Sustainability in Leaf Tobacco Production

Task Force Sustainability in Leaf Tobacco Production

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## REVIEW AND HISTORY

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1. INTRODUCTION TO GUIDELINES

1.1 Context / Background
Tobacco is grown and processed around the world. CORESTA members include equally diverse organizations, farmers, universities, NGOs, state monopolies, publicly listed companies, private companies, multinationals, local companies, and government agencies, most of them with many years of experience in addressing sustainability at local and global level.

With this in mind, CORESTA has launched a Task Force to develop the current guidelines designed to capture the sustainable tobacco production practices implemented by its members, delivering the dimensions of environmental integrity, economic resilience, social wellbeing and governance.

These guidelines focus on four key areas:
- Governance
- Agronomy
- Curing
- Livelihoods

1.2 Objectives
1. To identify key challenges for sustainability in tobacco leaf production.
2. To review, update and complement CORESTA Guide No. 3, Good Agricultural Practices (GAP) Guidelines, considering sustainability Principles and/or Best Practice.
3. To identify tools to support the achievement of sustainability in tobacco production.

1.3 Scope
The scope of these guidelines covers sustainable tobacco production through the responsible management of tobacco growing.

Key challenges and opportunities have been identified in order to provide tobacco organizations with a set of tools and advice on the way to address long term sustainability in tobacco production.

a. Governance
   The aim of these guidelines is to enable a common non-competitive approach to address four sustainability dimensions: governance structure, stakeholder engagement, farm performance and reporting benchmarks.

b. Agronomy
   These guidelines address sustainable practices and principles applied to water resource management, soil conservation and health, plant nutrition, integrated pest and disease management and biodiversity.

c. Curing
   These guidelines address various matters related to leaf curing, such as type and source of construction materials, fuel efficiency, management of the curing process and proper handling.
d. Livelihoods

These guidelines provide advice on practices that address relationships between farmers and companies, fair remuneration for growers and workers, human rights, capacity building, land tenure, health and safety and access to credit.

2. GOVERNANCE STRUCTURE

2.1 Context / Background

There is no single and exhaustive definition of “good governance,” nor is there a universally accepted delimitation of its scope. The term is used with great flexibility. Depending on the context and the objective, in the domain of business, good governance is used to include: transparent and accountable processes, full respect for human rights, the rule of law, effective participation, multi-actor partnerships, legitimacy, access to knowledge, information and education, equity, sustainability, and attitudes and values that foster responsibility, solidarity and tolerance.

However, there is a significant degree of consensus that good governance relates to processes and outcomes that are necessary to achieve the goals of development. Good governance can be defined as the process whereby organizations conduct business, protect the environment, manage resources and guarantee the respect of human rights without abuse and corruption, and with due regard for the rule of law.

Good governance is linked to sustainable development, emphasizing principles such as accountability, transparency, responsibility, participation, environmental respect and protection of human rights, whilst driving sustainable economic and business growth for farmers, communities, companies, and all other key stakeholders.

Good governance and sustainable development are mutually reinforcing. Sustainability principles provide a set of values to guide the work of organizations and individuals. They also provide a set of performance standards against which everyone should be held accountable. Sustainability principles inform the content of good governance efforts: they may inform the development of policies, programmes, budgetary allocations and other measures.

Without good governance, economic and business development cannot be respected and protected in a sustainable manner. Good governance ensures the existence of a process to set objectives and assess results in accordance with the indication of stakeholders. The implementation of good agricultural practices, environmental protection and human rights policies relies in turn on a conducive and enabling environment. This includes appropriate managerial and administrative processes responsible for responding to the needs of the technical aspects of business and of stakeholders.

Tobacco organizations are encouraged to take steps that go beyond minimum legal requirements, where applicable, ensuring that by pursuing tobacco production they do not infringe on the rights of farmers, workers and local communities and they comply with appropriate environmental, social, and human rights standards; that they contribute to sustainable development outcomes; and that they make pertinent information public and accessible.

The tobacco sector consists of various organizations whose structures range from limited to highly sophisticated systems. Size and market power also are very diverse.
Perceptions of the sector integrity are affected partly by how performance with respect to the economic, environmental and social dimensions of sustainability is communicated. Effective communication is based on the collection, evaluation and comprehensive compilation of performance data. Accounting complexity can be very high, particularly in diverse and internationally operating corporations. Reporting should be relevant and responding to the interests of the concerned audience.

2.2 Guidelines

These guidelines aim to support companies to put in place a robust governance structure mutually enforcing sustainable development.

Key attributes of good governance are:

- compliance
- transparency
- responsibility
- accountability
- participation
- responsiveness to the needs of the stakeholders

Bearing this in mind, tobacco organizations are recommended to:

a. have an explicitly and publicly stated business purpose, as well as a Code of Conduct, both of which are binding for management and employees, and values and ethical guidelines which are in line with the principles of rule of law and sustainable development;

b. follow due diligence procedures prior to decisions with potential major and long-term sustainability impact;

c. ensure compliance to local legislation at all levels of the organization and formalize such requirement with farmers and suppliers through appropriate contracts;

d. set relevant, time-bound and measurable short- and long-term objectives in line with the expectations of stakeholders and make the results accessible to the affected stakeholders in adequate form;

e. regularly review all sustainability-related business areas and performance indicators in accordance with recognised sustainability reporting systems; indicators should elicit comparable information on economic, environmental and social performance of the organization;

f. define and wherever possible include in their scope of action all entities that generate significant sustainability impacts (actual and potential); subsequently report back to the public on sustainability issues, efforts and results;

g. disclose how management approaches a given set of topics in order to provide context for understanding performance in a given area;

h. align business behaviour with corporate ethics and review and assess it at the most senior level of the enterprise.

In addition, tobacco manufacturers are encouraged to:

- commit to procure only from suppliers that demonstrate commitment to and continuous improvement on sustainability performance;
• ensure that the terms of agreements with their suppliers such as prices, lead times and quantities are consistent with the suppliers’ commitment to resources to fulfil the CORESTA sustainability guidelines;

• align sustainability principles with company organization interfacing with suppliers and farmers (including buying staff, legal departments, technical support and other personnel whose decisions may affect working conditions, labour practices and the environment in tobacco production). They should be provided with training and guidelines that enable them to carry out the company’s sustainability policies and their performance should be assessed and managed accordingly;

• ensure that governance systems contemplate the cost and investment required to deliver sustainability when negotiating production costs and prices with stakeholders;

• integrate implementation and independent verification of the CORESTA sustainability guidelines as a positive performance measure when assessing supplier performance.

2.3 Suggested Indicators

a. Existence of a publicly accessible mission statement including social, economic and environmental objectives of the enterprise and existence of a Code of Conduct providing guidance concerning rules, information flow, sanctions and other important sustainability issues of the organization.

b. Existence of procedures and instruments such as risk management, environmental impact assessment to identify and address sustainability challenges within sector and supply chain, in compliance with agreed international standards.

c. Evidence of due diligence, risk assessment or impact assessment concerning decisions on economic, environmental social and governance issues, and the results shared with affected stakeholders.

d. Existence of regular, timely, correct and adequate communication with all stakeholders affected by operations.

e. Existence of valid, auditable information about economic, social and environmental performance (e.g. Corporate Social Responsibility, Creating Shared Value reporting).

f. Existence of transparent definitions of mandates, responsibilities and accountability concerning sustainable development at all levels of management.

g. Existence of procedures and instruments to evaluate the Code of Conduct and improve its implementation, including acting upon deviations.

h. Repeated failures on stated policy.

2.4 Best Practice

• Ethical Trading Initiative - ETI Principles of Implementation, 2009 - http://www.ethicaltrade.org/resources/key-eti-resources/principles-implementation


3. SUSTAINABILITY IN LEAF PRODUCTION

3.1 Introduction

Sustainability in the leaf production sector aims at long-term farming. As such, it embraces all aspects of optimising yield, usability and profitability of the crop and of ensuring that it has been produced ethically and meets reliable standards of integrity. It also aims at conserving the environment and improving quality of life for farmers, their workers and surrounding communities.

The information provided within this document is designed to complement, and expand upon, with greater specificity, certain pillars contained in CORESTA Guide No 3: Good Agricultural Practice (GAP) Guidelines. The CORESTA Guide No. 3 sets forth the framework and key pillars of good agricultural practices which a responsible organization/individual should take into account in the establishment of local good agricultural practices. The Sustainability in Leaf Production Guidelines document is another tool to assist in the establishment of agricultural practices which further enhances sustainable tobacco production.

3.2 Seedling Production

A healthy transplant or seedling is the foundation for a successful field crop and better ensures a positive economic return to the farmer. Achieving favourable economics depends upon the grower’s ability to enhance productivity by deploying sustainable crop production practices and a carefully designed appropriate seedling production system. This is the first step towards achieving economic resilience and a successful crop season.

The seedling production phase, involves an interplay of soil or soil-less media, water, nutrients and the environment for successful production of healthy seedlings. Interaction of these critical elements, along with proper management, results in the production of healthy seedlings and optimisation of the factors impacting the long term sustainability of the farm. The objective of this section is to outline the importance of critical factors in seedling production and suggest indicators to preserve the natural ecosystem.

These guidelines highlight the importance of preserving water, environmental and soil (including soil-less media in seedling production) resources.

3.3 Seedling Production – Water Management (volume, availability and quality)

I. Context/ Background

Water resources have been under increasing pressure due to increasing water demand and limited water supply. Only 3% of world’s water is fresh water and only 1% is readily available for human, agricultural and industrial use. Around a third of countries are considered to be “water stressed” and this is predicted to rise strongly due to increasing demand from a growing population, improving standards of living and a shifting water supply related to climate change.
Seedling production requires water, which should be from a sustainable source, and the water should be used efficiently. Farming activities should be organized so that the natural water bodies and drinking water supplies do not become contaminated or depleted.

There is an array of technologies to improve water use efficiency during seedling production, such as: micro-irrigation; intact root seedling production; hydroponics (e.g. float systems); aeroponics; etc. Embedding the principles of these technologies within the current seedling production system is imperative to ensure sustainable water use.

II. Guidelines

Efficient utilization of water and protection of water quality are of paramount importance during the seedling production stage in order to produce robust & healthy seedlings with a minimal water usage footprint.

1. Irrigation scheduling should be based on the water requirements of seedlings.
2. Application techniques are appropriate to the relative availability of water and the production techniques are selected based on the local conditions to ensure efficiency in water use.
3. Micro-irrigation systems like micro-sprinklers can be used for overhead irrigation of seedbeds to reduce total water requirements. Such systems are often cost effective in various configurations.
4. Excessive irrigation, in addition to unsustainable water usage, can lead to the production of weak seedlings and increase the risk of root & leaf diseases, thus it should be avoided.
5. Alternative seedling production techniques using soilless media and resetting the young seedlings into eco-friendly trays or beds typically reduces the water requirement, as compared to poorly managed traditional bare-root seedlings.
6. Adopt practices such as clipping, mulching, etc., to reduce evapotranspiration.
7. The use of shade for the protection for seedlings, where needed, can reduce the water requirements by lowering evaporation. Suitable shade materials include UV stabilized shade nets, palm leaves, agro-waste materials, etc.

III. Suggested Indicators

The amount of water required for production of seedlings to plant one hectare is an objective measure to measure the efficiency of the system used for the seedling production.

IV. Best Practice

1. In soil-based systems of seedling production, base irrigation scheduling (i.e. frequency and amount of irrigation) on the water requirements at each stage of growth to avoid either under- or over-irrigation. In float systems, keep a minimum depth of water enough for proper seedling production. This will reduce water and fertiliser usage.
2. Micro-irrigation techniques are in use to better ensure water is not over applied and reduce unproductive losses at times of high evapotranspiration (ET).
3. Intact root seedling production, as compared to bare-root seedlings, using different formats of float and semi-float are practiced in the vegetable and tobacco nurseries.
4. Advanced techniques of seedling production like hydroponics and aeroponics, are extensively used in horticultural crops like vegetables & flowers, and contribute towards water & resource conservation and embedding climate resilience.
3.4 Seedling Production – Environment

I. Context/ Background

Seedling production is a critical activity and involves the use of several inputs such as seeds, water, fertilisers, crop protection agents (CPAs), trays, soil or media, mulch and protective covers. Some of these materials require careful handling and disposal, as appropriate during the production of seedlings and post production. Some materials can potentially damage the environment, if improperly handled.

Several seedling production methods are in practice in different parts of the world ranging from conventional bare-root seedbeds to float seedling production, which uses a combination of the above listed materials.

Float seedling production is practiced both by farmers with large holdings with intensive production practices, and small scale growers with relatively simple production systems.

Residual water from seedling production may contain nutrients and agrochemicals, therefore proper management is required to mitigate runoff and leaching from conventional seedbeds, and disposal of float water. Proper disposal of residual float water may include: evaporation and where diseases are not a concern, land application as transplant water and/or as supplemental irrigation.

II. Guidelines

1. Schedule water requirement based on the ET (evapotranspiration) and crop water requirement in the seedling production system.

2. In float systems, manage water levels to avoid having residual float water that requires disposal, by gradual reduction of water levels and avoiding unnecessary water additions, especially as seedlings approach transplantation time. Properly managing water requirements minimizes the amount of water that will need to be properly disposed of or wasted.

Where possible, seedling production materials should be (1) reused or repurposed; or (2) recycled; and if no other option (3) properly disposed. In most situations, reuse has less environmental impact than recycling, and recycling has less environmental impact than disposal.

III. Suggested Indicators

1. Percentage of farmers using locally defined best practices for their seedling production system.

2. Percentage of farmers adopting acceptable water disposal/management methods.

3. Percentage of farmers adopting acceptable reuse / recycling / disposal methods of waste materials used in seedling production.
IV. **Best Practice**


2. Seedling Production in Greenhouses - [http://edis.ifas.ufl.edu/cv268](http://edis.ifas.ufl.edu/cv268)


5. GreenTech seedling production system for small scale farmers in India

6. General
   a. Hydroponics and use of recirculation systems (where there are no disease concerns)
   b. Hydroponics with lettuce combined with aquaculture to recycle nutrients
   c. Advanced techniques of seedling production like aeroponics

### 3.5 **Seedling Production – Soil (Soilless media, etc.)**

#### I. **Context/ Background**

Soil sterilization is an important practice to provide a disease and weed free environment for the growth of tobacco seedlings. Seedling production on traditional seedbeds is a common practice by farmers in many growing regions, with a wide array of sterilization methods employed - from no sterilization and manual weed control, to less environmentally friendly options such as gaseous chemical fumigation, to more environmentally friendly options like solarisation.

In the case of soil-less systems, the farmers use a combination of growing media derived from various products, however whatever the final media mix, having established physical and biochemical characteristics is beneficial for successful seedling production (devoid of disease causing pathogens).

The media used for seedling production should be from a sustainable source. For example, peat based medias have a proven track record in seedling production, however the long-term sustainability of peat is debatable, therefore locally sourced alternatives should be developed, such as pine bark, coconut coir, etc. Other organic based materials may be available which are from recognized sustainable and renewable sources. The current trend in tobacco seedling production is to reduce the amount of peat in a media blend by the addition of sustainable organic materials, such as composted waste materials, coconut by-products, etc.

Similarly, many of the tobacco growing regions have shifted to the use of soilless media derived from various sources (pine bark, coconut, farm yard manure, compost, etc.). The physical and biochemical properties of these materials are important in supporting the growth of the seedlings, as is the availability of a consistent media product for the farmers to use.

#### II. **Guidelines**

1. Sterilized soilless media, devoid of weeds & disease causing organisms, derived from various plant sources can be used for seedling production.

2. Use of renewable media is preferred for seedling production.

3. Soil sterilization with methyl bromide for seedling production is not recommended due to the environmental impact, and is generally not permitted (Montreal Protocol)
4. Burning of agro-wastes on the seedbeds, while often effective at soil sterilization, has an impact upon the nutrient transformation process and is not considered to be the most environmentally appropriate practice.

5. An effective soil sanitation process, which minimizes the environmental impact and enhances the soil characteristics, such as solarisation, is preferred.

6. Homemade media are one option to avoid peat use, but they pose their own production risk such as diseases, inconsistent performance, etc., thus requiring more management and attention.

III. Suggested Indicators

1. The media used for seedling production must be consistent and within locally defined parameters. It is helpful to have locally prescribed and recommended physical characteristics, such as pore volume, bulk density, etc. and chemical characteristics such as electrical conductivity, cation exchange capacity, pH, C:N ratio, etc. Percentage of farmers using locally acceptable renewable media.

IV. Best Practice


3.6 Field Crop Management

Field crop management is the second phase in the crop growing cycle, which involves the efficient use of the resources to ensure a successful crop. The activities of any crop production impacts the physical, chemical and biological characteristics of the soil, as well as water and environment, before, during and after the production of the crop. These changes should be defined, monitored, measured, and managed throughout the crop production phase to better sustain the long-term productivity of the current, and future crop while protecting the environment and producing sustainable economic returns to the growers.

The efficient use of natural resources is a paramount requirement for responsible agriculture. The guideline highlights the importance of each phase of crop production, the associated impacts, and the indicators for measurement needed to support and strengthen sustainable production practices.

3.7 Field Crop Management – Crop Rotation

I. Context/ Background

It is widely agreed that crop rotation is a beneficial practice, however there are many factors to consider in establishing an effective crop rotation system, such as cropping history/systems, soil diseases, fertility, agricultural practices, land pressure/availability, seasonal weather patterns, etc. There are multiple crop rotation systems that are effective and provide long-term sustainability. However the effectiveness of unusual rotational practices, such as two years continuous tobacco followed by two or three years non-solanaceous crops, needs to be measured at individual farm-level and cannot be deemed globally acceptable in all situations. Likewise, extremely long rotations, such as one year tobacco and six or seven years non-solanaceous crops, cannot deemed as global best practice due to economic considerations and land usage/demand factors.
The choice of rotational crops is an important factor for the farmer and must take into account: the crop’s growing cycle; nutrient requirements and residual value; management and marketing (if applicable) costs and requirements; compatibility with local environmental conditions; and effectiveness in managing pest and diseases. A legume addition to crop rotation is often seen as advantageous, because legumes add nitrogen to the soil, but they may not always be the best choice as certain diseases and slow released nitrogen could impact the following tobacco crop. Additionally the cost of establishment and marketability may make a legume an unviable option for the farmer. Therefore careful consideration, evaluating multiple factors, must be taken into account when selecting rotational crops.

In many countries, increasing land pressure limits a farmer’s ability to practice effective crop rotation. In some places cover crops or fallow fields have been implemented to assist in overcoming a lack of true crop rotation, and effectively meet the local needs to break pest and disease cycles. However this practice does not work for all situations, therefore the local condition must be taken in to account. A fallow period can be an effective practice in some areas, when used in conjunction with other crops, especially in areas where only one field crop can be produced per year (i.e. rain & dry season areas), and in areas where farmers lack the resources to plant an alternative rotational crop. In these situations, a fallow period is generally longer than four months, and the soil surface should be protected from erosion.

In some areas soils are fumigated to overcome a lack of crop rotation; however mono-crop cultivation can lead to gradual decline in soil quality in terms of physical, chemical and biological health. Therefore fumigation solely to compensate for a lack of crop rotation is not considered a sustainable practice.

II. Guidelines

1. Legumes, cereals and other grasses, and other crops are grown widely as green manure and cover crops, but which ever rotational crop is selected, it should be fully vetted to ensure it is an appropriate fit in the entire farm cropping system. The use of Solanaceae crops should be avoided in tobacco rotations due to similarities in diseases and pests. If grown in any rotation scheme, enhanced management practices should be implemented to properly address potential pests and diseases.

2. Choice of crops to be based on the local availability and suitability for the growing conditions, as well as being economically viable for the farmer.

3. Almost any form of crop rotation, inter-cropping, fallow, cover crops, etc. is better than a single crop (mono-crop) system, but may not be practical or effective for all situations. The generally accepted minimum crop rotation for tobacco is: one tobacco crop followed by two non-solanaceous crops, or a fallow period and one non-Solanaceae crop.

III. Suggested Indicators

1. Physical characteristics (e.g. bulk density, aggregate stability), chemical characteristics (e.g. soil organic matter status, pH) and biological characteristics (e.g. soil flora and fauna) can be assessed periodically to determine the stability and/or enhancement of soil health related to farming activity.

2. Locally identified crop rotation systems and percentage of farmers which implement acceptable rotational practices.

IV. Best Practice


2. Crop Rotation - http://vdsa.icrisat.ac.in/Include/reports/rp91.pdf
3. Crop Rotation -  
http://extension.psu.edu/plants/crops/soil-management/conservation-tillage/crop-rotations-and-conservation-tillage

4. Crop Rotation -  
https://www.princeton.edu/~achaney/tmve/wiki100k/docs/Crop_rotation.html

3.8 Field – Soil Conservation

I. Context/ Background

Because tobacco is grown relatively widely spaced, often on ridges and on lighter soil types, there is a high risk of soil loss by erosion. Therefore, it is important to rigorously adopt all feasible soil conservation measures to achieve sustainable production.

Sustainable soil management and conservation practices which reduce erosion and support healthy plant growth assist in keeping the soil in good health. Furthermore, soils become less productive if eroded, compacted from improper use of machinery and farm traffic, or damaged by inappropriate fertilization or irrigation. Eroded soil creates problems in water courses and is a major cause of eutrophication and siltation. Soil compaction may be confused with poor soil fertility which may lead to excessive fertilizer application with limited crop response.

Productive soils are fundamental to sustainable agriculture. A lack of erosion control practices has a negative impact upon the soil’s physical and chemical status. It takes about 500-1000 years to form 2.5 cm of soil, and erosion at a rate of 10,000 kg/ha, would result in approximately 2.5 cm of soil being lost in 3.7 years.

Land pressure/tenure and economic pressure can limit the use of cover crops, long rotations, and some other practices that conserve the soil and improve soil structure, fertility, and productivity. However other conservation practices can be implemented (contour ploughing & planting, leaving field residues, strip cropping, etc.) which have minimum financial impact and require limited land area. It is important to understand the local dynamics which impede the adoption of certain beneficial conservation practices, and identify and implement conservation practices which are achievable under the local conditions. Without productive and healthy soils, farmers face ever increasing challenges and will fail to be sustainable in the long-term.

II. Guidelines

1. Identify the relevant components of a local soil management plan and established procedures and practices which protect the soil from erosion.

2. Crops to be selected where soils are proven to be suitable for the crop and in appropriate rotations and intercropping systems.

3. Risk assessments of soil erosion & loss potential and soil compaction along with identification of corrective / preventative practices.


5. Monitoring soil health and quality through measurement of identified soil quality parameters such as pH, soil organic matter, nutrient content, soil compaction, disease incidence and build-up, etc.
III. Suggested Indicators

1. Physical characteristics (e.g. bulk density, aggregate stability), chemical characteristics (e.g. soil organic matter status, pH) and biological characteristics (e.g. soil flora and fauna) can be assessed periodically to determine the stability and/or status of soil health related to farming activity.

2. Programs to be defined and implemented for improving physical, biological, and chemical composition. Percentage of farmers following guidelines & recommendations.

3. Percentage of farmers that adopt locally defined soil conservation practices.

IV. Best Practice


3.9 Field – Nutrient Management

I. Context/Background

Fertilizer materials are important inputs for economic sustainability in tobacco farming. Efficient use of fertilizer materials impacts the long term sustainability and viability of the soil and water.

Macronutrients, secondary and micronutrients should be provided in appropriate amounts to achieve economically viable yield and quality in an environmentally sustainable manner. Routine soil analysis, at least once every five years, identifies the nutrient composition of the soil and assists with fertilizer recommendations. Such tests will assist in identifying nutrient deficiency and help develop a balanced nutrient application program based on the crop needs.

Indiscriminate use and over application of nutrients are considered unsustainable practices since both are environmentally irresponsible as well as economically wasteful. Excessive nutrients can find their way into the atmosphere and ground and surface water. This may result in eutrophication of water bodies and contribute to climate change. Applied fertilizer materials, organic or inorganic, should be from known sources and with a known nutrient content. Avoid fertilizer materials that supply unnecessary or excessive nutrients which can have a negative impact upon leaf quality, such as chlorides and heavy metals.

Imbalanced nutrient application is counterproductive, impacting productivity and increasing the cost of production, thus eroding farmer margins.

Nutrient management practices are often linked to economic factors, for example over fertilizing for (arguably) greater yield & profit, and under fertilizing due to a lack of funds for fertilizer materials.
II. Guidelines

Nutrient Management System:

1. Basic knowledge of the soil’s chemical, biological and physical composition is the starting point in considering the fertilizer recommendation. Factors such as soil type and texture, soil organic matter content, soil compaction and pH can impact the fertilizer material applied.

2. Nutritional requirements of tobacco to reach the target yield and quality must be known and translated into local specific operational recommendations.

3. Fertilizer recommendations should take into account actual nutrients available from soil, the soil’s mineral composition, residual nutrient application, previous crop residues, cover crops, green manure crops, etc.

4. Fertilization selection criteria should consider: supply availability, nutrient content, cost, ease of application, rate of nutrient release, and potential for loss. Specific to tobacco fertilizer materials, the levels of chlorides and heavy metals should be known and minimized to ensure a commercially acceptable product.

Nutrient Application:

1. Avoid fertilizer application methods, and excessive dosages, which could contaminate surface and ground water. Suitable application technology, which is affordable, and appropriate rates are the starting point to protecting this limited resource.

2. Considerations to avoid nutrient loss can include: fertilizer placement and time of application, choice of fertilizer material, soil condition, and application technique/method.

III. Suggested Indicators

1. Some companies, such as Unilever, measure “nitrogen balance” as an indicator for the amount of nitrogen released into the environment.

2. Soil health indicators, mentioned in the previous sections, are helpful indicators.

3. Match nutrient application based upon the crop’s needs to achieve the desired yield and quality.

4. Percentage of farmers covered under a soil analysis programme and application of nutrients at the recommended rate.

IV. Best Practice

1. Sustainable Agriculture Network - http://sanstandards.org/sitio/


3.10 Field – Water Management

I. Context/Background

Water resources have been under increasing pressure due to increasing water demand and limited water supply. Only 3% of world’s water is fresh water and only 1% is readily available for human, agricultural and industrial use. Around a third of the countries are considered to be “water stressed” and this is predicted to rise strongly due to increasing demand from a growing population, improving standards of living and a shifting water supply related to climate change.

Productivity levels of several crops increase through the use of good quality irrigation water. Water availability helps in higher input efficiency and associated benefits of productivity and crop quality enhancement.

Water is arguably the most important factor for all crop production. In tobacco production water has a profound impact upon quality as well as yield. Tobacco can be negatively affected both by too much and too little water. However the tobacco plant is an efficient user of water and requires less water than many other commercial crops such as rice, maize, sugar cane, etc. therefore the correct timing of applied water can greatly assist in reducing over irrigation. Drought can have a negative impact on the tobacco crop. A lack of irrigation equipment, and/or available water is a concern to farmers in many countries. Likewise periods of excessive rainfall, and a lack of equipment to effectively manage this condition, also negatively impacts farmers. The availability and access to acceptable quality water and its efficient use through irrigation equipment and technology can greatly assist in stabilizing productivity and quality.

II. Guidelines

Availability of good quality irrigation water is achieved through several ways in different parts of the world.

1. Rainwater harvesting and storage through contour bunding (tie ridges), dams, weirs, etc.
2. Watershed development involving farmers, businesses, village representatives, water boards, environmental agencies, etc. for recharging water sources (ground and surface).
3. Efficient use of irrigation water through the adoption of appropriate and cost effective practices and equipment.

III. Suggested Indicators

1. Establish water use efficiencies under local production systems. The water use efficiency varies with the soil texture, growing pattern of tobacco, evapotranspiration and rainfall characteristics. Percentage of farmers which implement practices to minimize irrigation requirements and maximize water use efficiency.
2. Quantify the water required/applied to produce tobacco (mm/ha; litres/ton; etc.) and identify practices, where feasible and applicable, to reduce the amount of water applied. Annual water use reduction.

Monitoring the depletion of the water table in tobacco growing areas and measure extraction rates compared against replenishment rates.
IV. **Best Practice**

1. Timing and amount of irrigation must be tailored to crop requirements to meet the target productivity levels for a particular region.

2. Application techniques should be appropriate and suit the availability of water, soil type, slope, etc.

3. Water should not be over applied and mechanisms to regulate water supply should be in place.

4. Irrigation should be employed based on the ETc (evapotranspiration and crop coefficient, a numerical factor that relates the ET of the individual crop ETc to the reference ET).

5. Irrigation water quality should be monitored to avoid potential deterioration of crop quality.

6. Equipment used for irrigation should be maintained and calibrated periodically.

7. The effects of drought and excess rainfall situations should be identified and communicated to the growers.

**Following are some references defining the best practices:**

- **Scheduling Irrigation** - [http://www.cimis.water.ca.gov/cimis/infoIrrSchedule.jsp](http://www.cimis.water.ca.gov/cimis/infoIrrSchedule.jsp)
- **Scheduling Irrigation** - [http://www.cimis.water.ca.gov/cimis/infoIrrSchedule.jsp](http://www.cimis.water.ca.gov/cimis/infoIrrSchedule.jsp)
- **Scheduling Irrigation** - [http://www.netafimusa.com/agriculture/download/tobacco-form](http://www.netafimusa.com/agriculture/download/tobacco-form)
- **Fertigation and Chemigation** - [http://edis.ifas.ufl.edu/hs1206](http://edis.ifas.ufl.edu/hs1206)

**3.11 Field – Crop Protection Agents (CPA and Integrated Pest Management (IPM))**

I. **Context/Background**

The objective of IPM is to adopt cultural, biological, mechanical, physical and other strategies to minimize the crop loss due to disease and pest attack and reduce the use of CPAs (Crop Protection Agents) on the crop. IPM allows for the use of CPAs registered and recommended for tobacco locally. However, IPM prioritises other control mechanisms before the selection and use of a CPA. The goal is to reduce the number of CPAs applied in crop production, and to lower the residues levels of those CPAs which are used in crop production.
In a global context there are a limited number of Crop Protection Agents (CPAs) registered for use on tobacco. Within the tobacco industry there are stakeholders with varying views on the acceptability of some of these registered products, therefore CPA residues are an important factor in determining the acceptability of tobacco. All CPA’s used in tobacco must be compliant with local legislation and recommended for tobacco use in the country.

Some countries lack the newer IPM products and/or strategies; while other countries fail to use them. IPM programmes have been proven to be effective in reducing CPA use and associated residues while producing an acceptable tobacco crop. The development and utilization of IPM is fundamental to the long term sustainability of tobacco production regarding the environment, economics, and social concerns.

II. Guidelines

- Identify effective alternative control mechanisms, practices, and devices/products.
- Identify pests and beneficial organisms in the field, understand their life cycle and establish economic threshold levels.
- Scout fields for pests and diseases.
- Use alternative methods or control practices before applying CPAs.
- Use only approved and registered CPAs according to label and only when the economic threshold levels are reached, and where alternative methods are not appropriate. Selection of pest specific CPAs, as compared to broad-spectrum CPAs, is more environmentally responsible as it reduces the impact to non-target organisms.
- Follow safety guidelines when using CPAs (handling, application, storage, disposal, etc.).
- Pest and disease forecasting systems where available can be beneficial IPM tools.

III. Suggested Indicators

1. CPA residues detected in the cured leaf can be an indicator of which CPAs were used.
2. A declining trend in the number of CPA residues detected and/or declining residue levels can be an indicator of the effectiveness of IPM and CPA reduction practices.

IV. Best Practice

1. Implement farmer training on the principles of Integrated Pest Management for key pests and diseases that include threshold values, control strategies, and other important details.
2. Use CPAs based on economic threshold levels, according to the product label and local laws, and application in a manner to achieve effective control while minimizing CPA residues.
3. Follow safety guidelines whenever dealing with CPAs.

Following are some references defining the best practices:

- Integrated Pest Management - http://extension.psu.edu/pests/ipm/schools/educators/curriculum/contents/sixtactics
3.12 Prevention of NTRM and Taints

I. Context / Background

Incorrect tobacco handling, curing and storage practices may increase the risk of Non-Tobacco Related Material (NTRM), taints or chemical residues in tobacco.

NTRM is anything found in tobacco that is not tobacco lamina or stems. NTRM can be categorised as synthetic, non-synthetic and organic, including parts of the tobacco plant such as stalks, suckers and roots.

NTRM is an important issue because its presence will jeopardize the integrity of tobacco and, as a major industry concern, it must be addressed effectively.

Examples of NTRM include, but are not limited to, plastic, rubber, metal, glass, netting, foam material, insects, cocoons, feathers, leather, fur, cigarette butts, hessian and cotton string, cloth, lint, paper, grass, weeds, straw, stalks, food, fruit and sand.

The key objectives of these guidelines on preventing NTRM, taints and chemical residues during handling of fresh leaves, curing, and cured tobacco storage, are to enable tobacco companies to:

- Develop and deploy local best practices to minimize the risks of NTRM, taints and chemical residues in tobacco during curing and storage.

II. Guiding Principles

Most NTRM originates at the farm level. Preventing the introduction of NTRM in tobacco at this stage is the most effective way of addressing the problem; therefore, this is where most efforts must be focused.

The tobacco leaf purchaser should implement a system in place to provide feedback to farmers on the presence of NTRM.

Proposed Benchmark Indicators

- A standardised monitoring and reporting system in place for NTRM throughout the tobacco supply chain.
- Training and awareness programme targeting all key stakeholders within the supply chain.

III. Best Practice

General

1. Introduce a clause, where applicable, in the farmer/supplier contract stating that tobacco containing NTRM will not be accepted and/or may require re-handling.

2. Develop and distribute training material which is concise, pictorial and easy to understand.

3. Provide training to farmers and workers who are involved in crop production.
4. Assessment of NTRM risk, farm by farm, prior to tobacco handling, curing, sorting and baling.
5. On-farm inspections during curing and baling.
6. Provide feedback to farmers on NTRM contamination identified in their bales.

Sanitation

Some of the principal aspects to be considered relating to sanitation are:

1. All curing barns and tobacco storages are checked, raked and swept before initiation of harvest and kept free of storage pests at all times.
2. All areas where tobacco is handled are kept clean throughout the whole cycle.
3. No food or drink items are allowed in areas where tobacco is handled (sweet wrappers, coffee cups, drink containers, etc.).
4. Tobacco storage capacity is sufficient, appropriate, and free of NTRM.
5. Potential sources of taints should be considered and removed from tobacco production systems. Animals are kept away from tobacco and handling facilities (curing barns and/or curing areas, grading sheds, storage areas).
6. All vehicles, equipment, containers and materials used in tobacco transport are clean and, where appropriate, provide protection against potential contamination.
7. Collection/disposal program should be managed in a way that avoids NTRM contamination.

References:

- POST-HARVEST TOBACCO INFESTATION CONTROL (manual) - http://www.springeronline.com

Reporting benchmarks:

- Sustainable Tobacco Programme (STP)
- Individual Organization’s internal reporting
- Global Reporting Initiative (GRI)

3.13 Glossary of Technical Terms

Aeroponics: A technique for growing plants typically without soil or hydroponic media, in which the roots hang suspended in the air while a nutrient-laden water solution is constantly misted onto the roots.

Bare root seedling: Usually refers to tobacco seedlings produced on conventional seedbeds. The term “bare root” indicates the lack, or limited number, of fine root hairs present when the seedling is removed (drawn or pulled) from the soil prior to transplanting. Conventional seedbeds are often raised soil beds, or prepared soil, where raw tobacco seeds are sown on the soil surface. The soil surface of the bed is typically covered with a thin layer of organic mulch (e.g. straw, compost, etc.) or a row-cover (e.g. plastic sheeting, spun polyethylene sheeting, etc.) to facilitate seed germination and reduce seed movement immediately after sowing.
**Chemigation**: The application of crop protection agents (CPA) through an irrigation system. This can be done during seedling production and/or in the field, but only if the proper equipment is installed.

**Eutrophication**: the process by which a body of water becomes enriched by a high concentration of dissolved nutrients (e.g. nitrates & phosphates) that stimulate the excessive growth of aquatic plant life (e.g. algae). As the excessive aquatic plant life die and decompose, high levels of organic matter and the decomposing organisms typically result in the depletion of water available dissolved oxygen, causing the death of other aquatic organisms, such as fish.

**Fertigation**: The application of fertilizer material/nutrients through an irrigation system. This can be done during seedling production and/or in the field, but only if the proper equipment is installed.

**GreenTech**: An environmental friendly seedling production system for small scale farmers in India (ITC) which utilizes renewable, recyclable, and long-lasting components.

**Hydroponics**: refers to a plant production system where the growing of plants occurs in a water-based nutrient solution normally without the use of soil. Typically the plant’s roots are submerged in water/nutrient solution and the plants grow with or without an inert medium (sand, gravel, rock wool, organic media, etc.) to provide mechanical support. The tobacco seedling float system, a typical example of hydroponic seedling production utilized in tobacco cultivation, generally uses polystyrene (or floating plastic) trays which float on pools of water with added nutrients. The trays are most often filled with an organic growing media (e.g. peat moss), and the media wicks the nutrient solution upwards saturating the media and the raw tobacco seed to induce germination. As the seed germinates and the seedling develops, the roots grow downward through holes in the trays and into the water/nutrient solution.

**Intact root seedling**: Most commonly indicates tobacco seedlings grown in containers (e.g. polystyrene trays, plastic containers, peat pots, etc.) where the majority of the seedling’s fine root hairs are present for field transplanting. Intact root seedlings can also be produced without containers/trays such as in media beds, and in rare cases in conventional soil seedbeds if additional efforts to significantly loosen the soil (e.g. under-cutting, spade digging, etc.) prior to seedling removal for field transplanting.

**Soilless seedling**: Refers to seedling grown in production systems which do not utilize soil in the production of tobacco seedlings. Non-soil growing media may include; peat & sphagnum peat moss; compost; rock wool; coconut peat; etc.

**Solarisation**: Soil solarisation is a nonchemical technique in which transparent polyethylene tarps/sheets are laid over moist soil for a 6 to 12 week period to heat non-cropped soils to temperatures lethal to nematodes and other soil-borne pathogens. To be effective, soils must be wetted and maintained at high soil moisture content to increase the susceptibility (thermal sensitivity) of soil borne pests and thermal conductivity of soil. Soils with poor water holding capacity and rapid drainage can significantly inhibit heat transfer to deeper soil horizons. The most successful use of soil solarisation appears to occur in heavier (loamy to clay soils) rather than sandy soils. Loss of pest control is directly correlated with soil depth, with a limiting soil depth of 15-20 cm for lethal temperature to be achieved depending upon the intensity and duration of sunlight and ambient temperature. Many different pests can be suppressed and/or controlled by soil solarisation, particularly within arid environments with intense sunshine and limited cloud cover and rainfall. Plant parasitic nematodes have generally proved to be more difficult to control with soil solarisation, as have some weed pests.

(http://edis.ifas.ufl.edu/ng032)
4. GUIDELINES ON CURING BARN EFFICIENCY

4.1 Context / Background

Some leaf tobacco requires heat to cure and dry the green leaf to acquire the properties required. There is a wide range of curing barns in use today globally, from traditional barns constructed of wood and mud to extremely efficient, commercially produced bulk barns. There is also a wide range of furnaces, heat distribution and control systems that are incorporated in the barns. This guidance document is not intended to describe all possible configurations of barn types and heating system designs, as doing so would require a manual of its own. Instead, it should serve to supplement the current CORESTA GAP Guidelines and it will identify options that should be considered for improving barn, heat source, heat exchanger and barn airflow efficiency. These considerations should lead to minimized fuel consumption, associated waste and air emissions and reduced net cost to the grower, without compromising the quality of the leaf.

The key objectives of the draft guidelines on curing barn efficiency are to facilitate tobacco companies in:

- Holistically assessing the combination of efficiency improvement options available that provide the highest level of sustainability, from the point of view of the farmer, environment and community.
- Developing and implementing locally appropriate strategies for continually improving overall curing efficiencies.

4.2 Guideline

Efficiency improvements should be:

- Economically viable for the farmer
- Provide cumulative, long term efficiency improvements
- From sustainable and renewable sources, where possible
- Long lasting
- Low maintenance
- Measured against an efficiency target

Continuous technical support and encouragement towards the adoption of long-term, cumulative improvements for curing barns, is necessary for for maximizing sustainable net income for farmers.

Appropriate local best practices should be developed in each region that enforce adoption by growers in order to significantly reduce pressure on wood and other fuel supplies, while incrementally reducing the labour requirements of farmers and increasing their net income. This document is separated into efficiency improvement guidance for Traditional Curing Barns and Commercial Bulk Barns.

Many curing barns use wood as a heating fuel. All wood fuel should originate from a sustainably managed source. Protected forests should not be used for wood fuel or cleared for new plantations. Companies should ensure that adequate education, technical support and encouragement through contractual obligations are provided to growers, as needed.

Cooperation with governments, NGOs and third-party wood suppliers should also be sought to ensure that long-term strategies and plans are developed and implemented, at a local and national level, to provide future sources of sustainable wood products. In addition, processes to verify wood fuel sources should be developed.
4.3 Traditional Curing Barns

Fuel efficiency modifications to traditional curing barns and associated benefits include:

- Designing curing barn capacity to meet expected crop size, and thereby fully utilising the heat generated.
- Improving insulation in the curing barn to minimize heat loss through the structure.
- Conversion of open furnace to venturi type furnace with a sealed door will increase the heat that is available for curing from the fuel combustion process.
- Designing and installing a furnace flue system that will distribute heat across the bottom of the barn to provide even temperatures within the curing chamber.
- Installing vents that are properly sized, located and easy to control.
- Optimising chimney height to maintain efficient furnace airflow rates.
- Converting to forced convection using fans.
- Using hygrometers and/or wet/dry bulb thermometers to either automatically or manually control relative humidity during flue-curing, to avoid fuel wastage and optimise leaf quality and yield.
- Correct leaf loading and density will optimise fuel efficiency, while improving quality and yield.

4.4 Forced Air-Curing Systems

Fuel efficiency modifications to commercial bulk curing barns that should be considered:

- Walls, floors, ceilings and doors need to be insulated to reduce significant heat loss. Consider various insulation materials, according to availability. Use material with a high R-value (heat insulating property) and that does not absorb moisture, such as fibreglass batt, polystyrene board, or polyurethane. Special care must be taken to ensure adequate maintenance to prevent potential contamination of tobacco with NTRM (non tobacco related materials)
- Seal the foundations of bulk curing barns with an asphalt sealant. This material will expand and contract as the barn heats up and cools down during the curing season. A small crack between the foundation and pad area can cost more money in terms of energy loss than the minimal cost of sealing.
- The use of automated fuel feeding and curing control devices to improve fuel efficiency, optimise cured leaf quality and decrease net cost to farmer.
- Using hygrometers and/or wet/dry bulb thermometers to either automatically or manually control relative humidity in flue curing, to avoid fuel wastage and optimise leaf quality and yield.

4.5 Suggested Indicators

Average crop fuel efficiency rate for each fuel type used (measured in Heat Units/kg green tobacco).

References:
5. GUIDELINES ON BARN CONSTRUCTION MATERIALS

I. Context/Background
The majority of leaf tobacco produced today is cured in some type of structure after harvesting, either for air curing or through adding heat, as in the case of Flue-Cured Virginia (FCV). These structures range from simple, manually-constructed temporary sheds built from locally collected natural materials, to factory-built metal barns with sophisticated furnaces, controls, insulation and thermal seals that are designed for mechanically harvested leaf in bulk racks. This guidance document is not intended to describe all possible configurations of barn materials and design – doing so would require a manual of its own. Instead, this work serves as a list of many of the materials that have been used in practice or in trials and identifies the benefits and challenges of how each relates to sustainability of the environment, the community and the farmer.

The key objectives of the draft guidelines on barn construction materials are to help the industry to:

- Holistically assess the combination of locally available construction materials that provide the highest level of sustainability, in regard to the farmer, environment and community.
- Develop and implement locally appropriate strategies for addressing selection of sustainable materials for construction of curing barns.
- Develop designs, construction methods and procedures for constructing structurally sound buildings with a focus on safety, both during and post construction.

II. Guideline
Barn construction materials should preferably be:

- Locally available
- Economically viable for the farmer
- From sustainable and renewable resources
- Long lasting
- Low maintenance
- Free from NTRM and material that could result in taint or contamination risk
- Highest practically possible “R” value (heat insulating value), for heated curing barns only
- Resistant to moisture

Most types of curing barns and on-farm storage buildings use wood products to some extent as a construction material. All wood material should originate from a sustainably managed source. Native forests should not be used for wood products or cleared to plant new forest. The industry should ensure that adequate education, technical support and encouragement through contractual obligations are provided to growers, as needed.
Cooperation with governments, NGOs and third party wood suppliers should also be sought to ensure that long-term strategies and plans are developed and implemented at a local and national level to provide future sources of sustainable wood products. In addition, processes to verify sources of wood products should be developed.

The industry should provide growers with curing and storage barn designs, construction methods and operating methods to provide structurally sound buildings and procedures that focus on safety.

The guidelines for barn construction materials are broadly categorized into 3 sections, based on distinctive barn designs and requirements. These include: (a) Air-cured barns; (b) Convection air flow heat cured traditional barns and (c) Forced air flow heat cured barns, such as Bulk Curers.

5.1 Air-Cured Barns

Continuous support and encouragement to growers towards adoption of construction of long lasting air-cured barns using sustainable and renewable materials. The industry should develop locally appropriate best practices in each region and enforce adoption by growers to significantly reduce pressure on wood supplies for construction materials, while gradually reducing the labour requirements of farmers and increasing their net income.

- Where applicable, smallholder growers should be transitioned quickly from traditional air-cured barns to “live” barns. This type of structure uses living trees as the structural poles to support the roof and tiers. This is a long-term strategy which requires planting appropriately selected trees at correct spacing and allowing growth for several years before use. This method leaves the poles resistant to rot, termites and fire. In addition, the net cost to the farmer is lower, reduces labour requirements for transporting poles and has a much longer useful life than traditional barns, thereby enhancing biodiversity, carbon capturing from the atmosphere and provision of homes for fauna.

- Where cement is locally available and economically viable, air-cured barns can be constructed using locally produced sun-dried bricks to construct supporting columns on top of a cement footing base.

- Where cement is prohibitively expensive for transitioning to live barns, wood structural materials should come from a renewable and sustainable source.

- Where available, bamboo should be used for structural support and tobacco sticks for leaves during curing.

5.2 Heat-cured Traditional Barns

Continuous support and encouragement to growers towards adoption of construction of heat cured stick barns using sustainable and renewable materials. The industry should develop locally appropriate best practices in each region and enforce adoption by growers to significantly improve fuel efficiency, and correspondingly reduce GHG emissions, while gradually reducing the labour requirements of farmers and increasing their net income.

Wood material used for building materials should be from a sustainable source. Brick or concrete is preferred as a building material for its reasonable insulation qualities and durability.

Walls, floors, ceilings and doors should be insulated. Consider several kinds of insulation materials, according to availability. Use material with a high R-value and that does not absorb moisture, such as fibreglass batt, polystyrene board, or polyurethane. All insulation should be
correctly secured and covered to protect against introduction of NTRM into the tobacco leaf. Thatching is often used to provide additional insulation and protection for roof structures.

Conserve fuel by employing the most energy efficient curing structures and heating equipment, balancing barn (kiln) capacity with its capability to cure efficiently and curing using the technique that optimises output while maintaining the desired cured leaf quality.

5.3 Heat-Cured Bulk Barns

Growers should be continuously supported and encouraged to adopt long-term construction of heat cured bulk barns using sustainable and renewable materials. Tobacco companies should develop locally appropriate best practices in each region and enforce adoption by growers to significantly improve fuel efficiency and reduce GHG emissions, while gradually reducing the labour requirements of farmers and increasing their net income.

1. Walls, floors, ceilings and doors need to be insulated to reduce significant heat loss. Consider various insulation materials, according to availability. Use material with a high R-value (heat insulating property) and that does not absorb moisture, such as fibreglass batt, polystyrene board, or polyurethane.

<table>
<thead>
<tr>
<th>Insulation Materials</th>
<th>R-Value per inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Block 4”</td>
<td>0.2</td>
</tr>
<tr>
<td>Extruded Polystyrene</td>
<td>5</td>
</tr>
<tr>
<td>Fibreboard</td>
<td>2.64</td>
</tr>
<tr>
<td>Fibreglass (glass wool)</td>
<td>4</td>
</tr>
<tr>
<td>Polyurethane (foamed-in-place)</td>
<td>6.25</td>
</tr>
</tbody>
</table>

2. Designs and materials that minimise requirement of labour needed to fill and unload the barn.

3. Barns, where relevant, that incorporate the most efficient furnace designs available.

4. Seal the foundations of bulk curing barns with an asphalt sealant. This material will expand and contract as the barn heats up and cools down during the curing season. A small crack between the foundations and pad area can cost more money in terms of energy loss than the minimal cost of sealing.

5. The use of automated fuel feeding and curing control devices as they can decrease labour requirements, help to optimise cured leaf quality, improve fuel efficiency and decrease net cost.

6. Using hygrometers and/or wet/dry bulb thermometers to either automatically or manually control relative humidity in flue curing, to avoid fuel wastage and optimise leaf quality and yield.

7. Conserve fuel by employing the most energy efficient curing structures and heating equipment, balancing barn (kiln) capacity with its capability to cure efficiently and curing by the technique that optimises output while maintaining the desired cured leaf quality.

5.4 Suggested Indicators

Percentage of growers using curing barns constructed with sustainable materials, by barn type.
6. GUIDELINES ON CURING MANAGEMENT

6.1 Context / Background

Curing is the process in which the natural, metabolic changes of ripe, fresh, harvested leaves continue under more or less controlled conditions, to a stage considered to be optimal for producing the characteristic flavour, taste and physical properties of the cured product of each type and then dried to preserve them. In flue- and sun-cured tobaccos the changes are arrested before all carbohydrates are hydrolysed but in air- and fire-cured tobaccos they are allowed to continue until practically no starch remains.

Flue-curing requires sealed barns in which air temperature and relative humidity can be controlled. Heat is generated in furnaces and transferred indirectly through heat exchange systems. They are designed to avoid contact between combustion gases and the tobacco. Airflow is controlled by ventilators, and is generated by convection created by the heating system in traditional barns, assisted by fans in modified models of these and entirely by fans in modern bulk barns. Curing is started at around 35°C and 85% RH and ends at 70°C and 10-15% RH.

Air-curing is carried out under ambient conditions, ideally with temperatures in the range 15°C to 32°C and relative humidity in the range 65% to 70% over any 24 hour period. Air-cured tobaccos are therefore typically grown and cured in environments that naturally have these conditions during the curing phase of production. The barns can be left open when conditions are favourable but partly or fully closed when not. They are sited in areas with micro-climates best suited to this method of curing.

Barns for fire-cured tobacco are sealed to contain the smoke produced by open, smouldering fires. Burning is controlled to maintain temperatures suitable for the changes to take place but is not allowed to exceed 38°C. Moist air is expelled through ventilators when drying the tobacco.

Sun-cured tobaccos are grown in hot, dry, sunny environments. Curing starts in ambient, but shaded conditions and then, to arrest the biochemical changes, leaves are exposed to the sun to complete drying.

In terms of curing management, sustainability can be limited by harvesting un-ripe leaves, inadequate curing structures, incorrect application of the curing procedure for each type of tobacco and poor handling of the cured product after curing until its sale. Curing mismanagement results in poorer leaf quality and usability, loss of yield and, in the case of flue- and fire-cured tobaccos, inefficient energy use. Of these, loss of yield is probably the most serious, because it is not obvious and can be as high as 30% of potential yield.

References:

- Economic, Environmental and Social Sustainability Indicators of the Australian Cotton Industry - www.cottonaustralia.com.au
- http://www.allwallsystem.com/design/RValueTable.html
6.2 Guideline

a. The Curing Process

Optimal quality depends on harvesting only ripe leaves. Under-ripe leaves produce a product with a greenish caste, poor texture, a negative taste and generates smoke with a propensity for relatively high tar delivery. Extending curing time does not compensate for under-ripe harvesting. In over-ripe leaves much of the desirable flavour is lost, they tend to break-up in subsequent operations, have lower yield and poor manufacturing properties. Ripeness is judged subjectively, based on leaf colour and appearance. This requires experience supported by observing the length of curing time and quality of the cured product.

For correct, efficient curing management, it is important to know the principal metabolic changes that take place and how they should be controlled to produce the best product. The following description draws attention to the main processes. More detailed information should be referred to, and is provided in the references listed below.

The curing process is comprised of three overlapping phases: “colouring” (also referred to as “yellowing”), “fixing colour” and “drying”. The natural, metabolic changes, which started during ripening, are allowed to continue in the colouring phase under the conditions provided for each type of tobacco. One of the main changes is the breakdown of carbohydrates (mainly starch) into sugars, carbon dioxide and water. Proteins and other nitrogenous compounds also break down into simpler ones. Some of them subsequently recombine with the products of carbohydrate breakdown to produce products that contribute to flavour and taste. The curing process in air- and fire-cured tobaccos allows the metabolic breakdown to continue beyond that in flue- and sun-cured tobaccos, resulting in the oxidation of polyphenols and consequent development of the characteristic brown colour of these types.

The changes are controlled by enzymes that are active while the leaves are living. Therefore, the relative humidity of the atmosphere in curing barns is maintained at a sufficiently high level to avoid premature drying during colouring; around 85% at the start and then decreased progressively to around 60% to promote wilting towards the end of this phase. Furthermore, temperatures are kept in the range 35 to 40°C to provide optimal conditions for enzyme activity. Higher temperatures slow the process and could stop it completely by prematurely drying the leaves or even scalding them. In flue-cured and dark-fired tobaccos these conditions are achieved by controlling heat and ventilation. Smoke from smouldering open, hard-wood fires is introduced during this phase of curing fire-cured tobaccos and continues until curing is complete. Air- and sun-cured tobaccos depend on prevailing weather to provide the right conditions for colouring, with any necessary moderation coming from control of ventilation, in the case of air-cured, and by either shading the leaves or exposing them in the case of sun-cured tobaccos. Air temperature is not supplemented by artificial heat during colouring for these two tobacco types.

In flue- and sun-cured tobaccos, the aim is keep the leaves alive until most of the starch has broken down to sugars with the least possible loss of carbon dioxide. Leaves are therefore wilted in flue-curing by decreasing relative humidity from around 85% at the start of the cure to 60% when they are fully coloured by increasing ventilation and temperature. This ensures subsequent timely halting of the process across the whole leaf. In sun-cured tobacco this is done by gradually exposing the leaves to the sun. To produce the desired degree of metabolic change and, therefore, quality in air- and dark-fired tobaccos, the colouring phase is extended by maintaining humidity at a relatively high level for longer to permit almost total breakdown of the starch and loss of most of the sugar. Polyphenols are oxidised under these conditions, resulting in the characteristic brown colour of these tobaccos.
Chlorophyll breaks down during the colouring phase, exposing the yellow in the leaves. This begins at the tips and margins and moves progressively towards the main veins; a process that parallels the changes occurring in the other important chemical compounds of the leaf and serves as an indicator for managing the cure for best results.

The yellowing process across the leaf is arrested by drying, referred to as “fixing”. To avoid over-colouring and the consequent loss in quality and yield, the curing process is managed to ensure that the drying front closely follows the progression of yellowing. This is achieved by progressively decreasing the relative air humidity, causing the previously turgid leaves first to wilt, while remaining biologically active, and then to dry further. Premature drying stops the biochemical changes important for aroma and taste too soon and can also fix green, thus lowering leaf quality. Colour fixing occurs earlier in flue-cured and sun-cured tobaccos than in air- and fire-cured, where the colouring process is extended to enable the biological processes to continue further.

To preserve the leaves, drying continues until firstly the leaf lamina are completely dry and then the mid-veins. In flue-cured tobacco this is achieved by gradually increasing the temperature to 70°C; for sun-cured by continued exposure to the sun and for air-cured by continued ventilation, occasionally supplemented by low heat in some tobacco-growing regions. In fire-curing, exposure to smoke continues throughout drying and during subsequent conditioning to “finish” the leaves.

As a guide, the curing cycle for flue-cured tobacco from start to final drying should not exceed 144 hours for lower stalk and 172 hours for upper stalk leaf. Curing times for air-, sun- and dark fire-cured tobaccos are much longer and vary from one situation to another, depending on the environment. Unnecessarily long curing cycles result in poorer quality, loss in yield from over-colouring and inefficient use of energy for types requiring heat for curing. These are the result of one or more of the following:

- Harvesting of un-ripe leaves or a mixture of ripe and un-ripe leaves.
- Temperature below the optimal for colouring (35-40°C) during the colouring phase.
- Mass of tobacco in the barn too large in relation to the capacity of the system to remove moisture.
- Leaves not packed or tied uniformly.
- Racks or boxes not fitting tightly in bulk-curing systems. Sticks or strings not packed uniformly in traditional barns. This results in air by-passing some of the leaves, leaving wet spots where leaves over-colour and take longer to dry.
- Poor management of the curing technique.

b. **Common curing faults**

i. **Flue-cured tobacco**

- Green, as a result of harvesting and/or “fixing” colour prematurely. It can also be caused by scalding from radiant heat from very hot flues early in the cure.
- Slate grey, usually uniform, discolouration especially in mid- and upper-stalk leaves. This is typically in tobacco that ripened slowly and accumulated large amounts of carbohydrates; for example in crops that run out of nitrogen prematurely or irrigated crops grown in conditions where days are hot and dry and nights cool during ripening. Such conditions favour carbohydrate accumulation. In these crops, there tends to be a premature loss of chlorophyll, giving a false appearance of ripening and later,
colouring. The cured leaves typically have a “thick”, soapy feel and their smoke, a metallic after taste. Delaying harvesting to a more advanced stage of ripeness and then also extending the colouring period, can significantly improve the quality in this style of tobacco, although it results in some loss of yield.

- Sponge, a grey-brown, often mottled, discolouration in potentially good quality leaf, associated with over-colouring as a result of increasing temperature above 40°C when leaf still contains a lot of moisture. Typically found in leaf from over-packed or unevenly packed barns.
- Scald, red/brownish discolouration resulting from a too rapid increase in temperature during lamina drying or exceeding 70°C during final drying. Sugars are caramelised, imparting an off-type, sweet aroma.
- Browning, oxidation of polyphenols when over-colouring. Typical in leaf from over-fertilised crops, especially that from the lower stalk. This discolouration is not desirable in flue-cured tobacco but is, of course, in air-cured tobaccos.
- Barn rot can be caused by a number of fungal and bacterial pathogens that thrive in high humidity conditions, especially in the 35°-40°C temperature range. Control by ensuring that all harvesting and curing equipment and facilities are not contaminated, then avoid long colouring periods by harvesting only ripe leaves, not mixing ripe with un-ripe leaves and ensuring that drying starts as soon as possible after colouring commences. If there is difficulty in implementing these precautions, avoid the temperature range at which these pathogens are most active (35°-40°C) by colouring at less than 35°C, commencing drying at the same temperature and then increasing temperature as rapidly as possible to 45°C, after which the normal schedule should be followed.

ii. Air-cured tobaccos

- Green, associated with low temperatures during the colouring phase.
- Variegated, K-style, caused by periods of low humidity during the colouring phase and consequently premature fixing of colour. If temperatures are warm, leaf colour, although variegated, is usually bright and when cool, more of a green colour.
- Barn rot (houseburn) is caused by infections of pathogens which thrive under high moisture conditions and the resulting prolonged colouring phase. More prevalent in unevenly and over-packed barns where air movement is restricted.

iii. Fire-cured tobacco

- Scalding, leaf exposed to drying conditions during wilting after harvest.
- Houseburn (“strutting”, “sweating”), restricted air movement through tobacco as a result of uneven packing; especially prevalent in wet seasons.
- Premature drying, associated with low ambient temperature (<16°C) during curing and identified by discolouration of cured product.
- Undesirable (unspecified) discolouration, barn temperature exceeding 38°C.

iv. Sun-cured tobacco

- Brown, brittle, lifeless as a result of premature drying during colouring (too hot and dry).
- Rot caused by insufficient air circulation during colouring as result of too dense packing, poor location of racks during colouring, insufficient ventilation.

c. **Tobacco Specific Nitrosamines (TSNA)**

i. **Flue-cured tobacco**

TSNAs are generally at low concentration in flue-cured tobacco but increase significantly when the combustion gases of fuels used for heating come into contact with the tobacco. They can also form when leaf is over-conditioned, densely packed and stored in damp, un-ventilated conditions.

ii. **Air-cured tobacco**

The most important TSNA in Burley and dark air-cured tobaccos is NNN. It forms mainly during the late yellowing and early browning phases of curing. NNN is formed by the reaction of nitrite, derived from the microbial reduction of nitrate, on the alkaloid, nor-nicotine in a process referred to as nitrosation. Nor-nicotine is formed by conversion of nicotine, a genetically inherited trait. Both the alkaloid (nor-nicotine in the case of these tobaccos) and the nitrosating agent (nitrite) are necessary for the formation of TSNAs. Any practice or conditions that increase the accumulation of either of these two groups of compounds can be expected to increase TSNAs. Formation is a complex process but can be minimised by adopting the following practices, as a whole as far as is practicable:

- except where another variety is absolutely necessary because of its disease resistance, use only seed varieties that have been screened for the trait that controls nicotine conversion to nor-nicotine or “LC” (low conversion),
- avoid excessively high rates of nitrogen and follow recommendations for only applying side-dressing early on in the growth cycle,
- avoid use of muriate of potash, as it promotes production of fat stems that are difficult to dry promptly,
- follow recommendations regarding time and height of topping,
- harvest at the stage of ripeness that is optimal for yield and quality,
- fill barns as soon as possible after harvesting,
- do not harvest or fill barns with free moisture on the leaves,
- site barns in micro-environments most suited for good curing,
- space plants evenly on sticks in barns, and do not over-pack barns,
- manage air-curing carefully to ensure adequate ventilation for timely wilting and subsequent drying of leaves without compromising quality by drying prematurely,
- condition cured leaves naturally and avoid over-conditioning,
- strip, grade, bale and deliver tobacco as soon as possible after curing,
- do not put tobacco with a high moisture content in storage.

d. **Conditioning after curing**

All tobacco types need to be conditioned to enable subsequent handling after curing. This is an important process and, as such, is managed carefully. Tobacco in too low order is brittle and subject to significant losses, whereas that in too high order is likely to darken and decay, resulting in serious loss in value and yield of usable tobacco. As a rule, the moisture content of flue- and sun-cured tobaccos is increased to 15% and air-cured to 18 – 23%. Cured leaves
are stored in conditions that are not conducive to spoiling and not under unnecessarily high pressure, which accelerates spoiling.

6.3 Suggested Indicators

a. Fuel consumption Amount of fuel per kg of cured leaf in the case of flue-cured tobacco and of wood for producing smoke in fire-cured tobacco.

b. Length of curing cycle (hours).

c. Cured leaf quality measured subjectively, or by an index and percentage of leaf spoiled by curing faults, of which the following are the most common:

   i. Flue-cured tobacco
      Green
      Slate
      Sponge, packed Scaldroma
      Browning, Barn rot

   ii. Air-cured tobaccos
       Green
       Variegated, K-style
       Barn rot (houseburn)

   iii. Fire-cured tobacco
        Scalding, Houseburn (“strutting”, “sweating”)
        Premature drying
        Undesirable (unspecified) discolouration

   iv. Sun-cured tobacco
       Brown, brittle, lifeless, Rot

d. Concentration of tobacco specific nitrosamines (TSNAs).

6.4 Best Practice

a. Key requirements:

   i. Selecting the curing system that can best provide the curing conditions for the particular type of tobacco, can use locally available construction material from renewable resources as far as possible and can be managed in the most labour-efficient way. In addition, for flue-curing, that the curing system is designed to use fuel in the most efficient manner and, for air-curing, is located in the micro-climate that most closely provides the ideal conditions for natural curing.

   ii. Estimating as closely as possible the ratio of curing space per unit of production that is optimal for commercial viability, taking into account the potential losses that would be incurred by having to discard ripe leaf or by over-colouring caused by over-packing curing systems.

   iii. Harvesting only uniformly ripe leaves in the case of leaf-harvesting systems, and at a stage that is optimal for yield and overall quality in the case of stalk-cutting.
iv. Filling curing facilities as soon as possible after harvesting to minimise losses from scald in hot, dry weather and excessive wetting from rain or dew that adds to the moisture load in the barns and could delay timely drying.

v. Maintaining curing systems in good order and, where used, ensuring all instrumentation is accurate and fully functional.

vi. Ensuring uniform air-flow through the tobacco by uniform packing, tying and filling of curing space, especially avoiding gaps through which air could divert in fan assisted systems.

vii. Understanding the basic principles of curing different types of tobacco and implementing them to best advantage.

viii. Applying a curing schedule that provides optimal temperature during colouring and is capable of ensuring timely removal of moisture in line with the curing principles previously described. In fire-cured, controlling smoke and heat generation to best achieve the quality standards required for this type of tobacco.

ix. Using instruments, such as hygrometers, placed in the air flow to accurately measure temperature and relative humidity, rather than by judging curing conditions subjectively.

x. Inspecting the results of each cure, assessing its quality and identifying any visible faults. Using the information to gain experience and adjust subsequent harvesting and curing management.

xi. Avoiding excessive moisture during conditioning and storage, as well as packing and storing at too high a density.

This places an onus on members of the supply chain, as well as on the state, local and industry organisations involved in the leaf tobacco sector, to provide instruction and training in all aspects of curing, to monitor progress and to provide on-going extension support.

References and links:

7. CURING WASTE MANAGEMENT

7.1 Context / Background

The majority of leaf tobacco produced today is cured; either through air/sun curing or by adding heat, as in the case of Flue-Cured Virginia (FCV) varieties. Various energy sources are currently used for curing, and a selection is shown below.

Currently used energy sources for tobacco curing:

- Common sources: Kerosene, Natural Gas, Liquid Propane Gas (LPG), Methane, Electricity, Coal, Diesel, Wood (Waste (chips, stumps, branches), Native and Exotic species), Local Biomass (e.g.: Manure – India; Olive pits – Greece; Peach pits – Spain; Groundnut hulls – Zambia; Rice straw – Bangladesh); Palm oil kernel shells (POKS)-Indonesia

- Alternative / Experimental energy sources: Solar (solar assisted Long Sun Barn), Wind, Hot Water Heat Storage and Transfer

All of the common energy sources produce varying amounts of harmful solid residues or/and gaseous emissions during the combustion process. The most sustainable practice in the context of waste management would be for waste and emissions to be avoided or reduced whenever possible, or that processes with minimum emissions are used.

Biomass, a renewable and low Greenhouse Gas (GHG) producing energy source, may be preferred from a waste and emissions point of view, but it faces its own challenges. Wood
production should follow sustainable practices\(^4,5\). In the case of electrical energy being used for curing, environmental impact may occur when it is produced from a conventional or renewable source (i.e. photovoltaic or hydroelectric), with the latter only producing minor emissions.

Tobacco companies should develop locally appropriate best practices in each region and enforce adoption by growers of measures to significantly improve fuel efficiency (and therefore less residues and reduced GHG emissions), while incrementally reducing the labour needs of farmers and increasing their net income.

The key objectives of the guidelines on waste management (together with other sections) are to facilitate tobacco companies in:

- Identifying the combination of locally available energy sources that provides the highest level of sustainability from the point of view of the farmer, environment and community.
- Developing and implementing locally appropriate strategies for addressing the selection of practices to ensure sustainable fuel waste management.
- Consequently developing practices for reducing the amount of directly (Scope 1) and indirectly (Scope 2) burned fuel, to reduce GHG emissions.

7.2 Guidelines
1. The required energy input per kg of tobacco should be minimized, and based on a set benchmark. This consequently reduces the amount of waste and emissions.
2. The disposal of burnt material and its emissions should be:
   - Locally appropriate and in compliance with local laws and regulations;
   - Economically viable for the farmer;
   - Not harmful to the environment.
3. Greenhouse Gas (GHG) emissions
   A standardized reporting system for Greenhouse Gas emissions from curing, for a given amount of tobacco, should be established, with the results monitored and emissions minimised. Emissions of GHG should therefore be reduced to a given benchmark.
4. Waste from curing processes is heavily dependent on the nature of the energy source and local conditions. Appropriate disposal practices should be developed depending on the type of material.

7.3 Suggested Indicators
1. Waste from curing processes measured and action planned/in place to reduce.
2. Percentage of farmers practising appropriate disposal practices for any waste materials produced.

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3. GHG emissions monitored, plans to reduce them in place and reduction targets set.

4. Percentage of farmers aware of potential causes of pollution from curing fuel consumption and proper waste disposal methods, related to energy source use and reduction.

7.4 Best Practice

1. Waste disposal

Ash from wood or dry plant material: The physical and chemical properties of wood ash vary significantly, based on many factors. On average, the burning of wood results in about 6-10% ashes. When ash is produced, the combustion temperature (depending on the moisture content of the wood), cleanliness of the wood fuel, collection location, and the process itself, can have profound effects on the nature of the ash material. Wood ash composition, therefore, can vary significantly depending on the geographical location and processes. Ash is composed of many elements needed by the tree for growth. Since most of these elements are extracted from the soil and atmosphere during the growth cycle of the tree, they are common elements in our environment and are also essential elements in the production of crops and animal feed.

Calcium is the most abundant element in wood ash and gives the ash properties that are similar to agricultural lime. Ash is also a good source of potassium, phosphorus, magnesium, and aluminium. In terms of commercial fertilizer, average wood ash would probably be about 0-1-3 (N-P-K). In addition to these macronutrients, wood ash is also a good source of many micronutrients that are needed in trace amounts for good plant growth. Wood ash contains only a few elements that pose environmental problems. Heavy metal concentrations are typically low and not in a highly extractable or available form.\(^6\)\(^7\)

Coal ash: Coal ash is often used for road construction and dry landfill. Coal ash can also be used in concrete as a partial substitute for Portland cement.\(^8\)

2. GHG Emissions

Biomass vs. Fossil Fuel sources: In addition to fossil fuels such as coal, petroleum (i.e. oil), and natural gas, fuels can also be produced from biomass or plant materials (e.g., wood, crop residues and plant starches). The chemical composition and fundamental combustion process for biomass fuels are similar to that of fossil fuels. However, the origin of the carbon in the two types of fuels is different. Carbon in biomass is of a biogenic origin – meaning that it was recently contained in living tissue – while carbon in fossil fuels has been trapped in geological formations for millennia. Because of their biogenic origin, CO\(_2\) emissions from biomass fuels are treated differently from fossil fuel combustion emissions.\(^9\)

\(^6\) CLEMSON UNIVERSITY, South Carolina - [http://hubcap.clemson.edu/~blpprt/bestwoodash.html](http://hubcap.clemson.edu/~blpprt/bestwoodash.html)

\(^7\) Best Management Practices for Wood Ash as Agricultural Soil Amendment, Bulletin 1142 / Reviewed March 2013, Prepared by Mark Risse, Professor, Crop and Soil Sciences, The University of Georgia Cooperative Extension

\(^8\) [http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceead8525735900400c27/6a5375ff509189a185257c7800562d51?OpenDocument](http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceead8525735900400c27/6a5375ff509189a185257c7800562d51?OpenDocument)

8. SUSTAINABLE FUELS

8.1 Context / Background

A wide variety of fuel types are used to cure tobacco. The most common sources are:

- Wood biomass
- Biomass from organic waste products – coffee and rice husks, coconut shells, maize cobs, olive stones, sugar cane bagasse, palm oil kernel shells (POKS), groundnut hulls, etc.
- Charcoal
- Coal
- Natural gas, methane gas, liquid propane gas (LPG)
- Oil or kerosene
- Electricity

Alternative thermal and electrical energy sources such as solar and wind power are used on a limited basis, either as a primary or supplementary heat source, but current capital investment costs make these sources prohibitive for wide scale use.

Most of the common energy sources for curing are stored on the farm prior to use. Proper storage management practices should be implemented to protect biomass fuel from rain and to prevent spillage of liquid fuels that could cause environmental contamination.

Selection of fuel type is generally driven by local availability and cost. Where options exist, other fuel characteristics should be evaluated to ensure that the full life cycle costs of the available fuels are weighed against any potential environmental risks, in order to make the best selections. Each fuel has its own characteristics that affect desirability from a sustainability point of view.

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8.2 Guiding Principles

Available fuel sources should be fully evaluated and selected based on the lowest environmental risk that is economically viable. This evaluation should include objective weighting of individual criteria.

Coal should only be used where no other economically viable and renewable fuels are available, due to high emission levels of air pollutants and GHGs. It should only be used as a stopgap measure while sources of renewable fuels with a much lower environmental impact are established and available locally.
Industry, government and NGO collaboration toward large scale production of sustainable sources of environmentally friendly fuels is encouraged to provide faster progress toward a common goal. In many countries, quantities of fuel consumed for domestic cooking fuel far outweigh the quantities consumed for tobacco curing, but there is competition for the same fuel. In these cases, in particular, the pressure on existing fuel supplies should ensure that consideration is given to developing alternative fuel types that can support local requirements.

8.3 Benchmark Indicators

- % of renewable fuel consumed for tobacco curing
- % of alternative fuel (biomass) consumed for tobacco curing
- % of wood fuel from a sustainably managed source and consumed for tobacco curing

8.4 Best Practice

References:

- http://www.biomassenergycentre.org.uk/portal
- http://www.epa.gov/climate change/ghgemissions/gases.html
- http://umaine.edu/publications/2279e/
- https://www.ecn.nl/phyllis2/Browse/Standard/ECN-Phyllis
- http://converter.eu/calorific_value
- http://www.whatsyourimpact.org/
- http://www.ipcc.ch

N.B.: IPCC: Intergovernmental Panel on Climate Change

ECN: Energy Research Centre of the Netherlands

9. INTRODUCTION TO SOCIO-ECONOMIC ISSUES

9.1 Context / Background

The continuous development of social consciousness and standards has prompted CORESTA to take a fresh approach to the way GAP Guidelines address the relationship between tobacco organisations and tobacco growers. This relationship can have a strong impact on the social and economic conditions of the farm and is based on the services that tobacco organisations can provide to tobacco growers in the improvement of these conditions. It is vital for the long-term viability of tobacco leaf production that Good Agricultural Practices should not only be environmentally sustainable, but also economically viable, socially acceptable and fully compliant with legislation.
Many economic activities, including tobacco leaf production, involve the use of different types of capital (human, social, natural, financial and physical) to produce goods, and the use of services to satisfy the needs of people and enhance their livelihoods. A livelihood comprises the capabilities, assets and activities required to make a living. A livelihood is sustainable when it can cope with, and recover from, stresses and shocks, maintain or enhance its capabilities and assets, without undermining the natural resource base.

This dimension of livelihood sustainability is directly linked to the fulfilment of the needs of farmers and farm workers. Social and environmental sustainability is supported by efficient and effective enterprises and that is why economic sustainability has been included as a sustainability dimension in its own right.

Ideally, any successful enterprise, whether it is a tobacco company, large estate or small farm, should be able to pay its debts, generate a positive cash flow and adequately remunerate owners and employees. To be considered as economically sustainable, the enterprise should be able to maintain these capabilities under economic, social and environmental pressure, so as to minimise vulnerability and ensure resilience.

Social sustainability is the satisfaction of basic human needs and the provision of the right and freedom to seek to satisfy the aspirations of individuals for a better life. This applies if fulfilment of an individual’s needs does not compromise the ability of others, or of future generations, to do the same. As corporate citizens, tobacco organisations are responsible for respecting human rights, not only in their own business activities, but also in their business relationships with tobacco farmers, and support farmers in doing the same with their own workers.

While the first version of the social sustainability GAP Guidelines covered only training for farmers and generic socio-economic issues, this updated version includes the following issues:

- labour rights
- capacity building
- farmers return
- access to credit
- land tenure

Furthermore, this section of the GAP Guidelines better explains the institutional context of leaf production and takes into account existing codes, practices and guidelines in agriculture and, more specifically, in the tobacco sector.

10. HUMAN RIGHTS

10.1 Context / Background

Labour standards and human rights are of paramount importance in all industries. They are sanctioned in many international protocols and conventions, such as the International Labour Office (ILO) conventions and included in at least primary legislation across the world. Responsible tobacco organisations should respect human rights, both in their own business activities and where human rights impacts are directly linked to their operations, products and services through their business relationships. Tobacco organisations should respect human rights and avoid being complicit in state violations, even if they are formally legal under applicable national law. Tobacco organisations with a large sphere of influence and impact should not only respect the rule of law and international standards in their own operations, but require suppliers and business partners to do the same.
Fundamental human rights are generally recognised at the national, public and private levels, but the enforcement of international labour standards still represents a major challenge. Unfortunately, rural work and national legislation are not always aligned with international labour standards and in some countries human rights abuses may occur. The duty of responsible tobacco organisations is to raise awareness and provide training based on the highest standards available.

Tobacco organisations recognise their potential for supporting human rights within their value chains, as well as the benefits that arise from doing so, and many tobacco organisations are already implementing a variety of standards and approaches.

Occupational safety and health are of paramount importance for the social sustainability of labour relations and national economies, and are an integral component of worthwhile and productive work. Neither development nor operations of tobacco leaf production can be sustained when the farmers and their workforce suffer from poor health. Protecting and promoting human health requires primary health services, such as the provision of clean drinking water and prevention of health hazards originating from the working environment.

In the agriculture sector, the occupational security and health situation is characterised by specific hazards and risks, such as strenuous physical work, exposure to harmful substances, dealing with harsh weather conditions and events, and working with machines, equipment and animals.

The previous GAP Guidelines laid down the general principles of: protecting the health of farmers; reducing the level of heavy manual labour whenever possible and of complying with current legislation; hazards and risks posed by agrochemicals; safe working practices; emergency action; health monitoring and record keeping. This updated version defines what is required to better ensure that tobacco farmers and their workers are adequately protected.

The purpose of these guidelines is to assist tobacco organisations in complying with their human and labour rights obligations when dealing with suppliers and business partners, and to support tobacco farmers to:

i. deal with labour issues in a manner that is fully compliant with national law and international agreements and, whenever possible, to advise on contractual arrangements, labour and social security issues, and

ii. provide a farm work environment that is safe, hygienic and healthy and meets basic human needs, such as clean water, food, accommodation and sanitary installations.

10.2 Guidelines

Tobacco organisations should follow these guidelines with regards to human rights. In general, organisations engaged in tobacco production should have a comprehensive human rights policy covering all points below:

a. Policies and processes

i. Tobacco organisations should have clearly defined policies regarding the following points, allocating responsibility for their application and follow-up, providing guidance for their enforcement and adequate resources for their implementation.

ii. Tobacco organisations should have a training policy to ensure that all contracted farmers are instructed and supported in the understanding and implementation of labour rights. Their understanding of the training should be assessed on a regular basis.
iii. In countries where there is an auction system, tobacco organisations should engage with local authorities to ensure the existence of a national labour code that includes tobacco farmers. This code should be adopted and circulated by governmental extension groups and farmers' associations that will drive compliance.

iv. In countries where farmer cooperatives/associations exist, tobacco organisations should constructively engage in good faith dialogue and negotiate with them to secure an equitable deal for individual farmer households and their communities, as well as exploring opportunities of working together to improve productivity.

v. Tobacco organisations should have a mechanism for measuring and recording human rights abuses and, where appropriate, to report them to relevant external organizations.

b. Child labour

In line with the ILO conventions 138 (Minimum age for employment) and 182 (Worst forms of child labour)

i. Tobacco organisations should never accept child labour, either in its own operations or those of suppliers and business partners. No person under 18 should be involved in any type of hazardous work as defined by the ILO, meaning any work which is likely to jeopardize children’s physical, mental or moral health, safety or morals including harvesting and applying agrochemicals.

ii. Tobacco organisations should ensure that there is no employment or recruitment of child labour in tobacco production. The minimum working age should not be less than the age for completion of compulsory schooling and, in any event, is never less than 15 years or the minimum age required by the law of the country in question, whichever affords greater protection.

iii. Where applicable, children should not be engaged in tasks that are considered inappropriate by the local medical authorities and that may prejudice their attendance at school, their participation in vocational orientation or training programmes approved by the competent authority or their capacity to benefit from the instruction received.

iv. Tobacco organisations should promote, in collaboration with local stakeholders, the education of children living on tobacco farms, as well as their holistic development, in compliance with national laws and in line with international conventions.

c. Income and working hours

i. Tobacco organisations should agree that hired labour’s income earned during a pay period or growing season should be at least always sufficient to meet the basic needs of farmers and farm workers, and is of a level that enables the generation of discretionary income. Workers should not work excessive or illegal hours to achieve this.

ii. Tobacco organisations should ensure that prices paid to farmers take into consideration the amount of labour required to grow tobacco and are such as to ensure sustainable livelihoods for farmers.

iii. Wages for all farm workers (including temporary, piece rate, seasonal, and migrant workers) of contracted farmers, should at least meet national legal standards, agricultural benchmark standards, regional averages, or negotiated sector minimum wages, provided they are realistically benchmarked on the local cost of living and purchasing power.
iv. Tobacco organisations should strive to guarantee that wages for all farm workers are paid regularly, or in accordance with the law of the country in question.

v. Tobacco organisations should strive to guarantee, in collaboration with government agencies, that working hours of workers of their contracted farmers are in compliance with the laws of the country in question. Excluding overtime, working hours should not exceed, on a regular basis, 48 hours per week. Overtime is voluntary. Overtime wages for farm workers include a premium, as required by the laws of the country in question or by any applicable collective agreement.

vi. Tobacco organisations should strive to guarantee, in collaboration with government agencies, that farm workers of their contracted farmers are provided with the benefits, holidays, and leave to which they are entitled by the laws of the country in question.

d. Fair treatment and non-discrimination

In line with ILO convention 100 (Equal remuneration) and 111 (Discrimination),

i. Tobacco organisations should strive to guarantee that their contracted farmers treat workers fairly. There should be no verbal, sexual or moral harassment, no discrimination on any basis (race, colour, gender, age, religion, social class, political tendencies, nationality, union membership, sexual orientation, civil status or any other motives as indicated by national laws), no physical or mental punishment, or any other form of abuse.

ii. Tobacco organisations should encourage farmers to offer equal pay, training and promotion opportunities and benefits for all workers with similar functions. The same should apply if tobacco organisations own land for tobacco production and directly hire workers.

iii. Tobacco organisations should encourage farmers to hire local labour so as to positively contribute to the local economy and minimize the risk of trafficking in people.

e. Forced labour

In line with ILO convention 105, tobacco organisations should strive to guarantee that:

i. All farm labour is voluntary and that there is no forced labour;

ii. Workers of their contracted farmers do not work under bond, debt or threat and must receive wages directly from the employer;

iii. Workers of contracted farmers are not required to make financial deposits with their employers;

iv. Wages or income for workers of contracted farmers earned from crops and work done, are not withheld beyond the legal and agreed payment conditions;

v. Contracted farmers do not retain the original identity documents of any worker;

vi. Workers of contracted farmers are free to leave their employment, and the employer’s premises, at any time with reasonable notice;

vii. Contracted farmers do not employ prison or compulsory labour unless it is part of a national scheme for the rehabilitation or training of prisoners, under the approval and supervision of the relevant authorities.
viii. Even in countries where oral contracts are valid, tobacco organisations should engage with farmer associations to promote the adoption of written contracts and pay slips to protect the interest of both farmers and workers.

f. Safe work environment

Tobacco organisations should strive to ensure that:

i. their contracted farmers provide a safe work environment to prevent accidents and injury and to minimize health risks.

ii. accommodation, where provided, should be clean, safe and meet the basic needs of the workers.

iii. their contracted farmers provide protection against extreme weather for workers, such as shade from the sun during rest time, and shelter from rain.

iv. their contracted farmers permit no worker to plant, tend or harvest the crop, or load barns, unless they have been trained, and have understood the training on how to avoid green tobacco sickness and what appropriate protection equipment to use.

v. their contracted farmers permit no worker to use, handle or apply crop protection agents (CPA), or other hazardous substances such as fertilizers, without having first received adequate training and demonstrated that they understand it, and without using the required personal protection equipment.

vi. persons under the age of 18 and over the age of 65, pregnant women, and nursing mothers do not handle or apply CPA. Workers do not enter a field where CPAs have been applied unless and until it is safe to do so as specified in the instructions of each CPA’s label.

vii. whenever possible, workers who handle or apply CPAs should be encouraged to have examinations, needed to determine the potential effects of chemicals they handle before they initiate such activity on the farm. These workers must not have declared that they suffer from chronic diseases, hepatitis or renal diseases, or respiratory diseases, nor have been declared mentally challenged.

viii. their contracted farmers provide workers with access to clean drinking and washing water, close to where they work and live.

ix. their contracted commercial farms have first aid equipment on the premises, and that there is a procedure to take severely ill or injured workers to the nearest first aid facility where they can be effectively treated.

x. their contracted commercial farms establish joint management/worker committees, involving trade unions if they are available, to discuss issues of safety at work.

xi. tobacco organisations should also pro-actively work to ensure that there is a mechanism to report accidents at farm level to local authorities and that it has been discussed with stakeholders.

g. Freedom of association

In line with ILO conventions 087 (Freedom of association and protection of the right to organize) and 098 (right to organize collective bargaining):

i. Tobacco organisations should promote the recognition, respect and non-interference by their contracted farmers with the rights of their workers to freedom of association and to bargain collectively. Workers are free to join or form organizations and unions
of their own choosing and to bargain collectively; worker representatives are not
discriminated against and have unhindered access to farm premises and workers, to
carry out their representative functions in the workplace.

h. **Compliance with the law**

i. Tobacco organisations should ensure that their contracted farmers comply with all
laws of their country relating to employment; that all workers of contracted farmers
are informed of their legal rights and the conditions of their employment when they
start work; that farmers and workers have entered into written employment contracts
when required by the law of the country in question and that workers receive a copy of
the contract; and that the terms and conditions of employment contracts for workers of
contracted farmers do not contravene the laws of that country.

All points above should apply if tobacco organisations own land for tobacco production and
directly hire workers.

**10.3 Indicators**

a. **General**

i. Existence of company policies on human rights.

ii. Existence of a formal human rights governance system, including aspects of
verification, documentation and redressal mechanisms.

iii. Evidence that human rights are addressed in contracts with the farmers.

iv. Percentage of contracted farms that received unannounced visits during the crop
season, to ensure respect for every aspect of labour rights.

b. **Child labour**

i. Incidence of child labour among farmers, workers and subcontractors.

ii. Number of children under the age of 18 reported to be engaged in hazardous
work, overtime or night shifts.

iii. Percentage of farmers adequately trained on child labour awareness and
prevention.

iv. Percentage of farmers who demonstrate, upon assessment, that they have
adequately understood the training.

v. Evidence of efforts to improve the education of children living on tobacco farms.

c. **Income and working hours**

i. Percentage of contracted farmers whose income is above the national poverty line.

ii. Where applicable, percentage of contracted farmers whose workers earn more than
the minimum national wages or regional average.

iii. Where applicable, percentage of contracted farmers whose workers are paid a
living wage and who always receive their full wage on time.

iv. Percentage of farmers trained on the subject of income and working hours.

v. Percentage of contracted farmers who demonstrate, upon assessment, that they
have adequately understood the training.
d. **Fair treatment**
   i. Number of fair treatment abuses.
   ii. Percentage of farmers adequately trained on the issue of fair treatment.
   iii. Percentage of farmers trained on the issue of fair treatment who have demonstrated, upon assessment, to have fully understood the training.

e. **Forced labour**
   i. Number of incidents of forced, bonded or prisoner labour among farm workers without governmental approval and supervision.
   ii. Percentage of farmers adequately trained on forced labour awareness and prevention.
   iii. Percentage of farmers trained on forced labour awareness and prevention who have demonstrated, upon assessment, to have fully understood the training.

f. **Safe working environment**
   i. Percentage of farmers adequately trained on occupational health and safety installation and procedures.
   ii. Percentage of farmers trained on the issue of safe working environment who have demonstrated, upon assessment, to have fully understood the training.
   iii. Number of work-related accidents and injuries on farms.
   iv. Recordable incident rate: percentage of farmers who were themselves involved, or whose workers were involved, in recordable work-related injury or illness.
   v. Severity rate (number of lost workday cases per incident).
   vi. Percentage of farmers whose workers have access to clean drinking water and to improved sanitary conditions.
   vii. Percentage of farmers who provide shelter for workers against extreme weather.
   viii. Percentage of farmers who have sufficient and adequate protective gear for themselves and their workers.
   ix. Where relevant, percentage of contracted farmers who have easy access to medical assistance for themselves and their workers in case of accident.

g. **Freedom of association**
   i. Percentage of farmers adequately trained on the issue of freedom of association.
   ii. Percentage of farmers trained on the issue of freedom of association who have demonstrated, upon assessment, to have fully understood the training.

h. **Compliance with the law**
   i. Percentage of farmers found to be compliant with all labour laws.

10.4 **Best Practice**

Some organizations and sectors provide examples of best practices in human rights. For more information, please consult the following:
For the tobacco sector

- Philip Morris International – Agricultural Labor Practices Code -
- Elimination of Child Labour in Tobacco Growing (ECLT) Foundation – Ten guiding principles -
  http://www.eclt.org/about-us/guiding-principles/

Generic, or related to other sectors

- FAO - Sustainability Assessment of Food and Agriculture systems (SAFA) Guidelines, 2012 -
- Better Cotton Initiative - Section 2/A Production Principles & Criteria 2.0, 2012 -
- Bonsucro (Better Sugar Cane Initiative) – Bonsucro Production Standard Including Bonsucro EU Production Standard, 2011 -
- Ethical Tea Partnership - The Ethical Tea Global Partnership Standard, 2011 -
  http://www.ethicalteapartnership.org/our-work/monitoring-cert/
- Ethical Trading Initiative – ETI smallholder guidelines, 2005 -
  http://www.ethicaltrade.org/resources/key-eti-resources/eti-smallholder-guidelines-eng
- Fair Trade Standards -
- Food Alliance - Whole Farm/Ranch Inspection Tool, 2008 -
  http://foodalliance.org/certification/producer/WholeFarm.pdf
- Ministry of Manpower, Youth and Employment of Ghana – Hazardous Child Labour Activity Framework -
- Rainforest Alliance Sustainable Agriculture Network – Sustainable Agriculture Standard, July 2010 -
- Round Table on Responsible Soy Association - RTRS Standard for Responsible Soy Production, 2010 -
  http://www.responsiblesoy.org/
- Sustainable Agriculture Initiative (SAI) Platform - Principles & Practices for the Sustainable Production of Arable & Vegetable Crops, 2010 -
  http://www.saiplatform.org/activities/working-groups/arable-and-vegetable-crops
- Starbucks Coffee Company - C.A.F.E. Practices Generic Evaluation Guidelines, 2007 -
11. LAND TENURE

11.1 Context / Background

Sustainable tobacco growing requires long-term investments, such as in good quality curing barns and woodlots, which farmers may not be willing to undertake if there is a risk that they will not have access to the land long enough to make it financially worthwhile. Other investment may include, among others, irrigation infrastructure, land management through terracing and contouring and soil fertility improvement. Land access and tenure security influence the extent to which farmers are prepared, or able, to invest in improvements in production and sustainable land management, adopt new technologies and promising innovations, or access finance for on-farm investment and working capital.

Tobacco production often takes place in countries where farmers do not have tenure of land, and since the full benefits of certain sustainable practices accrue over several years, secure tenure, which provides the incentive for tobacco farmers to invest in a sustainable production environment, is critical.

The way that people, communities and others gain access to land, forests and water courses is defined and regulated through systems of tenure. These tenure systems determine who can use which resources, for how long, and under what conditions. These systems may be based on written policies and laws, as well as by undocumented customs and practices. Inadequate and insecure tenure rights increase vulnerability and poverty, and can lead to conflict and environmental degradation when competing users fight for control of these resources.

The governance of tenure is a crucial element in determining if, and how, people, communities and others are able to acquire rights, and associated responsibilities, to use and control land, forests and water courses.

In order to achieve sustainable tobacco production, organizations have the responsibility of respecting human rights and legitimate tenure rights and should, therefore, act with due diligence to avoid infringing on the human rights and legitimate tenure rights of others.

Land tenure is the basis for long-term investment that enables farmers to prepare better, maintain, and improve their economic condition and achieve environmental sustainability in tobacco production. While land tenure has not been directly addressed in previous CORESTA GAP Guidelines, it is now understood that all stakeholders need to take appropriate action to enable farmers to achieve sustainability in tobacco production.

The purpose of these guidelines is to focus on the role land tenure plays in sustainable tobacco production and provide guidance on ways of addressing this complex issue.

11.2 Guidelines

Tobacco organizations should follow these guidelines in regard to land tenure. In general:

a. Tobacco organizations should acknowledge that land, forests and water courses have social, cultural, spiritual, economic, environmental and political value to indigenous peoples and other communities with traditional tenure systems. They should include appropriate risk management systems to prevent and address adverse impact on human rights and legitimate tenure rights.

b. Tobacco organizations should identify and assess any current or potential impact on human rights and legitimate tenure rights in which they may be involved.
c. Tobacco organizations should cooperate in non-judicial mechanisms to provide remediation, where necessary, including effective operational-level grievance mechanisms when required, where they have caused, or contributed to, any adverse impact on human rights and legitimate tenure rights.

d. In specific cases, tobacco organizations should consult with indigenous peoples before initiating any project, or before adopting and implementing measures affecting the resources over which the communities have rights. Such projects should be based on an effective and meaningful consultation with indigenous peoples, through their representative institutions, in order to obtain their free, prior and informed consent under the United Nations Declaration of Rights of Indigenous Peoples and with due regard given to specific positions and understandings of individual states. Consultation and decision-making processes should be organized without intimidation and be conducted in a climate of trust.

e. Tobacco organizations should avoid infringing on or ignoring the tenure rights of others, including legitimate tenure rights that are not currently protected by law. In particular, safeguards should protect women and the vulnerable who hold subsidiary tenure rights, such as those for foraging and water.

f. When necessary, tobacco organizations should recommend to their national authorities that their contracted farmers are given land rights or very long leases because of the long term investments that tobacco production involves, such as the building of curing barns, planting trees, establishing irrigation infrastructure, improving soil fertility, etc.

g. Tobacco organizations should be aware of the land access of their contracted farmers.

h. Tobacco organizations should check documentation, proving that their farmers have land tenure or access to their property. Failing such documents, tobacco organizations should ensure that their contracted farmers obtain the consent of local communities regarding use of the land and natural and agricultural resources and, at the same time, engage with the appropriate stakeholders to obtain such land tenure titles for their farmers. Land that has been traditionally used for other purposes and alternative applications could lead to conflict: this should be resolved in advance, or use of that land should be avoided.

i. Tobacco organizations should encourage growers and local communities to respect areas and activities that are important to the community, be it socially, culturally, biologically, environmentally or religiously. These must not be affected by farm activities.

j. Tobacco organizations should encourage farmers towards long term land possession (long term rental or ownership) after due analysis of economic viability, at the lowest possible cost.

k. When operating in countries with a lack of land tenure, Tobacco organizations should encourage collective farmer cooperatives to promote sustainable agricultural and rural development. When undertaken with appropriate safeguards and the inclusion of smallholders and communities as beneficiaries, cooperative farming can provide development benefits through economies of scale, market discipline, and consumer accountability; large scale production has the potential to lower input cost for tobacco; improve productivity and efficiency in the use of fertilizers and water; and enable investment in innovation that may be too costly for small farmers to take on.
l. Where necessary, organizations should support the identification of their contracted tobacco farms by collecting GPS data as a way of helping farmers obtain land rights or long leases.

m. Tobacco organizations should engage in regular stakeholder consultation with local communities, with constructive, good faith dialogue over farmer and worker related land tenure issues.

n. Tobacco organizations should endeavour to prevent corruption regarding the traditional tenure systems of indigenous peoples and other communities through consultation, participation, and empowerment.

11.3 Suggested Indicators

a. The percentage of contracted tobacco producers, in any country, who farm their land on a long lease or on communal land.

b. Existence of a mechanism to assess if tobacco is grown on the traditional or sacred land of local communities.

c. Number of grievances from local communities regarding the use of land for tobacco.

11.4 Best Practice

Some organizations and sectors provide examples of best practices in land tenure and access. For more information please consult the following:

Generic, or related to other sectors:


- Round Table on Responsible Soy Association - RTRS Standard for Responsible Soy Production, 2010 – http://www.responsiblesoy.org/

12. ACCESS TO CREDIT

12.1 Context / Background

Access to affordable finance is a crucial element in improving farming conditions, in addition to the technical input that farmers use and the technical assistance that tobacco organisations supply through their extension services. Together with the stability and longevity of trading relationships, access to affordable credit is crucial to small and large producers alike. Apart from purchasing inputs, financial credit is used by farmers to support their households during
the off-season, to pay farm labour during the season, as well as for investing in other economic ventures.

Occasionally, farmers, and in particular smallholders, lack the financial resources needed to purchase inputs at the optimum time, and are unable to make long-term investments in infrastructure, such as barns, farm equipment or irrigation systems, which would improve productivity.

Financial institutions also often view farmers as unattractive financial risks due to insufficient collateral (such as formal land title), lack of written records of past performance, input purchases, and crop sales and the size of loans they request. In contrast to loans in urban settings, agricultural loans are typically paid off after the harvest, which may be eight to twelve months after the loan is taken out. This delay creates a further disincentive for financial institutions and, as a consequence, credit constrained farmers often use less inputs, invest less in better technology, forfeit yield and quality, and fail to maximise their income.

In order to achieve sustainable farming systems, it is important for tobacco farmers to have access to affordable financing and credit. While in the past access to credit has not been considered a fundamental part of the CORESTA GAP Guidelines, it can now be considered a limiting factor to achieving farmer sustainability – including tobacco production and other activities.

The purpose of these guidelines is to identify possible actions and mechanisms that tobacco farmers can utilise to achieve financial stability.

### 12.2 Guidelines

The following are guidelines to help farmers gain access to affordable credit:

- **a.** Whenever practical and allowable under local laws, farmers directly contracted to tobacco organisations can use their signed contract as a form of collateral when discussing financing with a lending institution. This may help farmers, especially farmers without land tenure, to secure a loan.

- **b.** Tobacco organisations should consider engaging with financial institutions to provide their contracted tobacco farmers with a suitable loan package and acceptable terms.

- **c.** Should tobacco organisations directly issue loans or credit to their contracted farmers, the terms and conditions should be agreeable to both parties.

- **d.** Group-guarantee mechanisms can substitute as collateral requirements for a loan. Tobacco organisations may be able to facilitate the establishment of such mechanisms, and enable access to credit more easily than would be possible for individual farmers.

- **e.** In an effort to provide equal opportunity to all growers, tobacco organisations can also assist by working with financial institutions to help them define eligibility requirements in line with the operating conditions of tobacco growers of varying size and scale.

- **f.** Tobacco organisations could work with financial institutions on the expected tobacco production and income level in order to enable financial institutions to better determine the optimum size of the loan that the farmer could reasonably repay with the income from the tobacco sale. Over-lending should be avoided so that farmers are not burdened with unsustainable levels of debt.

- **g.** Whenever appropriate, tobacco organisations should provide information to contracted tobacco farmers on how to access credit and use instruments and tools (e.g. financial planning) for improved financial management.
h. Accurate recordkeeping could help farmers understand and plan for future expenses, make them more attractive financial clients, and help them identify and save any surplus income. Tobacco organisations should consider ways to foster these skills in their contracted farmers through appropriate training, thereby increasing their ability to purchase inputs and save money.

i. It is also recommended that tobacco organisations should, where appropriate and possible, develop appropriate mechanisms for the farmer to have access to cash during the season to pay for farm labour.

12.3 Suggested Indicators

a. Number of contracted farmers who have been informed about, and trained on, access to finance.

b. Percentage of contracted farmers who are part of a loan support group (where applicable).

c. Percentage of contracted farmers who have fully repaid their debt, on time.

d. Percentage of expected tobacco income the financial institution uses as a loan ceiling—Debt Service Ratio (where applicable).

12.4 Best Practice

- Better Cotton Initiative, Promoting decent work in cotton: Good Practice and Guidance for BCI Implementing partners
- Dalberg Global Development Advisors, Catalyzing Smallholder Agricultural Finance, September 2012
- Fairtrade International, Fairtrade Standard for Contract Production, version 01.05.2011_v1.2
- FAO, Sustainability Assessment of Food and Agriculture systems Guidelines, version 1.0

13. FARMER RETURNS

13.1 Context / Background

A majority of the leaf tobacco produced today is from developing countries, and the crop is often cultivated by small farmers, in terms of both landholding and economic strength. Ensuring adequate farmer profitability is critical for the long term sustainability of tobacco cultivation and, hence, farmer return is a fundamental element in sustainable tobacco production.

Paying a fair price, though important, does not in itself guarantee a good net return for the farmer. From a purely economic dimension, the farmer profitability equation depends on four factors—productivity, market-related quality, market price and production cost. Furthermore, “profitability” in itself is often a relative term and depends on other contextual factors, such as the possibility of farmers to access crop insurance. The critical challenge faced by the industry today is to address farmer profitability in an economically, socially and environmentally sustainable manner.
Farmer resilience is based on their solvency, which directly impacts their ability to purchase sufficient technical inputs and labour services and to invest in farm improvements. Tobacco farmers operate under very volatile conditions, which are exacerbated by unpredictable regulatory developments, lack or limited access to crop insurance and complex market dynamics, as well as climate variability; all of these increase the uncertainty and volatility of economic and environmental conditions.

The purpose of these guidelines is to highlight the importance of resilience in leaf tobacco production, particularly in situations of economic, environmental and social pressure and to make it easier for tobacco organisations to:

- holistically assess farmer economics, incorporating elements of environmental, social and economic sustainability.
- develop and deploy sustainable and locally appropriate strategies for addressing farmer profitability.

### 13.2 Guidelines

The guidelines being proposed for improvement of farmer returns are broadly categorised into three key sub-themes: (a) Guidelines for the assessment of farmer economics (b) Guidelines for the evaluation of farmer margins and (c) Guidelines for the improvement of farmer profitability.

#### a. Guidelines for the assessment of farmer economics

Tobacco organisations should follow the guidelines below for assessment of farmer economics.

i. **Use appropriate procedures for capturing and archiving data on farm productivity, market price and cost of production from all contracted tobacco growers.** Tobacco organisations should measure productivity, price and all production cost elements.

ii. **Assess production economics and farmer returns from other comparable crops grown within the same geographical area, during the crop growing season.** Tobacco organisations should follow an objective process for assessment of economics and risks associated with the production of other crops comparable to tobacco.

iii. **Empower and support tobacco growers to comply with all relevant local laws pertaining to agriculture, applicable within the state.** Tobacco organisations should inform and educate growers to comply with locally applicable laws and should include the costs involved for compliance in the production cost assessment process.

iv. **Ensure that prices paid to farmers take into consideration the amount of family and hired work required to grow tobacco and are such as to ensure sustainable livelihood for farmers and workers.** Tobacco organisations should have a robust, transparent system to calculate cost of production, approved by local stakeholders, which takes into account all labour costs.
b. **Guidelines for the evaluation of farmer margins**

Tobacco organisations should follow the guidelines below when evaluating margins for providing tobacco farmers with good livelihoods. Since a majority of farmers grow other crops besides tobacco, the assessment should include the whole farm.

i. **Comply with minimum livelihood standards in the local economy.** Tobacco organisations should be aware of the minimum livelihood standards and, especially in areas where tobacco represents the crop providing by far the largest contribution to farmer revenues, formulate pricing policies that ensure that 100% of contracted tobacco growers live above the poverty line.

c. **Guidelines for the improvement of farmer profitability**

Tobacco organisations should follow the guidelines below for the improvement of farmer profitability.

i. **Continuously support and encourage growers to adopt sustainable tobacco farming practices in the areas of soil, water, labour, fuel and biodiversity conservation.** Tobacco organisations should develop locally appropriate best practices in each area, enforce adoption by growers, and include the costs incurred towards implementation in the production cost assessment process.

ii. **Support tobacco growers in improving farm productivity and product quality in a sustainable manner.** Tobacco organisations should continuously work with growers towards improving their farm productivity regarding tobacco, rotational crops and diversified farm activities through quality agricultural extension services to growers and Research & Development of current sustainable practices.

iii. **Promote farm investment.** Farmers who adopt improved technologies and adopt agricultural best practices should have sufficient disposable income to invest in farm improvements. Tobacco organisations should encourage farmers to do so and advise them on how to optimise the financial ratios of the farms.

iv. **Support tobacco growers in optimising production costs incurred through agricultural inputs (seeds, chemical fertilisers, pesticides, manures, etc).** Tobacco organisations should promote appropriate sustainable agricultural practices among growers for rationalisation of production costs of agricultural inputs in tobacco farming. Tobacco organisations should also continuously engage with stakeholders to stabilize prices of agricultural inputs.

v. **Implement feasible farm mechanisation and labour-saving solutions for controlling production costs incurred through labour.** Tobacco organisations should identify labour intensive operations and work towards dissemination of appropriate farm mechanisation solutions among growers.

vi. **Facilitate necessary financial infrastructure and credit/insurance mechanisms for tobacco growers with the aim of lowering their investment burdens and risks.** Wherever applicable, tobacco organisations should work with local financial and non-financial institutions to facilitate credit, crop insurance and other financial instruments for tobacco growers.

vii. **Improve natural resource use efficiency for growers in tobacco farming systems.** Tobacco organisations should help the growers in implementing production practices that significantly improve the farm efficiency in the use of natural resources, such as improving rain infiltration, improving irrigation systems, and minimizing the use of fuel/wood for curing.
viii. **Develop farm level approaches for tobacco growers to combat climate change.** Tobacco organisations should develop and deploy weather resilient production practices among growers to help them mitigate risks associated with climate change, such as developing drought resistant varieties, improving rain infiltration and enforcing reforestation practices where appropriate.

ix. **Engage in constructive, good faith dialogue.** Tobacco organisations should engage in constructive, good faith dialogue with stakeholders (farmer associations / organisations and trade unions) regarding production issues, with the aim of agreeing on how best to improve productivity and returns.

### 13.3 Suggested Indicators

a. **Farmer economics:**
   
i. Measure of the gross farm output per unit area (Kg/Hectare) for all tobacco growers.
   
   ii. Farm Business Profit (FBP), also known as net return: this provides a measure of profitability over time and represents the farm cash funds available for investment and consumption after paying for all costs of production, changes in inventories and depreciation. In practice, this means the total revenue from tobacco and other farm activities, less the total cash costs for material, services, farmers’ and adult family members’ labour and hired labour, plus depreciation, and wood/energy costs.
   
   iii. Tobacco contribution to the farm economy: the ratio of the proportion of net income of tobacco to the proportion of its sales value in the farm economy.
   
   iv. Percentage of farmers adopting specific sustainable agricultural practices as recommended: each local organization should identify and measure grower adoption rates of key recognized sustainability practice improvements appropriate for production practices in the origin.
   
   v. Percentage of improvement on returns introduced by specific sustainable agricultural practice and percentage of farmers adopting it.
   
   vi. Percentage of farmers having access to banking and other financial services (bank accounts, loans, insurance, etc.).
   
   vii. Average number of household members (including the farmer and his direct dependents, but excluding hired labour).

b. **Farmer margins**
   
i. Annual household income stream: This indicator assumes that the more the economic security of the household, the greater its annual cash income stream. This includes both cash and in-kind income. Cash income includes income from other crops, from the sale of vegetables, from miscellaneous labour jobs, and other sources. In-kind income is the income a household receives from crops grown but not sold for cash. The underlying concept behind this is that these crops have either a food value, or some other value, to households and, because they grew them, they do not have to buy them.
   
   ii. Crop input value pre-financed by contracted buyers, expressed as percentage of the expected tobacco value at point of sales.
   
   iii. Level of tobacco debt repayment by growers at the end of the season.
iv. Returns above Variable Cost: Returns above variable costs helps gauge the potential profitability of a farming operation and assists growers in evaluating alternative strategies for getting the most out of their land, capital and labour. Variable costs are cash expenses paid for inputs unique to tobacco; including seed, fertilisers, agrochemicals, fuel/wood for curing, and hired labour.

c. Farmer profitability
   i. Percentage of farmers covered by extension services and Research & Development, to help them adopt current sustainable practices for cultivating tobacco.
   ii. Profit margin as percentage of the total cost of production.
   iii. Percentage of farmers who adopted a farm mechanization solution in labour intensive operations, adopted new practices which bring about a reduction in man hours and/or improved efficiencies in any stage of tobacco cultivation.
   iv. Existence of an action plan to help farmers improve on these indicators.

13.4 Best Practice

- Economic, Environmental and Social Sustainability Indicators of the Australian Cotton Industry - http://www.cottoncrc.org.au/general/Research/Projects/3_03_09

14. CAPACITY BUILDING

14.1 Context / Background

Farming, including tobacco production, requires several skills to be successful and sustainable. Farmers have to deal with and respond to increasing pressure caused by regulatory requirements, labour laws, limited resources, climate change, the need to manage the environment well and in some cases poor enabling infrastructure. In addition to tobacco, other crops are grown, either to support sustainable tobacco production by providing fuel or to complement tobacco in a rotation according to good agricultural practices and to provide an additional source of income to the farmer.

Tobacco organisations should do their best to support farmers and the communities in which they operate, by providing technical advice and transfer of know-how in regular sessions of
training using the most appropriate means, systems and venues, by developing the amount of
local business and by helping improve local infrastructure.

Since agricultural work, including tobacco production, is very strenuous work, tobacco
organisations should be encouraged to support farmers find economically viable labour saving
techniques.

Capacity building should in the end help farmers become more efficient and earn better
revenues through increased crop production and crop diversification in a sustainable way.

14.2 Guidelines

a. Training

These guidelines aim to support tobacco organisations to address capacity building through
training and to limit the risk of tobacco monoculture dependence through the increase of
efficiency and returns that training achieves. Tobacco organisations should be encouraged to:

- have a well-trained network of field technicians who can transfer know-how to
  farmers through training sessions, demonstration days and other means suitable to the
  local circumstances.
- provide all field technicians not only with regular training but also with the technical
  instruments to fulfil their work such as adequate means of transport and IT and
  educational materials.
- assess the level of knowledge and literacy of new groups of farmers before providing
  the training.
- deliver the training of farmers, farm employees and workers on all aspects of
  sustainable agricultural practices through media that are within the grasp of average
  local farmers.
- verify the effectiveness of the training through regular checks.
- seek the views of their farmers over their ability to produce tobacco following the
  training provided, and assist them to meet their concerns.
- provide information to farmers using various methods e.g. extension leaflets, bulletins,
  stakeholder meeting, shows and radio programs.
- in the case of smallholder farmers in developing countries, provide interactive
  mode of communication supported by sequence of displays, which includes
  photographs, posters on good agricultural practices to be put up across the
  villages.
- encourage and organize reporting of issues and set up a clear communication channel
  bottom-up for the farmers to report their issues and get assistance to address these
  issues in the shortest timeline, identify the referent person the closest or more
  accessible from their farm.

b. Community investment

These guidelines aim to help tobacco organisations maximize the reach of the economic
benefits of tobacco production to local communities. Tobacco organisations should consider
to:

i. keep as many activities related to tobacco production, such as sourcing of inputs,
  processing, training of staff, in the country in order to maximise the creation of local
value through employment at all levels of qualification, investment, marketing and tax payments.

ii. recruit permanent and temporary personnel from local communities, thus contributing to the build-up of sustainable livelihoods.

iii. be active members in their community and engage and consult with local government, schools, faith organisations, non-governmental organisations on the needs of the community.

iv. collaborate with the local community on aspects of protection of the environment and improvement of health and safety linked to tobacco production.

v. where appropriate, promote education among rural communities by investing in the upgrading of the local schools through building classrooms, toilets and teaching staff accommodation, thereby reducing school drop-outs.

vi. where appropriate, promote education through scholarship which gives access to different levels and fields of education, leading local youths to take part in diversified jobs which are necessary for the entire community.

vii. where wood is used in tobacco growing, encourage wasteland development to grow high quality timber as viable cash crops and other local species that meets fuel, domestic fodder and nutrition requirements.

viii. where appropriate, work towards conservation, development/rehabilitation and sustainable management of natural resources like tanks, ponds, feeder channels and other water bodies like springs and streams with the full involvement of communities for soil and water conservation.

ix. where appropriate, support the upgrading of livestock among tobacco farmers as a way to provide an additional viable livelihood opportunity.

c. Labour saving techniques

These guidelines aim to support tobacco organisations to address the issues pertaining to labour shortage. Tobacco organisations should consider to:

i. promote labour-saving technologies that take into consideration cost, maintenance, upkeep and farmer needs in the design.

ii. promote improved practices and agricultural conservation techniques that reduce the intensity of labour requirements in land preparation, transplanting, weeding, pest control, tillage, harvest and post-harvest areas.

iii. where appropriate, work towards strengthening cattle population in the villages to enable timely planting by helping the farmers in ridging activity, marking, intercultivation and weeding.

iv. where appropriate, use agricultural extension to educate farmers on adoption of available labour-saving implements / technologies, like promoting cultivators, transplanters and fertilizer applicators.

v. where appropriate, propagate a community level approach among farmers for adoption / availing of the highly expensive labour-saving technologies / implements

vi. where appropriate, work with local government bodies for getting subsidy to farmers on farm mechanization implements.
vii. where appropriate, promote access to viable equipment hire opportunities for small scale growers who would otherwise not have access to such opportunities or promote workable collective equipment ownership schemes.

viii. where appropriate, increase the wages at par with other jobs available locally to make agricultural jobs more remunerative.

14.3 Suggested Indicators

a. Training

i. Percentage of field technicians undergoing regular training during each year of employment.

ii. Percentage of farmers provided training on sustainability-related topics.

iii. For each subject of training, percentage of farmers who upon verification have demonstrated that they have understood the training and are applying it.

b. Community investment

i. Percentage of locally hired workforce.

ii. Ratio of value added through operations (or tax payments) to total revenue (or profit).

iii. Percentage of total revenue (or profit) invested in the regional economy.

iv. Percentage of turnover (or profit) coming from local value chain.

v. Percentage of inputs procured from the country, excluding inputs which are not locally available and which should be detailed separately.

vi. Percentage of turnover (or profit) devolved to projects for community improvement.


b. Labour saving techniques

i. Percentage of farmers encouraged on conservation agriculture.

ii. Number of workshops arranged to farmers on farm mechanization.

iii. Percentage of farmers who have adopted new mechanization in a particular operation in a given area.

iv. Percentage of labour saving attained by using mechanization in a particular operation.

v. Where possible, percentage of cost reduced by collaborations with government institution on subsidy of the cost of implements.

vi. Where appropriate, number of community group models on farm mechanization set up in the region.

vii. Difference between farmers’ income level before and after adoption of labour saving technologies.

14.4 Best Practice

15. FARM PERFORMANCE

15.1 Context / Background

In the majority of tobacco-growing countries, agriculture is a key driver of the economy. Farms represent small or large business enterprises based on agricultural production. In countries where contracts can be put in place and with the respect due to business partners, tobacco organizations are recommended to provide farmers and, where appropriate, farmers organizations with a sound contract which outlines expectations of both parties and takes into consideration volumes, quality, prices and social and environmental conditions.

In addition, tobacco organizations should encourage diversification and in doing so, could also consider means of facilitating input and advising on cultivation techniques, post-harvest handling, storage, processing, transportation and marketing. By doing so, tobacco organizations facilitate economic growth and poverty reduction aiming at wealth creation so that benefits reach down the supply chain to small-scale producers and other vulnerable economic actors.

In addition to tobacco production, organizations should advise tobacco growers on good agricultural practices, sustainable management of resource, labour issues, income streams, and where appropriate on food security.

The size and operating conditions of tobacco farms world-wide are so different that organizations are recommended to be driven by an inclusive approach targeting leaf quality, sustainable production and economic returns with the provision of adequate technical support.
15.2 Guidelines
These guidelines aim to support tobacco organizations to address and assess total farm performance and sustainability.
Tobacco organizations should be encouraged to:

a. have written, clear and robust contractual arrangements with farmers / farmers organizations, wherever appropriate. Contracts should include, where applicable, quantity, quality, delivery time, prices, inputs, credits, support, environmental and social/human rights requirements, and compliance;

b. apply contract terms which provide realistic profit expectations under normal conditions and good crop management;

c. support the principle of continuous improvement at farm level through a regular and documented process of review of achieved results and setting of targets;

d. monitor the impacts of farm production so that improvements can be made over time.

15.3 Suggested Indicators

a. Where applicable, existence of a written clear contract between company and farmers and, where appropriate, farmers’ organizations.

b. Inclusion in the minimum contract of volume, terms and conditions of marketing, compliance, environmental and social/human rights requirements.

c. Existence of a company formalized process to review farm performance and targets for improving sustainability.

d. Existence of a process for informing farmers, about their own performance and for dealing fairly with results that need improvement.

e. Regular assessments of farms by external third parties.

15.4 Best Practice

- Ethical Trading Initiative - ETI Principles of Implementation, 2009 - http://www.ethicaltrade.org/resources/key-eti-resources/principles-implementation


16. STAKEHOLDER ENGAGEMENT

16.1 Context / Background

Sustainability is based on understanding the aspirations and concerns of stakeholders, and engaging them is a way of supporting sustainability through addressing their legitimate claims.

The number of people who work in, are dependent on and are affected by tobacco production is very high. The number of potentially impacted stakeholders can also be extensive, even for a small or medium sized enterprise. While identifying, informing and empowering stakeholders is crucial, it is also a major challenge. Tobacco organisations need to ensure comprehensive stakeholder participation by addressing sustainability concerns and developing solutions. Participation is equally important at all levels, for small and large farmers alike, through the sharing of knowledge and deciding fairly on issues regarding the use of family or community resources.
Tobacco farmers and their associations represent critical stakeholders and, therefore, management of these relationships needs to be transparent and take their concerns into consideration.

A large number of handbooks on how to conduct stakeholder engagement have been produced all over the world by expert organisations. The most important ones are listed under “Best Practice.”

16.2 Guidelines

The purpose of these guidelines is to help tobacco organisations to involve relevant stakeholders on issues relating to tobacco production.

Tobacco organisations should:

a. proactively identify, empower and consider relevant stakeholders, as far as possible, in decision-making processes, including vulnerable groups and those unable to claim their rights (e.g.: nature and future generations). This may take place through working groups, forums, public meetings, bilateral negotiations;

b. conduct engagement with legitimate stakeholders tailored to specific objectives;

c. keep legitimate stakeholders abreast of plans, developments and alterations in tobacco production. In particular, tobacco organisations should notify stakeholders of any decisions arising from their feedback that specifically address raised concerns;

d. ensure that all potentially affected stakeholders have access to appropriate grievance procedures without a risk of negative consequences;

e. resolve conflicts of stakeholder interests through appropriate direct or mediated dialogue based on respect, mutual understanding, fair conflict resolution and equal power.

16.3 Suggested Indicators

a. Existence of a thorough stakeholder mapping.

b. Existence and utilisation of a process to analyse claims, including explicit justification.

c. Existence and utilisation of procedures or instruments ensuring fair treatment for all stakeholders.

d. Existence and utilisation of procedures or instruments (e.g.: mediators) ensuring that conflict resolution is dialogue-based, not power-based.

e. Existence and utilisation of a transparent and clear process that ensures visibility and effective communication, and provides appropriate documentation for record keeping.

16.4 Best Practice


- FAO - Negotiation and mediation techniques for natural resource management - http://www.fao.org/docrep/008/a0032e/a0032e09.htm
- IISD International Institute for Sustainable Development - Corporate Social Responsibility: An Implementation Guide for Business -
  http://www.iisd.org/search/?qu=stakeholder+engagement+guidelines

- NEPAD – Enhancing Stakeholder Engagement -
  www.nepad-caadp.net/download/file/fid/258

- UN-REDD – Guidelines on Stakeholder Engagement in REDD+ Readiness With a Focus on the Participation of Indigenous Peoples and Other Forest-Dependent Communities, 20.4.2012 -