implemented by French farmers, since it is being carried out on a larger scale and involves controls and replications. Project partners have included the Conseil régional de Picardie [Picardie regional council], the Chambre régionale d'agriculture [regional chamber of agriculture], the Chambre d'agriculture de Deux-Sèvres [Deux-Sèvres chamber of agriculture], the INRA research station in Montpellier, and AGROOF. This research platform is promising for the various partners because it will permit the measurement of changes in the different components in the plot over time, from establishment through to harvesting of the timber, and because the information that is collected will be distributed within the established network.

The project's mandate is to show farmers the value of agroforestry by providing them with information and reference models based on a long-term assessment. The planned research activities seek to answer the following questions:

- Do trees and food crops compete with each other?
- Are the silvicultural products of sufficient quality and are they economically profitable?
- To what extent does agroforestry help to protect against erosion?
- Does agroforestry enhance soil quality and the beneficial components of biodiversity?
- How does agroforestry affect wildlife in terms of presence and retention?
- How does agroforestry affect water quality?
- How does agroforestry affect the sequestration of carbon dioxide in renewable biomass?

Special attention will be given to the effect of agroforestry on the reorganization of biological corridors (or greenways) and the recolonization of the agroecosystem by beneficial organisms (predators of crop pests). The goal is to make this platform a model for all of France, especially since this is the largest funded project implemented in the country to date. This agroforestry platform is a research tool available to regional, national and even international partners.

INRA project at the Restinclières site in the Hérault region

The Restinclières site, located 15 km north of Montpellier and covering an area of 215 ha, was acquired by the Department of Hérault in 1990. The agroforestry operations at Restinclières are managed as both a social experiment (association between a landowner and three farmers) and a biophysical experiment (cultivation of trees and crops together). A total of 12,000 trees have been planted since 1995. The agroforestry research component, which was set up to assess and explain the performance of the agroforestry plots, covers 53 ha and incorporates 25 tree species (planted in two types of soil) that are grown in combination with several types of crops (winter wheat, canola, vines, etc.). The experimental layout was designed by INRA. This agroforestry experiment is undoubtedly one of the largest in Europe.

The Programme intégré de recherches en agroforesterie [integrated agroforestry research program], launched in 1999 and funded by the council of the Department, is dedicated to R&D activities involving about a dozen partners, including INRA, the Centre de coopération internationale en recherche agronomique pour le développement [centre for international co-operation in agronomic research for development], the Montpellier and Toulouse schools of agrology, the Chambre d'agriculture de l'Hérault [Hérault chamber of agriculture], the Centre régional de la propriété forestière, and independent associations and consulting firms. The in-depth studies under way examine all the mechanisms of interaction between trees and food crops, from ecophysiological aspects to economic and regulatory aspects.

Regional project of the Commune of Anduze in the Gard region

The goal of this project is to change agricultural practices at the regional level (10 communes) by balancing production with environmental protection and agricultural sustainability. The GRAPPE3 association, the project proponent, is a legally constituted association with a board of directors composed of farmers, practitioners, experts, managers of co-operative groups, and individuals and is supported by public- and private-sector partners (public agencies, companies, associations and individuals). The main activities are aimed at influencing practices, particularly in agroforestry, in order to improve product quality while preserving water resources (reduction in phytosanitary pressure, diversification of crops, and biodiversity), consolidating the profitability of individual farms, and supporting new farmers.

The GRAPPE3 association was established to develop activities that could be implemented through collaboration among various public- and private-sector partners and through citizen participation. Priority activities include the following: identification of agricultural issues in a watershed-based management context; assessment of the potential for agroforestry development through surveys of farmers and landowners; development of a joint management policy; training; demonstrations; support for the pooling of means and resources; support for new farmers; development of alternative agricultural operations through initiatives such as the creation of an exchange for buying and selling abandoned land; dissemination of information to consumers; and establishment of a supply consolidation organization.

APPENDIX 4 – PARTICIPANTS' COMMENTS

Bertrand Anel
Conférence régionale des élus Gaspésie-Îles-de-la-Madeleine

First, I would like to say that the week-long mission was a very rewarding and pleasant experience on various levels: (1) the diversity of viewpoints on agroforestry in France to which we were exposed; (2) the discussions among the participants, who came from an interesting mix of geographic locations and organizations; and (3) the pleasant conversations we had with people, the variety of the landscapes we travelled through and, lastly, the excellent cuisine we enjoyed.

I was surprised to find that the stakeholders we met did not place much emphasis on the potential for wood production. Instead it was several members of the Quebec group who brought up the topic of wood products. The stakeholders placed greater emphasis on the capacity to maintain agricultural production and, particularly, on improvements to the agricultural environment.

All the agroforestry systems we visited had received outside funding (from research funds or foundations). In addition, there is now a European measure in effect that provides financial support for the establishment of new agroforestry systems. Since there is no financial support for silviculture in France, these tree-planting activities are especially remarkable.

Aside from the few older plots we saw, I got the impression that Quebec is not lagging that far behind France in terms of agroforestry activities. A large number of agroforestry systems have been set up in Quebec in the past 10 years or so, and most of them hold promise in terms of both production and knowledge acquisition.

Many presentations addressed very specific topics, and it seems important for us to continue looking at agroforestry as an entity based on a simple concept: combining agricultural and silvicultural production with a view to increasing the overall benefits for individuals and for society at large.

Overall, as co-ordinator of the rural laboratory project entitled *Agroforesterie et paysage* [agroforestry and landscape], I feel very satisfied as a result of this mission with the activities carried out by the Rocher-Percé regional county municipality and its partners. The use of agroforestry to promote multifunctional agriculture and multifunctional landscapes seems to me to be more important than ever. From the meetings and tours in France as well as from discussions I have had with colleagues in other regions and organizations in Quebec, I got the impression that agroforestry has the potential to sustainably support many different types of production and to generate multiple benefits for society. The appropriateness of using public funding to support the establishment of agroforestry systems appears to have been confirmed (the *Agroforesterie et paysage* project was granted funding equal to 80% of the implementation and maintenance costs).

I found it reassuring to hear that the trials undertaken had also had their share of mistakes. I was also happy to obtain information on the costs of implementing these trials. Testing a new method requires making investments and taking risks. From a technical standpoint, I was particularly interested in the various protective measures that were implemented, particularly in silvopasture systems.

With regard to project management, I found it inspiring to visit the Caps et Marais d'Opale park, where a technician is in charge of the agroforestry project: this set-up is a good example of the use of agroforestry by private landowners with a view to collective regional development. With regard to the knowledge transfer associated with our *Agroforesterie et paysage* project, the discussions with other members of the delegation were very informative and provided a better understanding of the diversity of regional conditions.

Agroforestry is a specific tool that is applied at the plot level but is intended to provide benefits for the entire region. The participation of a variety of stakeholders is essential, including not only producers (agricultural and silvicultural), but also regional planners and developers. In order to lead discussions on agroforestry development in Quebec, we must ensure that these stakeholders take part in agroforestry working groups.

Seeing that France has the Association française d'agroforesterie [French agroforestry association], I wonder whether it would be appropriate to set up a similar agroforestry organization in Quebec with the objective of greater representation than is currently the case with the agroforestry committee of the Centre de référence en agriculture et agroalimentaire du Québec. In my opinion, it is important to ensure that agroforestry is not simply lumped in with the agriculture community, especially in matters concerning recommendations for legislation and funding for agroforestry.

In the Quebec context, where the term "agroforestry" covers a variety of systems and practices, I believe we should make use of the terminology work done by the Centre de référence en agriculture et agroalimentaire du Québec. In particular, I think that the term "agrosilviculture" should be used more often to refer to the specific use of a plot for both agricultural and silvicultural purposes. Using well-defined terminology is important for getting messages across clearly.

Odile Comeau

Conseil pour le développement de l'agriculture du Québec

Thanks to the mission, we obtained a good basic understanding of the field and became familiar with the main agroforestry stakeholders in Quebec and France. After going on this mission to France, I have greater insight into how agroforestry could solve some of the issues facing farm businesses (climate change, need for diversification, etc.).

Robert Gagnon and Sébastien Lefebvre

Quebec Department of Natural Resources
Direction de l'aménagement et de l'environnement forestiers
Service de la planification, des programmes et de la forêt privée

From a personal standpoint, this mission gave us an opportunity to learn about and see, on the ground, concepts that would not have had the same impact if we had only read about them in books. Despite the small number of trees per hectare (50 to 100), we were able to appreciate their beneficial effects on the agricultural environment (effects on the soil, on biodiversity, on natural control of insect pests, etc.). Furthermore, we now believe that it is possible to produce high-quality timber in an agricultural setting. This in itself represents a major shift in our thinking.

In spite of the emphasis on agriculture during the week-long mission, we had an opportunity to gain insight into and embrace a component that could have potential for timber production in the future, particularly on privately owned lands in southern Quebec. We look forward to receiving the report so that we may submit the results of the week-long mission to senior management and discuss the potential that agroforestry holds for Quebec society.

We would also like to report on the results of the mission at a meeting of the Table consultative interministérielle en matière de mise en valeur de la forêt privée [interdepartmental advisory committee on private forest development]. We are even thinking of proposing that a committee be set up to deal solely with agroforestry with the goal of studying the complementary aspects of the programs administered by various government departments. Regardless of where these initiatives lead us, our objective is to disseminate worthwhile ideas throughout our respective organizations and create maximum benefits for Quebec society.

Caroline Jacob
Research Officer, Solidarité rurale du Québec

In keeping with its mandate, values and role as advisor to the government on rural matters, Solidarité rurale du Québec is interested in the various aspects of rural life and associated trends as well as in the solutions that can be implemented to revitalize or support the development of rural communities. The mission was an opportunity to learn more about the agroforestry sector and discover new agricultural practices that may produce environmental benefits for neighbouring communities.

I hope that trials will be set up in Quebec to fully assess the potential of agroforestry and that the results of current initiatives can be disseminated widely.

Simon Lacombe
Agrologist, Club-conseil en agroenvironnement Agri-Durable

I think that, through our group's combined expertise, officials in charge of regulations and grants in the agriculture sector will start to hear more and more about agroforestry, since there is still a lot of work to be done in this area. Although the agroforestry systems we saw are promising from a technical and developmental standpoint (particularly for people like me who deal with these systems in the field), I was primarily interested in the progress made in French policies. At the technical level, we need to come up with our own solutions to some key issues. For example, the effect that trees would have on drainage systems in Quebec is a major issue for the agriculture sector, especially in southern Quebec, where we can produce good-quality timber faster from a wider variety of tree species. Furthermore, because of differences in climate, there appear to be divergences between France and Quebec in terms of root competition between trees and crops, and consequently, we must conduct our own research in this regard.

Nonetheless, there is a lot we can learn from France with respect to agroforestry-related policies and regulations. The French are better equipped than we are thanks to their water agencies and other parapublic organizations that provide resources and incentives to develop practices that contribute to regional diversification. However, I believe that the most important step taken in France was to formalize and increase the use of the term "agroforestry" in many of their policies in order to increase the sector's visibility. The following are matters that we should address as soon as possible in Quebec, and I am reminded of them every time I mention agroforestry in my work: What effect does the presence of trees have on an area considered to be under cultivation? How does the presence of trees affect the regulations concerning the spreading of manure and other organic fertilizers (i.e., does that reduce the amount of manure/slurry that I am allowed to apply)? What effect does the presence of trees have on insurance and agricultural income stabilization programs? Is financial assistance available for the establishment, tending and maintenance of tree plantings in the landscape? I hope that our mission will speed up the provision of specific answers to these questions

so that stakeholders in the field are better equipped and have informative answers to give to agricultural producers.

On a personal level, I was happy to see several former colleagues again whom I had not seen since I first became more involved in agroforestry. I also found it encouraging to see some new faces as well as some prominent persons in the agriculture and forestry communities among the participants. I came away inspired and hope to be able to start up at least one project in the not too distant future.

Pierre Lemieux

Maple syrup producer and dairy farmer
First Vice-President, Union des producteurs agricoles du Québec

This mission gave me a better understanding of the roles of and interaction among various stakeholders (governments, research centres, forest engineers and consulting groups) and municipalities that provide grants to reintroduce trees into agroecosystems in order to enhance the environment and landscapes through an agroforestry approach.

Personally, I was able to gain a better understanding of agroforestry and of the role that my organization can play to provide support in the future for Quebec's producers of agricultural and forest products.

Geneviève Laroche

PhD student in agroforestry, Laval University

This mission gave me a better understanding of the relevant issues and the context in which agroforestry systems are established in France, and prompted me to start thinking about agroforestry needs and issues specific to Quebec. France is a country of contrasts, where agroforestry holds promise in both warm and temperate regions, whether for conducting research and making maximum use of available space or for expanding production in landscapes that are densely populated and where forests gave way to agriculture a long time ago or in landscapes where large woodlands need to be connected. I believe that these developments bode well and raise hopes for Quebec, where agricultural and silvicultural conditions vary considerably from region to region, as do the related issues. I could also see that the joint activities of a number of stakeholders taking action at different levels and in a variety of sectors were a determining factor in achieving full recognition for agroforestry in legislation and regulations.

I also found the mission very rewarding from a human standpoint, because I met people who are passionate about and committed to agroforestry, and this made me eager to increase my knowledge in this area. The discussions I had with the French and Quebec stakeholders I had the privilege of interviewing during the mission provided inspiration that will serve me well in my doctoral studies and increased my conviction that agroforestry can revitalize rural areas and communities.

David Rivest
Post-doctoral researcher, University of Quebec at Montreal

This mission gave my organization an opportunity to establish ties with many stakeholders in France's agroforestry R&D community and obtain a better understanding of the issues (productivity, biodiversity, water and soil quality, climate change, etc.) that they deal with in their work. I was able to talk with these experts about the adoption of agroforestry practices and the methods (policy and regulations, R&D, and knowledge transfer) used over the years to enhance agroforestry development. Based on this experience and the activities implemented in France, I believe that Quebec can learn important lessons that will help it chart a better course for agroforestry development.

From a personal standpoint, I established ties with a number of Quebec stakeholders I had never met before. This broader network will surely benefit agroforestry development and promote recognition of agroforestry among agricultural and forestry institutions.

One of the main outcomes of the mission was our being able to compare agroforestry development in Quebec with the situation in France, which we had suspected would be very much in the forefront. We could see that with the recent introduction of appropriate agroforestry funding policies in France and Europe, the future looks promising in terms of stimulating agroforestry development on a large scale. I am convinced that similar measures should be adopted in Quebec in the medium term to make agroforestry more attractive to agricultural producers.

It is my impression that the mission helped key stakeholders in Quebec's agriculture and forestry sectors—who were not necessarily aware of the benefits of agroforestry—increase their knowledge of the best strategies to adopt for promoting the implementation of agroforestry projects in Quebec and optimizing the benefits they provide. I believe that these stakeholders, many of whom exercise some influence in their communities, whether at the regional or national level, are now better equipped to promote agroforestry development in Quebec, if only within their own organizations.

Martine Ruel
Conférence régionale des élus Montérégie Est

The mission showed me that having the political will to ensure that agroforestry has its rightful place is essential. We must get this message across to our elected officials. I realize that R&D is vitally important if we want to make the right investments in the right places. However, we must work together, because without financial support and without the political will (regulations or enabling conditions), it may be difficult to go full speed ahead with agroforestry development here in Quebec.

I hope that agroforestry will be given due consideration in regional integrated development plans for natural resources and land and in other regional or local planning instruments (in particular, the metropolitan land-use and development plan, the land-use and development plans of regional county municipalities, master urban plans, the forest protection and development plans forestry agencies,

etc.). I hope to see local, regional, governmental and other authorities promoting agroforestry projects in order to reintroduce trees into the landscape, increase the area covered by woodlands, promote connectivity, and achieve other agroforestry-related objectives. Ultimately, I hope that the trees planted in agroforestry schemes will help to retain water, regulate low water flows and even improve water quality. It is also my hope that in Quebec, the Department of Agriculture, Fisheries and Food and the Department of Natural Resources will collaborate on and jointly fund projects.

Marie-Loup Tremblay

Agri-Food Industry Commissioner, Centre local de développement de Vaudreuil-Soulanges

The mission provided opportunities to network with stakeholders, acquire knowledge and see established projects. I hope to set up a 34-ha alley-cropping demonstration plot and lease the land to enable up to three young farmers to become established. The trees will also provide added value in the form of enhanced landscapes and water quality as well as economic benefits.

André Vézina

Biopterre and Institut de technologie agroalimentaire, La Pocatière campus

For Biopterre, the mission was an opportunity to establish collaborative arrangements with French stakeholders. We are exploring the possibilities of establishing scientific and technical working relationships with at least three of the organizations whose representatives we met: Centre d'Écodéveloppement de Villarceaux [Villarceaux ecodevelopment centre], Institut polytechnique Lasalle-Beauvais, and AGROOF. During the mission, we also identified appropriate stakeholders for scientific collaboration projects (Fabien Liagre, AGROOF; David Grandgirard, Institut polytechnique Lasalle-Beauvais; and Maryline Loquet, French Ministry of Agriculture, Agri-Food and Forestry). In addition, Biopterre was able to strengthen its ties with the Quebec stakeholders who participated in the tour.

For me personally, the mission provided an opportunity to see agroforestry systems that are not common in Quebec (alley-cropping and silvopasture systems) and obtain a good understanding of the issues associated with their success. It also convinced me of the importance of the environmental benefits provided by these systems. One must be realistic about the possibility of using these systems to produce high-quality timber: quality is not always guaranteed and requires careful tending to achieve. The wide variety of systems we visited will definitely serve as models for my future projects. I am now keenly interested in designing systems adapted to Quebec conditions and problems.

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