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MINISTERIUM FÜR ERNÄHRUNG UND LÄNDLICHEN RAUM

**WORKING GROUP ON DEVELOPING
SUSTAINABILITY CRITERIA AND STANDARDS
FOR THE CULTIVATION OF BIOMASS USED FOR
BIOFUELS**

WORKING PAPER:

**Compilations of existing certification schemes, policy
measures, ongoing initiatives and crops used for bioenergy**

June 2007

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- Forest Stewardship Council, FSC
- Programme for the Endorsement of Forest Certification Schemes, PEFC
- Canadian Standards Association's Sustainable Forest Management, CSA SFM
- Sustainable Forestry Initiative, SFI
- Rainforest Alliance, RA
- UTZ Certified
- Euro-Retailer Produce Working Group, EUREPGAP
- International Federation for Organization Agriculture, IFOAM
- Naturland Association for Organic Agriculture, Naturland
- Green Gold Label, GGL
- Roundtable on Sustainable Palm Oil, RSPO
- Fairtrade Label Organization, FLO

WORKING GROUP ON DEVELOPING SUSTAINABILITY CRITERIA AND STANDARDS FOR THE CULTIVATION OF BIOMASS USED FOR BIOFUELS

Overview

The growing interest in biofuels¹ is justified by their potential contribution to reducing both the CO₂-emissions related to road traffic and dependence on fossil fuels. While biofuels offer potentially significant benefits, it is clear that biofuels production should fulfill certain minimum standards to support the target of making, transport more sustainable. Consequently, the production of the biomass² for biofuels also needs to be sustainable. The challenges are at least twofold: on one side, it is important that certain environmental and social criteria for the production of the biomass are met, and on the other side these criteria should be flexible to achieve maximum yield for biofuels production.

With these objectives in mind, DaimlerChrysler and the United Nations Environment Programme (UNEP) agreed to set up a process for establishing standards for biofuels used in vehicles. This effort was initiated during the 4th Environmental Forum 2005 in Magdeburg. Two main activities are being carried out under this collaboration: (i) establishing standards for fuel blends consisting of up to 10 percent biofuels (both bio diesel and bio ethanol) and (ii) developing sustainability criteria for the cultivation of biomass used for biofuels production.

This information package focuses on activity (ii) mentioned above, whereby DaimlerChrysler, UNEP and the Ministry of Nutrition and Rural Affairs from the German State of Baden-Württemberg have formed a working group to investigate criteria and indicators to help ensure sustainability of biomass production. The aim of this project is to support an international process of establishing a voluntary minimum set of criteria and measurable indicators defined through multi-stakeholder consultations³.

This information package is a compilation of preparatory activities jointly undertaken by the working group members to facilitate the above-mentioned efforts. It includes:

Section A: Compilation of Existing Certification Systems for Biomass Production

The paper gives an overview of how existing certification systems might be suitably adapted for defining a sustainable biomass production system. Twelve different labels were screened in the forestry, agriculture, bioenergy for heat and

¹ Biofuels refer to transportation fuels in either liquid form (bioethanol or biodiesel) or gaseous form such as biogas or hydrogen derived from biological sources. (IEA, Biofuels for Transport, 2005, Lew Fulton)

² Biomass refers to the biological sources mainly from the agricultural sector. It is also referred to as energy crops.

³ With the growing interest on this subject and the establishment of several interest groups with similar objectives, it is hoped that the activities of this working group will contribute towards a collective work programme for defining sustainable biofuels pathways.

electricity production, and trade sector examining, in particular, the different indicators that being covered under social, economic, ecological, and general criteria. However, it does not suffice for an evaluation or comparison of the qualities of the different labels. The details of each label are provided in the Appendix A1.

Section B: Supplementary Information

The supplementary information contained in section B is broken down into three parts:

- B1** - Compilation of ongoing international bioenergy initiatives covering project goals, structure, geographical scope, activities, and the expected results. It is based on existing literatures, serves to help understand the status of ongoing initiatives, and provides guidance to link up with other groups doing similar work.
- B2** - Compilation of national biofuels policies in both developed and developing countries. The deployment of national biofuels policies will complement efforts leading to the acceptance and use of standards for biomass production.
- B3** - Compilation of crops for biofuels production. Eighteen different crops were screened to understand the different requirements for soil, water, nutrient and climatic conditions. It is non-comprehensive list based on existing literatures.

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1 Section A: Review of Existing Certification Systems for Biomass Production

1.1 Introduction

Biomass derived fuel provides about fourteen percent of the world's primary energy supplies. Most of this use is in traditional applications in developing countries. According to the International Energy Agency (IEA), energy produced from biomass has the potential to meet 50 percent of the world's energy demands by the next century. Bioenergy⁴ can be derived from wastes, forestry residues, and specially grown energy crops such as rapeseed, soy, sugar, palm oil and jatropha used as feedstock. Bioenergy offers many potential benefits including energy security, climate change mitigation, reduction of local air pollution and rural development. However, there also exist several environmental and social risks such as loss of biodiversity and infringement on the rights of indigenous people. As this can particularly result from the production of energy crops, land use planning and best agricultural practices need to be applied to reduce these risks.

Reaping the full benefits of bioenergy and reducing its impacts to acceptable levels will only be possible through the sound management of competing uses of land and resources. Given the large number of sectors involved and the growing internationalisation of the energy system, this might require the adoption of an internationally agreed sustainability standard and certification or assurance system. At minimum, it requires agreement on criteria or principles for the environmentally and socially sustainable production of biofuels.

Certification could be a voluntary process that is market-driven and encourages systematic management of production processes. This has the potential to assure customers that the product they purchase is produced in a sustainable manner.

In general, certification comprises four steps:

- **application of standards** - must be relevant locally but must also comply with international standards or definitions of good practice to have credibility and acceptance
- **inspection (or audit)** – an assessment to ensure standards are met
- **evaluation and results of audit** – tracing the product to its source
- **issuance of the certificate if compliance is met** - when the party receives accreditation, they can certify their products with a label which is a 'seal of approval' from the certifier.

In this paper, we gathered information on existing certification systems that might be suitably adapted for establishing sustainable biomass production system. Twelve different labels were screened in the forestry, agriculture, bioenergy for heat and electricity production, and trade sector examining, in particular, the different indicators that being covered under social, economic, ecological, and general criteria.

⁴ Bioenergy refers to all forms (solid, liquid or gaseous) of end-use energy

1.2 Need for Sustainability Criteria for Biomass Production

One of the major concerns of biomass production is the competition with food production for land and energy resources. Studies have shown that there is enough land to sustain and provide food for the growing population as well as to grow energy crops. The areas that could be targeted are degraded land, which is unsuitable for food crops. According to the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report, in 2025 the areas with the most promising potential are Latin America (23%), South and East Asia (20%) and Africa (17%). Inevitably, in the near future, the affects of using degraded lands on the ecological, social and economic situation in different regions have to be assessed as well.

Other risks include: (i) the loss of biodiversity, (ii) increase in water consumption and potential water contamination, (iii) threat to wildlife species and deforestation, (iv) net greenhouse gasses (GHGs) emissions gain and (v) concern over the rights of indigenous and local people.

Therefore, there are many areas of biomass production where the lack of proper management or an assurance scheme can lead to unsustainable practices. It is imperative that an internationally accepted standard for biomass production is adopted to ensure the preservation of land, air, water, and benefits to humanity.

1.3 Compilation of Certification Systems by Sector

The bioenergy production cycle ranges from the initial growing of the crops (agriculture), to the extraction of the ethanol, fatty acids or straight vegetable oil (SVO) from the crops (production), to trade, and finally to the management of these entire sectors. This paper focuses on the production phase of biomass. Therefore, the existing certification systems in the agriculture, forestry, bioenergy for heat and electricity production and trade sectors were examined and are briefly discussed below.

The range of biomass crops are large and varied, from herbaceous or cellulosic crops like switch grass, to energy crops like maize and sugar cane to woody biomass like willow trees. Accordingly, a combination of criteria from these four sectors may possibly be applied for biomass feedstock production.

Further details of each certification system examined can be found in Appendix A1

1.3.1 Agriculture

In the agricultural sector, there are no certification systems specific for biomass production used for bioenergy. The existing systems emphasis on either:

- Organic farming - prohibits the use of agrochemicals like mineral nitrogen fertilizers and pesticides

- Good Agricultural Practice (GAP) - application of knowledge and best available techniques to achieve protection of land and healthy crops
- Integrated agriculture - farming in an economically viable way, but respecting the ecological demands

1.3.2 Forestry

Forest certification ensures that management and proper logging practices are adhered to. Forest certification considers the social, economic and environmental benefits for both the producer and consumer of the products. There are over 20 different forest certification organisations and standards in operation today. The two major forest certification umbrellas are the Programme for Endorsement of Forest Certification Schemes (PEFC) and the Forest Stewardship Council (FSC).

1.3.3 Bioenergy for Heat and Electricity Production

At present there are two systems, EUGENE⁵ (European Green Electricity Network) and Green Gold Certificate, dealing with criteria for sustainable energy from biomass sources. A third system, the Roundtable on Sustainable Palm Oil (RSPO), which was formed on 8 April 2004, while not focused on bioenergy issues, has recently had their members adopt the principles and criteria for more socially, environmentally and economically sustainable palm oil production.

1.3.4 Trade

Trade can potentially contribute to national economic growth, but it can also create inequalities. For example, the forty-nine least developed countries, that represent 10 percent of the world's population, only contribute 0.4 percent to global exports⁶.

Therefore, the incorporation of trade criteria may provide better trading opportunities and, to ensure biomass producers, particularly the poor and disadvantaged producers from developing countries benefit from the development of the biofuels sector.

Organisations like OXFAM and FAIRTRADE serve as useful examples. In this report, fair-trade criteria for agricultural products such as coffee and cocoa were examined.

⁵ The EUGENE applies to 'eligible sources' for biomass production such as dedicated energy crops or agricultural residues but the label does not provide specific criteria for biomass production (Lewandowski, Faaij, 2004, p.7). More information about the EUGENE system is not available; therefore, we could not compile the list of indicators covered by this scheme.

⁶ John Wilkinson, The Food Processing Industry, Globalization and Developing Countries, Vol 1, No. 2, 2004, pp 193.

1.4 Criteria used in Certification Systems

The following tables give an overview of criteria that are addressed within the different certification systems according to their own specifications. The compilation does not constitute a qualitative evaluation of either the maturity or the rigour of the different certification systems. All coverage of criteria by the different labels is the result of self-appraisals carried out by the organizations that developed these labels (except for the RSPO).

Legend:

X - indicators covered under each criteria by the different certification systems

FSC - Forest Stewardship Council

PEFC - Programme for the Endorsement of Forest Certification Schemes

CSA SFM - Canadian Standards Association's Sustainable Forest Management

SFI - Sustainable Forestry Initiative

RA - Rainforest Alliance

UTZ Certified - Certification system for fair traded coffee; GAP guidelines

EUREPGAP - Euro-Retailer Produce Working Group

IFOAM - International Federation for Organization Agriculture Movements

Naturland - Naturland Association for Organic Agriculture

GGL - Green Gold Label

RSPO - Roundtable on Sustainable Palm Oil

FLO - Fairtrade Label Organization

1.4.1 Social Criteria

No	Sector Social Criteria	FORESTRY				AGRICULTURE					Bio energy		TRADE
		FSC	PEFC	CSA SFM	SFI	RA	UTZ Certified	EUREPGAP	IFOAM	Naturland	GGL	RSPO	FLO
1	Labour conditions	X	X	X	X	X	X	X	X	X		X	X
2	Protection of human safety & health	X	X	X	X	X	X	X	X	X		X	X
3	Rights of indigenous people	X	X	X	X		X		X			X	
4	No discrimination against gender, race, etc	X	X	X	X	X	X		X	X		X	X
5	Elimination of child labour	X	X	X	X	X	X		X	X		X	X
6	Protection of women and reproductive rights	X		X	X	X	X		X	X		X	X
7	Access to resources ensuring adequate quality of life	X	X	X	X	X	X	X	X	X			X
8	Food and energy supply safety			X			X	X	X	X	X		
9	Capacity building	X	X	X	X	X	X	X	X	X		X	X
10	Combating poverty	X	X	X	X	X			X	X			X
11	Democratic participation of multi-stakeholders	X	X	X	X	X			X	X		X	X
12	Land ownership being equitable	X		X					X			X	X
13	Community well-being	X	X	X	X	X	X	X	X	X			X
14	Fair trade conditions			X		X		X	X				X
15	Allow employees to unionize	X	X	X	X	X	X		X	X		X	X
16	Promote educational benefits for employees and their families	X	X	X		X	X		X	X			X
17	Provide healthcare access for employees	X	X	X	X	X	X		X	X			X
18	Dispute resolutions mechanism for locals	X											
19	Social impact evaluations conducted and used to improve management planning	X											
20	Research				X								
21	Training of workers on safety and basic hygiene						X						

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1.4.2 Economic Criteria

No	Sector → Economic Criteria	FORESTRY				AGRICULTURE					Bio energy		TRADE
		FSC	PEFC	CSA SFM	SFI	RA	UTZ Certified	EUREP GAP	IFOAM	Naturiland	GGL	RSPO	FLO
1	Viability of the business (business minimizes costs to ensure competitiveness and has adequate funding to sustain operations)	X	X			X					X	X	X
2	Long-term commitments, contracts, management plans	X	X		X	X					X	X	X
3	Strengthen and diversify local economy	X	X	X	X	X	X						X
4	Reliability of resources (guards against supply disruptions)	X	X		X			X			X		
5	Sustainable harvesting and yields (agricultural yields should be maintained on an economically viable and stable level)	X	X	X	X	X	X		X	X	X	X	X
6	No blocking of other desirable developments	X		X		X							X
7	Wage regulations		X		X	X	X		X	X		X	X
8	Fairtrade minimum price for most products (cost covering and giving market access)												X
9	Fairtrade premium (in addition to the minimum price)												X

1.4.3 Ecological Criteria

No	Sector → Ecological criteria	FORESTRY				AGRICULTURE					Bio energy		TRADE
		FSC	PEFC	CSA SFM	SFI	RA	UTZ Certified	EUREP GAP	IFOAM	Naturiland	GGL	RSPO	FLO
1	Protection of the atmosphere		X		X	X	X	X	X	X	X		
2	Preservation of existing sensitive ecosystems	X	X	X	X	X	X	X	X	X	X	X	X
3	Conservation of biodiversity	X	X	X	X	X	X	X	X	X	X		X
4	Conservation and improvement of soil fertility - avoidance of soil erosion	X	X	X	X	X	X	X	X	X	X	X	X
5	Conservation of ground and surface water	X	X	X	X	X	X	X	X	X	X	X	X
6	Combating deforestation	X	X	X	X	X	X		X	X	X	X	X
7	Combating desertification and drought	X	X		X	X	X			X	X		
8	Improve or preserve landscape	X	X	X	X	X	X	X	X	X	X	X	X
9	Conservation of non-renewable resources		X				X		X	X	X		X
10	Waste management and minimisation	X	X		X	X	X	X		X		X	X
11	Proper use of agrochemicals/ record keeping of its use	X	X		X	X	X	X	X		X	X	X
12	Reduce pollution and emissions						X	X	X	X	X	X	X
13	Prohibit or record genetically modified plants	X	X		X	X	X	X	X	X	X		X
14	Pest management control system	X	X		X	X	X	X	X	X	X	X	
15	Control and monitor exotic species	X			X								
16	Protection of rare, threatened, endangered species and their habitats / animals rights	X								X			
17	Prohibit or control the conversion of natural forest to plantation or non forest land use	X											
18	Fire management	X											
19	Re-use of process by-products as source of energy						X						
20	Prohibit the use of agrochemicals banned by the USA, EU and/or Japan and country of production						X						
21	No use of agrochemicals									X			

1.4.4 General Criteria

No	Sector → General Criteria	FORESTRY				AGRICULTURE					Bio energy		TRADE
		FSC	PEFC	CSA SFM	SFI	RA	UTZ Certified	EUREP GAP	IFOAM	Naturiland	GGL	RSPO	FLO
1	Compliance with laws and international agreements	x	x	x	x	x	x		x	x		x	x
2	Traceability of products from source	x	x		x	x	x	x	x	x	x		x
3	Avoidance of leakage effects	x				x		x		x			
4	Strengthening the role of NGOs	x	x	x		x		x		x			
5	Improvement of local conditions	x			x	x	x			x	x	x	
6	Transparency in practice and process	x	x	x	x	x	x	x		x	x	x	x
7	Social and environmental impact assessments	x		x	x	x	x	x		x	x	x	x
8	Regular updates and internal inspection	x	x		x	x	x	x	x	x	x		x
9	Protection of high conservation values	x											

1.5 Conclusion and Recommendations

Sustainable biomass production encompasses a wide area covering the forestry, agricultural, trade and end-use sectors. Therefore, the development of standards or assurance scheme for biomass production needs consideration or integration of these different sectors and its elements as well.

Presently, the certification systems examined in this paper cannot be applied directly for biomass production. The RSPO is a positive initiative among palm oil producers in developing countries where selection of criteria was done through a multi-stakeholder consultation process and is relatively applicable for biomass production. However, the initiative still needs to be developed further and accredited.

As for the forestry sector, the FSC and PEFC, contain the elements most conducive to adoption for biomass production. Whereas, in the agricultural sector, apart from organic farming, other systems can serve as basis for an agricultural based biomass production standards.

Some key considerations for the biomass production standards based on this review include:

- establishment of an international panel involving all stakeholders and interest groups ranging from countries that produce, buy and utilise the biomass;
- adaptation from existing certification systems should be dealt with carefully as several criteria do not directly apply to biomass production;
- development of indicators covering different aspects of sustainable biomass production has to be clearly defined to ensure that they are not misinterpreted or misused;
- selection of sustainability criteria for biomass production needs to be agreed upon, verified by the performance of case studies and revised according to regional priorities before being implemented at national level.

Clearly, it is imperative that an assurance scheme for biomass production is formulated. However, this can be costly if the system covers every sector.

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Furthermore, indicators also need to be developed for those crucial aspects that are not yet covered by existing certification systems such as the food and energy supply security, local benefits of biomass production, eradication of poverty and greenhouse gas impacts. As a first step towards development of indicators, methods are needed to assess the performance of the criteria that describe these aspects.

An assurance scheme for biomass production is a means to an end to reduce reliance on fossil fuels and achieve other benefits as well. A mechanism or framework for systematic management should encourage the production and use of biomass and biofuels in a sustainable manner, as this will help ensure its long-term fuel viability and positive impact on the energy supply.

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1.7 Appendix A1: Detailed description of existing certification systems

1.7.1 Forestry Labels

Forest Stewardship Council (FSC)
Program for Endorsement of Forest Certification Schemes (PEFC)
Canadian Standards Association (CSA)
Sustainable Forestry Initiative (SFI)

1.7.2 Bioenergy and Palm Oil Labels


Green Gold Agriculture Label (GGLS2)
Green Gold Forest Label (GGLS5)
Roundtable for Sustainable Palm Oil (RSPO)

1.7.3 Agriculture Labels

Rainforest Alliance Certified (RA)
Utz Certified
Euro-Retailer Produce Working Group (EUREPGAP)
International Federation of Organic Agriculture Movements (IFOAM)
Naturland Association for Organic Agriculture

1.7.4 Trade Labels

Fairtrade Label Organization (FLO)

<p>Name of Label</p> <p>Forest Stewardship Council (FSC)</p>	<p>Logo</p> 
<p>Label Category</p>	<p>Responsible forest management</p>
<p>Where you will find this Label</p>	<p>Forest land, forest products (e.g. wood, paper, wooden value-added products, non-timber forest products, buildings)</p>
<p>Purpose of the Label / Certification</p>	<p>The Forest Stewardship Council (FSC) promotes environmentally appropriate, socially beneficial and economically viable management of the world's forests.</p>
<p>Scope and Use</p>	<p>Forest managers, environmental / nature conservation NGOs and social/developmental NGOs, producers, traders, retailers, etc.</p>
<p>Organization</p> <ul style="list-style-type: none"> ▪ About 	<p>The Forest Stewardship Council (FSC) is an international organization that brings people together to find solutions which promote responsible stewardship of the world's forests.</p> <ul style="list-style-type: none"> - FSC is a multi-stakeholder owned system for promoting responsible management of the world's forest. - Through consultative processes, it sets international standards for responsible forest management. - It accredits independent third party organizations who can certify forest managers and forest product producers to FSC standards. - Its trademark provides international recognition to organizations which support the growth of responsible forest management. - Its products label allows consumers worldwide to recognize products that support the growth of responsible forest management worldwide. - FSC undertakes marketing programs and information services that contribute to the mission of promoting responsible forestry worldwide. <p>Since 1994 over 87 million hectares in 75 countries have been certified according to FSC standards to date (February 2007) while several thousand products are produced using FSC certified wood and carrying</p>

the FSC trademark. FSC operates through its network of National Initiatives in 40 countries. (www.fsc.org/en/about/about_fsc)

- **Funding**

Project funding for FSC is provided by various foundations and companies around the globe. Core funding is derived from membership and accreditation fees.

- **Structure / Decision-Making**

Three levels of decision making bodies:

1. General Assembly of FSC Members: highest body comprised of environmental, economic and social chambers whose main purpose is to approve and amend the FSC statutes, by-laws, and Principles and Criteria.
2. Board of Directors: nine member elected body, representing each FSC sub-chamber (North and South: environmental, social and economic interests) each serving three year terms. Accountable to General Assembly.
3. Executive Director: appointed by Board of Directors and responsible for day-to-day operations of FSC secretariat.

Structure of Standards

Based on [FSC's 10 Principles and 56 Criteria for Forest Stewardship](#). The FSC P&C are an international standard, developed and reviewed according to the ISEAL Code of Good Practice for Setting Social and Environmental Standards. This ensures that FSC certification does not constitute a technical barrier to trade under the rules of the World Trade Organization. Compliance is determined at the Criterion level, and indicators to the P&C are developed by FSC accredited national initiatives at the national or regional (sub-national) level and by certification bodies for use in the absence on nationally developed ones.

Label Standards

- **Social Development**

- Respect the rights of indigenous people
- Promote good community relations
- Maintain or enhance long-term social and economic well-being of forest workers and local communities

- **Economic Development**

- Encourage efficient use of multiple forest products to ensure economic viability
- Strengthen and diversify the local economy
- Rate of harvest shall not exceed levels which can be permanently sustained

- **Environmental Development**

- Conserve biological diversity to maintain ecological function and integrity of the forest
- Maintain or enhance high conservation values

- Plantations complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.

Label Criteria and Indicators

FSC's international standard for forest stewardship contains 10 principles and 56 criteria. Indicators are developed at the national or regional (sub-national) level by FSC-accredited national initiatives or FSC-accredited certification bodies following FSC procedures and requirements.

Accreditation

FSC has an Accreditation Program which is in charge of providing accreditation services to certification bodies and National Initiatives. The Accreditation Program is based on international standards and complies with ISO 17011 requirements. The FSC accreditation program provides the following services:

FSC accredits certification bodies to provide a credible assurance that they are competent and independent in providing certification services according to FSC standards.

FSC accredits nationally developed indicators and certification body indicators to ensure the consistency and integrity of standards used to assess compliance with FSC's Principles and Criteria in different countries and regions around the world. Requirements for accreditation of national standards refer to both the content of the standards and the process used to develop the standards. FSC has accredited 27 national/regional standards as of February 2007.

FSC accredits national initiatives, which are the foundation of FSC's global network, to ensure that they operate consistently and in line with FSC requirements. To date, 40 national initiatives have been accredited against FSC requirements.

Certification


Forests are inspected and certified against compliance with the [FSC's Principles and Criteria for Forest Stewardship](#). These inspections are undertaken by independent, third party certification bodies, that are accredited by FSC. In order to be given FSC certification a forest (or plantation) must be found to be managed in an environmentally appropriate, socially beneficial and economically viable manner, according to the FSC Principles and Criteria. Forest management certificates may be issued to individual, group, or small or low intensity managed forest operations (SLIMF).

Audits

On-site yearly audits, review of documents and actualization of data by FSC-accredited certification body, including the publication of public summaries of main assessments and audits..

Certification Area

Over 87 million hectares of forest and plantation certified in 75 countries worldwide (February 2007).

Name of Label	Logo	
Program for Endorsement of Forest Certification Schemes (PEFC)		
Label Category	Sustainable forestry	
Where you will find this Label	Forest land, forest products (wood, paper)	
Purpose of the Label / Certification	Sustainability of Forestry Management from an economical, social and environmental point of view.	
Scope and Use	PEFC allows certification and labeling of forest based products which cover both wood based (timber, paper) as well as non-wood forest products.	
Organization		
<ul style="list-style-type: none"> ▪ History 	<p>The PEFC Council (Programme for the Endorsement of Forest Certification schemes) is an independent, non-profit, non-governmental organisation, founded in 1999, which promotes sustainably managed forests through independent third party certification. The PEFC provides an assurance mechanism to purchasers of wood and paper products that they are promoting the sustainable management of forests.</p>	
<ul style="list-style-type: none"> ▪ Funding 	<p>PEFC is primarily funded by PEFC National Governing Bodies.</p>	
<ul style="list-style-type: none"> ▪ Structure / Decision-Making 	<p>The PEFC Council is administered and managed by the PEFC Council Board of Directors, which is elected by the General Assembly. The PEFC Council Board of Directors appoints an Executive Committee comprising the Chairman and Vice-Chairmen of the PEFC Council.</p>	
	<p>The General Secretary is responsible for day-to-day operations</p>	
Structure of Standards	<p>PEFC has in its membership 32 independent national forest certification systems of which 22 to date have been through a rigorous assessment</p>	

process involving public consultation and the use of independent consultants to provide the assessments on which mutual recognition decisions are taken by the membership.

Label Standards

- **Social Development**
 - Maintenance of other socio-economic functions and conditions.” (Criterion 6)

- **Economic Development**
 - Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles.” (Criterion 1)
 - “Maintenance and encouragement of productive functions of forests (wood and non-wood).” (Criterion 3)

- **Environmental Development**
 - “Maintenance of forest ecosystems health and vitality.” (Criterion 2)
 - “Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems.” (Criterion 4)
 - “Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water).” (Criterion 5)”

Label Criteria and Indicators

The PEFC logo is a communication tool that companies can use on their timber, paper and wood-based products to inform their customer base and final consumers about the origin of wood raw material. Those who have a valid forest management certificate or a chain of custody certificate to communicate to customers can use the PEFC logo.

Accreditation

A national accreditation body to ensure the credibility of the certification work and to facilitate mutual recognition shall accredit certification bodies carrying out forest management or chain of custody certification. Accreditation bodies shall be a part of the European co-operation for Accreditation (EA) and/or the International Accreditation Forum

(IAF) umbrella and implement procedures described in ISO/IEC 17011:2004 and other documents recognised by the above organisations

Audits

With due regard of the principles of non-discrimination, voluntariness and cost effectiveness, certification units are defined as appropriate in national conditions. The optional implementation levels in PEFC certification are: regional certification, group certification and individual certification.

The annual on-site audits are carried out by certification bodies which are impartial and independent third parties, and have the necessary technical competence.”

Certification Area

197 million hectares (monthly updated statistics are available at www.pefc.org). More than 2900 chain of custody certificates.

Name of Label**Logo****Canadian Standards Association Sustainable Forest Management (CSA SFM) Standard, CAN/CSA-Z809****Label Category**

Sustainable forestry

Where you will find this Label

Forest products (wood, pulp, paper, composite products) demonstrated to come from a forest certified to the CSA SFM Standard.

Purpose of the Label / Certification

To demonstrate that the forest product comes from a forest certified to Canada's National Sustainable Forest Management Standard, CAN/CSA-Z809.

CSA has three marking options. two are based on inventory control and accounting of certified wood flows and the third is based on physical separation of certified wood. An organization implementing the chain of custody and marking program will select the most suitable approach. CSA issues the CSA SFM Mark based on the following options.

i. Input / Output System (% in / % out) for Solid Wood

The input/output system is based on the premise that the total batch of products can be labelled with the CSA SFM Mark when the amount of certified (originating from a forest certified to Z809) wood based raw material in the input batch meets or exceeds the set minimum average threshold.

In order to apply the CSA SFM Mark, the minimum average input is 70% (by volume or by weight) of certified (originating from a forest certified to Z809) wood based raw material. In addition, none of the wood based raw material (including the remaining input percentage of wood-based-raw material) shall have come from controversial sources.

ii. Minimum Average Percentage System for Composite Products

The minimum average percentage system approach is based on the premise that the total batch of products can be labelled with the CSA SFM Mark when the

amount of certified (originating from a forest certified to Z809) wood based raw material in the

input batch meets or exceeds the set minimum average threshold.

In order to apply the CSA SFM Mark, the minimum average input is 70% (by volume or by weight) of certified (originating from a forest certified to Z809) wood based raw material. In addition, none of the wood based raw material (including the remaining input percentage of wood-based-raw material) shall have come from controversial sources.

iii. Physical Separation

In this approach, certified wood, wood raw materials, and wood products are received and clearly marked or physically segregated or otherwise identified as certified (originating from a forest certified to CSA Z809 DFA) and remain clearly identifiable as certified throughout transportation, handling, processing, manufacturing or remanufacturing process(s). This Mark can be applied on packaging and/or directly onto the product.

Scope and Use

The CSA is a National Standard of Canada applied in Canada to any defined forest area (DFA). An area exceeding 73 million hectares of forests has been certified to the CSA SFM Standard as of December 2006. More than ¼ of global forest certifications are to the CSA SFM Standard. As per the visual below, CSA is the leading forest certification standard in use in Canada.

The CSA SFM Technical Committee is responsible for the development and continual revision of the CSA SFM Standard. The committee consists of forest producers, private woodlot owners, government agencies, scientists, academics, as well as union, aboriginal, consumer and environmental representatives.

Organization

- **History**

The Canadian Standards Association is a not-for-profit membership-based association serving business, industry, government and consumers in Canada and the global marketplace. CSA was chartered in 1919 and has developed over 2000 standards for various industries. The CSA Standard required extensive public participation in its development. It was first published

in 1996 following years of discussions and work through an open and inclusive process managed by the CSA. The Standard is subject to revision every 5 years, and currently the 2002 version of the standard is being used in the marketplace. In addition, the CSA Sustainable Forest Management Technical Committee is also preparing the 2007 revision of the Standard which is expected for publication in 2008.

- **Funding**
- **Structure / Decision-Making**

Structure of Standards

Based on [6](#) criteria. Each criterion has a set of indicators.

Label Standards

- **Social Development**
 - Contribute to sustainability of communities by providing diverse opportunities
 - Respect aboriginal rights to forests
 - Allow for public participation in decision making process
- **Economic Development**
 - Promote fair distribution of timber and non-timber benefits and costs
- **Environmental Development**
 - Conserve biological diversity
 - Maintain and enhance forest ecosystem and productivity
 - Conserve soil and water resources

Label Criteria and Indicators

Accreditation

Product testing and certification organizations may or may not be government agencies, but they are regulated. Only accredited organizations can certify products to national standards. In the U.S, these organizations are accredited by the Occupational Safety and Health Administration (OSHA); in Canada they are accredited by the Standards Council of Canada (SCC).

Audits

Participating organizations will enter into a qualification agreement and a licensing agreement with CSA for the use of the CSA SFM Mark. During the period of qualification and licensing the organization's

Certification Area

programme will be subject to an annual surveillance audit, as well as unannounced audits to assure on-going compliance.

30 million hectares of forests

Name of Label**Sustainable Forestry Initiative (SFI)****Logo****Label Category**

Sustainable forestry

Where you will find this Label

Forest land, forest products (wood, paper)

Purpose of the Label / Certification

The Sustainable Forestry Initiative (SFI) programme is a comprehensive system of principles, objectives and performance measures developed by professional foresters, conservationists and scientists, among others that combines the perpetual growing and harvesting of trees with the long-term protection of wildlife, plants, soil and water quality.

Scope and Use

Foresters, landowners, loggers, wood and paper product consumers, environmental / nature conservation NGOs.

Organization

- **History**

Formed by American Forest and Paper Association (AF&PA) in 1994 to document the commitment of their members and the program's licensees keep our forests healthy and practice the highest level of sustainable forestry. In 2001 the Sustainable Forestry Board was created to govern the SFI Standard and Auditing Procedures and Qualifications. In 2004, the SFB undertook the 2nd complete review of the SFI Standard and released the 2005-2009 SFI Standards. In 2006 both the AF&PA Board and the SFB voted to transfer all responsibilities of the SFI Program to the SFB. As a result on January 1, 2007, the SFB became the Sustainable Forestry Initiative (SFI), Inc and now has sole responsibility for the entire SFI program. SFI participation still remains a requirement for AF&PA membership.

- **Funding**

Program participants, foundations, grants, projects

- **Structure / Decision-Making**

SFI, Inc is an independent 501(c) 3 organization, which is responsible for maintaining and enhancing the SFI Standard and verification procedures. The Board that oversees the SFI Program has 15 CEO members, with 1/3

Structure of Standards

representing ENGO's, 1/3 representing Industry and 1/3 representing the Broader forestry community (NIPF's, Academia, Labor, etc). Only the Board can make changes to the Standard.

The SFI Standard is based on 9 principles of sustainable forestry. There are 13 Objectives, each with a number of Performance and Indicators that all participants must meet to become certified.

Label Standards

▪ Social Development

- Protect Indigenous rights
- Worker health & safety
- All applicable social laws

▪ Economic Development

- Long term forest management
- Efficient use of Resources

▪ Environmental Development

- Sustainable forestry
- Responsible practices
- Long term soil forest and soil productivity
- Protection of water resources
- Reforestation and productive capacity
- Protection of special sites and biological diversity
- Protection of endangered species and communities
- Protect biodiversity
- Limit invasive species
- Protection of wildlife habitat

Label Criteria and Indicators

In addition to being certified to the SFI Standard, participants wishing to use an SFI Label must meet strict requirements. See the *Requirements for Fiber sourcing, Chain of Custody and Product Labels* document.

Accreditation

Only certification bodies accredited by ANSI, ANAB or equivalent internationally recognized accreditation body can perform SFI Audits. SFI audit teams include foresters, biologists, and other technical experts as needed. Auditors also must perform continuing educational activities. The SFI, Inc remains completely independent of certification body accreditation.

Audits

Only participants successfully completing a Third Party audit to the SFI Standard by an accredited certification body can be certified. Certification audits are a rigorous, on the ground activity that verify conformance to the Standard. All certified companies must achieve

Certification Area

conformance to all SFI Indicators that apply to the scope and scale of their operations.

There are currently over 135 million acres of forestland in North America enrolled in the SFI program, making it among the world's largest sustainable forestry.

Name of Label	Logo
Green Gold Agriculture Label (GGLS2)	
Label Category	Agricultural products
Where you will find this Label	Agriculture products
Purpose of the Label / Certification	<p>The GGLS2 is based on the United Nations sustainable development program Agenda 21. This standard is to be used for approval of the agricultural source when no other certification system is available. An audit based on these principles with a positive result will lead to a “testimony of approval” as a GGL approved source.</p> <p>Within GGLS1 – Chain of Custody (COC) and Processing (the chain of custody by which the biomass producers are audited and certified), the following certification systems are accepted for the raw material :</p> <ul style="list-style-type: none"> • Organic (IFOAM, EU 2092/91, NOP, JAS) • EUREPGAP • GGLS2 –Agricultural Source Criteria
Scope and Use	For use when no other agricultural certification system is available.
Organization	
<ul style="list-style-type: none"> ▪ History ▪ Funding ▪ Structure / Decision-Making 	<p>This system was developed by Essent, one of the major Dutch producers and suppliers of sustainable energy. The system is currently owned by the independent Green Gold Label foundation.</p>
Structure of Standards	<p>Six main principles each with sub-criteria. http://www.controlunion.com/certification/default.htm</p>
Label Standards	

- **Social Development**
- **Economic Development**
- **Environmental Development**

- food and energy supply safety
- Business viability
- Reliability of resources
Sustainable harvesting and yields
- Implement an agricultural management system based on land-resource planning and aimed at land conservation and rehabilitation
- Agricultural management system aimed at the insurance of a fresh water supply and quality for sustainable food production and sustainable rural development
- Agricultural management system has implemented a pest management control system
- Agricultural management system has implemented sustainable plant nutrition for increase food production

Label Criteria and Indicators

Accreditation

An audit based on these principles with a positive result will lead to a “testimony of approval” as a GGL approved source.

Audits

Certification Area

Name of Label	Logo
Green Gold Forest Label (GGLS5)	
Label Category	Sustainable forestry
Where you will find this Label	Forest land, forest products (wood, paper)
Purpose of the Label / Certification	<p>GGLS5 is derived from existing and internationally recognised forest management standards (FSC, PEFC, CSA SFM, and SFI).</p> <p>Within GGLS1 (i.e. the chain of custody by which the biomass producers are audited and certified) there are a number of certification systems that are accepted for raw materials:</p> <ul style="list-style-type: none"> • FSC (Forest Stewardship Council), including “FSC Controlled” • PEFC (Pan European Forest Certification) • CSA-SFM (Canadian Standards Association’s Sustainable Forest Management) • SFI (Sustainable Forest Initiative) • FFCS (Finnish Forest Certification System) • Approved pre-scope certificate of one of the endorsed forest management certification systems, with the intention of full certification • GGLS5: Green Gold Label Forest management criteria; temporary approval
Scope and Use	GGLS5 has not been developed to replace the existing standards, rather to enable participating parties and stakeholders to perform a quick-scan assessment on sound forest management practices.
Organization	
<ul style="list-style-type: none"> ▪ History ▪ Funding ▪ Structure / Decision-Making 	<p>This system was developed by Essent, one of the major Dutch producers and suppliers of sustainable energy. The system is currently owned by the independent Green Gold Label foundation.</p>

Structure of Standards

Six main principles each with sub-criteria.

<http://www.controlunion.com/certification/default.htm>

Label Standards

- **Social Development**
 - food and energy supply safety
- **Economic Development**
 - Business viability
 - Reliability of resources
 - Sustainable harvesting and yields
- **Environmental Development**
 - Implement a forest management plan geared towards environmental and economic sustainability
 - Forest management is aimed at conserving biological diversity and forest integrity, water resources, soils, unique ecosystems and landscapes
 - Plantations shall be planned and managed to reduce pressures on and promote the restoration and conservation of natural forests

Label Criteria and Indicators

Accreditation

The approval under these criteria is valid for a maximum of 4 years. After this 4 year period a GGL approval can only be given if a pre-scope route towards certification is initiated under one of the independent approved forest management certification systems. Within one year after initiating the pre-scope route the forest must be certified by one of the independent approved forest management certification systems to be able to deliver under GGL.

Audits

Certification Area

Name of Organization

Roundtable on Sustainable Palm Oil

Logo



Organization Category

Sustainable agriculture of palm oil in the economical, environmental and social point of view.

Where you will find this Label

In progress.

Purpose of the Label / Certification

RSPO's objectives are to promote the use and growth of sustainable palm oil through cooperation within the supply chain and open dialogue with its stakeholders.

Scope and Use

It was agreed that in order to promote the use of sustainable palm oil it would be necessary to have a mechanism for linking the palm oil being used by [RSPO members](#) and other responsible users (including industrial users of palm oil based substances) with the oil palm plantations being managed in accordance with the RSPO criteria.

Organization

- **History**

In 2001, WWF gave an assignment to Reinier de Man, a Dutch consultant, to explore the possibilities for a Roundtable on Sustainable Palm Oil. The result was an informal co-operation among Aarhus United UK Ltd, Golden Hope Plantations Berhad, Migros, Malaysian Palm Oil Association, Sainsbury's, and Unilever together with WWF in 2002. The inaugural meeting of the [Roundtable](#) took place in Kuala Lumpur, Malaysia on 21 – 22 August 2003 and was attended by 200 participants from 16 countries

On 8 April 2004, the "Roundtable on Sustainable Palm Oil (RSPO)," was formally established under Article 60 of the Swiss Civil Code with a governance structure that ensures fair representation of all stakeholders throughout the entire supply chain. The seat of the association is in Zurich, Switzerland, while the secretariat is currently based in Kuala Lumpur.

- **Funding**
- **Structure / Decision-Making**

Ordinary Membership fees : € 2,000 /year
 Affiliate membership € 250 /year

RSPO is managed by an Executive Board comprised of sixteen members, designated by the General Assembly for a period of two years. Members include representatives of Oil palm growers, Palm oil processors and/or traders, Consumer goods manufacturers, Environmental/nature conservation NGOs. Retailers, Banks/investors, Social/development NGOs. The decisions are made on consensus basis.

Structure of Standards

8 principles defined by criteria, indicators, and guidance for national interpretation.

Standards

- **Social Development**
- **Economic Development**
- **Environmental Development**
- **Generic Standards**

- Responsible consideration for employees, individuals, and communities affected by growers or mills.
- Commitment to long-term economical and financial viability
- Use of appropriate best practices by growers and millers.
- Environmental responsibility and conservation of natural resources and biodiversity
- Commitment to transparency
- Compliance with applicable laws and regulations
- Responsible development of new plantings
- Commitment to continuous improvement in key areas of activity.

Criteria and Indicators

The guidance document defines indicators and guidance for each criterion. Indicators are specific pieces of objective evidence that must be in place to demonstrate or verify the criterion is being met. The guidance consists of useful information to help the grower/miller and auditors understand what the criterion means in practice, including in some cases specific guidance for national interpretation of the criterion and application by small stakeholders.

Suggested: (still in progress)

Accreditation

- RSPO relies totally on other forms of accreditation

Audits


Certification Area

- RSPO carries out its own approvals of certification bodies
- Combination of supplementing other accreditation with a specific RSPO approval.

Still in progress

Criteria will be applied for an initial pilot implementation for 2 years from the date of adoption, and will be reviewed after this period. The objective is to enable field testing to improve the guidance and criteria. The role of the small stakeholders and the implementation of national initiatives will be an important part.

Note: Information in this template has not been verified by the RSPO

<p>Name of Label</p> <p>Rainforest Alliance Certified (RA)</p>	<p>Logo</p> 
<p>Label Category</p>	<p>Sustainable Agriculture, Social responsibility, Pest Management</p>
<p>Where you will find this Label</p>	<p>Agricultural Goods, Food (coffee, bananas, chocolate)</p>
<p>Purpose of the Label / Certification</p>	<p>The Sustainable Agriculture Network's (SAN) mission is to improve the social and environmental conditions of tropical agriculture through:</p> <ul style="list-style-type: none"> • Certifying sustainable practices on farms and awarding a credible seal of approval to farms that comply with the Sustainable Agricultural Network standard. • Changing the paradigm of farm owners, retailers, and consumers to make all involved in the agricultural industry take more responsibility for their actions. • Establishing contact between conservationists in the North and South and offering them a way to work together. • Increasing public awareness about consumer interdependence with tropical ecosystems and agriculture. • Educating people in the North about the effects that consumer purchases have on persons living in the tropics, and on tropical ecosystems. By doing this, consumers are offered the opportunity to choose socially and environmentally responsible certified products. • Creating a forum for discussing the impacts of agriculture. <p>The certification process begins with a preliminary site visit by SAN technicians to determine what changes are necessary to achieve certification. Technical support can be provided on demand through the Sustainable Agriculture Support Alliance. Once farmers determine that their operations are meeting the SAN certification standards, they may request for a full audit. A team of experienced and independent inspectors then reviews every aspect of the farm's compliance with</p>

the standards. Based on a comprehensive evaluation report, the certification committee determines whether the farm merits certification. A written contract governs and monitors the use of the seal, the handling of certified products, and marketplace promotion. All farms are inspected every year and must show continual progress.

Scope and Use

The standard's scope covers the management of farms of all different sizes and includes aspects relating to agricultural, social, legal, labor and environmental issues, in addition to sections on community relations and occupational health and safety. The farms' compliance with the standard is evaluated by observation of agricultural and labor practices existing infrastructure, plus interviews with farm workers and the management or administration team.

Organization

- **History**

The Rainforest Alliance (RA) is an international environmental organization based in New York City and dedicated to conserve biodiversity and ensure sustainable livelihoods by transforming land-use practices, business practices and consumer behavior. Rainforest Alliance provides two secretariats for the Sustainable Agriculture Network: The Standards & Policy Secretariat coordinates the development of standards and related policies for SAN and the Certification Secretariat administers the certification systems for the Sustainable Agriculture Certification Network (SANcert). The networks use the Rainforest Alliance certified™ seal, which has been granted since 1992.

- **Funding**

Funding for Rainforest Alliance is provided by foundations such as the John D. and Catherine T. MacArthur Foundation, Moriah Fund, Summit Foundation, Tinker Foundation Goldman Fund, Wallace Genetic, Entertainment Industry Foundation, Spray Foundation, National Fish and Wildlife Foundation, Prospect Hill foundation and by individual contributions, membership dues, certification fees, corporate donations and fundraising events.

- **Structure / Decision-Making**

Program decisions at RA are made by the board of directors. The sustainable agriculture program is jointly managed by RA and SAN. The standard

Structure of Standards

development is administered by SAN.

The standard structure consists of ten principles. Each principle is made up of criteria. The criteria describe best practices for social and environmental management, and are evaluated by the certification process.

Label Standards

- **Social Development**
 - Fair treatment and good working conditions for workers
 - Occupational health and safety
 - Community relations
 -
- **Economic Development**
 - Social and environmental management system
- **Environmental Development**
 - Ecosystem conservation
 - Wildlife protection
 - Water conservation
 - Integrated crop management
 - Soil management and conservation
 - Integrated waste management

Label Criteria and Indicators

In order to obtain and maintain certification, the farms must comply with at least 50% of each principle's criteria, and with 80% of all criteria. A farm must completely comply with all 14 critical criteria in order for the farm to be certified or maintain certification. Any farm not complying with a critical criterion will not be certified, or certification will be canceled, even if all other certification requirements have been met. The scoring system guides and encourages the farmers to make continual improvements in all principles and criteria.

Accreditation

The Certification Secretariat of the Rainforest Alliance works according to ISO 65 procedures. The Certification Secretariat controls the use of the certification procedures and documents by the SANcert partners. All farm evaluations are forwarded to Rainforest Alliance for final certification approval. In cases where there are no local certifying organizations, RA will perform the certification directly.


Audits

Farms in the program are fully inspected by our auditors at least every year, and SAN groups

Certification Area

regularly make unannounced visits. Farms must demonstrate continued progress in order to maintain their certified status.

240,861 ha of coffee, banana, cocoa, citrus and fern farms in 14 countries, as per March 1, 2007.

<p>Name of Label</p> <p>Utz Certified</p>	<p>Logo</p> 
<p>Label Category</p> <p>Where you will find this Label</p> <p>Purpose of the Label / Certification</p> <p>Scope and Use</p>	<p>Responsible agriculture</p> <p>coffee</p> <p>To provide assurance of responsible coffee production and sourcing.</p> <p>All types of coffee producers and all types of roasters in all countries.</p>
<p>Organization</p> <ul style="list-style-type: none"> ▪ History ▪ Funding ▪ Structure / Decision-Making <p>Structure of Standards</p>	<p>The founders created an organization that could stand independently from the producers and the roasters. They chose the name "Utz Kapeh", which means "good coffee" in the Mayan language Quiché. An office was opened in Guatemala City in 1999. In 2002 the head office was opened in the Netherlands. In 2007 the name of the organization was updated into UTZ CERTIFIED 'Good Inside' to allow for better communication about the program.</p> <p>Administrative fees (\$0.01/lb paid by first purchaser), Dutch NGOs, EU</p> <p>The UTZ CERTIFIED program is based on the UTZ CERTIFIED Code of Conduct: a set of social and environmental criteria for responsible coffee growing practices and efficient farm management (Good Agricultural Practices). The Code of Conduct is the only EurepGAP benchmarked coffee standard. Producers who are UTZ CERTIFIED comply with this Code of Conduct.</p>

Label Standards

▪ Social Development

- workers are protected by national laws and ILO conventions regarding age, working hours, pensions, working conditions, collective bargaining and health & safety
- workers receive training in their own language about safe handling of chemicals
- workers receive protective clothing for the use of chemicals
- access to health care for the workers and their families
- access to education for children
- access to decent housing
- access to clean drinking water
- freedom of cultural expression

▪ Economic Development

- Monitoring business processes
- Record keeping of fertilizers & agro chemicals
- Good housekeeping practices
- Workers trained properly
- Implementation of accident and emergency procedures
- Implementation of hygiene rules and practices
- Traceability of coffee
- Annual internal inspections

▪ Environmental Development

- reduce and prevent soil erosion
- responsible and minimal use of agrochemicals
- implementation of Integrated Pest Management
- minimize water usage and environmental pollution
- minimize energy use
- optimize use of sustainable energy sources
- treatment of contaminated water
- protecting water sources
- no deforestation of primary forests
- use of native tree species as coffee shade trees
- protecting endangered species

Label Criteria and Indicators

On product use of the UTZ CERTIFIED logo allowed when 100% of content is UTZ CERTIFIED coffee.

Accreditation

Certification granted through Certification Bodies – independent third party ISO 65 accredited certifiers approved by UTZ CERTIFIED.

Audits

Annual producer inspections conducted by independent third party ISO 65 accredited certifiers approved by UTZ CERTIFIED.

Certification Area

36,000 MT of green coffee were purchased as Utz Kapeh certified in 2006

Name of Label
Euro-Retailer Produce
Working Group (EUREPGAP)

Logo

EUREPGAP[®]

Label Category

Sustainable agriculture

Where you will find this Label

Agriculture products

Purpose of the Label / Certification

EUREPGAP is a certification system for Good Agricultural Practices (GAP).

Scope and Use

Agricultural producers and consumers, government agencies, NGOs.

Organization

- **History**

EurepGAP started in 1997 as an initiative of retailers belonging to the Euro-Retailer Produce Working Group (EUREP). It has subsequently evolved into an equal partnership of agricultural producers and their retail customers. The organization's mission is to develop widely accepted standards and procedures for the global certification of Good Agricultural Practices (GAP).

- **Funding**

- **Structure / Decision-Making**

Governance is by sector specific EurepGAP Steering Committees which are chaired by an independent Chairperson. The Technical and Standards Committees working in each product sector approve both the standard and the certification system. These committees have 50% retailer and 50% producer representation creating an effective and efficient partnership in the supply chain. The work of the Committees is supported by FoodPlus - a not for profit limited company based in Cologne, Germany.

Structure of Standards

Provide standards for fruit and vegetables, flower and ornamentals, integrated farm assurance,

integrated aquaculture, coffee. While biomass production is not specifically mentioned in any of these standards, it appears integrated farm assurance would be the most relevant.

Label Standards

- **Social Development**
 - Provide worker safety and health guarantees such as adequate training and inhabitable living quarters
 - Organization must implement worker training programs for items such as machinery operation and first aid administration

- **Economic Development**

- **Environmental Development**
 - Organization should implement a waste management plan
 - Organization should implement an energy efficiency plan
 - Organization should document all sources of pollution
 - Organization should take steps to minimize negative environmental impacts such as ground water depletion and nutrient loss
 - Organization should implement a conservation management plan
 - Responsible use of fertilizer and other agrochemical products
 - Organization should implement a traceability system
 - There is a documented wildlife and conservation statement


Label Criteria and Indicators

Accreditation

Accreditation granted by an independent third party certification body that has been approved by EUREPGAP.

Audits

Certification Area

<p>Name of Label</p> <p>International Federation of Organic Agriculture Movements (IFOAM)</p>	<p>Logo</p> 
<p>Label Category</p>	<p>Organic agriculture</p>
<p>Where you will find this Label</p>	<p>Agriculture products</p>
<p>Purpose of the Label / Certification</p>	<p>IFOAM label is a means of guaranteeing fair and orderly trade of organic products. IFOAM Accreditation facilitates equivalency of organic certification bodies worldwide by confirming whether they meet IFOAM's international norms. IFOAM groups together 750 organic institutions worldwide and ensures some equivalency of standards in 108 countries.</p>
<p>Scope and Use</p>	<p>Agricultural producers and consumers, government agencies, NGOs.</p>
<p>Organization</p> <ul style="list-style-type: none"> ▪ History ▪ Funding ▪ Structure / Decision-Making <p>Structure of Standards</p>	<p>Started in 1972 by the president of the French farmer's organization to ensure a future of worldwide organic agriculture.</p> <p>IFOAM is comprised of a variety of committees each with specific mandates. The IFOAM General Assembly is the main decision-making body. Today, IFOAM unites 750 member organizations in 108 countries. It elects the World Board for a three year term. The World Board appoints members to official committees, working groups and task forces based upon the recommendation of the IFOAM membership, and IFOAM member organizations also establish regional groups and sector specific interest groups.</p> <p>IFOAM Basic Standards and IFOAM Accreditation</p>

Criteria comprise the IFOAM Norms. Together with IFOAM Interpretations, Urgent Revisions and Technical Corrections the Norms establish the requirements for accreditation.

Label Standards

- **Social Development**
 - Labour conditions
 - Protections health, safety and well being
 - Capacity building and training
 - Food and energy supply
 - Elimination child labour
 - Combating poverty

- **Economic Development**
 - Sustainable harvesting and yields
 - Wage regulations

- **Environmental Development**
 - Protection of atmosphere
 - Preservation of ecosystem
 - Conservation of biodiversity
 - Conservation and improvement of soil fertility
 - Conservation of ground and surface water
 - Combating deforestation
 - Improve and preserve landscape
 - Conservation of non-renewable resources
 - Proper use of agrochemicals
 - Reduce pollution and emissions
 - Prohibit and record genetically modified plants
 - Pest management control system

Label Criteria and Indicators

Accreditation

The IFOAM Accreditation Program is a service within the [IFOAM Organic Guarantee System](#) that is offered to certification bodies. The IFOAM Basic Standards along with the IFOAM Accreditation Criteria (together called The IFOAM Norms) establish the requirements for certification bodies seeking IFOAM accreditation. IFOAM accreditation is awarded to certification bodies that use certification standards that meet the IFOAM Basic Standards. Additionally, the certification body itself must demonstrate compliance with the IFOAM Accreditation Criteria, which are requirements for how certification is conducted.

Audits

Certification Area

Name of Label

Naturland Association for Organic Agriculture

Logo**Label Category**

Organic Agriculture

Where you will find this Label

All kinds of food (plant and animal production as well as processed products), Organic forest and timber as well as organic aquaculture have been also adopted. Also: organic textiles and cosmetic products are certified under the Naturland label

Purpose of the Label / Certification

The objective and mission of Naturland is the conservation of the environment and the maintenance of the natural basis of life by means of organic farming in all fields of agriculture.

Certification and the decision as to whether a farmer or an enterprise is entitled to sell his or its products as being produced according to Naturland's standards is taken by Naturland's Certification Committee on the basis of the results and evidence presented in the written inspection reports.

Scope and Use

Worldwide, started with organic agriculture, but have expanded to other areas, food and non food (see above).

Organization

- **History**

Naturland - Association for Organic Agriculture was founded in 1982 in Gräfelfing, near Munich, Germany. It has grown to become one of the most important organisations in the field of organic agriculture in Germany. On the global level Naturland is one of the major certifying organisations for organic produce

- **Funding**

The Naturland Zeichen GmbH is the designated body by Naturland to grant licenses after the payment of a license fee. This fee rate depends on the turnover.

Part of the fee goes back to Naturland, the rest is dedicated to the Naturland Zeichen internal budget.

- **Structure / Decision-Making**

Organised on a regional and federal basis. The association's head office is located in Gräfelfing near Munich, Germany. The members in each German federal state are managed by their own regional association or their sector-specific association.

The Assembly of Delegates determines the policies and the current objectives of the association. Once every three years it elects the Board of Directors, which heads the Naturland association. The mission of the Standards Committee is to draft Naturland's standards and to bring them constantly up-to-date. The right to decide on which standards are to be accepted or modified lies with the Assembly of Delegates.

Structure of Standards

Different sets of Standards: Standards on Production (plant and animal production), standards on tropical perennial crops; Naturland Processing Standards and Processing Standards for Specific Groups of food products, Social Standards, Standards for organic Beekeeping, Standards for Organic forest management, Processing Standards for timber from organic forest management, Standards for Organic Aquaculture, Standards for organic textiles, Standards for cosmetic products.

Label Standards

- **Social development**

- Human rights
- No forced labour
- Freedom of Association, access to trade unions
- Equal treatment and opportunities
- No child labour
- Occupational health and safety
- Good working conditions

- **Environmental Development**

- Chemical-synthetic Nitrogen fertilizers are forbidden; Mineral and trace element fertilizers only after consultation.
- Purchase of fertilizers only for better humus supply. Over fertilizing has to be avoided. By own animal husbandry the limit to apply is 1,4 DE*/ha. (*DE means fertilizer unit and is the equivalent to 80 kg N or not more than 70 kg P2O5 yearly deposition.
- Composting of garbage or excrements is banned.
- Weeds are not completely disposed and when, in a mechanical manner.
- Seeds have to be certified as well and can't

have any trace of synthetic chemical plant protectants.

- Use of machinery has to respect the soil.
- Diversified wide crop rotation
- 25 % leguminous plants in crop rotation for annual cropsTundra and Natural forest have to be respected.
- Excessive use of water resources has to be avoided, excessive salting of soil has to be avoided
- Soil erosion and washing out of soil nutrients have to be avoided
- Biodiversity, e.g. shade trees in coffee plantations

Label Criteria and Indicators

Detailed provisions for the use of the Naturland logo published by the Naturland Zeichen GmbH

Accreditation


Naturland holds several voluntary accreditations of internationally recognized accreditation bodies. Naturland has been accredited by IFOAM, USDA/NOP and according to norm DIN EN 45011 (ISO 65).

Audits

Naturland members and partners are obliged to observe the standards set out by the Naturland Association. The production units - farmers, processors and international members - are inspected regularly, but at least once a year, by inspection bodies appointed by Naturland. Besides this, unannounced spot checks of at least 10% of them are carried out. The inspection is performed by external, state-approved inspection bodies.

Certification Area

At the start of the year 2007 Naturland was certifying some 45,600 farmers, horticulturists, wine growers and other producers and processors throughout the world. 291000 cultivated ha worldwide.

Name of Label Fairtrade Labelling Organization (FLO)	Logo 
Label Category	Sustainable agriculture
Where you will find this Label	Agriculture products such as coffee and cocoa
Purpose of the Label / Certification	<p>FLO International exists to improve the position of the poor and disadvantaged producers in the developing world, by setting the Fairtrade standards and by creating a framework that enables trade to take place at conditions respecting their interest. The Labelling Initiatives, members of FLO International, encourage industry and consumers to support fairer trade and to purchase the products. Products carry a Fairtrade Label, as the independent consumer guarantee that producers in the developing world get a better deal.</p>
Scope and Use	Agricultural producers, traders, retailers and consumers, government agencies (not sure), NGOs (not sure).
Organization	<ul style="list-style-type: none"> ▪ History ▪ Funding ▪ Structure / Decision-Making <p>License fees paid to the Labelling Initiatives; premiums paid by consumers of Fairtrade labelled products (this later does not finance the system). Certification paid by producers and traders.</p> <p>The highest governing body is the FLO Board of Directors, elected every three years by FLO's traders, producers, Labelling Initiatives and other stakeholder members. The Director of FLO runs the organization.</p>
Structure of Standards	These Standards are developed by the FLO Standards Committee, in which stakeholders from FLO's member organisations, producer organisations, traders and external experts

participate.

There are two sets of generic standards: one for small farmers and one for laborers on plantations and factories. A generic trader standard is under development. In addition there are product specific standards with mainly trade requirements and FT minimum price and premium information.

Standards have two layers: minimum requirements and progress requirements. Companies must meet the minimum standards from the moment they join Fairtrade and work towards achieving the progress requirements as long-term goals.

Label Standards

▪ Social Development

- Fairtrade participation must add development potential
- Producer organization must decide democratically
- The organization must be an instrument of social and economic development for its members
- Farm must not discriminate in its hiring and labour practices
- Forced or bonded labour must not occur
- Children's work should not interfere with their education and their tasks should not be hazardous
- Workers and employers should have the right to unionize
- Employer should take actions to minimize hazards of the working environment
- Farms/companies must do a lot more, pls see the generic Hired Labor standard

▪ Economic Development

- Producers must have ability to export their products
- Producers decide democratically about the use of the FT premium
- On farms a representative worker's body (Joint Body) decides on the use of the FT premium

▪ Environmental Development

- The organization must assess and monitor its environmental impact and develop plans for mitigating potentially negative impacts
- Producers are expected to gradually reduce the amount of agrochemicals used in their

	<ul style="list-style-type: none"> production process ▪ Producers are expected to reduce, reuse, recycle and compost waste whenever possible ▪ Producers are expected to enhance the fertility and structure of soil ▪ Water resources are managed with the objectives of conservation and non-contamination ▪ Producers are expected to prevent the use of fire that can adversely affect natural systems ▪ Producers do not use GMOs in the production or processing of their products
<p>Label Criteria and Indicators</p>	<p>Operators need to be in full compliance with major compliance criteria related to minimum and progress requirements of the standards, to prevent suspension or withdrawal of certificate. Non compliance with minor compliance criteria may lead to corrective actions or certification conditions. Fairtrade has a specific unit – the Producer Business Unit (PBU) - that supports producers to come into compliance if there is a need. The PBU works with staff on ground and in the central office and also conveys training material to producers.</p>
<p>Accreditation</p>	<p>Certification is run by FLO-Cert. Ltd. This body coordinates all aspects of certification including inspections, audits and certification.</p>
<p>Audits</p>	<p>Third party verification is a must for application of FT standards. The cert body undertakes yearly inspections based on a risk model. In between inspections incoming information about potential non compliances are taken into considerations for additional checks or inspections.</p>
<p>Certification Area</p>	<p>560 organizations in 75 countries in Africa, Asia and Latin America. More than 1000 traders throughout the globe</p>

2 Section B: Supplementary Information

2.1 B1 - *Compilation of ongoing international bioenergy initiatives*

Summary of Bioenergy Initiatives

Project	Agency	Agency Mandate	Project Goals/Overview	Project Structure	Geographic Scope	Project Start Date	Policy Studies/ Workshops	Website
UNEP/DTIE Bioenergy initiative: a) with DaimlerChrysler on developing an assurance scheme for the cultivation of biomass used for biofuels b) Biodiesel production for GSM net in Tanzania	UNEP/DTIE	To provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.	a) To promote the sustainable production of biomass for biofuels by either developing a certification system or advocating an existing certification system that meets the project's identified ecological, economic and social criteria. b) To assess the technical, financial, environmental and social aspects of a proposed local biodiesel production in forming different business models	a) Initiated during the 4th Environmental Forum 2005 in Magdeburg. A working group of UNEP, DaimlerChrysler, WWF Germany and Ministry of Nutrition and Rural Affairs of Baden-Württemberg, Germany was formed to undertake joint activities towards establishing standards for biomass production b) Feasibility study completed	a) worldwide b) Tanzania	a) 16-Nov-05 b) 22-Jun-06		
UN Biofuels Initiative - Trade, Investment, and Capacity Building Opportunities	United Nations Conference on Trade and Development (UNCTAD) /UN Foundation (UNF)/ United Nations Fund for International Partnerships (UNFIP).	To facilitate the incorporation of developing countries into the world economy.	To help build capacity in the production, use and trade of bio-fuels and raise public and private sector awareness of the challenges and opportunities of increased bio-fuel use. It will also promote ways of generating new investments, such as the Clean Development Mechanism (CDM).	The programme will coordinate economic and trade policy analysis, capacity building activities and consensus building efforts towards the ultimate goal of increasing production, domestic use and trade in biofuels. The programme will be implemented in Brazil, India, Mozambique, the Philippines and Uganda. The initiative is currently preparing country analyses for India, the Philippines and Thailand by using a common methodology to assess the potential for promoting bio-fuel use in these countries. The initiative is also forming an International Advisory Expert Group to provide guidance on technical issues related to biofuels production and international trade.	Brazil, India, Mozambique, the Philippines and Uganda	21-Jun-05		http://r0.unctad.org/gba/
International Bioenergy Platform (IBEP)	Food & Agricultural Organization (FAO)	To raise levels of nutrition, improve agricultural productivity, better the lives of rural populations and contribute to the growth of the world economy.	To ensure the delivery of sustainable, equitable and accessible bioenergy sources and services, irrespective of gender, wealth, location or culture, in support of sustainable development, energy security, poverty reduction and climate change.	Two main pillars each with sub-tasks: 1. Information Collection a. Knowledge – prepare outlook studies in key areas b. Potentials – develop tools to assess country-level bioenergy potential c. Sustainability – develop policies aimed at ensuring the sustainable development of bioenergy d. Interactive Bioenergy Information System (i-BIS) – develop a user-friendly portal to distribute information gathered in prior tasks 2. Mobilization and Implementation at Country Level a. Capacity building and stakeholder participation – help countries establish bioenergy programmes b. Partnerships and cooperation – assist international bodies, in particular through UN-Energy, collaborate to develop coherent national and international bioenergy activities c. FAO Bioenergy – FAO mobilizes its internal capacities and comparative advantages to promote national, regional and global bioenergy development	worldwide		Published paper to outline the initiative in May 2006 ftp://ftp.fao.org/docrep/fao/009/A0469E/A0469E00.pdf	http://www.fao.org/sd/dim_en2/en2_060501_en.htm
Global Bioenergy Partnership (GBEP)	G8	The G8 is an international forum bringing together the governments of Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States. Each year, member states of the G8 take turns assuming the presidency of the group and sets the annual agenda. The GBEP is a commitment flowing out of the Gleneagles Summit hosted by the UK in 2005.	The Partnership's main objectives are to: 1. Create a global high-level policy dialogue on bioenergy, support national and regional bioenergy policy-making and market development, and facilitate international cooperation. 2. Favour more efficient and sustainable uses of biomass and develop project activities in the bioenergy field. 3. Foster the exchange of information, knowledge skills and technologies by identifying and promoting potential areas of bilateral and multilateral collaboration. 4. Facilitate bioenergy integration into energy markets by tackling specific barriers in the supply chain. 5. Act as a cross-cutting initiative, working in synergy with other relevant activities, avoiding duplication.	The Partnership agreed to base its activities on three main pillars: Energy Security - Food Security - Environmental Sustainability. The Partnership agreed on key priorities for the immediate programme of work: - Raising awareness and facilitating information exchange on bioenergy. - Bioenergy and Trade. - Bioenergy and Sustainability. - Methodologies for measuring GHG emission reductions from the use of bioenergy.	worldwide	Launched at CSD 14; expected duration: May 2006 - May 2016	Workshop at COP11/MOP1 http://www2.minambiente.it/sito/settori_azione/pia/docs/roundtable_09_12_2005/chairstair_summary.pdf	www.globalbioenergy.org/ (under construction)

Summary of Bioenergy Initiatives

Project	Agency	Agency Mandate	Project Goals/Overview	Project Structure	Geographic Scope	Project Start Date	Policy Studies/ Workshops	Website
IEA Bioenergy	IEA	To promote energy policies that ensure reliable, affordable and clean energy for its 26 member countries.	To improve cooperation and information exchange between countries that have national programmes in bioenergy research, development and deployment.	Work organized into 12 main tasks which are described in detail below	worldwide			www.ieabioenergy.com
Task 29 : Socio-Economic Drivers in Implementing Bioenergy Projects	IEA	To promote energy policies that ensure reliable, affordable and clean energy for its 26 member countries.	a) achieve a better understanding of the social and economic drivers and impacts of establishing bioenergy markets at the local, regional, national and international level, b) synthesise and transfer to stakeholders critical knowledge and new information, c) improve the assessment of the above mentioned impacts of biomass production and utilisation in order to increase the uptake of bioenergy and to provide guidance to policy makers.	The task is seeking to investigate different regional and national achievements in recognition and evaluation of social and economic benefits of biomass utilisation and drivers in implementing bioenergy projects. Among others, deliverables include position papers outlining the benefits of bioenergy, brochures, scientific papers and presentations, posters and educational website with the possibility of producing a book about frequently asked questions on biomass and bioenergy (www.aboutbioenergy.info).	Austria, Canada, Croatia, Ireland, Japan, Norway, Sweden and United Kingdom		http://www.iea-bioenergy-task29.hr/publications.htm	http://www.iea-bioenergy-task29.hr/
Task 30 : Short Rotation Crops for Bioenergy Systems	IEA	To promote energy policies that ensure reliable, affordable and clean energy for its 26 member countries.	The objective of this task group is to meet the needs of bioenergy industries through technical improvement of biomass crop production technologies, through documenting and disseminating information on the potential environmental benefits of biomass crop production systems, and through developing information to enhance market development in collaboration with the private sector.	<ul style="list-style-type: none"> * Integration of production and environmental functions * Identifying barriers to large-scale implementation * Environmental consequences of short rotation biomass production * SRC Handbook 	Australia, Canada, Croatia, Denmark, the Netherlands, New Zealand, Sweden, United Kingdom, USA	1-Jan-01	Full list of workshops/papers categorized by year: http://www.shortrotationcrops.com/taskreports.htm	http://www.shortrotationcrops.org/
Task 31 : Biomass Production for Energy from Sustainable Forestry	IEA	To promote energy policies that ensure reliable, affordable and clean energy for its 26 member countries.	To develop an integrative framework for information relating to biomass production for energy from sustainable forestry, based on leading-edge science and technology; and to share and promote the use of such an information framework with advanced information technology and a high level of collaboration.	<ul style="list-style-type: none"> * Annual workshops and field study tours, for sharing of scientific and technical information and furthering the Task program, with published proceedings. * Provision of information framework for sustainable biomass production systems integrating (1) forest management activities offering simultaneous opportunities for biomass recovery for energy and civil cultural benefits (2) cost-effective, environmentally-benign operational biomass recovery (3) sustainable biomass productivity taking into account soil and water conservation, nutrient cycling, carbon sequestration and biodiversity, and (4) social and cultural considerations. * Transfer of new knowledge and technical information to research, government and industry stakeholders, with emphasis on advanced user-friendly interactive information technologies (Electronic Information System). * Strong collaboration and information exchange with related IEA Bioenergy Tasks and other forestry and bioenergy organizations worldwide. 	Australia, Belgium, Canada, Denmark, Germany, Norway, Sweden, UK, USA	1-Jan-04	August 2006 International Workshop: biofuels and Bioenergy: Challenges and Opportunities http://www.ieabioenergytask31.org/IEA_Bioenergy_Task_31/Workshops.htm *Details on past workshops can also be found at this website Policy papers can be found below: http://www.ieabioenergytask31.org/IEA_Bioenergy_Task_31/Lib	http://www.ieabioenergytask31.org/
Task 38 : Greenhouse Gas Balances of Biomass and Bioenergy Systems	IEA	To promote energy policies that ensure reliable, affordable and clean energy for its 26 member countries.	The goal of this task group is to investigate the full fuel-cycle of the bioenergy systems to establish the GHG balances. The objectives are to: * Collect and compare existing data on GHG emissions from various biomass production processes * Improve the common analytical framework for the assessment of GHG balances * Apply the common analytical framework to compare different bioenergy options and assist in the selection of appropriate national strategies for GHG mitigation; * Compare bioenergy and fossil energy systems in terms of GHG balance; * Evaluate the tradeoffs between strategies of maximised carbon storage (afforestation, forest protection) and maximised fossil fuel substitution with biofuels; * Identify missing data and R&D requirements; * Contribute to the work of IPCC/OECD/IEA, especially to promote the possible role of bioenergy for GHG mitigation.	Proposed work plan http://www.ieabioenergy-task38.org/description/task38workprogramme.pdf	Australia, Austria, Canada, Croatia, Denmark, Finland, Norway, the Netherlands, New Zealand, Sweden, United Kingdom, USA	1-Jan-01	Papers: http://www.joanneum.at/iea-bioenergy-task38/publications/ Workshops: http://www.joanneum.at/iea-bioenergy-task38/workshops/	http://www.ieabioenergy-task38.org/

Summary of Bioenergy Initiatives

Project	Agency	Agency Mandate	Project Goals/Overview	Project Structure	Geographic Scope	Project Start Date	Policy Studies/ Workshops	Website
Task 39 : Liquid Biofuels from Biomass	IEA	To promote energy policies that ensure reliable, affordable and clean energy for its 26 member countries.	<p>The objectives of this task are to:</p> <ul style="list-style-type: none"> * Work jointly with governments and industries to identify and eliminate non-technical environmental and institutional barriers which impede the use of liquid fuels from biomass in the transportation sector; * Establish an advisory board of stakeholders in the liquid biofuels industry to bring a business environment to the work of the Task; * Identify remaining technological barriers to liquid biofuels and recommend strategies for overcoming these barriers; * Consolidate these efforts and formulate a deployment strategy for technology demonstration 	Comprise of research program to meet objectives outlined under 'goals' section to the left but also includes sub tasks for biodiesel, ethanol and policy/regulatory issues	Austria, Canada, Denmark, EC, Finland, the Netherlands, Sweden, UK, USA	1-Jan-01	<p>Publications: http://www.task39.org/members.htm</p> <p>*Of note, 'Policy Options to Support Biodiesel Production'</p> <p>Co-sponsor, along with Task 29 and Task 3 of August 2006 International Workshop: Biofuels and Bioenergy: Challenges and Opportunities http://www.iea.bioenergytask31.org/IEA_Bioenergy_Task_31/Workshops.htm</p>	www.task39.org
Task 40 : Sustainable International Bioenergy Trade: Securing Supply and Demand	IEA	To promote energy policies that ensure reliable, affordable and clean energy for its 26 member countries.	<p>This task group aims in its first working period (1-3 year) on results that will create insights in information, decision factors and preconditions for the medium-term (4-10 year) results.</p> <p>Key short-term objectives (1-3 year)</p> <ol style="list-style-type: none"> 1. Improvement on insights in influencing factors on the supply and demand of biomass 2. Overview of development of biomass markets 3. Synthesis of existing trade experiences and strategies to overcome "barriers" 4. Identification of sustainability criteria and their local influence on the biomass market 5. Increasing public awareness of international bioenergy trade 6. Exchange of information on bioenergy experiences between parties with a different stage of market development <p>Medium-term objectives (4-10 year)</p> <ol style="list-style-type: none"> 1. Intl. platform (representatives from all relevant stakeholders) for bioenergy trade 2. Dynamic demand and supply models of bioenergy 3. Identification and analysis of options for integrating the production of biomass for energy and subsequent export into agricultural and agro-forestry systems 	<p>Deliverable 1: market experience: Sweden (support by all members)</p> <p>Deliverable 2: Strategic advice on barriers, opportunities and strategy; Netherlands (support by all members).</p> <p>Deliverable 3: Modelling markets: on hold; Norway, Netherlands, Finland pursue realization of projects</p> <p>Deliverable 4: Supply chain analysis: Finland, Canada, Norway (Sweden, Netherlands)</p> <p>Deliverable 5: Certification systems: Netherlands, FAO, UK</p> <p>Deliverable 6: Pilot projects: Worldbank / FAO; Netherlands, UK, Canada</p> <p>Deliverable 7: Case studies; impact analysis: FAO, Netherlands, UK, World Bank</p> <p>Deliverable 8: Evaluation of markets (Ethanol): Brazil; UK, Canada...</p> <p>Deliverable 9: Improved communication, raising awareness, networking and information exchange on the fields covered by the Task.</p>	Germany, Brazil, The Netherlands, Norway, Sweden. In addition Croatia, Finland and the European Commission will join the Task as Observers in 2004.	1-Jan-04	<p>International Biotrade Workshop http://www.bioenergytrade.org/otherreports/publications/workshopinternationalbiotrade092002/index.html</p> <p>Publications: http://www.bioenergytrade.org/t40reports/papers/index.html</p>	www.bioenergytrade.org
Task 41 : Bioenergy Systems Analysis	IEA	To promote energy policies that ensure reliable, affordable and clean energy for its 26 member countries.	<p>The objective of this Task is to supply decision makers with scientifically sound and politically unbiased analyses and conclusions needed for strategic decisions related to research or policy issues. The target groups are particularly decision makers in Ministries, national or local administrations, deploying agencies/organisations, etc. Depending on the character of the various projects some deliverables are also expected to be of direct interest to industry. Decision makers, both public and private, have to consider a whole range of aspects in their planning and deliberations. Hence the Task will cover technical, economic and environmental data in its work.</p>		Sweden, UK, USA and EC	1-Jan-05		

Summary of Bioenergy Initiatives

Project	Agency	Agency Mandate	Project Goals/Overview	Project Structure	Geographic Scope	Project Start Date	Policy Studies/ Workshops	Website
The United Nations Biofuel Initiative	UN Foundation	The UN Foundation builds and implements public-private partnerships to address the world's most pressing problems, and also works to broaden support for the UN through advocacy and public outreach. The UN Foundation is a public charity.	The UN Biofuels Initiative promotes the sustainable production and use of biofuels in developing countries, under conditions that can attract foreign and domestic investment. The Initiative will assess biofuels potential within developing countries and work with national decision-makers and private-sector groups, including NGOs and civil society groups, to develop country-specific strategies for the production and use of biofuels.	The Foundation is currently assembling its International Advisory Experts Group (IAEG) which will provide guidance for the new initiative. Members of the IAEG will facilitate partnerships and advise governments on feedstock potential, technology applications, international trade opportunities, finance, natural resource management, rural development, and potential CDM baseline analysis. The IAEG will be a multi-national, multi-disciplinary and multi-sectoral group that will select six pilot developing countries for the Initiative and provide customized advice and guidance for their national biofuels programs.	worldwide			http://www.unfoundation.org/biofuels/index.asp
Competence Platform on Energy Crop and Agro forestry Systems for Arid and Semi-arid Ecosystems - Africa (COMPETE)	EU International Scientific Cooperation Activities (INCO)	To facilitate information exchange between EU member countries, between INCO countries and EU countries and non-EU/non-INCO countries.	COMPETE will establish a platform for policy dialogue and capacity building and identify pathways for the sustainable provision of bioenergy <ul style="list-style-type: none"> • to improve the quality of life and create alternative means of income for the rural population in Africa • to aid the preservation of intact ecosystems in arid and semiarid regions in Africa • to enhance the equitable exchange of knowledge between EU and developing countries 	COMPETE will deliver a matrix of multi-disciplinary and cross-sectoral work-packages <ul style="list-style-type: none"> • to evaluate current and future potential for the sustainable provision of bioenergy in Africa in comparison to existing land use patterns and technologies • to facilitate South-South technology and information exchange capitalising the world-leading RD&D in bioenergy in the key countries Brazil, Mexico, India, China and Thailand • to develop innovative tools for the provision of financing for national bioenergy programmes and local bioenergy projects, including: carbon credits, bilateral and multi-lateral funding instruments, and the role of international trade • to develop practical, targeted and efficient policy mechanisms for the development of bioenergy systems that enhance local value-added, assist local communities and address gender inequalities • to establish the Competence Platform to ensure effective dissemination and knowledge exchange inside and outside the network 	Africa but hopes to facilitate South-South information exchange drawing on Brazil, Thailand, Mexico, India and China	Oct-06		www.compete-bioafrica.net
Biofuels Production and Policy: Implications for Climate Change, Water Quality and Agriculture	World Resources Institute (WRI)	The World Resources Institute's mission is to move human society to live in ways that protect Earth's environment and its capacity to provide for the needs and aspirations of current and future generations.	This project assesses the impact of biofuel production on the environment and agricultural structure, and how policy influences feedstock production, technology change and the environment.	emphasizes how agricultural policy can be used to promote biofuel use and mitigate climate change				http://biofuels.wri.org/
FAS Attache Reports (Foreign Agriculture Service, US Dept. of Agriculture)	FAS	The Foreign Agricultural Service (FAS) is responsible for collecting, analyzing, and disseminating information about global supply and demand, trade trends, and market opportunities.	assessment of biofuel potential for various countries. Assessments included in country attache reports.	individual country assessments of biofuel potential	prior work has been EU focused but plans to assess developing countries in the future			http://www.fas.usda.gov/scriptsw/AttacheRep/default.asp

2.2 B2 - Compilation of national biofuels policies in both developed and developing countries.

Biofuel Programmes by Country

Country	Crops/ Resources	Fuel	Government Biofuel Mandates	National Biofuel Policy	Source
India	molasses, sweet sorghum (under consideration), jatropha, pongamia	ethanol, biodiesel, straight vegetable oil (SVO)	E5 in 9 states and 5 union territories mandated in 2003 but policy was stopped in 2004 because ethanol was not price competitive with fossil fuels	National Mission on Biodiesel plan which doesn't specify a biodiesel blend but promotes jatropha planting; Biodiesel Purchase Policy - Effective 1 January 2006 oil marketing companies are required to purchase B100 at Rs. 25/liter to blend with diesel. Plan is to increase blends from B5 to B20.	WW, GTZ, WB
China	agricultural residues, animal wastes, forestry residues, rape, sunflower, soybeans, peanuts, sorghum, corn, Manihot esculenta Crantz, Saccharum officinarum L, jatropha	ethanol, biodiesel	in the process of requiring E10 in 5 provinces which would affect 16% of total vehicle fleet		WW, GNESD, GTZ, WB
Brazil	sugarcane, palm oil, macauba, buriti, mamona, soybean, sunflower, castor plant	ethanol, biodiesel	E25, B2 by 2008, B5 by 2013	Brazilian Bioethanol Program - started 30 years ago and included price controls and subsidies. Today, the price controls and subsidies have been eliminated and the government only regulates ethanol production specifications. Federal Law Nº 11.097 passed in January 2005 established the country's biodiesel program. It calls for B2 blends by 2008 and B5 blends by 2013. All biodiesel producers must obtain the Social Seal to certify their product.	WW, GNESD, GTZ
South Africa	soya, sunflower, canola, corn	ethanol, biodiesel		According to news clips, the country was to establish a Biofuels Task Force in 2005 but I couldn't confirm this was formally established via web searches	GNESD, news clips
Malaysia	palm oil	biodiesel	B5 by 2008	National Biofuels Policy which calls for the following: * B5 blends by 2008 * incentives for oil retailers to offer biodiesel * establishing biodiesel production standards * constructing first palm oil biodiesel plant	WW, news clips
Indonesia	palm oil, jatropha curcas, cassava and sugar cane	biodiesel		reduce fossil fuel use by 10% by 2010 (policy just unveiled in Aug. 2006)	WW, news clips
Thailand	sugarcane, molasses, cassava, used vegetable oil, coconut oil, palm oil	ethanol, biodiesel	E10 in 2007	requirement that gasohol be 1.5 baht per litre less than gasoline; 8 year tax break to ethanol producers to stimulate production	WW, GNESD, WB
Philippines	coconut	ethanol, biodiesel	B2 and E5 in 2007 (policy under consideration)		WW
Russia	forest residues, wood pellets	ethanol, biodiesel			

Country	Crops/ Resources	Fuel	Government Biofuel Mandates	National Biofuel Policy	Source
Argentina	soybean (mentioned in GTZ Brazil report)	biodiesel, ethanol	E5 and B5 within the next 4 years (by 2010)	tax breaks to producers and a guarantee that producers will have a share in the market for 15 years	WW, IPS
Malawi	sugarcane	ethanol	no formal programme but the country has been producing ethanol since the 1970s		WB2
Tanzania	jatropha, oil palm, moringa, sugar cane, sorghum, cassava, sisal, agricultural residues	biodiesel, ethanol (esp. cellulosic)			GTZ

Note : The table above is a non-exhaustive listing of policies related to biofuels. They are included here in efforts to complement certification schemes with biofuels policies.

Regional level policies / programme on biofuels : the European Commission's new Energy Policy for Europe includes a renewable energy roadmap. The proposal, dated 10 January 2007 include :

- * a binding 20% target for the overall share of renewable energy in 2020 - the effort to be shared in an appropriate way between Member States
- * a binding 10% target for the share of biofuels in petrol and diesel in each Member State in 2020, to be accompanied by the introduction of a sustainability scheme for biofuels.

The Commission is currently drafting the proposal to incorporate these targets into the legislation and is expected to be endorsed by fall, 2007. In parallel the EU Fuels Quality directive is being reviewed.

Source Key:

WW- WorldWatch Institute (<http://www.worldwatch.org/node/4081>)

GNESD- "Can Renewable Energy make a Real Contribution?", Global Network on Energy for Sustainable Development.

WB1 - World Bank, "Potential for Biofuels for Transport in Developing Countries", [http://wbln0018.worldbank.org/esmap/site.nsf/files/312-05+Biofuels+for_Web.pdf/\\$FILE/312-05+Biofuels+for_Web.pdf](http://wbln0018.worldbank.org/esmap/site.nsf/files/312-05+Biofuels+for_Web.pdf/$FILE/312-05+Biofuels+for_Web.pdf).

WB2 - World Bank, "Advancing Bioenergy for Sustainable Development", [http://wbln0018.worldbank.org/esmap/site.nsf/files/300-05+Biomass+Fina+with+covers.pdf/\\$FILE/300-05+Biomass+Fina+with+covers.pdf](http://wbln0018.worldbank.org/esmap/site.nsf/files/300-05+Biomass+Fina+with+covers.pdf/$FILE/300-05+Biomass+Fina+with+covers.pdf)

Country Study Sources:

GTZ - <http://www.gtz.de/en/themen/laendliche-entwicklung/14071.htm>

IEA- <http://www.bioenergytrade.org/t40reportspapers/00000095e00c86217/00000097af0aba418.html>

South Africa -

http://www.southafrica.info/ess_info/sa_glance/sustainable/update/biofuel-13130206.htm

http://www.southafrica.info/ess_info/sa_glance/sustainable/ethanol-100506.htm

http://www.greencarcongress.com/2005/08/south_africa_in.html

Malaysia

http://www.nst.com.my/Current_News/NST/Saturday/Columns/20051231143911/Article/indexb.html

http://www.bcb.com.my/corporate_info/pdf/Aug05/Vol%203%202005%20Ind%20Issue%20Biofuel%20policy%20081205.pdf

<http://www.orangutan.org.au/132.html>

Argentina:

<http://www.ipsnews.net/news.asp?idnews=32959>

Indonesia:

http://english.people.com.cn/200608/13/eng20060813_292686.html

2.3 B3 - *Compilation of crops for biofuels production*

1. Cereal	<ul style="list-style-type: none"> • Triticale, wheat, rye, barley. Oat.
Soil requirements	<ul style="list-style-type: none"> • Less disruption of soil. • Very constant yield • Humus balance is negatively influenced by annual removal of straw.
Water requirements	
Nutrient Requirements	<ul style="list-style-type: none"> • Medium, depending on goal. Distribution in 3 dosis, 120-180 kg N
Efficiency	<ul style="list-style-type: none"> • Wheat has the highest yield potential on good soils, while rye produces better on poor soils. Triticale performs intermediate and attracts interest for energy purpose, as it is not used for food production.
Climate	<ul style="list-style-type: none"> • Wheat needs moderate climate
Others	<ul style="list-style-type: none"> • Cereals are highly developed crops, knowledge widespread among farmers

2. Hemp	<i>Cannabis</i> Herbaceous crops
Soil requirements	<ul style="list-style-type: none"> • Roots can get very deep, can be used to loosen harder soil and prepare it for the cultivation of other plants • Good agricultural soils the best. • Deep soils with good water supply. • Needs appropriate soil for roots. pH 6-7, good water supply, deep. • Provides good soil cover.
Water requirements	<ul style="list-style-type: none"> • Some moisture throughout the entire season
Nutrient Requirements	<ul style="list-style-type: none"> • Moderate demand, no pesticides needed, shadow of the canopy makes hard for other unwanted plants to grow • No fungicides needed. 60-100 kg N / ha
Efficiency	<ul style="list-style-type: none"> • Yield relatively high compared with input

Climate	<ul style="list-style-type: none"> • Grows under varied environmental conditions but prefers warmer climates
Others	<ul style="list-style-type: none"> • Energetic use new idea • Fungi might cause problems in wet years • High diversity of crop types, as currently not common.

3. Jatropha	
Soil requirements	<ul style="list-style-type: none"> • Undemanding, does not require tillage
Water requirements	<ul style="list-style-type: none"> • Can be cultivated under both irrigated and rain fed conditions • Requires about 200 mm year to survive but responds very well to high rain conditions like 1200 mm (especially in tropical areas)
Nutrient Requirements	<ul style="list-style-type: none"> • Although Jatropha is adapted to low fertility sites and alkaline soils, better yields are obtained on poor quality soils if fertilizers containing small amounts of calcium, magnesium, and sulphur are used. Mycorrhizal associations have been observed with Jatropha and are known to aid the plant's growth under conditions where phosphate is limiting.
Efficiency	<ul style="list-style-type: none"> • Capability to grow on marginal land, restore eroded areas • Jatropha products from the fruit - the flesh, seed coat and seed cake - are rich in nitrogen, phosphorous and potassium (NPK) and are fertilizers that improve soil
Climate	<ul style="list-style-type: none"> • Tropical and subtropical
Others	<ul style="list-style-type: none"> • Very resistant plant, resistance against pests and pathogens • Seed remaining after oil extraction is toxic and can be used as biofertilizer and biopesticide. • Risk of pests and diseases despite of the toxicity of the fruit.

4. Maize	<i>Zea mais spp. Mays</i> cereal
Soil requirements	<ul style="list-style-type: none"> The plant does well on most soils but less so on very heavy dense clay and very sandy soils. The soil should preferably be well-aerated and well-drained as the crop is susceptible to waterlogging.
Water requirements	<ul style="list-style-type: none"> Maize is an efficient user of water in terms of total dry matter production. For maximum production a medium maturity grain crop requires between 500 and 800 mm of water depending on climate.
Nutrient Requirements	<ul style="list-style-type: none"> The fertility demands for grain maize are relatively high and amount, for high-producing varieties, up to about 200 kg/ha N, 50 to 80 kg/ha P and 60 to 100 kg/ha K. In general the crop can be grown continuously as long as soil fertility is maintained.
Efficiency	<ul style="list-style-type: none"> C4 Plant, high water efficiency, but often irrigated. Greatest decrease in grain yields is caused by water deficits during the flowering period New maize varieties that mature later increase yield.
Climate	<ul style="list-style-type: none"> The crop is grown in climates ranging from temperate to tropic during the period when mean daily temperatures are above 15°C and frost-free.
Others	<ul style="list-style-type: none"> Maize in comparison to other cereals has relatively low requirements for soil but is more demanding when it comes to water and climatic conditions Provides little soil cover, late seeding: increased erosion risk. Can be improved through catch crop (Untersaat) Monoculture has a negative effect on humus balance, there is little organic matter turnover. Environmental negative effects can be decreased by good management through crop rotation. Poorly developed root system; average machinery use. High pesticide use due to poor competitive ability; subject to many diseases.

5. Miscanthus	Woody, perennial rhizomatous grass. Herbaceous crop
Soil requirements	<ul style="list-style-type: none"> • Soils with good water supply, not water saturated • Brown soils, high humus percentage • Optimum pH 5.5-7.5
Water requirements	<ul style="list-style-type: none"> • Crucial during the main growing seasons
Nutrient Requirements	<ul style="list-style-type: none"> • The highest from may until July. Nutrient addition not needed if water is lacking, no effect observed • 30-50 kg N/ha, 30-50 kg P₂O₅/ ha, 50-100 kg K₂O / ha(relatively low) • C-fixation in soil (plantation is active for 15 years). Very late harvest.
Efficiency	<ul style="list-style-type: none"> • Weed treatment during establishment essential • Potential for very high rates of growth • Relatively cheap • Higher potential growing season compared top maize.
climate	<ul style="list-style-type: none"> • C4 perennial grass, adapted to warmer climates • Native from tropical Asia and Africa • Fairly cold tolerant
Others	<ul style="list-style-type: none"> • Risk of invasive species (neophyte) • Grown using conventional agricultural methods, harvested annually • Might be difficult to rehabilitate land for other uses due to its deep root structure • Endophytic nitrogen fixing bacteria can occur, effect on nutrient cycling • Clearing of perennial weed before planting is vital, when crop is mature is more resistant. • Apart from herbicides in the establishment phase, (1-3 years), Miscanthus requires very few agrochemical inputs. • A little risk of soil erosion in the first year of the plants, due to wide plant species and slow establishment until complete crop cover. The risk is reduced from the second year onwards. • Miscanthus leaves are not palatable to insects, and as such most of the invertebrate population depends on the weed. If the herbicides keep the crops weed-free, there will be a loss in invertebrates (like in other arable crops) • Very long life span, relative big height: visual impact • Retreat for many small animals and birds.

6. Oil Palm	<i>Elaeis guineensis</i>
Soil requirements	<ul style="list-style-type: none"> • Wide range of soil types, provided good drainage and pH between 4 and 7. Best soil flat, rich, deep. • They do poorly on heavily leached sands or heavy clays that do not drain well, and have low amounts of exchangeable cations. Species is riparian by nature, can tolerate floods.
Water requirements	<ul style="list-style-type: none"> • rainfall demand is usually in excess of 2000mm, with a fairly even distribution required throughout the year(1800mm to 5000mm)
Nutrient Requirements	<ul style="list-style-type: none"> • Relatively low.
Climate	<ul style="list-style-type: none"> • Tropical, subtropical climates. Humid Tropical areas For satisfactory productivity, five hours of sunlight per day is considered the minimal requirement. Its temperature requirement is roughly 22-32°C.
Others	<ul style="list-style-type: none"> • Basic criticism related to conversion of big areas of tropical forest to palm oil plantation, loss of biodiversity, extinction of wildlife. • Fire for land clearing • Conflicts of land ownership with local communities • Pollution caused by excessive or improper use of agrochemicals (little control) • Palm oil mill effluent dumping • Soil erosion: land clearing causes increases topsoil run off, disturbs stream flow, increases sediment loads in rivers and streams • The crop is basically low altitude (< 400m), wet tropical, but it is a hardy crop and has performed very well in areas with a marked dry season and on a very wide variety of soils. • Oil palm, per hectare, is the highest yielding vegetable oil crop in the world. • Oil Producer with the highest yield • Uses only one seventh of the land to produce the same amount of oil as does soybean, is even more efficient compared to rape and sunflower

7. Poplar	<i>Populus spp</i> Woody crop
Soil requirements	<ul style="list-style-type: none"> • Deep soils, developed root systems • Moist soils, riparian areas. Highly flood tolerant. Medium texture.
Water requirements	<ul style="list-style-type: none"> • Relatively high, irrigation might be needed
Nutrient Requirements	<ul style="list-style-type: none"> • High nutrient requirements, especially Ca and Mg. Does not tolerate deep acidic peats and humus with slow release of nutrients. Good uptake of nutrients.
Climate	<ul style="list-style-type: none"> • Can grow in warmer climates than willow. From arctic to temperate.
Others	<ul style="list-style-type: none"> • More resistant to pests and disease than others (like willow) • High establishing costs, not easily propagated from cuttings • Short rotation crop (fast growing tree)

8. Potato	<i>Solanum tuberosum</i>
Soil requirements	<ul style="list-style-type: none"> • Grows on a wide variety of soils. Ideal soil is deep, well drained, and friable • Soils with high clay content require special treatment to maintain productivity. • Potato requires a well-drained, well-aerated, porous soil with pH of 5 to 6. Usually on sandy soils with high water demand. • Heavy machinery and harvested mass lead to soil compaction • Root and row crop, leaves bare soil into late spring.
Water requirements	<ul style="list-style-type: none"> • For high yields, the crop water requirements (ETm) for a 120 to 150 day crop are 500 to 700 mm, depending on climate. • Very important factor, irrigation required for climatic negative balances of more than 350 mm.
Nutrient Requirements	<ul style="list-style-type: none"> • Potatoes provide little organic matter to be returned into the soil. • Fertilizer requirements are relatively high and for an irrigated crop they are 80 to 120 kg/ha N, 50 to 80 kg/ha P and 125 to 160 kg/ha K. • Moderate demand, but late growth and soil erosion risks.

Climate	<ul style="list-style-type: none"> • Optimum mean temperature 18-20 °C. Relatively sensible to temperature changes. • Classified as cool crop, does very well in warm conditions if the water supply is sufficient
Others	<ul style="list-style-type: none"> • Potato is grown in a 3 or more year rotation with other crops such as maize, beans and alfalfa, to maintain soil productivity, to check weeds and to reduce crop loss from insect damage and diseases, particularly soil-borne disease. • Fairly pesticide intensive. • To maximize yield, the soil should be maintained at relatively high moisture content; adverse effect when frequent irrigation with relatively cold water may decrease the soil temperature below the optimum value of 15 to 18°C for tuber formation. Also, soil aeration problems in wet, heavy soils. Very productive.

9. Rapeseed	<i>Brassica napus</i> Brassicaceae
Soil requirements	<ul style="list-style-type: none"> • Best soils are mild, deep loamy soils. Possibility for develop good root system. Medium textured, well drained. Good yields are also obtained with sandy soils with high humus content, if there is enough nutrient supply. Best pH is 6.5
Water requirements	<ul style="list-style-type: none"> • 600 mm minimum yearly precipitation.
Nutrient Requirements	<ul style="list-style-type: none"> • Similar to wheat • High N requirements (200kg N). Leaching risk depends on the use of harvest residues.
Efficiency	<ul style="list-style-type: none"> • Rapeseed is not sustainable, you need to make a break of 3, 4 years between every cultivation, so that only up to 25% of the are should be cultivated with rapeseed.
Climate	<ul style="list-style-type: none"> • Late frosting is very negative • Very cold temperatures for many days have a very negative impact as well • Very sensitive to high temperatures, grow best between 15 and 20 °C
Others	<ul style="list-style-type: none"> • Most grown energy crop in Europe • Well known to farmers • Production of an annual crop is not as risky within a changing agricultural policy as the production of perennial crops • Many illnesses or pests can attack it • Very intensive culture, high input of pesticides and herbicides.

10. Rice	<i>Oryza sativa</i> and <i>Oryza glaberrima</i>
Soil requirements	<ul style="list-style-type: none"> • Not very exigent, but because of the cultivation method needs permeable layer and good drainage.
Water requirements	<ul style="list-style-type: none"> • Very high, grown in flooded fields
Nutrient Requirements	<ul style="list-style-type: none"> • Relatively high input of fertilizers, very intensive systems
Climate	<ul style="list-style-type: none"> • High, constant temperatures are highly favourable, like in tropical areas • Minimum: 13°C, max 40°C, optimum around 30°C.
Others	<ul style="list-style-type: none"> • Ph is variable, depending on variety from 4 to 7 • High level of the landscape alteration for the surface infrastructure needed to move water about the landscape and hold it in fields • Creates anaerobic conditions in underlying soils, which has unique impacts on carbon and nutrient cycling. • Different farming systems: rainfed lowland rice, upland or dryland rice, irrigated rice, deepwater or flood-prone rice. • Very labour intensive.

11. Sorghum	Herbaceous crops
Soil requirements	<ul style="list-style-type: none"> • Extensively branched root system, compacted soil or shallow topsoil can limit the plants ability to deal with drought. pH between 4.3 and 8.7 • The crop does well on most soils but better so in light to medium textured soils. The soil should preferably be well-aerated and well-drained. Sorghum is relatively tolerant to short periods of waterlogging.. • Good soil cover if sufficient water available.
Water requirements	<ul style="list-style-type: none"> • Water holding capacity of the soil is very important. Needs progressively less water(as roots reach deeper) • Sorghum is relatively more drought-resistant than many other crops, e. g. maize. This is due to an extensive root system, effective control of evapotranspiration and stomata with an ability to recover rapidly after periods of water stress, and an ability to withstand desiccation. • Sorghum shows a high degree of flexibility toward depth and frequency of water supply because of its drought resistance characteristics.

Nutrient Requirements	<ul style="list-style-type: none"> • Very high nitrogen feeding crop, but relatively small amounts of phosphorus and potassium The fertilizer requirements are up to 180kg/ha N, 20 to 45 kg/ha P and 35 to 80 kg/ha K
Efficiency	<ul style="list-style-type: none"> • With irrigation very high yields • It fits well into crop production • Existing agricultural machinery can be used • High Photosynthesis rate • Less yield than Maize
Climate	<ul style="list-style-type: none"> • Tropical origin, C4 annual crop • Mainly adapted to southern Europe, but then irrigation might be needed (growing season is dry season) • Drought tolerant, very important in arid regions • Needs 25°C • Optimum temperatures for high producing varieties are over 25°C but some varieties are adapted to lower temperatures and produce acceptable yields • Low temperatures (<15°C) during flowering and yield formation, and high temperatures (>35°C) lead to poor seed set, problems with ripening and reduced yields. • Needs a lot of sunlight
Others	<ul style="list-style-type: none"> • Birds are a major source of yield loss • Sorghum is moderately tolerant to soil salinity. • Numerous diseases, not very competitive at the beginning.

12. Soybean	<i>Glycine max</i> legume
Soil requirements	<ul style="list-style-type: none"> • Wide range of soils, optimum growth in moist alluvial soils with a good organic content, very sandy soils are inadequate • High water capacity, good structure, loose soil.
Water requirements	<ul style="list-style-type: none"> • Relatively high water requirement • Water requirements (ETm) for maximum production vary between 450 and 700 mm/ season depending on climate and length of growing period.
Nutrient Requirements	<ul style="list-style-type: none"> • The fertilizer requirements are 15 to 30 kg/ha P and 25 to 60 kg/ha K. Soybean is capable of fixing atmospheric nitrogen which meets its requirements for high yields. However, a starter dose of 10 to 20 kg/ha N is beneficial for good early growth. Optimum soil pH is 6 to 6.5.
Climate	<ul style="list-style-type: none"> • The crop is grown under warm conditions in the tropics, subtropics and temperate climates. Soybean is relatively resistant to low and very high temperatures but growth rates decrease above 35°C and below 18°C. In some varieties, flowering may be delayed at temperatures below 24°C. Minimum temperatures for growth are about 10°C and for crop production about 15°C.
Others	<ul style="list-style-type: none"> • A shallow water table, particularly during the early growth period can adversely affect yields. The plant is sensitive to water logging, but moderately tolerant to soil salinity. • Growing of two or more years of soybeans is becoming common. That results in an increased risk of erosion (compared to corn) because of decrease of porosity and therefore of rainwater infiltration. • Compared with Switchgrass provides less environmental benefits.

13. Sugarbeet	<i>Beta vulgaris</i> Chenopodiaceae
Soil requirements	<ul style="list-style-type: none"> • The crop is grown under rainfed conditions but also widely under irrigation in the subtropics where the crop is known for its high tolerance to saline and alkali soils. • Wide range of soils with medium to slightly heavy textured, well-drained soils preferred. pH < 5.5 unfavourable. Tolerant to salinity. • Best suited: clayey, marled soils with humus content • Worst suited: poor, dry sandy soils, wet soils • Row crop, sown late, thus bare soil until late spring.

Water requirements	<ul style="list-style-type: none"> • Can stand very dry conditions • Total water requirements are in the range of 550 to 750 mm/growing period, but vary with climate and length of the total growing period. • Thus, except during emergence and early growth periods, it appears that the crop is less sensitive to moderate water deficits.
Nutrient Requirements	<ul style="list-style-type: none"> • Adequate nitrogen is required to ensure early maximum vegetative growth. Nitrogen is often given in split applications, a small amount at planting and the rest after thinning. Nitrogen either in an excessive amount or when applied late during the growing season reduces sugar content. Fertilizer applications may be up to 150kg/ha N, 50 to 70kg/ha P at planting and 100 to 160kg/ha K. • High fertilizer demand and soil erosion risks. • Various pesticide treatments to eliminate weeds.
Climate	<ul style="list-style-type: none"> • Variety of temperate climates • The crop is grown in different climates. Seed germination is possible at 5°C but the effective minimum is considered to be 7 to 10°C. Higher temperatures during vegetative growth are preferred, but high sugar yields are obtained when night temperatures are between 15 and 20°C and day temperatures between 20 and 25°C during the latter part of the growing period. During this period temperatures greater than 30°C greatly decrease sugar yields. For high sugar yields and low vegetative growth in the latter part of the growing period, progressively cooler nights should be accompanied by an exhaustion of available soil nitrogen and soil water.
Others	<ul style="list-style-type: none"> • Heavy machinery and harvested mass lead to soil compaction. • Can provide nesting habitat and shelter in autumn

14. Sugarcane	<i>Saccharum officinarum</i> Grass
Soil requirements	<ul style="list-style-type: none"> Sugarcane does not require a special type of soil. Best soils are those that are more than 1 m deep but deep rooting to a depth of up to 5 m is possible. The soil should preferably be well-aerated (after heavy rain the pore space filled with air > 10 to 12 percent) and have a total available water content of 15 percent or more. When there is a groundwater table it should be more than 1.5 to 2.0 m below the surface. The optimum soil pH is about 6.5 but sugarcane will grow in soils with pH in the range of 5 to 8.5
Water requirements	<ul style="list-style-type: none"> Precipitation requirements of 1500-1800 mm annually, high water requirement, evenly distributed through the growing season.
Nutrient Requirements	<ul style="list-style-type: none"> Sugarcane has high nitrogen and potassium needs and relatively low phosphate requirements, or 100 to 200 kg/ha N, 20 to 90 kg/ha P and 125 to 160 kg/ha K for a yield of 100 ton/ha cane, but application rates are sometimes higher. At maturity, the nitrogen content of the soil must be as low as possible for a good sugar recovery, particularly where the ripening period is moist and warm.
Efficiency	<ul style="list-style-type: none"> Very high efficiency in conversion of solar energy into biomass (C4 plant)
Climate	<ul style="list-style-type: none"> Tropical or subtropical climate Optimum temperature for sprouting (germination) of stem cuttings is 32 to 38°C. Optimum growth is achieved with mean daily temperatures between 22 and 30°C. Minimum temperature for active growth is approximately 20°C. For ripening, however, relatively lower temperatures in the range of 20 to 10°C are desirable, since this has a noticeable influence on the reduction of vegetative growth rate and the enrichment of sucrose in the cane.
Others	<ul style="list-style-type: none"> Partially high losses caused by pests, management very important. Cuba fly, Peru fly.

15. Sunflower	<i>Helianthus giganteus</i> Asteraceae,
Soil requirements	<ul style="list-style-type: none"> • The crop is mainly grown under rainfed conditions on a wide range of soils. Under erratic and low rainfall, a rather deep soil with good water holding capacity is required. Fertile, moist, well-drained soil with a lot of mulch • Deep and dense root system. • Row crop, leaves bare soil until late spring.
Water requirements	<ul style="list-style-type: none"> • The water requirements of sunflower vary from 600 to 1000 mm, depending on climate and length of total growing period. • Water efficient crop but often irrigated as better growth. .
Nutrient Requirements	<ul style="list-style-type: none"> • Fertilizer application is in general 50 to 100 kg/ha N, 20 to 45 kg/ha P and 60 to 125 kg/ha K. The crop is particularly sensitive to boron deficiency. • Moderate demand, good fertilizer uptake.
Climate	<ul style="list-style-type: none"> • Sunflower thrives in climates ranging from arid under irrigation to temperate under rainfed conditions, but is susceptible to frost. Mean daily temperatures for good growth are between 18 and 25°C. Full sun
Others	<ul style="list-style-type: none"> • For farmers not intending to grow it, the sunflower can be an noxious weed • They can be used as intermediate crop for maize plantations. Similar management as Maize. • Can undergo various pesticide treatments to combat pests.

16. Switchgrass	<i>Panicum virgatum.</i> Perennial grasses
Soil requirements	<ul style="list-style-type: none"> • Tolerates diverse growing conditions, ranging from prairies to arid or marsh. Conserve soil. Improve its quality, reduce soil erosion. • Permanent crop, hence good soil cover. • Relatively tolerant to poor soils • Needs good developed root system
Water requirements	<ul style="list-style-type: none"> • Relatively tolerant to floods or drought • Irrigation only necessary in very hot or very dry climates • Drought resistant and very efficient water use (C4), but because of deep roots groundwater abstraction possible.
Nutrient Requirements	<ul style="list-style-type: none"> • Relative little nutrient requirements • Less loss of Soil Organic Matter (SOM) • Nitrogen demand ranging from 25-100 kg N/ha/year
Climate	<ul style="list-style-type: none"> • Warm season plant. Original from North America. Good resistance to dry summer months.

Others	<ul style="list-style-type: none"> • Extended root system, addition of carbon to the soil • Very little pesticide use. • It can be harvested with conventional hay-making equipment, it has high yields in marginal or erosive land. • Similar to Miscanthus, little bit less yield.
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17. Wheat	<i>Triticum aestivum</i> cereal
Soil requirements	<ul style="list-style-type: none"> • The crop can be grown on a wide range of soils but medium textures are preferred. Peaty soils containing high sodium, magnesium or iron should be avoided. • Winter wheat provides a good soil cover. • Intensive rooting system, harvest in dry weather.
Water requirements	<ul style="list-style-type: none"> • For high yields water requirements (ETm) are 450 to 650 mm depending on climate and length of growing period. • It is the cereal with the highest water demand.
Nutrient Requirements	<ul style="list-style-type: none"> • The optimum pH ranges from 6 to 8. For good yields the fertilizer requirements are up to 150 kg/ha N, 35 to 45 kg/ha P and 25 to 50 kg/ha K. • High Cu, Mg. medium Zn, low B and Mb requirements. • Higher fertilizer demand but good uptake.
Climate	<ul style="list-style-type: none"> • The crop is grown as a rainfed crop in the temperate climates, in the sub-tropics with winter rainfall, in the tropics near the equator, in the highlands with altitudes of more than 1500 m and in the tropics away from the equator where the rainy season is long and where the crop is grown as a winter crop. • Wheat is grown under irrigation in the tropics either in the highlands near the equator and in the lowlands away from the equator. In the subtropics with summer rainfall the crop is grown under irrigation in the winter months. In the subtropics with winter rainfall it is grown under supplemental irrigation.
Others	<ul style="list-style-type: none"> • Cereal with the highest soil requirements. • High number of pesticide treatments. • Most common cereal. • Wheat has the highest yield potential on good soils

18. Willow	<i>Epilobium angustifolium</i> Woody crop
Soil requirements	<ul style="list-style-type: none"> • Helps retaining loose topsoil • Permanent crop, good soil cover • Deep rooting • Leafy canopy prevents saturation of the land during periods of heavy rainfall, reduces soil erosion from run-off and prevents nutrients from entering streams • Can grow on land that is too wet for other crops. Does well in moist sites, survives severe flooding. Found along stream beds. • Dry limestone and chalk not suitable. Loamy sands, sandy loams, clay loams and silt loams are common. • pH 5.5-8
Water requirements	<ul style="list-style-type: none"> • Substantial quantities of water (600 mm rainfall), suffers reduced growth in dry conditions or dry years
Nutrient Requirements	<ul style="list-style-type: none"> • Significant nutrient uptake but good uptake also.
Climate	<ul style="list-style-type: none"> • Can tolerate very low temperatures in winter, but frost in late spring or early autumn will damage the top shoots.
00thers	<ul style="list-style-type: none"> • Short rotation coppice (*) • Easy and relatively inexpensive to plant • Level of pest and pathogen unacceptable for food crops can be accepted here • Already used in commercial or near-commercial applications • Willow can take up heavy metals (Phytoremediation) • Weed competition is critical • Riparian buffer strips • Depletion of soil nutrients from frequent and repeated harvesting • Rust is an important disease. • Very competitive, hence no or little pesticides applications necessary • Can provide winter shelter

(*) Short rotation coppice (SRC) consists of densely planted, high-yielding varieties of either willow or poplar, harvested commonly every 3 years. SRC is a woody, perennial crop, the rootstock or stools remaining in the ground after harvest with new shoots emerging the following spring.

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