Integrating Crops-tree Systems in Out grower Schemes and Food Security

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Abstract: ***In the past decades, the rapid world's population growth and increasing needs for suitable agricultural lands and forest products have occurred at the expense of forests, woodlands, crop diversity, and biodiversity, leading to food insecurity and poverty in some areas. Tree planting and management can help solve society needs for forest products and reduce poverty, through increase in production and income generation. Among many initiatives, Ot grower Schemes have been implemented in different parts of the world to provide wood to forest companies and as income for farmers. Considering the importance of subsistence crops and forest products to smallholders and consumers and the viability of Agroforestry, attention ought to be given to Out grower Schemes that combine tree planting with Agroforest systems. The issue of out grower schemes through integrated crops-tree systems was raised in a previous study of five out grower schemes in Brazil, commissioned by the FAO[3]. This paper examines, based on such research, the views and perspectives of companies' personnel, tree growers, and other stakeholders related institutions with regard to the promotion of Out grower Schemes through integrated crops-tree systems, with views to integrate them with Agroforestry, food security and environment preservation goals.***

Resumo: ***Nas últimas décadas, o crescimento populacional e a necessidade crescente de terras agrícolas e produtos florestais levou a redução de florestas, de culturas agrícolas, e da biodiversidade e conduziu a insegurança alimentar e pobreza em algumas áreas de vários países. As plantações e gestão florestais podem ajudar a atender às necessidades crescentes da sociedade por produtos florestais e contribuir para a redução da pobreza e preservação ambiental se promover o aumento da produção com geração de emprego e renda e gestão ambiental apropriadas. Programas de fomento florestal têm sido implementados em alguns países com o fim de fornecer madeira a empresas do setor e outras e como alternativas de renda para pequenos e médios produtores rurais (P&M) em países em desenvolvimento. Este artigo examina, baseando-se em pesquisa realizada sobre programas de fomento florestal em cinco estados Brasileiros,***

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as visões de funcionários das empresas envolvidos com tais programas e em áreas ambientais, produtores rurais que participam dos programas de fomento e outros atores do estado e da sociedade civil, sobre a promoção de programas de fomento florestal integrados com Sistemas Agro-florestais, com vistas a contribuir para a redução da pobreza prevalente am algumas áreas rurais, para a segurança alimentar e preservação ambiental.

1. Introductions and Background

In the past decades, the rapid world's population growth and increasing needs for suitable agricultural lands and forest products have occurred at the expense of forests, woodlands, crop diversity, and biodiversity, leading to food insecurity and poverty in some areas. These are problems that require urgent attention presently and that demand the formulation of development strategies that solve them through appropriate policies, programs, and technologies. Tree planting and management can help solve society needs for forest products and biodiversity conservation, food security, and to reduce poverty, through increase in production and income generation, with appropriate policies and methods of implementing them. Among many initiatives, Out grower Schemes have been implemented in different parts of the developed and developing world, to provide needed wood to forest and other companies and as income alternatives for small and medium farmers in rural areas of those countries. They have been considered by some researchers and practitioners in the field as important advances in the area of planted forests and have been promoted by governments in some instances and by private forest companies in partnership with rural farmers and communities, among others.

Another theme of great importance in the forest sector, specially for alternatives of employment generation and income for small and medium producers and rural communities, the reduction of poverty, food security, and the preservation of the biodiversity, refers to the Agroforestry Systems. The Agroforestry Systems have been promoted in some countries, more specifically in Africa, where the lost decade of 1980 showed the urgency of looking for alternatives that would contribute to poverty reduction and food security in many countries of that continent. The introduction of Agroforestry Systems have been important in the attainment of such objectives, as could be seen in several works presented in the 1st World Congress of Agroforestry (WAC) that occurred in Orlando, United States in the period of 27 June to July 02, 2004. Also in Asia, in such countries like India, Nepal, Siri Lanka, among others, the Agroforestry Systems have been proliferating in the search of resolution of poverty problems and of environmental degradation, as verified in the same event.

The issue of Out grower Schemes through integrated crops-tree systems was raised in a previous study of five out grower schemes in Brazil, commissioned by the FAO[4] (Alves 2003, FAO). That study was aimed at assessing and examining the relevance of the FAO/CIFOR framework on mutually beneficial partnerships to Brazil, finding ways forward, and identifying partners for more in-depth testing of the framework. The FAO/CIFOR framework grew out of a consultative process that began in June 2000, bringing together representatives of corporate entities, government agencies, NGOs, CIFOR and FAO. That process included a global postal survey, undertaken to determine the magnitude and main characteristics of Out grower Schemes and, in turn, developed a preliminary framework to help analyze and develop such schemes (Desmond and Race, FAO 2000), and was an important information source for this study focused on Brazil.

The current FAO/CIFOR framework presents a set of guidelines for assessing Out grower Schemes' potential for sustainability, their benefits to both tree growers and forest companies, and their ability to contribute to equitable and sustainable management of forests. The study of out grower schemes in Brazil was first, to assess how the economic, socio-cultural, ecological, management and policy issues identified by the FAO/CIFOR framework are incorporated into the Out grower Schemes. And second, to identify stakeholders who could work together in an action-learning process for an in-depth testing of the framework with the FAO and other organizations. The research also sought to obtain insights on which would be the most indicated form of exploration of the small and medium farms participating in the Out grower Schemes, seeking to improve their role in food security and environment conservation.

This paper examines one of the major issues raised by that study, which is the establishment of Agroforestry Systems in the farms involved in the Out grower Schemes. The responses to the questionings about the most indicated use of the small and medium farms in rural areas of Brazil and the insights obtained on the economic, socio-cultural, policy and ecological dimensions of the schemes, called attention to the role of Agroforestry to help participants growers with other sources of income and aliments during the time required for tree returns, one of the problems confronted by them. Agroforestry Systems have the potential to support equitable and sustainable development if they recognize the socio-economic, cultural, policy, and environmental dimensions of rural farmers and

relate their work to food security and sustainable agriculture and forestry. According to The Orlando Declaration (2004), "the adoption of Agroforestry during the next decade will greatly enhance the achievement of the United Nations *Millennium Development Goals".* These are certainly, among the goals of developing countries in their development process in the 21st Century.

Considering the importance of subsistence crops and different forest products to smallholders and the society generally and other findings about the economic viability provided by Agroforestry systems to the people involved in a sustainable way in Brazil (Lopes and Almeida, 2993; Capobianco, 1997*)*, attention ought to be given to Out grower Schemes that combine tree planting within agro forest systems. This paper examines, based on the research mentioned, the views and perspectives of company personnel, tree growers, and other stakeholders' related institutions involved in such Schemes, with regard to the promotion of Out grower Schemes through integrated crops-tree systems. After this introduction, the paper presents a section on literature survey about the role of forests in equitable and sustainable development of nations, and other sections on the methodology and cases selected for the study mentioned and the findings related to the questions examined in this paper. The concluding remarks presents recommendations about Agroforestry Systems to farmers in the Out grower Schemes, in ways that contribute to food security and sustainable development.

2. Literature Survey

An important body of literature on Out grower Schemes (Mayers and Vermeulen 2002; Desmond and Race 2000; Arnold, 1997), among others, discusses different kinds of schemes around the world, their roles, problems, limitations, and potentials in the area of planted forests and sustainable development. Seeking to use the forest sector in ways that lead to that kind of development, organizations as the Food and Agriculture Organization of the United Nations (FAO), the International Conservation Union (IUCN), the Center for International Forest Research (CIFOR), the World Wildlife Fund (WWF) and others, have called attention to the importance this sector may have to sustainable livelihoods and environmental conservation.

FAO works within a mandate "to enhance human well-being through support to member countries in the sustainable management of the world's trees and forests". IUCN sees sustainable development as hinging "on the successful integration of efforts to conserve nature and eradicate poverty." CIFOR's

research and empirical studies recognize the importance of including all stakeholders in its work toward "the empowerment of forest people, more equitable sharing of forest resources, improved cooperation among stakeholders, better links between policy-makers and forest-based groups, leading to poverty alleviation and improved conservation of resources". And the WWF, as an advocate of targeting public funds for the restoration of multi-functional forest landscapes emphasizes: a) lobbying against socially or environmentally damaging plantations; b) promoting the landscape approach to balance intensive wood production and other forest goods and services; and c) identifying a common vision for the future of plantations via the establishment of an independent, multi-stakeholder plantations commission.

The study also considers other important issues raised by the previously mentioned organizations and others such as the International Institute for Environment and Development (IIED), and by the available literature on Out grower Schemes and Community Forestry (FAO, 2001), on partnerships between forest companies and smallholders (Holding and Nawir, 2002) and others, and studies on the subjects related specifically to the case of Brazil such as Lopes and Almeida (2003) in the case of Agroforestry , among others.

In this paper we examine the perspectives for the integration of Agroforestry Systems in the properties of the rural producers that participate in Out grower Schemes. Such integration is considered here of great importance to socio-economic and sustainable development strategies that seek to reconcile the production of food crops with the plantation of forests, in order to contribute to the food security and biodiversity conservation. Agroforestry Systems have been developed in different parts of the world (Mead and Healthy 2004), more specifically in Africa (Healthy and Dagar, 2004) and Asia (Kumar and Miah, 2004). Other studies (Schroth et al, 2004), confirm that such systems have already gotten the attention for the amount of information accumulated recently, on the effects of different Agroforestry practices in the conservation of the biodiversity.

An important element related to the adoption of Agroforestry Systems that must be considered refers to the diversity of the environments where they can be introduced. Taking a country such as Brazil or area, like the Latin America, for example, one must considers the existing diversity so that the systems and Agroforestry technologies adopted for these areas are appropriate. Peter

Hildebrand and Marianne Schmink (2004) affirm that "one of the great challenges facing developers of science-based Agroforestry Systems is the heterogeneity and diversity of the livelihood systems of smallholders who can benefit from the technology. Diversity exists, across regions and among communities, but even within seemingly homogeneous communities there is heterogeneity among households". This diversity must be considered in different countries and regions and inside countries with different ecosystems and regions as Brazil for example, so that such programs are well developed and resources not wasted.

Within the diversity of Agroforestry experiences, we adopt the concept included in the Orlando declaration, to which "Agroforestry is a dynamic, ecologically based, natural resources management system that, through the integration of trees on farms, ranches, and in other landscapes, diversifies and increases production and promotes social, economic, and environmental benefits for land users." The declaration also calls attention that unfortunately, many policy-makers, natural resources professionals, and farmers still lack an awareness of the potential of Agroforestry. In this text we will stress the importance of promoting Agroforestry systems for countries such as Brazil that has a large amount of forest land and different ecosystems where those systems can be stimulated in areas such as the Amazon that has different Agroforestry experiencies as well as in the Out grower Schemes and other Ecosystems.

Literature focusing on Brazil and other Latin American countries on the themes of forestry and environment recognizes a variety of experiences and some examine possibilities related to the Agroforestry Systems (Lopes and Almeida, 2003). Capobianco (1997) found that Agroforestry experiences in Brazil present economic viability in terms of providing for the people involved in a sustainable way. The four major innovations identified by him are those that seek to: 1) promote sustainable practices for the timber sector, trying to reduce its negative impacts, diversify the types of species exploited and increase the control of local communities; 2) increase the exploitation of value-added non-wood products; 3) recuperate degraded lands in partnerships with rural farmers, planting native and non-native species; and 4) promote an articulation of government and non-government actors in the formulation of public policies for the socio-environmental sustainability of forests and populations. These innovations offer a different concept of resource use than in the past to help avoid in

other ecosystems such as the Cerrado, for example, and others, a recurrence of the devastation suffered by ecosystems such as the Atlantic Forest by the development process over the years.

With regard to food security, the FAO, the United Nations organization responsible for Agriculture and Food, has been working in several fronts in order to help reduce the food insecurity still present in the world today. According to a study of that organization on the state of the food security in the World in relation to the attainment of the objectives of the World Cupule on Food and the Objectives of Development Millennium (2004), FAO conclude:

> *Hasta la fecha, los esfuerzos para reducir la hambre crónica en el mundo en desarrollo han estado muy lejos de alcanzar el ritmo necesario para reducir a la mitad el número de personas que padecen hambre hacia el ano 2015.* ***Debemos hacer mejor****. 2) A pesar de los lentos y vacilantes progresos obtenidos a escala mundial, numerosos países en todas las regiones del mundo en desarrollo han demostrado que el éxito es posible. Más de 30 países, que engloban una población total de más de 2 200 millones de personas, han logrado reducir la prevaléncia de la subnutrición en un 25 por ciento y han realizado importantes avances para reducir la mitad el número de personas que padecen hambre hacia el año 2015.* ***Podemos hacer mejor****. 3) Los costes de no tomar medidas inmediatas y enérgicas para reducir el hambre, calculados en tasas comparables en todo el mundo, son escalofriante...Cada año en que el hambre se mantiene en los niveles actuales comporta un coste cifrado en más de 5 millones de fallecimientos infantiles y en miles de millones de dólares en pérdidas de productividad y de ingresos en los países en desarrollo. E los costes de las intervenciones que podrían reducir el hambre resultan, en comparación, irrisorios.* ***No podemos permitirnos no hacerlo mejor.*** *Grifos meus.*

The discussion of Out grower Schemes that associate to Agroforestry Systems in the properties of small and medium rural producers seeks to contribute to development alternatives with the potential to contribute to the reduction of the poverty still present in several areas of Brazil and of the world, to food security in these areas, and that lead to biodiversity conservation. Because otherwise -- with increasing monoculture and/or plantations, the biodiversity would continue to be reduced, compromising indispensable resources to the socio-economic, ethical and sustainable development of the countries that still seek and need it.

For the purpose of the research mentioned and in relation to Out grower Schemes, **growers** means farmers contracted with Out grower Schemes; **government staff** are representatives of local, state and national governments dealing with forestry and environment issues; **NGOs,** Non-governmental organizations; **Associations** means different groups such as the Small Farmers Associations, The Landless Movement (MST) and others, and **Third Parties** refer to NGOs or other Institutions that can assist in negotiations--parties not directly participating in the contracts between farmers and companies. **Agroforestry** refers to systems where tree planting are combined with food and other crops in order to contribute to socio-economic, cultural and ecological development goals.

3. Methodology Adopted for the Previous Research

The research that served as basis for the analysis developed in this paper was conducted on five Out grower Schemes of the forest companies Aracruz Cellulose S.A, Bahia Sul, CENIBRA, Klabin Monte Alegre and Klabin Florestal, located in the states of Espírito Santo (ES), Bahia (BA), Minas Gerais (MG), Paraná (PR), and Santa Catarina (SC) respectively. These states belong to the Atlantic Forest which has in its domain the states of Rio Grande do Sul, SC, PR, São Paulo, Rio de Janeiro, ES, MG, BA and parts of Goiás and Mato Grosso do Sul. According to (FASE 2002), for the occasion of the country's discovery, the Atlantic Forest covered more than 1.3 billion of square kilometers, 15 percent of its territory, but has been reduced to 8 percent today. Among the factors contributing for this reduction we find the predatory use of its natural resources, various economic cycles--gold, sugar cane, coffee, clearance for agro-pasture and silviculture activities, rapid industrialization and urbanization. Other studies by the National Institute of Space Research (INPE) and SOS `*Mata Atlântica*`, cited by FASE (2002), compared satellite images of forest reminiscent and associated ecosystems of the Atlantic Forest in those ten states, of years 1985, 1990, 1995 and 2000, and found that since the year of 1985 more than 1 million hectares have been cleared.

The fieldwork was conducted from 29 December 2002 to 16 January 2003, and 18 February 2003 to19 March 2003. The cases selection was based on literature review and research on the Websites and links of organizations such as the Brazilian Environmental Ministry (MMA), Brazilian Society of Silviculture (SBS), Brazilian Company of Cellulose and Paper (BRACELPA), in addition to international literature provided by Christine Holding (FAO), and other forest companies. The location of the schemes in the Atlantic Forest, the need to assess the elements of the FAO/CIFOR framework

in different contexts, and the limited number of Out grower Schemes that could be researched in the time frame allowed for the research were elements considered in the case selection.

Case Studies Location (Companies, not all cities where growers are located)

1 – Aracruz Cellulose S.A - Aracruz – ES (Case not included in this paper).
2 – Klabin Monte Alegre - Telêmaco Borba - PR
3 – Klabin Florestal - Otacílio Costa - SC
4 – Bahia Sul - Teixeira de Freitas - BA
5 – CENIBRA - Belo Oriente – MG

A total of 20, 51, 16, 13 people were interviewed, from the companies, tree growers, governments/research, and associations/NGOs, respectively. The sample is not as broad as might have been desired and a more adequate assessment would require the inclusion of a larger number of tree growers and of other stakeholders. However, it fulfils the assignment to make a preliminary assessment of the FAO/CIFOR framework and obtain insights to help in the elaboration of future testing of the framework, possibly in the sites studied. This paper focuses on the four later cases that were chosen for more detailed studies and on some of the research questions as posed bellow.

The major instrument used to collect the data was a structured interview, designed for different stakeholders: Version A was directed toward company staff including managers of the Out grower Schemes and of the environment sector and field technicians; B for a sample of the tree growers participating in the schemes and C for government officials at different levels, researchers, members of NGOs and of Associations of Producers, including Cooperatives, Landless Workers (MST), etc., that have a stake in rural land use issues. The interviews sought information on the economic, socio-cultural, ecological, managerial, and policy aspects of the management of forests as these relate to the Out grower Schemes and their contexts. Also on the perspectives for partnerships among the stakeholders involved in the cases studied for in-depth testing of the framework and improved elaboration and implementation of Out grower Schemes and on insights about the most indicated sustainable use of the small and medium farms in the country.

The fieldwork also included government offices related to agriculture, extension and environment such as the Brazilian Corporation for Agriculture and Rural Extension (EMATER), the National Institute for Land Reform (INCRA), the Brazilian Environment Institute (IBAMA), the Brazilian Agricultural Research Corporation (EMBRAPA), as the EMBRAPA-Florestas etc. A percentage of the small and medium farmers participating in the Out grower Schemes of the municipalities and regions of the states where the companies develop their activities in planting forests and processing operations were also interviewed.

Table 1: Companies Included in the Study/Individuals Interviewed

Companies	**Number of People Interviewed**			
	Company	Growers	Governments/ Research*	Assoc/NGOs*
Aracruz Cellulose	07	27	03	10
Klabin-PR	03	08	06	03
Klabin-SC	04	03	04	---
Bahia Sul	03	07	---	---
Cenibra	03	06	03	---
Total	**20**	**51**	**16**	**13**

*Government agencies such as EMATER, State Agency for Agricultural Research and Rural Extension in SC (EPAGRI), (IBAMA), State Institute on Forests (IEF), Municipal Secretary of Industry. *Researchers from EMBRAPA-Fl, Small Farmers Associations (CCA), Landless Movement (MST), NGOs APTA (Appropriate Technology in Agriculture) and FASE (Federation for Socioeconomic Education and Public Policy Analysis).

The next section presents the findings related to the questions examined in this paper, including the views of the company staff involved in the Outgrower schemes and environment issues related to management, policy, and others, tree growers and third parties, with regard to the integration of crops-tree growing along with the Out grower Schemes. It includes brief information on the cases studied and the answers of those interviewed to the questions on crop diversity, company or other programs on the subject matter, and tree planting in consortium

with subsistence crops in the landholdings of small and medium farmers that participates in the Out grower Schemes. The questions posed were:

1) Whether crop diversity was stimulated in the Out grower Schemes;
2) If there were incentives and/or development of programs by company, governments or other institutions directed toward the diversification of production in the landholdings;
3) Whether the growers received information on the planting of other crops in consortium with the forest in their holdings.

4. Agroforestry along with Out grower Schemes and Food Security

The issues of crop diversity and tree planting in consortium with subsistence crops were mentioned in different occasions during the research, but this section will focus on specific questions posed about the issue when examining the most indicated use of small and medium farms in the country. The answers to those questions stimulated a deeper discussion about crop diversification and the promotion of Agroforestry Systems to the farmers participating in the Out grower Schemes, relating those systems to food security, poverty alleviation and environment conservation.

Bellow we present brief information on the cases studied and the views of companies, tree growers, and in some cases other stakeholders, with regard to the questions posed, which sought to verify if the Out grower Schemes include measures to keep and/or elevate the social and ecological integrity of the participating farms.

4.1 The Out grower Scheme of Klabin Monte Alegre - Paraná

The Fazenda Monte Alegre Out grower Schemes consists of a partnership among Klabin-PR, landholders located within 100 kilometers of the factory, municipalities of the area, EMATER of Paraná, and the Environmental Institute of Paraná (IAP). Documents provided by the Out grower Schemes coordinator state that these forest partnerships can contribute to the democratization of the wealth generated by the forests, maintain small farmers on their farms through the production of economically viable crops, create local forest-based enterprises that provide production and exploitation alternatives and income to the farmers, promote a larger raw material resource base, provide opportunities for productive use of family labor in lean periods between cropping seasons, maintain ground cover and control soil erosion, and protect and recover the riverside forests.

The scheme started in 1987 in four municipalities and, according to the Program Coordinator, after three years of successful implementation and increasing local interest, the "Term of Technical and Administrative Collaboration" was signed on November 15, 1991 by Klabin, the Paraná government (through EMATER and IAP) and 11 municipalities. The agreement provided an example of a multi-stakeholder mechanism for implementing the scheme, facilitating dialogue towards enhanced equity, social and ecological sustainability of Out grower Schemes. This kind of mechanism may contribute to goals such as the adoption of strategies such as Agroforestry Systems to help achieve those goals. The Out grower Schemes currently has 4300 growers and 42 000 ha of forest planted with *Pinus Taeda* and *Eucalyptus Glandis* in landholdings of various sizes.

With regard to the question on the existence of crop diversification on the farms that participate in the Out grower Schemes, two company staff answered yes and the other two answered no. Most of the growers (4) said that they planted vegetable gardens with potatoes, corn, and beans; two answered no, one said that he would never plant rice/beans or other crop because that would require paying labor benefits, and the other informed that he would never plant more than 30 percent of his

farms with forests. Lack of labor was an issue raised by the tree growers, especially in the first three years of forest establishment, an important reason to justify the promotion of Agroforestry Systems, once studies in Brazil (Lopes and Almeida 2003) has found that such systems use less labor than most other agricultural pursuits.

With regard to the second question, two company staff informed that EMATER gives incentives to diversification in the small and medium farms and the company supports it, two others said that there were incentives to diversification by the federal and state governments. The grower's answers varied. Two said that EMATER helped with diversification, two answered no, and the other answers were: did not know, the company gives some information to plant corn with the forests, one does it by himself as he adds the planting of the trees to the planting of corn. The later informed that the Union or family agriculture group is promoting crop diversification in the area.

Related to the third question-- Whether the tree growers received information on the planting of other crops in consortium with the forest in their holdings, three of the company staff informed that the growers did plant the forests in consortium with beans, corn, cassava and rice and another said that they did not suggest the growers to do it in the scheme, but in other areas of their farms. Two growers answered no, but informed that the company was starting to advice about this matter and two informed that after four years, the shade prevented growing other crops with the trees. It implies that programs aimed at stimulating agro-forest activities ought to be designed for the first four years of forest establishment.

4.2 The Out grower Schemes of Klabin Florestal – Santa Catarina

Klabin Florestal, located in the state of Santa Catarina, operates its Out grower Schemes through a partnership with the owners of the small and medium farms of the region, the prefectures, and the state extension agency EPAGRI. The main objective is to plant forests on under utilized and marginal areas of the farms, a process also stimulated by the state government, whose role seemed to be an important element on this Out grower Schemes.

The Out grower Schemes started in 1983, with distribution of *Eucalyptus sp* seedlings to farmers to produce wood for energy. This program did not succeed. According to the Klabin program coordina-

tor, it ended in 1988 because, among other reasons, the species was not well accepted. In 1990, the scheme began again, distributing *Pinus* seedlings to farmers. Through EPAGRI, Klabin participates along with other forest companies in the Foment Forestation Program of Santa Catarina.

This Out grower Schemes includes rural farms between 20-50 ha. This program has developed for some years and, according to the program coordinator, it has produced good results. Klabin has given around two million *Pinus Taeda* seedlings of high genetic quality to about 500 tree growers in the 12 municipal districts close to its factory. Farmers have already planted 10 000 ha of forests; the company plans eventually to involve 40 000 ha in the scheme.

In this case, two company staff answered yes to the first question on crop diversification, pointing out that they did not use land designated to other crops to plant trees, one said crop diversity was the government's responsibility and the other that often the growers had pasture land on which the trees could be planted. One of the growers confirmed that most had pasture on their farms, one answered no and the other, a large grower, said that 55 percent of his farm remains with native forest.

To the inquiries about the existence of incentives or projects by the company, governments or other institutions toward the diversification of production and if the growers received information about planting the trees in consortium with other crops, two of the company staff answered, to the first, that the state maintained various agricultural programs, even to organize farmers, one did not know and the other answered no. To the second question, two said EPAGRI had a program on agro-silviculture. The growers all answered no to the first question, and to the second question, one said that he had heard about it, another answered no and the other informed that there were incentives to plant the trees in consortium with pasture.

To government staff, whose views are included in this case because of its role in the scheme, these three previous questions were integrated into one, examining if the Out grower Schemes promoted crop diversity in the farms, consortium of trees with other crops and if consideration were given to the planting of native species. One answered no, another said the growers were advised on these matters and that there were some experiments, another informed that research on the combination of *Pinus* and pasture found no reduction in returns if they were grown together. The other answered

yes. In this case, crop diversification was a concern of government staff, but the company did not encourage it and the growers did not get information about planting forest in consortium with other crops, although they said the state was working on the subject. The state is aware that in low income areas subsistence crops are necessary to small growers with limited cash to buy goods and services.

4.3 The Out grower Schemes of Bahia Sul - Bahia

The state of Bahia has the second largest forested area in the country (Bracelpa, 2002). The Out grower Schemes of Bahia Sul, the `Programa de Fomento de Madeira` (PROFMAD), began in 1992 and had its first harvest in 1999. Its main objectives are to stimulate productive activities to small and medium farms in the region; to encourage the growth of *Eucalyptus sp* using marginal and sub-used areas; to produce wood to sell, for farmer own consumption and in conjunction with other crops as animal enterprises; and as income diversification.

This Out grower Schemes has 113 growers in 14 municipalities, 10 in Bahia, 03 in Espírito Santo and 01 in Minas Gerais. The later two states border Bahia, but belong to the southeast region. The Bahia Sul has planted 17 000 ha of forest through the Out grower Schemes and plan up to 32 000 ha in this modality. The sizes of the grower's farms, ranging from 5 to 3000 ha, are larger than in the other cases.

When asked if there plantation diversity in the farms that participate in Out grower Schemes, three Company staff answered yes and the other no. Three of the growers answered yes and three no. The growers answering yes cited: short-cycle pasture and fruit crops, and one who answered no said that this kind of experiment does not exist at the national level. The lack of information about the promotion of the diversification of cultures in the rural properties seems to be confirmed by the literature, but this has been changing in the recent years, as for example the proposition of Agroforestry Systems by the EMBRAPA in Paraná, for example.

With regard to incentives programs by companies, governments or other institutions directed toward the diversification of production in the landholdings, three Company staff informed that the incentives to crop diversification were given by the company. Three growers answered yes and three no, and one of them said that he did not know about any program or incentive toward crop diversifica-

tion in their farms, although this is one of the schemes studied that promotes such diversification (trees with livestock). One grower informed that such incentives/information on diversification happens more at a particular level, meaning this is not extended to the Out grower Schemes as a whole.

Three company staff said that information was given to growers on the planting of other crops in consortium with the forest. Three growers confirmed that response, two said the consortium is done only with pasture and the other said that it could be done. Company personnel cited as examples of diversification silvopastoril and Agroforestry, mostly pasture. Growers said it was not well disseminated. But in this case crop diversification in the landholdings was encouraged and according to the company staff, 30 to 40 percent of growers practiced crop diversification, an important point since the cultivation of other crops is often a necessity for small and medium holders achieve subsistence and other goals in such areas.

4.4 The Out grower Scheme of CENIBRA - Minas Gerais

The Out grower Schemes of CENIBRA started in 1985 as an extension program of the State Institute on Forests (IEF), but the scheme with formal contractual links with the rural producers started in 1995. CENIBRA operates in Minas Gerais, the state with more planted forests in the country (IEF 2002), and a long-term tradition in forestry. There are other forest companies in the surrounding area, which has been the focus of an important interdisciplinary study on Biodiversity, Population and Economy by researchers from the Federal University of Minas Gerais and other research institutions. Other authors as (Guerra, 1997) have discussed socio-economic and environment impacts of the culture of *eucalyptus* in the area, including use of land previously occupied with subsistence crops and changing the pattern of agriculture and local landscape, causing various environmental problems and creating economic and social dependencies, and negatively affecting the soils and water courses in the area.

The Company has contracts with small and medium farmers to plant *Eucalyptus sp*, mostly *Urophyla/Glandis*, to be sold to its pulp mill when harvested. The scheme today includes 610 tree growers and 1029 contracts with small and medium-sized farms with a medium size of 8.96 ha, in 48 municipalities in four regions of the state. There are 8.932 hectares of land planted through this partnership and the company plans to plant a minimum of 2.300 hectares per year. To have contracts

with CENIBRA, the farmer must be located within 180 kilometers of its pulp mill, have 10 ha minimum for beginners and 5 ha for those with previous contracts with the company.

Half of the company staff answered yes and half no to the question on whether there were crop diversity in the growers holdings, but their answers refer to the existence of other crops in the holdings and not in the Out grower Schemes. One grower answered yes and three answered no to the same question. The company staff and growers who answered yes cited: pasture, coffee and subsistence crops. One government staff answered yes and two answered no to that question. These answers show that crop diversification is not encouraged in the area.

According to all company staff, there are no incentives or programs by companies, governments or other institutions directed toward the diversification of production in the landholdings. One of the growers answered yes, three answered no and two did not know about incentives. The company staff said that crop diversification was not good for the forest. One grower said the meetings gave incentives to diversification in their farms, but did not inform which meetings, although it is most probable that he refers to meetings promoted by the company to inform about the Out grower Schemes.

The company staff agreed that information on the planting of other crops in consortium with the forest was not given to farmers. Four growers also answered no to this question and two said they have never received any information about this. Crop diversification in the small and medium farms was not encouraged in this case, although it operates close to Bahia Sul, which encourages tree planting in consortium with pasture. Also, the growers did not obtain information or orientation on crop diversification or on how to plant trees in consortium with subsistence or commercial crops.

One of the conclusions about the integration of tree-crops systems in the in the small and medium farms that participate in the Out grower Schemes, is that to improve the chances for adoption of Agro-forest systems in conjunction with those schemes, different stakeholders, specially tree growers and their supporters and associations, research, governments and non-government organizations ought to work together in the elaboration of programs of such nature. As partners, these different stakeholders must examine the feasibility for tree-crops integration in each region or area of the

country, soil aptitude and the socio-cultural, political and environmental conditions and influence public policies toward their design and implementation with participatory methodologies.

5. Concluding Remarks

Among the reasons that contributed to the focus on the theme of Agroforestry Systems integrated into the Out grower Schemes with views to contributing to food security, is the recognition of the importance of such systems at the world level, with experiences that demonstrate their viability in the last three decades and the proliferation of Out grower Schemes worldwide. Equally important was the fact of seeing the Out grower Schemes for rural properties as an opportunity for promoting a development strategy that considers the social, economic, managerial, policy and cultural dimensions of small and medium farmers and that has the potential to contribute to poverty reduction, food security and conservation of biodiversity. Legislation and alternative practices on Agriculture, Forestry, and Environment preservation have been already promoted in Brazil, and by some International Organizations, the United Nations and others, and if assumed by appropriated public policies in those areas can certainly help them contribute to the Development process in such fields and to the Development Goals of the Millenium.

The promotion of Agroforestry Systems to the farmers participating in the Out grower Schemes are important ways to help in their subsistence needs and of family agriculture groups as well. For the formulation and implementation of such systems, it is important to accentuate the governments' and other stakeholders´ roles, and institutional changes that contribute to improved conditions for a participatory approach to implement them in ways that benefit the tree growers, companies, cooperatives and other actors in the forest sector, the environment and society as a whole. For example, EMATER was mentioned in most cases as an institution that help rural farmers, and given its respected role in extension, it can certainly help with Agroforestry and other programs to plant fruit and other native trees in small and medium farms. Likewise, agencies as the IEF, IAP, EPAGRI and others with stake in the schemes, agriculture, environmnent and forestry; family agriculture and environment groups; NGOs, associations; cooperatives and unions; are important actors in such process when relating it to food security, income generation and environment preservation.

Introducing crop diversification to make up for the long time required to grow the forest or planting forests in consortium with subsistence crops, e.g. Agroforestry activities, are recommended. Only one of the schemes studied promotes the planting of other crops integrated with the trees. This alternative was not well accepted by the other cases. If it comes to be considered as an appropriate policy as this study recommends, Agroforestry Systems would need to be proposed and supported by other stakeholders such as government extension agencies. An integrated work with the FAO that has experience in this area could certainly help. For example, to conduct studies that compare Out grower Schemes that promote diversification of trees and crops in the small and medium farms and encourage them to plant the trees in conjunction with other agricultural crops, with those schemes that do not support livelihood diversification. Results of such studies could provide useful guidance in future Out grower Schemes and on the significance of farm enterprise diversification for the livelihoods of growers and environmental sustainability.

Agroforestry Systems established through sound ecological technologies and socio-economic and cultural considerations can contribute to farmers in Out grower Schemes and other community members, by providing income opportunities and aliments for them and their families. This system was suggested by many interviewees as a way to help in the subsistence needs of tree growers. However, the farmers could also produce crops that can have value added by agro-industries, furniture companies or grower's cooperatives to local, regional, or other markets, contributing to the socio-economic and sustainable development of the area with income opportunities to rural farmers and other workers. The integration and diversification of trees and agricultural crop systems may also help governments and policy makers in attempting to formulate forestry policy with immediate impact on poverty alleviation and the environment while helping with problems related to the long term growing required for tree return, and improve food security and environment conservation of rural farms in Brazil.

To improve the chances for adoption of Agroforestry Systems with the Out grower Schemes, different actors, especially the tree growers participating in such programs and their associations, in an integrated work with the other stakeholders as mentioned before, specially universities and government research institutions, need to examine the viability of such tree-crops integration in each area. This is useful in order to consider the existing heterogeneity in such areas and to influence public

policies for their formulation and implementation through appropriate technologies and participatory methodologies. Systems and methodologies that integrate the social, political-cultural, economic and environmental dimensions, in a development process that has as central objectives the reduction of poverty, food security, the preservation of biodiversity in such areas and a process of socioeconomic, ethical and sustainable development.

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